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ORIGINAL ARTICLE

Effects of social distancing during the COVID-19 pandemic on cognitive function and mental health in woman older

Efeitos do distanciamento social durante a pandemia de COVID-19 na função cognitiva e saúde mental de mulheres idosas

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Abstract

Objective: investigate the effects of social distancing during the COVID-19 pandemic on the global cognitive function and mental health of elderly women. **Methods**: a cross-sectional study was conducted through a video call of forty elderly women. Scores of cognitive functions (global, memory, and executive function) and levels of mental health (anxiety, depression, and sleep quality) were assessed before and during (after four months) COVID-19 pandemic. **Results**: social distancing significantly decreased global cognitive function (MMSE: -0.8; 95% CI: -1.2; -0.2; P = 0.006) and memory (Verbal fluency: −0.9; 95% CI: −1.6; −0.0; P = 0.035). Regarding mental health, social distancing demonstrated increasing significant levels of anxiety (+2.0; 95% CI: 0.3; 3.7; P = 0.042). No significant between-moment differences were observed for other cognitive and mental health outcomes. **Conclusion**: the measures of social distancing during the COVID-19 pandemic have had a major impact on the cognitive and mental health of elderly women.

Keywords: social distancing; COVID-19; cognitive function; mental health.

Resumo

Objetivo: investigar os efeitos do distanciamento social durante a pandemia de COVID-19 na função cognitiva global e saúde mental de mulheres idosas. **Métodos**: um estudo transversal foi conduzido por meio de uma videochamada com quarenta mulheres idosas. Os escores das funções cognitivas (global, memória e função executiva) e os níveis de saúde mental (ansiedade, depressão e qualidade do sono) foram avaliados antes e durante (após quatro meses) a pandemia de COVID-19. **Resultados**: o distanciamento social diminuiu significativamente a função cognitiva global (MMSE: -0,8; IC 95%: -1,2; -0,2; P = 0,006) e a memória (fluência verbal: -0,9; IC 95%: -1,6; -0,0; P = 0,035). Em relação à saúde mental, o distanciamento social demonstrou aumento significativo dos níveis de ansiedade (+2,0; IC 95%: 0,3; 3,7; P = 0,042). Não foram observadas diferenças significativas entre os momentos para outros desfechos cognitivos e de saúde mental. **Conclusão**: as medidas de distanciamento social durante a pandemia de COVID-19 tiveram um grande impacto na saúde cognitiva e mental de mulheres idosas.

Palavras-chave: distanciamento social; COVID-19; função cognitiva; saúde mental.

INTRODUCTION

Social distancing is a method used to reduce physical contact and social interaction between people, which is essential to break an infection chain and the effective separation of infected and/or suspected individuals from unaffected populations. This term is often designated, sometimes, when referring to measures used to minimize contact, including isolation and quarantine[1]. However, reduced contact with other people is associated with negative health consequences, which can lead to death[2].

In the current world context, social distancing has been adopted to contain the transmission of Coronavirus 2019 (COVID-19), avoiding the connection between individuals in their habitual conviviality. It is possible that these recommendations have an exponential impact on the mental health and cognitive function of individuals, mainly of the elderly population since loneliness is already an important attribute in aging without the additional load of imposed social isolation[3]. In addition, the elderly are targets of greater social restriction due to a high chance of complications of morbidities more common in the public during COVID-19 disease.

Thus, in view of this sine qua non situation, the risk of mortality has been a basic factor of fear in the COVID-19 pandemic, especially in the elderly, and it is believed that many may be suffering from signs of anxiety, depression, and cognitive impairment. In another perspective, some studies have shown that stress, symptoms of depression, and social

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isolation can compromise immune defenses, which can make an individual more susceptible to potential viral infection[4]. A study of isolated or quarantined patients for MERS (Middle East Respiratory Syndrome) found that of those who were isolated and later developed MERS, more than 40% needed psychiatric intervention, while those who did not develop the disease and were not isolated did not need this support[5]. Thus, it is possible to note that social distancing, in times of pandemic, has some implications for the mental state of individuals.

Studies show that social distancing is associated with worse cognitive outcomes[6]. Specifically, it has been found that this is associated with an increased risk of developing dementia and a faster decline in global cognition, semantic memory, perceptual speed and visuospatial capacity[7], memory, executive function, and attention[8].

However, it is not clear, until now, the effect of social distancing during the COVID-19 pandemic on the cognitive function and mental health of elderly women. Skoog (2020)[9], in his study, related that so far, there is no real discussion on whether the mental health consequences of long-term isolation outweigh the risk of getting infected with the coronavirus. In this sense, the objective of this study is to investigate the effect of social distancing during the COVID-19 pandemic on global cognitive function, cognitive domains (executive function and memory), and mental health in elderly women. We hypothesize that social distancing during the COVID-19 pandemic will significantly reduce the cognitive function and mental health of elderly women.

METHODS

Participants and ethical aspects

A total of 40 healthy women between 60 and 77 years old volunteered for this study. Inclusion criteria were: Being female gender, being between 60 and 80 years old, having a device for making a phone or video call. The criteria exclusion was lack of access to the internet and Inability to complete an online survey. All subjects were explained about the study procedures and signed an informed consent form before participating. This study was approved by the Clinical Research Ethics Committee of the Federal University of Paraiba (UFPB) (ID: 11399019.7.0000.5188), registered on the Brazilian Registry of Clinical Trials (REBEC ID: RBR-7BC8ZP). All subjects provided informed consent electronically before registration. The informed consent page presented two options (yes/no). Only subjects who chose yes could participate in the interview, and subjects could quit the process at any time.

Study design

Cross-sectional study was carried out a few weeks before (November 25th, 2019 to December 20th, 2019) and approximately 6 months after (July 27th, 2020 to August 7th, 2020) the beginning of the COVID-19 pandemic.

Study Population and sample

In total, 40 women, elderly, healthy, aged between 60 and 77, participated in the study. This simply comes from the randomized clinical trial of the Forte-Mente-Ativa Project (N = 40). The inclusion and exclusion criteria required for eligible participants are provided in Table 1.

Table 1. Eligibility criteria of the survey.

Inclusion Criteria	Exclusion Criteria
Female Gender	Lack of access to the internet
Have between 60 and 80 years old	Inability to complete on online survey
Have a device for making a phone or video call	

Procedures for conducting online research

Baseline data were collected in person before the COVID-19 pandemic, while post-data were collected through video calls by two trained members of the research team. Some Previous studies have assessed the validity and reliability of virtual versus face-to-face measurements of select neuropsychological measures and have indicated that virtual measurements are reliable across modalities[10] and show good criterion validity[11].

There was telephone contact to explain the study and schedule the application of tests and questionnaires. At the time of data collection, the participant was asked to be accompanied by a family member for possible technological assistance without any type of participation or induction of responses. In addition, some instructions were conducted during the interview: 1) Make it clear what is happening, making the online environment as pleasant as possible, as not all participants are familiar with this type of communication; 2) Make it clear that the maximum interview time will be 30-40 minutes; 3) Make sure the environment is quiet, without distractions (TV, radios among others); 4) Ask the interviewee to answer all questions as best she can, without giving up and saying: try to do your best! 5) Establish an identification sign if the participant does not understand what was verbalized.

The variables of Mental Health and Cognitive Function were evaluated at two moments: before the COVID-19 pandemic and during (after four months) the COVID-19 pandemic (Figure 1).

Cognitive function and mental health assessment

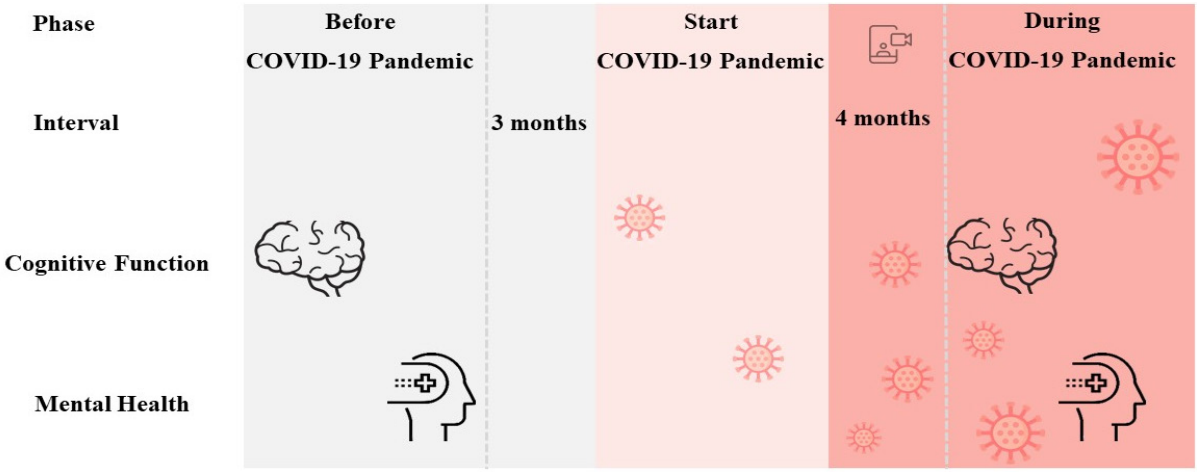
The instruments used to survey consist of attributes related to cognitive function (global cognition, executive function, and memory) and mental health (depression, anxiety, and sleep) compared to before the COVID-19 outbreak.

Cognitive Function Assessment: Three neuropsychological tests

were used to assess the cognitive function, especially executive function (Digit Span Forward and Backward scale [Digit B]), which consists of a list of numbers that must be repeated correctly in reverse order[12], memory (Verbal Fluency test)[13] and cognitive function global (Mini-Mental State Examination [MMSE]) of an elderly woman.

Three verbal scales were used to assess mental health status: the Beck scale, the Trace-State Inventory (IDATE), and the Pittsburgh scale, which measured depression, anxiety, and sleep quality, respectively. The Beck scale has 21 items, each with four statements as options. The final score was calculated by the sum of all answers and classified as follows: normal (0-9), (10-15) mild depression, (16-23) moderate depression, and more than 24 severe depression[14]. The IDATE scale is a 40-item self-administered tool divided into two sections for anxiety as a personality trait and/or a state[15]. Finally, the Pittsburgh scale is a self-administered tool with a good Kappa score (*Kappa* = 0.75)[16]. The scale consists of 19 questions structured in seven components that can be scored from 0 (No difficulty) to 3 (Severe difficulty): subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleeping drugs, and daytime dysfunction[16].

Figure 1. Schematic overview of the study timeline.



Statistical Analysis

Exploratory analyses were performed to verify the data distribution and identification of outliers, missing data, and asymmetries. To verify the normality of the data, the Shapiro–Wilks analysis was used. Descriptive analysis between moments differences was summarized in median and 95% confidence intervals (95%IC). To assess for significant differences in responses before and during the COVID-19 pandemic, Wilcoxon t-tests were used.

To determine the magnitude of the change of the variables, Cohen's d effect was calculated and was interpreted as follows: $d < 0.20$ (small); $d = 0.21$-0.80 (moderate); $d \geq 0.80$ (large) [17]. Data analysis was performed using IBM SPSS Statistics for Windows, version 23.0 (IBM SPSS Corporation, New York, USA). P values < 0.05 indicated that a difference was statistically significant.

RESULTS

Table 2 presents descriptive characteristics of participants between experimental groups MLRT: at baseline. There were no differences between groups at baseline (Table 2).

Table 2. General characteristics of participants.

Characteristics	MLRT (n=11)	BFRRT (n=11)	CON (n=8)	p-value
Age (years)	65.80 + 3.92	65.36 + 3.32	66.44 + 4.56	0.84
Body mass (kg)	63.67+ 12.26	59.20 + 6.65	64.45 + 10.36	0.44
Stature (m)	1.49 + 0.05	1.52 + 0.05	1.54 + 0.05	0.20
BMI (kg/m2)	27.94 + 5.14	25.81 + 2.09	26.57 + 4.77	0.50
Cognitive Function				
MMSE (score)	28.20 + 1.47	28.18 + 1.99	27.66 + 1.41	0.73
Verbal Fluency (nº words)	15.80 + 2.65	15.00 + 3.87	15.11 + 3.82	0.85
DS Forward (nº correct)	6.70 + 1.49	7.45 + 2.29	8.22 + 2.33	0.29

Characteristics	MLRT (n=11)	BFRRT (n=11)	CON (n=8)	p-value
DS Backward (nº correct)	3.90 + 0.99	3.72 + 1.61	4.33 + 1.58	0.63
Forward - Backward	2.80 + 2.04	3.72 + 2.14	3.88 + 2.14	0.47
Mental Health				
Anxiety	34.90 + 3.28	32.90 + 5.70	37.44 + 5.17	0.13
Depression	6.80 + 3.99	4.81 + 3.94	4.33 + 3.64	0.34
Sleep Quality Index Total Score	4.90 + 2.76	3.63 + 2.01	4.33 + 1.80	0.44

Legend: MLRT, Moderate Load Resistance Training; BFRRT, Blood Flow Restriction Resistance Training; CON, Control; BMI, Body mass index; MMSE, Mini-Mental State Examination; DS, Digit span; Data are presented as mean and standard deviation ± SD.

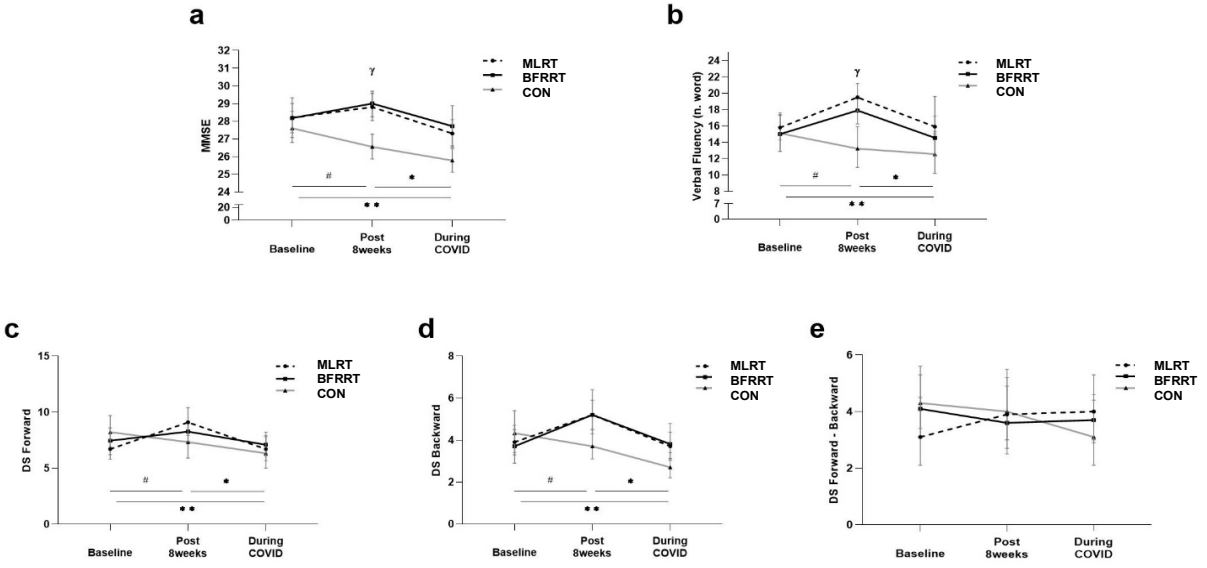
Cognitive Function

After 8-weeks of intervention, both groups interventions promoted significant effects on verbal fluency (MLRT: +3.7; 95% CI: 0.86; 3.73; p = 0.001; BFRRT: +2.9; 95% CI: 1.69; 5.02; p = 0.004), digit span forward (MLRT: +2.4; 95% CI: 0.74; 2.25; p < 0.001; BFRRT: +0.8; 95% CI: 0.31; 1.50; p < 0.001) and digit span backward (MLRT: +1.30; 95% CI: 0.04; 1.44; p < 0.001; BFRRT: +1.50; 95% CI: 0.07; 1.95; p < 0.001). In the Control group, we observed significantly decrease in MMSE (-1.05 95% CI: -1.48; -0.73; p < 0.001), verbal fluency (−1.89; 95% CI: −2.74; −1.03; p < 0.001), digit span forward (-0.89; 95% CI: -1.44; -0.55; p < 0.001) and digit span backward (-0.63; 95% CI: -1.54; -0.45; p = 0.029). After 8 weeks of intervention, both groups' interventions promoted significant effects on MMSE (between -group differences: MLRT: -2.44; p = 0.004; BFRRT: -2.39; p = 0.003) compared with the control group.

The effect of social distancing of COVID-19 pandemic without exercise intervention resulted significantly decrease in MMSE (-1.83; 95% CI: -2.62; -1.15; p < 0.001), verbal fluency (−2.56; 95% CI: −3.60; −1.50; p < 0.001), digit span forward (-1.89; 95% CI: -3.03; -1.63; p < 0.001) and digit span backward (-1.63; 95% CI: -2.26; -0.84; p < 0.001) only in control group. No statistically significant between-group differences were observed for global cognitive function (MMSE) or other cognitive outcomes (p > 0.05 for all).

The effect after 8 weeks of intervention and during social distancing of the COVID-19 pandemic showed a significant decrease in MMSE only BFRRT (-1.28; 95% CI: -5.02; -1.69; p < 0.005) group, fluency verbal for MLRT (-3.60; 95% CI: -4.73; -2.46; p < 0.001) and BFRRT (-3.36; 95% CI: -5.02; -1.69; p = 0.002), digit span forward only for MLRT (-2.4; 95% CI: -4.73; -2.46; p < 0.001) and CON (-1.00; 95% CI: -1.11; -0.22; p = 0.001) and digit span backward only for BFRRT (-1.39; 95% CI: -5.02; -1.69; p < 0.001) and CON (-1.00; 95% CI: -1.11; -0.22; p = 0.001). No statistically significant between-group differences were observed for global cognitive function (MMSE) or other cognitive outcomes (p > 0.05 for all).

Figure 2. Cognitive function outcomes values in each time point



Legend: Values of (a) Mini-Mental State Examination, (b) Fluency Verbal, (c) Digit Span Forward, (d) Digit Span Backward and (e) Forward- Backward are estimated marginal means and 95% Confidence Interval. Within-groups time effect: significantly different from the indicated time point at the level of p<0.05: * Baseline vs post 8-weeks training, # post 8-weeks training vs during COVID, ** Baseline vs during COVID. Between-group effect: γ significant differences between MLRT, BFRRT and CON. MLRT, Moderate Load Resistance Training; BFRRT, Blood Flow Restriction Resistance Training; CON, Control.

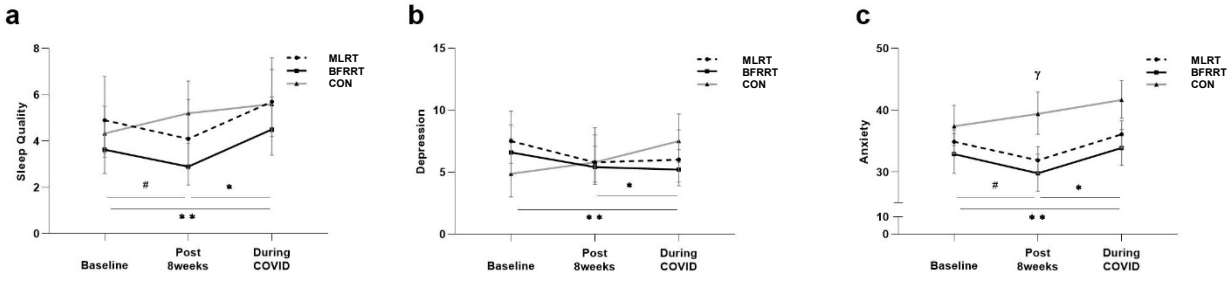
Mental Health

After 8 weeks of intervention, MLRT (-3.00; 95% CI: -4.22; -1.77; p < 0.001) and BFFR (-3.10; 95% CI: -4.21; -1.96; p < 0.001) groups presented to significantly a decrease only in the anxiety variable. However, in the CON group, we observed a significant increase in sleep quality (+0.87; 95% CI: 0.67; 1.89; p < 0.001) and anxiety (+2.00; 95% CI: 1.37; 2.62; p < 0.001). After 8 weeks of intervention, both groups' interventions promoted significant effects on anxiety (between -group differences: MLRT: +7.50; p < 0.001; BFRRT: +9.60; p < 0.001) when compared with the control group. No statistically significant between groups differences were observed for Depression and Sleep Quality (p > 0.05).

The effect of social distancing during the COVID-19 pandemic without exercise intervention resulted in a significant effect in all mental health variables (sleep quality: +1.27; 95% CI: 0.70; 1.96; p = 0.001, depression: +2.63; 95% CI: 2.14; 4.07; p < 0.001; anxiety +4.26; 95% CI: 3.53; 4.90; p < 0.001) only control group.

The effect after 8 weeks of intervention and during social distancing of COVID-19 pandemic showed significantly increase in sleep quality for interventions groups (MLRT: +1.60; 95% CI: 1.09; 2.10; p < 0.001; BFRRT: +1.60; 95% CI: 0.77; 2.49; p < 0.001), depression only control group (CON: +1.70; 95% CI: 0.72; 2.60; p = 0.015) and anxiety for all groups (MLRT: +4.20; 95% CI: 2.85; 5.54; p < 0.001; BFRRT: +4.10; 95% CI: 3.15; 5.02; p < 0.001; CON: +2.26; 95% CI: 1.53; 2.90; p < 0.001). No statistically significant between-group differences were observed for mental health variables (p > 0.05 for all).

Figure 3. Mental Health outcomes changes in each time point



Legend: Values of (a) Sleep Quality, (b) Depression and (c) Anxiety are estimated marginal means and 95% Confidence Interval. Within-groups time effect: significantly different from the indicated time point at the level of p<0.05: * Baseline vs post 8-weeks training, # post 8-weeks training vs during COVID, ** Baseline vs during COVID. Between-group effect: γ significant differences between MLRT, BFRRT and CON.

DISCUSSION

This study aimed to evaluate the effect of social distancing during the COVID-19 pandemic on the cognitive function and mental health of elderly women. The key findings of this trial were that, in women older, the social distancing decreased global cognitive performance and memory, in addition to increasing levels of anxiety. These findings reinforce our hypothesis that social distancing is harmful to the cognitive and mental health of this population. In addition, effect sizes indicate that social distancing has a moderate influence on decreased global cognition and increased anxiety and a small on memory. Our findings are consistent with those of the existing literature[18-21] despite the heterogeneity that exists due to methodological limitations, such as the absence of standardized tests to assess cognitive function.

Regarding aspects of cognitive function, systematic reviews have demonstrated that social distancing has a strong negative correlation with global cognitive function and some of its domains[18-19]. Griffin et al. (2020)[19] found that social isolation was associated with a lower and faster decline in global cognitive function over time in older. Another study of elderly women found that social isolation influences global cognitive performance and other domains such as memory, executive functions, attention, and language[22]. In the present study, we demonstrated that social distancing during the COVID-19 pandemic reduced global cognitive function and memory, which is in line with a longitudinal study by Read et al.[21], which showed a greater decline in memory in women facing social isolation. Conversely, no between-moment differences were observed in the other cognitive function outcomes. Lara et al.[18] found a relationship between social isolation and the forward digit test, but not backward. These differences could be explained by the following reasons: short observation time and the variety of cognitive tests used in other studies, thus limiting the comparison.

Additionally, the decline in global cognitive function and some of its aspects can be explained by changes in lifestyle caused by social isolation, causing the individual to adopt unhealthy habits, such as decreased physical activity and poor diet, increasing the risks to health[23]. From the biological point of view, such changes occur due to the reduction of the hippocampal volume resulting from social isolation, especially in the hippocampal área CA1, which is essential for memory[24-25]. In addition, older theories

seek to explain the decline in global cognitive function, such as mechanisms of neurobiological activation, vascular hypothesis, or stress hypothesis[26].

The results of this study also found that mental health was affected, with increased anxiety. These changes can be explained by changes in behavior triggered by confinement[27], as well as the fear of the unknown that leads to a higher level of anxiety in healthy people[11]. However, an important unexpected finding of our study is the no between-moment difference in the levels of depression and sleep quality. Research so far has shown an increased incidence of depressive disorders and insomnia in the elderly[28-29]. Furthermore, studies show that female gender is associated with greater depressive symptoms and anxiety[29-30]. In fact, it is necessary to highlight that women generally tend to assume a caregiving role, having to balance it with work and usually household tasks, being a group at risk and more vulnerable in this situation of overload.

The current study presents strengths and some limitations. To our knowledge, this was the first study that investigated the results of cognitive and mental health in elderly women during the COVID-19 pandemic and the moment of data collection regarding blocking restrictions in Brazil. The main limitation was the sample number was restricted only to the elderly, women. In relation to the data collection method, the use of the online tool limits access to persons who use this technology to a lesser degree, such as the elderly, in addition to self-reported responses and not a clinical diagnosis. Furthermore, the data collected only refers to the first four months of the quarantine and alarm situation, and data is needed at a prospective level, including this line of work in our future research.

CONCLUSION

Our results confirm that the COVID-19 pandemic and measures of social distancing have had a major impact on the cognitive and mental health of elderly women. Our findings reinforce the need for psychological interventions, as well as good social connections to help women with cognitive and mental health difficulties in times of pandemic.

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