Esc Anna Nery 2025;29:e20250138

SPECIAL ISSUE

www.scielo.br/EAN

Trajectories of depressive symptoms in middle-aged and older adults: a longitudinal study

Trajetórias de sintomas depressivos em adultos de meia-idade e pessoas idosas: um estudo longitudinal

Trayectorias de síntomas depresivos en adultos de mediana edad y personas mayores: un estudio longitudinal

Juliana de Oliveira Bezerra[1]
Ana Carolina Rodrigues Gualdi[2]
Marisa Matias[3]
Maria Raquel Barbosa[3]
Marcelo Kwiatkoski[4]
Bruna Moretti Luchesi[1]
Tatiana Carvalho Reis Martins[1]

1. Universidade Federal do Mato Grosso do Sul, Programa de Pós-graduação em Enfermagem. Campo Grande, MS, Brasil.

2. Universidade Federal do Mato Grosso do Sul. Três Lagoas, Brasil.

3. Universidade do Porto, Faculdade de Psicologia e de Ciências da Educação. Porto, Portugal.

4. Universidade Federal do Mato Grosso do Sul, Instituto de Biociências. Campo Grande, MS, Brasil.

Corresponding author:
Tatiana Carvalho Reis Martins.
tatiana.reis@ufms.br

Submitted on 08/28/2025.
Accepted on 10/14/2025.

DOI:https://doi.org/10.1590/2177-9465-EAN-2025-0138en

Abstract

Objective: to identify the trajectories of depressive symptoms in community-dwelling middle-aged and older adults before, during, and after the COVID-19 pandemic, and their relationship with age group, sleep problems, and living arrangements. **Method:** longitudinal study with 300 participants aged 45 years and older, conducted in Family Health Units in the countryside of Mato Grosso do Sul, with data collected in 2018–2019, 2021, and 2023. The Center for Epidemiological Studies – Depression scale and questions regarding sociodemographic characteristics, sleep problems, and living arrangements were used. **Results:** a significant reduction in depressive symptoms was observed in the second assessment, during the pandemic, with maintenance in the following evaluation. No statistical differences were found by age group. Individuals with sleep complaints showed higher depressive symptom scores but demonstrated progressive improvement. Participants living alone presented an initial reduction in symptoms during the pandemic, followed by an increase afterward. **Conclusion and implications for practice:** the improvement in depressive symptoms may have occurred due to emotional adaptation to the pandemic. Factors such as sleep complaints and living alone should be considered in mental health actions aimed at older adults and individuals in the aging process.

Keywords: Depression; Mental Health; Middle Aged; Older adults; Pandemics.

Resumo

Objetivo: identificar as trajetórias de sintomas depressivos em adultos de meia-idade e em pessoas idosas da comunidade, antes, durante e após a pandemia da COVID-19, bem como sua relação com a faixa etária, os problemas com sono e o arranjo de moradia. **Método:** estudo longitudinal com 300 participantes com idade igual ou superior a 45 anos, realizado em Unidades de Saúde da Família no interior de Mato Grosso do Sul, com coletas em 2018–2019, 2021 e 2023, utilizando a escala *Center for Epidemiological Studies – Depression* e questões de caracterização sociodemográfica, problemas de sono e arranjo de moradia. **Resultados:** observou-se uma redução significativa nos sintomas depressivos na segunda avaliação, realizada durante a pandemia, e a manutenção dos resultados na avaliação seguinte. Não houve diferenças estatisticamente significativas entre as faixas etárias. Indivíduos com queixas relacionadas ao sono apresentaram maiores escores de sintomas depressivos, embora tenham demonstrado melhora progressiva. Participantes que moravam sozinhos apresentaram redução inicial dos sintomas durante a pandemia, seguida de um novo aumento após esse período. **Conclusão e implicações para prática:** a melhora dos sintomas depressivos pode ter acontecido devido à adaptação emocional diante da pandemia. Fatores como as queixas de sono e o fato de morar sozinho devem ser considerados em ações de saúde mental voltadas aos indivíduos idosos e em processo de envelhecimento.

Palavras-chave: Depressão; Pandemias; Pessoas de Meia-Idade; Pessoas Idosas; Saúde Mental.

Resumen

Objetivo: identificar la evolución de los síntomas depresivos en adultos de mediana edad y mayores de la comunidad antes, durante y después de la pandemia de COVID-19, así como su relación con el grupo de edad, los problemas de sueño y la situación de vivienda. **Método:** estudio longitudinal con 300 participantes de 45 años o más, realizado en Unidades de Salud Familiar del interior de Mato Grosso do Sul, con recolección de datos en 2018-2019, 2021 y 2023, utilizando la escala del Centro de Estudios Epidemiológicos - Depresión (CES-D) y preguntas sobre características sociodemográficas, problemas de sueño y situación de vivienda. **Resultados: s**e observó una reducción significativa de los síntomas depresivos en la segunda evaluación, realizada durante la pandemia, y los resultados se mantuvieron en la evaluación posterior. No se encontraron diferencias estadísticamente significativas entre los grupos de edad. Las personas con problemas de sueño presentaron puntuaciones más altas en síntomas depresivos, aunque mostraron una mejoría progresiva. Los participantes que vivían solos mostraron una reducción inicial de los síntomas durante la pandemia, seguida de un nuevo aumento después de este período. **Conclusión e implicaciones para la práctica:** la mejoría en los síntomas depresivos podría deberse a la adaptación emocional a la pandemia. Factores como los trastornos del sueño y vivir solo deben tenerse en cuenta en las intervenciones de salud mental dirigidas a personas mayores y en el proceso de envejecimiento.

Palabras-clave: Anciano; Depresión; Pandemias; Persona de Mediana Edad; Salud Mental.

INTRODUCTION

Depression is characterized by causing feelings of suffering and incapacity in humans.[1] It includes a loss of interest in activities and/or a depressed mood, and can affect anyone and their relationships with family, friends, and the community.[1,2] Among a wide range of existing depressive symptoms, the disease is mainly marked by a state of dejection and/or a lack of motivation and interest.[1,2] According to data from the World Health Organization (WHO), approximately 280 million people suffer from depression worldwide, representing about 3.8% of the population, including 5.7% of adults over 60 years old.[1] During the first year of the COVID-19 pandemic, the global prevalence of anxiety and depressive symptoms increased by 25%.[3] Furthermore, more than 75% of people living in low- and middle-income countries do not receive treatment.[4]

Depressive symptomatology, when associated with impaired functionality, can significantly impact daily living activities, interfering with routine, decision-making ability, autonomy, and self-care. Furthermore, it can hinder social interactions, affect quality of life, and trigger feelings of frustration, sadness, and helplessness.[5,6] However, among older people, depression is still underdiagnosed and often understood as a natural manifestation resulting from the human aging process and/or secondary to other pre-existing morbidities.[6] Therefore, screening for depressive symptoms in the aging population is important as an indicator of the possible presence of depression, allowing for a more in-depth assessment.[7]

Several factors have been associated with the development of depressive symptoms in middle-aged and older adults.[8-11] Among them, this research highlights poor sleep quality, significantly associated with increased depressive symptoms,[8] and living arrangements, which can also influence depressive symptomatology, especially due to the relationship between isolation and family support.[9] Individuals who live alone have a higher risk of developing depression, as evidenced in a systematic review of longitudinal studies.[10] Regarding age, factors such as widowhood, retirement, bereavement, the presence of chronic conditions, physical limitations, and low or nonexistent social support may be related to a higher prevalence in this age group.[1,11] In this study, three central variables were prioritized - age, sleep problems, and living arrangements - because they are dimensions consistently associated with depressive symptomatology in middle-aged and older adults, both in Brazil and in other countries.[7,8,10]

These findings highlighted the importance of integrated approaches that consider environmental, behavioral, and demographic factors in the prevention and management of depression among older adults and those in the aging process, considering possible changes over time.[1] The COVID-19 pandemic impacted the lives of the population; However, in Brazil, longitudinal studies that have followed the trajectory of depressive symptoms at different phases of the pandemic and in the subsequent period are still scarce, one example being the PAMPA study, which followed adults over 10 months.[12]

Therefore, this study aimed to identify the trajectories of depressive symptoms in middle-aged and older adults in the community before, during, and after the COVID-19 pandemic and their relationship with age group, sleep problems, and living arrangements. It was expected to find higher levels of depressive symptoms during the pandemic and a progressive reduction in the subsequent period. This work is in line with the third Sustainable Development Goal (SDG) – "Ensure healthy lives and promote well-being for all at all ages", as it can support interventions, prevention programs, and health promotion actions aimed at providing the population with healthy aging and a good quality of life, focusing on the factors that impact depressive symptomatology.

METHOD

This is a prospective longitudinal study, developed from the database of the research group "Assistance, research, teaching and management in Collective Health". The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist was used to support the writing of the article.[13] The project was approved by the Research Ethics Committee (REC) for Human Beings under opinions No. 2,596,194 and No. 4,467,405.

The sample consisted of 300 participants aged 45 years or older (including middle-aged and older adults), registered in the Family Health Units (FHU) of the municipality of Três Lagoas, Mato Grosso do Sul, Brazil. According to the 2010 Census, the last one available before data collection, the city had 101,791 inhabitants, of which 16.1% were aged between 45 and 59 years, and 9.9% were older adults (≥60 years).[14] At the beginning of the research, in 2018, the city had nine FHU, all included in the study.

Inclusion criteria were defined as: being 45 years of age or older, being registered in one of the municipality's FHU, and being able to answer the interview questions (assessed by the interviewer's perception).

For the initial assessment (T1), the sample size was calculated using the formula for estimating proportions in a finite population. A significance level of 5% (α=0.05), a sampling error of 6% (e=0.06), and a conservative estimate of 50% (p=0.50) were adopted. Considering a finite population of N = 26,331 (total number of individuals over 45 years old in the municipality according to the 2010 Census), a minimum sample of n=265 individuals was obtained. To compensate for possible losses, 10% was added to the total, resulting in 292 participants. Participants were located through a list of names and addresses provided by the FHU teams and randomly selected. During the data collection, 300 individuals were interviewed, resulting in a sampling error of 5.63%.

The assessments occurred at three points in time: T1 (November 2018 to June 2019, before the pandemic), T2 (February to December 2021, during the pandemic), and T3 (March to July 2023, after the pandemic). For the assessments in T2 and T3, contact was made via the FHU or directly with the participants. In all stages of the research, the interviews were conducted by trained evaluators at the participants' homes or on the FHU premises, lasting an average of 40 minutes.

The dependent variable was depressive symptomatology, assessed in T1, T2, and T3 using the Center for Epidemiological Studies-Depression (CES-D), validated in Brazil in adolescent, adult[15], and elderly populations.[7] The instrument contains 20 questions that assess the frequency of depressive symptoms experienced in the previous week, generating scores from 0 to 60, with higher values indicating greater intensity of symptoms. In this study, the scale showed a Cronbach's alpha of 0.883 at T1, 0.866 at T2, and 0.890 at T3.

The independent variables collected at T1 were:

- Sociodemographic characteristics: sex (male/female); age (45–59, 60–74, and ≥75 years); education level (in years), and marital status (with or without a partner).

- Sleep: assessed with a single dichotomous question (Yes/No) about self-perception of sleep problems. "Do you believe you have any problems with sleep?".

- Living arrangement: number of residents in the household, classified as "lives alone" and "other arrangements".

The data were entered in duplicate into Microsoft Excel™, validated and checked, and then exported to the Statistical Package for the Social Sciences (SPSS) software for analysis. It was found that 13.3% of the data were missing, with a monotonic pattern.[16] The association between demographic variables (sex, age, education, marital status) and loss to follow-up was investigated using logistic regressions. It was identified that individuals without a partner had a higher chance of responding to T3 (OR = 1.63; p = 0.038; 95% CI [1.03–2.61]) than those with a partner. The other variables were not significant. Missing data were imputed using the Expectation Maximization (EM) method, and were considered Missing Completely at Random (Little's MCAR test: $X^2(25) = 37.20$; p = 0.055).[17]

The T1 variables were analyzed in terms of absolute frequency (n), relative frequency (%), mean ($\bar{X}$), and standard deviation (σ). The data on depressive symptoms in the three phases were evaluated for normality and showed a normal distribution by skewness and kurtosis. A repeated measures ANOVA was performed, with time (T1, T2, and T3) as the within-subjects variable and depressive symptoms as the dependent variable. The adequacy of the ANOVA was verified by Mauchly's test of sphericity; when the assumption was violated, Greenhouse-Geisser or Huynh-Feldt corrections were applied, with adjusted degrees of freedom reported. In addition to statistical significance ($p < 0.05$), effect sizes were calculated using partial eta squared (ηp^2), interpreted according to Cohen's criteria (1988),[18] where 0.01 represents a small effect, 0.06 a medium effect, and 0.14 a large effect. Subsequently, further ANOVAs were conducted to verify variations in scores by age group, sleep problems, and living arrangement, treated as between-subjects variables. Pairwise comparisons were performed using Bonferroni post hoc tests. The significance level adopted was $p < 0.05$.

RESULTS

300 individuals were interviewed at T1 (2018/2019). Between T1 and T2, there were 100 losses (due to change of address, refusal, death, or inability to locate), resulting in 200 participants evaluated in 2021. Between T2 and T3, there were 79 losses, leaving 121 individuals in 2023 (T3).

Table 1 shows the characteristics of the 300 participants at T1. The sample was composed mostly of women (65.7%), aged 45-59 years, with a partner, and with an average of 5.7 years of schooling. Most of the sample did not report sleep problems (60.3%) and did not live alone (86.0%).

Table 1. Characterization of participants (n=300) before the pandemic. Três Lagoas (MS), Brazil, 2018/2019.

Variable	Categoria	n (%) ou $\bar{X}$ (σ)
Sex	Male	103 (34.3)
	Female	197 (65.7)
Age (years)	-	60.9 (11.0)
Age group (years)	45-59	147 (49.0)
	60-74	116 (38.7)
	75+	37 (12.3)
Marital status	With a partner	168 (56.0)
	Without a partner	132 (44.0)
Education (years)	-	5.7 (4.6)
Sleep problems	Yes	119 (39.7)
Living arrangement	Lives alone	42 (14.0)

Note: $\bar{X}$ - mean; σ – standard deviation.

Mauchly's test of sphericity indicated a violation of the sphericity assumption ($\chi^2(2) = 6.172$, $p = 0.046$; $\varepsilon=0.986$). Therefore, Huynh-Feldt corrections were applied. The effect of time on depressive symptoms remained significant, $F_{(1.97)} = 14.101$; $p < 0.001$; $\eta_p^2 = 0.045$, with a small to medium effect size, according to Cohen's criteria (1988).[16] The post hoc test showed that there were differences in depressive symptomatology between T1 and T2 ($p<0.001$) and between T1 and T3 ($p<0.001$), that is, depressive symptoms decreased during the pandemic and remained lower after its end (Table 2).

Table 3 presents the interaction effects of time with the between-subject variables. No significant interaction was identified between age group and time. Symptom reduction between T1 and T2 was maintained across all age groups. For sleep problems, a significant main effect of this variable was observed, as well as a time × sleep interaction. Participants with sleep problems showed higher depressive symptoms in all assessments, with a progressive reduction over time; among participants without sleep problems, a decrease was observed between T1 and T2, which was maintained in T3. Living alone was associated with higher scores for depressive symptoms ($p = 0.010$, $\eta p^2 = 0.022$), and there was a time × living arrangement interaction ($p = 0.020$, $\eta p^2 = 0.013$). Among those living alone, symptoms decreased in T2 but increased again in T3, while among those living in other arrangements, there was a progressive reduction.

Figure 1 graphically illustrates the trajectories of depressive symptoms across the three assessments, considering age group, presence of sleep problems, and living arrangement, highlighting the results presented in Table 2. The scores and variations between age groups were similar across the three data collection periods. Participants with sleep problems showed higher scores on the assessment of depressive symptoms at all times and a progressive reduction in these scores over the period. Regarding living arrangements, higher scores were observed among participants who lived alone, who showed a decrease in T2 and an increase in T3, unlike the other arrangements, which exhibited a gradual reduction.

DISCUSSION

This study investigated the trajectory of depressive symptoms and their relationship with age group, sleep problems, and living arrangements in middle-aged and older adults. Overall, depressive symptoms decreased during the pandemic and remained stable afterward. Although statistically significant, the differences were small in magnitude, suggesting that the variation explained by the time factor was modest, although relevant in terms of public health.

Participants who had sleep problems and those who lived alone exhibited more depressive symptoms. Among those who initially reported sleep problems, a progressive reduction in depressive symptoms was observed across the three data collection points; however, among those who did not have such problems, there was a decrease only from T1 to T2. For those who lived alone, there was a reduction in depressive symptoms during the pandemic, but a subsequent increase.

The reduction in depressive symptoms during the pandemic period contrasts with the initial hypothesis of this study and with research that pointed to a significant increase in these symptoms.[19-21] In the United Kingdom, when analyzing a representative cohort, researchers identified that symptoms of psychological distress increased significantly at the beginning of the pandemic (April 2020), followed by a trend of gradual improvement in the following months.[19] The authors described different patterns of response to the crisis, including groups with persistent deterioration, partial recovery, and resilience. However, the follow-up was limited to the first months of the pandemic, not covering the period after the easing of social restrictions.[19]

A longitudinal study conducted in Iceland showed an increase in depressive symptoms at the beginning of the COVID-19 health crisis, with fluctuations over time, influenced by factors such as social support and family context.[20] A systematic review of 49 studies on the prevalence of depressive symptoms in American adults identified a high prevalence of these symptoms during the pandemic, which remained high until the last study analyzed, conducted in June 2021.[21]

However, a systematic review that aimed to analyze global mental health and anxiety and depression symptoms in 137 studies that compared assessments made before and during the pandemic identified that most studies did not find significant worsening, and when these existed, they were minimal. High heterogeneity and a high risk of bias were highlighted, but the high level of resilience of the population in dealing with the health crisis was emphasized.[22] The COVID-19 pandemic had a profound impact on daily life, but much of the research focused on the initial stage of the health crisis, without considering prolonged trajectories. This study allows for a more comprehensive analysis of depressive symptoms trajectories in a context of transition and return to daily life, since the T2 data were collected throughout

Table 2. Comparison and effect of time on depressive symptomatology. Três Lagoas (MS), Brazil, 2018/2019, 2021 and 2023.

Variable $\bar{X}$ (σ)	T1	T2	T3	Time		
				F	*P*	η_p^2
Depressive symptoms[a]	18.42±13.16[†‡]	16.15±10.99[†]	15.43±9.68[‡]	14.101	<0.001*	0.045

Note: $\bar{X}$ - mean; σ – standard deviation;
* - *p*<0.05; [a] - Center for Epidemiological Studies – Depression (CES-D). [†‡] Comparisons performed using Bonferroni's post hoc test.

Table 3. Comparison and effect of time (T1, T2, T3) on depressive symptoms by age group, sleep problems, and living arrangement. Três Lagoas (MS), Brazil, 2018/2019, 2021 and 2023.

Variable	ANOVA			Comparison of means					
	Time	Group	Time X Group	Group	T1	T2	T3	By group	Summary
					$\bar{X}$ (σ)	$\bar{X}$ (σ)	$\bar{X}$ (σ)	$\bar{X}$ (σ)	
Age group									
Depressive symptoms[a]	F(1.99) = 11.496 p<0.001* ηp^2 = 0.037	F(1) = 2.065 p = 0.129 ηp^2 = 0.014	F(3.97) = 0.816 p = 0.514 ηp^2 = 0.005	45-59 years	19.86 (13.84)	16.84 (11.80)	16.72 (10.14)	17.8 (12.93)	-
				60-74 years	16.54 (11.90)	15.55 (10.20)	14.10 (8.89)	15.4 (10.33)	
				75+ years	18.54 (13.77)	15.32 (10.10)	14.48 (9.77)	16.1 (11.21)	
Sleep problems									
Depressive symptoms[a]	F(1.98) = 16.410 p<0.001* ηp^2 = 0.052	F(1) = 37.421 p<0.001* ηp^2 = 0.112	F(1.98) = 4.965 p = 0.007* ηp^2 = 0.016	Yes	23.16 (15.26)[†]	20.72 (11.16)[†‡]	18.14 (10.14)[‡]	20.67 (12.19)[§]	With problems > Withoutproblems With problems: T1 > T2 > T3 Without problems: T1 > T2, T3
				No	15.30 (12.16)[†]	13.15 (9.80)[†]	13.66 (8.96)[†]	14.04 (10.31)[§]	
Living Arrangement									
Depressive symptomsa	F(1.97) = 7.500 p = 0.001* ηp^2 = 0.025	F(1) = 6.808 p = 0.010* ηp^2 = 0.022	F(31.97) = 3.988 p = 0.020* ηp^2 = 0.013	Lives alone	22.12 (15.11)[†]	17.67 (10.86)[†‡]	21.03 (11.37)[‡]	20.27 (12.45)[§]	Lives alone > other arrangements Lives alone: T1 > T2 < T3 Other arrangements: T1 > T2 > T3
				Other arrangements	17.81 (12.75)[†]	15.91 (11.01)[†‡]	14.52 (9.08)[‡]	16.08 (10.94)[§]	

Note: * - *p*<0.05; T – Time; $\bar{X}$ - mean; σ - standard deviation; a - Center for Epidemiological Studies – Depression (CES-D). [†‡§] Comparisons performed using the Bonferroni post hoc test.

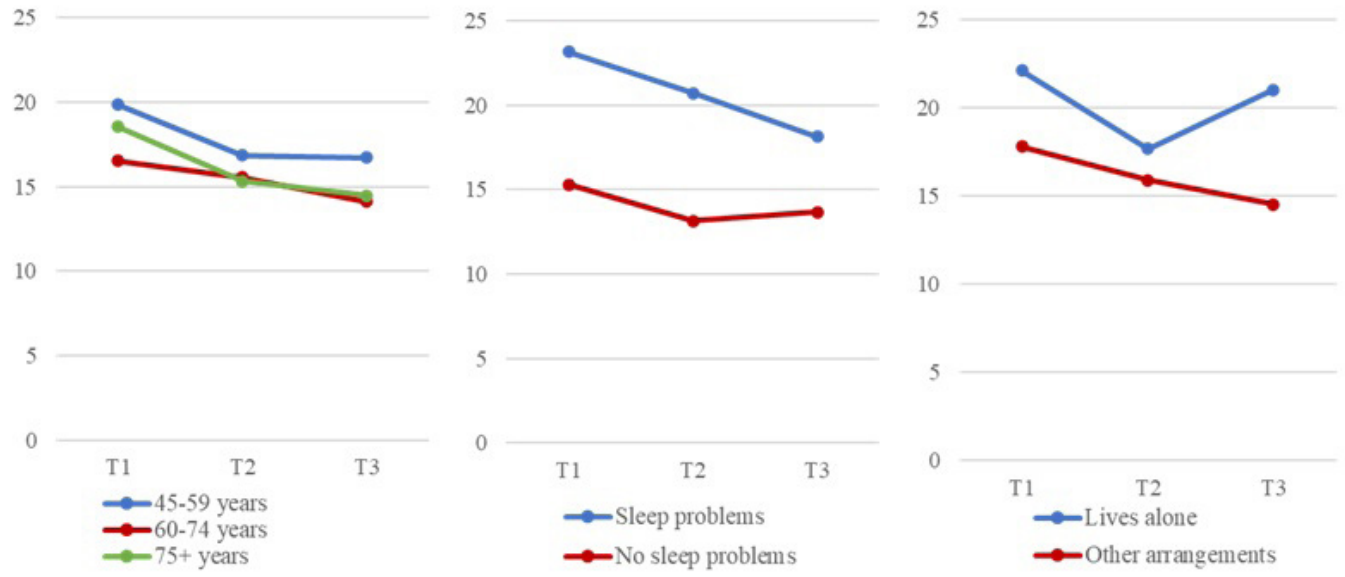

Figure 1. Trajectories of depressive symptoms by age group, sleep problems, and living arrangement. Center for Epidemiological Studies – Depression (CES-D) scores – ranging from 0 to 60 points. Três Lagoas (MS), Brazil, 2018/2019, 2021 and 2023.

2021. While studies conducted in the United Kingdom[19] and Iceland[20] reported average increases in depressive symptoms of two to four points on the scales used, this study found an average reduction of 2.3 points, corresponding to a small to medium effect. This divergence may be due to both contextual and methodological differences.

The instrument used to assess depressive symptoms may also have influenced this difference in results between the studies, as no pattern was identified among the investigations. A review of 49 studies conducted during the pandemic identified the application of at least four different instruments in these studies,[21] and a review of 137 investigations comparing assessments conducted before and during the pandemic also identified this diversity.[22] Different instruments may result in different estimates of the prevalence of depressive symptoms,[21] and may also be more or less sensitive depending on the age of the sample, which varied in previous studies.[21,22]

Regarding age, research was conducted with adults in general (18 years or older), while this study was conducted with individuals over 45 years of age, which may explain the differences in the results. The older population was less emotionally impacted than younger people during the pandemic, according to a study conducted with 111,225 individuals from 176 countries[23] and an investigation conducted with 2,321 participants over 18 years of age in Brazil.[24] However, the data should be viewed with caution, as these investigations used online questionnaires, generally answered by people with greater access to the Internet and better socioeconomic conditions.

Participants who reported sleep problems exhibited a higher number of depressive symptoms compared to those without problems. The effect size found ($\eta p^2 = 0.112$) was considered medium, reinforcing that even smaller variations can have a relevant clinical impact in vulnerable populations. A review study found a relationship between sleep problems and psychological distress; in particular, depressive symptoms appear to be negatively related to sleep in older people during the COVID-19 pandemic.[25]

In South Korea, a survey of 176,794 individuals (≥19 years) showed that those with sleep disorders had a significantly higher prevalence of depressive symptoms.[26] A longitudinal study conducted in Italy followed 1,062 adults at three different points during the COVID-19 pandemic and observed a progressive reduction in depressive symptoms.[27] Both studies highlighted the central role of sleep in the trajectory of depressive symptoms, reinforcing the importance of strategies to promote healthy sleep as an essential component for maintaining mental health, especially during periods of prolonged health crisis.

Analyzing the interaction between time and sleep problems, it was observed that depressive symptoms progressively decreased at each assessment among participants who reported sleep complaints. Similar evidence was found in a study that aimed to understand the consequences of the COVID-19 pandemic on the sleep and mental health of 8,798 individuals, aged between 20 and 76 years, at three different points during the pandemic. A progressive reduction in depressive scores was identified among individuals with sleep disorders, accompanied by a gradual improvement in sleep quality. The findings suggest that, despite the initial negative impact of the pandemic, there was a process of emotional adaptation that may have contributed to the improvement of psychological well-being in this group.[27]

Regarding living arrangements, the condition of living alone was associated with the highest scores of depressive

symptoms. The findings of this study are consistent with studies conducted during the COVID-19 pandemic, which showed that living alone is associated with a higher risk of depressive symptoms.[28-31] A meta-analysis, including six cohort studies and one case-control study, revealed that living alone increases the risk of depression by 42%.[10] Living alone is a predictor for the early identification of depressive symptoms in the aging population. Recognizing this condition as a risk factor can contribute to the implementation of preventive and intervention strategies aimed at delaying depression development and reducing the social and economic burden associated with this mental health problem.[31]

Among the participants who lived alone, a reduction in symptoms was observed during the pandemic, followed by an increase in the post-pandemic period. Due to the isolation measures adopted during this period, the use of alternative forms of interaction was encouraged as a strategy to mitigate feelings of loneliness. In this context, non-face-to-face interaction modalities, such as telephone, email, and video calls, were widely encouraged, especially among older adults who lived alone. Such forms of social connection may have contributed to the reduction of depressive symptoms in this group during the pandemic.[30]

The Icelandic COVID-19 National Resilience Cohort study, conducted with individuals aged ≥18 years, found that increased family and social support was associated with a decrease in depressive symptoms during the pandemic, while a reduction in such support correlated with a worsening of these symptoms.[20] Thus, a possible explanation for the observed increase in the post-pandemic period is that, with the return to normalcy, the family and social support received by those living alone may have decreased. The impact of the pandemic on the mental health of the population appears to be long-lasting,[20] and, as people living alone are more vulnerable to depressive symptoms, it becomes necessary to direct special attention to this more affected group.

Based on the data obtained, it was possible to identify factors associated with variation in depressive symptoms, with particular emphasis on sleep and living arrangements. The importance of a multidimensional approach is highlighted, including support networks for middle-aged and older adults, with a view to maintaining and/or recovering mental health. The nurse plays a fundamental role in the early identification of psychological distress signs, through the development of educational actions, the application of screening tests, the promotion of self-care, and the strengthening of the support network for these individuals. The active involvement of this professional is essential to promote healthy aging, especially in contexts of greater social vulnerability.[32] Thus, despite the limitations of the study, it is important to emphasize that even effects of small magnitude, such as those found here, are relevant in public health, given their cumulative impact over time. Therefore, the results reinforce the importance of integrating factors such as sleep and living arrangements into clinical screenings and mental health policies.

CONCLUSION AND IMPLICATIONS FOR PRACTICE

This study aimed to understand how mental health was affected in the periods before, during, and after the COVID-19 pandemic, investigating the existence of signs of worsening, stabilization, or improvement of depressive symptoms at three distinct points in time among middle-aged and older adults residing in the community. Although the observed effects were of small magnitude, they are relevant in terms of public health, given the cumulative impact of depressive symptoms over time. This improvement is related to processes of emotional adaptation and the development of coping strategies in the face of prolonged stress.

Furthermore, it was observed that factors such as having sleep problems and living alone negatively impact depressive symptomatology. These variables should be considered in the formulation of mental health actions aimed at the aging population, especially in contexts of crisis or social isolation.

This study presents some limitations that deserve consideration. The use of a depressive symptom screening instrument, although validated, does not replace a formal clinical diagnosis performed by a health professional. In addition, the sample consisted exclusively of users of the public health system, not including individuals served by private services or health plans, which limits the generalization of the findings. Conducting the research in a single municipality in the state of Mato Grosso do Sul also restricts the extrapolation of the results to other regions or to the national context.

Despite the limitations, the study presents relevant strengths. The inclusion of participants aged 45 years or older allows for a broader understanding of the aging process, contemplating not only the elderly population but also individuals transitioning to this phase of life, which expands the understanding of the factors that affect mental health throughout maturity. The longitudinal design further strengthens the findings, allowing for monitoring changes over time. It is especially noteworthy that the study addresses the context of the COVID-19 pandemic, one of the most significant events of the 21st century, offering valuable evidence on how this global crisis affected the psychological well-being of the investigated population.

ACKNOWLEDGMENTS

We thank the members of the research group “Assistance, research, teaching and management in Collective Health” – Health and Aging line, who collaborated with the data collection.

FINANCIAL SUPPORT

This work was supported by the *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior*-Brazil (CAPES) – Funding Code 001; PIBIC Program of the *Fundação de Apoio ao Desenvolvimento do Ensino, Ciência e Tecnologia* (FUNDECT) in the State of Mato Grosso do Sul, and the *Universidade Federal de Mato Grosso do Sul* (UFMS). Marisa Matias and Raquel Barbosa participation in this work is funded by the Center for Psychology

at the University of Porto, Foundation for Science and Technology Portugal (https://doi.org/10.54499/UID/00050/2025).

DATA AVAILABILITY RESEARCH

The content underlying the research text is contained in the article.

CONFLICT OF INTEREST

No conflict of interest.

REFERENCES

1. World Health Organization. Depression [Internet]. Geneva: WHO; 2023 [cited 2025 Apr 13]. Available from: https://www.who.int/news-room/fact-sheets/detail/depression
2. American Psychiatric Association. Wha tis depression? [Internet]. Washington: APA; 2024 [cited 2025 Jul 30]. Available from: https://www.psychiatry.org/patients-families/depression/what-is-depression
3. Organização Pan-Americana da Saúde. Pandemia de COVID-19 desencadeia aumento de 25% na prevalência de ansiedade e depressão em todo o mundo [Internet]. Washington: OPAS; 2022 [cited 2025 Apr 13]. Available from: https://www.paho.org/pt/noticias/2-3-2022-pandemia-covid-19-desencadeia-aumento-25-na-prevalencia-ansiedade-e-depressao-em
4. Evans-Lacko S, Aguilar-Gaxiola S, Al-Hamzawi A, Alonso J, Benjet C, Bruffaerts R et al. Socio-economic variations in the mental health treatment gap for people with anxiety, mood, and substance use disorders: results from the WHO World Mental Health (WMH) surveys. Psychol Med. 2018;48(9):1560-71. https://doi.org/10.1017/S0033291717003336. PMid:29173244.
5. Nicolau SA. Prevalência de sintomas depressivos e fatores associados em pessoas idosas atendidas em um ambulatório de geriatria [dissertação]. Botucatu: Universidade Estadual Paulista; 2024 [cited 2025 Apr 27]. Available from: https://repositorio.unesp.br/entities/publication/b32e84d9-d3ba-4ddf-a56d-3c0db7e2880a
6. Santos LLS, Oliveira NGN, Marchiori GF, Tavares DMS. Indicative of depressive symptoms among older people: a longitudinal study. ABCS Health Sci. 2022;48:e023203. https://doi.org/10.7322/abcshs.2021028.1755.
7. Batistoni SST, Neri AL, Cupertino APFB. Validity of the Center for Epidemiological Studies Depression Scale among Brazilian elderly. Rev Saude Publica. 2007;41(4):598-605. https://doi.org/10.1590/S0034-89102007000400014. PMid:17589758.
8. Alves ÉS, Cardoso JFZ, Bento SR, Iroldi GF, Inouye K, Pavarini SCI. Relationship between sleep duration, depressive symptoms and stress in older people in the community. J Bras Psiquiatr. 2023 Apr;72(2):90-9. https://doi.org/10.1590/0047-2085000000412.
9. Nshimyumuremyi E, Uwiringiyimana I, Uwimana A, Niyonsenga A, Nsengiyumva V, Habimana E et al. Prevalence and family determinants of geriatric depression among elderly people in elderly support groups in Rwanda. Psychol Res Behav Manag. 2023;16:1445-55. https://doi.org/10.2147/PRBM.S406386. PMid:37131955.
10. Wu D, Liu F, Huang S. Assessment of the relationship between living alone and the risk of depression based on longitudinal studies: a systematic review and meta-analysis. Front Psychiatry. 2022;13:954857. https://doi.org/10.3389/fpsyt.2022.954857. PMid:36111305.
11. Zenebe Y, Akele B, W/Selassie M, Necho M. Prevalence and determinants of depression among old age: a systematic review and meta-analysis. Ann Gen Psychiatry. 2021;20:55. https://doi.org/10.1186/s12991-021-00375-x. PMid:34922595.
12. Feter N, Caputo EL, Leite JS, Smith EC, Doring IR, Cassuriaga J et al. Depression and anxiety symptoms remained elevated after 10 months of the COVID-19 pandemic in southern Brazil: findings from the PAMPA cohort. Public Health. 2022 Mar;204:14-20. https://doi.org/10.1016/j.puhe.2021.12.019. PMid:35121569.
13. Malta M, Cardoso LO, Bastos FI, Magnanini MMF, Silva CMFP. STROBE initiative: guidelines on reporting observational studies. Rev Saude Publica. 2010 Jun;44(3):559-65. https://doi.org/10.1590/S0034-89102010000300021. PMid:20549022.
14. Instituto Brasileiro de Geografia e Estatística. Censo demográfico 2010. Características da população e dos domicílios: resultados do universo. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística; 2011.
15. Silveira DX, Jorge MR. Propriedades psicométricas da escala de rastreamento populacional para depressão CES-D em populações clínicas e não clínicas de adolescentes e adultos jovens. Arch Clin Psychiatry. 1998;25(5):251-61.
16. Dong Y, Peng CYJ. Principled missing data methods for researchers. Springerplus. 2013;2(1):222. https://doi.org/10.1186/2193-1801-2-222. PMid:23853744.
17. Graham JW. Missing data analysis: making it work in the real world. Annu Rev Psychol. 2009;60(1):549-76. https://doi.org/10.1146/annurev.psych.58.110405.085530. PMid:18652544.
18. Cohen J. Statistical power analysis for the behavioral sciences. 2nd ed. Hillsdale, N.J.: Lawrence Erlbaum Associates; 1988.
19. Pierce M, McManus S, Hope H, Hotopf M, Ford T, Hatch SL et al. Mental health responses to the COVID-19 pandemic: a latent class trajectory analysis of 19 763 UK adults. Lancet Psychiatry. 2021;8(7):610-9. https://doi.org/10.1016/S2215-0366(21)00151-6. PMid:33965057.
20. Wang Y, Hauksdóttir A, Thordardottir EB, Ge F, Gísladóttir EU, Jakobsdóttir J et al. Depressive symptom trajectories among general population during the COVID-19 pandemic in Iceland: a prospective cohort study (2020–2023). BMJ Public Health. 2024 Nov 4;2(2):e001294. https://doi.org/10.1136/bmjph-2024-001294. PMid:40018606.
21. Ettman CK, Fan AY, Subramanian M, Adam GP, Badillo Goicoechea E, Abdalla SM et al. Prevalence of depressive symptoms in U.S. adults during the COVID-19 pandemic: a systematic review. SSM Popul Health. 2023;21:101348. https://doi.org/10.1016/j.ssmph.2023.101348. PMid:36741588.
22. Sun Y, Wu Y, Fan S, Dal Santo T, Li L, Jiang X et al. Comparison of mental health symptoms before and during the COVID-19 pandemic: evidence from a systematic review and meta-analysis of 134 cohorts. BMJ. 2023 Mar 8;380:e074224. https://doi.org/10.1136/bmj-2022-074224. PMid:36889797.
23. Egbert AR, Karpiak S, Havlik R, Cankurtaran S. Global occurrence of depressive symptoms during the COVID-19 pandemic. J Psychosom Res. 2023 Mar;166:111145. https://doi.org/10.1016/j.jpsychores.2022.111145. PMid:36736190.
24. Feter N, Caputo EL, Doring IR, Leite JS, Cassuriaga J, Reichert FF et al. Sharp increase in depression and anxiety among Brazilian adults during the COVID-19 pandemic: findings from the PAMPA cohort. Public Health. 2021;190:101-7. https://doi.org/10.1016/j.puhe.2020.11.013. PMid:33387848.
25. Cipriani GE, Bartoli M, Amanzio M. Are sleep problems related to psychological distress in healthy aging during the COVID-19 pandemic? A review. Int J Environ Res Public Health. 2021;18(20):10676. https://doi.org/10.3390/ijerph182010676. PMid:34682423.
26. Joo HJ, Kwon KA, Shin J, Park S, Jang SI. Association between sleep quality and depressive symptoms among middle-aged and older adults in Korea. J Affect Disord. 2022;310:258-65. https://doi.org/10.1016/j.jad.2022.05.004. PMid:35545156.
27. Salfi F, Amicucci G, D'Atri A, Viselli L, Gorgoni M, Scarpelli S et al. Sleeping under the waves: a longitudinal study across the contagion peaks of the COVID-19 pandemic in Italy. J Psychiatr Res. 2022;153:154-62. https://doi.org/10.1111/jsr.13313. PMid:33687798.
28. Baek J, Kim GU, Song K, Kim H. Decreasing patterns of depression in living alone across middle-aged and older men and women using a longitudinal mixed-effects model. Soc Sci Med. 2023 Jan;317:115513. https://doi.org/10.1016/j.socscimed.2022.115513. PMid:36450172.
29. Kobayashi E, Harada K, Okamoto S, Liang J. Living alone and depressive symptoms among older Japanese: do urbanization and period matter? J Gerontol B Psychol Sci Soc Sci. 2023;78(4):718-29. https://doi.org/10.1093/geronb/gbac195. PMid:36548947.
30. Noguchi T, Hayashi T, Kubo Y, Tomiyama N, Ochi A, Hayashi H. Living alone and depressive symptoms among older adults in the COVID-19

pandemic: role of non-face-to-face social interactions. J Am Med Dir Assoc. 2023 Jan;24(1):17-21.e4. https://doi.org/10.1016/j.jamda.2022.10.014. PMid:36435273.

31. Zheng G, Zhou B, Fang Z, Jing C, Zhu S, Liu M et al. Living alone and the risk of depressive symptoms: a cross-sectional and cohort analysis based on the China Health and Retirement Longitudinal Study. BMC Psychiatry. 2023 Nov 17;23(1):853. https://doi.org/10.1186/s12888-023-05370-y. PMid:37978367.
32. Oliveira TR. O papel da enfermagem na promoção da saúde mental na terceira idade. Rev FT. 2024;28(136):55-6. https://doi.org/10.69849/revistaft/th10247271355.

AUTHOR'S CONTRIBUTIONS

Study design: Bruna Moretti Luchesi, Tatiana Carvalho Reis Martins.

Data acquisition: Ana Carolina Rodrigues Gualdi.

Data analysis and interpretation of results: Juliana de Oliveira Bezerra, Ana Carolina Rodrigues Gualdi, Marisa Matias, Maria Raquel Barbosa, Marcelo Kwiatkoski, Bruna Moretti Luchesi, Tatiana Carvalho Reis Martins.

Writing and critical review of the manuscript: Juliana de Oliveira Bezerra, Ana Carolina Rodrigues Gualdi, Marisa Matias, Maria Raquel Barbosa, Marcelo Kwiatkoski, Bruna Moretti Luchesi, Tatiana Carvalho Reis Martins.

Approval of the final version of the article: Juliana de Oliveira Bezerra, Ana Carolina Rodrigues Gualdi, Marisa Matias, Maria Raquel Barbosa, Marcelo Kwiatkoski, Bruna Moretti Luchesi, Tatiana Carvalho Reis Martins.

Responsibility for all aspects of the content and integrity of the published article: Juliana de Oliveira Bezerra, Ana Carolina Rodrigues Gualdi, Marisa Matias, Maria Raquel Barbosa, Marcelo Kwiatkoski, Bruna Moretti Luchesi, Tatiana Carvalho Reis Martins.

ASSOCIATED EDITOR

Cristina Lavareda Baixinho

SCIENTIFIC EDITOR

Marcelle Miranda da Silva