REVIEW ARTICLE

# Depression in older adults during the COVID-19 pandemic: A systematic review

Celso Silva MSc[1,2,3] | César Fonseca PhD[3,4] | Rogério Ferreira PhD[1,3] |
Anna Weidner BSc[5] | Bruno Morgado BSc[6,7] | Manuel J. Lopes PhD[3,4] |
Steffen Moritz PhD[8] | Lena Jelinek PhD[8] | Brooke C. Schneider PhD[8] |
Lara G. Pinho PhD[3,4]

[1]Higher School of Health, Polytechnic Institute of Beja, Beja, Portugal

[2]Instituto de Investigação e Formação Avançada, University of Évora, Évora, Portugal

[3]Comprehensive Health Research Centre (CHRC), University of Évora, Évora, Portugal

[4]Nursing Department, University of Évora, Évora, Portugal

[5]MSH Medical School Hamburg, University of Applied Sciences and Medical University, Hamburg, Germany

[6]Serviço de Psiquiatria e Saúde Mental, Garcia de Orta Hospital, EPE, Almada, Portugal

[7]Facultat d'Infermeria, Universitat Rovira y Virgili, Tarragona, Spain

[8]Department of Psychiatry and Psychotherapy, University Medical Center Hamburg-Eppendorf, Hamburg, Germany

**Correspondence**
Celso Silva, Largo do Sr. da Pobreza, 2B, Évora 7000-811, Portugal.
Email: celsosilva30@gmail.com

## Abstract

**Background:** Depression affected 5.7% of people aged 60 years and over prior to the pandemic and has increased by approximately 28%. The aim of this study is to identify and describe factors associated with depressive symptoms, the diagnostic assessment instruments and interventions used to evaluate and treat depression in adults aged 60 years and older since the onset of the COVID-19 pandemic.

**Methods:** Four electronic databases were systematically searched to identify eligible studies published since the beginning of the COVID-19 pandemic. A total of 832 articles were screened, of which 53 met the inclusion criteria.

**Results:** Factors contributing to depressive symptoms in older adults prior to the pandemic were grouped into the following categories: sociodemographic characteristics (i.e., being female); loneliness and weak social support; limitations in daily functioning, physical activity and neurocognitive impairment; and clinical factors. The following groups of factors directly related to the pandemic were found: stress-related factors and feelings or worries related to the pandemic; information access (e.g., receiving news about COVID-19 through the media); factors directly related to COVID-19 (e.g., having infected acquaintances); and factors related to the measures that were taken to reduce the spread of COVID-19 (e.g., confinement measures). The most frequently used instrument to assess depressive symptoms was the Geriatric Depression Scale Short Form (GDS-SF). Four studies implemented interventions during the pandemic that led to significant reductions in depressive symptoms and feelings of loneliness.

**Conclusions:** Improved understanding of pandemic-associated risk factors for depression can inform person-cantered care. It is important continued mental

Brooke C. Schneider and Lara G. Pinho are shared senior authorship.

healthcare for depression for older adults throughout crises, such as the COVID-19 pandemic. Remote delivery of mental healthcare represents an important alternative during such times. It is crucial to address depression in older adults (which often causes disability), since the pandemic situation has increased depressive symptoms in this population.

## INTRODUTION

Approximately 280 million people have been diagnosed with depression worldwide and it is considered a common mental disorder by the World Health Organization (WHO). Depression is one of the leading causes of years lived with disability, affecting 5.7% of people aged 60 years and over prior to the COVID-19 pandemic.[1,2] The pandemic has led to a significant increase in the prevalence of major depression, with an estimated 28.1% increase in cases worldwide.[3] Recently the OECD/European Union warned that stronger and more resilient health systems are needed to provide care after the acute phase of the pandemic of COVID-19.[4]

The first cases of infection with the SARS-CoV-2 were reported by the WHO in December 2019.[5] Upon the recommendation of the WHO, governments took measures to minimize the spread of the virus, including implementing social distancing and quarantine regulations.[6] Older adults were faced with unique challenges and risk factors during the pandemic. Compared with younger and middle-aged adults, older adults tend to experience more functional disability and are more likely to depend on others for self-care,[7,8] making it more difficult to completely adhere to pandemic-related physical distancing recommendations, which could then lead to increased risk of infection.[9] Older adults also have more comorbidities, which increases the risk of serious complications if they become infected[9,10] as well as the chance of negative outcomes due to reduced healthcare services during pandemic times. This may then lead to an increased fear of dying from COVID-19 and worries related to maintaining access to medical care, which can increase anxiety and depressive symptoms.[11–13] Access to care was likely very heterogenous and dependent on local regulations. In Germany, during the first wave of the pandemic, more than 25% of older adults in Germany reported having unmet healthcare needs,[14] which may have resulted from requests (formal and informal) to avoid unnecessary visits to healthcare professionals and many appointments were only offered online. Given that older adults may have reduced access to (e.g., due to

quarantine or isolation measures) or may not feel comfortable using the Internet for healthcare purposes, this may have limited their accessibility to mental healthcare even further. Moreover, fears of COVID-19 infection and the (possible) consequences of the pandemic may have been intensified by media coverage, which often sensationalized the risk of mortality or serious consequences from COVID-19, particularly in older adults. Finally, several additional pandemic-related factors have been shown to contribute to reduced mental health in adults, including isolation and the socio-economic consequences of the pandemic.[15]

As a result, an older adult's risk of developing depression has likely intensified in the pandemic context. Therefore, the implementation of strategies that empower older adults with depression to improve their mental health especially during and following the COVID-19 pandemic is urgent. The use of evidence-based strategies can help reduce the consequences of depression and improved information on risk factors can help to better target individuals particularly at risk for depression.[16] Timely diagnostic assessments, utilizing measures proven valid and reliable in remote diagnostic settings, are essential to prevent or reduce chronicity of symptoms. As such, person-centered care planning, adapted to patient-specific characteristics, and context is necessary.[17]

Person-centered care is an approach that aims to promote the patient's autonomy and patient preferences and characteristics should be taken into account when choosing treatment approaches.[18] Decisions are shared while respecting the patient's rights. It is a complex, multidimensional approach, with a focus on care integration.[19] In this sense, care planning in people with depression needs to be individualized, dynamic, flexible and participatory, and should meet the specific needs of the person, identifying problems, establishing individual goals in a perspective of shared decision-making, information and education, involving the family and therapeutic management in care.[18] Person-centered care is needed because people have specific and unique individual and contextual characteristics.[18] Person-centered care is more effective than standard health care in improving depressive symptomatology, self-management outcomes and quality

of life, and increasing the likelihood of depression remission.[20] Since people aged 60 years and older have specific individual characteristics, and there is a high rate of multimorbidity, it is important to implement person-centered intervention strategies tailored to their specific health and contextual conditions. Furthermore, the more empowered the person and/or their caregiver is in depression self-management and decision-making, the more easily they will be able to manage their symptoms in crisis situations, such as a COVID-19 pandemic.

In order to implement person-centered strategies, it is necessary that health professionals know the determinants of depression, so that they can take into account the individual factors of the person, not only in preventing the disorder, but also in minimizing its impact. However, we found no reviews in the scientific literature that clearly identify determinants of depression, diagnostic assessment tools used to assess depressive symptoms remotely, and / or interventions to decrease depressive symptoms in older adults since the beginning of the COVID-19 pandemic. Considering that the pandemic has altered life in society, it is important to understand which factors are associated with depression in older adults so that an adequate diagnostic evaluation and consequent intervention can be made. In this review, we aim to learn about the current evidence on diagnostic assessment, factors associated with depression in later life, and intervention strategies for this population.

## Aim

To identify and describe factors associated with depressive symptoms, as well as the diagnostic assessment instruments and interventions used to evaluate and treat depression in adults aged 60 years and older since the onset of the COVID-19 pandemic.

## Review questions

This review will be conducted to answer the following questions:

1. What factors are associated with depression in older adults since the start of the COVID-19 pandemic?
2. What assessment instruments were used to evaluate depressive symptoms in older adults during the COVID-19 pandemic?
3. What studies were conducted on interventions to decrease depressive symptoms in older adults during the COVID-19 pandemic?

**Key points**

- Some factors associated with depression were already known in the pre-pandemic period were maintained during the COVID-19 pandemic. These include being female, being widowed, single or divorced, having low levels of education, feeling lonely, or having limitations in functioning.
- New factors associated with depressive symptoms emerged with the pandemic. These include: (1) stress-related factors and feelings or worries related to the pandemic (e.g., feeling very vulnerable to the risk of contracting COVID-19, fear of infecting other people); (2) factors related to information access (e.g., receiving news about COVID-19 through the media, having insufficient knowledge of the pandemic); (3) factors directly related to COVID-19 (e.g., having infected acquaintances and the proximity of contact with COVID-19); and (4) factors related to the measures that were taken to reduce the spread of COVID-19 (e.g., containment measures, difficulty receiving medical care and difficulty obtaining medications).
- In crisis situations, such as a pandemic, it is possible to implement remote interventions with positive effects on reducing depressive symptoms.

**Why does this paper matter?**

This study identifies and describes the factors associated with depressive symptoms, as well as the diagnostic assessment tools and interventions used to assess and treat depression in adults aged 60 years and older since the onset of the COVID-19 pandemic. Some of these factors were already related to depression in the pre-pandemic period, (e.g., loneliness) and others emerged due to social changes resulting from the pandemic period, (e.g., worry regarding COVID-19 infection). Protective factors (e.g., physical activity) were also identified. Through identification of risk and protective factors, this study can serve to inform health policies in similar crisis situations in the future and may help health professionals to implement person-centered intervention strategies for the reduction of depressive symptoms.

# MATERIALS AND METHODS

## Protocol and registration

The protocol for this review has been registered with PROSPERO (CRD42022299775). More details about the methodological procedures can be found in the published protocol.[21]

## Study design

This systematic review was reported in accordance with the Preferred Reporting Items for Reporting of Systematic Reviews and Meta-Analyses (PRISMA) and the methodology followed this reference (see Supplementary Material for additional details).[22]

## Eligibility criteria

The inclusion criteria were as follows: Studies in which participants were diagnosed with or screened for a depressive disorder, regardless of progression status and the presence or absence of other conditions, in older adults aged 60 years or older. The review includes studies on factors associated with depression, diagnostic assessment tools for depression, and intervention strategies to decrease depressive symptomatology in older adults since the onset of the pandemic by COVID-19, regardless of geographical location and context (community, culture or specific environment). The review includes primary quantitative empirical studies: cross-sectional, longitudinal, observational or experimental studies. This review also includes studies with or without a comparison group.

## Search strategy

In this review, a comprehensive literature search was developed, and the databases consulted were: CINAHL Plus with Full Text, MedicLatina, MEDLINE with Full Text and Psychology and Behavioral Sciences Collection. The strategy was adapted according to each database and was be limited to the period December 2019 to March 2022. Studies published in English, Portuguese, Spanish or German were considered.

## Search terms and boolean operators

Search terms included combinations of the following three subject headings according to Medical Subject Headings (MeSH) terms: Depression, Depressive Symptoms, Older Adult or COVID-19. Articles with the following terms or combinations or terms in the title, keywords and/or abstract were retained: ("Depression") OR ("Depressive Disorder") OR ("depressive symptoms") AND ("Older Adults") OR ("Aging") OR ("Elderly") AND ("Pandemic") OR (COVID-19″).

## Data collection and analysis

### Selection of studies

Studies selection included various steps. The studies resulting from the research in each database was exported into Mendeley and duplicates were removed. To minimize bias, two reviewers independently assessed the inclusion of the studies by reading the titles, abstracts and keywords, excluding those that did not fit the inclusion criteria (Figure 1 – PRISMA flowchart).[22] A third reviewer was consulted in case of disagreement or doubts. Subsequently, we proceeded to the full-text assessment phase using the same method.

### Data extraction

Data extraction was performed by the same two reviewers responsible for selecting the studies, independently, and doubts and disagreements were resolved, once again, through consultation with a third reviewer. In the data extraction phase, a descriptive assessment of each study was performed using an extraction tool built to extract information according to the research questions.

### Quality appraisal

To analyze the quality of articles included in this review we use the Joanna Bring Institute (JBI) assessment tools.[23] This step was performed by the same two reviewers independently and any disagreement with the quality assessment of the studies was resolved again by the third reviewer.

### Strategy for data synthesis

As this review includes studies with various methodologies (randomized controlled trial (RCT); cross-sectional; prospective cohort study and mixed research design), the synthesis and analysis of the results was of a narrative
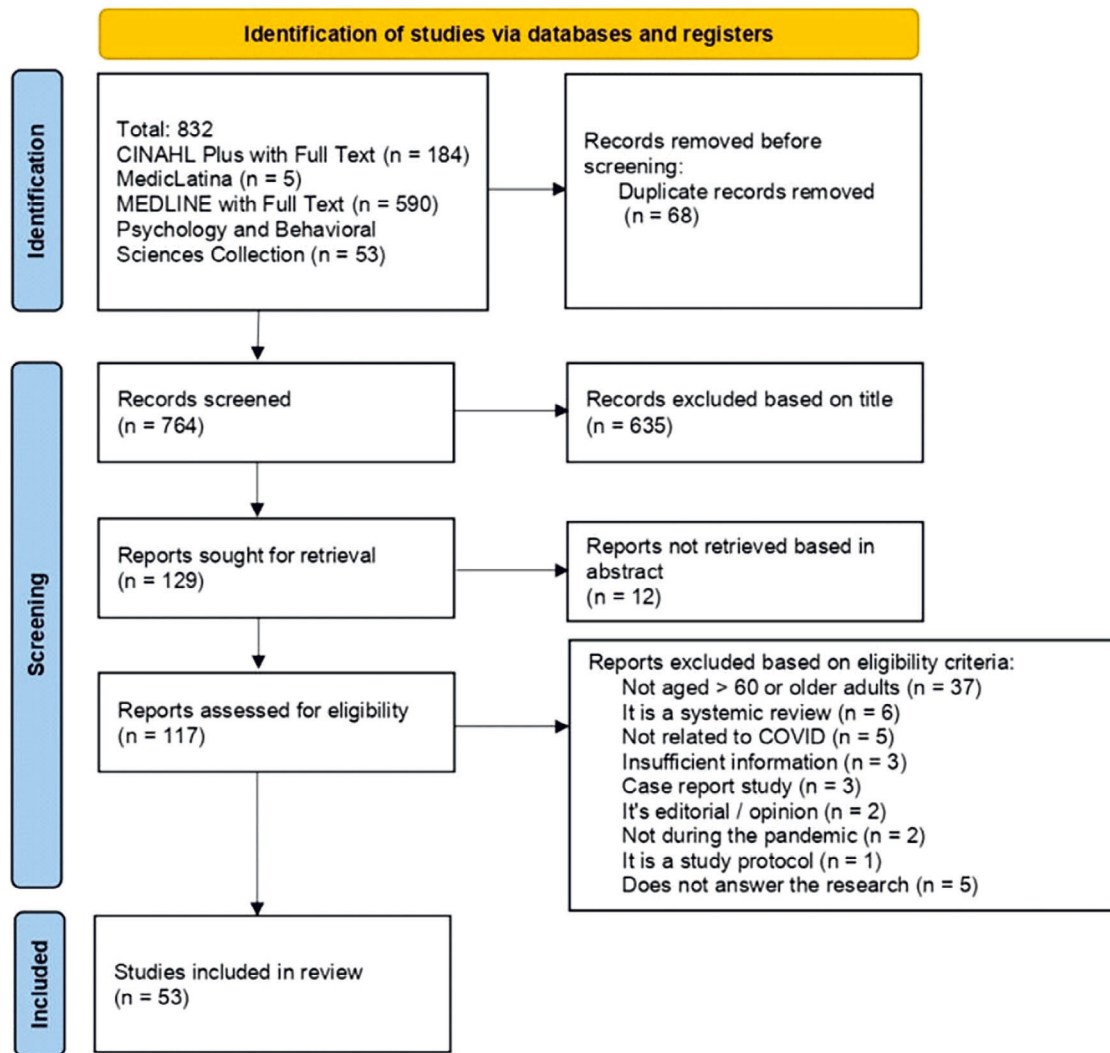
**Identification of studies via databases and registers**

Identification

Total: 832
CINAHL Plus with Full Text (n = 184)
MedicLatina (n = 5)
MEDLINE with Full Text (n = 590)
Psychology and Behavioral Sciences Collection (n = 53)

Records removed before screening:
    Duplicate records removed (n = 68)

Screening

Records screened (n = 764)

Records excluded based on title (n = 635)

Reports sought for retrieval (n = 129)

Reports not retrieved based in abstract (n = 12)

Reports assessed for eligibility (n = 117)

Reports excluded based on eligibility criteria:
    Not aged > 60 or older adults (n = 37)
    It is a systemic review (n = 6)
    Not related to COVID (n = 5)
    Insufficient information (n = 3)
    Case report study (n = 3)
    It's editorial / opinion (n = 2)
    Not during the pandemic (n = 2)
    It is a study protocol (n = 1)
    Does not answer the research (n = 5)

Included

Studies included in review (n = 53)

**FIGURE 1**    PRISMA flowchart.

nature, structured to answer the defined questions.[24] The determinants of depression, the instruments used for diagnostic assessment, and the interventions that were implemented to decrease depressive symptomatology will be presented.

## RESULTS

The search yielded 832 results, and, after removal of duplicates, 764 publications were identified as eligible. Based on abstract information, 117 articles were selected for comprehensive assessment (Figure 1 – PRISMA flowchart).

Studies were excluded for the following reasons: The age of the sample did not fit the criteria or was not provided (37 studies), systematic review article (6 studies), articles not related to COVID (5 studies), insufficient information (3 studies), case report study (3 studies), editorial/ opinion articles (2 articles), the study was not conducted during the pandemic (2 articles), study protocol (1 study) and does not answer the research (5 studies).

Fifty-three studies were included in the review, most of which were conducted in the USA (7 studies). Studies were also conducted in the following countries: Japan (five studies); China, Brazil or Turkey (four studies); Israel or the UK (three studies) Germany, Bangladesh, Indonesia, Hong Kong or Sweden (two studies); Thailand, Australia, Italy, Canada, the Netherlands, Poland, Portugal, South Korea, Spain, Ireland, or Taiwan (one study), two studies included European countries and Israel.

We organized the data extracted according to each study (Figure 2 – COVID-19 pandemic specific factors associated with depression among older adults; Figure 3 – Factors associated with depression among older adults;
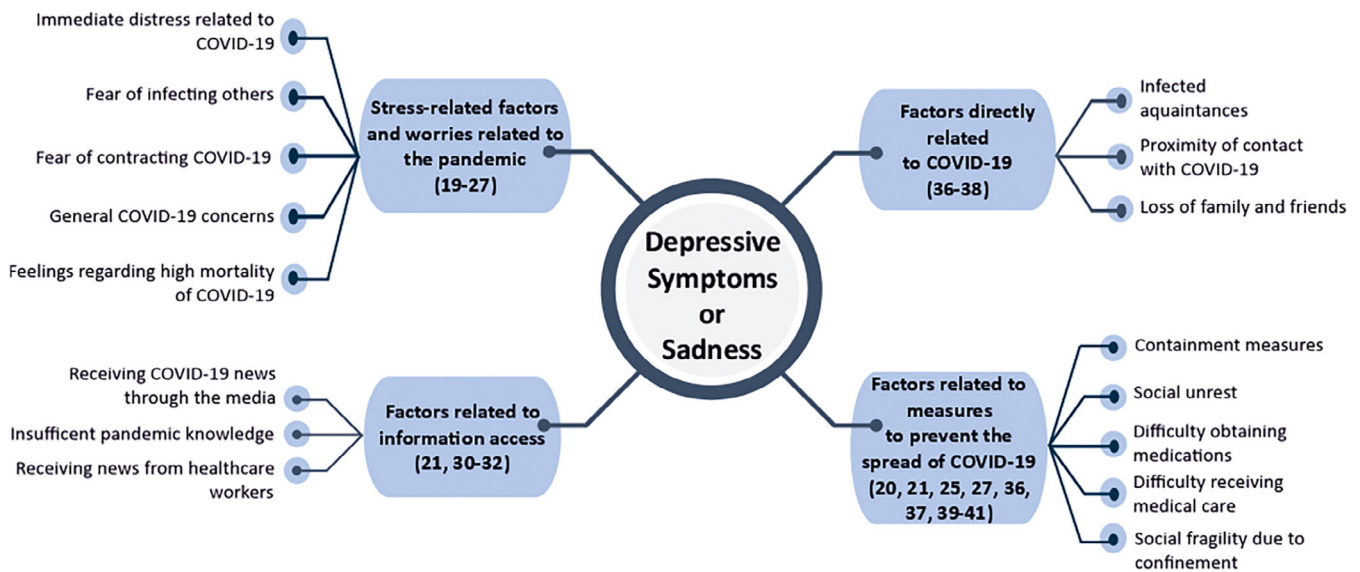
**FIGURE 2** COVID-19 pandemic specific factors associated with depression among older adults.
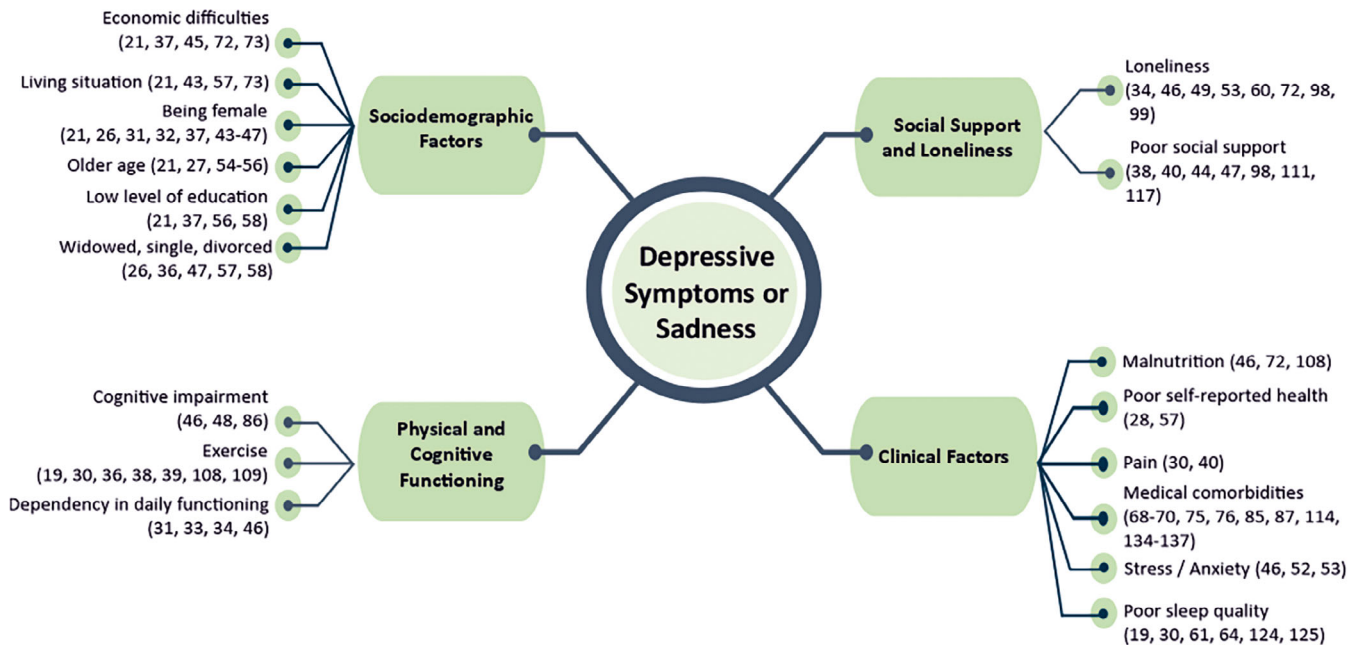
**FIGURE 3** Factors associated with depression among older adults.

Table 1 – Diagnostic assessment instruments used to evaluate depression and other associated dimensions and Figure 4 – Interventions offered in research studies during the COVID-19 pandemic for older adults with depression).

## DISCUSSION

Factors associated with depressive symptoms in older adults were grouped into the following categories: sociodemographic characteristics, loneliness, limitations in functioning and physical activity, social support, clinical factors, neurocognitive impairment, and factors directly related to the pandemic. Some of these factors were already associated with depression in the pre-pandemic period, such as being female and having low levels of education, but others emerged due to social changes resulting from the pandemic period, such as confinement measures, or less health care for medical and mental health conditions (Figure 2 – Associated factors to depressive symptoms). Also described are instruments used to assess depressive symptoms as well as interventions implemented to decrease depressive symptoms. We also report prevalence rates of depression as identified in each study.

**T A B L E 1**    Diagnostic assessment instruments used to evaluate depression and other associated dimensions.

| What this instrument assessed? | Assessment instruments | Authors |
| --- | --- | --- |
| Depression symptoms | Geriatric depression scale (GDS)-Short form | 29–36,38,50,57,71,85,100,103, 141–143 |
| | Patient health questionnaire (PHQ-9) | 38,44,49,103,109,110,143–145 |
| | Patient health questionnaire-8 (PHQ-8) | 26,55 |
| | Self-developed questions[a] | 27,28,39 |
| | Center for epidemiological studies-depression scale (CES-D) | 37,41,54,62,79,99,111,145 |
| | Patient-reported outcomes measurement information system (PROMIS) depression version 1.0 | 40 |
| | World health organization-five well-being index (WHO-5) | 43 |
| Depression and anxiety | Hospital anxiety depression scale (HADS) | 59,63 |
| Depression in relation to death | The death depression scale (DDS) | 45 |
| Changes in feelings of sadness/ depression | Self-developed questions[a] | 46 |
| Depressive symptoms and change over the pandemic | Self-developed questions[a] | 25 |
| Rumination | Ruminative response scale (RRS) | 110 |
| Suicidality | Item 9 of the patient health questionnaire (PHQ-9) | 111 |
| Current mental well-being | World health organization-five well-being index (WHO-5) | 43 |

[a]Each study used self-developed questions which were different.

## Depressive symptoms across countries

Changes in the prevalence of depressive symptoms differed across studies. Voss et al. (2021) reported a 21.9% increase in sadness/depression during the pandemic across Europe and Israel with the greatest increases in prevalence of sadness/depression found in Portugal, Italy and Spain (39.4; 30.8; 28.2 percent, respectively). In contrast, Denmark, Slovenia, and the Czech Republic (10.3; 10.6; 10.8 percent, respectively) had the lowest prevalence of increased sadness/depression as measured by a two-item survey.[25] A study conducted in the USA ($N = 2829$) showed that the prevalence of depressive symptoms increased significantly from pre- to during COVID-19 (19.3%–30.4%; $p < 0.001$).[26]

Some studies included in this systematic review have reported an increase in sadness/depression in the pandemic period, with a prevalence of 22.7% (USA)[27]; 21.9% (European countries and Israel)[25]; 20.1% (Japan).[28] Studies that assessed depressive symptoms using the GDS-15 report the following prevalence rates for depression: 52.9% (Portugal)[29]; 51.9% (Turkey)[30]; 40.1% (Bangladesh)[31]; 32.3% (Japan)[32]; 30.4%[33,34] and 28.7% (Brazil)[35]; 21.9% (Spain).[36]

Four studies compared prevalence data for depressive symptoms before and during the pandemic period: US: PHQ-9 (19.3%–30.4%; $p < 0.001$)[26]; Ireland: CES-D (7.2%–19.8%)[37]; Japan: GDS-15 (25.8%–32.3%)[32]; and Canada: PHQ-9 (3.2%–7.3%).[38] A study conducted in Japan with a sample of 957 older adults independent in their daily living reported that there was an increase in the prevalence of depressive symptoms from March 2020 (Non-caregiver: 38,7%; Caregiver: 47,5%) to October 2020 (Non-caregiver: 41.8%; Caregiver: 63.7%).[39]

## Factors associated with depressive symptoms

### Factors related to the pandemic

Eighteen studies report an association between depressive symptoms and factors related to the COVID-19 pandemic, which can be grouped into: (1) stress-related factors and feelings or worries related to the pandemic; (2) factors related to information access; (3) factors directly related to COVID-19; and (4) factors related to the measures that were taken to reduce the spread of COVID-19.

*Stress-related factors and feelings or worries related to the pandemic*: COVID-19 concerns,[31,40–42] immediate distress related to COVID-19,[43] feeling very vulnerable to the risk of contracting COVID-19,[31,35,44,45] fear of infecting other people[45] and feelings regarding the high mortality due to COVID-19[46] are encompassed in this domain and were associated with higher rates of depression. Studies related to the previous outbreak of SARS-CoV-1 in 2002 also reported an association between

| | Fogelson et al. (2021) United States | Shapira et al. (2021) Israel | Gilbody et al. 2021 United Kingdom | Pellas et al. (2022) Sweden |
|---|---|---|---|---|
| Intervention | Robotic Pet Intervention | CBT-based group intervention | Behavioral Activation in Social Isolation | Behavioral Activation with Mental Imagery |
| Control | --- | Wait-list | Usual primary care | Attention-Assessment |
| Mode of Delivery | In-person (residential care facility) | Online | Telephone | Telephone |
| Study Design | Mixed research design | RCT | RCT | RCT |
| Time Frame | Oct – Dec 2020 | April – June 2020 | June – Oct 2020 | August – Oct 2020 |
| Sample | Older adults with mild – moderate dementia | Community-dwelling 65 – 90 years | Community-dwelling ≥ 65 years plus ≥ 2 LTC | Community-dwelling ≥65 years |
| Number of Sessions | 6 weeks | 14 | 8 | 4 |
| Instruments | GDS-SF UCLA Loneliness Scale | PHQ-9 UCLA Loneliness Scale | PHQ-9 DGLS | MADRS-S |
| Outcome: Depression | $d = 4.61$; $p = .002$ (within-group, Pre-Post) | $d = 0.43$, $p = .05$ (Intervention > Control) | AMD = 0.19 [95% CI -1.36, 1.75] | Hedge's $g = 0.85$, $p = .024$ (Intervention > Control) |
| Outcome: Loneliness | $d = 1.59$; $p = .002$ (within-group, Pre-Post) | $d = 0.58$, $p = .02$ (Intervention > Control) | AMD = -0.87 [95% CI -1.56, -0.18] | |

FIGURE 4   Interventions offered in research studies during the COVID-19 pandemic for older adults with depression. AMD, adjusted mean difference; CI, confidence interval; DGLS, DeJong Gierveld loneliness scale; GDS(-SF), geriatric depression scale (short-form); LTC, long-term condition; MADRS – S, montgomery-åsperg depression rating self-rating scale; PHQ-9, nine-item patient health questionnaire.

depressive symptoms and concerns about the future[47] and high perceived threat of mortality.[47,48]

*Factors related to information access*: Receiving news about COVID-19 through the media,[27,49] having insufficient knowledge of the pandemic[50] and receiving COVID-19 related information from health workers[31] were associated with (higher) rates of depression. In contrast, during the 2002 SAR-Cov-1 outbreak, a study found that having medical knowledge was related to fewer depressive symptoms.[51] According to the above results, stress and worries related to the pandemic and (increased) access to information were related to higher depressive symptoms. Worries, stress and feeling of vulnerability could be related to the way the news about COVID-19 was presented, as the news was constantly focused on catastrophic scenarios and rarely broadcasted successful clinical cases. In addition, news about other topics was neglected; the media was very focused on the pandemic over long periods of time,

allowing little room for other topics. Echoing this, during the pandemic, Director General Tedros Adhanom Ghebreyesus of the WHO stated, "We're not just fighting an epidemic; we are fighting an infodemic," as social media dictated content and demonization.[52] Thus, it is understandable that the levels of concern in the most vulnerable population were exaggeratedly high, leading to depressive symptoms. Indeed, in some cases people who watch more news tend to worry more.[53] Thus, as has been done for other negative events (e.g., murders, suicides), it is likely important to develop public policies in preparation for future pandemics so as not to induce "mental pandemics" which overly catastrophize (possible) effects of health conditions. That is, information should be transmitted with serenity and in a way that does not cause social panic, and the numerous success stories should also be transmitted. Likewise, clinicians working with older adults may recommend reducing time spent watching the

news and / or consuming other new sources to avoid unnecessary worry.

*Factors directly related to COVID-19*: Having infected acquaintances[54] and the proximity of contact with COVID-19[25] were associated with depressive symptoms. These factors may also be related to the feelings of concern regarding the consequences of COVID-19 already reported above. Another factor associated with depressive symptoms was the loss of family and friends,[55] which may be accounted for by bereavement. In the previous severe acute respiratory syndrome (SARS-CoV-1) outbreak that occurred in 2002, studies showed identical results, with factors such as having infected acquaintances being associated with depression.[56]

*Factors related to the measures to reduce the spread of COVID-19*: containment measures,[25,44,46,54] social unrest related to COVID-19[41]; greater social fragility due to confinement during the pandemic[57]; difficulty receiving medical care[31,58,59] and difficulty obtaining medications[31] were included in this category. Containment measures were also associated with depressive symptoms in the 2002 SARS-CoV-1 outbreak.[48] Data from the Survey of Health, Aging and Retirement in Europe (26 countries) corroborates these results, concluding that increased stringency of physical distancing measures was associated with worsening mental health.[60] As previously, discussed, social isolation and loneliness are well-known contributors to depression. Additionally, during the pandemic, healthcare resources were funneled heavily to individuals infected with COVID-19, whereas healthcare for other diseases was neglected. Reflecting findings in samples with adults of all ages (over 18 years old),[61] difficulty in receiving health care and obtaining medication were associated with more depressive symptoms. This may have caused the worsening of pre-existing diseases and in consequence depressive symptoms. In future pandemics, it would be important to keep this data in mind and adopt strategies to avoid overloading health services with non-urgent patients and prioritize maintenance of services for individuals with other illnesses for which a lack of treatment could led to significant consequences, which could be as or more serious than COVID-19 (e.g., suicide).

## Factors related to depression known prior to the pandemic

A number of factors were identified in studies conducted during the pandemic, which were known risk factors for depression in later life prior to the pandemic:

### *Sociodemographic characteristics*

This review concludes that sex, specifically being female,[25–27,31,32,38,45,50,62,63] is associated with an increased likelihood of having depressive symptoms. This finding is consistent with pre-pandemic studies,[64–66] as well as a study conducted during the previous SARS-CoV-1 outbreak.[47] Regarding age, pre-pandemic studies significantly associate older age with a greater likelihood of depression,[67–69] which is in line with our review.[31,37,46,70,71] Being widowed, single, or divorced is associated with the presence of depressive symptoms in both pandemic[28,30,45,54,63] and pre-pandemic periods.[68,72–75] These results may be due to affective relationships and social interaction with a partner represent protective factors for mental health.[76–78] However, one study in our review reported that living with someone was not associated with depressive symptoms.[79] Despite findings that women have more depressive symptoms than men, there is some discussion that perhaps the depressive symptoms present in men are not measured well enough on the scales presented, such as the GDS or the PHQ9. Since men have a higher risk of suicide, suggesting that there are as many or more men who are depressed versus women. The use of male-specific scales such as the MDRS-22 (Male Depression Risk Scale) can help improve the detection of depression in men and can also identify factors that put men at risk for poor physical and mental health outcomes.[80] Low levels of education were also associated with (greater) depressive symptoms,[25,28,31,71] while higher educational levels, in turn, were identified as protective factors for depression.[54,62] There are several studies that corroborate these results in the pre-pandemic period[81–84]; and in the previous SARS-CoV-1 outbreak.[47] There are also studies indicating that education may have protective effects in relation to depression.[54,62,72] These results may be associated with socioeconomic factors, since the more educated a person is, the more likely he or she is to have better jobs, higher socioeconomic levels and better access to (healthcare) resources. It would also be interesting to examine to what extent education was associated with better health literacy and, therefore, a more informed understanding of the COVID-19 pandemic. Regarding economic difficulties, as in our review,[25,31,39,41,85] being in a poor financial situation has also been reported in pre-pandemic studies[68,75,82,86] as being associated with depressive symptoms. Better financial status was associated with fewer depressive symptoms,[54,85] which is in line with pre-pandemic studies.[81,87–89] Underscoring this, one study reported having health insurance[85] as a protective factor for depressive symptoms. Individuals with greater economic resources

typically had more access to strategies that promote (mental) health, such as going to the gym, traveling, participating in recreational activities, and having a healthy diet, among other factors. In addition, they will also have greater accessibility to health services, which may allow them to receive treatment for physical disease, as well as early symptoms that can lead to depression and other mental disorders, in a timely manner. One study reported that being religious is a protective factor for depressive symptoms,[85] which is in line with findings from pre-pandemic studies.[90–92] As for residence-related factors, one study found that older adults living in a nursing home were more likely to have depression compared to older adults living in the community,[85] which is in line with pre-pandemic studies.[93–95] Living in small flats in urban areas[30,38] was also associated with depressive symptoms. The pre-pandemic literature is not congruent on this point, with some studies reporting higher rates of depression among older adults living in urban areas[68] and others associating it with living in rural areas.[96] One explanation for these findings may be distance participants live from healthcare facilities[31] as it was found that increased proximity from health facilities was associated with more depressive symptoms. Conversely, it could be that in the confinement phase of the pandemic period, people living in small apartments had fewer opportunities to perform activities, such as taking care of the garden, so the presence of more depressive symptoms may be related to the reduced activities that can be done in a smaller space. Regarding the accessibility of health care services, this could be due to the fear of not getting timely health care in case one might get infected. On a more general level, older adults living in retirement homes are subject to routines, are often dependent on others for care and are not completely free to organize their daily lives. Changes in services due to COVID-19 and the ability to move about freely may have contributed to more depressive symptoms.

### Limitations in functioning and physical activity

In this review, individuals who endorsed being (at least somewhat) dependent on other people for daily tasks,[28,30,31,43] and totally dependent (incapacity)[85] were more likely to have depression. This conclusion is not new and already pre-pandemic studies have reported that limitation in basic activities of daily living is associated with more depressive symptoms.[69,84,86,96–98] However, one study reported that having more functional limitations was not associated with depressive symptoms.[79] Being dependent on others can generate feelings that can lead to depression, such as feeling like a burden.

Moreover, being dependent limits the performance of social activities, recreation, and physical exercise, which are predictors of better mental health. In this review, seven studies reported an association between increased depressive symptoms and less physical exercise,[16,27,33,35,36,99,100] which is supported by pre-pandemic studies.[83,96] Likewise, seven studies in this review associate physical activity or exercise as a protective factor for depression.[29,33,34,100–103] These results are consistent with a pre-pandemic meta-analysis.[104] Other studies concluded that physical activity was associated with reduced depressive symptoms.[105–107] These findings underscore the importance of strategies for maintaining physical exercise in pandemic settings. It is also crucial to promote physical exercise in older adults, even if they have functional limitations, with the practice being adapted to the conditions of each person using person-centered care. Improving offerings for and access to (online) exercise groups for older adults in future pandemics are needed.

### Social support and loneliness

Differing from feelings of loneliness, perceived social support refers to people's beliefs about how much support is potentially available from their relationships and social contacts as well as the perceived quality of this support.[108] In our review, we found evidence for an association between depressive symptoms and loneliness[31,43,46,50,58,71,109,110] and social isolation.[35,39,41,44,102,109,111] Before the pandemic, loneliness was already considered a risk factor for depression,[112–116] including a pre-pandemic meta-analysis that also corroborates our results, as it reports that loneliness is a significant variable affecting depression.[117] Given that social relationships are predictors of better mental health, it makes sense that people who are lonely have more depressive symptoms. The measures that confinement may have aggravated the feeling of loneliness by restricting physical contact with friends and family.

Social isolation already existed in the pre-pandemic period.[72,118] In fact, social isolation can not only lead to depression, but is also a symptom of depression. Promisingly, having a chat group was associated with fewer depressive symptoms among older adults,[85] and may be related to socializing, albeit virtually, with a group of people. This is supported by previous work indicating that older adults are open and interested in using technologies to keep in touch with friends and family.[119] Never or hardly ever having received support from family/friends,[35] family relationship difficulties[29,85] and decreased social participation[28] was also associated with depressive symptoms in this review. We also highlight the association of depressive symptoms with the absence of a partner, already described in relation to marital

status. On the other hand, the presence of social support was associated with less depressive symptoms both in this review[62] and in previous studies,[120–122] and is considered a protective factor for depression.[86] These data emphasize the importance of assessing older adults' social support during the diagnostic assessment, and, in line with the concept of person-centered care, involving the family or significant others in care.[18] In addition to social support from family and friends, one study also found that having a dog was associated with fewer depressive symptoms,[34] similar to a pre-pandemic study with institutionalized seniors.[123] The existence of a pet promotes interaction, increases feelings of usefulness and requires that the owner take on tasks of caring for a pet, which have accounted for these results.

### Clinical factors

The clinical conditions associated with depressive symptoms were malnutrition,[43,71,99] poor sleep quality,[16,27,59,63,124,125] and higher levels of anxiety[50] stress,[43,49] pre-existing medical conditions, and self-reported pain as well as lower levels of self-reported health. Similar findings were reported in pre-pandemic studies (malnutrition[96,126,127]; worse sleep quality[74,128–131]; anxiety[86,132,133]). Healthy eating and sleep are factors that promote mental health. Many older adults report sleep problems to health professionals, so it is urgent that their actions do not go through the simple prescription of medication but involve non-pharmacological strategies that promote a good night's sleep.

There are several pre-pandemic studies that indicate that multimorbidity may contribute to depression,[67–69,74,75,84,86,105,134–137] including neurocognitive impairment.[138] With the pandemic, this conclusion still holds, and six studies were identified in this review that report the same,[31,41,59,79,85,139] of which two specify the contribution of self-reported pain[49,58] and neurocognitive impairment.[43,79] One study reported that not having memory problems is associated with lower depressive symptoms.[85] Other studies have found that lower levels of self-reported health were also associated with depressive symptoms.[25,54] This finding underscores the importance of screening for depressive symptoms among individuals with pre-existing (chronic) health conditions. Professionals often focus on physical illness care and do not concomitantly assess mental health, so a paradigm shift is urgently needed, and strategies for mental health monitoring and mental disorder prevention should be adopted. Neurocognitive assessment by health professionals is also essential when depressive symptoms are present, and cognitively stimulating activities should be included in care planning, such as cognitive remediation that has demonstrated small to moderate effects on improving cognitive functioning in older adults with depression.[140]

## Assessment instruments

Regarding instruments to assess depressive symptoms, consistent with work prior to the pandemic,[140] the Geriatric Depression Scale (GDS) – Short Form was the most commonly used measure of depression in the studies reviewed,[29–36,38,50,57,71,85,100,103,141–143] followed by the nine-item Patient Health Questionnaire (PHQ-9)[38,44,49,103,109,110,143–145] Both of these measures were administered remotely due to the pandemic and associated confinement measures (e.g., telephone interview, online questionnaire, video call media). For the GDS-Short Form acceptable to excellent internal consistency was reported for remote administration (Cronbach's alpha values of 0.77–0.93).[30,71,85] One study used the GDS face-to-face, and reported a Cronbach's alpha value of 0.77.[142] Similarly, good to excellent internal consistency was reported for the PHQ-9 (Cronbach's alpha = 0.83–0.92).[44] The Center for Epidemiological Studies-Depression Scale (CES-D) was also administered remotely and yielded (Cronbach's alpha values of 0.78–0.82).[62,99] One study assessed ruminations using the Ruminative Response Scale (RRS) by phone call, and reported a Cronbach's alpha of 0.77.[110] Taken together, these studies indicate it is possible to assess depressive symptoms with self-report scales remotely, so they can be used even when physical contact with the health professional is not possible. Moreover, these results suggest that older adults are willing and able to participate in online assessments.

Assessment instruments were also used to evaluate levels of depression and anxiety [Hospital Anxiety Depression scale (HADS),[59,63]], changes in feelings of sadness/depression [with self-developed questions,[46]] depressive symptoms and change over the pandemic [with self-developed questions,[25]], and current mental well-being [Five Well-Being Index (WHO-5),[43]]. Self-report measures were likely preferred over clinician-rating scales given the ease of administration in online studies; however, these scales represent gold-standards in screening for depression in older adults and can be easily implemented also in telehealth settings.

## Interventions implemented to decrease depressive symptoms

We found only four studies that implemented interventions during the pandemic, three of which were conducted remotely, one by videoconference[109] and two by phone.[143,145] The fourth study was conducted in-person in a residential care setting.[142] The interventions implemented in a pandemic context yielded improvements in

depressive symptoms[109,142,143] and feelings of loneliness.[109,142,143,145] One of the studies looked at the outcomes of a robotic pet intervention in older adults with mild to moderate dementia living in residential care, and experiences of family members and professional caregivers were also examined.[142] Family members and professional caregivers reported the positive impact of robotic pets on participants' well-being, especially during the most restrictive period of COVID-19. Depression ($p < 0.001$) and loneliness ($p < 0.001$) also significantly improved. Participant interactions with robotic pets enhanced well-being and quality of life, being a good alternative to live animals.[142] One of the studies analyzed the results of the efficacy of a short-term CBT-based group intervention conducted online aimed at providing older adults with the tools and skills needed to improve their coping during the time of enhanced stress (COVID-19).[109] Intervention techniques included cognitive restructuring, guided imagery, and mindfulness. The intervention consisted of group sessions in which behavioral and cognitive techniques were conveyed and practiced through the ZOOM videoconferencing platform. The results of mixed effect models yielded a superior small effect for depressive symptoms ($d = 0.43$) and a medium effect on loneliness ($d = 0.58$) for CBT versus a wait-list control group.[109] Similarly, another study analyzed effects of behavioral activation versus care as usual (CAU) among a sample of older adults with at least two chronic health conditions.[145] Behavioral activation was administered as a telephone- or video-call based intervention in which a therapist and the participant worked together to develop a collaborative treatment plan that sought to encourage reuptake (or replace, if former activities were no longer possible because of social isolation and/or chronic health conditions) behaviors that connected them to sources of positive reinforcement (valued activity). No significant group effects were detected for the main outcome depression (PHQ-9: adj. mean difference = $-0.50$ [95% CI -2.01,1.01] after 1 month, 0.19 [95% CI -1.36, 1.75] at 3 months). For loneliness, the adjusted between-group mean difference in the De Jong Gierveld Loneliness Scale at 1 month was 0.28 (95% CI -0.51,1.06), which reached significance at 3 months $-0.87$ (95% CI -1.56, $-0.18$).[145] Moreover, this study demonstrates the feasibility and acceptance of a remotely delivered behavioral activation intervention among older adults with chronic health conditions. Interestingly, although video calls were offered to study participants, none expressed interest in this modality; however, reasons for refusal were not provided. In a final study, the feasibility, acceptance, and preliminary efficacy of telephone-delivered Behavioral Activation with Mental

Imagery (BA-MI) for the treatment of depressive symptoms was analyzed. BA-MI included telephone-administered BA including a mental imagery component over a 4-week period Prospective mental imagery has been shown to amplify the anticipation of reward-related emotions; that is, the anticipation of pleasant and rewarding consequences of future behavior, in order to enhance motivation for such behavior.[143] BA-MI was compared with an Attention-Assessment Control in which participants received weekly follow-up calls. Depressive symptoms decreased more in the treatment condition compared to the control condition (effect size = 0.58; $p = 0.024$). Thus, this study provided initial evidence that BA with mental imagery administered via telephone is feasible, acceptable, and potentially effective for the treatment of depressive symptoms in older adults living in isolation.[143] In addition to the interventions with older adults carried out in the pandemic period, we also highlight the results obtained in a study that examined outcomes of a cognitive behavioral therapy (CBT)-based intervention prior to the pandemic period.[141] This study reported that 17%–22% of older adults previously treated with CBT for anxiety and depression showed a relapse of symptoms during COVID-19 confinement. Thus, CBT may have long-term protective effects despite challenging life circumstances.[141]

Other, more recent studies published after March 2022 have concluded similar results. One RCT conducted in 24 primary care clinics of Brazil that applied a 17-week psychosocial program based on psychoeducation and behavioral activation approaches obtained positive results in reducing depression in older adults.[146] Another study conducted in Spain with a sample of 34 older women living in nursing homes (intervention group ($n = 14$) and control group ($n = 20$)), which applied a reminiscence program, demonstrated positive results of the intervention in reducing depressive symptoms and feelings of loneliness.[147] Moreover, studies with samples of adults of other ages have also shown positive results in reducing depressive symptoms, such as a study with a sample of students who used the Smartphone app MCT & More.[148]

Taken together, our findings demonstrate that it is possible to conduct interventions for depression, even with the constraints associated with the pandemic. In future pandemic situations, it must be ensured that interventions for individuals with depression are maintained, and the means must be adapted to the circumstances to minimize the impact of the disease. For example, Germany reacted quickly to the pandemic-associated changes such that insurances allowed coverage of both individual and group psychotherapy conducted (completely) online.

## Limitations of the current study

This systematic review included studies in English, Portuguese, Spanish, or German. No studies in other languages were included, so there may be language bias. There is a high heterogeneity among studies, so we did not opt for a study with meta-analysis. This study addressed depression, perhaps an approach associating depression to other psychiatric conditions in the included studies would have different results.

## Contributions to clinical practice, health policy, and future research

What stands out most in the evidence found in this review is the importance of an adequate evaluation of the diverse factors associated with depressive symptoms. To this end, we suggest that health professionals should adopt a person-centered care strategy, making a global assessment and planning care according to individual needs. Moreover, this review underscores the importance of the early identification of these factors to allow time for early interventions to prevent the conversion of depressive symptoms to depressive disorders. We also highlight the positive results of the interventions carried out in a pandemic context, showing that it is possible to maintain interventions even with pandemic restrictions. We suggest that, in a pandemic context (and beyond) and in view of the results, mental health professionals implement interventions for the reduction of depressive symptoms in older adults, even if they are done remotely. This is a relevant contribution to clinical practice as it provides data that may contribute to the development of care plans based on scientific evidence. It is likely that older adults will need more digital knowledge, resources, and/or support so that they are able to participate in such online assessments and interventions.

In future pandemics, the way news is transmitted should be rethought, so as not to generate another problem on top of the existing one (a "mental pandemic"). Information should be transmitted with serenity, avoiding social panic, with the transmission of success stories and not only of deaths and complications from the virus. Likewise, older adults, as well as clinicians working with older adults, should consider the way in which pandemic-related information is distributed, the amount of news consumed, and the news sources used by older adults to reduce unnecessary stress and worry. Restrictions on social contact should also be rethought so that important health aspects are not neglected (e.g., access to medical care). A strategy should be found to avoid overloading health services with non-urgent patients and to allow for care of other illnesses that may have consequences, which are as or more serious than COVID-19. Particularly with regard to older adults who may already have limited social contacts, the consequences of stringent quarantine and social isolation on mental health and cognition may be grave. Shared decision-making according to person-centered care may be implemented to help older adults consider the consequences of isolation for their own physical and mental health.

For future research, we suggest that literature reviews like this one to be carried out, which address other psychiatric pathologies, focus on mental health promotion strategies, and identify protective factors (vs. correlates) of mental health problems in older adults aged 60 and over.

## AUTHOR CONTRIBUTIONS

Celso Silva, Lara G. Pinho, Brooke C. Schneider, César Fonseca, Anna Weidner, and Bruno Morgado assisted in article concept and design, acquisition of data, drafting of the manuscript, and final approval. Celso Silva, Lara G. Pinho, Brooke C. Schneider, César Fonseca, Lena Jelinek, Steffen Moritz assisted in article concept and design, analysis and interpretation of data, revision of the manuscript and final approval. Celso Silva, Lara G. Pinho, Brooke C. Schneider, César Fonseca, Rogério Ferreira, Manuel J. Lopes, Steffen Moritz further assisted in revisions of the final manuscript.

## CONFLICT OF INTEREST STATEMENT

The authors declare that there is no conflict of interest.

## DATA AVAILABILITY STATEMENT

Data generated or analyzed during this study are included in this article. Further enquiries can be directed to the corresponding author.

## ORCID

*Celso Silva* https://orcid.org/0000-0002-4258-8629
*César Fonseca* https://orcid.org/0000-0001-6975-612X
*Rogério Ferreira* https://orcid.org/0000-0001-5180-2036
*Anna Weidner* https://orcid.org/0000-0003-0787-6630
*Bruno Morgado* https://orcid.org/0000-0002-9931-3677
*Manuel J. Lopes* https://orcid.org/0000-0002-7554-8041
*Steffen Moritz* https://orcid.org/0000-0001-8601-0143
*Lena Jelinek* https://orcid.org/0000-0001-5292-350X
*Brooke C. Schneider* https://orcid.org/0000-0003-0772-6819
*Lara G. Pinho* https://orcid.org/0000-0003-1174-0744

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

**Appendix S1.** PRISMA 2020 checklist.