Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Psychiatry Research 316 (2022) 114748

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Review article

International PRISMA scoping review to understand mental health interventions for depression in COVID-19 patients

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ARTICLE INFO

Keywords:
COVID-19 patients
Psychotherapy
COVID-19 psychological treatment
Scoping review
Depression

ABSTRACT

Preliminary research indicates that the COVID-19 illness affects the mental well-being of patients. This scoping review, thus, aims to examine the current state of research into mental health treatments for depression symptoms in COVID-19 patients. Select databases were searched on 7/1/2021. Full-text articles involved (1) mental health treatment (2) suicide and/or depression outcomes, (3) a quasi-experimental research trial, and (4) a primary analysis. 11 articles were included in this review. The studies spanned 5 countries, and demonstrated immediate positive effects of mental health treatments and tele-health as a treatment modality for depression in COVID-19 patients. 6 studies were randomized controlled trials. Various treatments were administered, including cognitive behavior therapy, mindfulness, and muscle relaxation. Most interventions were conducted in in-patient units and focused on acute symptoms. There were limitations in the design and description of methodology in many studies, which affects the generalizability and replicability of positive findings. Only two studies included a post-intervention follow-up and one study assessed suicide risk. Thus, this review found there is a pressing need for more research in the area, with greater rigor in study methodology, and for treatments targeting long-term symptoms and suicidality, and outpatient services.

1. Introduction

The novel coronavirus (SARS-CoV-2, or COVID-19) has had a significant and lasting impact worldwide. Infection from the virus has devastated the health and taken the lives of millions of people and counting. Emerging research shows that repercussions from national lockdowns and social distancing measures range anywhere from mass unemployment and economic crises (Haleem et al., 2020) to significant mental health effects in general populations (Le et al., 2020; Tran et al., 2020). Individuals that contract the novel coronavirus may experience symptoms such as cough, fever, and loss of sense of smell and taste (Chen et al., 2021). COVID-19 infection is further seen to have lasting effects in survivors, with one study finding that, post-infection, damage to the lungs, heart, brain, and other organs were evident in severe cases and chronic fatigue was seen in milder cases (Marshall, 2020).

In addition to physical health complications and lengthy hospitalizations, COVID-19 patients may undergo other stressful experiences, including uncertainty regarding their illness and recovery, isolation from loved ones, the stigma of contracting the virus, and feelings of guilt from spreading the virus, which may detrimentally affect their mental well-being (Villa et al., 2020). These experiences are likely to manifest clinically, and emerging research supports this, demonstrating high rates of depression in patients recently diagnosed with COVID-19 (Ma et al., 2020). Preliminary research suggests that COVID-19 patients may experience mental health symptoms long-term, for instance, a study with a 6-month follow up after COVID-19 infection found that it was associated with wide-ranging psychiatric sequelae, including mood, anxiety, and psychotic disorders (Taquet et al., 2021). Emerging literature also demonstrates long-term cognitive effects in COVID-19 survivors, with patients reporting symptoms such as 'brain fog', and difficulty

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https://doi.org/10.1016/j.psychres.2022.114748
Received 22 April 2022; Received in revised form 22 July 2022; Accepted 24 July 2022
Available online 25 July 2022
0165-1781/Published by Elsevier B.V.

with attention, memory, and executive processing, even at 12-weeks post-recovery (Ceban et al., 2022).

In particular, undergoing hospitalization may have a significant impact on patients who experience severe COVID-19 symptoms, given past research that established a connection between lengthy hospital stays and depression (Sullivan et al., 2017; Sugawara et al., 2015; AbuRuz, 2019). One study demonstrated that social support and loneliness significantly affect the length of hospital stay, and that lower social support and feelings of loneliness were related to higher depression. This increased depression, in turn, also predicted longer hospital stays (Krampe et al., 2018). Considering how social distancing measures and practices during the COVID-19 pandemic has led to a widespread sense of isolation and diminished access to social support (Grey et al., 2020; Pietrabissa and Simpson, 2020), there is an urgent need to examine the link between patients' hospital stays, including length and received interventions, and depression. In line with this, a recent study of COVID-19 patients in isolation treatment found that approximately 50% and 10% of their study sample showed symptoms of depression and severe depression, respectively (Zhao et al., 2020). There is a dearth in research into suicidality in COVID-19 patients, however the study found that around 25% of their sample experienced self-injurious or suicidal thoughts (Zhao et al., 2020), demonstrating a need for increased research and treatment in this area. These mental health effects of lengthy hospital stays on COVID-19 patients may be experienced long-term, given findings that show a lowered quality of life in survivors of the Middle East Respiratory Syndrome (MERS) who were admitted to the ICU when compared to survivors who were not (Batawi et al., 2019).

In considering emerging research into the effects of COVID-19 illness and hospitalization, there is a great need for effective mental health treatments for patients with short- and long-term symptoms. This need is highlighted by research that demonstrates the effectiveness of psychosocial interventions for patients during previous pandemics, such as SARS, MERS, and Ebola (Soklaridis et al., 2020). Additionally, the increase in wide-spread utility of telehealth services during the COVID-19 pandemic, particularly in the United States, provides opportunities to administer interventions to patients with greater accessibility and lowered risk of infection (Zhou et al., 2020). The usefulness of this treatment modality is seen in recent research, including a study by Gromatsky et al. (2021) that supports the acceptability and feasibility of VA CONNECT - a telehealth group intervention aimed at developing a Safety and Resilience Plan for veterans experiencing COVID-19 related stress. Similarly, another study described a WeChat-based psychological intervention that demonstrated improvements in depression and anxiety levels in patients with suspected COVID-19 infections (Hu et al., 2021). However, it is important to note that significant barriers to healthcare, including telehealth, exist for minority populations in and outside of the United States, while they also disproportionately experience higher rates of COVID-19 related infection, death, and mental health issues (Tai et al., 2021). Thus, steps to ensure accessible and quality healthcare for minority communities are critical considerations for mental health treatment and research (Sullivan et al., 2021a).

Given the emerging research into the significant mental health impact of COVID-19, an urgent need to develop treatments for psychological symptoms in COVID-19 patients becomes apparent. The goal of this scoping review is to study and describe the current status of the literature surrounding this topic, and to provide an understanding of what treatments are available and effective, and what are the necessary future directions for this area of research. Specifically, this review first aims to determine and describe research into mental health interventions that have been adapted or created for depression and suicidal symptoms in patients currently or previously infected with COVID-19, and evaluate their feasibility and effectiveness. Second, the review aims to present the nature and findings of research into interventions targeting long-term mental health symptoms for recovered patients. Third, the review aims to assess whether studies employed telehealth services and included diverse populations in order to examine the accessibility of treatment. Finally, this scoping review will aim to describe the clinical implications of the results of the scoping review for treating short- and long-term depression and other mental health concerns in patients infected with or recovered from COVID-19, and to discuss important future directions for this line of research and clinical work.

2. Methods

A scoping review following the PRISMS-ScR reporting guidelines (Tricco et al., 2018) was conducted in order to identify key concepts within the COVID-19 and mental health literature base. Arksey and O'Malley's (2005) five-stage framework informed the methodology for this scoping review. Following this framework, the authors identified the research question, identified relevant articles, selected the studies, extracted the data, and finally summarized and reported the data.

2.1. Identifying the initial research questions

The focus of the current review was the exploration of mental health treatments that exist for those who were diagnosed with or recovered from COVID-19. The review was specifically focused on treatments that had depression and/or suicide-related outcomes. In order to ensure that the search captured a wide range of literature relating to the topic of interest, the authors posed the following initial research questions as a guide to the search process:

1 What exists regarding intervention research for individuals diagnosed with or recovered from COVID-19 experiencing mental health related concerns?
2 What is known regarding the outcomes of these interventions?
   a Specifically, do they have an effect on improving depressive and/or suicidal symptoms in the patients receiving treatment?

2.2. Identifying relevant articles

Following preliminary searching, the aim was to identify all articles addressing mental health interventions for individuals with COVID-19 that included suicide and/or depression-related outcomes. A comprehensive search was constructed in Ovid Medline, Ovid PsycINFO, and Ovid Embase. The research team attended recurring meetings with a librarian experienced in conducting scoping reviews (SW), during which the search terms were developed and revised. See Appendix A for the complete search strategies. The final search was run on 7/1/2021, with no limits placed on date or country of origin. All search results were imported into the Covidence software to manage the references more efficiently (COVIDence systematic review software).

Titles and abstracts were first independently screened by four reviewers (LC, JS, JW, HT), and any conflicts were resolved by (KHP). Full-text articles were then screened by two authors (KHP and LC) and all full-text conflicts were resolved by another reviewer (SS). From a total of 4812 original search results, 11 studies were selected for inclusion. See Fig. 1 for the PRISMA flow diagram.

2.3. Study selection

For the initial abstract screening, articles were included if they: (1) were in English; (2) involved people diagnosed with COVID-19; (3) were mental-health related; (4) involved a treatment. For the full-text screening, articles were included if they: (1) involved a specific treatment; (2) had suicide and/or depression-specific outcomes; (3) had study methods that were of a quasi-experimental research trial; (4) involved a primary analysis (e.g., secondary analyses were excluded). Non-peer-reviewed materials such as dissertations, manuscripts, or conference abstracts reporting on incomplete trials were excluded. The articles ultimately had to be a completed research trial to be included,

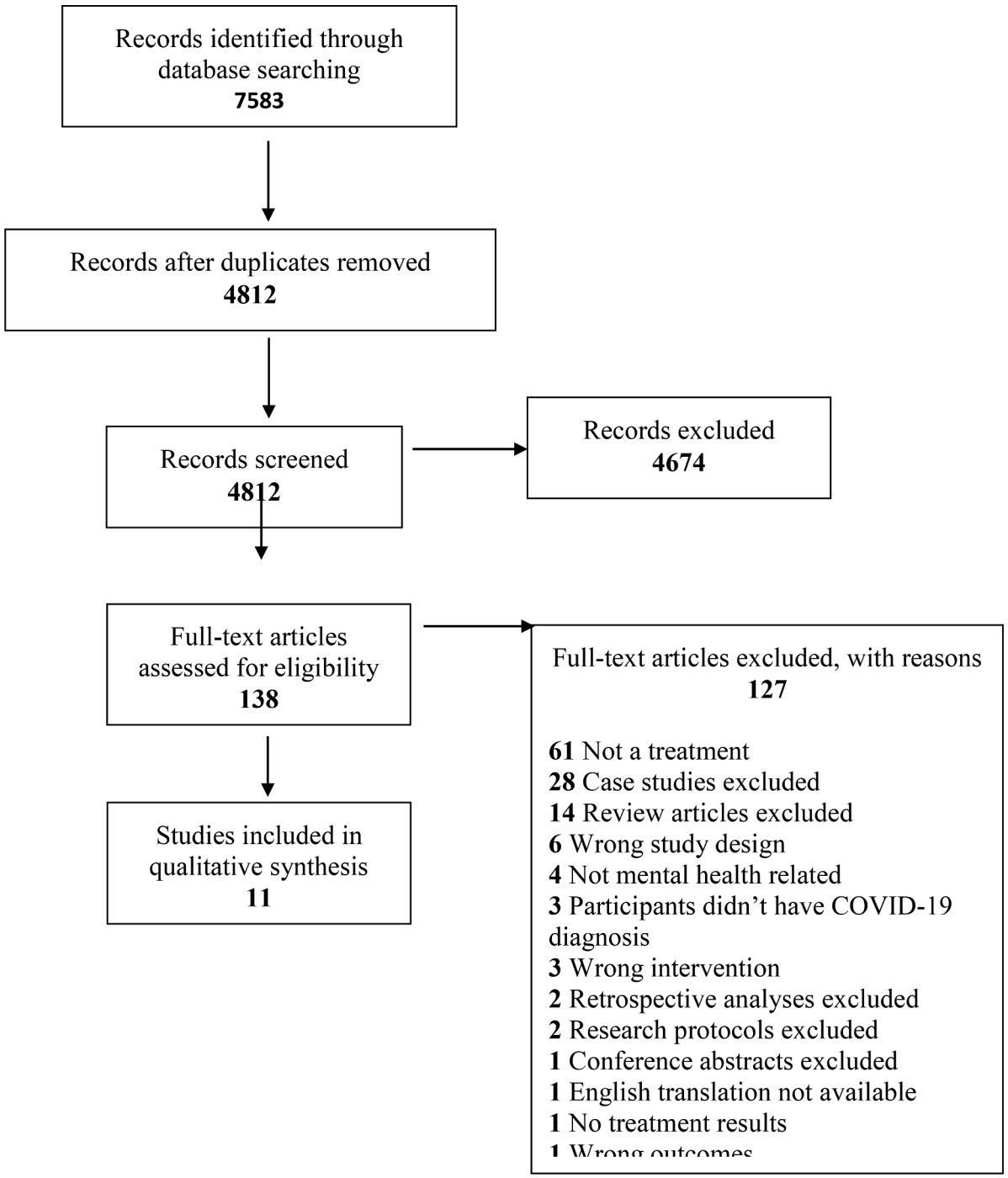

Fig. 1. Papers included and excluded in the scoping review of mental health treatments for COVID-19 patients.

therefore excluding review articles, case studies, protocol papers, clinical work, commentary articles, or letters to the editor from the review. There were no exclusion criteria related to sample size, age group, or location.

2.4. Data extraction

Prior to data extraction, the research team attended a consensus meeting led by senior team members (LC and SS). This framework was informed by the staff librarian (SW) and previous work (Sullivan et al., 2021b, 2021c; Gromatsky et al., 2020). These meetings were held so that various variables could be discussed and an agreement could be reached about which variables to extract from the included articles. The agreed upon data to extract included sample descriptives, methodology, information about the intervention, and outcomes and measures. After this, two extractors reviewed the included articles, formed the tables, and filled them in with the pertinent information (LC, JS). Three team members double checked the data that was extracted into tables and helped with revisions (SS, JW, HT).

2.5. Ethical considerations

Since this scoping review is based on published articles, ethical approval was not sought. The authors of the review did not register the review with PROSPERO, a database of registered health and social care systematic reviews, because scoping reviews do not meet registration

Table 1
Study and participant characteristics.

Study	*N*	Participants *Mean Age*	*Gender %*	*Region*	*COVID-19 Diagnosis Status*	Method *Study Design*	*Treatment Enrollment Period*	*Setting*	*Treatment Modality*	*Telehealth Medium*
Fan et al. (2021)	111	46	Male: 37.8 Female: 62.2	China	Recently Diagnosed Cases	3-site RCT (single blind)	2/2020 - 6/2020	Outpatient	Hybrid	Internet services
Jerrin et al. (2021)	130	44	Male: 65.4 Female: 34.6	India	Recently Diagnosed Cases	Single-site, open clinical, non-randomized trial	6/2020-10/2020	Inpatient	Hybrid	E-modules
Kim et al. (2020)	33	45	Not recorded	South Korea	Recently Diagnosed Cases	Single-site, non-randomized, non-controlled, open trial	2/2020-4//2020	Inpatient	Tele-health	Telephone
Kolbe et al. (2021)	13 patients, 11 staff	Not recorded	Not recorded	United States	Recently Diagnosed Cases	Single-site, open clinical trial	Spring 2020	Inpatient	Tele-health	Virtual Reality Headset
Kong et al. (2020)	26	Not recorded	Not recorded	China	Recently Diagnosed Cases	Single-site RCT single (evaluator) blind	2/2020-3/2020	Inpatient	Hybrid	Video calls
Li et al. (2020)	93	48	Male: 35.5 Female: 64.5	China	Recently Diagnosed Cases	Single-site RCT	2/2020-3/2020	Inpatient	In person	N/A
Liu et al. (2021)	252	43	Male: 59.5 Female: 40.5	China	Recently Diagnosed Cases	5-site RCT (non-blinded)	3/2020 - 6/2020	Inpatient	Tele-health	Offline mobile terminal
Sotoudeh et al. (2020)	30	43	Male: 53.3 Female: 46.7	Iran	Recently Diagnosed Cases	Single-site RCT	5/2020-6/2020	Inpatient	In person	N/A
Wei et al. (2020)	26	45	Male: 61.5 Female: 38.5	China	Recently Diagnosed Cases	Single-site RCT	2/2020-2/2020	Inpatient	Tele-health	Audio-recorded, internet-based, intervention accessed via mobile phones
Xiao et al. (2020)	79	59	Male: 55.7 Female: 44.3	China	Recently Diagnosed Cases	Single-site, non-randomized open trial	2/2020 - 3/2020	Inpatient	Hybrid	Instructional videos
Yang et al. (2020)	35	57	Male: 60.0 Female: 40.0	China	Recently Diagnosed Cases	Single-site, non-randomized, non-controlled open trial	2/2020 - 3/2020	Inpatient	Hybrid	Online counselling

criteria (https://www.crd.york.ac.uk/prospero/#aboutpage).

3. Results

The results of the present PRISMA scoping review are presented in Table 1 (Study and participant characteristics) and Table 2 (Intervention characteristics and outcomes). Only 11 studies of mental treatments for COVID-19 diagnosed or recovered patients that included depression or suicide outcomes were identified. Although this review was conducted in July of 2021, included trials were all conducted between the months of February and June of 2020, the time frame of when the disease was initially declared a pandemic (World Health Organization, 2020). This was also during the period of time where the initial (i.e., alpha) strain of COVID-19 was the dominant strain throughout most of the world, and before a COVID-19 vaccination had been developed and disseminated. Thus, at this time in the pandemic, COVID-19 illness and hospitalization may have carried a different sense of severity and uncertainty than it does now, as the virus continues to mutate and the global and medical response continues to advance. A majority (72.7%) of the studies were conducted in China, including 5 in China's Hubei province, which is where the virus is first known to have been discovered (Centers for Disease Control and Prevention, 2021). Other study sites include India (1; Jerrin et al., 2021), South Korea (1; Kim et al., 2020), the United States (1; Kolbe et al., 2021), and Iran (1; Sotoudeh et al., 2020), which demonstrates a dearth in research into treatment for COVID-19 patients and survivors from most regions of the world.

3.1. Study design and treatment population

As previously mentioned, all studies were conducted in the first half of 2020. Of the included articles, five were open trials (Jerrin et al., 2021; Kim et al., 2020; Kolbe et al., 2021; Xiao et al., 2020; Yang et al., 2020), whereas the other six were randomized control trials (Fan et al., 2021; Kong et al., 2020; Li et al., 2020; Liu et al., 2021; Sotoudeh et al., 2020; Wei et al., 2020). Three of the eleven studies included in this review did not report on gender (Kim et al., 2020; Kolbe et al., 2021; Kong et al., 2020). Most of the treatments were conducted in an inpatient setting (90.9%). Only two studies included a follow-up assessment post-intervention (1 month, Liu et al., 2021; 2 weeks, Kim et al., 2020), and none of the studies included a long-term follow-up (6 months $\leq$).

Across all eleven studies, a total of 828 participants were studied. All of the participants across all studies were recently diagnosed with COVID-19. Of note, Kolbe et al. (2021) also studied an additional 11 staff members. Although the reported gender was relatively even when this information was provided, five studies had slightly more males (Jerrin et al., 2021; Liu et al., 2021; Wei et al., 2020, Xiao et al., 2020; Yang et al., 2020), whereas three studies had slightly more female participants (Fan et al., 2021; Li et al., 2020; Sotoudeh et al., 2020). Furthermore, none of the included studies provided relevant race and/or ethnicity demographics of their participants. All 11 studies recruited participants from various hospital settings, including a tertiary care hospital (Jerrin et al., 2021), a COVID-19 recovery ward (Kolbe et al., 2021), an isolation ward (Wei et al., 2020), and an intensive care unit (Yang et al., 2020). These differences may provide insight into the severity of the COVID-19 cases enrolled in the studies.

Table 2
Intervention characteristics and outcomes.

Study	Intervention *Name*	*Description and Interventionist*	*Treatment Duration and Frequency*	*Goal of providing treatment*	*Depression Assessment*	*Assessment of Other Mental Health Outcomes*	*Key Findings and Conclusions*
Fan et al. (2021)	Narrative Exposure Therapy (NET)	NET is a Cognitive-Behavioral Therapy that targets trauma-related psychological disorders. It begins with relevant psycho-education, and through the sessions participants are guided in creating an autobiographical time-line of major life events and asked to narrate their traumatic events while providing them with a supportive environment. This treatment was administered on-one-on by doctors and nurses with relevant NET training.	90-120 min sessions, 1-2 sessions per week, over 8 weeks. Follow up session conducted 6 months post-intervention.	To explore the effects of NET on COVID-19 patients experiencing PTSS	Self-rating Depression Scale (SDS)	PTSS: PTSD Checklist-Civilian Version (PCL-C) Anxiety: Self-rating Anxiety Scale (SAS) Sleep Quality: Pittsburgh Sleep Quality Index (PSQI)	Patients in the intervention group (NET and personalized psychological intervention) reported significant improvements in PTSS symptoms post-discharge in comparison to control group members (personalized psychological intervention only). Non-significant improvements in depression, anxiety, and sleep quality were also reported following NET. Thus, NET may be an effective treatment to target trauma disorders in discharged COVID-19 patients.
Jerrin et al. (2021)	Yoga and Naturopathy Intervention	The intervention included a set of asanas (poses) in yoga, pranayama (breathing exercises), steam inhalation, salt gargling, and helio therapy (sun exposure). This treatment was administered by yoga and naturopathy doctors.	60 min session per day, every morning, for two weeks.	To assess the effects of yoga and naturopathy on anxiety and depression in COVID-19 positive patients	Hospital Anxiety Depression Scale (HADS)	Anxiety: Hospital Anxiety Depression Scale (HADS) Anxiety related to COVID-19: Corona Anxiety Scale (CAS)	Patients reported a significant reduction in anxiety and depression symptoms (across both measures) following the intervention, which suggests that yoga and naturopathy can be used as a complementary treatment for COVID-19 patients to manage their psychological symptoms.
Kim et al., 2020	Telephone-based psychiatric intervention	The intervention used a primarily supportive approach and provided patients with psychoeducation and empathy related to COVID-19 stress. Therapists also used active listening and a cognitive-behavior approach to treat inappropriate cognitive appraisals. Psychotropic medication was given in conjunction with the intervention when deemed necessary. This treatment was administered by psychiatrists who were members of the study research team.	30 min sessions, twice a week, over 5 weeks or until discharge if sooner	To investigate the feasibility and effectiveness of telephone-based interventions for psychological problems in hospital isolated COVID-19 patients	Hospital Anxiety Depression Scale - depression subscale	Anxiety: Hospital Anxiety Depression Scale - anxiety subscale Insomnia: Insomnia Severity Index Suicide: 9th item of the Beck Depression Inventory (BDI)	Significant improvements in anxiety, depression, and suicidal ideation were reported at 1 week following the start of the treatment. However, there were no significant differences between symptoms at baseline and two-weeks, which may be, in part, due to 14 study participants being discharged before 2 weeks. Telephone-based interventions may be highly successful in this patient population, with low withdrawal and refusal rates.
Kolbe et al. (2021)	Virtual Reality-based Mindfulness Intervention	Applied VR's SootheVR headset provides guided medication sessions in highly realistic, three dimensional natural settings, and sessions where patients can passively and actively explore a variety settings (e.g., swimming with dolphins, or exploring world cities). Patients were	Patients offered up to 30 min of VR use daily	To investigate the satisfaction and perceived benefit of the VR tool from patients and hospital staff	None	Investigator generated survey to assess user satisfaction and perceived benefit	The VR program was rated as highly satisfactory, with a perceived benefit for enhancing treatment for COVID-19 patients as reported by both patients and healthcare providers in a COVID-19 recovery unit. Participants commented that the use

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Table 2 (*continued*)

Study	Intervention *Name*	*Description and Interventionist*	*Treatment Duration and Frequency*	*Goal of providing treatment*	*Depression Assessment*	*Assessment of Other Mental Health Outcomes*	*Key Findings and Conclusions*
		not given tasks so as to maintain their autonomy as a therapeutic aspect of the experience. Patients used the VR individually, either guided by neuropsychological staff, with a period to reflect and debrief about the experience, or independently after initial orientation.					of VR was useful in coping with isolation and loneliness. Satisfaction and perceived benefit (the survey tool) was measured after patients' first VR session.
Kong et al. (2020)	Psychological-Behavioral Intervention	The treatment involved daily morning breathing exercises and psychosocial support given by providers, which included setting up interviews with patients, providing empathy and comfort, COVID-19 education, relaxation and self-emotional management techniques training, and supporting the patient through their treatment. This intervention was administered by two trained medical staff from the Naval Medical University.	20 min daily morning breathing exercises & 15 min psychosocial support, over 10 days	To explore the effects of a designed intervention (the psychological behavioral intervention) on the mental well-being (anxiety and depression) of COVID-19 patients	Hospital Anxiety Depression Scale	Anxiety: Hospital Anxiety Depression Scale Perceived Social Support: Perceived Social Support Scale	Participants who received the psychological-behavioral intervention reported significant improvements in anxiety, depression and perceived social support. Significant improvement was not reported by patients in the control group (TAU) between pre- and post-intervention.
Li et al. (2020)	Cognitive Behavioral Therapy (CBT)	CBT included relaxation and problem solving training and developing a social support strategy for patients. The Cognitive aspect of the intervention targeted patients' misconceptions regarding COVID-19 and its management. The Behavioral aspect aimed to provide patients strategies to cope with the illness and pandemic. CBT training was personalized to meet the unique needs and capabilities of each patient. This interventions was administered one-on-one by nurses with CBT training.	30 min sessions, once a day, for 7-29 days (until patient's discharge)	To examine the effectiveness of Cognitive Behavioral Therapy (CBT) in relieving patients' psychological distress during the COVID-19 epidemic	Chinese Version of Depression Anxiety and Stress Scale-21 (DASS-21)	Anxiety: Chinese Version of Depression Anxiety and Stress Scale-21 (DASS-21) Stress: Chinese Version of Depression Anxiety and Stress Scale-21 (DASS-21)	Significant improvements at post-intervention in depression, anxiety, and stress symptoms were reported by patients in both the intervention (CBT) and control group (routine treatment), and the patients in intervention group had a greater reduction in means. CBT may, thus, be useful in treating mental health symptoms in patients with COVID-19 infection.
Liu et al. (2021)	Computerized Cognitive Behavioral Therapy	The intervention involves interactive modules, exercises, and videos. It aims to correct negative cognition in patients, particularly in regards to stress related to COVID-19. It further provides relaxation mental imagery training, mindfulness meditation, and counting meditation as the behavioral therapy component. Patients could complete the intervention on their own, individually, or with	10+ min, daily, for one week	To assess the efficacy of computerized cognitive behaviors therapy developed by the study in improving depression and anxiety symptoms in COVID-19 patients	Hamilton Depression Rating Scale (HAMD) Self-rating depression scale (SDS)	Anxiety: Hamilton Anxiety Scale (HAMA); Self-rating anxiety scale (SAS) Insomnia: Athens Insomnia Scale (AIS)	Patients in the intervention group (computerized CBT and TAU) reported improvements in depression, anxiety and insomnia symptoms post-intervention and at the one month follow-up when compared to patients in the control group (TAU). Thus, computerized CBT may be an effective treatment for anxiety, depression, and insomnia symptoms in

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Table 2 (*continued*)

Study	Intervention Name	*Description and Interventionist*	*Treatment Duration and Frequency*	*Goal of providing treatment*	*Depression Assessment*	*Assessment of Other Mental Health Outcomes*	*Key Findings and Conclusions*
		the help of a non-psychological professional.					patients with COVID-19.
Sotoudeh et al. (2020)	The Brief Crisis Intervention Package	The intervention includes role-playing and relaxation training. Skills that were taught include adjustment, responsibility, reduction, and cognition and meta cognition techniques. This intervention was administered by two clinical psychologists.	60 min sessions, 4 sessions, over 1 month	To investigate the effects of the Brief Crisis Intervention Package on Depression, Anxiety, Stress, Quality of Life, and Mental Health symptoms in COVID-19 patients	Depression, Anxiety, and Stress Scale (DASS)	Anxiety: Depression, Anxiety, and Stress Scale (DASS) Stress: Depression, Anxiety, and Stress Scale (DASS) Quality of Life: WHO-QOL-BREF Mental health: Symptom Checklist-25 (SCL-25)	Patients in the intervention group (The Brief Crisis Intervention package) reported significant improvements post-intervention in depression, anxiety, and stress symptoms and Quality of Life scores in comparison to patients in the control group (standard individual psychotherapy). Thus, the intervention may have rapid benefits to the mental health of COVID-19 patients, and may be helpful for use with this patient population.
Wei et al. (2020)	Internet-Based Integrated Intervention	The intervention comprised breath relaxation training, mindfulness (body scan), "refuge" skills, and the butterfly hug method. Participants followed online instructions that guided them through the intervention.	50 min, daily, for 2 weeks	To introduce an internet-based integrated intervention for COVID-19 patients experiencing distress, and asses its efficacy in improving their depression and anxiety symptoms	17-item Hamilton Depression Scale (17-HAMD)	Patient Health Questionnaire - 9, General Anxiety Disorder - 7, and Hamilton Anxiety Scale	Patients in the intervention group (internet-based integrated intervention) experienced significant reductions in depression and anxiety symptoms post-intervention compared to patients in the control group (daily supportive care). The online intervention may have rapid benefits for COVID-19 patients, and should be used in the management of their psychological distress symptoms.
Xiao et al. (2020)	Progressive Muscle Relaxation Training	The training involved focusing on and relaxing muscles in a sequence of body parts, including patients' legs, waist, chest, arms, face, etc. Each session was guided by a video and audio recording of the training. Training was also taught by research team members.	15 min, twice a day, over 1 week	To assess the effects of Progressive Muscle Relaxation Training on the negative mood symptoms and sleep quality of COVID-19 patients	The patient health questionnaire (PHQ-9)	Sleep quality: the Pittsburgh sleep quality index (PSQI) Anxiety: the generalized anxiety disorder (GAD-7)	Isolated COVID-19 patients in the observation group (progressive muscle relaxation training and routine treatment and nursing) showed significant improvements in depression, anxiety, and sleep quality post-intervention when compared to patients in the control group (routine treatment and nursing).
Yang et al. (2020)	Unnamed/ unspecified psychosocial intervention (incorporates CBT techniques)	An in-person interview was first conducted to understand the psychosocial impact of the infection on patients and their family and friends. This was followed by face-to-face interviews and online consulting that involved cognitive behavior therapy, listening and supportive psychotherapy, muscle and breath relaxation, etc. The	15-30 min, 3 times a week, for 2 weeks	To assess the sleep quality and psychological well-being in COVID-19 patients and the change in their well-being following psychological intervention. Also, to identify how risk factors relating to social support affect patients' mental	Patient Health Questionnaire (PHQ-9)	Anxiety: Generalized Anxiety Disorder (GAD-7) Sleep Quality: Pittsburgh Sleep Quality Index (PSQI) Social Support: Social Support Rate Scale (SSRS)	Patients showed significant improvements in depression, sleep quality, anxiety, and social support scores post-intervention when compared to scores at baseline. Improved psychological well-being post-intervention was related to improved social support and physical

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Table 2 (*continued*)

Study	Intervention *Name*	*Description and Interventionist*	*Treatment Duration and Frequency*	*Goal of providing treatment*	*Depression Assessment*	*Assessment of Other Mental Health Outcomes*	*Key Findings and Conclusions*
		treatment was adapted progressively to meet the changing needs of patients. This intervention was administered by a psychotherapist and nurse.		health and improvement			health status related to patient's COVID-19 infection.

3.2. Content and provision of mental health treatments

Of the studies included, one provided daily sessions of Cognitive Behavioral Therapy (CBT) to patients (Li et al., 2020) until their discharge, while another study disseminated computerized CBT (c-CBT) to patients daily, for one week (Liu et al., 2021). Fan et al. (2021) administered a form of CBT known as Narrative Exposure Therapy (NET), that targets trauma-related symptoms and may, thus, be beneficial for COVID-19 patients who underwent traumatic hospital visits. Further, two psychosocial treatments developed for COVID-19 patients incorporated CBT techniques (Kim et al., 2020; Yang et al., 2020). Many of the treatments involved mindfulness and physical movement techniques to improve patients' mental health, including, yoga and naturopathy (Jerrin et al., 2021), guided meditation using virtual reality technology (Kolbe et al., 2021), daily breathing exercises (Kong et al., 2020), body scanning (Wei et al., 2020), and progressive muscle relaxation training (Xiao et al., 2020). Many studies also included relaxation techniques (63.6%), psycho-education (18.2%), coping strategies for the pandemic (36.4%), and strengthening patients' social support networks in their treatments (18.2%).

Ten of the 11 studies provided treatment during patients' hospital stay, and thus, treatments were administered for a relatively brief period, ranging between 1 and 35 days, with the exception of Fan et al. (2021), where NET was delivered in an outpatient setting over a duration of 8 weeks. Studies using a telehealth medium provided treatment through telephone calls (Kim et al., 2020), virtual reality headsets (Kolbe et al., 2021), and offline (Liu et al., 2021) and online/internet-based (Wei et al., 2020) mobile services. Other studies conducted treatment in-person (Li et al., 2020; Sotoudeh et al., 2020), while many provided hybrid services with a tele-health component, including online consulting and counselling (Fan et al., 2021; Kong et al., 2020; Yang et al., 2020) and instructional videos (Jerrin et al., 2021; Xiao et al., 2020). Treatments that involved in-person counselling or training were typically administered by trained hospital staff, including psychologists and nurses, or research team members. However, the providers' training and qualifications were often insufficiently described across the studies. Finally, whether a treatment was provided in a group or individual format was not always specified in the included articles however, all the articles that did include this information provided individual treatment.

3.3. Main treatment findings and mental health topics

The primary goal of a majority of the studies (63.6%) was to investigate the effectiveness of their respective interventions in improving patients' mental health symptoms, including anxiety and depression (Jerrin et al., 2021; Kong et al., 2020; Li et al., 2020; Liu et al., 2021; Sotoudeh et al., 2020; Wei et al., 2020), and trauma (Fan et al., 2021). Additionally, some of the studies assessed for improvements in sleep quality (45.5%), stress (18.2%), quality of life (9.1%), COVID-19 related anxiety (9.1%), and social support/perceived social support (18.2%). Only one study included a suicide outcome measure (9th item of the Beck Depression Inventory (BDI); Kim et al., 2020). Most of the controlled trials (85.7%) found that the treatment group showed significantly greater improvements post-intervention in targeted symptoms (NET, Fan et al., 2021; Psychological-Behavioral Intervention, Kong et al., 2020; c-CBT, Liu et al., 2021; The Brief Crisis Intervention Package, Sotoudeh et al., 2020; Internet-based Integrated Intervention, Wei et al., 2020; Progressive Muscle Relaxation Training, Xiao et al., 2020). Li et al. (2020) found significant improvements in both the CBT and Treatment As Usual (TAU) groups, with greater means reduction in the former. Furthermore, non-controlled trials included in the review observed significant improvements post-intervention (unspecified psychosocial intervention, Yang et al., 2020; yoga & naturopathy, Jerrin et al., 2021).

Kim et al. (2020) investigated both the effectiveness and feasibility of their telephone-based treatment, and found that it was a successful treatment modality, with low withdrawal and refusal rates; the delivered intervention was also found to be effective at 1-week post-intervention. Meanwhile, Kolbe et al. (2021) found that their virtual reality tool aimed at improving patients' depression, stress, and other mental health issues was found to be rated as highly satisfactory with high perceived benefit from patients and doctors following one session. In line with these findings, the effectiveness of c-CBT (Liu et al., 2021) and internet-based integrated intervention (Wei et al., 2020) support the use and benefit of tele-health to provide mental health treatment for COVID-19 patients. Given that many of the studies provided treatments through a combined use of face-to-face and virtual counselling and training (45.5%) and that their findings were promising, hybrid in-person and online services may also be a potential future direction for research and practice in mental health treatment for COVID-19 patients. Importantly, as previously mentioned, none of the studies included a long-term follow-up assessment, and thus, all of the interventions were able to demonstrate only immediate improvements to patients' mental health.

Lastly, it is important to note that most of the articles (63.6%) did not include information on whether participants in their study were diagnosed with depression prior to contracting COVID-19. Some of the articles stated that patients with depression (Li et al., 2020; Sotoudeh et al., 2020) or patients with any psychiatric disorder (Xiao et al., 2020; Liu et al., 2021) were excluded from study participation.

4. Discussion

The present scoping review aimed to examine the current state and findings of mental health treatment research for depression and/or suicidality in COVID-19 patients. Eleven studies reporting on a total of 828 patients were included in this review. Overall, the findings were promising regarding the immediate effectiveness of mental health treatments and the use of tele-health as a treatment modality for COVID-19 patients. CBT techniques were administered in nearly half of the trials, while the other treatments provided include yoga, muscle relaxation, and mindfulness. Most trials primarily focused on improving anxiety and depression, but numerous other symptoms were targeted as well, including sleep quality, stress, and intervention feasibility. Counselling and training in most of the interventions were either entirely or partially administered using tele-health, and all but one intervention (Fan et al., 2021) were conducted in inpatient settings. Despite positive findings across studies, limitations in study design and methodology descriptions may reduce the generalizability and replicability of these

findings. These limitations may, in part, be due to rapid efforts to meet an urgent need for mental health intervention research after the onset of the COVID-19 pandemic.

This scoping review found that CBT training was commonly administered to COVID-19 patients to improve their mental well-being; three of the included articles provided CBT (Li et al., 2020; Liu et al., 2021) or CBT-based therapy (NET, Fan et al., 2021). Two studies also incorporated CBT techniques into provided treatments. For instance, Kim et al. (2020) employed cognitive re-appraisal training to address patients' irrational beliefs, particularly about their illness, to reduce their distress. Meanwhile, Yang et al. (2020) provided CBT for patients' individual and evolving needs; for example, a patient with constant chest tightness was asked to pay notice to their symptom, its triggers, and distinguish between physical and psychological experiences of tightness. The results of these CBT trials were positive and promising, which aligns with prior research that demonstrates the effectiveness and feasibility of CBT for depression in patients with other respiratory illnesses, including chronic obstructive pulmonary disease (COPD) (Fritzsche et al., 2011) and asthma (Yorke et al., 2017). Other forms of treatments administered in the studies include yoga, relaxation, and other mindfulness- and body-focused training. Research into mindfulness demonstrates its positive mental and physical health benefits for hospitalized persons with acute pain (Miller-Matero et al., 2019), cancer (Compernolle, 2020), psychiatric disorders (Mistler et al., 2017), and other hospitalized patient populations.

As previously described, emerging research shows a link between depression and COVID-19 illness, particularly in those who underwent hospitalization (Zhao et al., 2020). Thus, our current review focused on depression symptoms in COVID-19 patients. Suicide measures were noted in the review as well, given the paucity in research into the link between COVID-19 and suicidality. As a result, all of the reviewed studies assessed for depression outcomes in their treatment trials. Depression and anxiety were primary symptoms targeted by most of the included interventions, and are commonly seen in similar patient groups, including survivors of other respiratory illnesses requiring hospitalization (Lam et al., 2009; Batawi et al., 2019). Most of the reviewed treatments showed significant reductions in depression post-intervention in comparison to control or baseline (Jerrin et al., 2021; Kim et al., 2020; Kong et al., 2020; Li et al., 2020; Liu et al., 2021; Sotoudeh et al., 2020; Wei et al., 2020; Xiao et al., 2020; Yang et al., 2020). As all but one of the treatments (Fan et al., 2021) was provided in an in-patient setting, these findings suggest that providing mental health treatment to hospitalized COVID-19 patients could assist in mitigating their depression with immediate effects. Furthermore, although depression is highly comorbid with suicidal ideation and behavior (Rudd et al., 1993), only one reviewed study, Kim et al. (2020), assessed suicide outcomes post-intervention. The study yielded positive results, demonstrating reduced suicide ideation in patients at 1 week following the start of a telephone-based psychiatric intervention (Kim et al., 2020). Several researchers have proposed that COVID-19 survivors with mental health disorders and those with post-COVID syndrome may be acutely at risk of developing suicidal symptoms (Jefsen et al., 2020; Sher, 2021). Our review therefore demonstrates an urgent need for mental health treatment research to address and assess for suicidality in COVID-19 patients.

Most of the included interventions were administered by doctors, nurses, or members of the study research team or hospital medical staff. However, providers' training was not described in sufficient detail across most of the papers. The finding that a variety of professionals were involved in administering treatments is a promising finding, given that hospital resources have been strained over the course of the pandemic; interventions can be delivered with greater feasibility if administration can be shared between a large and diverse pool of medical staff. This notion is supported by the positive findings from treatments included in this review such as muscle relaxation (Xiao et al., 2020) or virtual reality-based mindfulness intervention (Kolbe et al., 2021), which are treatments that may be easier to train non-mental health professionals in delivering in comparison to CBT and other psychosocial interventions. Another aspect of treatment provision that the present scoping reviews assessed for was whether treatments were delivered in a group or individual format. Many of the included studies did not specify this detail, and among those that did, all were delivered in individual sessions. Group treatment is a key consideration for treatment development and adaptation for COVID-19 patients, given that the illness and hospitalization (Hao et al., 2020) and pandemic (Killgore et al., 2020) have both shown to be isolating experiences. Prior research has demonstrated the effectiveness of group treatment in promoting social support and mitigating loneliness (e.g., Project Life Force; Goodman et al., 2021), and thus, group treatment for COVID-19 patients is an important avenue for future research and treatment efforts.

Across most of the review studies, treatments were provided either entirely or partially using tele-health services, with only two studies being completely delivered in-person (Li et al., 2020; Sotoudeh et al., 2020). The tele-health modalities used in the study include telephone (Kim et al., 2020), virtual reality headsets (Kolbe et al., 2021), and online services (e.g., Yang et al., 2020). There are several advantages to adapting treatments to tele-health and hybrid formats, including increased accessibility, cost-effectiveness, and the ability to provide novel or improved treatment experiences. Our review found preliminary evidence that different tele-health treatments may be effective, acceptable, and feasible in treating depression and other mental health symptoms in hospitalized COVID-19 patients. Furthermore, demand for mental health services among underserved populations is increased with the emergence of tele-health, inferred to be due to ease of access and reduced cost for patients and providers (Botaitis and Southern, 2021). It is important to note that there may be significant barriers to delivering treatment via tele-health in certain resource-limited settings. In such regions, a systematic and community-based approach to disseminating tele-health treatment may be necessary for promoting equitable access to care (Tran et al., 2020). In addition to increased accessibility, tele-health or hybrid modalities afford patients unique benefits and experiences, including access to instructional videos to view at any time point (e.g., Jerrin et al., 2021) or mindfulness training in different virtual reality landscapes (Kolbe et al., 2021).

Small sample sizes and a lack in sufficient description of methodology are largely responsible for reduced generalizability and replicability of findings across many included articles. Sample sizes across the studies ranged from 24 to 252 participants, and thus, a critical consideration for future research in the area is to enroll larger samples into trials to increase the power of treatment findings. Secondly, some studies were open trials without randomization (36.4%) or a control group (18.2%), which limits our ability to determine the efficacy of a specific treatment. Few details were provided regarding treatment attendance, integrity, control group treatment, and providers' training across studies, further affecting the replicability of these findings. Furthermore, a majority of the reviewed articles did not include any information regarding whether participants were diagnosed with depression prior to receiving a COVID-19 diagnosis. Thus, another key consideration for future research is to assess whether participants experienced depression prior to contracting COVID-19, as this an important factor to control for when measuring the efficaciousness of mental health treatment for depression and other psychiatric symptoms in COVID-19 patients. Another important limitation across the included studies is that relevant information on participants' race and ethnicity was not disclosed. COVID-19 has disproportionately impacted minority communities in the United States and across the world, and thus, mental health treatment research for COVID-19 patients must report these key demographics to ensure their tested treatments are generalizable and beneficial to all.

Furthermore, all the reviewed articles lack long-term post-intervention follow-up assessments (6 months $\leq$) and all but one article (Fan et al., 2021) reviewed inpatient services for recently diagnosed or recovered patients. Consequently, most of the current mental health

treatment research for depression and suicidality in COVID-19 patients targets acute symptoms for hospitalized patients and demonstrates immediate, rather than sustained, effects. Given emerging research into long-term mental health effects in patients who contracted or were hospitalized for COIVD-19, including a study showing that patients may experience anxiety and depression up to 12 months following hospital discharge and recovery (Liu et al., 2021), long-term follow-up periods and outpatient services are critical considerations for future research in the area. Lastly, future research into mental health treatments for COVID-19 patients should analyze the costs and benefits of their interventions in order to provide detailed and helpful information to health agencies on how to adapt and implement treatments in various healthcare settings.

5. Conclusion

The present scoping review found that there were few studies that investigated the effectiveness of mental health treatments targeting depression and suicidality in COVID-19 patients published before 7/1/2021. The treatments commonly included CBT techniques, while other interventions provided include mindfulness training, yoga, muscle relaxation, etc. The trials found promising results regarding the immediate positive effects of mental health interventions for COVID-19 patients, particularly in in-patient settings. Most of the treatments were delivered using a tele-health or hybrid (in-person and tele-health) medium, which has important implications for increased accessibility to treatment. All the included studies targeted and/or assessed for depression in patients, and other studied outcomes include feasibility, sleep quality, social support, trauma, etc. Future directions for mental health treatment research for COVID-19 patients are discussed, and they include targeting suicide and long-term symptoms, investigating the effects of group treatment, and including longer follow-up assessments and other key improvements to study design and reporting to increase the quality, power, generalizability, and replicability of findings.

Declaration of Competing Interest

None.

Acknowledgements

This scoping review was supported by the VISN Mental Illness Research, Education and Clinical center (MIRECC). The content of this article is solely the responsibility of its authors and does not necessarily represent the views or official position of the Veterans Administration or the U.S. Government. The authors would like to acknowledge Levy Library at Mt. Sinai for providing access to Covidence software.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2022.114748.

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