University of Nebraska Medical Center
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Translational Science in Occupation

Volume 1 | Issue 3 Article 2

2024

Mapping Occupational Therapy Interventions in Adult Patients with Post-COVID Diagnosis: A Scoping Review

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Recommended Citation
Ng, J., Franks, H., Halvorson, M., Malone, S., Hilton, C. L., & Mani, K. (2024). Mapping Occupational Therapy Interventions in Adult Patients with Post-COVID Diagnosis: A Scoping Review. *Translational Science in Occupation, 1*(3). https://doi.org/https://doi.org/10.32873/unmc.dc.tso.1.3.02

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Abstract

Importance: Post-COVID patients experience difficulties in their everyday lives due to the persistent nature of their symptoms. This scoping review explores the role of occupational therapists in treating post-COVID patients and examines occupational therapy intervention options for this population.

Objective: This scoping review seeks to answer the following questions: What does the literature say about the role of occupational therapy with post-COVID patients? Which rehabilitation interventions are currently being utilized for treatment? How often are occupational therapists involved in the treatment of and research of post-COVID patient care?

Data Sources: Articles were obtained through an exhaustive search in the following databases: Ovid - Medline, Scopus, CINAHL, and Cochrane Library.

Study Selection and Data Collection: Articles included were required to be within the scope of occupational therapy practice, address post-COVID patients, use an intervention method, have full-text article available in English.

Findings: Overall, 33 articles met inclusion criteria. Six articles had occupational therapy involvement in treatment while the remaining articles did not specify occupational therapy involvement but were options for occupational therapists.

Conclusions & Relevance: Occupational therapists are infrequently engaged in research regarding post-COVID patients despite many of the interventions falling within the occupational therapy scope of practice. Interventions commonly used with post-COVID patients that fall within occupational therapy's scope of practice included therapeutic exercise, pulmonary exercise, client education, mental health interventions, functional training, and cognitive training.

Keywords

Adults, COVID-19, occupational therapists, professional practice, health

Cover Page Footnote

We would like to thank Alison R. DeVries for her assistance with the literature review and Daisy Gomez for her integral role in our research team.

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ABSTRACT

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PLAIN LANGUAGE SUMMARY

People who have had COVID-19 may stay sick for a long time and may not be able to do things they want and need to do. We read research studies about various treatments for these people. These studies show that occupational therapy helps teach people how to do things in a different way. People were also taught exercises to get stronger. Overall, occupational therapy was shown to be useful in helping these people. We need to keep studying occupational therapy treatment for COVID-19.

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Mapping Occupational Therapy Interventions in Adult Patients with Post-COVID Diagnosis: A Scoping Review

COVID-19, also known as coronavirus disease or SARS-CoV-2, has affected millions of people around the world since its outbreak in 2019 (Centers for Disease Control and Prevention [CDC], 2022). Although numerous COVID-19 strains exist and can cause a variety of symptoms, one common consequence exists among them: the risk of developing long-term symptoms. The symptoms commonly reported include cough, fatigue, dyspnea, loss of taste or smell, headaches, psychological distress, muscular weakness, and cognitive impairments (CDC, 2022; Faghy et al., 2022; Halpin et al., 2020). This condition can affect both those who were diagnosed with COVID-19 and those unaware of the infection (Parker et al., 2021).

According to the CDC, individuals infected with COVID-19 and experience new, returning, or ongoing symptoms that last weeks, months, or even years are considered post-COVID (CDC, 2022). Similarly, the National Institute for Health and Care Excellence (NICE) defines post-COVID as continuous physical, mental, or cognitive symptoms that last at least 12 weeks after being diagnosed (Parkin et al., 2021). The persistence and high prevalence of symptoms has increased the need for rehabilitation services to ensure continuity of care and decrease the chances of long-term disability (Leite et al., 2021; Simpson & Robinson, 2020).

The current review focuses on the clinical treatment of post-COVID patients by occupational therapy practitioners (OTPs). OTPs are rehabilitation specialists who provide interventions that facilitate client engagement in meaningful activities (American Occupational Therapy Association [AOTA], 2020). The Occupational Therapy Practice Framework describes an occupational therapy practitioner's role as increasing a person's ability to participate in their preferred daily activities or occupations. Interventions include symptom management, physical exercise, breathing techniques, and behavioral practices to promote health.

With the influx of post-COVID patients, OTPs play a key role in the rehabilitation process (Leite et al., 2021). The symptoms impact a person's ability to functionally engage in their activities of daily living (ADL; e.g., dressing, bathing, hygiene) as well as their instrumental activities of daily living (IADL; e.g., meal preparation, driving, care of others). The multisystem impact of post-COVID can affect a person's sleep patterns, ability to return to work, and engagement in everyday activities (Faghy et al., 2022; Heightman et al., 2021). As such, it is important for OTPs to engage with this population due to the limits on occupational engagement caused by these symptoms. OTPs can operate in numerous settings ranging from hospital acute care, long-term acute care, inpatient or outpatient rehabilitation, and home health (AOTA State Affairs Group, 2017). This implies that OTPs can evaluate patients regardless of their disposition if a referral for evaluation is obtained. Additionally, they can collaborate with an interdisciplinary team of healthcare professionals within these settings to optimize the rehabilitation of individuals with post-COVID symptoms (Piquet et al., 2021).

Although studies have been published about post-COVID treatments utilizing rehabilitation professionals (Fugazzaro et al., 2022; Webber et al., 2021), little has been written about the common approaches for post-COVID patients amongst OTPs. Systematic reviews with a focus on the multidisciplinary approach to the management of post-COVID have been published (Cha & Baek, 2021). Other studies describe the physical therapy (physiotherapy) interventions used for post-COVID patients (Swaminathan et al., 2020; Viera et al., 2022). However, no scoping or systematic reviews focus exclusively on an OTPs approach to interventions.

Systematic reviews on the role of OTPs with patients who were actively infected with COVID-19 have been published; however, none specifically presented a focus on the role of occupational therapy with post-COVID patients (Ataide et al., 2021). This scoping review examines the potential occupational therapy interventions described in the literature specific to the care of post-COVID patients to establish the role of occupational therapy.

Method

The goal of the review was to map and examine the emerging evidence regarding occupational therapy intervention options for treating post-COVID symptoms. Hence, we decided to use a scoping review format. Additionally, the literature for post-COVID is ever-evolving because COVID-19 is a new condition.

Following Arksey and O'Malley's (2005) and Peters et al. (2020) frameworks, this scoping review was conducted to determine the current gaps in research of occupational therapy interventions with post-COVID patients, to identify OTPs value and role in treating these patients, and to illustrate these findings to stakeholders. We chose to conduct a scoping review as our method of study over a systematic review because published literature regarding the treatment OTPs provide to post-COVID patients is scarce and unfocused. The five steps of the scoping review methodology were followed: (1) identifying the research questions, (2) identifying relevant research articles, (3) selecting relevant studies, (4) charting the data, and (5) collecting and summarizing the data (Arksey & O'Malley, 2005).

The questions guiding our scoping review were: (1) What does the literature say about the role of occupational therapy with post-COVID patients? (2) Which rehabilitation interventions are currently being used for treatment? (3) How often are OTPs involved in the treatment and research of post-COVID patient care?

To ensure a comprehensive search, a team of five graduate students (JN, HF, MH, DG, and SM) under the supervision of two professors (KM and CH) as well as a library liaison (AD) searched the following online databases on July 15, 2022, for eligible peer-reviewed articles: Ovid - Medline, Scopus, CINAHL, and Cochrane Library. We purposefully selected these databases because they target healthcare research outcomes. Databases that did not include articles regarding medical professionals or practice were excluded.

The key medical subject heading (MeSH) terms used in our search are listed below in Tables 1-3. The same keywords were used across all databases, but the syntax used was adjusted based on the specific requirements of each database. We included the first set of "occupational therapy" terminology variations to cover the range of semantic differences that can appear across the databases and articles. The latter half of the search term focuses on the "post-COVID" status, which is new both in literature and study. Our research team tried to comprehensively search for all terminology that would capture this population of interest after doing an initial search for commonly used terms.

Articles included the population of interest, patients who previously had COVID and continued to experience symptoms. All ages of patients were included. Studies of other populations were excluded.

Table 1

Keyword search syntax and search strategy for Ovid - Medline and CINAHL

1. Occupational Therapy
2. Occupational Therapists
3. "occupational therap*"
4. Rehabilitation
5. Functional Status
6. Activities of Daily Living
7. 1 OR 2 OR 3 OR 4 OR 5 OR 6
8. Post-COVID
9. Long-COVID
10. "COVID-19 Recovery"
11. "COVID Recovery"
12. "Post-Acute COVID-19 Syndrome"
13. 8 OR 9 OR 10 OR 11 OR 12
14. 7 AND 13

Table 2

Keyword search syntax and search strategy for Scopus

1. "Occupational Therapy"
2. "Occupational Therapists"
3. "Occupational therap*"
4. Rehabilitation
5. "Functional Status"
6. "Activities of Daily Living"
7. 1 OR 2 OR 3 OR 4 OR 5 OR 6
8. Post-COVID
9. Long-COVID
10. "COVID-19 Recovery"
11. "COVID Recovery"
12. "Post-Acute COVID-19 Syndrome"
13. 8 OR 9 OR 10 OR 11 OR 12
14. 7 AND 13

Table 3

Keyword search syntax and search strategy for Cochrane Library

1. "Occupational Therapy" OR "Occupational Therapists" OR occupational therap* OR Rehabilitation OR "Functional Status" OR "Activities of Daily Living"
2. Post-COVID OR Long-COVID OR "COVID-19 Recovery" OR "COVID Recovery" OR "Post-Acute COVID-19 Syndrome"
3. 1 AND 2

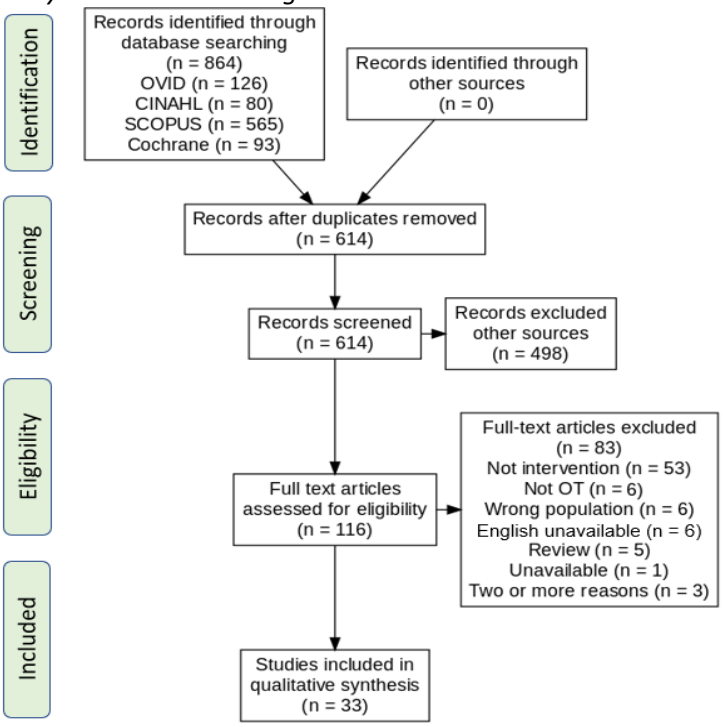
As one of the primary goals of the scoping review was to establish the role of occupational therapy with post-COVID patient care, articles were required to involve either an OTP or include interventions that fall within the OT scope of practice. Inclusion of the latter criteria was added during the initial search process as there was a limited amount of published literature that utilized OTPs for treatment. The reviewers used the Occupational Therapy Practice Framework (AOTA, 2020) for comparison to determine if interventions fell within the occupational therapy scope of practice.

Studies that were non-interventional, published in a language other than English, or unavailable in full text were excluded. We did not consider or report on the level of evidence or risk-of-bias assessment when deciding to include or exclude articles. Systematic and scoping reviews were excluded; however we searched reference lists for additional literature not found in initial database searches.

After searching each database, selected articles were divided evenly among the five graduate students for efficiency of initial screening, which consisted of reviewing the article's title and abstract to determine initial eligibility based on inclusion and exclusion criteria. If a student was unsure of an article's eligibility, the full text was reviewed to ascertain eligibility. If an article was still questionable, the entire team read the full text, compared the article to eligibility criteria, and had to agree regarding inclusion or exclusion. For verification of final eligibility, the team cross-checked each other using full-text articles and eligibility criteria. The study selection process is shown in Figure 1.

Figure 1.

Study Selection Flow Diagram



Once search and eligibility screening were finished, finalized articles were divided among the group to complete the evidence table. Then, the team collectively analyzed the data obtained to address the research questions. The team created a spreadsheet with major columns designating research objectives and sub-columns for specific information, such as intervention type. Later, the objective questions were assigned to two or three authors depending on level of complexity and number of articles involved for further analysis, discussion, and summarization of results.

Results

864 articles were retrieved from our initial database search, and 33 articles were included in this review. Figure 1 displays the study inclusion results. The aim of this scoping review was to examine the roles of OTPs in this population and which interventions are currently in use for post-COVID patients. Of

the 33 articles that fit the criteria for this scoping review, six utilized interventions performed by OTPs on patients with post-COVID symptoms while 27 were multidisciplinary studies including interventions that fall within the scope of occupational therapy practice. The Appendix shows the details of the results from each included article.

Most articles (n=22) were higher levels of evidence such as randomized or nonrandomized control trials or pre/post or cohort studies. There was representation from multiple countries and continents, providing additional varied perspective of obtained data (Albu et al., 2021; Chuang et al., 2022; Espino-Tato et al., 2022; Harenwall et al., 2021; Novak et al., 2022; Wilcox & Frank, 2021).

Population

The studies examined adults aged 18 years or older with a combined 1440 participants. No pediatric studies fit the inclusion criteria. All included studies confirmed previous COVID-19 diagnosis and persistence of symptoms; however, each study defined "post-COVID" differently. For this review, we defined post-COVID diagnosis as a negative COVID-19 test with participants who continued to experience symptoms regardless of time since initial onset.

Interventions

The involvement of OTPs in post-COVID interventions was examined by reviewing studies that utilized OTPs or interventions within occupational therapy's scope of practice (AOTA, 2020). Only two studies exclusively included OTPs providing the interventions (Espino-Tato et al., 2022; Wilcox & Frank, 2021). Four of the articles had one or more additional disciplines working with the OTPs to provide care for this population (Albu et al., 2021; Chuang et al., 2022; Harenwall et al., 2021; Novak et al., 2022). A multidisciplinary team without occupational therapy was utilized for one other study (Nopp et al., 2022). Seven studies did not indicate who performed the intervention. The lack of clarity about which professional provided the interventions makes it difficult to draw conclusions on specific role of occupational therapy.

Researchers identified OTPs involvement in treatment through specific intervention strategies. Most studies (n=28) reported therapeutic exercise such as aerobic exercise and strengthening to combat post-COVID symptoms. Seventeen articles implemented pulmonary exercises, six addressed functional training, such as ADL engagement, five reported interventions that contained cognition training (Albu et al., 2021; Espino-Tato et al., 2022; Kolbe et al., 2021; Kireyev et al., 2021; Mayer et al., 2021), 10 incorporated education and three addressed nutrition adjustments (Harenwall et al., 2021; Kokhan et al., 2022; Maniscalco et al., 2021). Nine studies included mental health in their interventions. One study reported the use of physical agent modalities (PAMs) (Santos & Flores, 2022) and another study reported fabricated orthotics (Albu et al., 2021). Many articles included multiple interventions, but for simplicity, the interventions were totaled separately.

Practice Setting

To answer the guiding question of how OTPs are involved in the treatment of post-COVID patients, we examined practice settings. Most interventions (n=10) took place in outpatient settings or inpatient settings (n=8). Ten studies used telerehabilitation as the primary delivery of intervention. Five studies were home-based (Avancini et al., 2021; Hameed et al., 2020; Kortianou et al., 2022; Longobardi et al., 2022; Santos & Flores, 2022). Two studies have unknown practice settings (Daynes et al., 2021; Kireyev et al., 2021). One study was at a cardiopulmonary rehabilitation clinic (Tosato et al., 2021). One study took place at a post-acute pulmonary rehabilitation clinic (Maniscalco et al., 2021). One study was listed as post-acute care but did not specify type (Udina et al., 2021).

Discussion

Based on the results, we identified three major themes regarding literature on post-COVID patients. Themes include a general outline of the role of occupational therapy, involvement of treatment independently or in a team, and the emerging use of telerehabilitation for interventions.

Role of Occupational Therapy

One of the aims for this review was to understand the occupational therapy practitioner's role in treating post-COVID patients. Because an occupational therapy intervention protocol for post-COVID patients is not currently established, many of the articles primarily followed the standard protocol of pulmonary intervention which consists of respiratory monitoring combined with therapeutic exercise (Albu et al., 2021; Grbovic et al., 2021; Hsu et al., 2022; Kokhan et al., 2022; Okan et al., 2022). Only two articles utilized OTPs exclusively to provide interventions to post-COVID patients (Espino-Tato et al., 2022; Wilcox & Frank, 2021). In both articles, the researchers used OTPs in many ways to focus on patient outcomes. These interventions included ADL/IADL engagement, cognition, and various methods to increase activity tolerance including exercise and energy conservation. These studies show that OTPs can be used holistically, targeting the mental and physical symptoms of the post-COVID symptomatology.

In contrast, OTPs working in interdisciplinary settings typically focused on ADL/IADL engagement exclusively (Albu et al., 2021; Chuang et al., 2022; Novak et al., 2022). These studies followed more traditional role placement in which physical therapists conducted exercise and psychologists oversaw mental health. Harenwall et al. (2021) conducted a study in which OTPs often worked in pairs with another rehabilitative professional to facilitate exercise, education, and address mental health issues. Within the interdisciplinary setting, the occupational therapist's role shifts to working on functional activities and engagement as the other roles are being fulfilled by various rehabilitation professionals.

OTPs have a role in treating post-COVID symptoms, including working separately and with an interprofessional team. Interventions by an occupational therapist include therapeutic exercise, cognition, or mental health, also indicated in occupational therapy scope of practice (AOTA, 2020; Espino-Tato et al., 2022; Wilcox & Frank, 2021). Based on this review, there is currently no explicit protocol for OTPs to follow in post-COVID patients. Lack of a clear plan could also be because OTPs are client-centered and have different care plans based on the individual needs of each client (AOTA, 2020).

As the number of individuals grows who have experienced critical COVID-19 illness and post-COVID symptoms, there is an increasing need for intervention with rehabilitation professionals including OTPs (Leite et al., 2021; Simpson & Robinson, 2020). Increasing concomitant mental health conditions, such as anxiety and depression (Simpson & Robinson, 2020), suggest a growing need for intervention that may also be addressed by OTPs (AOTA, 2020).

Occupational Therapists Involvement in Treatment

Most studies identified therapeutic exercise as a primary intervention. Programs commonly included balance training, aerobic or endurance exercises, strengthening or resistance training, and stretching. Interventions to increase activity tolerance through graded exercise also addressed fatigue, one of the symptoms reported by the CDC (2022) for individuals with post-COVID diagnosis. All studies using therapeutic exercise reported either an increase in perceived physical health, functional activity engagement, or decreased fatigue, indicating that therapeutic exercise may be a necessary intervention with post-COVID patients. Due to COVID-19 protocols at the time, some therapeutic exercise programs were completely or partially remote. The program participants made progress when there were

supplemental weekly telehealth appointments from professionals. The accountability from weekly telehealth sessions may have ensured progress in this population.

Telerehabilitation appeared to be a viable option for the treatment of post-COVID symptoms. In the beginning of the pandemic, countries across the globe enforced lockdowns and social distancing to protect the public from this highly contagious virus. As a result, the use of telehealth has grown in the United States since the start of the COVID-19 pandemic (Shaver, 2022). This has caused a significant demand for healthcare professionals to familiarize themselves with virtual services and discover their unique roles in treating patients with this new condition. The use of telerehabilitation interventions may be due to these lockdowns across the globe and the increase in the promotion of reducing in-person contact to minimize the spread of the COVID-19 virus.

The CDC (2022) reported that post-COVID patients continue to experience decreased pulmonary function such as difficulty breathing and persistent cough following discharge from the hospital. This is consistent with our findings that most studies used a pulmonary program, intervention, or measurement to improve or assess pulmonary functioning. Pulmonary programs were primarily facilitated by physical therapists and OTPs with the aid of respiratory therapists who were responsible for evaluating lung function and providing or adjusting respiratory tanks as needed throughout the sessions. For OTPs, interventions can include diaphragmatic strengthening, resistive diaphragmatic exercise, or pursed lip breathing (Albu et al., 2021; Harenwall et al., 2021; Novak et al., 2022).

Cognition and mental health were also areas in which OTPs intervened. Interventions that focused on cognition in post-COVID patients were implemented by OTPs, physical therapists, neuropsychologists, or unknown treatment providers (Albu et al., 2021; Espino-Tato et al., 2022; Kolbe et al., 2021; Kireyev et al., 2021; Mayer et al., 2021). The cognitive interventions provided by OTPs specifically (Espino-Tato et al., 2022) showed a reduction in the incidence of mild cognitive impairment. For post-COVID patients, addressing cognition is particularly important given the common symptom of “brain fog” (CDC, 2022). Mental health issues in the form of anxiety and depression have been commonly reported in post-COVID patients (Bhakaney et al., 2021; Cahalan et al., 2022; Harenwall et al., 2021; Kolbe et al., 2021; Maniscalco et al., 2021; Mayer et al., 2021; Novak et al., 2022; Wilcox & Frank, 2021). Wilcox and Frank (2021) was the only study in which occupational therapy addressed mental health. Their interventions included coping strategies of journaling, mindfulness, or reflection on emotional experiences.

Patient and care partner education was also a frequently intervention (Albu et al., 2021; Bhakaney et al., 2021; Chuang et al., 2022; Daynes et al., 2021; Grbovic et al., 2021; Harenwall et a., 2021; Mayer et al., 2021; Spielmanns, Buelow, et al., 2021; Udina et al., 2021; Wilcox & Frank, 2021). Education was primarily used to support intervention. However, studies that included education did not specify method of delivery or type of intervention provider. Given that patient and caregiver education is part of the intervention process, it is possible for OTPs to fulfill this role (AOTA, 2020).

One study mentioned orthotic device prescription as an intervention but did not specify the intended use (Albu et al., 2021). Because of the scarcity of this intervention in the literature, we conclude that orthotic device prescription is uncommon in post-COVID patients and, therefore, may need further research regarding its use with this population.

Limitations

A major limitation of the study lies in the lack of an established MeSH search term for post-COVID symptoms. We worked with a librarian to formulate a comprehensive search strategy, but some studies may have been missed due to post-COVID symptomatology being a recent phenomenon. Articles addressing interventions within the scope of occupational therapy practice performed by other healthcare professionals may have also not been retrieved by our search strategy focused on occupational therapy practice. Additionally, the articles included in the current study may not have comprehensively reported interventions currently in use.

Defining the post-COVID timeline was also an area of limitation as each study used different criteria. For the current scoping review, we included any study in which patients continued to experience symptoms despite a negative COVID test. However, in addition to a negative COVID test, some of the included studies required a minimum amount of time to pass. Symptom presentation and impact on ADLs may differ depending on time since diagnosis. As the timelines for post-COVID diagnosis differed between studies, it is difficult to draw detailed conclusions regarding the efficacy of interventions.

Lastly, we had to limit the articles to full-text availability in English only. This may have biased some of the geographical representation. The articles that met inclusion criteria only included adults as all articles that included pediatric patients did not fit within the subject matter. Given that the initial search yielded studies that focused on the adult patients, the results of the current review may not be generalizable to the pediatric population.

Future Research

Future research could explore the efficacy of occupational therapy interventions with the pediatric population, as 1.3% of U.S children diagnosed with COVID had long COVID (CDC, 2023). Search results generated few studies with pediatric patients, and none fit the inclusion and exclusion criteria for the current review. Future studies could triangulate effectiveness of interventions with other populations.

Most studies included in this scoping review identified interventions completed by other rehabilitation professionals but within the occupational therapy scope of practice. Future research is needed to establish occupational therapy role when treating the post-COVID population, as this scoping review only yielded six studies that included intervention by OTPs. It is also possible that there are additional studies that used OTPs but some of the literature did not specify who provided the intervention.

Research performed by OTPs was scarce. Without published literature, it is difficult to draw conclusions regarding evidence-based practice. OTPs should seek opportunities at the local or national level to publish or present findings.

Conclusion

The goal of this review was to examine the potential occupational therapy interventions described in the literature specific to the care of post-COVID patients and to establish the role of occupational therapy in the treatment of post-COVID patients. This review exhibited the following implications for occupational therapy practice and research:

- Commonly used interventions among all rehabilitation specialists were therapeutic exercise, functional training, pulmonary exercise, education, cognition, and mental health. Results from the

literature review indicate that these interventions were beneficial for patients. If OTPs provide service, they should incorporate these interventions.

- According to the research, OTPs tend to use ADL retraining or bedside mobility within interprofessional settings. OTPs provide a unique perspective that is functionally oriented, which can serve as a benefit in co-treatment. Further research is needed to establish how OTPs can be used within the interprofessional setting aside from ADL performance.
- There is a need for more research related to post-COVID care as it may further establish the role of OTPs in post-COVID patient care and the extent to which they can be utilized. This review yielded only six articles in which OTPs were cited to perform post-COVID care interventions, indicating a major gap within published literature.

Knowledge Translation Takeaway

Current literature suggests that OTPs focus on therapeutic exercise, functional training, pulmonary exercise, education, and interventions that address cognition and mental health. The role OTPs fill, however, may depend on the clinical setting or team member composition. If working interprofessionally, OTPs may focus more on functional training or bedside mobility. Alternatively, if speech therapy or counseling is not involved, OTPs may more thoroughly address cognition or mental health. Because OTPs have a wide scope of practice, they may find themselves filling in intervention gaps (AOTA, 2020).

An initial interview on July 15, 2022, with Susanne Boisvert, an occupational therapist treating post-COVID patients in the inpatient rehabilitation setting, revealed interventions center around functional activities. Consistent with our findings from the literature, OTPs must tailor the interventions to each specific patient (Avancini et al., 2022; Bhakaney et al., 2021). Patient experiences of post-COVID vary in terms of symptoms and severity; OTPs must constantly monitor vital signs to progress treatment while bearing in mind cardiac and pulmonary precautions.

While published literature pertaining to occupational therapy practices with post-COVID care is scarce, this review provides a starting point for evidence-based practice. OTPs should consider engaging in research to add to the body of literature and explore other areas of post-COVID care such as in pediatric populations.

Acknowledgement

We would like to thank Susanne Boisvert, Alison DeVries, and Daisy Gomez for lending us their expertise.

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Appendix

Interventions Performed by Occupational Therapy Practitioners with Post-COVID Patients.

Author/Year	Level of Evidence/ Study Design/Setting	Participants/ Inclusion Criteria[a]	Intervention and Control Groups	Outcome Measures[b] and Results
Albu et al., 2021	Level: 3B Study: Pre-Posttest Intervention Setting: Outpatient	Participants: ● N = 43 (24 males, 16 females, ● Mean age of 52 years Inclusion Criteria: ● Neurological, cognitive, and musculoskeletal sequelae ● Persistent symptoms >3 months following COVID-19 infection confirmed by PCR	Rx provider: physicians, neuropsychologists, OTPs, and physical therapists Intervention: ● Physical rehabilitation: static/dynamic balance, endurance, fatigue management ● Individualized OT programs w ADL/IADL retraining, orthotic or technical aid ● Cognitive rehabilitation: Guttmann, NeuroPersonalTrainer® ● Respiratory rehabilitation with resistance	Improvements were seen in physical functioning, self-care, cognition, respiratory performance, and fatigue.
Chuang et al., 2022	Level: 4 Study: Case Series Intervention Setting: Inpatient	Participants: ● N = 5 (1 female, 4 males) Inclusion Criteria: ● Two consecutive sets of PCR w negative results or a cycle threshold value exceeding 34 within 7 days	Rx provider: physical therapists, OTPs, and speech language pathologists Intervention: ● 20-minute sessions/day; 5 days/week ● PT program: strengthening, training on balance, aerobic exercise, ambulation ● OT program: Skill training BADLs, energy conservation, adaptive devices, environmental modification	Barthel Index score assessing ADL performance and Functional Ambulation Category score increased in all five patients. Functional Oral Intake Scale either increased or remained the same.
Espino-Tato et al., 2022	Level: 3B Study: Pre-Posttest Intervention Setting: Inpatient	Participants: ● N = 30 (ages 74-95 years, predominantly female) Inclusion Criteria: ● “passed the Covid-19”	Rx provider: OTPs Intervention: ● 5 weekly sessions of 50 to 60 minutes ● Joint mobility ● Postural hygiene ● Recognition of body schema ● Cognition ● Leisure participation	Incidence of mild cognitive impairment decreased on the Lobo Mini Mental Scale. Independence increased on the Barthel Index.

Harenwall et al., 2021	Level: 3B Study: Pre-Posttest Intervention Setting: Telehealth	Participants: ● N = 76 (53 female, Mean age 48.97 years) Inclusion Criteria: ● Self-report of Long-COVID-19 following National Institute for Health and Care Excellence guidelines	Rx provider: clinical psychologist, physiotherapist, occupational therapist, dietician, speech and language pathologist, and a personal support navigator Intervention: ● 7-week rehabilitation course ● Education: fatigue and activity management, stress management, energy conservation, sleep optimization, nutrition, swallowing, and breathing	Significant decrease in post-COVID syndrome reported on Visual Analog Scale and EQ-5D-5L meaning participants improved in their mobility, self-care, usual activities, pain/discomfort, anxiety/depression, and overall health.
Novak et al., 2022	Level: 2B Study: Prospective Observational Intervention Setting: Inpatient	Participants: ● N = 50 (14 females and 36 males) Inclusion Criteria: ● ICU stay for COVID-19 with respiratory failure and mechanical ventilation ● Diagnosis of critical illness neuropathy or critical illness myopathy ● Referral for rehab	Rx provider: nursing, nutritionists, respiratory therapists, electrotherapists, kinesiotherapists, speech therapists, and OTPSS OT intervention: ● Bedside ADL training ● Functional fine motor skills training ● Kinesiotherapy, e-stim, aerobic training, balance and walking training ● Individual and/or group psychosocial support	Significant improvements in total and motor Functional Independence Measure, De Morton Mobility Index, 6MWT, 10 m Walk Test, and Canadian Occupational Performance Measure on perceived performance satisfaction.
Wilcox & Frank, 2021	Level: 4 Study: Case Report Setting: Outpatient OT clinic and telehealth	Participants: ● N = 1 (32 years, female) Inclusion Criteria: ● Long-COVID-19 ● Received occupational therapy services for long-COVID-19	Rx provider: OTPSS Intervention: ● Services provided 1x/week for 12 weeks ● Task simplification and training ● Energy conservation ● Gradual increase of daily activity ● Purse lipped breathing	Improvements seen in Lawton IADL scale score, 1-minute sit-to-stand test, and with dizziness episodes. Patient reported improvement in all areas of Role Checklist but had continued difficulties in the workplace.

Note: 6MWT = 6-Minute Walk; ADL = activities of daily living; IADL = instrumental activities of daily living; ICU = Intensive Care Unit; m = meter; OT = Occupational Therapy; PCR = polymerase chain reaction; PT = Physical Therapy; Test; Rx Provider = Intervention Provider;

[a] Inclusion criteria as related to post-COVID diagnosis

[b] Outcome measures related to results

Interventions Performed by Other Disciplines that may also Fall Within the OT Scope of Practice on Post-COVID Patients.

Author/Year	Level of Evidence/ Study Design/Setting	Participants/Inclusion Criteria[a]	Intervention and Control Groups	Outcome Measures[b]/Results
Avancini et al., 2021	Level: 5 Study: Case Report Intervention Setting: Home-based	Participants: ● N = 1 (female, age 55 years) Inclusion Criteria: ● Persistent symptoms 3 weeks after COVID-19 infection	Rx provider: Unknown Intervention: ● 8-week, home-based exercise program ● Based on the American College of Sports Medicine guidelines: aerobic, resistance, and balance training	Patient increased in: endurance, physical activity, lower limb strength, leg press, and quality of life. Patient decreased in weight, body mass index, waist-hip ratio, and symptoms.
Bhakaney et al., 2021	Level: 5 Study: Case Report Intervention Setting: Inpatient	Participants: ● N = 1 (male, age 50 years) Inclusion Criteria: ● COVID positive 3 months ago ● Admitting complaint of 8-10 days SOB, chest pain with palpitations for 3 weeks	Rx provider: Physiotherapist Intervention: ● Patient education ● Breathing retraining and positioning ● Walking program ● Psychological support	At week 8, patient progressed to walking independently without a gait aid, increased mobility as seen in requiring 15 seconds to complete the TUG test, scoring minimal assistance on FIM, and had moderate depression and anxiety.
Bouteleux et al., 2021	Level: 2B Study: Longitudinal, Non-RCT Intervention Setting: Two physiotherapy respiratory outpatient clinics	Participants: ● N = 39 (29 to Post-COVID, 10 to control, average age 48 years) Inclusion Criteria: ● Post-COVID defined as more than 3 months p dx onset	Rx provider: physiotherapist Intervention: ● 1.5 hour sessions, 3 times per week ● Aerobic exercise ● Strength training ● Ventilation support as needed	After the intervention, patients in both groups experienced less dyspnea. Both groups also had improvement in their lung function, functional mobility, hyperventilation, and overall improvement in quality of life.
Cahalan et al., 2022	Level: 3B Study: Pre-Posttest Intervention Setting: Tele-rehabilitation	Participants: ● N = 27 (23 female, mean age 48 years) Inclusion Criteria: ● 18 years or older ● Previous COVID-19 diagnosis	Rx provider: researchers Intervention: ● 45 minutes sessions, bi-weekly for 10 weeks ● Mindfulness, body-scanning, and relaxation exercises ● Physical warm-up	Participants experienced statistically significant less breathlessness at rest, while dressing, and when using the stairs. They had fewer issues with fatigue, engaging in usual activities, and pain/disability.

		● At least 28 days post-diagnosis of persistent respiratory symptoms and/or fatigue	● Vocal and breathing exercises, singing	There was significant improvement in voice quality, swallowing, and cognition/ communication.
Choi et al., 2021	Level: 5 Study: Case Report Intervention Setting: Inpatient	Participants: ● N = 1 (male, age 59 yrs) Inclusion Criteria: ● Diagnosis of post-COVID pulmonary fibrosis	Rx provider: physical therapist Intervention: ● 10 sessions, 5 days/ week, 60 mins / day ● Conventional pulmonary rehabilitation program for pulmonary fibrosis ● Stretching, strengthening, aerobic exercises	Day 1, the patient was unable to perform the 1-hr exercise w/o O^2. By the 8th day, the patient did not require O2 supplementation during the whole exercise session.
Dalbosco-Salas et al., 2021	Level: 2B Study: Prospective Observational Cohort Intervention Setting: Tele-rehabilitation	Participants: ● N = 115 (51 male, 64 female; mean age 55.6 years) Inclusion Criteria: ● Persistent dyspnea ● Previous SARS-CoV-2 infection diagnosis	Rx provider: physiotherapists Intervention: ● 2-3 tele-rehab sessions per week for 9 weeks (24 sessions total) ● Breathing, aerobic, strength, and stretching exercises	Improvements with physical capacity (1-Minute Sit to Stand Test), quality of life (36-Item Short Form Health Survey global score), and fatigue and dyspnea symptoms.
Daynes at al., 2021	Level: 2B Study: Cohort Intervention Setting: Unknown	Participants: ● N = 32 (17 male, 15 female; mean age 58 years) Inclusion Criteria: ● Ability to self-identify rehabilitation needs ● Displayed physical or psychological symptoms affecting their functioning ● Medically stable	Rx provider: researchers Intervention: ● 6 weeks, bi-weekly supervised sessions ● Aerobic exercise, ● Strength training ● Patient education: breathing, anxiety, memory, eating, sleeping	On average, participants improved in endurance and respiratory measurements. Mental health and cognition showed normal scores for anxiety and depression before and after the program.
Grbovic et al., 2021	Level: 2B Study: Prospective Clinical Trial Intervention Setting:	Participants: ● N = 62 (38 male, 24 female, mean age 60.82 years)	Rx provider: physiotherapist Intervention: ● 14 day-long program ● Daily respiratory exercises 15-45 minutes	The values of O2 saturation significantly increased before and after one treatment of respiratory exercise. There

	Inpatient	Inclusion Criteria: ● Older than 18 years ● Positive PCR result for SARS-CoV-2 ● Pneumonia diagnosis		were significantly lower values of anxiety (Generalized Anxiety Disorder-7 scale) after the exercise program.
Hameed et al., 2020	Level: 2B Study: Prospective Cohort Intervention Setting: Outpatient	Participants: ● N = 106 (58 male, 48 female, mean age 58.5 years) Inclusion Criteria: ● Persistent symptoms of weakness, fatigue, & shortness of breath that interferes with ADLs ● Difficulty weaning from supplemental O2 OR ● D/C from acute rehab unit w need to continue physiatry-led care	Rx provider: physical therapist Intervention: ● 3 week-long program of 30-60 minute sessions 1-2 times/ week of PT exercises ● 4 groups: virtual, home physical therapy, independent exercise program, or no therapy	Significant improvements in physical functioning (30-second sit-to-stand) scores were seen in virtual and home PT groups. Significant improvements were seen in also seen in 2-minute step test scores in virtual PT, home PT, and independent exercise groups.
Hsu et al., 2022	Level: 4 Study: Case Report Intervention setting: Outpatient pulmonary rehabilitation program	Participants: ● N = 1 (female) Inclusion criteria: ● Previously healthy and functionally independent ● Diagnosed with COVID-19 ● Developed ARDS ● Continued to experience long-COVID-19 ● Functionally dependent	Rx provider: physiotherapist Intervention: ● 50 minutes/ day, biweekly for 8 weeks with progressing intensity ● Respiratory muscle training with chest expansion and resisted diaphragmatic training ● Aerobic, endurance, and resistance training ● Daily home exercise program prescribed Spirometer and lip breathing training	Patient's muscle strength, balance, and gait, dyspnea, O2 saturation significantly improved. However, the patient had lingering difficulties with grip strength, sleep, anxiety, and depression after 2 month follow up.

Kireyev et al., 2021	Level: 2B Study: Three group, Non-RCT Intervention Setting: ● Unknown	Participants: ● N = 28 (10 male; aged 25-83 years) Inclusion Criteria: ● Patients who suffered mild, moderate, or severe COVID-19 infection ● No need for artificial ventilation of lungs	Rx provider: unknown Intervention: ● 1 month-long program ● Group 1: Physical exercises 30 minutes per day, 5 days per week. Brain activity stimulators. ● Group 2: Brain activity stimulators only ● Brain activity stimulators consisted of complex puzzles and memorization	Group 1: increase in well-being, activity, and mood. Group 2: increase in well-being and mood. Both groups showed a decrease in asthenic syndrome
Kokhan et al., 2022	Level: 3B Study: Pre-Posttest Intervention Setting: Outpatient	Participants: ● N = 33 (17 males, 16 females; mean age 52.1 years) Inclusion Criteria: ● Received treatment for complicated Coronavirus pneumonia in a medical institution	Rx provider: unknown Intervention: ● 3 weeks ● Customized individual rehabilitation plan based on general condition and underlying, concomitant diseases	All participants experienced improvements in cardiovascular and respiratory systems, exercise tolerance, number of steps, respiratory rate at rest blood oxygen saturation blood pressure, and quality of life as reported on the EuroQoL-5D.
Kokhan et al., 2021	Level: 3B Study: pre-posttest, Non-randomized Intervention Setting: Outpatient	Participants: ● N = 34 ● Group 1 = lung lesion 50-75%. Mean age 45 years, 19 males ● Group 2 = lung lesion >75%. Mean age 61 years, 15 males Inclusion Criteria: ● COVID-19 survivors without contraindications for physical rehabilitation in ambulatory conditions ● No severe cognitive impairment	Rx provider: physical therapist Intervention: ● 3-month program with individualized PT ● 14 x 30 mins sessions ● Static and dynamic breathing, specifically thorax and diaphragm	Both groups experienced statistically significant differences by an increase in SpO2 3 months post rehabilitation. Endurance significantly increased on the Borg RPE and 6MWT as well as strength with hand-held dynamometry.

Kolbe et al., 2021	Level: 3B Study: Cohort Study Intervention Setting: Inpatient	Participants: ● N = 13 patients ● N = 11 staff Inclusion Criteria for patients: ● Positive COVID-19 PCR test during hospitalization and now receiving rehabilitation post-COVID infection ● Medically stable with ongoing medical and rehabilitative needs	Rx provider: neuropsychologists or self-guided Intervention: ● 30 minutes at a time, average of 10 minutes ● Virtual reality tool with 1 module per session exploring natural environments, guided meditation, or cognitive stimulation games	Both patients and staffs overall were extremely satisfied with their VR experiences, felt that VR contributed positively to their well-being, and would recommend the intervention to others.
Kortianou et al., 2022	Level: 3B Study: Pre-Posttest Intervention Setting: Home based and tele-rehab	Participants: ● N = 74 (median age 52.5 years) Inclusion Criteria: ● Ages 20-65 years ● Hospitalization > 7 days ● Moderate disease during hospitalization and fatigue as the main symptom at hospital discharge	Rx provider: physiotherapist Intervention: ● Home-based program for 2 months ● 1 hour supervised telerehabilitation exercises every 10 days ● Aerobic exercises and strength training.	There was improvement in anxiety, depression, quality of life, as well as lower extremity physical performance.
Longobardi et al., 2022	Level: 5 Study: Case Report Intervention Setting: Home-based and telehealth	Participants: ● N =1 (67 years, female) Inclusion Criteria: ● Had critical COVID-19 disease ● 71 days of hospitalization ● 49 days of hospitalization were in the ICU with invasive mechanical ventilation	Rx provider: researcher Intervention: ● 10 weeks of weekly telehealth session Home-based exercise training program ● Aerobic and flexibility exercises, strengthening	Patient improved in physical functioning with hand grip strength, 30-second sit-to-stand test, TUG test. Post-COVID Functional Status improved with the exception of anxiety.

		because of respiratory failure ● Enrolled in study two weeks after discharge		
Maniscalco et al., 2021	Level: 2B Study: Pre-Posttest Intervention Setting: Post-acute pulmonary rehabilitation unit	Participants: ● N = 95 ● Group 1: N = 46, with pre-existing cardiorespiratory disease, 39 males, avg age 65.3 years ● Group 2: N = 49, no comorbidities, 41 males, avg age 61.5 years Inclusion criteria: ● Discharged from COVID-19 acute care ward	Rx provider: unknown Intervention: ● 30 days total, 6 days/week for 5 weeks Intervention: ● Physical exercise training: strengthening, treadmill walking, stationary cycling ● Dietary counseling ● Psychosocial counseling	Both groups had significant improvements in pulmonary function, endurance, dyspnea, and muscle fatigue. No between group differences were observed
Mayer et al., 2021	Level: 4 Study: Case Report Intervention Setting: Outpatient Physical Therapy	Participants: ● N =1 (37 years female) Inclusion Criteria: ● 10 weeks post positive test for SARS-CoV-2 ● Experience of persistent symptoms including dyspnea, headaches, and cognitive fog	Rx provider: physical therapist Intervention: ● Bi-weekly sessions for 8 weeks, 16 sessions total ● Aerobic training: Upper extremity bicycle, treadmill, stepper, walking, jogging, dancing ● Strengthening: weights, functional movements ● Diaphragmatic breathing techniques ● Relaxation and mindfulness ● Education	In general, physical measures of muscle strength, muscle power, and physical function improved. Cognitive functioning was slightly improved or unchanged. Scores on emotional health and Health-related Quality of Life were the same or worse.
Nambi et al., 2022	Level: 3B Study: Pre-Posttest Intervention Setting: University physiotherapy clinic	Participants: ● N = 76 (mean age 63.2 years) ● Group 1: N = 35 (mean age 63.2 years)	Rx provider: physical therapist Intervention: ● 8 weeks ● Group 1: low-intensity aerobic training with strength training.	Low-intensity aerobic training w strengthening significantly better effects on handgrip strength, kinesiophobia, and quality of life compared to

		● Group 2: N = 34 (mean age 64.1 years) Inclusion Criteria: ● Post-COVID sarcopenia	● Group 2: high-intensity aerobic training with strength training.	high-intensity aerobic training combined with strengthening training. Both groups showed significant improvement for all variables despite the intensity of exercise.
Nopp et al., 2022	Level: 2B Study: Prospective Observational Cohort Intervention Setting: Outpatient	Participants: ● N = 58 (34 male, 24 female; mean age 46 years) Inclusion Criteria: ● Admitted to hospital May 2020-April 2021 with a confirmed COVID-19 diagnosis	Rx provider: physicians, physical therapists, and sport scientists. Intervention: ● 3-4 hours 3x/ week for 6 weeks ● Respiratory, endurance, and strength training individualized for each patient	Statistically significant decrease in almost all measurements: 6MWT, Post-COVID Functional Scale, Borg, 1-minute sit to stand test, maximal workload, European quality of life score, Fatigue Assessment Scale, 1 second forced expiratory volume
Okan et al., 2022	Level: 3B Study: Pretest-posttest, Randomized Controlled Parallel Groups Intervention Setting: Tele-rehabilitation	Participants: ● N = 52 (26 intervention group, 25 females) Inclusion Criteria: ● Access to technology for telemedicine	Rx provider: researcher Intervention: ● Face-to-face and telemedicine visits ● Pursed lipped and diaphragmatic breathing ● Respiratory control ● Breathing exercises 3 times per day for 5 weeks, 2 hours after meals	Intervention group had significantly higher posttest max voluntary ventilation, Respiratory Questionnaire, 6MWT values. Control group had significantly higher posttest Dyspnea Scale values. Both groups had significant increases in Dyspnea Scale over time.
Santos & Flores, 2022	Level: 4 Study: Case Report Intervention Setting: Patient's home	Participants: ● N = 1 (60 years, female) Inclusion Criteria: ● Mild COVID-19 diagnosis during July 2020	Rx provider: physiotherapists Intervention: ● 15 visits of 3 inter-daily visits for 5 weeks ● Transcutaneous electrical stimulation ● Transverse massage ● Stretching ● Manual therapy ● Balance ● Coordination exercises	At the end of the 15 visits, the patient had a reduced numerical pain scale score, increased goniometric measurements, increased time on the Unipodal Station Test, and an increase in the muscle strength assessment using the Daniel Scale

Spielmanns, Buelow, et al., 2021	Level: 2B Study: Prospective Observational Intervention Setting: Outpatient	Participants: ● N = 183 (123 males, 60 females; mean age 69 years) Inclusion Criteria: ● Previous COVID-19 diagnosis ● Hemodynamically stable without need for ventilation ● Cognitively able to answer questionnaires and surveys	Rx provider: unknown Intervention: ● 5-6 days each week for 3 weeks ● 25-30 sessions ● 4 exercises each day consisting of endurance and strength training ● Educational sessions were every 2 weeks	All patients improved with endurance on the 6MWT. FIM scores also improved.
Spielmanns, Pekacka-Egli, et al., 2021	Level: 4 Study: Prospective Non-randomized Pre-Posttest Intervention Setting: Outpatient	Participants: ● N = 99 (58 males, 41 females; mean age 67 years) Inclusion Criteria: ● Previous COVID-19 diagnosis ● Hemodynamically stable w/o ventilation	Rx provider: physio/sports therapists Intervention: ● Pulmonary rehabilitation program ● 5-6 days per week for 3 weeks ● 25-30 sessions ● 4 exercises each day of strength and endurance training ● Educational sessions every 2 weeks	Patients with post-COVID improved more from the pulmonary rehab program than patients who had other pulmonary diagnoses.
Stavrou et al., 2021	Level: 3B Study: Pre-Posttest Intervention Setting: Telerehabilitation	Participants: ● N = 20 (15 males, 1 female; mean age 64.1 years) Inclusion Criteria: ● No O2 and fever has resolved for 48-hr period w/o any fever-reducing meds OR ● Stable patients still require supplemental O2 supposing oximetry self-monitoring	Rx provider: unsupervised pulmonary rehab program by researchers Intervention: ● 3 training session/ week for 8 weeks, 100 minutes each ● Warm-up, recovery, aerobic exercise set ● Walking 50 minutes ● Yoga exercises ● Strength exercises	Dyspnea improved during 6MWT. Sleep quality improved. Patients had lower visceral body fat after the program. Higher values of muscle mass.

Tozato et al., 2021	Level: 4 Study: Case Series Intervention Setting: Cardiopulmonary rehabilitation program	Participants: ● N = 4 (2 females, 2 males, mean age= 56 years) Inclusion Criteria: ● Post-COVID symptoms	Rx provider: unknown Interventions: ● Aerobic exercise 3 times a week for 30 minutes and ● Resistance exercise 3 times a week at 3 sets of 10	After 3 months of treatment, the distance covered during the 6MWT increased and peripheral muscle strength increased.
Udina et al., 2021	Level: 3B Study: Pre-Posttest Intervention Setting: Post-acute care setting	Participants: ● N = 33 (19 females, average age 66 years, 20 ICU) Inclusion Criteria: ● Ability to walk unassisted pre-COVID-19 ● Ability to stand after resolution of acute COVID-19	Rx provider: physical therapist Intervention: ● 30 minutes for 7 days each week ● Training with resistance, endurance, and balance ● Breathing exercises ● Recommendations to promote activity rather than sedentary behavior	ICU patients had greater improvement in Short Physical Performance Battery overall and gait speed. Non-ICU patients did not improve in balance.

Note: 6MWT = 6-Minute Walk Test; ICU = Intensive Care Unit; O2 = Oxygen; PCR = polymerase chain reaction; PT = Physical Therapy; Rx Provider = Intervention Provider; SpO2 = oxygen saturation; TUG = Timed Up and Go; VR = Virtual Reality

[a] Inclusion criteria as related to post-COVID diagnosis
[b] Outcome measures related to results