

Participant perspectives of pulmonary telerehabilitation in people with respiratory post-acute sequelae of COVID-19 (PASC): a nested qualitative study in a randomised controlled trial

Jack Reeves , Helen Kindness , Lissa M. Spencer , Ling-Ling Tsai , Andrew J. Baillie & Jennifer A. Alison

To cite this article: Jack Reeves , Helen Kindness , Lissa M. Spencer , Ling-Ling Tsai , Andrew J. Baillie & Jennifer A. Alison (13 May 2026): Participant perspectives of pulmonary telerehabilitation in people with respiratory post-acute sequelae of COVID-19 (PASC): a nested qualitative study in a randomised controlled trial, European Journal of Physiotherapy, DOI: [10.1080/21679169.2026.2668431](https://doi.org/10.1080/21679169.2026.2668431)

To link to this article: <https://doi.org/10.1080/21679169.2026.2668431>



© 2026 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group



View supplementary material [↗](#)



Published online: 13 May 2026.



Submit your article to this journal [↗](#)



View related articles [↗](#)



View Crossmark data [↗](#)

RESEARCH ARTICLE



Participant perspectives of pulmonary telerehabilitation in people with respiratory post-acute sequelae of COVID-19 (PASC): a nested qualitative study in a randomised controlled trial

Jack Reeves^{a,b,c}, Helen Kindness^a, Lissa M. Spencer^{a,b}, Ling-Ling Tsai^{a,b}, Andrew J. Baillie^{b,d} and Jennifer A. Alison^{b,d}

^aPhysiotherapy Department, Royal Prince Alfred Hospital, Sydney, NSW, Australia; ^bSydney School of Health Sciences, Faculty of Medicine and Health, the University of Sydney, Sydney, NSW, Australia; ^cDiscipline of Physiotherapy, Graduate School of Health, Faculty of Health, University of Technology Sydney, Sydney, NSW, Australia; ^dProfessorial Unit, Allied Health, Sydney Local Health District, Sydney, NSW, Australia

ABSTRACT

Background: Many people experience persistent and heterogenous symptoms following infection with COVID-19. While there is emerging evidence for rehabilitation strategies, few studies have reported patient experiences of rehabilitation, particularly experiences of pulmonary telerehabilitation (PTR). The aim of this study was to explore the perspectives of people with respiratory post-acute sequelae of COVID-19 (PASC) who participated in a 4-week PTR arm of a randomised controlled trial (RCT).

Methods: This qualitative study used semi-structured interviews and reflexive thematic analysis. Participants had completed at least one session of PTR. Recruitment was *via* convenience sampling and continued until thematic saturation. Interviews were recorded, de-identified and coded to guide theme development.

Results: Fifteen participants were interviewed [mean (SD) age 54 (14) years; 5 females], 12 completed the PTR program and three commenced but did not complete. Seven themes emerged: (1) remote access to telerehabilitation; (2) access to a health professional; (3) validation of PASC; (4) having a shared experience; (5) work commitments; (6) PASC symptoms; and (7) desire for more telerehabilitation opportunities.

Conclusions: The experiences of people with respiratory PASC, identified through these themes, may help to shape future PTR programs and inform clinical trials.

ARTICLE HISTORY

Received 5 March 2026
Revised 10 April 2026
Accepted 28 April 2026
Published online 3 May 2026

KEYWORDS

Post-COVID conditions; telerehabilitation; rehabilitation; post-acute sequelae of COVID-19 (PASC); respiratory signs and symptoms

Introduction

Post-acute sequelae of COVID-19 (PASC), also termed 'Long-COVID', is defined by the World Health Organisation (WHO) as the continuation or development of new symptoms three months following infection with COVID-19, and lasting for at least two months [1]. A systematic review and meta-analysis with a large sample size ($n=735,006$) demonstrated that 45% of COVID-19 survivors had at least one unresolved symptom at 126 d (~4 months) post-infection, regardless of hospitalisation [2]. There is also marked heterogeneity of COVID-19 symptoms, with more than 50 different symptoms frequently reported in the post-acute infective period [3]. In individuals with respiratory PASC (i.e. symptoms, such as dyspnoea, cough, chest pain and/or dysfunctional breathing) [4], non-pharmacological therapies such as pulmonary rehabilitation may be of benefit [5].

Challenges exist in providing rehabilitation that is safe, effective and acceptable given the magnitude and diversity of people affected by PASC [6,7]. International guidelines and guidance documents [8–10] suggest physical rehabilitation, including pulmonary rehabilitation, may be appropriate. Telerehabilitation is a mode of physical rehabilitation which may improve physical function for some people with PASC

CONTACT Jack Reeves  jack.reeves@uts.edu.au  Physiotherapy Department, Royal Prince Alfred Hospital, 100 Broadway, Chippendale, 2008, NSW, Sydney, Australia

 Supplemental data for this article can be accessed online at <https://doi.org/10.1080/21679169.2026.2668431>.

© 2026 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. The terms on which this article has been published allow the posting of the Accepted Manuscript in a repository by the author(s) or with their consent.

[11]. Whilst PASC affects individuals of all ages, it predominantly affects people of middle-age [12] who are likely to be working. Therefore telerehabilitation, with the ease of remote access, may be more acceptable than centre-based rehabilitation due to time saved from not commuting to a rehabilitation centre. Additionally, PASC can include fatigue and postural orthostatic tachycardia syndrome (POTS), both of which can be exacerbated by travel, making telerehabilitation a reasonable alternative.

Targeted quantitative and qualitative research approaches are required to determine optimal rehabilitation services for those affected by persistent physical and psychological sequelae after COVID-19 infection [13]. Qualitative research has the potential to inform rehabilitation providers about how to adapt the delivery of services to improve the patient experience and outcomes of rehabilitation. There are limited qualitative studies reporting patient experiences of centre-based rehabilitation for people with PASC, and even fewer on experiences of telerehabilitation [14,15]. This qualitative study was nested within a randomised controlled trial (RCT) evaluating a 4-week pulmonary telerehabilitation (PTR) program of twice-weekly supervised exercise and education with a control of usual medical care [16]. The aim was to explore the perspectives of participants with respiratory PASC who were in the 4-week PTR arm of the RCT.

Methodology

Study design

This study utilised an inductive reasoning approach and reflexive thematic analysis. The study was approved by the Sydney Local Health District (SLHD) Human Research and Ethics Committee (Protocol No X21-0460 & 2021/ETH12273) and overall trial registered on the Australian and New Zealand Clinical Trials Registry (ANZCTR 12622000355774). All participants provided informed consent prior to undertaking a semi-structured interview. The study protocol describing the methods of the RCT and this study has been published [17]. The study was supported by a SLHD Allied Health Research Grant.

Participants

All participants had persisting respiratory symptoms after COVID-19 infection (which was the inclusion criteria for the RCT) and were invited for an interview if they had completed at least one session of telerehabilitation. This enabled the views of both completers and non-completers of the 4-week PTR program to be captured, which offered the potential to provide insights into barriers that affected participation in those who were unable to complete the program. Recruitment was *via* convenience sampling and continued until thematic saturation was achieved, which was decided by the interviewer (HK) in conjunction with two other researchers (JR, LS).

Pulmonary telerehabilitation program

Participants in the PTR arm of the RCT attended a 4-week, twice-weekly PTR program (exercise training and education) supervised by a physiotherapist experienced in remote exercise monitoring and rehabilitation. There were several reasons for delivering a 4-week intervention which included: the optimal duration of rehabilitation for people with PASC is unknown and early non-randomised studies found positive results with shorter programs of ≤ 4 weeks [18,19]; most people with PASC are of working age [12] and therefore a shorter duration intervention may have been more acceptable; a previous study that evaluated pulmonary rehabilitation in a chronic obstructive pulmonary disease (COPD) population demonstrated the greatest statistically significant improvements in exercise capacity and HRQoL occurred within the first four weeks of rehabilitation [20]; and at the time of study design, infection rates were high and it was unknown how many people might require rehabilitation and therefore a shorter program, if effective, could reduce strain on healthcare systems. PTR was delivered through real-time teleconferencing using the secure Zoom platform (Zoom Video Communications Inc., San Jose, CA) and was provided at set times (during normal business hours), synchronously to groups of up to five participants. Participants performed upper and lower limb exercises of moderate-intensity using body weight and minimal

equipment, such as light hand weights (1–2 kg), and were provided with education relating to: managing fatigue; pacing with daily activities; staying physically active; managing anxiety and depression; and returning to work. Participants were also provided with the WHO Pamphlet ‘*Support for rehabilitation: self-management after COVID-19-related illness*’ [21] (Supplementary Document 1) and the Lung Foundation Australia (LFA) *Understanding Long COVID* booklet [22] (Supplementary Document 2). Outcomes of exercise capacity, symptoms, cognition, anxiety, depression, HRQoL and fatigue were collected before and after the intervention and compared to a control group (CG) of usual medical care. The CG participants were invited to cross-over into the intervention group (IG) following the control period. Further details about the program can be found in the protocol [17] and the published findings of the RCT [16,23].

Interviews

Interviews were led by a skilled interviewer (HK) who was not involved in the delivery of the PTR program so that participants were more likely to provide their true opinions of their rehabilitation experience. Interviews were carried out within three months of the conclusion of the PTR program. Semi-structured interview questions were developed by the researchers (JR, JA, AB, LS, LLT) who had prior experiences in providing physical and psychological rehabilitation programs for this patient cohort, as well as the provision of PTR for people with chronic respiratory disease. Questions were open-ended and accompanied by probes in order to foster deeper insight into participant perspectives (Table 1). Interviews were recorded, deidentified and transcribed verbatim by an independent transcription service. The transcripts were checked for accuracy by a researcher (JR).

Data analysis

Transcripts were uploaded onto NVivo version 14 (QSR International, Melbourne, Vic., Australia) for coding. Coding was compared between two researchers (JR, JA), and discrepancies discussed to

Table 1. Semi-structured interview questions and probes.

Question	Probe(s)
How did you find exercising online at home through zoom?	Did you have adequate space at home? How did you find exercising in a group?
What, if anything, made it more difficult to participate?	Did you feel uncomfortable exercising with others in a group online? Did work commitments interfere with participation? Did technological issues (sound, visual) interfere with participation? Did your persistent COVID symptoms interfere with participation? If you stopped the classes, what made you stop?
What sort of changes did you notice to your persistent COVID symptoms throughout the program, if any?	Did you experience any language difficulties whilst participating? Did you feel overly fatigued within 24 hours of participation in an exercise session? Did you notice any changes to your shortness of breath throughout the program? Did you notice any changes to your cognition/brain fog (i.e. memory and attention)?
Did you find the exercise program was suitable for you in terms of the session intensity, duration, and frequency to be an effective treatment for your persistent COVID symptoms and why/why not?	Did you find the amount of exercise to be appropriate? What do you think is the ideal length of a program? How frequent do you think sessions should be?
After the program, do you feel confident you can manage your ongoing symptoms effectively?	How would you change the program to make it more appropriate? Do you feel confident you can continue to exercise independently? What support would help you manage your persistent COVID symptoms?
Do you feel interaction with a health professional, or other participants, through the telerehabilitation program helped you to cope with your persistent COVID symptoms?	Did it help with symptoms of anxiety and depression or any other symptoms?
Did you find education to be useful in helping you manage for your persistent COVID symptoms? Why/why not?	Did you find the education and information helpful for managing your symptoms? Was the depth of education and information provided adequate? Do you feel there was anything else which should have been covered in the education?
Did you find the telerehabilitation program (exercise training, education, support from healthcare professionals) helpful overall? Is there anything else that you would like to add?	

ensure codes were insightful. Thematic and descriptive quality analysis [24,25] was used to identify key themes regarding the perspectives of participants undertaking rehabilitation. The investigators utilised an inductive approach to analysis whereby the coding framework was developed through repeated engagement with transcripts and iterative refinement of codes, categories and themes. All investigators agreed upon selected themes to be confident they reflected the perspectives of participants.

Guiding approach

Based in grounded theory, a 'reflexive' approach to thematic analysis was used [26]. This was a systematic iterative process whereby researchers cyclically reviewed coded observations as they were generated, ensuring sufficient analytical rigour of the emerging thematic model. To ensure robustness of the inductive coding framework, researchers (JR, JA) employed such reflexivity with a view to cast aside preconceptions forged by their professional, personal and cultural life experiences. This allowed researchers (JR, JA) to acknowledge their positionality and mitigate the effect to which their assumptions could prejudicially reshape the resultant findings. Furthermore, researchers immersed themselves in the transcripts, taking time to revisit and reconsider codes based on newly established understandings in a manner conducive with constructivism. Coding was cross-checked between researchers (JR, JA) during the development of the framework, and all other researchers reviewed the coding to ensure themes generated were perceptive. From an epistemological stance, the researchers believed this method was adequate to sift through the wealth of rich understandings gathered from participant interviews to answer the research question posed. The research team involved four clinicians skilled in administering PTR for people with respiratory PASC (LS, LLT, HK, JR), two researchers who support a Long-COVID lived experience group (AB, JA) and five researchers who have previously published research on people with PASC (JA, AB, LS, LLT, JR). The Standards for Reporting Qualitative Research (SRQR) were used to describe this study [27].

Results

Of the 42 participants who completed at least one session of PTR, 15 were interviewed. Participant characteristics are presented in Table 2. Interviews were conducted between January and October 2023 and were an average of 21 min (range 13–29 min). Seven themes were identified and are presented below, and summarised in Figure 1. Further illustrative quotes evidencing the themes are presented in Supplementary Document 3.

Theme 1: remote access to telerehabilitation

Telerehabilitation was considered desirable by the majority of participants. The main reason provided was the ability to attend sessions because participants could manage conflicting schedules and decreased fatigue from not needing to travel (given that sessions were at set times). Participants used words, such as 'flexible,' 'preferable' and 'easier' when describing their experience of using telehealth to access rehabilitation.

Table 2. Characteristics of those who participated in a semi-structured interview ($n=15$).

Characteristics	Interviewed
Age, years	54 (14)
Male	10 (67%)
Hospitalised	4 (27%)
Smoking history	7 (47%)
History of respiratory disease	6 (40%)
Lives alone	5 (33%)
Has caring responsibilities for others	3 (20%)
Completed rehabilitation (>75% of sessions attended)	12 (80%)

Data presented as mean (SD) or frequency (%).

BMI: body mass index; kg/m²: kilograms per square metre

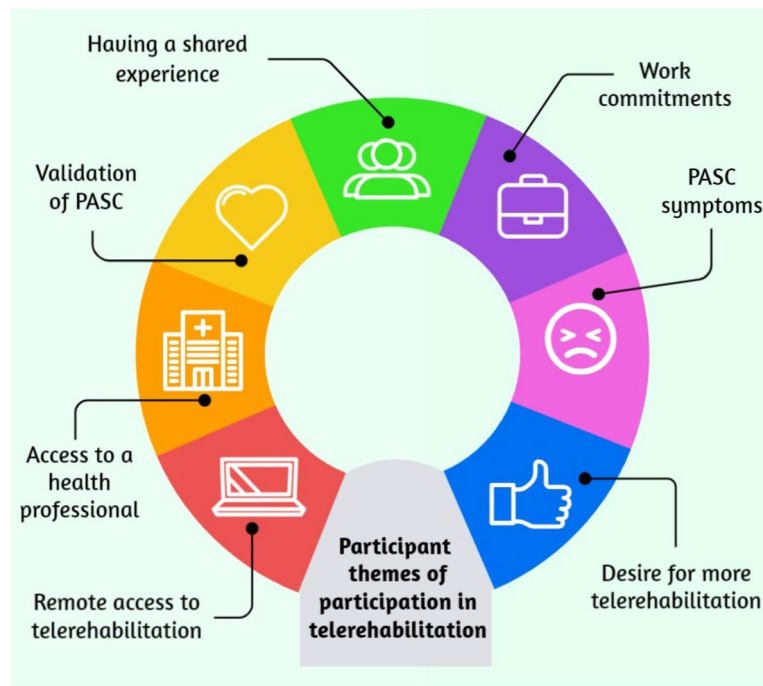


Figure 1. Themes identified through the semi-structured interviews. PASC: post-acute sequelae of COVID-19.

It's less commitment to do it at home than to travel somewhere, and it's less exhausting of course too. So, it makes it easier to fit into the day, so it's good doing it at home. – Participant 15 (female, 63 years)

'[...] coming to clinic more than once or twice a week would be almost impossible because you need to clear out more time off your schedule during the day.' – Participant 8 (male, 44 years)

In terms of the use of technology, a few participants struggled at times with setting up the videoconferencing software, connecting through their local network, or hearing instructions.

'I think only once there was some major problems with the connections. But otherwise, it worked fine and the Zoom calls were easy.' – Participant 13 (female, 45)

Zoom, the way Zoom is, there's always issues. I think sometimes – I'm not an expert on Zoom, but sometimes people would forget to turn their microphone off, so all their background noise was coming in and you couldn't hear the presenter – Participant 2 (male, 44 years)

Theme 2: access to a health professional

Many of the participants felt unsure about managing their symptoms and participating in rehabilitation concurrently. They valued the guidance that health professionals provided in terms of adjusting exercise prescription, helping to balance fatigue and activity through pacing and facilitating exercise in a setting that was supervised by someone with experience in delivering rehabilitation remotely.

It's really hard at the moment to know what level of exercise is good for me. Like is [the] exertion enough that I'm going to develop some strength and get stronger but not too much [to avoid post-exertional malaise], so I've been avoiding it [physical activity] and that was something else that was really good - I can see that the classes push me to a level where I'm getting stronger, but I don't get that post exertion fatigue, whatever it's called. – Participant 1 (female, 40 years)

It made me feel good that I was doing it in an environment where there was someone watching me. I mean I was worried about the symptoms because it had been going on for such a long time and it was great to have someone there with some knowledge of long COVID to just keep an eye on you and watch what you're doing. – Participant 14 (male, 53 years)

it wasn't ever lost on me how privileged I was to be able to get access to that professional support at a time when I really needed it and did feel quite isolated. – Participant 4 (female, 46 years)

Theme 3: validation of PASC

Many participants felt as though they had found an environment where their symptoms were validated, some after numerous appointments with healthcare professionals.

But the struggle I went through, there was someone [the rehab provider] to understand, yes there is someone – because I went to a GP, before coming to the clinic [post-COVID respiratory clinic where recruitment occurred], I had three other what is called 'second opinions.' Second and third. Those two fellows told me, there's nothing called long COVID. – Participant 5 (male, 65 years)

Participants felt understood by the health care team, using terms like 'treated like a human,' 'taken seriously' and 'know what you're going through' and this facilitated engagement in the program.

I know with you guys [rehab providers], you're completely overwhelmed with people who are suffering. But anything with you guys is a big benefit to me. Just for the fact of, like – I mean, this is going to sound silly, but someone out there is on this. There's someone, somewhere, that takes this seriously. Because as you guys would know, this is one where I just don't – I read about it and stuff, but it's really, like, too hard basket, long COVID, for society. It's just not – it's hard to have any engagement. So, anything with you guys, actually, it makes you think, oh, yeah, see, I'm not crazy, kind of thing. – Participant 11 (male, 51 years)

Theme 4: having a shared experience

Many participants found solace through the experiences shared with other participants during the program, whether through verbal interactions or simply visualising others. Participants often expressed feelings of isolation prior to joining the program, as they struggled to find others to relate to about their condition. They valued the social interaction through the videoconferencing software, with many using words, such as 'comradery,' 'together' and 'community' when describing the benefits of a group format.

It was good because a lot of, with the long COVID, is that you spend a lot of time alone and not knowing where you're at and having people in the same situation and seeing your own skill level as a comparison. – Participant 13 (female, 45 years)

Like sometimes you think it's just in your mind, people, if they haven't been through what you've been through and you're living with people who have completely recovered and they're calling it the flu and you've got these persistent symptoms, you kind of think, well maybe it's me, I'm going crazy. But when others are sharing the same feelings, yeah I do have brain fog or I do get this [dyspnoea] when I walk upstairs, you can see there is that shared experience, that it is something that is a little bit more common, rather than it's just me and I'm just imagining these things. – Participant 2 (male, 44 years)

Theme 5: work commitments

Many participants viewed work as a barrier to participating in the PTR program for reasons such as: difficulty attending due to concurrent work commitments; struggling to work as participation in rehabilitation was fatiguing; or having difficulty participating whilst at their workplace. A few participants had to withdraw completely due to work, and many missed sessions due to unavoidable work obligations. Some participants who were not working at the time of participation, commented that they would have withdrawn should they have had the opportunity to return to work.

'Well, the thing with me is, I only did it for one session, because shortly after that I got a job ... and I kind of said, oh, I can't do the exercise, anymore' – Participant 11 (male, 51 years)

'It was more adding that level of movement on top of my already active day [at work] was also just too much for me in the long run.' – Participant 12 (female, 44 years)

'I think if I had been working during the rehab program, I think I would've struggled a lot more.' – Participant 7 (male, 37 years)

Theme 6: PASC symptoms

Participants expressed mixed experiences with changes in PASC symptoms. PASC symptoms such as fatigue, brain fog and dyspnoea were often cited as reasons for difficulty in participating in PTR at various times during the 4-week program. Participants often felt disheartened when being reconfronted with the reality of their symptoms during sessions, and used words such as 'demoralised,' 'upset' and 'emotional' to describe how their symptoms made them feel whilst participating or attempting to participate.

It was fatigue during, and I was exhausted afterwards. It was also, to an extent, demoralising, because I had to sit out most – like, half of the session, anyway, because I couldn't do it. It was just too much for me, and it was very low-key exercises to begin with. – Participant 8 (male, 44 years)

I... actually found it mentally difficult. There's a lot of sort of activity, and then do this and do this, and change side to this and change side to that. That is my real struggle with long COVID is, I am very mentally sluggish. – Participant 11 (male, 51 years)

Conversely, some participants expressed gratitude as they felt they had improved in terms of their PASC symptoms. A few participants felt they had made significant gains in terms of their physical abilities.

But now I can do what I want to do. I have no problem at all. I do my shopping. I carry things. Yeah. It's okay. So, it's a vast improvement from where I used to be and where I am now. – Participant 5 (male, 65 years)

There was a stage, there, afterwards [after COVID Infection], back in September/October, when I was really, really [bloop], and I had no energy to do anything. But, since then, it's built up quite a bit, and I'm back walking again. I walk with a friend about two or three times a week for about an hour or so. – Participant 9 (male, 79 years)

Then the next day I didn't have that post-exertional fatigue which I know was the sign that you'd done enough but not too much. Also, as a result of the exercises my COVID changed in that my fatigue definitely got better and my stamina got better and I think my coordination got a bit better. – Participant 1 (female, 40 years)

Theme 7: desire for more telerehabilitation opportunities

Participants frequently wanted longer programs and more class times outside business hours to help them manage their condition. Overall, there was a desire for more rehabilitation, despite the challenges with participating regularly. Participants craved further health professional contact.

I reckon six weeks would've been better. I reckon that way you would've gotten more into the swing of things and get used to your breathing being better and you'd handle it better. That's how I look at it.– Participant 9 (male, 79 years)

But if you think that it's something [telerehabilitation] that would be good for people going forward, I think you're going to need to make it offer more times, offer more days, even maybe do weekends and evenings.– Participant 12 (female, 44 years)

Despite educational handouts, one-on-one education during initial assessment, and group education during PTR sessions, participants felt as though they could have used more information and advice about how to manage their symptoms. Many participants wanted more individualised education, as well as education covering a broader range of topics. Some participants were concerned about continued exercise and ongoing self-management without the support of an experienced health professional following completion of the program. They often wanted further guidance about exercise prescription.

I got two really good pamphlets about long COVID but sometimes the information was too generalised and hard for me to use. For example, it was saying with the exercise, just increase it a bit and see how you go for two weeks and if you're okay increase it a bit again. I don't know if it's because I've got ADHD, but I don't know how much to increase it. – Participant 1 (female, 40 years)

But that one session at the end of it when we were talking about breathlessness and things like that, that is – or maybe at the end of the – maybe the last five or 10 minutes at the end, that there could be a little bit more information about how we deal with fatigue or are there any medicines or natural medicines or foods that we should be eating rather than – nutrition ideas and things like that. – Participant 2 (male, 44 years)

Discussion

People with respiratory PASC who undertook a PTR program of aerobic and resistance exercise training provided their experiences of the program *via* semi-structured interviews. Seven themes were identified which were: remote access to telerehabilitation; access to a health professional; validation of PASC; having a shared experience; work commitments; PASC symptoms; and desire for more telerehabilitation opportunities.

Remote access to rehabilitation using videoconferencing (i.e. telerehabilitation) (Theme 1) was preferred by most participants, typically as participants could manage conflicting schedules and decrease symptoms from avoiding travel. This is similar to findings in a qualitative systematic review that included 19 studies ($n=301$) which explored the perceptions of those with COPD towards telemedicine [28]. The majority held positive views of telehealth, typically due to the perceived ease of use, ease of access to health services and due to perceptions that telehealth facilitated the ability to self-manage their condition. Whilst the population of this study was living with PASC as opposed to COPD, many of the same sentiments are mirrored throughout the interviews, with participants finding online participation 'easier.' Both studies noted that a minority of participants had negative experiences, mostly due to personal difficulties with using technology and/or occasional technology issues.

People experiencing PASC desire support from health professionals (Theme 2), often through rehabilitation programs [29]. This view was demonstrated in this study, where participants valued the way telerehabilitation providers validated the symptoms they reported. Only one qualitative study [15], has explored perspectives on rehabilitation for people with *respiratory* PASC, however, the rehabilitation provided did not have the key components of pulmonary rehabilitation [30] but rather an intervention of supervised respiratory muscle training delivered *via* telehealth. This differed from our trial which used aerobic and resistance training which are key components of pulmonary rehabilitation [30]. Similar to our findings, the study found that the presence of a health professional to talk with and to lead the exercise program was deemed helpful and supportive for those with respiratory PASC. They noted how the physiotherapists leading the exercise helped participants feel motivated and able to continue with the treatment. This aligns with previous qualitative findings in COPD where participants felt their adherence to the program was supported by the social connection with the physiotherapist and other patients in attendance at rehabilitation [31].

Our study showed that participants valued their symptoms being validated by health professionals (Theme 3). One participant reflected how their condition had been placed in the 'too hard basket' and another discussed how a medical practitioner informed them 'there's nothing called Long-COVID.' A further participant recalled thinking 'well maybe it's me, I'm going crazy' when considering why they had persistent symptoms. Participants often commented on the need for validation of their experience of PASC, and this validation allowed participants to more consistently participate in the rehabilitation program, which is supported by previous evidence for delivering trauma-informed care [32]. Many people with PASC encounter scepticism and denial of their symptoms through health care systems, leading to feelings their condition is not being taken seriously [33]. Similar findings have been previously reported [15] where validating symptoms helped participants feel understood and optimistic about the potential benefits of rehabilitation. This study noted that the desire for rehabilitation often came about due to feelings of abandonment by the health system following an absence of improvement in their condition with standard medical management. They concluded that within many health contexts, there is a lack of recognition of the patient's condition, with terms such as 'abandoned' and 'forgotten' noted through their interviews.

Shared experiences (Theme 4) were highlighted in our study as an important consideration for rehabilitation as participants are often isolated from others who can relate to their condition. A 2024 study evaluated the perspectives of ten participants who had been hospitalised with COVID-19 and who completed a telerehabilitation program [14]. Similar to our study, these participants positively viewed the opportunity to participate with others with similar experiences. Peer aspects of participation led to reduced feelings of social isolation, a sense of 'reassurance and togetherness' through meeting others with similar health challenges, and fostered a positive environment for rehabilitation through encouragement between participants during sessions. Similar to our study,

they also noted a group environment was central to a positive experience in supporting broader participant wellbeing [14].

Whilst a typical pulmonary rehabilitation population is closer to retirement age, most people with PASC are of working age [12]. Work commitments (Theme 5) hindered participation in numerous ways, including due to conflicting schedules, work-associated fatigue or needing to find a suitable space to participate while at the workplace. Initially, the research team believed a short four-week program to be appropriate as was less likely to impact on work commitments, which may occur with a longer program. However, our study found that work commitments were a significant barrier even with a short duration of rehabilitation.

The symptoms of PASC (Theme 6), commonly interfered with participation in the PTR program. PASC symptoms are diverse (over 200 reported), multisystemic and episodic [3,34,35]. When symptoms worsened, participants felt demoralised when attempting to participate. An individualised approach to rehabilitation is necessary to support rehabilitation that is flexible enough to enable the program to be varied according to the presentation of PASC symptoms on a given day.

Many participants expressed that they would have liked the telerehabilitation program to be offered for longer and with ongoing education (Theme 7). A previous systematic review suggests that programs of longer duration may better support improvements in HRQoL and exercise capacity [36]. However, in respiratory conditions such as COPD there is only weak evidence for the benefit of ongoing programs for maintaining benefits gained from initial pulmonary rehabilitation programs [37]. Given this study utilised a short 4-week program, a program of longer duration may be appropriate given the perspectives of participants in this study who desired longer programs and given that pulmonary rehabilitation programs are typically eight weeks in duration [38]. The benefits of ongoing maintenance exercise and education programs after an initial pulmonary rehabilitation program in people with PASC is unknown.

Integration with RCT findings

Feedback from participants through interviews was overwhelmingly positive, with many perceiving the program of high value in addressing their COVID sequelae. Despite this, quantitative results from the RCT did not show any between-group differences in any outcome assessed, which included functional capacity, symptoms, cognition, anxiety, depression, HRQoL and fatigue. Qualitative inquiry allows deep insight into the experiences of individuals allowing for rich understandings in concepts, such as motivation, wellbeing and quality of life. Participants often reflected on the importance of validation of their condition and how this supported their self-management and participation in telerehabilitation. This validation was enhanced by having a shared experience of PTR with others dealing with respiratory PASC, however, these identified benefits did not translate into statistically significant improvements in the outcomes assessed in the RCT. The chosen outcome measures for our RCT, whilst appropriate for a clinical trial, did not have the measurement qualities to capture participant perspectives on the value of the program.

Clinical implications

Those with 'invisible illness' (i.e. conditions without outwardly visible signs) such as PASC often receive poor support and recognition [39]. Clinicians should be aware of the pathophysiological evidence [34] of PASC and consider how their interactions with people reporting PASC affect their healthcare experiences, access and utilisation. Additionally, participants frequently expressed how the virtual delivery of rehabilitation enabled participation and therefore clinicians should consider the modes in which rehabilitation is delivered and the potential for provision of rehabilitation outside of typical business hours. Clinicians should also consider the value of group-based programs given that participants often commented on the benefits to their psychological health derived from having a shared experience of rehabilitation. Finally, clinicians should acknowledge how PASC-specific barriers to participation, such as work commitments and PASC symptoms, such as fatigue, may impact the capacity of individuals to participate. Allowing flexible scheduling and adaptable exercise prescription for when symptoms worsen will likely support adherence and build rapport with patients.

Limitations

Given this study utilised semi-structured interviews, there is a risk that findings may have been positively inflated by response bias [40]. Whilst a possibility, this risk was mitigated by (a) using an interviewer who was not involved in the delivery of the intervention to reduce the likelihood participants would provide socially desirable responses; (b) carefully considering the phrasing of questions posed to participants so that questions were not leading; and (c) addressing courtesy bias by reinforcing to participants prior to their interview that their honest answers would be more helpful for improving future telerehabilitation programs and that, regardless of their opinions, they would receive any future care without prejudice.

As this study reports the perspectives of participants with respiratory symptoms (such as dyspnoea) after COVID-19, findings may be less generalisable to people with other symptoms; however, fatigue, which is common in PASC [41], was also reported by many participants in this study. Another limitation was that this study did not include the views of all participants of the PTR program and therefore may not represent the complete views of the cohort. However, a recent systematic review suggested that thematic saturation can be reached between 9 and 17 participants [42]. Discussions with the interviewer and research team provided confidence that saturation of themes was reached with the 15 participants interviewed.

Conclusion

For people with respiratory sequelae after COVID-19 infection, the main themes surrounding participation in PTR were remote access to telerehabilitation; access to a health professional; validation of PASC; having a shared experience; work commitments; PASC symptoms; and desire for more telerehabilitation opportunities. Clinicians should consider how the participant experiences presented within these themes impact the ability of people with PASC to participate in PTR. Rehabilitation programs for people with PASC should consider how program length, flexibility in scheduling, validation of PASC and symptoms and shared experiences through group exercise programs influence engagement.

Acknowledgements

NA.

Author contributions

CRediT: **Jack Reeves:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Writing – original draft; **Helen Kindness:** Conceptualization, Data curation, Investigation, Methodology, Writing – review & editing; **Lissa M. Spencer:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing – review & editing; **Ling-Ling Tsai:** Conceptualization, Investigation, Methodology, Writing – review & editing; **Andrew J. Baillie:** Conceptualization, Investigation, Methodology, Writing – review & editing; **Jennifer A. Alison:** Conceptualization, Data curation, Investigation, Methodology, Writing – review & editing.

Disclosure statement

The authors report there are no competing interests to declare.

Funding

This study was supported by a Sydney Local Health District Allied Health Research Grant.

Data availability statement

NA.

References

- [1] Soriano JB, Murthy S, Marshall JC, et al. A clinical case definition of post-COVID-19 condition by a Delphi consensus. *Lancet Infect Dis.* 2022;22(4):e102–e7. doi: [10.1016/S1473-3099\(21\)00703-9](https://doi.org/10.1016/S1473-3099(21)00703-9)
- [2] O'Mahoney LL, Routen A, Gillies C, et al. The prevalence and long-term health effects of Long Covid among hospitalised and non-hospitalised populations: a systematic review and meta-analysis. *EClinicalMedicine.* 2023;55:101762. doi: [10.1016/j.eclinm.2022.101762](https://doi.org/10.1016/j.eclinm.2022.101762).
- [3] Lopez-Leon S, Wegman-Ostrosky T, Perelman C, et al. More than 50 long-term effects of COVID-19: a systematic review and meta-analysis. *Sci Rep.* 2021;11(1):16144. doi: [10.1038/s41598-021-95565-8](https://doi.org/10.1038/s41598-021-95565-8).
- [4] Natarajan A, Shetty A, Delanerolle G, et al. A systematic review and meta-analysis of long COVID symptoms. *Syst Rev.* 2023;12(1):88. doi: [10.1186/s13643-023-02250-0](https://doi.org/10.1186/s13643-023-02250-0).
- [5] Singh SJ, Baldwin MM, Daynes E, et al. Respiratory sequelae of COVID-19: pulmonary and extrapulmonary origins, and approaches to clinical care and rehabilitation. *Lancet Respir Med.* 2023;11(8):709–725. doi: [10.1016/S2213-2600\(23\)00159-5](https://doi.org/10.1016/S2213-2600(23)00159-5)
- [6] Parotto M, Gyöngyösi M, Howe K, et al. Post-acute sequelae of COVID-19: understanding and addressing the burden of multisystem manifestations. *Lancet Respir Med.* 2023;11(8):739–754. doi: [10.1016/S2213-2600\(23\)00239-4](https://doi.org/10.1016/S2213-2600(23)00239-4)
- [7] Reeves J, Spencer L, Tsai L-L, et al. Author response to Shukla and Chaudhary. *Phys Ther.* 2025;105(4): pza024. doi: [10.1093/ptj/pzaf024](https://doi.org/10.1093/ptj/pzaf024).
- [8] World Physiotherapy. World physiotherapy response to COVID-19 briefing paper 9. Safe rehabilitation approaches for people living with Long COVID: physical activity and exercise. Southwark, England: World Physiotherapy; 2021.
- [9] National Institute of health and Care Excellence. National institute for health and care excellence (NICE) COVID-19 rapid guideline: managing COVID-19. Manchester: National Institute of health and Care Excellence; 2023.
- [10] Antoniou KM, Vasarmidi E, Russell AM, et al. European respiratory society statement on long COVID follow-up. *Eur Respir J.* 2022;60(2):2102174. doi: [10.1183/13993003.02174-2021](https://doi.org/10.1183/13993003.02174-2021).
- [11] Yang J, Li H, Zhao H, et al. Effectiveness of telerehabilitation in patients with post-COVID-19: a systematic review and meta-analysis of randomised controlled trials. *BMJ Open.* 2024;14(7):e074325. doi: [10.1136/bmjopen-2023-074325](https://doi.org/10.1136/bmjopen-2023-074325).
- [12] Thompson EJ, Williams DM, Walker AJ, et al. Long COVID burden and risk factors in 10 UK longitudinal studies and electronic health records. *Nat Commun.* 2022;13(1):3528. doi: [10.1038/s41467-022-30836-0](https://doi.org/10.1038/s41467-022-30836-0).
- [13] Zeng N, Zhao YM, Yan W, et al. A systematic review and meta-analysis of long term physical and mental sequelae of COVID-19 pandemic: call for research priority and action. *Mol Psychiatry.* 2023;28(1):423–433. doi: [10.1038/s41380-022-01614-7](https://doi.org/10.1038/s41380-022-01614-7).
- [14] Killingback C, Thompson M, Nettleton M, et al. Telerehabilitation for patients who have been hospitalised with covid-19: a qualitative study. *Disabil Rehabil.* 2024;46(1):150–158. doi: [10.1080/09638288.2022.2159075](https://doi.org/10.1080/09638288.2022.2159075).
- [15] Palacios-Ceña D, Bautista-Villaécija O, Güeita-Rodríguez J, et al. Supervised telerehabilitation and home-based respiratory muscle training for post-COVID-19 condition symptoms: a nested qualitative study exploring the perspectives of participants in a randomized controlled trial. *Phys Ther.* 2024;104(5):pzae043. doi: [10.1093/ptj/pzae043](https://doi.org/10.1093/ptj/pzae043).
- [16] Reeves JM, Spencer LM, Tsai LL, et al. Effect of a 4-week pulmonary telerehabilitation program for people with respiratory post-acute sequelae of COVID-19—A randomised controlled trial. *Eur J Physiother.* 2025;27(6):402–411. doi: [10.1080/21679169.2025.2479676](https://doi.org/10.1080/21679169.2025.2479676).
- [17] Reeves JM, Spencer LM, Tsai LL, et al. Effect of a 4-week telerehabilitation program for people with post-COVID syndrome on physical function and symptoms: protocol for a randomized controlled trial. *Phys Ther.* 2024;104(9):pzae080. doi: [10.1093/ptj/pzae080](https://doi.org/10.1093/ptj/pzae080).
- [18] Gloeckl R, Leitl D, Jarosch I, et al. Benefits of pulmonary rehabilitation in COVID-19: a prospective observational cohort study. *ERJ Open Res.* 2021;7(2):00108–2021. doi: [10.1183/23120541.00108-2021](https://doi.org/10.1183/23120541.00108-2021).
- [19] Estebanez-Pérez M-J, Pastora-Bernal J-M, Martín-Valero R. The effectiveness of a four-week digital physiotherapy intervention to improve functional capacity and adherence to intervention in patients with long COVID-19. *Int J Environ Res Public Health.* 2022;19(15):9566. doi: [10.3390/ijerph19159566](https://doi.org/10.3390/ijerph19159566).
- [20] Bishop JA, Spencer LM, Dwyer TJ, et al. Changes in exercise capacity and health-related quality of life at four and eight weeks of a pulmonary rehabilitation program in people with COPD. *COPD: J Chronic Obstruct Pulmonary Dis.* 2021;18(6):612–620. doi: [10.1080/15412555.2021.2013793](https://doi.org/10.1080/15412555.2021.2013793).
- [21] WHO. World Health Organization (WHO) Support for rehabilitation: self-management after COVID-19-related illness. Geneva, Switzerland: World Health Organization. Regional Office for Europe; 2021.
- [22] LFA. Understanding long COVID. New South Wales, Australia: Lung Foundation Australia (LFA); 2023.
- [23] Reeves JM, Spencer LM, Tsai L-L, et al. Long-term outcomes following a pulmonary telerehabilitation trial for people with respiratory post-acute sequelae of COVID: a 12-month follow-up study. *J Rehabil Med.* 2026;58: jrm44828. doi: [10.2340/jrm.v58.44828](https://doi.org/10.2340/jrm.v58.44828).
- [24] Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol.* 2006;3(2):77–101. doi: [10.1191/1478088706qp063oa](https://doi.org/10.1191/1478088706qp063oa).

- [25] Nowell LS, Norris JM, White DE, et al. Thematic analysis: striving to meet the trustworthiness criteria. *Int J Qual Methods*. 2017;16(1):1609406917733847. doi: [10.1177/1609406917733847](https://doi.org/10.1177/1609406917733847).
- [26] Braun V, Clarke V, Hayfield N, et al. Thematic analysis. In: Liamputtong P, editor. *Handbook of research methods in health social sciences*. Singapore: Springer Singapore; 2018. p. 1–18.
- [27] O'Brien BC, Harris IB, Beckman TJ, et al. Standards for reporting qualitative research: a synthesis of recommendations. *Academic Medicine*. 2014;89(9):1245–1251. doi: [10.1097/ACM.0000000000000388](https://doi.org/10.1097/ACM.0000000000000388).
- [28] Li W, Liu W, Liu S, et al. Perceptions of patients with chronic obstructive pulmonary disease towards telemedicine: a qualitative systematic review. *Heart Lung*. 2021;50(5):675–684. doi: [10.1016/j.hrtlng.2021.03.081](https://doi.org/10.1016/j.hrtlng.2021.03.081).
- [29] Hung P, Brehon K, Miciak M, et al. "I had to know about it, I had to find it, I had to know how to access it": experiences of access to rehabilitation services among people living with long COVID. *Physiother Can*. 2024;76(1): 8–24. doi: [10.3138/ptc-2023-0021](https://doi.org/10.3138/ptc-2023-0021).
- [30] Holland AE, Cox NS, Houchen-Wolloff L, et al. Defining modern pulmonary rehabilitation. An official American Thoracic Society workshop report. *Ann Am Thorac Soc*. 2021;18(5):e12–e29. doi: [10.1513/AnnalsATS.202102-146ST](https://doi.org/10.1513/AnnalsATS.202102-146ST).
- [31] Spitzer KA, Stefan MS, Drake AA, et al. "You leave there feeling part of something": a qualitative study of hospitalized COPD patients' perceptions of pulmonary rehabilitation. *Int J Chron Obstruct Pulmon Dis*. 2020;15: 575–583. doi: [10.2147/COPD.S234833](https://doi.org/10.2147/COPD.S234833).
- [32] Barton C, Troy L, Teoh A, et al. COVID-19 and collective trauma: implementing a trauma-informed model of care for post-COVID patients. *J Adv Nurs*. 2024;80(9):3593–3599. doi: [10.1111/jan.16076](https://doi.org/10.1111/jan.16076).
- [33] Au L, Capotescu C, Eyal G, et al. Long covid and medical gaslighting: dismissal, delayed diagnosis, and deferred treatment. *SSM Qual Res Health*. 2022;2:100167. doi: [10.1016/j.ssmqr.2022.100167](https://doi.org/10.1016/j.ssmqr.2022.100167).
- [34] Davis HE, McCorkell L, Vogel JM, et al. Long COVID: major findings, mechanisms and recommendations. *Nat Rev Microbiol*. 2023;21(3):133–146. doi: [10.1038/s41579-022-00846-2](https://doi.org/10.1038/s41579-022-00846-2).
- [35] Brown DA, O'Brien KK. Conceptualising long COVID as an episodic health condition. *BMJ Glob Health*. 2021;6(9): e007004. doi: [10.1136/bmjgh-2021-007004](https://doi.org/10.1136/bmjgh-2021-007004).
- [36] Beauchamp MK, Janaudis-Ferreira T, Goldstein RS, et al. Optimal duration of pulmonary rehabilitation for individuals with chronic obstructive pulmonary disease - a systematic review. *Chron Respir Dis*. 2011;8(2):129–140. doi: [10.1177/1479972311404256](https://doi.org/10.1177/1479972311404256).
- [37] Spencer LM, McKeough ZJ. Maintaining the benefits following pulmonary rehabilitation: achievable or not? *Respirology*. 2019;24(9):909–915. doi: [10.1111/resp.13518](https://doi.org/10.1111/resp.13518).
- [38] Spruit MA, Singh SJ, Garvey C, et al. An official American thoracic society/European respiratory society statement: key concepts and advances in pulmonary rehabilitation. *Am J Respir Crit Care Med*. 2013;188(8):e13–e64. doi: [10.1164/rccm.201309-1634ST](https://doi.org/10.1164/rccm.201309-1634ST).
- [39] Dobson J. Invisible illness and measurability. *AMA J Ethics*. 2021;23(7):512–513. DOI: [10.1001/amajethics.2021.512](https://doi.org/10.1001/amajethics.2021.512).
- [40] Bergen N, Labonté R. "Everything is perfect, and we have no problems": detecting and limiting social desirability bias in qualitative research. *Qual Health Res*. 2020;30(5):783–792. doi: [10.1177/1049732319889354](https://doi.org/10.1177/1049732319889354).
- [41] Whitaker M, Elliott J, Chadeau-Hyam M, et al. Persistent COVID-19 symptoms in a community study of 606,434 people in England. *Nat Commun*. 2022;13(1):1957. doi: [10.1038/s41467-022-29521-z](https://doi.org/10.1038/s41467-022-29521-z).
- [42] Hennink M, Kaiser BN. Sample sizes for saturation in qualitative research: a systematic review of empirical tests. *Soc Sci Med*. 2022;292:114523. doi: [10.1016/j.socscimed.2021.114523](https://doi.org/10.1016/j.socscimed.2021.114523).