RESEARCH ARTICLE

WILEY

Co-development and evaluation of the Musculoskeletal Telehealth Toolkit for physiotherapists

Allison M. Ezzat[1,2] | Matthew G. King[1,3] | Danilo De Oliveira Silva[1] |
Marcella F. Pazzinatto[1] | J. P. Caneiro[4] | Stephanie Gourd[5] | Rhona McGlasson[6] |
Peter Malliaras[7] | Amy Dennett[1,8] | Trevor Russell[9] | Joanne L. Kemp[1,3] |
Christian J. Barton[1,3]

[1]La Trobe Sport and Exercise Medicine Research Centre, School of Allied Health, Human Services and Sport, La Trobe University, Bundoora, Victoria, Australia

[2]Department of Physical Therapy, Faculty of Medicine, University of British Columbia, Vancouver, British Columbia, Canada

[3]Department of Physiotherapy Podiatry and Prosthetics and Orthotics, School of Allied Health, Human Services and Sport, La Trobe University, Bundoora, Victoria, Australia

[4]School of Allied Health, Curtin University, Perth, Western Australia, Australia

[5]Australian Catholic University, Melbourne, Victoria, Australia

[6]Bone and Joint Canada, Toronto, Ontario, Canada

[7]Physiotherapy Department, School of Primary and Allied Health Care, Faculty of Medicine, Nursing, and Health Science, Monash University, Clayton, Victoria, Australia

[8]Allied Health Clinical Research Office, Eastern Health, Box Hill, Victoria, Australia

[9]RECOVER Injury Research Centre, The University of Queensland, Herston, Queensland, Australia

Correspondence
Allison M. Ezzat.
Email: a.ezzat@latrobe.edu.au

Abstract

Introduction: In-person physiotherapy services are not readily available to all individuals with musculoskeletal conditions, especially those in rural regions or with time-intensive responsibilities. The COVID-19 pandemic highlighted that telehealth may facilitate access to, and continuity of care, yet many physiotherapists lack telehealth confidence and training. This project co-developed and evaluated a web-based professional development toolkit supporting physiotherapists to provide telehealth services for musculoskeletal conditions.

Methods: A mixed-methods exploratory sequential design applied modified experience-based co-design methods (physiotherapists [$n = 13$], clinic administrators [$n = 2$], and people with musculoskeletal conditions [$n = 7$]) to develop an evidence-informed toolkit. Semi-structured workshops were conducted, recorded, transcribed, and thematically analysed, refining the toolkit prototype. Subsequently, the toolkit was promoted via webinars and social media. The usability of the toolkit was examined with pre-post surveys examining changes in confidence, knowledge, and perceived telehealth competence (19 statements modelled from the theoretical domains framework) between toolkit users (>30 min) and non-users (0 min) using chi-squared tests for independence. Website analytics were summarised.

Results: Twenty-two participants engaged in co-design workshops. Feedback led to the inclusion of more patient-facing resources, increased assessment-related visual content, streamlined toolkit organisation, and simplified, downloadable infographics. Three hundred and twenty-nine physiotherapists from 21 countries completed the baseline survey, with 172 (52%) completing the 3-month survey. Toolkit users had greater improvement in knowledge, confidence, and competence than non-users in 42% of statements. Seventy-two percentage of toolkit users said it changed their practice, and 95% would recommend the toolkit to colleagues. During the evaluation period, the toolkit received 5486 total views.

Discussion: The co-designed web-based Musculoskeletal Telehealth Toolkit is a professional development resource that may increase physiotherapist's confidence, knowledge, and competence in telehealth.

KEYWORDS

co-design, digital tools, mixed methods, professional development, telehealth

1 | INTRODUCTION

Musculoskeletal conditions are a leading cause of pain and disability, estimated to affect 1.71 billion people globally (GBD 2019 Diseases and Injuries Collaborators, 2020). The prevalence of conditions varies by age and region, with back and neck pain, osteoarthritis, and fractures among the most common (GBD 2019 Diseases and Injuries Collaborators, 2020). Musculoskeletal conditions significantly limit mobility, disrupt work productivity and lead to reduced ability to participate in society (Briggs et al., 2016). Together, musculoskeletal conditions are the biggest contributor to years lived with disability worldwide (149 million YLDs) (GBD 2019 Diseases and Injuries Collaborators, 2020) and are among the highest contributors to the global need for rehabilitation (Cieza et al., 2021).

International guidelines strongly recommend exercise therapy and education, delivered by physiotherapists, as 'high-value' management for many common musculoskeletal conditions (Bannuru et al., 2019; Koes et al., 2001). Yet, despite compelling evidence, physiotherapists are not always accessed by patients due to numerous barriers, including patient and health professional beliefs, health system funding, and service accessibility (Nauton et al., 2020; Runciman et al., 2012; Williams et al., 2010). For example, in-person physiotherapy is not always available to those living in rural and remote regions or with time-intensive occupational or caring responsibilities (VAHWRP, 2016). Reduced access to in-person care during the COVID-19 pandemic highlighted the importance and value of alternative delivery models such as telehealth to facilitate continuity of patient care (Barton, Ezzat, Meroli, et al., 2022; Ezzat, Esculier, et al., 2023; Malliaras et al., 2021).

Telehealth, involving remote patient-clinician interaction via synchronous means (e.g. telephone, teleconference, video call) (Dorsey & Topol, 2016), facilitates effective management of musculoskeletal conditions, that is non-inferior to in-person care in contexts where evidence is currently available (Cottrell & Russell, 2020). The introduction of permanent telehealth funding models (MDAC, 2023) and research showing high patient acceptability among those who have accessed telehealth (Barton, Ezzat, Bell, et al., 2022) have created an opportunity to improve patient access to physiotherapy well beyond the pandemic. However, many physiotherapists lack confidence and feel inadequately trained to safely and competently adapt their scope of practice to deliver telehealth for musculoskeletal pain conditions (Ezzat, Esculier, et al., 2023; Malliaras et al., 2021).

To overcome this inadequacy, physiotherapists are seeking accessible, high-quality resources to support their assessment and management of musculoskeletal pain conditions via telehealth (Ezzat, Esculier, et al., 2023; Malliaras et al., 2021). Web-based toolkits are reported to be one of the most preferred methods to receive further training (Ezzat, Esculier, et al., 2023; Malliaras et al., 2021) due to their ability to tailor the knowledge translation and meet diverse learning preferences through text, video, infographics, quizzes, and podcasts (Barton & Merolli, 2017). Previous work evaluating musculoskeletal physiotherapists use of online toolkits in management of Achilles tendinopathy has found their use could increase physiotherapists' knowledge and confidence and are associated with greater odds of following best practice guidelines (Ezzat et al., 2017).

Co-design methods involving end-users to co-create interventions or resources, such as web-based toolkits, may improve end-users' satisfaction through empowerment (Leask et al., 2019; Slattery et al., 2020) and result in improved product effectiveness or higher quality service provision (De Oliveria Silva et al., 2020; Leask et al., 2019). However, despite these promising advantages and the increased advocacy for end-user engagement by research funders (CIHR, 2014), few resources for physiotherapists have been developed using co-design methods. The current project uses experience-based co-design methods (CHFA, 2023) involving physiotherapists, clinic administrators, and people with musculoskeletal conditions to develop and evaluate a web-based telehealth toolkit to support physiotherapists in implementing telehealth for musculoskeletal conditions. The aims of this project were three-fold: (1) to co-develop an accessible and evidence-guided toolkit to enhance training and support for physiotherapists to deliver care via telehealth for people with musculoskeletal conditions; (2) to evaluate the toolkit usability and changes in physiotherapists' confidence, knowledge, perceived telehealth competence following use; and (3) to explore the association of physiotherapist demographic and practice characteristics on toolkit use to better understand the toolkit reach and to inform future targeted dissemination strategies.

2 | METHODS

2.1 | Study design

This mixed-methods, two-phased study involved the co-design and evaluation of the Translating Research Into Practice (TREK)

Musculoskeletal Telehealth Toolkit, a web-based resource co-created by researchers in collaboration with physiotherapist clinicians, clinic administrators, and people with lived experience of musculoskeletal conditions. A needs identification process provided the impetus, informed the background and guided the creation of a toolkit prototype. Using modified experience-based co-design methods (Dennett et al., 2022; The Point of Care Foundation, 2013) the toolkit was iteratively developed and refined using an in-depth, interactive approach between June 2021 and February 2022. Experience-based co-design is a collaborative strategy for product design or service improvement that partners with end users (The Point of Care Foundation, 2013). Rather than perceiving end-users as passive recipients of a product, users' unique knowledge of the experience is recognised as highly valuable, and they are viewed as integral contributors to the improvement and innovation process (Bates & Robert, 2006). The co-development process included a series of online qualitative workshops held between September and December 2021 with toolkit end-user groups. The toolkit evaluation occurred between March and October 2022, involving quantitative within-participant pre-post toolkit use questions and analysis of website metrics. The overall study procedure is outlined in Figure 1.

2.2 | Phase 1: Needs identification and co-design process

At project commencement, a research steering committee was formed with diverse research and clinical expertise in telehealth, co-design methods, and implementation science. Committee members had recently led research examining physiotherapists learning preferences (Barton, Ezzat, Bell, et al., 2022), physiotherapist knowledge, confidence, and perceived skills related to telehealth in musculoskeletal practice (Ezzat, Esculier, et al., 2023; Malliaras et al., 2021) and physiotherapy patient experiences with telehealth (Barton, Ezzat, Meroli, et al., 2022). The knowledge generated and gaps identified from this work were the main drivers for the toolkit creation. In addition, informal expert opinion was obtained from clinicians with extensive telehealth experience, and a research assistant conducted a comprehensive environmental scan of freely available online resources pertaining to physiotherapist delivery of telehealth in musculoskeletal practice, to understand content gaps and highlight potential linkages.

Prior to the involvement of end-users, a telehealth toolkit prototype was built by the research team on the TREK platform (https://telehealth.trekeducation.org.) TREK is a non-for-profit initiative that aims to develop and share freely available online digital resources to support the health-related education of clinicians and people managing musculoskeletal pain. The prototype was intended to serve as a rudimentary framework on which to apply iterative experience-based co-design methods (The Point of Care Foundation, 2013) to create a more engaging, useful toolkit. Its primary purpose was to facilitate discussion and showcase potential content domains and formats for

communicating knowledge, such as text, video clips, infographics, and case-based learning approaches.

2.3 | Participants

Two cohorts of participants were recruited to engage in the iterative, reflective, and co-design process. As the intended primary end-users of the resource, registered physiotherapist clinicians residing in Australia who treated patients with musculoskeletal conditions were recruited. A purposive sample was sought with variable levels of telehealth experience, as well as diversity in workplace location (e.g. urban or rural). Physiotherapists were recruited through advertisements in the Australian Physiotherapy Association E-newsletter, social media posts, and via snowball sampling through the clinical network of the research team. The second cohort of co-design participants were patients with lived experience of musculoskeletal pain conditions (knee and hip osteoarthritis, shoulder pain, and non-specific low back pain) both with and without telehealth experience, as well as physiotherapy clinic administrators who had experience coordinating telehealth appointments between clinicians and patients. People with lived experience of musculoskeletal conditions were recruited via study posters that were distributed by consumer groups (Musculoskeletal Australia and Good Life with osteoArthritis in Denmark [GLA:D®]) Australia], displayed in physiotherapy clinics of research team members (Complete Sports Care [CB, PM], Body Logic Physiotherapy [JC]), and posted on social media. Clinic administrators were identified through a clinical network and personal contacts.

Potential co-design participants responded to Research Electronic Data Capture (REDcap) (Harris et al., 2009) survey link on the recruitment materials where they answered screening and demographic questions, read study information, provided consent, and left their email address for further contact. It was anticipated that 8–10 participants from each cohort would be sufficient to capture diverse experiences and perspectives on telehealth and provide in-depth co-design recommendations (The Point of Care Foundation, 2013).

2.4 | Workshops

Four semi-structured co-design workshops were held via teleconference (Zoom video communications) over a 4-month period. One week prior to each workshop, participants were emailed access to the toolkit with instructions to explore it before the workshop along with some broad open-ended guiding questions designed to prompt personal reflection. Workshops were facilitated by members of the research team with extensive qualitative research experience (AE, CB) and additional team members attended to observe, participate in post-workshop discussions, and take notes. The first three workshops involved physiotherapist clinicians (September 15, 17, and 24, 2021). Data analysis began immediately following workshops with the research team holding reflective meetings, discussing fieldnotes and
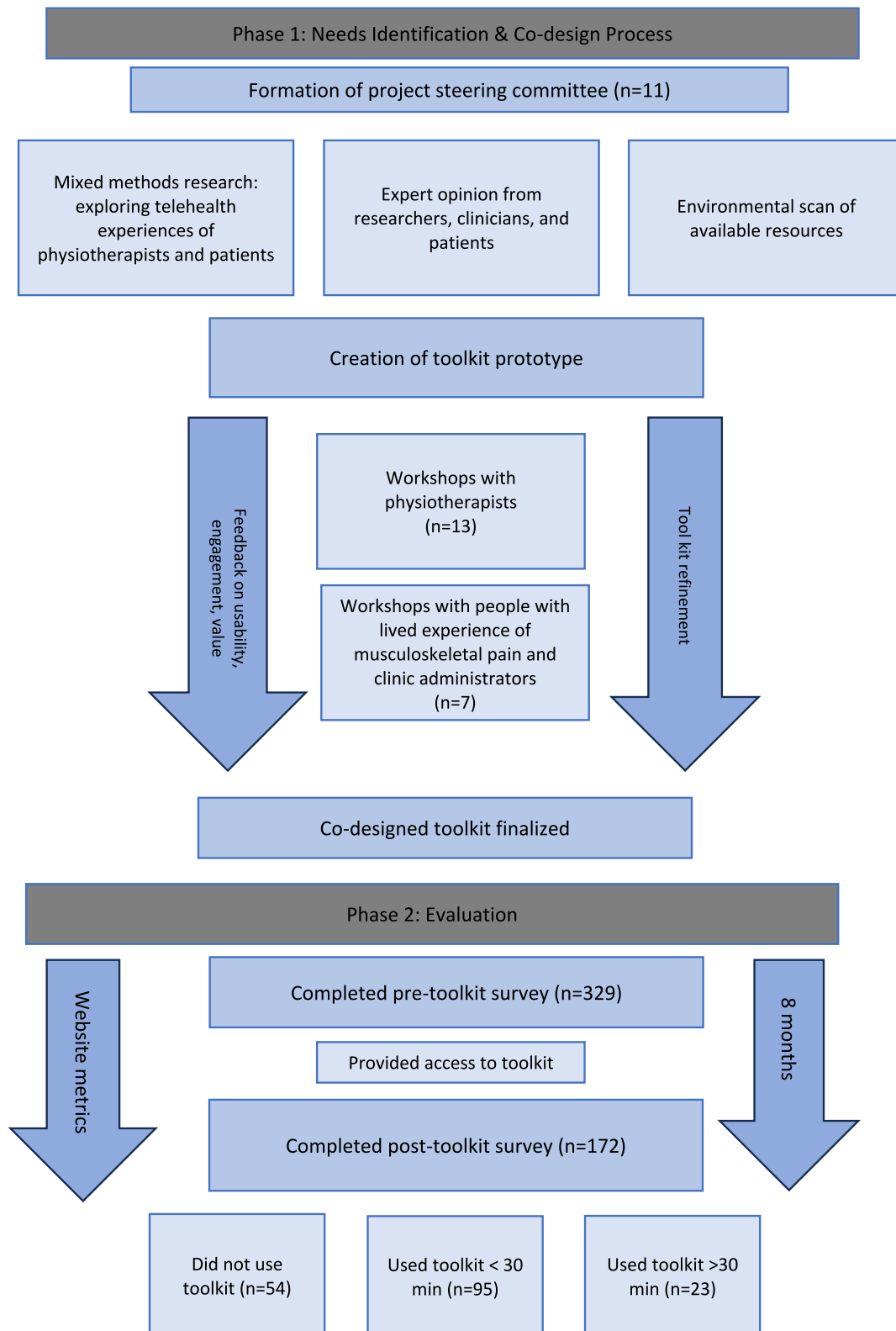
FIGURE 1 Overall study flow for co-design and evaluation of the Musculoskeletal Telehealth Toolkit.

prioritising toolkit feedback for action. Discussion notes were collated and summarised, and a plan for toolkit adaptations was determined. A concise document with action items was sent to workshop participants providing an opportunity for further feedback and suggestions. Revisions and updates were made to the toolkit before workshop four, which included both people with lived experience of musculoskeletal conditions and clinic administrators (6 December 2021).

Workshops were planned to be approximately 2 h in duration (including a 15-min break) and involved a mix of facilitated group discussions and smaller group breakout sessions. Directed by a semi-structured topic guide (Appendix A), they were designed to obtain in-depth participant perspectives on the overall design, content, navigation, and format of the toolkit, as well as if and how it would meet physiotherapists learning needs. Participants were asked further input about perceived accuracy and engagement of content, useability in clinical practice including patient facing resources, potential weaknesses or limitations of the resource and how these could be addressed.

2.5 | Data analysis

All workshops were video and audio recorded and transcribed verbatim. The accuracy of transcripts was confirmed by listening to audio files and research team members read and re-read transcripts for data immersion. Transcripts and field notes were discussed in-depth by members of the research team for data triangulation and trustworthiness. Team members (AE, CB, SG) independently used an inductive thematic analysis approach (Fereday & Muir-Cochrane, 2016) to identify key areas for improvement or refinement (touchpoints) (The Point of Care Foundation, 2013). Throughout the toolkit development, areas for improvement were discussed as a larger research team group (AE, CB, SG, DOS, MP) to reach consensus and create an action plan for the toolkit. Data were organised, managed, and analysed using Microsoft word and NVIVO (2020).

2.6 | Phase 2: Evaluation

The newly co-designed toolkit was formally evaluated in an international sample of physiotherapists using within-participant pre-post toolkit use surveys to examine toolkit usability and change confidence, knowledge, perceived competence in telehealth. We also sought to explore any associations between physiotherapist demographic and practice characteristics and toolkit use.

2.7 | Pre-toolkit webinar and survey

Once the co-designed toolkit was deemed ready for evaluation, the research team set two dates (30 March 2022 and 13 April 2022) for free 60-min live, online webinars to formally launch the resource. Webinars were open to physiotherapists and physiotherapy students worldwide and were held at times most convenient for clinicians in Australia and Canada. The webinars were promoted by the research team on social media (e.g. Twitter, Facebook) and circulated via email by the Canadian Physiotherapy Association Orthopaedic Division.

Before attending the webinar and to receive the link to the on-line toolkit, potential participants were asked to first complete a 12-min pre-toolkit survey via RedCap (Harris et al., 2009). This survey included demographics and practice characteristics (i.e. gender, country, setting), previous telehealth training, resources and experiences, and a set of 19 statements modelled on the theoretical domains framework (Atkins et al., 2017) designed to examine physiotherapists confidence, knowledge, and perceived competency surrounding telehealth (Appendix B). Physiotherapists were asked for their agreement with each statement on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The survey was developed based on a previous online toolkit evaluation (Dennett et al., 2022) (AD) and was pilot tested by members of the research team (AE, CB, MP) for readability before distribution. At pre-toolkit survey completion, participants provided their email address which facilitated the delivery of the direct link to the toolkit and the linkage of pre-test and post-test survey responses.

2.8 | Post-toolkit survey

All physiotherapists who left their email in the pre-toolkit survey were emailed and individualised link to the post-toolkit survey 3-month after originally gaining access to the telehealth toolkit. This second survey was shorter (estimated time to completion 8-min) and repeated the 19 statements related to telehealth confidence, knowledge, and perceived competence, as well as new questions on utility and useability of the toolkit (Appendix B). It asked participants if they had accessed the toolkit with four response options (no, yes <15 min, yes 15–30 min, and yes >30 min). Participants were given a token of appreciation ($20 AUD gift card) for completing the post-toolkit survey within 1 month of receiving the email regardless of their toolkit use. A maximum of 3 reminder emails were sent. Participant consent for involvement in the toolkit evaluation was implied by survey completion.

2.9 | Data analysis

Quantitative survey responses from physiotherapists were descriptively summarised using frequency and proportions. To evaluate the changes in confidence, knowledge, and perceived telehealth competence, agreement on all 19 statements was defined as a binary outcome as those who indicated ≥4 to each statement (agree or strongly agree) or <4 (strongly disagree, disagree, neither disagree or agree). Given the volume and depth of content contained in the toolkit, it was decided that a minimum of 30 min of engagement with the resource would be needed to lead to changes in physiotherapists telehealth-related beliefs. Within-group, change in confidence, knowledge, and perceived telehealth competence was calculated as the proportionate increase in agreement score (agree or strongly agree) at follow-up with differences between groups (no use vs. >30 min) compared with the Chi-squared test for independence with $\alpha = 0.05$. The association between demographic (gender and country) and practice characteristics (years experience and patient type) on

toolkit use were explored using multivariable binomial logistic regression with reported use (yes/no) defined as a binary outcome and $\alpha = 0.05$. All statistical analyses were conducted in R (R, R foundation for statistical computing).

3 | RESULTS

3.1 | Phase 1: Co-design of Musculoskeletal Telehealth Toolkit

The characteristics of the steering committee members are summarised in Table 1. Twenty-two participants were involved in the co-design workshops over a 4-month period. This included 13

TABLE 1 Steering committee members characteristics ($n = 11$).

Gender, women	6 (55%)
Professional roles[a]	
Academic physiotherapist	9 (82%)
Clinician physiotherapist	6 (55%)
Consultant in health care	1 (9%)
Location	
Melbourne, Australia	8 (73%)
Perth, Australia	1 (9%)
Brisbane, Australia	1 (9%)
Toronto, Canada	1 (9%)
Research telehealth experience,	9 (82%)
Clinical telehealth experience	9 (82%)

Note: n (%).

[a]Members had multiple professional roles.

physiotherapists, of whom 11 (85%) had previous telehealth experience and 7 people with lived experience of musculoskeletal pain conditions (knee, hip, shoulder, lumbar spine), of whom 4 (57%) had previous telehealth experience. Two clinic administrators, both with experience coordinating telehealth appointments, also participated (Table 2).

3.2 | Physiotherapist input

Physiotherapists attended co-design workshops 1–3 and provided detailed feedback and suggestions that covered various aspects of the prototype toolkit. This input has been organised thematically in Appendix C and summarised in Table 3 alongside the resulting actions taken to implement the feedback into the toolkit.

Overarching physiotherapist feedback was positive pertaining to the toolkit content '*there's a lot of good stuff in [the toolkit]. I'm already looking at some stuff that I'll follow up on*' (PT 2), although many wanted more in-depth learning related to '*how to do the objective assessment … to adapt that to be delivered by telehealth*' (PT 1) and specifically further visual content including '*more videos or images of assessment tests*' (PT 2). In response, we added additional short assessment video clips and photos of special tests that could be performed by telehealth. Other suggested content areas included lived experience videos, how to complete running assessments, and guidance on providing telehealth by telephone.

Physiotherapists also had numerous suggestions to improve the toolkit organisation, including the layout, navigation, and aesthetics. This included PT 13: '*You [have] got so much information there, but maybe that person needs a bit more direction of where to go*'. Echoed by PT 4: '*I just felt the only thing was the uniformity… it just looked like you got all these great resources [but] it felt a bit disjointed.*' This was an impetus to create 'start here' icons on the landing page, add new pages to better organise content, and improve navigation by ensuring embedded links opened in new tabs.

TABLE 2 Co-design participant characteristics ($n = 22$).

	Physiotherapists ($n = 13$)	People with lived experience ($n = 7$)	Clinic administrators ($n = 2$)
Gender, women n (%)	9 (69%)	4 (57%)	50%
Urban/rural	11/2	6/1	2/0
Telehealth experience, n (%)	11 (85%)	4 (57%)	2 (100%)
Telehealth patients treated, median (range)	16 (4, 600)	NA	NA
Telehealth sessions attended, median (range)	NA	7.5 (4, 30)	NA
Musculoskeletal conditions n, (%)[a]	NA		NA
Knee		5 (71%)	
Hip		2 (29%)	
Shoulder		1 (14%)	
Lumbar spine		2 (29%)	

[a]Some participants reported experiencing multiple conditions.

TABLE 3 Summary of major feedback from physiotherapists who participated in co-design workshops to develop the Musculoskeletal Telehealth Toolkit ($n = 13$).

Feedback	Supporting data	Actions implemented into toolkit
Usability: navigation, aesthetics, layout, and purpose of toolkit	'I quite like if I click it, the different section actually opens up a different window, rather than always having to press the back button to go back to…so opening up another window might be quite nice.' PT4 'I found it really easy to navigate with the tabs across the top, could see and they were nice order getting started, assessment, treatment.' PT3 'We should have something on the main page that would be like for physios, you click here; for patients, click here.' PT9 'The cleaner it is and the more you can show the basics the better, and then the more advanced stuff that I was talking about like group telehealth… it needs a separate section.' PT10 'I saw "technology resources" and then just couldn't – I thought, "Oh, no, I'm not gonna look at that" and I didn't understand exactly what it was.' PT11	Ensuring when user clicks on links embedded in toolkit this opens in a new tab Add 'start here' icons to landing page to signpost clinicians and patients Add additional tabs to organise content into different pages (i.e. group telehealth) Re-name and re-organise 'technology resources' into 'patient resources' Creation of introductory video that articulates clear aim for toolkit
Guidance in getting started and logistics involved with delivering care via telehealth	'What platforms can be used to deliver telehealth and maybe a comment on safety.' PT5 I guess as a clinician, having some resources that are, 'Okay, here's a checklist.' PT4	Additional section added on telehealth software information, new to telehealth, and physiotherapist and clinic administrator checklists
How to perform a telehealth assessment Specific assessment areas related to palpation, outcome measures, and neurological exam	'I liked the videos. I liked to watch the thing…we know subjective and objective, and it's just how to put that into the telehealth assessment.' PT2 'Some visual pictures of the anatomy, surface anatomy.' PT3 'The assessment tab really helps have a comprehensive version of that information.' PT7 'Being able to do outcome measures…I'm thinking knee scores or hip scores…they exist as online tools.' PT4 'Things that are challenging but possible, to an extent, like the neurological examination.' PT3	Creation of additional short assessment video clips and photos (e.g. special tests) Addition of surface anatomy photos Addition of links to online outcome measures Addition of how to do a neurological exam
Content domains and format: Additional topics, appropriate depth, diversity in presentation style, and more infographics	'The way it is now, it's quite clear and it's quite concise and I think if you start adding too much, it just becomes too much.' PT11 'Have a PDF or an infographic, so something static, particularly if Internet is an issue.' PT4 'A few more case studies, I think.' PT1 'A lot of our patients just don't have the devices to do telehealth…something about the telephone assessment would be helpful.' PT10 'Consider [more] the patient's point of view…are they willing to do it, that was also pretty handy.' PT10	Keep written information simple Created more infographics (i.e. patient education infographics) Additional content areas added included run assessments, case study, and telehealth via phone. Addition of lived experience videos from patient and physiotherapist with telehealth experience
Patient resources should be presented in variety of visual mediums	'Having resources for the patients to know how they can best set up at their end as well.' PT7 'A what to expect out of virtual assessment… So, something that tells [patients] we're going to	Additional development of patient-oriented resources in video and infographic formats: - how to set up home environment - What to expect during telehealth session

(Continues)

TABLE 3 (Continued)

Feedback	Supporting data	Actions implemented into toolkit
	be asking you questions, we're gonna go through an assessment where you have to move...this is the kinda space that I will need.' PT10 'The [patient] resources, there's a lot of good stuff in there. I'm already looking at some stuff that I'll follow up on, so I think it's good.' PT2	Ensuring patient-oriented content is not too in-depth or overwhelming for patients
Additional links to high-quality resources, rather than creating new resources if something already exists	'That's what this whole resource is, is pulling together what is available out there for physiotherapists and it is quite substantial, rather than you having to reinvent it all, which is what you said, I think it's fantastic.' PT4 'Not necessarily to be reinventing things that are already out there.' PT 1 'All of the link side of things, getting set up, that was helpful'. PT10	Addition of more physiotherapist and patient-oriented links organised using accordions by topic area
Further treatment approaches including additional self-management strategies	'I'll be looking for self-management as well, whether that's like the trigger point therapy or self-massage advice...maybe even like some self-taping technique'. PT8 'Some more sections on treatment available'. PT2 'How they can adapt their normal treatment for patients to be used in the treatment session'. PT11	Addition of adjunct therapies treatment section that includes taping and self-manual therapy guides
Additional co-design suggestions that were beyond the scope of current project	'Some English-second-language patient [resources] as well and making sure that things are accessible for people from all different backgrounds'. PT1 'If one of us were to discover, "Hey, we can do it like this," and was able to share it in some place with the community through this tool-kit.... like a message board or something, where you could post things or videos or ask questions'. PT 3 'A mentorship-type programme...something where you could pair up more experienced telehealth clinicians with people who were new or looking to try telehealth'. PT 1	None

Abbreviation: CALD: Culturally and linguistically diverse.

Overall physiotherapists stated they highly valued the inclusion of patient facing resources, especially infographics and short video clips and expressed that they appreciated the toolkit provided them with links to other high-quality resources rather than re-creating or duplicating existing material. Other aspects highlighted for improvement included clarifying the overall purpose of the toolkit, adding additional treatment strategies including patient self-management options, and further case study examples of telehealth targeted for new graduate physiotherapists. After receiving the summary of the proposed toolkit edits and additions, two physiotherapists responded via email and provided positive feedback that they agreed with the proposed revisions.

3.3 | People with lived experience and clinic administrators

Patients and clinic administrators attended workshop four and discussed potential content and navigational improvements detailed in Appendix D and summarised in Table 4. They emphasised prioritising important content without the toolkit being overwhelming. For example, A1 proposed emphasising 'Why should I choose telehealth? [this] should be right on the homepage...cause that's what everyone is gonna be there for: Why telehealth? Is it gonna help me?' which prompted the research team to re-organise and streamline patient information on the toolkit. From a user experience perspective, they suggested the toolkit could be 'more directive...like watch this first' (P7)

TABLE 4 Summary of major feedback from people with lived experience of MSK conditions (n = 7) and clinical administrators (n = 2) who participated in co-design workshop to develop the Musculoskeletal Telehealth Toolkit.

Feedback	Supporting data	Actions implemented into toolkit
Prioritising important content without being overwhelming, keep language simple.	'It was more comprehensive than I thought it was going to be'. P2 'Are you worried about something about tele-health? watch this person's experience'. P7 'I love the dot points, I love the concise word, like one sentence with, 'If you wanna do this, click here... our patients get bombarded ...I like the conciseness of it but lots of information'. A1	Prioritise toolkit content to address potential patient telehealth barriers, such as getting set up and knowing what to expect. Highlight when the same information is presented in different ways.
Improve navigation, better organisation, and layout of information.	'A lot of people get lost when there's just a lot of text there...people look for symbols, images, and better prompt to point them where they're going'. P3 'I really like the layout'. P4 'I think some icons and pictures to try to set the scene'. P7 'I think the structure and the layout of the website is gonna be key to letting them progress to that more detailed stuff as they become the experienced user of it, versus giving them too much upfront and scaring them off'. A2	Add links to bottom of each page to provide direction for navigating and smooth transition from section to section Icons added to replace sections text Ensure website compatible to be viewed on phone Streamline navigation of fact sheets so all on one page instead of three separate pages Re-organise surface anatomy photos by joint and add labels in lay language
Patient resources: Infographics were received positively	'Downloadable fact sheets: I thought that was really good...it was concise, and just easy to follow, and just really helpful'. P6 'Looking at the infographics, the information is clear and easy to read'. P3 '[Infographics are] easy on the eye, they're easy to read, they've got great symbols and you could flick through all three of them'. P5	Ensuring all infographics could be easily downloaded
Patient resources: Video Patients appreciated videos, including the idea of physiotherapists sharing links to exercise videos. An exception to this was when Internet connection was poor, then static photos also preferred.	'Videos are incredibly powerful tools, up to the two-minute...it's really good for engaging people'. A1 'Anything that could be printed in or shown in infographic, or a little video would appeal'. P9 'When you're exercising on your phone, and you go,' 'How to do that exercise. I can't quite remember again?' and you click on a link and it pops up and you can say, 'That's right, that's how you do it'. P6	No additional action.
Confusion about purpose of toolkit	'I went into [the toolkit] thinking of it trying to sell me on telehealth'. P6 'What you're trying to achieve with the website. Is it to introduce people to telehealth or is it a wider tool to share information on more specific subjects that is more about physio overall?' A1 'It's structuring it in a way where you're not confusing your core message'. P3	Update the introductory video to clarify the toolkit's primary purpose is for clinicians to share individual resources with patients

and to focus on 'making it easier to navigate' (P3). Subsequently, links were added to the bottom of each page to provide clear direction and smooth transition from page to page, as well as additional icons replaced text and signposted patients directly to patient-facing resources.

Patient feedback was primarily focused on the patient resource sections of the toolkit. Everyone spoke positively about using visual modes to convey important information, especially infographics, saying, 'Looking at the infographics, the information is clear and easy to read' (P3) and 'I really liked the infographics' (P5). Administrators also expressed that 'short little [video] snippet of seeing the physio interacting with the patient, and also the idea of [how to] set up your laptop' (A2) were helpful, although patient 6 mentioned 'I don't have a very good Internet connection, and so I found going into the videos and things were

pretty tedious...I'm in the in the bush out here and that the Internet is not great.' Patients spoke positively about clinicians sharing links to videos of exercises, such as patient 5 who said: 'If you're a patient on tele, ...to have a link where there might be a little video to show you, to remind you how to do it.' Patients also highlighted that they appreciated '*being able to download the information so I've got it handy if I need it*' (P5). Based on this feedback, we ensured that videos and photographs complemented each other in the patient resource section, and that infographic could be easily downloaded. Patients and clinical administrators did not provide any additional feedback on the summary of proposed toolkit changes via email.

3.4 | Phase 2: Evaluation

A total of 347 participants consented to the study and opened the baseline survey. Of these, 18 participants were excluded for the following reasons: 16 did not complete any questions beyond demographics and 2 self-identified as not being a physiotherapist or physiotherapy student. Women accounted for 68% ($n = 224$) of respondents and 21 different countries were represented, with the most common being Canada (57%; $n = 188$) and Australia (29%; $n = 96$). Nearly all (96%; $n = 318$) respondents were registered physiotherapists, with 61% ($n = 199$) working in private practice and half (50%; $n = 164$) having worked for more than 15 years. Table 5 summarises the demographic characteristics of the full cohort, as well as the cohort divided into 3-month follow-up survey respondents (52%; $n = 172$) and survey non-respondents (48%; $n = 157$). Compared to non-respondents, it appeared that respondents were more likely to be from Australia (17% [$n = 55$] vs. 12% [$n = 41$]), work in public practice (15% [$n = 49$] vs. 7% [$n = 22$]) and have less than 5 years of clinical experience (19% [$n = 32$] vs. 7% [$n = 24$]).

3.5 | Telehealth practice, previous training, and learning preferences

At baseline, 59% ($n = 194$) of physiotherapists reported currently using telehealth for the assessment or management of patients with musculoskeletal conditions. Only 14% ($n = 46$) stated they used telehealth prior to the pandemic, while 80% ($n = 263$) stated that they used telehealth at some time point during the pandemic. Over two-thirds of physiotherapists (67%; $n = 220$) reported having completed some type of telehealth related professional development (including courses, accessing resources, or mentorship) at baseline (Figure 2). Mentoring or discussion with colleagues (34%; $n = 112$), followed by completing online courses (25%; $n = 82$; $n = 79$), accessing professional association resources (24% $n = 78$), and accessing other websites (24%; $n = 78$) were the most common ways of obtaining telehealth professional development. Participants ranked web-based toolkits (43%;

$n = 141$), pre-recorded videos (14%; $n = 46$) and in-person sessions (12%; $n = 39$) as their most preferred method to access telehealth learning resources (Figure 3).

3.6 | Telehealth toolkit usage, engagement, and usability

During the evaluation period (March to October 2022), the toolkit received a total of 5486 total views, with the homepage receiving an average of 150 views per month. The most viewed pages were 'Clinicians Start Here,' 'Hip Special Tests', and 'Neurological Testing'. Over the next year until March 2023, engagement with the toolkit remained consistent (average 156 unique visitors per month), with usage peaking in March 2022 with 311 unique visitors, while the lowest usage occurred in May 2022 with 92 unique visitors.

In the 3-month toolkit follow-up survey, 19% ($n = 33$) and 37% ($n = 64$) of physiotherapists found the overall toolkit 'extremely useful' or 'moderately useful,' respectively. Physiotherapists found the assessment section (29%; $n = 50$), preparing patients for telehealth (27%; $n = 46$), and patient resources (27%; $n = 46$) sections to be the most useful sections of the toolkit (Figure 4). Nearly three quarters (72%; $n = 85$) of physiotherapists who used the toolkit said that it changed or informed their practice to some extent (Figure 5) and 95% ($n = 112$) said they would recommend the toolkit to colleagues.

3.7 | Telehealth confidence, knowledge, and perceived competence

Physiotherapists baseline responses examining telehealth confidence, knowledge, and perceived competence for the cohort are summarised in Figure 6a. Before using the toolkit, the statements with the lowest agreement were 'My perception is that patients value physiotherapy via telehealth the same as in-person care' (13% [$n = 22$] agreed or strongly agreed); 'For me, using telehealth to manage musculoskeletal conditions is as effective as in-person care' (22% [$n = 38$] agreed or strongly agreed); and

'For me, performing an accurate assessment and making a diagnosis via telehealth for musculoskeletal conditions is very easy' [23% ($n = 39$) agreed or strongly agreed]. The results examining physiotherapist agreement with statements at baseline and post toolkit use are provided in Figure 6b (>30 min use), Figure 6c (0–30 min use) and Figure 6d (0 min use), with chi-square tests for independence outcomes provided in Appendix E.

Compared to non-users at 3-month follow-up, toolkit users (>30 min) had greater improvement in proportion agreeing with 8 of the 19 (42%) statements about confidence, knowledge, and perceived competence in providing telehealth ($p < 0.05$, Appendix E). The largest improvements in agreement were observed for the following statements: 'I know how to provide care via telehealth for

TABLE 5 Participant demographics for Musculoskeletal Telehealth Toolkit evaluation.

Full cohort (n = 329)		Survey responders (n = 172)			Survey non-responders (n = 157)
		No toolkit use (n = 54)	Toolkit use <30 min (n = 95)	Toolkit use >30 min (n = 23)	
Gender					
Woman	224 (68)	45 (1)	58 (18)	14 (4)	107 (33)
Man	98 (30)	9 (3)	35 (11)	9 (3)	45 (14)
Prefer to not to say	7 (2)	0	2 (1)	0	5 (2)
Country/region					
Australia	96 (29)	16 (5)	32 (10)	7 (2)	41 (13)
Canada	188 (57)	34 (10)	50 (15)	8 (2)	96 (29)
Other					
Asia/Pacific	15 (5)	1 (0)	5 (2)	3 (1)	6 (2)
Europe	14 (4)	1 (0)	5 (2)	2 (1)	6 (2)
Americas	10 (3)	0	1 (0)	2 (1)	7 (2)
Africa	2 (1)	2 (1)	0	0	0
Unknown	4 (1)	0	2 (1)	1 (0)	1 (0)
Career stage					
Physiotherapist	318 (96)	53 (16)	90 (27)	23 (7)	152 (46)
Physiotherapy student	11 (3)	1 (0)	5 (2)	0	5 (2)
Workplace setting					
Private practice	199 (61)	32 (10)	54 (16)	9 (3)	104 (32)
Public hospital	53 (16)	11 (3)	16 (5)	9 (3)	17 (5)
Public community or home care	18 (6)	6 (2)	6 (2)	1 (0)	5 (2)
Both public and private	31 (9)	3 (1)	10 (3)	1 (0)	17 (5.1)
Elite sport	4 (1)	1 (0)	2 (1)	0	1 (0)
Other	24 (7)	1 (0)	7 (2)	3 (1)	13 (4)
Clinical experience					
Still studying for entry level degree	12 (4)	1 (0)	5 (2)	0	6 (2)
<5 years	57 (17)	5 (2)	24 (7)	3 (1)	24 (7)
5–10 years	46 (14)	7 (2)	15 (5)	2 (1)	22 (7)
11–15 years	51 (16)	8 (2)	17 (5)	5 (2)	21 (6)
>15 years	164 (50)	33 (10)	34 (10)	13 (4)	84 (26)
Patient population					
Musculoskeletal	171 (52)	28 (9)	48 (15)	14 (4)	81 (25)
Musculoskeletal and other types	156 (47)	26 (8)	46 (14)	9 (3)	75 (23)
Not musculoskeletal	2 (1)	0	1 (0)	0	1 (0)

musculoskeletal conditions' (S1); 'For me, providing treatment via telehealth for musculoskeletal conditions is very easy' (S11); 'I am confident that I can provide advice about taping/strapping via telehealth for musculoskeletal conditions' (S9); 'For me, using telehealth to manage musculoskeletal conditions is as effective as in-person care' (S13) (Appendix E).

3.8 | Physiotherapist characteristics associated with toolkit use

Results of multivariable binomial logistic regression evaluating the effect of demographic and practice characteristics on toolkit use (Appendix F) indicated that women had 60% lower odds of accessing
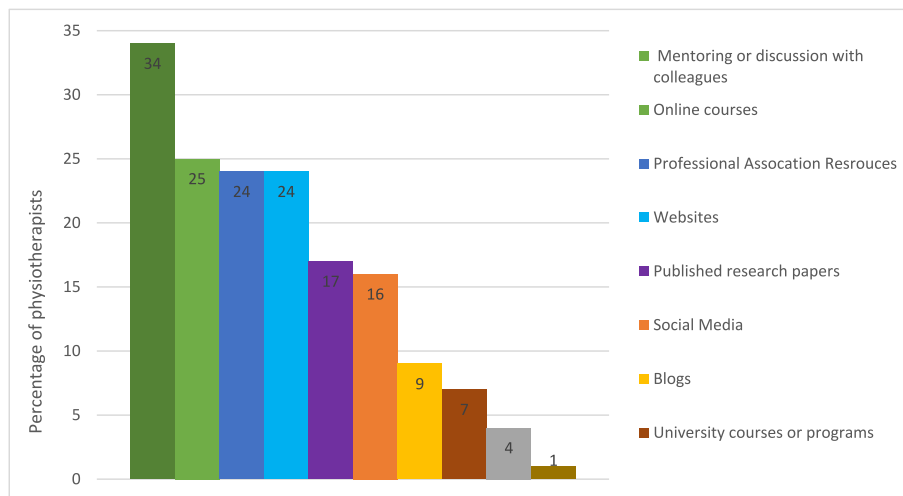
FIGURE 2 Telehealth courses, training, or resources previously completed by physiotherapists ($n = 329$).
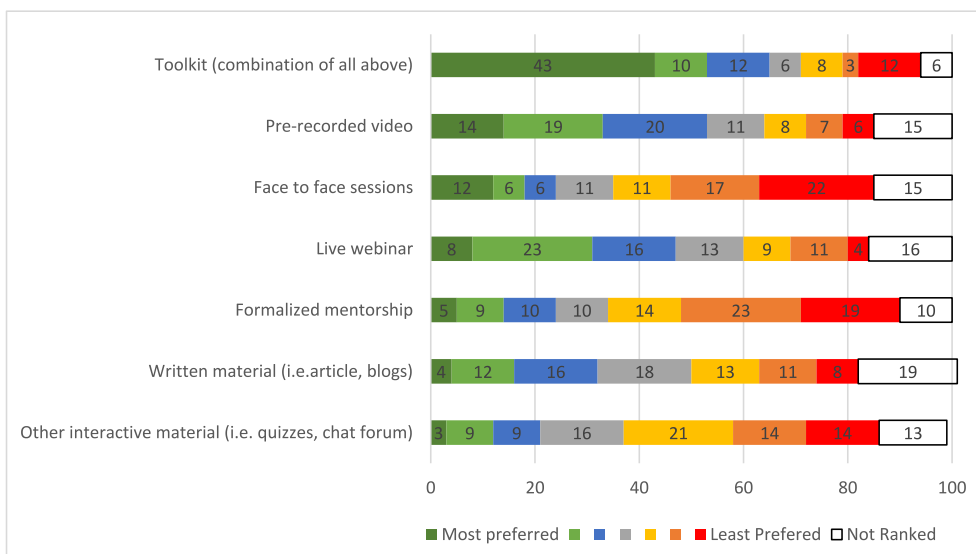

FIGURE 3 Physiotherapists ($n = 329$) ranked preferences for accessing learning resources to improve their ability to provide telehealth.

the toolkit at follow-up compared to men (odds ratio 0.40 [95% confidence interval 0.17–0.93], $p = 0.03$), independent of country, years of clinical experience, and patient type.

4 | DISCUSSION

In this project, we partnered with clinicians, clinic administrators, and people with lived experience of musculoskeletal pain to identify learning needs and address educational and training resource gaps for physiotherapists providing care via telehealth to people with musculoskeletal conditions. The freely available co-designed TREK Musculoskeletal Telehealth Toolkit incorporated critical feedback from these three stakeholder groups through in-depth workshop discussion and qualitative analysis. Key input from physiotherapists included adding more images and video content on how to conduct

assessments via telehealth, increasing the number of patient-facing resources, and suggestions to streamline the layout, navigation, and aesthetics of the toolkit. Patients and clinic administrator feedback focused on simplifying the content. They praised the inclusion of infographics and stressed that resources needed to be easily downloaded. During an initial evaluation, the toolkit had international reach 329 physiotherapists from 21 different countries, who provided largely positive feedback on its overall usability and ability to inform or change practice. The toolkit evaluation with these early adopters indicates that it has the potential to improve physiotherapists' confidence, knowledge, and perceived competence in providing care via telehealth to people with musculoskeletal pain conditions.

Our co-design workshops revealed a high demand for patient-oriented resources by all users, with an emphasis on simplicity and practicality. Physiotherapists articulated the need to communicate the value of telehealth to patients, which aligns with previous work
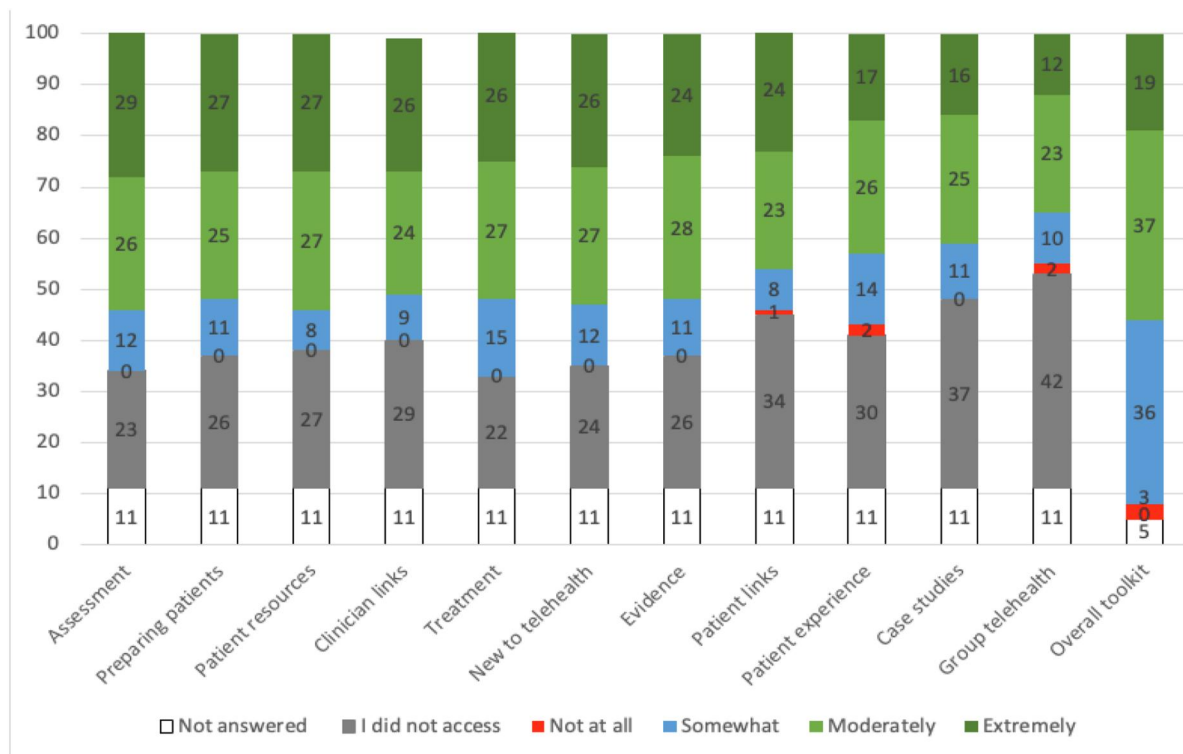
FIGURE 4 Physiotherapists (*n* = 172) self-reported the usefulness of different sections of the telehealth toolkit.

suggesting that physiotherapists perceive a lack of understanding and appreciation for telehealth among the general public as a key barrier for more widespread telehealth implementation (Barton, Ezzat, Meroli, et al., 2022; Ezzat, Esculier, et al., 2023). Encouragingly, toolkit users significantly increased their perception that patients value telehealth compared to non-toolkit users, perhaps influenced by the toolkit lived experience videos. However, it is important to recognise that only 13% of toolkit users agreed with this statement, illustrating that this perception of patients undervaluing telehealth persists among many physiotherapists. The workshops also revealed that among those with lived experience of musculoskeletal pain, infographics and short video clips (<30 s) were the preferred format to provide information. These formats can help avoid information overload, a problem that has limited the success of other web-based resources (Parsons & Adams, 2018; Umapathy et al., 2015). Similar sentiments were expressed in our previous work co-designing a patient-facing web-based resource, 'My Knee', where lived experience participants encouraged the use of short video, icons, and frequently asked questions sections to simplify and organise information (Goff et al., 2023).

Longer duration of toolkit use was associated with a greater improvement in the proportion agreeing or strongly agreeing in 42% of statements compared to non-use. This improved agreement was seen in areas related to telehealth know how, telehealth training, confidence and ease in using telehealth, perception of telehealth effectiveness and value compared to in-person care, reduced nervousness, and improved planning ability. Toolkit use was associated with improvement in the proportion who felt that

they 'knew how' and had 'been trained' to provide care via telehealth. At baseline mentoring or informal discussion was the most common way of physiotherapists to receive telehealth professional development (Figure 2), which may not feel like adequate training to many clinicians. The more formal, structured nature of the toolkit seems to be perceived by therapists as more comprehensive training, while still having the advantages of being flexible and allowing individuals to tailor their own learning needs compared to other professional development options (i.e. structured course). Physiotherapists also had improved agreement related to telehealth effectiveness after toolkit use and this may be related to them exploring the section of the toolkit that highlighted evidence and research supporting telehealth (Cottrell et al., 2017; Grona et al., 2017; Jiang et al., 2018.)

Physiotherapists reported some improved agreement across most knowledge and confidence survey statements over time which did not appear to be influenced by toolkit use. This is not surprising as it is likely that many clinicians gained further practical telehealth experience in the 3-month between surveys, thus building their confidence and skills. While many formal mandated restrictions may have been eased by mid-2022, there was still a common feeling of cautiousness among the general public and overall willingness to use telehealth as a viable option compared to in-person care by both physiotherapists and patients. Aligning with these thoughts, qualitative interviews conducted with Australian physiotherapy university educators in 2022 found that they believed telehealth was here to stay as a part of contemporary physiotherapy practice (Davies et al., 2023).
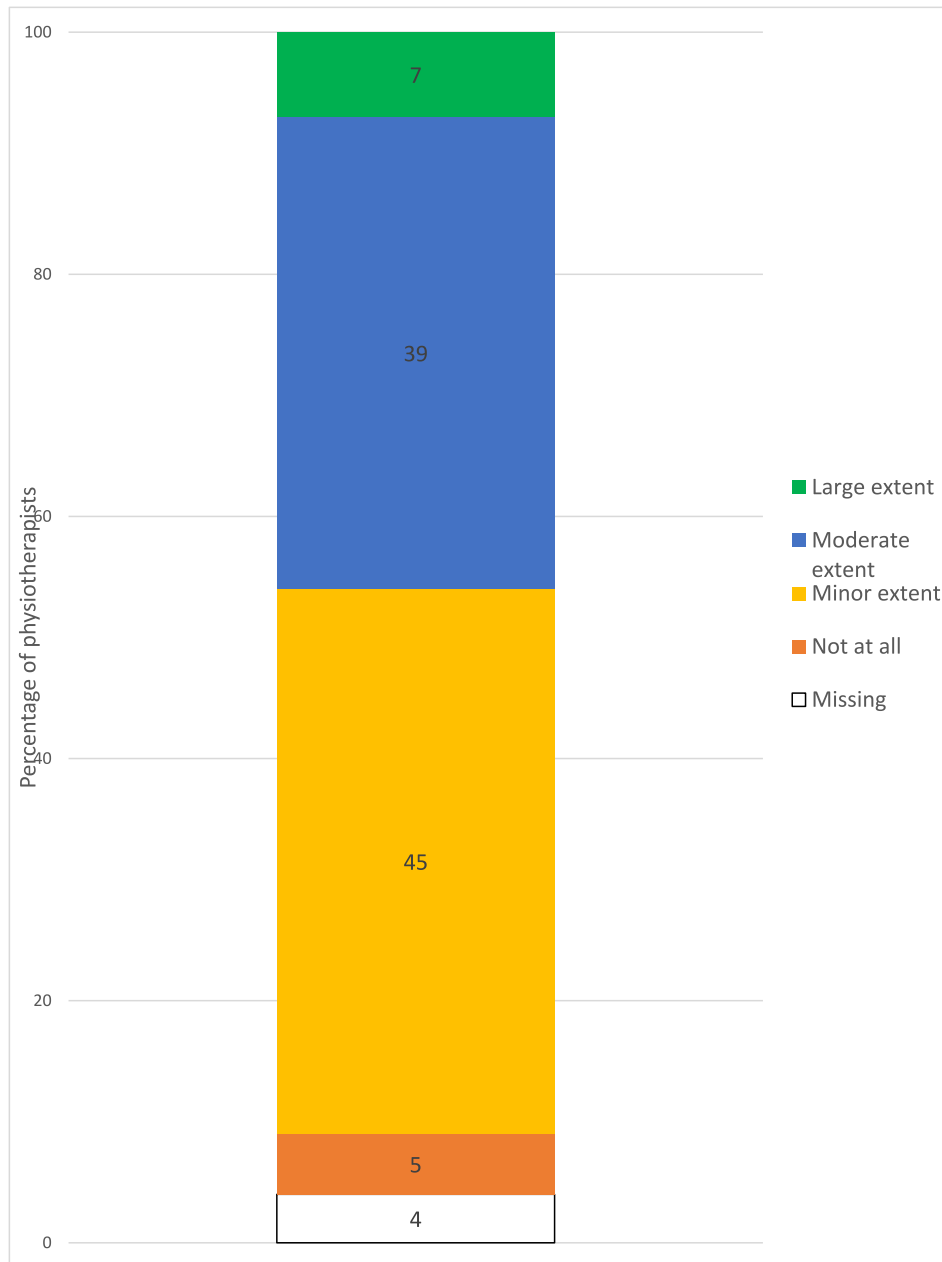
FIGURE 5 How the toolkit changed or informed physiotherapists in clinical, research or educational practice ($n = 118$).

Two statements related to providing exercise and education via telehealth (S6, S7) scored relatively positively at baseline, with 71% and 82% agreeing they were confident at baseline, limiting the capacity for improvement at follow-up. However, it is encouraging that many physiotherapists already felt comfortable providing these core treatments for musculoskeletal conditions via telehealth. Perceived funding support for telehealth (S15) did not improve over the 3-month. Consistent with previous research (Ezzat, Esculier, et al., 2023; Malliaras et al., 2021), only 19% agreed that funding support was sufficient at follow-up, illustrating that lack of health system funding is a key ongoing barrier to telehealth implementation.

At baseline only 6% of physiotherapists strongly agreed to the statement: '*I am confident that I can perform an accurate assessment via*

telehealth for musculoskeletal conditions' (S4). Aligning with this, physiotherapist workshop participants strongly purported the need for support in conducting musculoskeletal assessments via telehealth, prompting the inclusion of additional targeted resources. In the evaluation, the assessment section of the toolkit received the highest proportion of 'extremely useful' ratings of any toolkit section (29% of respondents; Figure 4) indicating the high perceived value of this content. However, despite this, there was no significant improvement in agreement with S4 among toolkit users compared with non-users. Thus, while there is evidence supporting the utility and validity of many aspects of physiotherapy assessment delivered via telehealth for musculoskeletal population (Cottrell et al., 2018; Zischke et al., 2021) conducting assessments via telehealth appears to remain
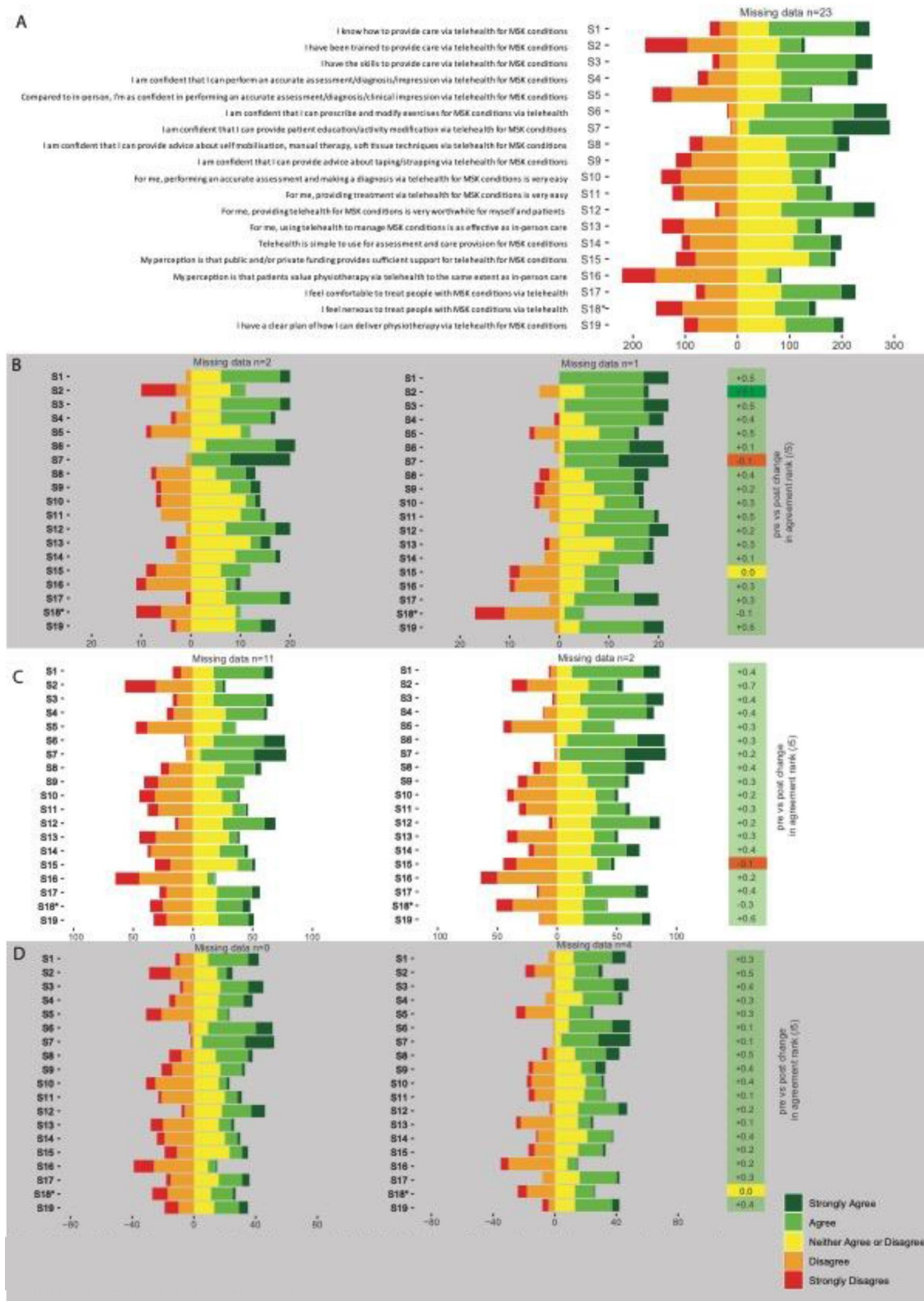
FIGURE 6 Physiotherapist agreement to 19 statements related to telehealth, confidence, knowledge, and perceived competence. (a) Baseline full cohort; (b) Toolkit users >30 min; (c) Toolkit users <30 min; (d) Toolkit non-users. Plot on the left=baseline, plot on the right=follow up *S18 is negative question.

challenging, even following engagement with the toolkit. To better support clinicians in conducting assessments via telehealth, there may be a need to expand formal training opportunities as well as promote observation of and mentoring by expert telehealth clinicians, and for telehealth to be integrated into curriculums for physiotherapy students (Ashley et al., 2023; Martin et al., 2022). Alternatively, other hybrid models of care that blend in-person assessments with telehealth follow-up treatments may be another viable solution (Ezzat, Kemp, et al., 2023; Simony et al., 2023).

The strengths of this project include the use of novel co-design methods to create a practical and relevant telehealth resource for physiotherapists to improve their musculoskeletal practice. Our findings support our previous work that showed physiotherapists perceive online toolkits as an engaging, accessible, and valid method to obtain professional development training (Barton, Ezzat, Bell, et al., 2022; Ezzat, Esculier, et al., 2023). We also integrated a useability and effectiveness evaluation, something rarely done in co-design methods or knowledge translation resource development (Slattery et al., 2020). In addition, our evaluation with a 3-month follow-up had a higher response rate (52%) when compared to other clinician surveys designed to evaluate physiotherapy professional development initiatives (Barton et al., 2021; Dennett et al., 2022). However, there are important limitations to consider when interpreting our results. With our study design, it was not feasible to have a true control group in the evaluation or account for all potential external factors that could influence improvements in telehealth knowledge, confidence, or perceived competence of physiotherapists. In the future, a randomised controlled trial could further evaluate toolkit effectiveness. Yet, the inclusion of 'toolkit nonusers' in our analysis strengthen the methodological quality and transparency of our results. The toolkit was co-designed by Australian participants, which may impact the applicability and usefulness of the toolkit to other international contexts. However, the results of our exploratory analysis suggest this toolkit may act as a template to build on for the creation of additional future context specific resources. The patient resources co-developed in our toolkit are at a relatively high digital literacy level, and future work should consider involving people with variable health literacy levels or from culturally and linguistically diverse communities to improve the reach and accessibility of information and resources contained in the toolkit.

Women had lower odds of using the toolkit at 3-month follow up compared to men. However, this finding should be interpreted with caution and future work is needed to better explore the role of gender in physiotherapy preferences for and access to professional development resources. Importantly, none of the other demographic or practice characteristics were significant in this model, indicating the overall broad appeal of the resource across countries, years of clinical experience, and practice areas. Lastly, further research is needed to examine whether physiotherapists who participate in targeted telehealth training lead to improved access to telehealth and better quality of care for people with musculoskeletal conditions.

This study successfully co-developed and evaluated a freely available online toolkit for physiotherapists to improve their ability to deliver high-quality care via telehealth to patients with musculoskeletal conditions. Physiotherapists gave highly positive feedback on toolkit usability support the use of online toolkits as which has the potential acceptable knowledge translation resources with potential to improve user confidence, knowledge, and perceived confidence with telehealth. The web-based toolkit had good international reach during the initial evaluation, and continued dissemination strategies are warranted. While the toolkit appeared to improve some aspects of physiotherapists knowledge, confidence, and perceived competence, further telehealth training for both practicing physiotherapists and physiotherapy students are needed to address physiotherapists confidence and skills in conducting assessments.

AUTHOR CONTRIBUTIONS

Allison M. Ezzat: Conceptualization, methodology, formal analysis, investigation, writing – original draft, project administration. **Matthew G. King:** Methodology, Formal Analysis, data curation, writing – review and editing. **Danilo De Oliveira Silva**: Conceptualisation, investigation, writing – review and editing. **Marcella F. Pazzinatto**: Conceptualization, writing – review and editing. **JP Caneiro:** Conceptualization, methodology; writing – review and editing. **Stephanie Gourd:** Formal analysis, investigation, writing – review and editing. **Rhona McGlasson:** Conceptualization, writing – review and editing. **Peter Malliaras**: Conceptualization, methodology, writing – review and editing. **Amy Dennett**: Conceptualization, methodology writing – review and editing. **Trevor Russell:** Conceptualization, writing – review and editing. **Joanne L. Kemp:** Conceptualization. **Christian J. Barton**: Conceptualization, methodology, formal analysis, writing – review and editing.

ACKNOWLEDGEMENTS

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

This study was reported in accordance with the COnsolidated criteria for REporting Qualitative research (COREQ) (Tong et al., 2007) checklist and the Good Reporting of A Mixed Methods Study (GRAMM) (O'Cathain et al., 2008) checklist. Ethical approval was

obtained from La Trobe University's Human Ethics Research Committee (HEC21226). All workshop participants provided written informed consent, while consent for online surveys was implied by survey completion.

ORCID

Allison M. Ezzat 🄳 https://orcid.org/0000-0003-2576-0412

REFERENCES

Ashley, C., Williams, A., Dennis, S., McInnes, S., Zwar, N. A., Morgan, M., & Halcomb, E. (2023). Telehealth's future in Australian primary health care: A qualitative study exploring lessons learnt from the COVID-19 pandemic. *BJGP Open, 7*(2). https://doi.org/10.3399/bjgpo.2022.0117

Atkins, L., Francis, J., Islam, R., O'Connor, D., Patey, A., Ivers, N., Foy, R., Duncan, E. M., Colquhoun, H., Grimshaw, J. M., Lawton, R., & Michie, S. (2017). A guide to using the theoretical domains framework of behaviour change to investigate implementation problems. *Implementation Science, 12*(77), 77. https://doi.org/10.1186/s13012-017-0605-9

Bannuru, R. R., Osani, M. C., Vaysbrot, E. E., Arden, N. K., Bennell, K., Bierma-Zeinstra, S. M. A., Kraus, V., Lohmander, L., Abbott, J., Bhandari, M., Blanco, F., Espinosa, R., Haugen, I., Lin, J., Mandl, L., Moilanen, E., Nakamura, N., Snyder-Mackler, L., Trojian, T., ..., & McAlindon, T. (2019). OARSI guidelines for the non-surgical management of knee, hip, and polyarticular osteoarthritis. *Osteoarthritis and Cartilage, 27*(11), 1578–1589. https://doi.org/10.1016/j.joca.2019.06.011

Barton, C., & Merolli, M. (2017). It is time to replace publish or perish with get visible or vanish: Opportunities where digital and social media can reshape knowledge translation. *British Journal of Sports Medicine, 53*(10), 594–598. https://doi.org/10.1136/bjsports-2017-098367

Barton, C. J., Ezzat, A. M., Bell, E. C., Rathleff, M., Kemp, J. L., & Crossley, K. M. (2022). Knowledge, confidence and learning needs of physiotherapists treating persistent knee pain in Australia and Canada: A mixed-methods study. *Physiotherapy Theory and Practice, 38*(12), 2073–2085. https://doi.org/10.1080/09593985.2021.1906805

Barton, C. J., Ezzat, A. M., Meroli, M., Williams, C., Haines, T., Mehta, N., & Malliaras, P. (2022). "It's second best": A mixed-methods evaluation of the experiences and attitudes of people with musculoskeletal pain towards physiotherapist delivered telehealth during COVID-19 pandemic. *Musculoskeletal Science & Practice, 58*, 102500. https://doi.org/10.1016/j.msksp.2021.102500

Barton, C. J., Kemp, J. L., Roos, E. M., Skou, S. T., Dundules, K., Pazzinatto, M. F., Francis, M., Lannin, N. A., Wallis, J. A., & Crossley, K. M. (2021). Program evaluation of GLA:D® Australia: Physiotherapist training outcomes and effectiveness of implementation for people with knee osteoarthritis. *Osteoarthritis and Cartilage Open, 3*(3), 100175. https://doi.org/10.1016/j.ocarto.2021.100175

Bates, P., & Robert, G. (2006). Experience-based design: From redesigning the system around the patient to co-designing services with the patient. *BMJ Quality and Safety, 15*(5), 307–310. https://doi.org/10.1136/qshc.2005.016527

Briggs, A. M., Cross, M. J., Hoy, D. G., Sanchez-Riera, L., Blyth, F. M., Woolf, A. D., & March, L. (2016). Musculoskeletal health conditions represent a global threat to healthy aging: A report for the 2015 world health organization world report on ageing and health. *The Gerontologist, 56*(S), S243–S255. https://doi.org/10.1093/geront/gnw002

Canadian Institute for Health Research. (2014). Strategy for patient-oriented research: Putting patients first. Retrieved October 26, 2023, from https://cihr-irsc.gc.ca/e/41204.html#:~:text=Patient%2Doriented%20research%20is%20about,leads%20to%20better%20patient%20outcomes

Cieza, A., Causey, K., Kamenov, K., Hanson, S. W., Chatterji, S., & Vos, T. (2021). Global estimates of the need for rehabilitation based on the global burden of disease study 2019: A systematic analysis for the global burden of disease study 2019. *Lancet, 396*(10267), 2006–2017. https://doi.org/10.1016/s0140-6736(20)32340-0

Consumers Health Forum of Australia. (2023). Experience based Co-design toolkit. Retrieved September 25, 2023, from https://chf.org.au/experience-based-co-design-toolkit

Cottrell, M., & Russell, T. (2020). Telehealth for musculoskeletal physiotherapy. *Musculoskeletal Science & Practice, 48*, 102193. https://doi.org/10.1016/j.msksp.2020.102193

Cottrell, M. A., Galea, O. A., O'Leary, S. P., Hill, A. J., & Russell, T. G. (2017). Real-time telerehabilitation for the treatment of musculoskeletal conditions is effective. *Clinical Rehabilitation, 31*(5), 625–638. https://doi.org/10.1177/0269215516645148

Cottrell, M. A., O'Leary, S. P., Swete-Kelly, P., Elwell, B., Hess, S., Litchfield, M. A., McLoughlin, I., Tweedy, R., Raymer, M., Hill, A. J., & Russell, T. G. (2018). Agreement between telehealth and in-person assessment of patients with chronic musculoskeletal conditions presenting to an advanced-practice physiotherapy screening clinic. *Musculoskeletal Science & Practice, 38*, 99–105. https://doi.org/10.1016/j.msksp.2018.09.014

Davies, L., Lawford, B., Bennell, K., Russell, T., & Hinman, R. (2023). Telehealth education and training in entry-to-practice physiotherapy programs in Australian universities: A qualitative study with university educators. *Musculoskeletal Care, 21*(2), 491–501. https://doi.org/10.1002/msc.1723

Dennett, A. M., Tang, C. Y., Chiu, A., Osadnik, C., Granger, C. L., Taylor, N. F., Campbell, K. L., & Barton, C. (2022). A cancer exercise toolkit developed using co-design: Mixed methods study. *JMIR Cancer, 8*(2), e34903. https://doi.org/10.2196/34903

De Oliveira Silva, D., Pazzinatto, M., Crossley, K. M., Azevedo, F., & Barton, C. J. (2020). Novel stepped care approach to provide education and exercise therapy for patellofemoral pain: Feasibility study. *Journal of Medical Internet Research, 22*(7), e18584. https://doi.org/10.2196/18584

Dorsey, E. R., & Topol, E. J. (2016). State of telehealth. *New England Journal of Medicine, 375*(2), 154–161. https://doi.org/10.1056/nejmra1601705

Ezzat, A. M., Esculier, J. F., Ferguson, S. L., Napier C., & Wong, S. (2023). Canadian physiotherapists integrate virtual care during the COVID-19 pandemic. *Physiotherapie Canada, 75*(2), 134–145. https://doi.org/10.3138/ptc-2022-0092

Ezzat, A. M., Kemp, J. L., Heerey, J., Pazzinatto, M. F., De Oliveira Silva, D., Dundules, K., Francis, M., & Barton, C. J. (2023). Implementation of the good Life with osteoArthritis in Denmark (GLA:D®) program via telehealth in Australia: A mixed-methods program evaluation. *Journal of Telemedicine and Telecare.* https://doi.org/10.1177/1357633X231167620

Ezzat, A. M., Schneeberg, A., Huisman, E. S., White, L. D., Kennedy, C., Levesque, Let al, Scott, A., & Hoens, A. M. (2017). A cross-sectional evaluation examining the use of the Achilles tendinopathy toolkit by physiotherapists in British Columbia, Canada. *Disability & Rehabilitation, 39*(7), 671–676. https://doi.org/10.3109/09638288.2016.1160447

Fereday, J., & Muir-Cochrane, E. (2016). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International Journal of Qualitative Methods, 5*(1), 80–92. https://doi.org/10.1177/160940690600500107

Goff, A., De Oliveira Silva, D., Ezzat, A. M., Crossley, K. M., Pazzinatto, M., & Barton, C. J. (2023). Co-design of the web-based "My Knee" education and self-management toolkit for people with knee osteoarthritis. *Digital Health, 9*, 205520762311638. ecollection. https://doi.org/10.1177/20552076231163810

Grona, S. L., Bath, B., Busch, A., Rotter, T., Trask, C., & Harrison, E. (2017). Use of videoconferencing for physical therapy in people with musculoskeletal conditions: A systematic review. *Journal of Telemedicine and Telecare*, 24(5), 341–355. https://doi.org/10.1177/1357633x17700781

Harris, P., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). REDCap—A metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics*, 42(2), 377–381. https://doi.org/10.1016/j.jbi.2008.08.010

Jiang, S., Xiang, J., Gao, X., Guo, K., & Liu, B. (2018). The comparison of telerehabilitation and face-to-face rehabilitation after total knee arthroplasty: A systematic review and meta-analysis. *Journal of Telemedicine and Telecare*, 24(4), 257–262. https://doi.org/10.1177/1357633x16686748

Koes, B., van Tulder, M., Ostelo, R., Burton, K., & Waddell, G. (2001). Clinical practice guidelines for low back pain in primary care: An international comparison. *Spine*, 26(22), 2504–2514.

Leask, C. F., Sandlund, M., Skelton, D. A., Altenburg, T. M., Cardon, G., Chinapaw, M. J. M., De Bourdeaudhuij, I., Verloigne, M., & Chastin, S. F. M. (2019). Framework, principles and recommendations for utilising participatory methodologies in the co-creation and evaluation of public health interventions. *Research Involvement and Engagement.*, 5(2), 2. https://doi.org/10.1186/s40900-018-0136-9

Malliaras, P., Merolli, M., Williams, C., Caneiro, J., Haines, T., & Barton, C. (2021). "It's not hands-on therapy, so it's very limited" Telehealth use and views among allied health clinicians during the coronavirus pandemic. *Musculoskeletal Science & Practice*, 52, 102340. https://doi.org/10.1016/j.msksp.2021.102340

Martin, R., Mandrusiak, A., Russell, T., & Forbes, R. (2022). New-graduate physiotherapists' training needs and readiness for telehealth. *Physiotherapy Theory and Practice*, 38(13), 2788–2797. https://doi.org/10.1080/09593985.2021.1955423

Ministers Department of Heath and Aged Care. (2023). Ministers department of heath and aged care. Permanent telehealth to strengthen universal medicare. Retrieved May 23, 2023, from https://www.health.gov.au/ministers/the-hon-greg-hunt-mp/media/permanent-telehealth-to-strengthen-universal-medicare#:~:text=To%20continue%20to%20support%20Australia%27s,Better%20Access%20to%20vital%20services

Nauton, J., Harrison, C., Britt, H., Haines, T., & Malliaras, P. (2020). General practice management of rotator cuff related shoulder pain: A reliance on ultrasound and injection guided care. *PLoS One*, 15(1), e0227688. https://doi.org/10.1371/journal.pone.0227688

O'Cathain, A., Murphy, E., & Nicholl, J. (2008). The quality of mixed methods studies in health services research. *Journal of Health Services Research & Policy*, 13(2), 92–98. https://doi.org/10.1258/jhsrp.2007.007074

Parsons, L., & Adams, J. (2018). The accessibility and usability of an Australian web-based self-management programme for people with lower health literacy and joint pain in the UK: A qualitative interview study. *Musculoskeletal Care*, 16(4), 500–504. https://doi.org/10.1002/msc.1355

Runciman, W. B., Hunt, T. D., Hannaford, N. A., Hibbert, P. D., Westbrook, J. I., Coiera, E. W., Day, R. O., Hindmarsh, D. M., McGlynn, E. A., & Braithwaite, J. (2012). CareTrack: Assessing the appropriateness of health care delivery in Australia. *Medical Journal of Australia*, 197(2), 100–105. https://doi.org/10.5694/mja12.11210

Simony, C., Clausen, B., Beck, M., Nyberg, M., Tang, L. H., Skou, S., & Holm, P. M. (2023). An invigorating journey towards better function and well-being: A qualitative study of knee osteoarthritis patients' experiences with an online exercise and education intervention. *Osteoarthritis and Cartilage Open*, 5(3), 100384. https://doi.org/10.1016/j.ocarto.2023.100384

Slattery, P., Saeri, A. K., & Bragge, P. (2020). Research co-design in health: A rapid overview of reviews. *Health Research Policy and Systems*, 18(17), 17. https://doi.org/10.1186/s12961-020-0528-9

The Point of Care Foundation. (2013). Experience-based co-design toolkit, 2016. Retrieved October 21, 2023, from https://www.pointofcarefoundation.org.uk/resource/experience-based-co-design-ebcd-toolkit/

Tong, A., Sainsbury, P., & Craig, J. (2007). Consolidated criteria for reporting qualitative research (COREQ): A 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*, 19(6), 349–357. https://doi.org/10.1093/intqhc/mzm042

Umapathy, H., Bennell, K., Dickson, C., Dobson, F., Fransen, M., Jones, G., & Hunter, D. J. (2015). The web-based osteoarthritis management resource my joint pain improves quality of care: A quasi-experimental study. *Journal of Medical Internet Research*, 17(e167), e167. https://doi.org/10.2196/jmir.4376

Victorian Allied Health Workforce Research Program. (2016). Physiotherapy workforce report. Retrieved September 25, 2023, from https://www.health.vic.gov.au/sites/default/files/migrated/files/collections/research-and-reports/a/allied-health-victorian-research-framework.pdf

Vos, T., Lim, S. S., Abbafati, C., Abbas, K. M., Abbasi, M., Abbasifard, M., Abbasi-Kangevari, M., Abbastabar, H., Abd-Allah, F., Abdelalim, A., Abdollahi, M., Abdollahpour, I., Abolhassani, H., Aboyans, V., Abrams, E. M., Abreu, L. G., Abrigo, M. R. M., Abu-Raddad, L. J., Abushouk, A. I., ..., & Murray, C. J. L. (2020). Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: A systematic analysis for the global Burden of disease study. *Lancet*, 396(10258), 1204–1222. https://doi.org/10.1016/s0140-6736(20)30925-9

Williams, C. M., Maher, C. G., Hancock, M. J., McAuley, J. H., McLachlan, A. J., Britt, H., Fahridin, S., Harrison, C., & Latimer, J. (2010). Low back pain and best practice care: A survey of general practice physicians. *Archives of Internal Medicine*, 170(3), 271. https://doi.org/10.1001/archinternmed.2009.507

Zischke, C., Simas, V., Hing, W., Milne, N., Spittle, A., & Pope, R. (2021). The utility of physiotherapy assessments delivered by telehealth: A systematic review. *Journal of Global Health*, 11, 04072. https://doi.org/10.7189/jogh.11.04072

SUPPORTING INFORMATION

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