Received: 18 October 2023 | Revised: 30 October 2023 | Accepted: 1 November 2023

DOI: 10.1002/msc.1842

RESEARCH ARTICLE

WILEY

From sceptic to believer: Acceptability of cognitive muscular therapy™, a new intervention for knee osteoarthritis

Daniela Ghio[1] | Nathan Brookes[2] | Stephen Preece[2] | Nicola Walsh[3]

[1]Division of Psychology and Mental Health, Faculty of Biology, School of Health Sciences, Medicine, and Health, University of Manchester, Manchester, UK

[2]School of Health and Society, Health Sciences, University of Salford, Manchester, UK

[3]Centre for Health and Clinical Research, University of the West of England, Bristol, UK

Correspondence
Stephen Preece, School of Health and Society, Health Sciences, University of Salford, Manchester, UK.
Email: s.preece@salford.ac.uk

Funding information
NIHR Research for Patient Benefit, Grant/Award Number: NIHR202203

Abstract

Background: Cognitive Muscular TherapyTM (CMT) is an integrated behavioural intervention developed for knee osteoarthritis. CMT teaches patients to reconceptualise the condition, integrates muscle biofeedback and aims to reduce muscle overactivity, both in response to pain and during daily activities. This nested qualitative study explored patient and physiotherapist perspectives and experiences of CMT.

Methods: Five physiotherapists were trained to follow a well-defined protocol and then delivered CMT to at least two patients with knee osteoarthritis. Each patient received seven individual clinical sessions and was provided with access to online learning materials incorporating animated videos. Semi-structured interviews took place after delivery/completion of the intervention and data were analysed at the patient and physiotherapist level.

Results: Five physiotherapists and five patients were interviewed. All described a process of changing beliefs throughout their engagement with CMT. A framework with three phases was developed to organise the data according to how osteoarthritis was conceptualised and how this changed throughout their interactions with CMT. Firstly, was an identification of pain beliefs to be challenged and recognition of how current beliefs can misalign with daily experiences. Secondly was a process of challenging and changing beliefs, validated through new experiences. Finally, there was an embedding of changed beliefs into self-management to continue with activities.

Conclusion: This study identified a range of psychological changes which occur during exposure to CMT. These changes enabled patients to reconceptualise their condition, develop a new understanding of their body, understand psychological processes, and make sense of their knee pain.

KEYWORDS
early intervention, knee conditions, qualitative research

Daniela Ghio and Nathan Brookes are joint first authors

1 | INTRODUCTION

Knee Osteoarthritis (OA) is a chronic secondary pain condition characterised by altered joint function, cartilage deterioration, bone remodelling, and inflammation (Hunter & Bierma-zeinstra, 2019). Typical symptoms of OA include pain, stiffness, and joint swelling (Jang et al., 2021). It is estimated that 10% of men and 18% of women over the age of 60 have a diagnosis of symptomatic knee OA in the UK (Glyn-Jones et al., 2015). Symptomatic OA affects participation in work and social activities due to the psychological and physical responses to pain. This negatively impacts the quality of life and economic output (Leifer et al., 2022). The recommended conservative management of OA is a biopsychosocial approach that consists of exercise (Goh et al., 2019) combined with education (Ton et al., 2020), weight loss (NICE, 2022), and pharmacological management (Ton et al., 2020).

Physiotherapist-led muscle strengthening interventions for knee OA typically integrate psychological components. For example, with the Enabling Self-management and Coping with Arthritic Pain using Exercise (ESCAPE) programme, patients attend group exercise classes and receive education. This consists of discussion sessions regarding the condition itself, the benefits of exercise, pacing, the impact on anxiety and depression, activity planning, and relaxation techniques (Hurley et al., 2012). This integration of psychological principles within physiotherapy-led interventions is now widely accepted (Alexanders, 2017; Alexanders et al., 2015). However, despite the inclusion of psychological principles, current exercise-based interventions (Hurley et al., 2012; Roos et al., 2021) deliver only small (25%–30%) effects on pain and function which diminish over time (Bandak et al., 2022; Fransen et al., 2015; Hurley et al., 2012; Roos et al., 2021). This may be because these interventions do not specifically target muscle overactivity which has been consistently observed in people with knee OA (Hubley-Kozey et al., 2006; Lyytinen et al., 2010) and which is linked to increased joint loading (Brandon et al., 2014) and rate of cartilage loss (Hodges et al., 2016). Furthermore, muscle overactivity may exacerbate pain (Heiden et al., 2009; Preece et al., 2016) and can be related to fear of movement and negative beliefs for example, catastrophising (Butera et al., 2016; Hodges et al., 2015; Hodges & Tucker, 2011). Muscle overactivity could therefore be a key therapeutic target for new knee OA interventions.

Cognitive Muscular Therapy™ (CMT) is a new multifaceted intervention designed to reduce pain in knee OA. It specifically targets muscle overactivity, addresses the link between biomechanical and psychological factors and aims to teach patients to reconceptualise the condition (Preece et al., 2021). CMT is individually tailored across five components. In the first two components, patients learn how their thoughts and beliefs can influence motor responses and central pain mechanisms. For example, fear of damage to the knee can lead to inappropriate bracing of the quadriceps and increased attention to pain. In the third component, patients are taught that overactivity of the knee muscles can be a compensatory pattern resulting from a suboptimal distribution of postural tone in the upper body. In this component, patients are taught about potential links between muscle overactivity, stress and posture. Specific clinical techniques are then used to improve postural tone by reducing muscle overactivity of the trunk and neck muscles, thereby reducing compensatory knee muscle overactivity in standing. In the final two components, the focus is on teaching the patient awareness of how psychological state and anticipation of pain can be related to muscle overactivity during everyday activities. For example, the intention to ascend stairs can become subconsciously associated with a bracing of the quadriceps muscles.

To facilitate patient learning, CMT incorporates a range of visual tools to communicate concepts related to pain psychology and biomechanical theory. At the start of each session, the patients will watch an overview video which uses animations and voiceover to explain the key concepts for that session. During the session, animated video clips are used to convey biomechanical principles. EMG biofeedback is also used to raise awareness of quadricep's activity and to enable patients to understand, and visualise, how postural patterns and thoughts about pain can trigger overactivity of the knee muscles. This combination of visual biofeedback and animated videos enables the use of guided imagery, which is critical if the patient is to reconceptualise their condition.

For an effective intervention, both physiotherapists and patients require a shared belief system about the physical and psychological drivers of pain and knee OA. As such, in CMT there is an emphasis on adequate training for physiotherapists that maps onto the integrated biomechanical and psychosocial approach. Research has shown that physiotherapists report a lack of confidence in delivering interventions incorporating psychological concepts and strategies (Alexanders et al., 2015; Driver et al., 2017). Therefore, training to deliver CMT focuses on increasing their confidence with psychological models. Specifically, there is a focus on the fear avoidance (Vlaeyen and Linton, 2012) and cognitive behavioural therapy models (Sharp, 2001) alongside motivational interviewing techniques (Alperstein and Sharpe, 2016). These models and techniques are then linked with biomechanical concepts such as postural tone, alignment, and muscle co-contraction. As part of the training, there is a strong focus on challenging physiotherapist beliefs about strengthening exercises and supporting them to consider the role of muscle overactivity and its relationship with pain. Online resources are available for the physiotherapists to support them through the intervention to empower them to reconceptualise the condition with the patients whilst delivering CMT.

Preliminary clinical data suggest that CMT may be able to deliver large reductions in knee OA pain (Preece et al., 2023). However, little is known about the perceptions of patients and physiotherapists in receiving and delivering the intervention. Therefore, the aim of the current study was to understand these two perspectives and gain insight into changes in pain beliefs which may occur when receiving or delivering CMT.

2 | METHOD

2.1 | Design

This was a nested qualitative study conducted as part of ongoing research aimed at creating a training course for physiotherapists to enable them to deliver the CMT intervention. The design of the qualitative study followed a critical realist epistemological framework.

2.2 | Participants

As part of the training course development study, we recruited 12 patients with knee OA and five physiotherapists. Each physiotherapist worked in the UK NHS (National Health Service) and had at least 3 years of experience of treating patients with musculoskeletal pain. They were identified through advertisements in NHS departments. None of the physiotherapists had any previous experience of the CMT intervention and completed 20 h of online learning followed by a 1-day face-to-face workshop. To guide the delivery of the CMT intervention, the physiotherapists were expected to follow a clearly defined protocol, which was designed to lead the patient through an incremental learning process.

Patients with knee OA were identified through a volunteer database, through community sites in outpatient clinics and social media adverts. Each of the 12 patients with knee OA received seven sessions of CMT from one of the physiotherapists, with each physiotherapist delivering to at least two patients. Patients were also provided with access to an online learning platform. The platform included videos and written materials to support the information and learning provided in each clinical session. The videos and materials were developed through an iterative process with 21 patients (described in full in Preece et al. (2021). An example of one of the videos can be accessed at www.cogmustherapy.com/BMC_example_2. Quantitative data on changes in knee pain which happened across the delivery of the intervention are reported in a separate publication (Preece et al., 2023). For this study, each of the five physiotherapists was interviewed along with five of the patients. This is a pragmatic sample size for this type of study, providing adequate information power (Malterud et al., 2016). All participants gave consent to participate, and ethical approval was obtained from the HRA and Health and Care Research Wales Ethics committee (21/EM/0255).

2.3 | Procedure

All participants provided written consent and opted for an online, semi-structured interview, which was held after the completion of CMT. The interviews took place with experienced qualitative researchers (DG, NW). For ease of communication and to build rapport, the physiotherapist interviews were conducted by NW, a physiotherapist researcher who has extensive experience in treating musculoskeletal pain. The interviews lasted between 21 and 50 min with an average of 34.5 min. The interview schedule was developed by the research team including the patient representatives, physiotherapists and pain experts. It focused on the experiences of living with or treating knee OA, and about experiences of delivering and receiving the different components of CMT.

2.4 | Analysis

Interviews were conducted online, audio-recorded, and transcribed verbatim. Identifying information was then deleted from the transcripts and pseudonyms were assigned (pseudonyms: Ash, Kelly, Blair, Frankie and Robin). Inductive reflexive thematic analysis (Braun & Clarke, 2019) was conducted together by DG and NW. They both familiarised themselves with the data through repeated reading of the transcripts and discussion of initial line-by-line coding, and through an iterative discussion, an analysis plan was developed. The final thematic structure and narrative summaries were developed by DG. Through discussions between DG and NW regarding the narrative summaries, a timeline framework was developed to understand how patients and physiotherapists were conceptualising pain and how this changed throughout their interactions with CMT.

3 | FINDINGS

The aim of the interviews was to explore the experiences of both patients and the physiotherapists in receiving or delivering CMT and to understand any changes in pain beliefs. The demographics of each group are presented in Table 1. The mean (SD) age for the patient group of 7 males and 5 females was 59 (6.5) years. Mean (SD) BMI for the group was 27 (2.4) years. The changes in beliefs happened gradually throughout the course of the intervention and therefore, the findings were organised into three timeline-related themes. The initial phase included beliefs that patients and physiotherapists held at the beginning, before exposure to CMT; the second phase included how these beliefs were challenged through the process of delivering/receiving CMT; and the last phase included how new beliefs were embedded in life and practice.

3.1 | Initial phase: Pain beliefs to be challenged

The initial phase in changing beliefs was recognising scepticism from both the patients and the physiotherapists. The scepticism from both parties came from diverse sources where they had *preconceptions about pain*. However, early on there was a readiness to question the beliefs they held because of *misalignment with their experiences*.

3.1.1 | Preconceptions about pain

The patient participants held common beliefs about pain related to their knee OA, that the cause of the pain was *damage*. Furthermore, due to this *damage* and '*wear and tear*' the pain will get progressively

TABLE 1 Demographic information about participants who took part in the interviews (patients $n = 5$ and physiotherapists $n = 5$).

Patients	
Sex	*Frequency*
Male	2
Female	3
Age (years)	*Mean*
52–64	59
BMI	
23.8–31.6	27
Physiotherapists	
Sex	*Frequency*
Male	2
Female	3
Age (years)	*Mean*
27–50	33
Band	
6	4
7	1
Years Qualified	
3–5	2
7–20	3
Specialism	
MSK	4
Emergency dept	1

worse, as highlighted by 'Dean' below. All the patients mentioned that they believed that surgery was inevitable. Pain for them had severe consequences, affecting their quality of life, stopping them from participating in activities important to them, and making everyday tasks more difficult.

> You've got the issue of growing older with knee pain and becoming more and more debilitating, and then you think you're going to need a knee replacement, and then that'll make you, you know, you'll be able to do less going forward, so… Well, it is quite painful when you are doing simple tasks… My knee did get really very sore, so it was inhibiting my lifestyle, if you like, so it was stopping me cycling. It was painful walking up the stairs, so it is difficult.
>
> Dean (patient)

The physiotherapists confirmed that these are beliefs that their patients tend to hold, and there was a shared belief of inevitable decline amongst the patients they see. This was occasionally shared by physiotherapists, as observed by Frankie in the quote below.

> Traditional therapy for osteoarthritic knee pain, I've sort of had a mixed experience with it. […] I think there's a lot of therapists out there who believe that osteoarthritis is a slow process leading towards a knee replacement. […] the therapists believe that that's what's happening, then the patient's not going to move away from that sort of belief. Personally, I think I've just always been invested in strengthening, so when strengthening didn't work, I was like well, that's everything we can do.
>
> Frankie (physiotherapist)

The physiotherapists explained that these negative beliefs about the prognosis made it challenging to provide alternative beliefs for their patients. Some physiotherapists pointed out that there were further challenges as OA is a well-known condition. This is highlighted in the quote by Ash, the negative outlook is already embedded in the patients.

> I think for conditions that are well-documented or well-known about, there's always myths and stigma around it. I think a lot of people's beliefs are that this is it, and it's going to get worse no matter what you do. A lot of people believe that activity is bad for you and it's going to make things worse. So yes, I think it can be quite a difficult one from an emotional and psychological standpoint from the patient's point of view as to what their future might look like.
>
> Ash (physiotherapist)

3.1.2 | Beliefs misaligning with experiences

Patients discussed their motivation to take part in CMT, ranging from to delay an inevitable surgery to a sense of not accepting that this is the only prognosis for knee OA. Whilst they held strong beliefs about the cause of their pain, they developed coping strategies in dealing with their pain, management including painkillers, use of heat or ice packs, and at times avoiding activities or engaging in '*all or nothing*' behaviour.

> Just grit my teeth and just got on with it or, depending on when it was in the day…. I do have access to Nurofen and paracetamol and if it got too bad, I used to take one. I wouldn't say that I reach for it specifically but it has to be really bad. I've got ibuprofen gel. I have ice packs, just all on hand.
>
> Clara (patient)

The fluctuating nature of pain and the inconsistency in their pain experiences meant that the patients were uncertain about their future, as highlighted by Beatrix.

> It's quite weary, quite tiring sometimes, it's one of those things that you, I don't know when it's going to happen. So I guess I'm a little bit worried about when it, is it going to happen, am I going to be able to do things and such… it's that not knowing when it's going to happen because it's not all the time, it can come and go so, depending on what I do.
>
> Beatrix (patient)

Furthermore, the inconsistency of pain intensity was evident in different pain behaviours (e.g. Clara discussed days when they had to crawl up the stairs but on other days being able to go for long walks). These experiences do not align with a gradual decline in the disease. This misalignment between their experience and beliefs led them to continue looking for further explanations and perhaps allowed them to be open to different conceptualisations of pain being offered in CMT.

For the physiotherapists, there was a misalignment between current practices of strengthening exercise and the pain beliefs of *wear and tear* and *damage* with inevitable decline. This adds a challenge for them to convince their patients to take part in exercises; as discussed by Blair below, this did not come across as logical for their patients.

> Difficult mainly because of what they've been told in the past, like it's the wear and tear, degeneration, what I need to live with, it's not going to get any better, and the fact that we, most of the time, prior to doing CMT, tell them that exercise is going to make their knee pain better when exercise actually is what causes their knee pain. Telling them to do something that causes them pain just isn't logical for them, so it's very difficult to get them on board with that. Then diet, lifestyle, things like that, some people just aren't willing to change, and a lot of patients think I need a knee replacement, that's the only thing that's going to get rid of my pain basically.
>
> Blair (physiotherapist)

Furthermore, some physiotherapists also felt that CMT protocols were an advancement in their understanding of the biomechanical views and aligned with their ethos in understanding the pain experience for their patients and doing more than strengthening. However, for some like Robin, this was conflicting with previous information they had been provided, whilst logically it required going through the process of delivering the intervention and seeing the results to make sense of the new protocols and underlying mechanisms.

> At first, when I was learning about it [CMT], it seemed like a good, logical idea, but it conflicted with other things I've learnt in the past. As I've gone through it. I've made more sense of it and it makes sense. From the patients I've been with, they are changing and they are improving..
>
> Robin (physiotherapist)

The issues raised by all the physiotherapists was that current practices were not addressing everyone's needs and as described by Kelly, below, you try to justify the unsuccessful cases as those being the ones who will need the knee replacements. However, this arbitrary success with current practices led to physiotherapists feeling intrigued by utilising CMT and ready to try new methods to help these patients and to try addressing the needs of the patients who fit in with their ethos as physiotherapists.

> I feel like I'm just handing out a leaflet but not really addressing anything, but I didn't know what else to do, so you keep going, and those patients that get better, justify it, and the ones that don't get better, you think, well, they need a knee replacement anyway so, yes.
>
> Kelly (physiotherapist)

Despite feeling like having an alignment with their ethos as physiotherapists, all the physiotherapists spoke about how challenging it was to make the CMT protocol their own. They spoke about how it felt like there was a lack of confidence with the new approaches. This led to physiotherapists feeling they were novices and needed time to familiarise themselves with CMT. However, they felt that, as they became more familiar with the materials, they became more comfortable delivering the intervention.

> I think it works really well. For my comfort, my first couple of sessions, I didn't feel very comfortable delivering. I suppose it's because I've been in my comfort zone for the last ten years as being an MSK physio. You get used to doing things your own way, and then, obviously, you've got to ask certain questions and remember the order of what we're trying to do.
>
> Ash (physiotherapist)

3.2 | Middle phase: Challenging and changing beliefs

CMT was a space to challenge and change beliefs for both patients and physiotherapists. For both there was a need for finding a way in, that led to acceptance, there was a need for validation and credibility, and this was achieved through the techniques and tools that were incorporated in the sessions of CMT. Furthermore, CMT allowed

both patients and physiotherapists to consider the body in an integrated approach, which helped address the doubts they previously held and make sense of the misalignment they felt between their beliefs and their experiences.

3.2.1 | A need for validation and credibility

There were aspects of CMT that both patients and physiotherapists felt helpful in challenging existing beliefs about pain and movement. For patients, the first session was monumental in challenging their preconceptions of knee OA and their previous pain beliefs. The biofeedback played an important role in providing the visualisation and complementing the educational elements.

> Physio can't fix the damage. I need an operation for that. So I was quite sceptical. Then I looked at the videos on the first session and the first video that really struck me [...] All around the cartilage area there's no pain sensors there. So what's actually causing the pain? [...] What was explained to me was that circle [cycle] of you automatically feel pain so then you tense up more [...] Again, I was a little bit sceptical [...] when they first put the sensors onto the top of my thighs, for the first session I physically could not get the left leg to relax. It was impossible.
>
> Edward (patient)

The continuation of the use of biofeedback allowed for the validation and time to accept the new information. For example, Edward, from the quote above, who spoke about the initial scepticism, was subsequently impressed and described disbelief when he was able to see the connection between the information on the screen, relaxation and a change in pain as highlighted in the quote below.

> After a couple of sessions, with the breathing exercises, relaxing the stomach muscles, relaxing the quad muscles, you could see that line dropping flat, which meant that I couldn't believe not only was I feeling better, I was walking more smoothly and not feeling the pain. You could see on an actual chart that that knee was relaxing, or that leg was relaxing for the first time. So that was a massive, massive shock to me. So I was really impressed with that.
>
> Edward (patient)

The initial change was noted within the first two sessions for the patients, and this encouraged them to engage in the subsequent sessions. Some explained they were still apprehensive before the start of the second session, but it was after that session that they began noticing changes. Patients experienced reinforcements in how they felt, the activities they were able to take part in, and in how other people had viewed them. This continued even after completion of CMT. George discussed the changes he noted, including how others noticed how his posture had changed and this ensure he remained motivated to continue practising CMT after his final session.

> I was like an old man going upstairs, I had to hold on to the handrail. Now, honest to God I don't even think about it. I can go upstairs now with no pain. I can come down with no pain. I get up in the morning with no pain. If I told people they probably wouldn't believe me, but the difference it's made to my life. I still do the exercises now because I've left, I still do them, every day I do exactly what they've told me to do. My back pain's eased. People say, because I'm 6ft 4, they say, 'Have you grown?' because I don't know if my stance and my back - everything's sort of like... I've got to work at it, I've got to set myself back up, everything he told me to do. I've done it now since I started it, I went out on Friday, 27,000 steps I did walking.
>
> George (patient)

As mentioned in the previous theme, the physiotherapists spoke about how the beliefs held by the patients could pose a challenge for their usual care. For the physiotherapists, they felt that they needed to find a way for a *'buy-in'* in order to convince the patients to let go of previous beliefs. They discussed how some of the motivational interviewing techniques and tools allowed for validation and credibility in education that was provided in the first session. According to the physiotherapists, these tools were an important aspect of CMT as the information also contradicted what patients may have heard from surgeons or consultants.

> I think, for me, it's always the bits that you can evidence and show to a patient without having them to just believe you and trust you. I think that's huge, so that's why I really bought into... The EMG was invaluable, I think, and I have tried to deliver some other similar treatments back at base and found that the buy-in isn't quite as effective because there still has to be an element of trust in believing what I'm saying about physics, and biomechanics of the knee. They just have to trust what I'm saying, whereas actually, I can prove it to them using the EMG markers. I love any kind of biofeedback for that, really, because it shows that you're not guessing; you're measuring.
>
> Ash (physiotherapist)

However, the physiotherapists spoke about one disadvantage when familiarising yourself with a multi-sessional treatment is to be able to move across the information from the sessions if a question came up. The physiotherapists recognised that they needed the confidence to tailor and respond to the patients and move freely

between components to see the links between the sessions. They felt that they needed the experience of delivering CMT to completion to be able to perceive these links.

> At the start, when I didn't really have - I had an understanding of it, but I wasn't that familiar with it, so teaching that to patients was quite difficult. I kind of got where they were coming from with like, 'Well, this doesn't really make any sense, why am I affecting my posture when my knee is painful?' Then, as I got more familiar with it, each session I would then link it back to why we were going to go through all this postural deconstruction and reconstruction to then help with the knee pain.
>
> Blair (physiotherapist)

The visualisation was key for both patients and the physiotherapists. For the patients, this allowed a further understanding of the material and for the physiotherapists, this allowed them to provide a coherent explanation to the patients. As highlighted by Robin below, the videos also allowed for better communication of the materials, a way of incorporating the motivational interviewing techniques, for patients to reflect and discuss.

> I can imagine with some more difficult patients, so our strong-minded patients, breaking them down at first might be harder. I know we use motivational interviewing techniques and we get the patients to reflect, at pretty much every stage we get them to reflect to try and change their behaviour. [...] there's a lot of videos and animations, which I think patients like. I think that takes a bit of the pressure off, for us as a clinician, to teach, because they watch something, we ask them to reflect and then we can fill in the gaps, which is quite nice. So that's been helpful.
>
> Robin (physiotherapist)

Having access to the videos beyond the sessions allowed for the reinforcement of these conversations for the patients and provided the space for them to practise. The videos allowed for moving towards the application of the knowledge and allowed patients to integrate something concrete to be able to do in response to this knowledge about their bodies.

> I think what's really interesting is the difference between how one stands previously to how one stands now and how it has a marked effect.[...] I just had that knowledge. It's just knowing how to put that into practice. That's been really good to see; especially with the skeletal videos which was great.
>
> I mean I think it's really good to see the diagnostics of how this particular muscle worked in relation to this particular structure and how things work. I mean, it has a progressive bit which is quite nice and it's good to go back and you can keep going back and replaying them. You can reinforce what you're seeing.
>
> Clara (patient)

3.2.2 | Making sense of how the body works

For both patients and physiotherapists, there was an appreciation that CMT works in a holistic way by engaging the whole body, resulting in patients and physiotherapists feeling they understood the links between posture, breathing, beliefs and the overall pain experience. This was evident in how the patients described the key messages they remembered from CMT, they talked about the links they were able to see and how they were able to adjust when they felt their pain being triggered. For example, for Beatrix, feeling stressed usually meant she also felt knee pain, and they conceptualised the link between the pain and stress and changes in their posture and breathing with the help of the video and visualising those links.

> It's the overall concept of, your stomach goes tight, your breathing is not correct, you're not getting the space to push your stomach out, lift your ribs up to stand tall, so you're... That's probably maybe because that's what affects me. I've been suffering with a bit of stress. [...]Then I practiced standing up straight without tensing the knees, putting your hips more in line, the top section of your back up straight, and getting your breathing correct, which again, it's all like a circular thing, because breathing correct creates less stress. I remember that video, the whole torso video, if you like, I think it's very good.
>
> Beatrix (patient)

For the physiotherapists, they were able to see patterns in the presentation of the pain; therefore, they saw the potential for CMT to be adapted for other pain conditions, as highlighted by Ash in the quote below.

> I also have noted patterns between the people who - similar - people with this kind of knee pain, they often come in with back pain and neck pain, and I do think there's a link between all three of those just having seen them. The potential to improve other conditions at the same time, which I think is really good.
>
> Ash (Physiotherapist)

Furthermore, the physiotherapists felt that this approach allowed them to incorporate the pain science concepts into practice because they felt they were now psychologically informed. As argued

in the quote below, CMT sits in both old and new science aligning with biopsychosocial guidelines. Simultaneously, CMT provides an overall understanding of what is happening to a person, encompassing the patient's understanding of their body and how this results in different outcomes.

> I think the main thing that I want to say about CMT is that it fits in with previous biomedical and physiological theories. […] the stuff that we're doing that's new doesn't contradict anything that's been done previously, we're using the same science to justify an application and the application's just providing fantastic results. So it's, all of the new emerging stuff is all about psychologically informed therapy, holistic, bringing the patient in, having the patient as an effective part of the treatment. It fits in with goal setting, it fits in with CSP guidelines, HCPC standards, it fits the mould and it's the outcomes which are different.
>
> Frankie (physiotherapist)

3.3 | Final phase: Embedding new beliefs

The final theme we developed was regarding how these new shifts became embedded in the patient's daily life and the physiotherapist practise. The patients applied CMT concepts to how they dealt with pain experiences and physiotherapists applied it to patients presenting with pain in other areas. There was one sub-theme within this final phase, that was described as the reconceptualisation of self-management.

3.3.1 | Reconceptualisation of self-management

Both patients and physiotherapists reflected on changes in how they dealt with pain. A key message that patients took forward from their CMT experience was changing their inner dialogue when feeling pain. They discussed that in that moment, they told themselves to 'reset' and respond to pain in a different way. This was demonstrated by George, who after noticing pain, completed a reset. Applying the skills learned during CMT, he was able to continue walking without pain.

> I take a minute, reset, and I don't even think about it anymore [..] It's getting your posture right. They gave us breathing exercises, and you get your posture, and then you can breathe out and pull yourself into a vertical position. You're up, and they do all your…Anyway, I can reset myself, get myself up on to a nice position and carry on walking with no pain.
>
> George (patient)

Others like Clara also spoke about resetting becoming an initial coping behaviour when becoming aware of pain in the knee. In addition to this in 'the moment adjustment', Clara discussed practicing realignment and breathing exercises as part of the morning routine. Suggesting that she is transitioning how she is conceptualising the management of pain and changing her behaviours, beyond her exposure to CMT.

> The way I stand. The way that I approach things, especially just day-to-day stuff. Every time I feel a niggle on my knee I go, 'Okay, let's have a reset.'' […] I think there's a whole lot that has become a habit now. First thing in the morning, I literally just stand up and I reset myself before I even walk out the door now. I haven't quite mastered it down the stairs because I'm too busy doing things. I've just got to stop but I think that will come as long as I carry on with it. […] I was thinking, I hurt, so I stopped. I actually did - okay, let's do this breathing. Let's do that breathing. It's really helped seeing that video because every time I say, 'Let's do it,' I can visualise it. It's been brilliant from that point of view.
>
> Clara (patient)

For the physiotherapists, they were able to reflect on the role of physiotherapy in empowering self-management. They felt there was previously a dependency or expectation that the physiotherapist could cure pain. Physiotherapists also spoke of their own learnt experiences on how they now understand self-management and where physiotherapy fits in a person's ability to manage their condition. Besides providing the baseline as discussed below, they spoke about their own unlearning and relearning for future implementations. Highlighting a preference for this new dynamic between physiotherapist and patient.

> Yes, so I have struggled with it, because when I said I'd been in physio for a long time, it's a long time, so you've got 25-plus years of practising it one way in the very medical model, like the old cyriax. You do this test, it's positive, it means this, so I have a lot of undoing of stuff like that to do, but I like this better. We're pushed to self-management but the old way didn't really lend itself to self-management because you weren't giving them tools to problem-solve. It was very physio-orientated where this just feels, you're giving them a recipe, and it's up to them whether they put sprinkles in it, or they put extra bit of fruit, that's entirely up to them. If they've got the baseline, they can actually problem-solve for the rest of their life. They don't necessarily need to come back and me make them better, so I do like this approach.
>
> Kelly (physiotherapist)

In contrast to the usual care approach, the physiotherapists found that CMT provided problem-solving skills and targeted self-efficacy. These skills went beyond the provision of exercises and advice, which meant patients were more likely to be able to self-manage their condition. Both examples provided here by Frankie and Kelly illustrate how patients are provided with tools. These tools gave patients a baseline to work and develop from. The messages of self-management and the approach of CMT fit with their and their patients' experiences, and an approach they plan to implement in the future.

> … we need to have more in our toolkit than strengthening, and at the minute we're working on a platform where the answer to everything is strength, […] If the answer to everything is strength, then that implies that the problem is always weakness, […] and I'm like why did I never question this before in out-patients? […] When we're testing strength, I've tested strength on people with knee OA, and they're pushing me away, and I'm like they're not weak. Then they come out of that assessment, and I give them strengthening exercises! So it's like, it's really resonated with me […] it's tied together a lot of loose ends that I had but, yes. […] Whether it's the exact biomechanics or whether it's the constant reflections, the application, there's lots of aspects of CMT which are very helpful and reduces fear, reduces tension, gives people more of a self-efficacy that they can get better.
>
> Frankie (physiotherapist)

4 | DISCUSSION

Through this qualitative study, we have gained insight into how CMT may empower patients with mild-to-moderate knee OA to manage their pain. We have also described how CMT brings about changes in patient and physiotherapist beliefs, related to both the disease and clinical management of knee OA. The results from this investigation are consistent with the large reductions in pain observed in our training course development study across 12 patients with knee OA (Preece et al., 2023). Specifically, we observed a mean (SD) reduction of 80 (22)% in WOMAC pain. There is growing support for the use of psychological interventions in the management of knee OA (Bennell et al., 2016; Caneiro et al., 2020; Hunt et al., 2013; Zhang et al., 2018) and our qualitative and quantitative data support the idea that integrating psychological techniques may improve patients' capacity to self-manage their condition. Building on this work, we have explored the processes that influence patient and physiotherapist engagement with CMT.

Our findings support and confirm previous research into the beliefs held by patients and physiotherapists regarding knee OA progression (Bunzli et al., 2019; Kennedy et al., 2022; Wallis et al., 2019). We found that patients and physiotherapists view OA as a wear and tear disease that affects the quality of life and is likely to require surgical input. This is supported by Bunzli et al. (2019) who reported that 'patients believed that their pain would deteriorate over time' and 'that physiotherapy and exercise interventions would increase pain and could not replace lost knee cartilage'. Furthermore, Nissen et al. (2022) reported that 'physiotherapists perceive OA to be a low priority "wear-and-tear" disease with expected progression of symptoms, making joint replacement surgery eventually inevitable'. These beliefs are likely to influence patient and physiotherapist decision making.

Our findings suggest that physiotherapists and patients involved in this study were motivated to make a change to their practices/lifestyle but often felt powerless to do so. The patients described feeling that the previous information about OA (progressive condition) was from a reliable source (clinicians, family, friends). However, this information did not always fit their experiences of a relapsing and remitting process. As such, although motivated to engage with health professionals, patients felt a lack of confidence in managing their condition. Moreover, due to commonly held beliefs about exercise causing harm (Bunzli et al., 2019; Kennedy et al., 2022), the patients had previously found engaging in exercise a challenge. In turn, the physiotherapists felt that their current practices were not meeting the needs of all patients, and they were not able to consistently influence the patient's outcomes.

The physiotherapists recognised that their own beliefs influenced their clinical recommendations. They rationalised failed treatment as being related to factors outside their control (the disease process or lack of adherence). Yet they also recognised that providing some patients with exercise was likely to fail from the outset due to a patient's expectations (surgery) or concomitant psychosocial factors (kinesiophobia). The physiotherapists felt that they did not have the words or tools to challenge patients' beliefs or offer alternative management strategies. As such, they rationalised that these patients required surgery. Overall, misalignment between patient/physiotherapist beliefs and experiences continues to exist. They lead to confusion with decision making and negatively influence healthcare decisions. This may lead to patient disengagement with conservative management and progression to surgery.

The structure of CMT allowed both patients and physiotherapists to reconceptualise self-management, incorporating a changed understanding of pain and their body. In work with reconceptualising chronic pain, researchers have identified that healthcare providers tend to underestimate how well patients can understand the underlying neurophysiology, however, patients are able to make sense of complex information (Moseley, 2003). The use of visualisation and biofeedback in CMT were tools that the physiotherapists utilised to provide concrete evidence for abstract and complex information about how the body is adapting and coping with pain. Moreover, these tools allowed the physiotherapist to challenge the patient's beliefs through novel experiences rather than through verbal violation of belief, maintaining a therapeutic alliance (Rossettini et al., 2022). This process positively influenced patient engagement and physiotherapist credibility.

Visual representation as a health communication tool has been found to be highly acceptable for patients with other conditions where they then develop their own mental images of the condition (Devcich et al., 2014; Harrow et al., 2008). Furthermore, emerging research in this area of using active visualisation (e.g. animations, modelling, or demonstrations) has shown to improve knowledge and understanding of treatment (Jones and Petrie, 2017). In the current study, the visualisation element of CMT was useful for both patients and physiotherapists, where the physiotherapists felt validated and empowered in communicating within this framework. The patients in the current study discussed bringing up the videos and visualisations when experiencing pain and using this to implement change. This demonstrated that the patients were able to use visualisation to construct a mental representation of the mechanisms of pain. The reinforcement of messages helped tackle the preconceptions of pain, address previous gaps they had when their beliefs misaligned with their experiences and supported the reconceptualisation of self-management as an ongoing journey towards meaningful activity.

There are some limitations to consider. Firstly, when compared to previous knee OA research (Hurley et al., 2012), the mean age of the patients was younger and mean BMI was lower. Furthermore, the patients were previously highly active, and this might have been a motivator for signing up and engaging with the intervention. It is unclear if this engagement is representative of other knee OA patients. However, their motivation to get back to their activities may have played a role in their readiness for change (Jensen et al., 2007).

Secondly, conducting a single interview with each participant could be seen as a limitation of this study. However, this interview was undertaken after participants had completed their final session of CMT and therefore enabled a reflection on the whole journey of the intervention. This allowed for an analysis that captured the initial scepticism and the gradual change in beliefs that happened over the course of the treatment. Finally, The physiotherapists in this study were very enthusiastic and open to a change in practice and it is not clear whether this is representative of other clinicians. Further work is therefore required to understand how to engage different groups of clinicians in this new approach and how to implement CMT in the UK NHS and across other healthcare settings.

5 | CONCLUSION

CMT has been designed to empower individuals with the capability and motivation to change muscle activation patterns and beliefs associated with knee OA. Our findings suggest that this occurs across three distinct phases. In the first phase, patient beliefs and preconceptions about OA and its management are explored and patient experiences validated. In the second phase, patient beliefs are challenged through education and direct experience. This is achieved by using biofeedback and animated videos to change the patients understanding of how the body works. In the final phase, the patients' new beliefs are embedded to allow for long-term reconceptualisation and management of OA. This is described as an onward journey to return to meaningful activity. For both patients and physiotherapists there was evidence of increased empowerment and confidence as they moved through these phases. Overall, both physiotherapist and patient perceptions/experiences are consistent with the idea that CMT may be able to bring about a sustained change in the way patients with knee OA think about and manage their knee pain.

AUTHOR CONTRIBUTIONS

Dr Daniela Ghio- conceptualisation (equal), data curation (equal), funding acquisition (supporting), formal analysis (equal), investigation (equal), methodology (equal), visualisation (lead), writing- Original Draft Preparation (equal), Writing – Review & Editing (equal). **Mr Nathan Brookes**- conceptualisation (equal), funding acquisition (supporting), project administration (supporting), methodology (equal), resources (equal), visualisation (lead), writing- Original Draft Preparation (equal), Writing – Review & Editing (equal). **Professor Stephen Preece**- conceptualisation (equal), funding acquisition (lead), project administration (lead), methodology (equal), supervision (lead), project administration (lead), resources (equal), visualisation (supporting), Writing – Review & Editing (equal). **Professor Nicola Walsh**- conceptualisation (equal), data curation (equal), funding acquisition (supporting), formal analysis (equal), investigation (equal), methodology (equal), supervision (lead), visualisation (supporting), Writing – Review & Editing (equal).

ACKNOWLEDGEMENTS

The authors would like to thank our public co-applicant and Jennifer Parker, our research support officer. We would like to thank all the participants for taking part in this study. This study/project is funded by the NIHR Research for Patient Benefit NIHR202203. The views expressed are those of the author(s) and not necessarily those of the NIHR or the Department of Health and Social Care.

CONFLICT OF INTEREST STATEMENT

None.

DATA AVAILABILITY STATEMENT

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

ETHICS STATEMENT

All participants gave informed consent and all methods were carried out in accordance with the Declaration of Helsinki and approved by HRA and Health and Care Research Wales Ethics committee (21/EM/0255).

ORCID

Daniela Ghio https://orcid.org/0000-0002-0580-0205

REFERENCES

Alexanders, J. (2017). The role of psychological skills within physiotherapy: A narrative review of the profession and training. *Physical Therapy Reviews*, 21.

Alexanders, J., Anderson, A., & Henderson, S. (2015). Musculoskeletal physiotherapists' use of psychological interventions: A systematic review of therapists' perceptions and practice. *Physiotherapy*, *101*(2), 95–102. https://doi.org/10.1016/j.physio.2014.03.008

Alperstein, D., & Sharpe, L. (2016). The efficacy of motivational interviewing in adults with chronic pain: A meta-analysis and systematic review. *The Journal of Pain*, *17*(4), 393–403. https://doi.org/10.1016/j.jpain.2015.10.021

Bandak, E., Christensen, R., Overgaard, A., Kristensen, L. E., Ellegaard, K., Guldberg-Møller, J., Bartholdy, C., Hunter, D. J., Altman, R., Bliddal, H., & Henriksen, M. (2022). Exercise and education versus saline injections for knee osteoarthritis: A randomised controlled equivalence trial. *Annals of the Rheumatic Diseases*, *81*(4), 537–543. https://doi.org/10.1136/annrheumdis-2021-221129

Bennell, K. L., Ahamed, Y., Jull, G., Bryant, C., Hunt, M. A., Forbes, A. B., Kasza, J., Akram, M., Metcalf, B., Harris, A., Egerton, T., Kenardy, J. A., Nicholas, M. K., & Keefe, F. J. (2016). Physical therapist-delivered pain coping skills training and exercise for knee osteoarthritis: Randomized controlled trial. *Arthritis Care & Research*, *68*(5), 590–602. https://doi.org/10.1002/acr.22744

Brandon, S. C., Miller, R. H., Thelen, D. G., & Deluzio, K. J. (2014). Selective lateral muscle activation in moderate medial knee osteoarthritis subjects does not unload medial knee condyle. *Journal of Biomechanics*, *47*(6), 1409–1415. https://doi.org/10.1016/j.jbiomech.2014.01.038

Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, *11*(4), 589–597. https://doi.org/10.1080/2159676x.2019.1628806

Bunzli, S., O'Brien, P., Ayton, D., Dowsey, M., Gunn, J., Choong, P., & Manski-Nankervis, J. A. (2019). Misconceptions and the acceptance of evidence-based nonsurgical interventions for knee osteoarthritis. A qualitative study. *Clinical Orthopaedics and Related Research*, *477*(9), 1975–1983. https://doi.org/10.1097/corr.0000000000000784

Butera, K. A., Fox, E. J., & George, S. Z. (2016). Toward a transformed understanding: From pain and movement to pain with movement. *Physical Therapy*, *96*(10), 1503–1507. https://doi.org/10.2522/ptj.20160211

Caneiro, J. P., O'Sullivan, P. B., Roos, E. M., Smith, A. J., Choong, P., Dowsey, M., Hunter, D. J., Kemp, J., Rodriguez, J., Lohmander, S., Bunzli, S., & Barton, C. J. (2020). Three steps to changing the narrative about knee osteoarthritis care: A call to action. *British Journal of Sports Medicine*, *54*(5), 256–258. https://doi.org/10.1136/bjsports-2019-101328

Devcich, D. A., Ellis, C. J., Waltham, N., Broadbent, E., & Petrie, K. J. (2014). Seeing what's happening on the inside: Patients' views of the value of diagnostic cardiac computed tomography angiography. *British Journal of Health Psychology*, *19*(4), 810–822. https://doi.org/10.1111/bjhp.12080

Driver, C., Kean, B., Oprescu, F., & Lovell, G. P. (2017). Knowledge, behaviors, attitudes and beliefs of physiotherapists towards the use of psychological interventions in physiotherapy practice: A systematic review. *Disability & Rehabilitation*, *39*(22), 2237–2249. https://doi.org/10.1080/09638288.2016.1223176

Fransen, M., Mcconnell, S., Harmer, A. R., Van der Esch, M., Simic, M., & Bennell, K. L. (2015). Exercise for osteoarthritis of the knee. *Cochrane Database of Systematic Reviews*, *1*, Cd004376. https://doi.org/10.1002/14651858.cd004376.pub3

Glyn-Jones, S., Palmer, A. J., Agricola, R., Price, A. J., Vincent, T. L., Weinans, H., & Carr, A. J. (2015). Osteoarthritis. *Lancet*, *386*(9991), 376–387. https://doi.org/10.1016/s0140-6736(14)60802-3

Goh, S. L., Persson, M. S. M., Stocks, J., Hou, Y., Lin, J., Hall, M. C., Doherty, M., & Zhang, W. (2019). Efficacy and potential determinants of exercise therapy in knee and hip osteoarthritis: A systematic review and meta-analysis. *Ann Phys Rehabil Med*, *62*(5), 356–365. https://doi.org/10.1016/j.rehab.2019.04.006

Harrow, A., Wells, M., Humphris, G., Taylor, C., & Williams, B. (2008). Seeing is believing, and believing is seeing": An exploration of the meaning and impact of women's mental images of their breast cancer and their potential origins. *Patient Education and Counseling*, *73*(2), 339–346. https://doi.org/10.1016/j.pec.2008.07.014

Heiden, T. L., Lloyd, D. G., & Ackland, T. R. (2009). Knee joint kinematics, kinetics and muscle co-contraction in knee osteoarthritis patient gait. *Clinical biomechanics*, *24*(10), 833–841. https://doi.org/10.1016/j.clinbiomech.2009.08.005

Hodges, P. W., Tsao, H., & Sims, K. (2015). Gain of postural responses increases in response to real and anticipated pain. *Experimental Brain Research*, *233*(9), 2745–2752. https://doi.org/10.1007/s00221-015-4347-0

Hodges, P. W., & Tucker, K. (2011). Moving differently in pain: A new theory to explain the adaptation to pain. *Pain*, *152*(3), S90–s98. https://doi.org/10.1016/j.pain.2010.10.020

Hodges, P. W., Van Den Hoorn, W., Wrigley, T. V., Hinman, R. S., Bowles, K. A., Cicuttini, F., Wang, Y., & Bennell, K. (2016). Increased duration of co-contraction of medial knee muscles is associated with greater progression of knee osteoarthritis. *Manual Therapy*, *21*, 151–158. https://doi.org/10.1016/j.math.2015.07.004

Hubley-Kozey, C. L., Deluzio, K. J., Landry, S. C., Mcnutt, J. S., & Stanish, W. D. (2006). Neuromuscular alterations during walking in persons with moderate knee osteoarthritis. *Journal of Electromyography and Kinesiology*, *16*(4), 365–378. https://doi.org/10.1016/j.jelekin.2005.07.014

Hunt, M. A., Keefe, F. J., Bryant, C., Metcalf, B. R., Ahamed, Y., Nicholas, M. K., & Bennell, K. L. (2013). A physiotherapist-delivered, combined exercise and pain coping skills training intervention for individuals with knee osteoarthritis: A pilot study. *The Knee*, *20*(2), 106–112. https://doi.org/10.1016/j.knee.2012.07.008

Hunter, D. J., & Bierma-Zeinstra, S. (2019). Osteoarthritis. *Lancet*, *393*(10182), 1745–1759. https://doi.org/10.1016/s0140-6736(19)30417-9

Hurley, M. V., Walsh, N. E., Mitchell, H., Nicholas, J., & Patel, A. (2012). Long-term outcomes and costs of an integrated rehabilitation program for chronic knee pain: A pragmatic, cluster randomized, controlled trial. *Arthritis Care & Research*, *64*(2), 238–247. https://doi.org/10.1002/acr.20642

Jang, S., Lee, K., & Ju, J. H. (2021). Recent updates of diagnosis, pathophysiology, and treatment on osteoarthritis of the knee. *International Journal of Molecular Sciences*, *22*(5), 2619. https://doi.org/10.3390/ijms22052619

Jensen, M. P., Turner, J. A., & Romano, J. M. (2007). Changes after multidisciplinary pain treatment in patient pain beliefs and coping are associated with concurrent changes in patient functioning. *Pain*, *131*(1), 38–47. https://doi.org/10.1016/j.pain.2006.12.007

Jones, A. S. K., & Petrie, K. J. (2017). I can see clearly now: Using active visualisation to improve adherence to ART and PrEP. *AIDS and Behavior*, *21*(2), 335–340. https://doi.org/10.1007/s10461-016-1611-7

Kennedy, B. L., Currie, G. R., Kania-Richmond, A., Emery, C. A., Mackean, G., & Marshall, D. A. (2022). Patient beliefs about who and what influences their hip and knee osteoarthritis symptoms and progression. *Musculoskeletal Care*, *20*(3), 605–615. https://doi.org/10.1002/msc.1620

Leifer, V. P., Katz, J. N., & Losina, E. (2022). The burden of OA-health services and economics. *Osteoarthritis and Cartilage*, *30*(1), 10–16. https://doi.org/10.1016/j.joca.2021.05.007

Lyytinen, T., Liikavainio, T., Bragge, T., Hakkarainen, M., Karjalainen, P. A., & Arokoski, J. P. (2010). Postural control and thigh muscle activity in men with knee osteoarthritis. *Journal of Electromyography and Kinesiology*, *20*(6), 1066–1074. https://doi.org/10.1016/j.jelekin.2010.05.005

Malterud, K., Siersma, V. D., & Guassora, A. D. (2016). Sample size in qualitative interview studies:guided by information power. *Qualitative Health Research*, *26*(13), 1753–1760. https://doi.org/10.1177/1049732315617444

Moseley, L. (2003). Unraveling the barriers to reconceptualization of the problem in chronic pain: The actual and perceived ability of patients and health professionals to understand the neurophysiolog. *Pain*, *4*, 184–189. https://doi.org/10.1016/s1526-5900(03)00488-7

NICE. (2022). National Institute for Health and Care Excellence [NICE] (2022) Retrieved from https://www.nice.org.uk/guidance/ng226

Nissen, N., Holm, P. M., Bricca, A., Dideriksen, M., Tang, L. H., & Skou, S. T. (2022). Clinicians' beliefs and attitudes to physical activity and exercise therapy as treatment for knee and/or hip osteoarthritis: A scoping review. *Osteoarthritis and Cartilage*, *30*(2), 260–269. https://doi.org/10.1016/j.joca.2021.11.008

Preece, S. J., Brookes, N., Walsh, N. E., & Ghio, D. (2023). *A new behavioural intervention for knee osteoarthritis* (p. 31). Osteoarthritis and Cartilage.

Preece, S. J., Brookes, N., Williams, A. E., Jones, R. K., Starbuck, C., Jones, A., & Walsh, N. E. (2021). A new integrated behavioural intervention for knee osteoarthritis: Development and pilot study. *BMC Musculoskeletal Disorders*, *22*(1), 526. https://doi.org/10.1186/s12891-021-04389-0

Preece, S. J., Jones, R. K., Brown, C. A., Cacciatore, T. W., & Jones, A. K. (2016). Reductions in co-contraction following neuromuscular re-education in people with knee osteoarthritis. *BMC Musculoskeletal Disorders*, *17*(1), 372. https://doi.org/10.1186/s12891-016-1209-2

Roos, E. M., Grønne, D. T., Skou, S. T., Zywiel, M. G., Mcglasson, R., Barton, C. J., Kemp, J. L., Crossley, K. M., & Davis, A. M. (2021). Immediate outcomes following the GLA:D® program in Denmark, Canada and Australia. A longitudinal analysis including 28,370 patients with symptomatic knee or hip osteoarthritis. *Osteoarthritis and Cartilage*, *29*(4), 502–506. https://doi.org/10.1016/j.joca.2020.12.024

Rossettini, G., Colombi, A., Carlino, E., Manoni, M., Mirandola, M., Polli, A., Camerone, E. M., & Testa, M. (2022). Unraveling negative expectations and nocebo-related effects in musculoskeletal pain. *Frontiers in Psychology*, *13*, 789377. https://doi.org/10.3389/fpsyg.2022.789377

Sharp, T. J. (2001). Chronic pain: A reformulation of the cognitive-behavioural model. *Behaviour Research and Therapy*, *39*(7), 787–800. https://doi.org/10.1016/s0005-7967(00)00061-9

Ton, J., Perry, D., Thomas, B., Allan, G. M., Lindblad, A. J., Mccormack, J., Kolber, M. R., Garrison, S., Moe, S., Craig, R., Dugré, N., Chan, K., Finley, C. R., Ting, R., & Korownyk, C. S. (2020). PEER umbrella systematic review of systematic reviews: Management of osteoarthritis in primary care. *Canadian Family Physician*, *66*, e89–e98.

Vlaeyen, J. W. S., & Linton, S. J. (2012). Fear-avoidance model of chronic musculoskeletal pain: 12 years on. *Pain*, *153*(6), 1144–1147. https://doi.org/10.1016/j.pain.2011.12.009

Wallis, J. A., Taylor, N. F., Bunzli, S., & Shields, N. (2019). Experience of living with knee osteoarthritis: A systematic review of qualitative studies. *BMJ Open*, *9*, e030060. https://doi.org/10.1136/bmjopen-2019-030060

Zhang, L., Fu, T., Zhang, Q., Yin, R., Zhu, L., He, Y., Fu, W., & Shen, B. (2018). Effects of psychological interventions for patients with osteoarthritis: A systematic review and meta-analysis. *Psychology Health & Medicine*, *23*, 1–17. https://doi.org/10.1080/13548506.2017.1282160

SUPPORTING INFORMATION

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

How to cite this article: Ghio, D., Brookes, N., Preece, S., & Walsh, N. (2023). From sceptic to believer: Acceptability of cognitive muscular therapy™, a new intervention for knee osteoarthritis. *Musculoskeletal Care*, 1–12. https://doi.org/10.1002/msc.1842