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Research

Therapeutic alliance facilitates adherence to physiotherapy-led exercise and physical activity for older adults with knee pain: a longitudinal qualitative study

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KEY WORDS

Physiotherapy
Therapeutic alliance
Osteoarthritis
Knee
Exercise
Physical activity

ABSTRACT

Questions: What are people’s experiences and perceived impact of physiotherapist-led exercise interventions for knee pain attributable to osteoarthritis? What barriers and facilitators to change in exercise and physical activity behaviour exist over time? Design: A longitudinal qualitative study was undertaken; it involved face-to-face, semi-structured and longitudinal interviews. Participants: Interviews were undertaken with older adults with knee pain and who had been randomised to one of three physiotherapist-led exercise intervention arms in the Benefits of Effective Exercise for Knee Pain (BEEP) trial. Thirty participants were enrolled in this qualitative study, with interviews scheduled at the end of the trial intervention period and 12 months later. Data analysis: A ‘layered approach’ to thematic analysis was used, including open coding (using constant comparison), deductive coding and within-case and cross-case longitudinal analysis of change. Results: Different levels of exercise supervision, progression and individualisation emerged, matching the content of the intervention protocols. Barriers to exercise and general physical activity were similar across intervention arms (lack of motivation, time, physical environment, lack of supervision and/or monitoring). Despite individualising exercise programs and specifically targeting exercise, some barriers to adherence remained at 12 months. Factors facilitating longer-term exercise adherence included change in or retained knowledge about the role of exercise for knee pain and the presence and quality of a therapeutic alliance, which was also reflective of the participants’ experience of the intervention, regardless of the trial arm. Conclusion: Despite a focus on individualisation and exercise adherence, barriers remained in the longer term. Strong therapeutic alliance during treatment appeared to facilitate adherence to exercise and general physical activity. The findings highlight ongoing physiotherapy support and therapeutic alliance as targets for future adherence-enhancing interventions for exercise in older adults with knee pain.

Introduction

Musculoskeletal conditions, after mental health, are the leading cause of disability worldwide.1,2 Osteoarthritis (OA) is associated with more limitations in activities of daily living among older people than any other disease.3 Exercise, including local muscle strengthening and general physical activity (general aerobic fitness), is recommended as a core treatment.4 Although there is evidence of small-to-moderate benefits from exercise and physical activity for knee OA, these decline over time, which is potentially explained by reduced adherence.5 Previous research has identified a wide array of factors that influence adherence to exercise and physical interventions for knee OA, including: the person’s physical capacity to exercise; previous exercise history; symptom relief and improvement; positive exercise experiences and beliefs; healthcare professional and social support; and expectations of improvement.6–12 Lack of motivation, pain, physical limitations, low self-efficacy, depression, anxiety, time constraints, poor social support, non-positive experiences of physical activity and beliefs about OA, exercise and pain also impact on exercise adherence.8–12 External factors include physiotherapists’ professional care and encouragement towards patients, while environmental factors include weather and suitable/accessible exercise environments.7,6,13 Clinical recommendations for promoting exercise adherence include: improving the nature of the relationship between patient and provider; individually tailoring exercise programs; and better supervision to facilitate the prescription of progressive exercise programs tailored to suit the changing needs of patients.7,11,12

However, whether the influence of these factors changes over time, regarding the uptake and maintenance of exercise and physical activity behaviour, remains unexplored.12 Understanding whether and how these factors change over time can potentially provide
evidence that will enable the development and optimisation of exercise interventions for OA, to provide maximum benefit for patients over the longer term. Additionally, the majority of studies have focused on prescribed exercise rather than general physical activity.12 The Benefits of Effective Exercise for knee Pain (BEEP) trial14 aimed to test whether enhanced physiotherapist-led exercise interventions could provide larger and longer-lasting benefits for people with knee OA. It was hypothesised that; greater individualisation, supervision and progression of a lower limb exercise program would be superior to usual National Health Service (NHS) physiotherapy exercise; and a program that targets exercise adherence in the longer term, supporting the transition from lower-limb exercise to general physical activity, would be superior to usual NHS physiotherapy exercise.

Within the trial, participants were randomised to one of three groups. The usual physiotherapy care (UC) control group received up to four treatment sessions of advice and exercise over 12 weeks (n = 176 participants). The individually tailored exercise (ITE) group received six to eight sessions of individualised, supervised and progressed lower limb exercises over 12 weeks (n = 178 participants). The targeted exercise adherence (TEA) group were transitioned from lower limb exercise to general physical activity, with eight to ten contacts over 6 months (n = 172 participants). The interventions are described in full elsewhere and this paper contains some information included in the report summarising the much wider research programme of which this was part.14–16 The trial results showed that participants receiving UC, ITE and TEA, on average, experienced moderate improvements in pain and function, as measured by the Western Ontario and McMaster Universities Arthritis Index (WOMAC).17 However, there were no significant differences between arms at 6 months (primary outcome). It may be possible that more time was needed to see a difference.18–20

In this paper reports findings from a program evaluation utilising qualitative interviews alongside the trial to understand the experience of trial participants. Qualitative methods are important in trials as they: help to explain how complex interventions are implemented within a particular social context; facilitate interpretation of trial outcomes; and highlight to researchers any future trials in which interventions are most likely to be effective.18–22 Furthermore, a longitudinal qualitative approach was used to understand adherence to exercise and physical activity across the course of the trial.23,24 This study aimed to investigate participants’ experiences of treatment, and barriers and facilitators to exercise and general physical activity behaviour in the longer term. Therefore, the research questions for this longitudinal qualitative study were:

1. What are people’s experiences and perceived impact of physiotherapist-led exercise interventions for knee pain attributable to osteoarthritis?
2. What barriers and facilitators to change in exercise and physical activity behaviour exist over time?

Methods

Participants

The BEEP trial participants were adults aged ≥ 45 years, with knee pain and/or stiffness in one or both knees and who met criteria for a clinical diagnosis of OA. None of the participants were previously known to the interviewers. Purposive sampling was undertaken (using trial questionnaire data) to ensure a diverse range of characteristics, including: age, gender, trial intervention arm, baseline pain severity and changes in knee pain and function according to WOMAC scores after intervention.16

Data collection

Face-to-face, semi-structured interviews with a subsample of participants from each intervention arm were undertaken at two time points: post-intervention interviews shortly following the BEEP intervention period; and follow-up interviews approximately 12 months after the end of the intervention period. Interviews were undertaken by AM, MH and DR, all of whom are experienced in qualitative research methods. The post-intervention interview topic guide included open questions to explore participants’ views on: what happened during physiotherapy sessions; the impact of treatment on exercise and general physical activity behaviour; and beliefs about changes in knee symptoms and exercise behaviour over the course of treatment. Follow-up interviews explored participants’ experiences of: exercise and treatment over the longer term; perceptions of adherence to the prescribed exercises and changes in physical activity behaviour over time; and impact on their knee (the topic guides are presented in Appendices 1 and 2 on the eAddenda).

All interviews were conducted in the participants’ homes. Field notes were written up as soon as possible after the interviews to record the interviewers’ immediate impressions. Interviews were audio-recorded (with the participant’s consent), transcribed by an independent university-approved transcription company and anonymised. Commercial software was used for data management.25

Data analysis

A ‘layered approach’ to thematic analysis was undertaken.26 Open coding of all transcripts identified: experiences of interventions; views on the trial exercises and general physical activity; and barriers and facilitators to exercise. Adopting constant comparison, transcripts were read and re-read, an initial coding framework was devised and codes were grouped into themes by AM.27,28 CJ, MH and NF independently coded a sample of transcripts. Codes and initial themes were discussed, agreed, and then applied to the dataset, with ongoing refinement. Data collection and analysis were carried out iteratively so that emerging themes (post-intervention) could be explored during follow-up interviews. Sampling continued until no new themes emerged, indicating data saturation.29 Next, deductive coding included pre-determined codes of individualisation, supervision and progression because these were core characteristics of the trial interventions.14

Finally, longitudinal qualitative analysis was used, which is particularly useful when studying changes in health behaviour and within program evaluations to further an understanding of not just whether an intervention is perceived to work, but why it works and whether it is feasible and acceptable over time.24,30 Within-case and cross-case longitudinal analyses using descriptive and interpretive questions were used to determine elements of behaviour change within the data.31 Summaries of each participant’s data were used to identify perceptions of changes in the trial exercises and general physical activity, and influences of change during the period from post-intervention to follow-up (within case) and in each intervention arm (cross-case).32,26

Results

Participants

Thirty participants consented to and completed a post-intervention interview. There was a spread of participants across the three intervention arms and according to age, gender, baseline and 18-month follow-up physical activity levels and adherence to exercise at 3, 6 and 18 months (measured in trial questionnaires). Twenty-two of the participants agreed to be interviewed at follow-up 12 months after the end of the intervention period (See Table 1).

Themes

The results are presented in four parts. The first part outlines participant perceptions of what happened during the trial intervention period. The second and third parts focus on perceptions of change over time, and barriers and facilitators to exercise and physical activity in the longer term. The fourth part focuses on
participants’ suggested improvements to physiotherapy interventions. Illustrative data excerpts are available in Table 2 on the eAddenda.

Participant perception of the trial interventions

Physiotherapy-led exercises were described by participants across all arms of the trial, and the core exercise characteristics of supervision, progression and individualisation were experienced at different levels (basic and higher) and varied across each arm.

Supervision

A basic level of supervision was evident in the participants’ narratives. They described how the treating physiotherapist demonstrated and explained the purpose of the exercises before observing and assessing them as they performed the exercises, and monitored for any symptom response to the exercise program. Some physiotherapists performed the exercises with the participants, creating a sense of partnership. Some participants noted particularly high levels of attentiveness from the physiotherapists, suggesting a higher level of supervision. Participants across all arms of the trial reported being motivated when performing the exercises under the supervision of the physiotherapists; however, their motivation faded over time without supervision.

Progression

A basic level of exercise progression was evident in all arms and included increasing the number of repetitions of exercises, introducing new exercises and maintaining improvements in exercise. Higher levels of progression were described by participants in the ITE and TEA arms, such as moving beyond specific lower limb exercises to more general physical activity, which was often linked to their own individual exercise goals, and valued activities (e.g., cycling, attending a gym).

Individualisation

Patient interviews revealed evidence of a basic level of exercise individualisation in all three intervention arms. Exercises were adapted based on the individual’s ability to perform them, reducing or increasing exercise difficulty, or providing alternatives if a participant found them too difficult (e.g., due to pain). Individualisation in the UC arm did not extend beyond this basic level. However, a higher level of individualisation was evident in both the ITE and TEA arms, with participants reporting that the physiotherapists adjusted their exercise programs to suit their individual needs (e.g., co-morbidities) and personal exercise goals. Providing explanations for adjustments and exercise replacements, monitoring participants’ progress and moving beyond the specific lower limb exercises of the BEEP trial characterised a higher level of individualisation.

Overall, in this sample, it was found that the core intervention constructs (supervision, progression and individualisation) were delivered as expected. Therefore, the findings of no substantial between-group differences in the trial may not have been due to poor delivery of these key intervention components. The trial paper reports on other aspects of fidelity (e.g., delivery of cognitive behavioural
A model explaining longer-term barriers to exercise and physical activity were identified (Table 3), with some being common across the intervention arms of the trial. Participant factors (existence of pain or other physical symptoms, low exercise self-efficacy, lack of motivation, or incentive to exercise during pain-free periods), time and place, weather, lack of supervision and monitoring remained as barriers to exercise or uptake of general physical activity in the longer term. The excerpts in Table 2 on the eAddenda are illustrative of these themes. Barriers relating to a lack of motivation, unsuitable physical environment and a lack of support or incentives during pain-free periods remained at follow-up. Participants also had ongoing concerns about exercising when in pain and a lack of exercise self-efficacy. At follow-up, continuing knee pain, instability, fear of falling or ‘doing the wrong thing’ also deterred some participants from continuing with exercise in the longer term. Whilst articulated as barriers to exercise in post-intervention interviews, the burden of exercises and physiotherapist-related factors (eg, perceptions that the physiotherapist was disinterested) did not appear to be barriers in the intervention arms of the trial. A model explaining longer-term facilitators to exercise and physical activity adhereance to an exercise and physical activity intervention. Participants who felt that they were ‘naturally active’ and exercised regularly prior to the trial generally maintained their physical activity behaviour into the longer term, regardless of intervention arm. A strong therapeutic alliance between physiotherapist and participant was also a powerful facilitator of exercise and physical activity.

Change in knowledge
Knowledge about exercise specific to individual needs facilitated exercise and physical activity in the longer term and was linked to participants’ and physiotherapists’ characteristics. In general, participants reported learning about the benefits of exercising for joint pain from the physiotherapist and information booklets, and experientially during supervision of their exercise program in the trial intervention sessions. Physiotherapists’ explanations of the value and rationale of exercise for knee pain, how to perform the exercises and what should feel right and wrong changed participants’ perceptions of exercise. A participant in the ITE intervention arm retained knowledge about the role of exercise for pain and how this was supported by reassurance from the physiotherapist, increasing the participant’s exercise self-efficacy and ability to exercise despite pain.

Table 3
Barriers to physiotherapy-led exercises and general physical activity.

<table>
<thead>
<tr>
<th>Exercise prescribed in the trial</th>
<th>Post-intervention</th>
<th>Follow-up</th>
<th>Individually targeted exercise</th>
<th>Post-intervention</th>
<th>Follow-up</th>
<th>Targeted exercise adherence</th>
<th>Post-intervention</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General physical activity</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient: lack of motivation or enjoyment</td>
<td>Time limitations</td>
<td>Replaced exercises with other activities</td>
<td>Weather</td>
<td>Patient: lack of motivation or enjoyment</td>
<td>Time limitations</td>
<td>Replaced exercises with other activities</td>
<td>Weather</td>
<td>Patient: pain, injury, lack of motivation, no change in knowledge, comorbidity, injury, negative beliefs about exercise for pain</td>
</tr>
<tr>
<td>Patient: ongoing pain</td>
<td></td>
<td></td>
<td></td>
<td>Patient: ongoing pain</td>
<td></td>
<td></td>
<td></td>
<td>Patient: lack of motivation and self-efficacy</td>
</tr>
</tbody>
</table>

HCPs = healthcare providers.
See main text for descriptions of the interventions given to each of the three trial groups.

and educational strategies) and so the findings are complementary in helping to interpret the trial results.

Longer-term barriers to exercise and general physical activity
A wide range of barriers to exercise and general physical activity were identified (Table 3), with some being common across the intervention arms of the trial. Participant factors (existence of pain or other physical symptoms, low exercise self-efficacy, lack of motivation, or incentive to exercise during pain-free periods), time and place, weather, lack of supervision and monitoring remained as barriers to exercise or uptake of general physical activity in the longer term. The excerpts in Table 2 on the eAddenda are illustrative of these themes. Barriers relating to a lack of motivation, unsuitable physical environment and a lack of support or incentives during pain-free periods remained at follow-up. Participants also had ongoing concerns about exercising when in pain and a lack of exercise self-efficacy. At follow-up, continuing knee pain, instability, fear of falling or ‘doing the wrong thing’ also deterred some participants from continuing with exercise in the longer term. Whilst articulated as barriers to exercise in post-intervention interviews, the burden of exercises and physiotherapist-related factors (eg, perceptions that the physiotherapist was disinterested) did not appear to be barriers in the longer term. New barriers at 12 months were lack of support to exercise and receipt of conflicting advice from healthcare practitioners.

A model explaining longer-term barriers to exercise and physical activity is presented in Figure 1 on the eAddenda. It illustrates how the barriers are linked and how there are often multiple influences on adherence to an exercise and physical activity intervention.

Longer-term facilitators to exercise and general physical activity
A wide range of facilitators to exercise and general physical activity were identified (Table 4), with some being common across the intervention arms of the trial. A model explaining longer-term facilitators to exercise and physical activity is presented in Figure 2 on the eAddenda. The most prominent facilitators remaining at 12 months were participant-related factors, specifically an individual’s ‘naturally active’ identity, motivation regarding prevention (ie, avoiding the return of pain or future surgery), observing/feeling benefits, and knowledge (ie, change in knowledge or retained knowledge) about the role of exercise for pain. Participants who felt that they were ‘naturally active’ and exercised regularly prior to the trial generally maintained their physical activity behaviour into the longer term, regardless of intervention arm. A strong therapeutic alliance between physiotherapist and participant was also a powerful facilitator of exercise and physical activity.

Change in knowledge
Knowledge about exercise specific to individual needs facilitated exercise and physical activity in the longer term and was linked to participants’ and physiotherapists’ characteristics. In general, participants reported learning about the benefits of exercising for joint pain from the physiotherapist and information booklets, and experientially during supervision of their exercise program in the trial intervention sessions. Physiotherapists’ explanations of the value and rationale of exercise for knee pain, how to perform the exercises and what should feel right and wrong changed participants’ perceptions of exercise. A participant in the ITE intervention arm retained knowledge about the role of exercise for pain and how this was supported by reassurance from the physiotherapist, increasing the participant’s exercise self-efficacy and ability to exercise despite pain.

Therapeutic alliance
Therapeutic alliance — defined as a sense of collaboration, warmth and support between physiotherapists and participants — emerged as a core facilitator of exercise in the short and longer term regardless of intervention arm.31–33 A therapeutic alliance facilitated agreement on the exercise intervention and generated an affective bond. Table 5 outlines features of a therapeutic alliance between the participants and physiotherapists in all three intervention arms alongside information about adherence to exercise and physical activity. Participants spoke positively about physiotherapists who took time to get to know them and valued physiotherapists’ ability to understand and empathise. Participants appreciated physiotherapists taking time to explain exercises and show how and why they worked, and positively encouraging and empowering them to contribute to their own treatment and to ask questions in return. Continuity over treatment sessions
with the same physiotherapist helped to build a sense of collaboration, and participants spoke about developing rapport, openness and trusting relationships where they felt valued, respected and supported.

Figure 2 on the eAddenda presents a model of facilitating factors to explain the interplay between participant and physiotherapy characteristics, therapeutic alliance, knowledge and longer-term exercise or physical activity. Participants from all intervention arms reported anxiety about exercising with pain but physiotherapists’ reassurance during supervision (linked to therapeutic alliance above) helped them to understand when pain was an indication to stop and when it was safe to work through pain. Participants described how changes in their knowledge and confidence to exercise (fostered during interactions in treatment sessions) impacted on exercise and physical activity over 12 months later.

Time and place

Time and place remained as an exercise facilitator 12 months after the trial intervention period, as the nature of the exercises meant that participants could fit them into their daily lives at home and work (eg, sitting at work, waiting for the kettle to boil).

Support and supervision

Regular contact and support from others (family and friends) also emerged as a factor that facilitated exercise and physical activity in the longer term. For those who had moved on to more general physical activity, staff at local gyms were an important source of motivation, especially when they took an interest in their knee problem and progress. Participants also reported wanting supervision from staff at local gyms, like they had experienced with the physiotherapists in the trial.

**Suggested improvements to physiotherapy interventions**

Participants from all intervention arms talked of a need for more regular physiotherapist reviews (eg, 6, 12 or 24 months after the end of the initial intervention) to enable changes in exercises to be made appropriately and remind participants of the importance of continuing with exercise and physical activity. Participants in the UC and ITE arms felt that regular reviews with physiotherapists rather than primary care physicians (general practitioners) or hospital consultants (specialists) were more appropriate, as they provided the ‘right kind of advice’ and support and were ‘easier to talk to’. Other suggestions included more treatment sessions, treatment spread over a longer period and different modes of delivery (eg, email or telephone sessions and reminders, physiotherapist home visits and community-based activities).

**Discussion**

This qualitative study embedded within a randomised trial aimed to investigate participants’ experiences and perceptions of treatment, particularly supervision, individualisation, progression and barriers and facilitators to exercise and general physical activity behaviour in the longer term. This helped to shed light on the quantitative clinical results of the trial and provided a novel understanding of changes in barriers and facilitators to exercise and physical activity over time. This understanding can inform how to optimise future exercise interventions for OA and to provide maximum benefit for patients over the longer term.

The qualitative findings showed that participants experienced different levels of supervision, individualisation and progression within each arm. This provides context for the other qualitative findings and for the interpretation of the quantitative clinical results because the physiotherapists generally appeared to deliver core intervention components well. The lack of significant differences in clinical outcomes between the intervention arms may therefore be attributed to other factors. For example, regardless of intervention arm, the barriers and facilitators to exercise and physical activity were common and similar, both at the end of the trial intervention period and at longer-term follow-up. This has added to previous research on barriers and facilitators to exercise by identifying the longer-term barriers as predominantly patient factors, but which also include time and place, the weather and ongoing supervision and monitoring.7,9,12,35,36 All three interventions appeared to facilitate those who saw themselves as ‘naturally active’ to maintain levels of physical activity despite their knee pain.

The importance of a therapeutic alliance during treatment in facilitating both short-term and longer-term adherence to exercise and general physical activity behaviour has also been highlighted within this study, suggesting that it may be an important target in future exercise interventions for knee OA. Previous studies have recognised the importance of therapeutic alliance (or patient-provider relationship) as a central component of the therapeutic process and a determinant of treatment outcome in psychotherapy, but the impact on musculoskeletal outcomes has not been studied.
<table>
<thead>
<tr>
<th>Therapeutic alliance characteristic</th>
<th>Example</th>
<th>Illustrative quotation</th>
<th>Perceptions of adherence to exercise and physical activity levels at end of treatment and 12-month follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mutual Investment</strong></td>
<td>Equity in the work/reciprocity</td>
<td>The thing is you do the exercise ‘cause you feel that you don’t want to let the other person down. You know you do them ‘cause in the first instance you think, ‘Oh that’s going to do me good, it’s going to yeah’, but also there’s a secondary thing there you think, ‘Oh he’s gone out of his way to explain these things to me and shown me what to do it’s only fair that I do them so at least I can tell him what sort of effect its having the next time I meet him’, you know. (UC 7058 FU)</td>
<td>At end of treatment was partially adherent to exercises and was an active hill walker. At follow-up no longer did the exercises from the trial but was an active hill walker and had joined a gym. (UC 7058)</td>
</tr>
<tr>
<td><strong>Appreciative of other</strong></td>
<td>So I, I think, and I think it’s because of [physiotherapist] in a way, I didn’t, don’t feel as though I wanted to let him down ‘cause he’d been so good, got me so far. (TEA 3657 PI)</td>
<td>I also think that because they see you trying, it motivates them as well. (ITE 1481 FU)</td>
<td>At end of treatment was adherent to exercise and joined a gym. At follow-up was partially adherent, joined different gym and cycled. (TEA 3657)</td>
</tr>
<tr>
<td><strong>Joint motivations</strong></td>
<td>Watched me doing all the exercise, then she’d write on the list how many times she wanted me to do, you know. But I said to her, I said, ‘Well I’m doing them once, once a day.’ She said, ‘Well as long as you do thoroughly, but do the ten times of each exercise, you know.’ (UC 6153 PI)</td>
<td>At end of treatment was adherent to exercises, withdrawn from study at follow-up. (UC 6153)</td>
<td>At end of treatment was adherent to exercises from the trial and active through dancing. At follow-up continued to dance but not doing exercises from the trial as knee worsened and awaiting knee replacement. (ITE 61)</td>
</tr>
<tr>
<td><strong>Personal interactions/affective bond</strong></td>
<td>Feeling at ease/relaxed/valued</td>
<td>I mean, he always had time to talk to you, and say, you know, ‘any questions or anything?’ He didn’t rush you in and rush you out or, like, you know, it does happen sometimes but, with people, but, no, he was very good. (ITE 61 FU)</td>
<td>At end of treatment was partially adherent to exercises from the trial, cycled, walked dog and did morning stretches. At follow-up continued to cycle, and walk and did exercises from the trial 2 or 3 times a week. (TEA 30)</td>
</tr>
<tr>
<td><strong>Perception of therapist (eg, good, nice)</strong></td>
<td>She was a nice young lass, you know, bedside manner, the fact that she straightforward sort of suspected what it was, do you know what I mean? (TEA 30 FU)</td>
<td>At end of treatment partially adherent to exercises from the trial. At follow-up partially adherent as tried to do some exercises but others were too painful (due to Baker’s cyst). (ITE 26)</td>
<td>At end of treatment partially adherent to exercises from the trial, cycled, walked dog and did morning stretches. At follow-up continued to cycle, and walk and did exercises from the trial 2 or 3 times a week. (TEA 30)</td>
</tr>
<tr>
<td><strong>Getting to know each other/making connections</strong></td>
<td>We were talking about gardening whatever as I was doing my exercises as well. And she sort of mentioned things about her life and what she could do with various bits and pieces and it just made it a much more enjoyable experience I think. […] I think it made a difference. It made me feel I wanted to do the exercises more. (ITE 26 FU)</td>
<td>She’d had a car crash. She herself, her leg’s badly damaged. So she had got an insight into sort of what it was all about, you know. (TEA 30 FU)</td>
<td>At end of treatment partially adherent to exercises from the trial. At follow-up partially adherent as tried to do some exercises but others were too painful (due to Baker’s cyst). (ITE 26)</td>
</tr>
<tr>
<td><strong>Attentiveness to other</strong></td>
<td>I think she was far more realistic and she seemed more interested in me as a person and what I did. I know the other girl talked about it but it was more as a matter of course, not out of [...made you feel particularly valuable I suppose. (ITE 26 PI)</td>
<td>Of course she said, ‘Three times a day’ and I’d look at her. ‘How many times you do that?’ I said ‘Once.’ […] Oh yes, I was honest with her, yes. I said, ‘Once but very thorough.’ Yes, you know. (UC 6153 PI)</td>
<td>At end of treatment partially adherent to exercises from the trial. At follow-up partially adherent as tried to do some exercises but others were too painful (due to Baker’s cyst). (ITE 26)</td>
</tr>
<tr>
<td><strong>Communication</strong></td>
<td>I do think it was probably seeing that (trial) physio that really made me open up and think this is a shared thing, he is trying to help me. I wanted to be helped. But he was on such a level that I could share things that I’d maybe found in the past difficult to share. (UC 1135 FU)</td>
<td>Of course she said, ‘Three times a day’ and I’d look at her. ‘How many times you do that?’ I said ‘Once.’ […] Oh yes, I was honest with her, yes. I said, ‘Once but very thorough.’ Yes, you know. (UC 6153 PI)</td>
<td>At end of treatment was adherent to exercises, withdrawn from study at follow-up. (UC 1135)</td>
</tr>
<tr>
<td><strong>Listening</strong></td>
<td>So I think, I was quite impressed with the physio in that she listened and understood what I was saying with regard to both the pain in the knee and my mental health problems and the hernia. (TEA 7880 PI)</td>
<td>And then you start asking more, you develop a bit of a rapport and I think that from the study I’m sure the physio gets a little bit more out of it because you start expanding on, on what you’re saying. (ITE 1481 PI)</td>
<td>At end of treatment was adherent to exercises, used exercise bike. At follow-up was not adherent to exercises from the trial but did other sitting exercises, cycled and walked. (ITE 1481)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>At end of treatment partially adherent and did mountain biking and walking. At follow-up partially adherent, did exercises from the trial but irregularly. (TEA 7880)</td>
</tr>
</tbody>
</table>
Explanations offered and self-efficacy

At end of treatment partially adherent and did mountain biking and walking. At follow-up partially adherent. Did exercises from the trial but did other sitting exercises, cycled and walked (ITE 1483)

At end of treatment was adherent to exercises, used exercise bike. At follow-up continued with the exercises because felt knee was deteriorating (UC 1135)

Reassurance/confidence

At end of treatment was adherent to exercises from the trial, declined interview at follow-up (ITE 6878 PI)

mutual investment, facilitators to exercise adherence, which include: mutual investment, the quality of personal interactions and communication, and an affective bond.

Various conceptual frameworks have been used to explain therapeutic alliance in relation to physiotherapy, but the heterogeneity of these models limits their application in the musculoskeletal pain context. Identifying an optimal framework for use in musculoskeletal pain rehabilitation settings may be informed by the current analysis. Quantitative measures of therapeutic alliance are available. Babatunde et al identified 26 measures; among these, the Working Alliance Inventory is the most used. However, Hall et al found that measures developed from psychotherapy exhibit a ceiling effect and require re-contextualisation for a musculoskeletal pain context. Despite specifically targeting exercise adherence in the longer term in the TEA intervention in the BEEP trial, similar barriers to exercise were identified in participants in each of the three intervention arms and remained over time.

When asked about potential improvements to the interventions used in the BEEP trial, participants suggested regular reviews (with a physiotherapist or primary care physician) over a longer period of time and different modes of delivery. The best method for providing ongoing support for exercise to this patient population remains unclear. The addition of two 30-minute booster sessions to a 12-week supervised physiotherapy exercise program did not increase adherence or improve pain or function in a trial by Bennett et al. Although regular reviews are a component of a chronic disease management model, there is a barrier to the use of OA chronic disease management models. It is possible that harnessing the potential of eHealth to provide ongoing reminders and monitoring may help to maintain adherence over time.

A strength of this work is that the analysis was not constrained to the core constructs of the exercise interventions and did not attempt to either confirm or reject the clinical trial results, but to explain them. The qualitative data analysis was conducted while the authors were unaware of the quantitative clinical trial results, in order to maintain an interpretive approach. By sampling for a diverse range of characteristics and applying a within-case and cross-case longitudinal approach, it went beyond a cross-sectional analysis of the qualitative data set, ensuring that data saturation was achieved in accordance with the aims of the study. The use of descriptive and analytical questions about change in behaviour also provided insight into longitudinal data analysis, which is seldom reported. A limitation is that it did not also interview physiotherapists to explore their experiences of delivering the trial interventions or to gain understanding of their perceptions of therapeutic alliance. Future research is required to establish if it is possible to harness the potential of a greater therapeutic alliance between patients and physiotherapists, and whether regular reviews and ongoing support of patients lead to sustained changes in exercise and physical activity behaviour in the longer term. There were also eight participants who declined to a follow-up interview. The purposive sampling framework ensured a good range of patient characteristics and a state of saturation was reached within the analysis; the authors are confident in the themes that were identified. However, they cannot be sure that the addition of data from the eight participants who...
declined a follow-up interview would have changed the results, and accept this as a limitation of longitudinal qualitative studies. The interview participants experienced different levels of supervision, individualisation and progression, which of the three trial intervention arms participants were allocated to. Despite a focus on supervision, individualisation and progression to improve exercise adherence, barriers remained 12 months after participation. The presence and quality of a therapeutic alliance during treatment appeared to facilitate adherence to exercise and general physical activity. These findings help to explain the quantitative trial results. They also highlight that models of ongoing support and enhanced therapeutic alliance should be targets for future trials of exercise in older adults with knee pain.

What was already known on this topic: Osteoarthritis is common and can impair function. Exercise, including local muscle strengthening and general physical activity, is recommended in clinical guidelines. The benefits obtained after commencing exercise typically decline over time, which is probably due to progressive reductions in adherence to the exercise.

What this study adds: Patients with knee osteoarthritis reported that lack of motivation, time, physical environment and lack of monitoring were barriers to exercise and general physical activity. These barriers seemed similar, regardless of the levels of supervision, individualisation and progression that were used when exercise was commenced. The presence and quality of a therapeutic alliance with a physiotherapist facilitated adherence to exercise and general physical activity.

eAddenda: Table 2, Figures 1 and 2, and Appendices 1 and 2 can be found online at https://doi.org/10.1016/j.jphys.2019.11.004.

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Competing interests: Nil.

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