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Telephone coaching to enhance a home-based physical activity program for knee osteoarthritis: A randomised clinical trial

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Conflicts of interest

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Abstract

Objectives

Investigate whether simultaneous telephone coaching improves the clinical effectiveness of a physiotherapist-prescribed home-based physical activity program for knee osteoarthritis (OA).

Methods

168 inactive adults aged ≥50 with knee pain ≥4 (0-10 numeric rating scale (NRS)) and knee OA were recruited from the community and randomly assigned to a physiotherapy (PT) and coaching (N=84) or PT (N=84) group.

All participants received 5x30 minute consultations with a physiotherapist over 6 months for education, home exercise and physical activity advice. PT+coaching participants also received 6-12 telephone coaching sessions by clinicians trained in behaviour change support for exercise and physical activity.

Primary outcomes were pain (NRS) and physical function (Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), score range 0-68) at 6 months. Secondary outcomes included these measures at 12 and 18 months, physical activity, exercise adherence, other pain and function measures, and quality-of-life. Analyses were by intention-to-treat with multiple imputation for missing data.

Results

142 (85%), 136 (81%) and 128 (76%) participants completed 6-, 12- and 18-month measurements, respectively. Change in NRS pain (mean difference 0.4 units; 95%CI -0.4 to 1.3) and WOMAC function (1.8; 95%CI -1.9 to 5.5) did not differ between

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groups at 6 months, with both showing clinically relevant improvements. Some secondary outcomes related to physical activity and exercise behaviour favoured PT+coaching at 6 months but generally not at 12- or 18-months. There were no between-group differences in most other outcomes.

Conclusions

Addition of simultaneous telephone coaching did not augment pain and function benefits of a physiotherapist-prescribed home-based physical activity program.

Trial registration: Australian New Zealand Clinical Trials Registry (www.anzctr.org.au/): ACTRN12612000308897

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SIGNIFICANCE AND INNOVATION

- This study assessed a model of care that aimed to improve home exercise adherence and levels of physical activity in people with knee OA.
- Telephone coaching is increasingly used to support patient self management but has undergone limited investigation in knee OA.
- The results showed that simultaneous telephone coaching for 6 months did not augment the pain and function benefits of a physiotherapist-prescribed home-based physical activity program for knee OA. This was despite some improvements in physical activity and exercise behaviour.

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Knee osteoarthritis (OA) is a prevalent, costly chronic condition causing pain, disability and reduced quality-of-life. (1) It is a common reason for consultation with a family physician in older adults. (2) Exercise is recommended by OA clinical (3) and general health (4) guidelines. Amongst people with OA, however, there is global under-utilisation of exercise, (5) and for those who commence exercise, benefits are generally not sustained (6) because adherence is suboptimal and declines. (7) Furthermore, compared with those without OA, physical activity levels are low in people with knee OA, with most failing to achieve levels recommended for health. (8) Thus, interventions that facilitate exercise and physical activity behaviours in patients with knee OA may improve clinical outcomes.

Physical activity and exercise are under-prescribed by physicians (9) with some preferring to refer patients with OA to physiotherapists for management. (10) Although physiotherapists are skilled in prescribing exercise, their use of motivational strategies and behaviour change techniques to facilitate adherence is limited due to a lack of training in these behavioural techniques. (11) Both patients with OA, and health professionals, have reported a need for better self-management support. (12)

Health coaching, often delivered by health professionals from diverse backgrounds and often by telephone, is increasingly used for chronic disease self-management. (13) Health coaching interventions typically apply various psychological, counselling and coaching principles and techniques aiming to improve patient adherence to treatment recommendations and facilitate health behavior change. (14) A systematic review found solid evidence from other populations supporting the efficacy of telephone coaching for improving physical activity levels. (15) As yet, no research

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has evaluated whether telephone coaching for people with knee OA augments a physiotherapist-delivered program with respect to patient-relevant outcomes. (16)

We tested the primary hypothesis that simultaneous addition of telephone coaching to a physiotherapist-prescribed, home-based physical activity and exercise program (PT+coaching) would be more effective in improving pain and function at 6 months, than the program alone (PT) for knee OA. Secondary aims were to evaluate these outcomes at 12- and 18-month follow-up, as well as physical activity, exercise adherence, other pain and function measures, and quality-of-life.

PATIENTS AND METHODS

Study design

We conducted a 2-arm parallel-design pragmatic randomized controlled trial. The protocol is reported elsewhere. (17) The institutional Human Ethics Committee approved the study (#1137237). All participants provided written informed consent.

Participants

Participants from metropolitan and regional communities in Victoria, Australia were recruited between July 2012 and August 2013 via advertisements in print, radio and social media, and our research volunteer database, with follow-up completed February 2015. Inclusion criteria were: age ≥50 years, average knee pain ≥4 on an 11-point numeric rating scale (NRS, 0='no pain', 10='worst pain possible'), American College of Rheumatology clinical criteria for knee OA, (18) and classification as 'sedentary' or 'insufficient physical activity time' according to the Active Australia Survey (activity <150 minutes or <5 sessions in past week). (19) Exclusion criteria were:

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inability to safely participate in moderate-intensity exercise (Sports Medicine Australia Stage I pre-exercise screening questions); (20) undertaking regular lower-limb strengthening exercises or receiving non-drug management for knee pain from a health professional more than once within past six months; knee surgery or intra-articular corticosteroid injection within past six months; history of joint replacement on study knee or on waiting list; systemic arthritic conditions or current or past (within four weeks) oral corticosteroid use; other condition affecting lower-limb function more than knee pain; unable to use/access a telephone; score ≥21 on the depression subscale of the Depression, Anxiety and Stress Scale. (21)

Randomisation and masking

After baseline assessment, participants were randomized in permuted blocks of 6 and 12 using computer-generated random numbers table stratified by physiotherapist (prepared by biostatistician A.F.), to one of 2 treatment groups (PT+coaching or PT). Participants chose their physiotherapist based on location while coaches were randomly assigned. Allocations were sealed in opaque consecutively numbered envelopes by an independent person and stored in a locked location. A different independent person accessed envelopes to firstly reveal group allocation and then coach if appropriate. Physiotherapists were unblinded given the need to communicate with the coaches. Participants were blinded to study hypotheses. Research assistants entering data and statisticians remained blinded to group allocation.

Interventions

Detail of the interventions is found elsewhere. (17) Participants in both groups visited a project physiotherapist for 5 individual 30-minute sessions over 6 months (weeks 1,

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3, 7, 12 and 20). This session number is consistent with the Australian health insurance funding scheme and practices in other countries. (11) The physiotherapist: i) provided verbal and written education/information about OA, benefits of physical activity/exercise, and strategies to enhance adherence (such as using a log book); ii) prescribed an evidence-based (22) progressive individualised home exercise program comprising 4-6 lower limb exercises (at least 3 knee extensor strengthening exercises and at least 1 hip abductor strengthening exercise from a pre-determined list with 1-2 optional exercises based on assessment) performed 3 times per week (eTable 1) and, iii) promoted increased general physical activity, including provision of a pedometer for optional self-monitoring/motivation, and assistance with formulating short-term goals. A brief assessment was performed by the physiotherapist at each session to ascertain any adverse effects, to check exercise performance and to guide progression. Progression was provided by varying exercise type, number of repetitions, load or difficulty. Participants were encouraged to continue their program during the unsupervised 12-month follow-up.

Those allocated to PT+coaching additionally received 6 telephone-delivered coaching sessions over 6 months (approximately weeks 2, 4, 8, 13, 21 and 25), with the option of up to 6 additional sessions. The decision by the coach to utilise optional sessions was based on participant preference, confidence and success in achieving desired behaviour changes. The coaching intervention used HealthChange® Methodology, (23) that integrates theories/principles commonly used in behavioural interventions, and which impact health literacy, readiness, motivation, decision-making and self-efficacy to treatment adherence. The approach draws on techniques used in motivational interviewing, solution-focused counselling and cognitive behavioural

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therapy. (23) The methodology addresses 3 crucial components of facilitating behaviour change: i) effective information exchange; ii) assistance to form behavioural goal intention and; iii) support to convert intention into action and maintenance. (23) Although participants were educated about target recommendations (30 minutes of moderate intensity physical activity in bouts of ≥10 minutes on most days and 10,000 steps per day), goals were individualised. Participants were encouraged to monitor their progress and assisted to identify individual barriers as well as strategies to overcome barriers.

Following each consultation, physiotherapists and coaches completed an on-line communication form outlining topics discussed and any problems, plus other relevant information such as goals and adherence, to facilitate two-way interaction. (17)

Physiotherapist and telephone coach training and treatment fidelity

Thirteen (8 male) physiotherapists with an average of 17.9 (10.1) years of post-graduate experience (range 3-42 years) provided the physiotherapy intervention. Five female telephone coaches with health backgrounds (3 nurses, 1 occupational therapist, 1 health psychologist: average 15.8 (12.8) years of clinical experience) were utilised. Physiotherapists and coaches attended one-day training sessions about study procedures. Two coaches had prior practical experience in HealthChange® Methodology health coaching (3 and 4 years) while the other 3 had no prior experience. They attended HealthChange Australia workshops (3 days) and practiced behavioural change skills. Mentoring for coaches was provided by a behaviour change consultant (CB). Ten percent of coaching session audiotapes were randomly selected

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and rated for 10 HealthChange® practice principles (CB) using a custom-developed 11-point NRS (with 0=need to work on, 10=doing really well).

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Measures

Self-report questionnaires were completed at home and returned via post/email at baseline, 6, 12 and 18 months, while objective physical activity recording occurred at baseline and 6 months. Adherence measures were collected 3-monthly.

Primary outcomes were valid and reliable self-report measures recommended for knee OA clinical trials. (24) Overall average knee pain intensity in the past week was rated using an 11-point NRS, (0='no pain', 10='worst pain possible', minimal clinically important difference (MCID) 1.8 units (25)). Physical function in the previous 48 hours was measured using the function subscale of the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC, Likert version 3.1) (26), (0=no difficulty, 68=extreme difficulty, (27) MCID 6 units (28)). The primary time point was 6 months.

Secondary outcomes included: NRS pain on walking in past week (25); WOMAC pain subscale (27, 29); Quality-of-life (AQoL-6D) (30, 31); Physical Activity Scale for the Elderly (PASE) (32); Active Australia Survey (AAS) (33); and objectively-measured physical activity (stepping duration and steps per day over 7 consecutive days) recorded at 6 months using an accelerometer-based device worn on the anterior thigh (activPAL™ Professional (34), PAL Technologies Ltd, Glasgow, UK). At 6, 12 and 18 months, participants reported their global rating of change (GROC) relative to baseline i) overall, ii) in pain, and iii) in physical function using a 7-point ordinal

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scale (1='much worse', 7='much better'). Participants also rated their perceived change in physical activity since baseline using a 7-point Likert scale (1='much less', 7='much more'). Every 3 months, participants were asked by postal questionnaire the number of home exercise sessions performed in the previous 2 weeks (out of maximum of 6 prescribed sessions, converted to a percentage). They also rated their home exercise adherence over the previous 3 months using an 11-point NRS (0='not at all', 10='completely as instructed'). Several psychological measures collected as potential treatment mediators, (17) will be reported elsewhere.

The number of physiotherapy visits and number, timing and duration of telephone coaching calls were recorded. Information on adverse events and co-interventions was collected every 3 months using prospective log sheets.

Sample size

We aimed to detect MCID in pain NRS of 1.8 (25) and in WOMAC function of 6 non-normalized units. (35) Calculations were based on analysis of covariance adjusting for baseline scores, assuming between-participant standard deviations and baseline-6-month assessment correlations of 2.2 and 0.29 respectively for pain, and 11.6 and 0.51 respectively for function. (36) Clustering of participants within coaches was accounted for assuming an intra-coach correlation of 0.05. (37) These assumptions produced a sample size of 67 patients per arm to achieve 80% power to detect the above differences for function. With this sample size, the power for pain was 98%. Assuming 20% attrition, the required sample size was 84 participants per arm.

Statistical analysis

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Analyses were performed using Stata(v12) software. We used intention-to-treat with missing data imputed using chained equations with predictive mean matching, imputing data for each arm separately. Estimates from 20 imputed datasets were combined using Rubin's rules. Testing was two-sided with a significance level of $p<0.05$. The mean (95% confidence interval, CI) difference in change (baseline minus follow-up) between groups was estimated using a linear mixed model. This model included random effects for physiotherapists and coaches and baseline outcome score as a covariate. Comparisons of change from baseline within each group were performed using paired t tests. Exercise adherence during 6-monthly intervals was compared between groups using a linear mixed model including random effects for physiotherapists and coaches. Global change ratings were *a priori* dichotomized as improved (those scoring 'much better' or 'moderately better' or for physical activity levels 'moderately more' or 'much more') or not improved ('slightly better' to 'much worse' or for physical activity levels 'slightly more' to 'much less') and compared between groups using proportional odds regression models with random effects for telephone coach, adjusting for physiotherapist, with results presented as odds ratios.

Sensitivity analyses were performed by 1) additionally adjusting for age and other baseline characteristics, and 2) complete case analyses. Estimates of PT+coaching effects under hypothetical full adherence were also performed for the primary outcomes, assuming that there was a linear relationship between number of calls and outcome, using a two-stage least squares instrumental variables approach accounting for clustering within physiotherapist and coach. (38)

RESULTS

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Of 700 volunteers, 532 (76%) were ineligible or did not wish to participate (Figure 1) and 168 were enrolled (84 per group). Treatment groups were similar at baseline, except PT+coaching was, on average, 2 years younger than PT ($p<0.05$) (Table 1). Loss to follow-up was 26/168 (15%), 32/168 (19%) and 40/168 (24%) at 6, 12 and 18 months, respectively, with rates comparable between groups. Those lost to follow-up had similar baseline characteristics and outcomes to those who remained (data not shown).

Continuous outcomes across time-points are summarized in Table 2, and changes between- and within-groups in Table 3. For the 6-month primary outcomes, there were no significant between-group differences in change in average pain (mean difference 0.4 units; 95%CI, -0.4 to 1.3) or WOMAC function (1.8 units; 95%CI, -1.9 to 5.5) (Table 3, Figure 2). Furthermore, no between-group differences were observed at 12 or 18 months. At 6 months, both groups showed large significant and clinically important improvements from baseline in the primary outcomes of pain (25) and function. (35) These improvements were generally maintained over 18 months (Figure 2).

For secondary outcomes (Table 3), there were no between-group differences for change in NRS walking pain, WOMAC pain or quality-of-life scores at any time-point. More PT+coaching participants reported global improvement overall, and in function, but not pain, compared to PT at 6 months, with similar findings at other time-points (Table 4).

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Most secondary outcomes related to physical activity and exercise behaviour favoured PT+coaching at 6 months, but generally not at 12 or 18 months (Table 3 and 4). Two of the 3 self-reported physical activity measures improved to a greater extent with PT+coaching at 6 months (PASE, mean difference -28; 95%CI -55 to -2; Global increase in physical activity odds ratio 2.1; 95%CI 1.0 to 4.4). However, changes in physical activity measured by accelerometry were not statistically different between groups at any time. Adherence to home exercise, as shown by the percentage of prescribed sessions completed, was greater in PT+coaching (mean 69%; 95%CI 63, 75) versus PT (mean 55%; 95%CI 47, 63) during the 6-month intervention (mean difference 14%, 95%CI 4, 24), but was not different during months 6-12 (PT+coaching 42%; 95%CI 34, 50 versus PT 39%; 95%CI 31, 48; mean difference 2%, 95%CI -10, 14), or months 12-18 (PT+coaching 39%; 95%CI 31, 46 versus PT 37%; 95%CI 28, 46; mean difference 1%, 95%CI -10, 12). Self-rated home exercise adherence using the NRS was also higher in PT+coaching (mean 7.4; 95%CI 6.9, 7.8) than in PT (mean 5.7; 95%CI 4.9, 6.4) during the intervention (mean difference 1.7, 95%CI 0.8, 2.6), but was not different during months 6-12 (PT+coaching 4.1; 95%CI 3.3, 4.9 versus PT 3.9; 95%CI 3.1, 4.7; mean difference 0.2, 95%CI -0.8, 1.3), or months 12-18 (PT+coaching 3.8; 95%CI 3.1, 4.6 versus PT 3.6; 95%CI 2.9, 4.4; mean difference 0.2, 95%CI -0.8, 1.2).

Results of sensitivity analyses using multiple imputation data additionally adjusted for baseline characteristics (eTable 2) and hypothetical complete adherence analyses, (eTable 3) were similar. For complete case analyses (eTable 4), significant benefits favouring PT+coaching were also observed for WOMAC pain at 6 months, and for global change in pain at 6 and 12 months.

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Most participants attended all 5 physiotherapy sessions with the mean (SD) number being 4.4 (1.2) for PT+coaching and 4.3 (1.4) for PT ($p>0.05$). The mean (SD) number of telephone sessions was 5.4 (2.0) ranging from 0 to 9, with the mean (SD) call duration being 39.6 (11.5) and 24.1 (10.2) minutes for initial and subsequent calls respectively. Overall mean (SD) treatment fidelity of coaches from auditing 83 telephone calls was 7.1 (0.6) out of 10 (range 5.5 – 7.7).

Adverse events and co-intervention details are found in eTable 5. Adverse events were mild (mostly transient increased knee pain) and reported by approximately one-third of participants during the intervention, but were infrequent during follow-up. Co-interventions were similar across groups.

DISCUSSION

Addition of simultaneous telephone coaching targeting physical activity and exercise adherence did not augment the clinically-relevant pain and function benefits of a physiotherapist-prescribed program alone in people with knee OA. This was despite most self-reported outcomes related to adherence favouring coaching at 6 months. Thus, although our telephone coaching protocol appeared to facilitate some behaviour change, this did not translate into tangible clinical benefits.

Improving exercise adherence was an aim of our coaching intervention given that adherence is positively linked to clinical outcomes in knee OA. (7, 39) However, adherence levels needed to impact pain and function are unknown. Clearly, the 14% greater adherence to home exercise in the PT+coaching group compared to the PT

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group at 6 months was insufficient and greater differences in adherence may be required. Alternatively, the relationship between adherence and pain/function may not be linear. There may be a threshold level needed for clinical improvements, beyond which greater adherence has little clinical consequence. Both groups may have reached this threshold level and as such, the greater adherence in the coaching group did not influence our primary pain and function outcomes.

The other aim of our coaching intervention was to increase physical activity. Although longitudinal data show associations between physical activity levels and pain and function in knee OA, (40) it is not clear whether intervening to improve physical activity necessarily leads to improved pain and function, which may explain our findings. Recent data from the Osteoarthritis Initiative (41) suggest that an intervention focussing on reducing sedentary behaviour alone or combined with increasing physical activity, might be warranted.

Telephone coaching occurred over the same timeframe as visits to the physiotherapist. It may be more effective if the coaching commences after visits to the physiotherapist cease when exercise adherence levels drop to around 40%. Our coaching intervention may have been of insufficient intensity. A systematic review found that telephone coaching interventions lasting 6-12 months and including 12 or more calls produced the most favourable physical activity outcomes. (15) Although our protocol deemed that participants receive a minimum of 6 coaching sessions over 6 months, with option of up to 12 sessions if necessary, the mean number of coaching sessions was 5.4 due to difficulty contacting participants and cancellations. Nonetheless, this suggests that a greater number of calls may be difficult to implement in the real world.

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Our service delivery model involved face-to-face contact with a physiotherapist and a separate health professional to deliver the coaching intervention. However, a common theme from a qualitative study we embedded in to our trial was that the coaches found the lack of face-to-face contact hampered their ability to establish their normal rapport and build effective relationships with their patients. (42) Given this, there may be benefit from having physiotherapists trained in behavior change and integrating health coaching in to their exercise management. This was supported by comments from some physiotherapists who queried whether a second professional was necessary to fulfill the health coach role. (42) Conversely, others thought having a separate coach freed them up to focus on different treatment aspects. (42)

It is feasible that we recruited a sample less responsive to telephone coaching. Whilst recruited for their self-reported physical inactivity at baseline, participants averaged around 8,000 steps per day (measured by accelerometry) which is relatively high. Our sample also reported moderate baseline levels of self-efficacy for physical activity and for overall OA management. Telephone coaching may be more effective in people who are less active, have low self-efficacy, and lack confidence in exercising and managing their condition. (43) Over half our sample were tertiary educated and another study showed benefits of telephone coaching were greatest in those with no college education and low health literacy. (44)

Several GROC measures significantly favoured PT+coaching at most time-points, despite no differences on the primary outcomes. This discrepancy is likely to reflect the nature of the questionnaires. Although GROC and domain-specific measures are correlated, the open nature of the GROC question allows patients to take into account

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other factors they consider important. The GROC is also thought to reflect current status more than change in status. (45) Thus coaching may have improved patients' confidence and feelings of control so that participants perceived they have improved to a greater extent than those in the PT group.

Our study provides novel information about the effects of telephone coaching alongside a physiotherapy-prescribed physical activity and exercise program and extends the limited research in telephone coaching for OA. Although one study evaluated addition of telephone reinforcement following an exercise program in people (mostly women) with lower limb OA, (46) the primary outcome was caloric expenditure. Another study evaluated telephone-based self-management in mostly male veterans with knee/hip OA. (47) However it is not directly comparable to our study as the intervention covered educational modules spanning diet, exercise, medications, stress management and joint injections/surgery and only 56% of the participant goals related to physical activity/exercise.

Both groups showed large clinically relevant improvements in pain and function with benefits still evident over 18 months. Improvements at this time-point were of an order of magnitude of 42-54% for function, which far exceed the MCID in both groups, and 26-36% for pain, attaining the MCID only in the PT+coaching group. Without a 'no treatment' control group, the extent to which these improvements can be explained by direct and/or contextual effects of the intervention or by other factors, such as spontaneous recovery or regression to the mean, cannot be determined. Nonetheless, minimal changes have been noted in such control groups in other studies over similar timeframes (48) suggesting that the improvements we found are likely

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related to the physical activity and exercise program. Importantly, the program was not resource-intensive, home-based, supplemented with a small number of visits to a physiotherapist. This enhances its attractiveness as a feasible intervention for the management of knee OA.

Strengths of our study are inclusion of metropolitan and regional participants, using multiple physiotherapists and coaches to enhance generalizability, blinded analysis, longer-term follow-up, good participant retention, adequate statistical power, a brief, replicable and commercially-available health coaching model, documented coaching fidelity and outcome measures recommended for OA clinical trials. (24)

Our study has limitations. Blinding of participants, physiotherapists and coaches was not possible, but detection bias was minimized by blinding participants to hypotheses. Nonetheless, any bias from unblinding would likely over-estimate pain/function effects of telephone coaching but this was not evident. The same physiotherapists treated participants in both study arms to control for therapist style and personality. It is unlikely this introduced contamination in the PT arm because physiotherapists were not trained in health coaching, they were instructed to treat both groups equally without deviation from the protocol, they were not permitted to conduct telephone consultations and the 30-minute treatment sessions did not allow time for additional intervention. We lost 24% of participants to 18-month follow-up, however this was accounted for with multiple imputation and results were generally similar when presented as complete cases. The PT+coaching group was slightly younger, and more likely to be educated, have longer symptom duration and be currently employed than the PT group. Controlling for these characteristics did not alter results. Objective

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accelerometry data were only available at 6 months due to resource constraints so we were unable to supplement self-reported physical activity measures with this data at later time points.

In summary, pain and function benefits of a 6-month physiotherapist-prescribed physical activity and exercise program were not augmented by simultaneous telephone coaching performed by a separate health professional, although self-reported physical activity levels and adherence to home exercise were generally increased in the short-term.

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Author's Contribution

KLB and RSH conceived the project; KLB procured the project funding and led the co-ordination of the trial. KLB, RSH, TE, JG, CB, GSK, SJB, DJH, and CAB assisted with protocol design. KLB, RSH and TE designed the physiotherapy program and, along with CB, trained the physiotherapists. JG and CB trained the clinicians in the HCA Model of Health Change and JG provided manualised protocols for the behaviour change support component. KLB, CB and TE provided study-specific training for the telephone coaches, CB provided mentoring and feedback during the telephone coach's training and practice phase. JG provided quality auditing tools for the telephone coaches while CB performed the auditing. TE applied for ethics approval, wrote the study procedures manual and the information and education Booklet. PKC recruited and screened the participants and managed the overall trial. BM conducted the group randomization and booked participant appointments with the Project Physiotherapists and Telephone Coaches. AF performed the sample size

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calculations and designed the randomisation schedule. JK and AF performed the statistical analyses. AH designed the methods for the economic analysis. All authors participated in the trial design, provided feedback on drafts of this paper and read and approved the final manuscript. All authors provided feedback on drafts of this paper and read and approved the final manuscript.

Permission to include the Project Physiotherapists and Telephone Coaches in the Acknowledgements section was obtained.

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The study sponsor had no role in: the design and conduct of the study; collection, management, analysis, and interpretation of the data; and preparation, review or approval of the manuscript; and decision to submit the manuscript for publication. KLB had full access to all the data in the study and takes full responsibility for the integrity of the data and the accuracy of the data analysis.

The study physiotherapists and telephone coaches were paid on a consultancy basis for treatments provided. The telephone coaches were:

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Catherine McCann – BAppSc (HumMove), B Nurs

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Vanessa Thiele – DPsych (Health)

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Table 1: Baseline characteristics by group given as mean (standard deviation) or number (%)

Characteristic	PT+coaching n=84	PT n=84
Age (years)	61.1 (6.9)	63.4 (7.8) *
Symptom duration		
Less than 2 years	29 (35%)	22 (26%)
2 years to 10 years	39 (46%)	44 (52%)
More than 10 years	16 (19%)	18 (21%)
Height (cm)	167.5 (8.6)	167.3 (10.3)
Body mass (kg)	89.0 (19.5)	87.5 (22.0)
Body mass index (kg/m^2)	31.9 (7·5)	31.1 (6.7)
Male (n-%)	27 (32%)	35 (42%)
Arthritis self-efficacy#	20.7 (3.8)	20.0 (3.7)
Self efficacy for physical activity¢	14.9 (3.9)	13.9 (3.5)
Level of education (n-%)		
Less than 3 years of high school	6 (7%)	12 (14%)
Three or more years of high school	33 (30%)	30 (36%)
Tertiary level	45 (54%)	42 (50%)
Employment status		
Currently employed	49 (58%)	41 (49%)
Unable to work due to health reasons	2 (2%)	5 (6%)
Retired (not due to health reasons)	23 (27%)	31 (37%)
Not employed	10 (12%)	7 (9%)
Current drug/supplement use (n-%)†	62 (74%)	64 (76%)
Analgesia (paracetamol combinations)	39 (46%)	42 (50%)
Non-steroidal anti-inflammatories	22 (26%)	26 (31%)
COX-2 inhibitors	7 (8%)	2 (2%)
Topical anti-inflammatories	8 (10%)	10 (12%)
Oral opioids	1 (1%)	0 (0%)
Oral corticosteroids	1 (1%)	1 (1%)
Glucosamine/chondroitin products	29 (35%)	28 (33%)

† defined as at least once per week * $p<0·05$

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#Arthritis Self Efficacy scale (0-30)(49) ¢ Self Efficacy for Physical Activity scale (5-25)(50) - higher scores indicate better self efficacy

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Table 2. Mean (standard deviation) scores on outcome measures over time according to group

	Groups							
	Month 0 (Baseline)		Month 6		Month 12		Month 18	
Primary outcomes	**PT+coaching**	**PT**	**PT+coaching**	**PT**	**PT+coaching**	**PT**	**PT+coaching**	**PT**
	n=84	**n=84**	**n=72**	**n=70**	**n=70**	**n=66**	**n=66**	**n=62**
NRS overall pain†	5.6 (1.4)	5.8 (1.5)	3.1 (2.2)	3.8 (2.3)	3.2 (2.4)	3.7 (2.2)	3.6 (2.4)	4.1 (2.8)
WOMAC function†	27.3 (11.1)	30.3 (10.1)	14.7 (10.6)	18.2 (11.7)	13.3 (10.5)	17.4 (11.9)	12.2 (10.5)	16.4 (11.7)
Secondary outcomes								
NRS walking pain†	5.7 (1.6)	5.6 (2.0)	2.8 (2.5)	3.2 (2.4)	3.0 (2.5)	3.7 (2.6)	3.2 (2.6)	3.5 (3.2)
WOMAC pain†	8.1 (2.7)	8.5 (2.9)	4.2 (3.0)	5.7 (3.6)	4.3 (3.3)	5.4 (3.4)	4.4 (3.4)	4.3 (3.5)
AQoL II^	0.7 (0.1)	0.7 (0.1)	0.8 (0.1)	0.8 (0.1)	0.8 (0.2)	0.8 (0.1)	0.8 (0.1)	0.8 (0.2)
PASE^	171 (85)	151 (78)	189 (85)	158 (63)	172 (80)	166 (77)	180 (94)	162 (70)
AAS Total Activity Time^	277 (326)	238 (229)	392 (378)	325 (303)	336 (354)	394 (447)	427 (599)	284 (344)
AP time stepping (hrs/day)^	1.8 (0.6)	1.7 (0.6)	2.0 (0.7)	1.9 (0.7)	N/A	N/A	N/A	N/A
AP steps (n per day)^	8116 (2755)	7879 (2750)	9148 (3178)	8504 (3180)	N/A	N/A	N/A	N/A

NRS=Numeric Rating Scale (0-10); WOMAC=Western Ontario and McMaster Universities Osteoarthritis Index, physical function (0-68), pain (0-20); AQoL II=Assessment of Quality of Life Version 2, (-0.04-1.0); PASE=Physical Activity Scale for the Elderly (0->400); AAS=Active Australia Survey; AAS Total Activity Time = Active Australia Survey total activity time in last week (minutes) including walking, "vigorous" (eg. Heavy yard work) and "moderate" (eg. Golf, swimming) activity; AP = activPAL objectively measured physical activity data; N/A=not assessed

† Lower scores = better

^ Higher scores = better

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Table 3: Mean (95% confidence interval) changes within groups and adjusted mean (95% confidence interval) difference in the change between-groups for continuous primary and secondary outcome measures

Primary outcomes	Timeframe	Change within groups		Difference in change between-groups ‡
		PT+coaching	PT	PT+coaching vs PT
NRS overall pain †	Month 0-6	2.4 (1.8, 2.9)	2.0 (1.4, 2.6)	0.4 (-0.4, 1.3)
	Month 0-12	2.3 (1.7, 3.0)	1.9 (1.3, 2.5)	0.6 (-0.3, 1.5)
	Month 0-18	2.0 (1.4, 2.7)	1.5 (0.8, 2.2)	0.7 (-0.2, 1.5)
WOMAC function †	Month 0-6	11.8 (9.1, 14.6)	11.4 (8.4, 14.4)	1.8 (-1.9, 5.5)
	Month 0-12	13.3 (10.5, 16.1)	11.0 (7.8, 14.1)	3.9 (-0.3, 8.2)
	Month 0-18	14.6 (11.5, 17.7)	12.6 (8.8, 16.3)	3.9 (-1.0, 8.7)
Secondary outcomes				
NRS walking pain†	Month 0-6	2.8 (2.2, 3.4)	2.6 (1.9, 3.2)	0.2 (-0.7, 1.0)
	Month 0-12	2.6 (2.0, 3.2)	1.8 (1.1, 2.5)	0.7 (-0.2, 1.6)
	Month 0-18	2.5 (1.9, 3.2)	2.0 (1.2, 2.8)	0.4 (-0.5, 1.4)
WOMAC pain†	Month 0-6	3.5 (2.6, 4.3)	2.9 (1.9, 3.9)	0.8 (-0.5, 2.0)
	Month 0-12	3.2 (2.0, 4.4)	2.1 (0.6, 3.5)	1.5 (-0.3, 3.4)
	Month 0-18	3.5 (2.6, 4.5)	3.7 (2.3, 5.0)	0.2 (-1.4, 1.8)
AQoL II^	Month 0-6	-0.1 (-0.1, 0.0)	0.0 (-0.1, 0.0)	0.0 (-0.1, 0.0)
	Month 0-12	0.0 (-0.1, 0.0)	0.0 (-0.1, 0.0)	0.0 (-0.1, 0.1)
	Month 0-18	0.0 (-0.1, 0.0)	0.0 (-0.1, 0.0)	0.0 (-0.1, 0.0)
PASE^	Month 0-6	-29 (-54, -4)	-8 (-23, 7)	-28 (-55, -2)¥
	Month 0-12	-16 (-41, 9)	-15 (-37, 7)	-9 (-39, 20)
	Month 0-18	-28 (-60, 4)	-11 (-31, 8)	-23 (-54, 9)
AAS Total Activity Time^¢	Month 0-6	-4.0 (-7.8, -0.2)	-2.1 (-4.9, 0.7)	-2.5 (-6.4, 1.4)
	Month 0-12	-2.2 (-5.3, 1.0)	-4.8 (-8.2, -1.5)	2.4 (-2.0, 6.8)
	Month 0-18	-4.5 (-9.4, 0.4)	-3.1 (-6.5, 0.3)	-1.7 (-7.1, 3.8)
AP time stepping (hrs/day)^	Month 0-6	-0.2 (-0.5, 0.0)	-0.1 (-0.4, 0.1)	-0.1 (-0.4, 0.2)
AP steps (n per day)^	Month 0-6	-1299 (-2483, -115)	-588 (-1959, 783)	-811 (-2414, 791)

† For change within groups, positive change means improvement. For difference in change between-groups, positive difference favors PT+coaching while a negative difference favors PT.

^ For change within groups, negative change means improvement. For difference in change between-groups, negative difference in change between-groups favors PT+coaching while a positive difference favors PT.

*p<0.05; œ p<0.01; ¥ p<0.001

¢ analyses for AAS total activity time were performed on a square-root transformed scale as assumptions of normality were violated.

NRS=Numeric Rating Scale (0-10); WOMAC=Western Ontario and McMaster Universities Osteoarthritis Index, physical function (0-68), pain (0-20); AQoL II=Assessment of Quality of Life Version 2, (-0.04-1.0); PASE=Physical Activity Scale for the Elderly (0->400); AAS=Active Australia Survey; AAS Total Activity Time = Active Australia Survey total activity time in the last week; AP=ActivPAL.

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Table 4: Number and percentage of participants reporting improvement overall, and with respect to pain and function, as well as physical activity levels, in the two groups at three different time points. Also, odds ratios (95% confidence intervals) for improvement comparing the PT+coaching group to the PT group, adjusting for age. Odds ratios greater than 1 favour the PT+coaching group.

Global Improvements		Number (%) reporting improvement		
		PT+coaching	PT	Odds Ratio (95% CI) ‡
Pain	Month 6	42/58 (72%)	30/57 (53%)	1.7 (0.8, 3.5)
	Month 12	38/58 (66%)	25/54 (46%)	2.3 (1.0, 5.2)
	Month 18	36/58 (62%)	28/52 (54%)	1.1 (0.5, 2.1)
Function	Month 6	45/58 (78%)	26/57 (46%)	3.3 (1.5, 7.1)œ
	Month 12	36/58 (62%)	23/54 (43%)	2.3 (1.2, 4.7)*
	Month 18	39/58 (67%)	24/52 (46%)	2.2 (1.0, 4.5)*
Overall	Month 6	43/58 (74%)	30/57 (53%)	2.2 (1.1, 4.4)*
	Month 12	41/58 (71%)	26/54 (48%)	2.7 (1.2, 5.6)*
	Month 18	39/58 (67%)	25/52 (48%)	2.1 (1.0, 4.4)*
Physical activity level	Month 6	37/58 (64%)	25/55 (45%)	2.1 (1.0, 4.4)*
	Month 12	27/58 (47%)	19/54 (35%)	1.4 (0.6, 3.1)
	Month 18	37/58 (64%)	21/52 (40%)	2.1 (1.0, 4.4)*

‡ Odds ratio >1 favors PT+coaching

*$p<0.05$; œ $p<0.01$

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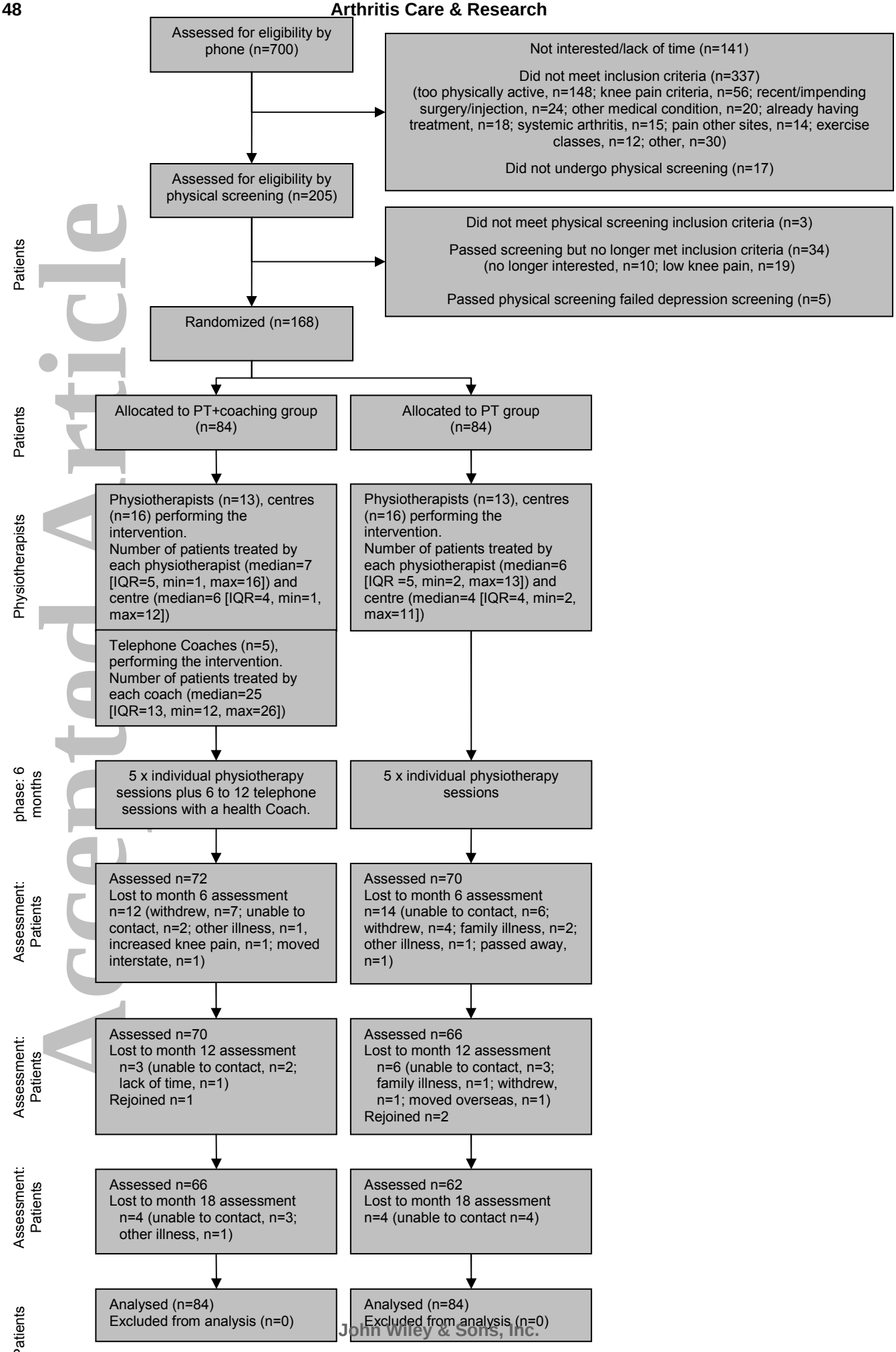
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Figure 1: Flow chart describing progression of participants through the randomized controlled trial. Number of assessed participants is based on data obtained for the primary outcome measures.

Figure 2: Mean (SE) improvement in primary outcomes, a) overall knee pain (measured via numerical rating scale (NRS)) and b) physical function (measured via Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)), over time in the two groups, where the horizontal line indicates the minimum clinically important difference (MCID) for each.

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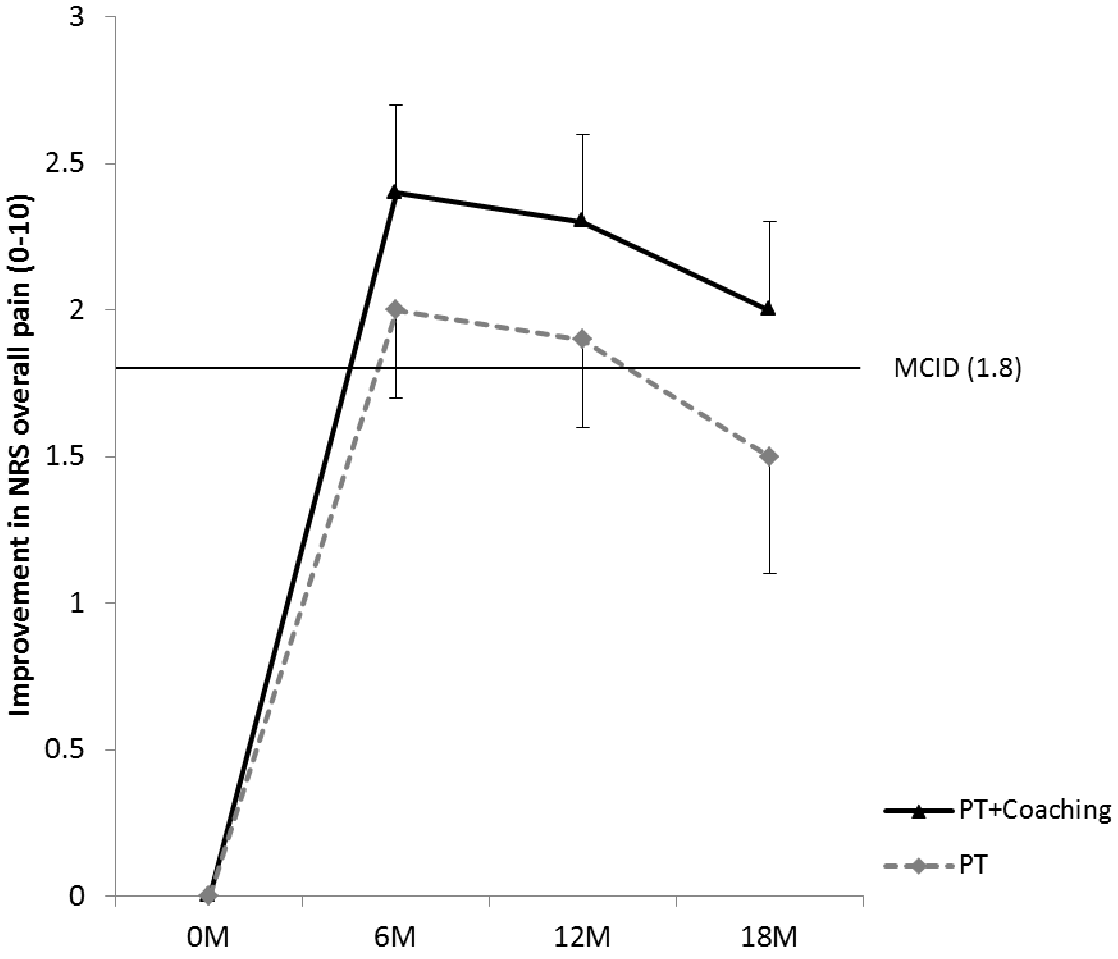


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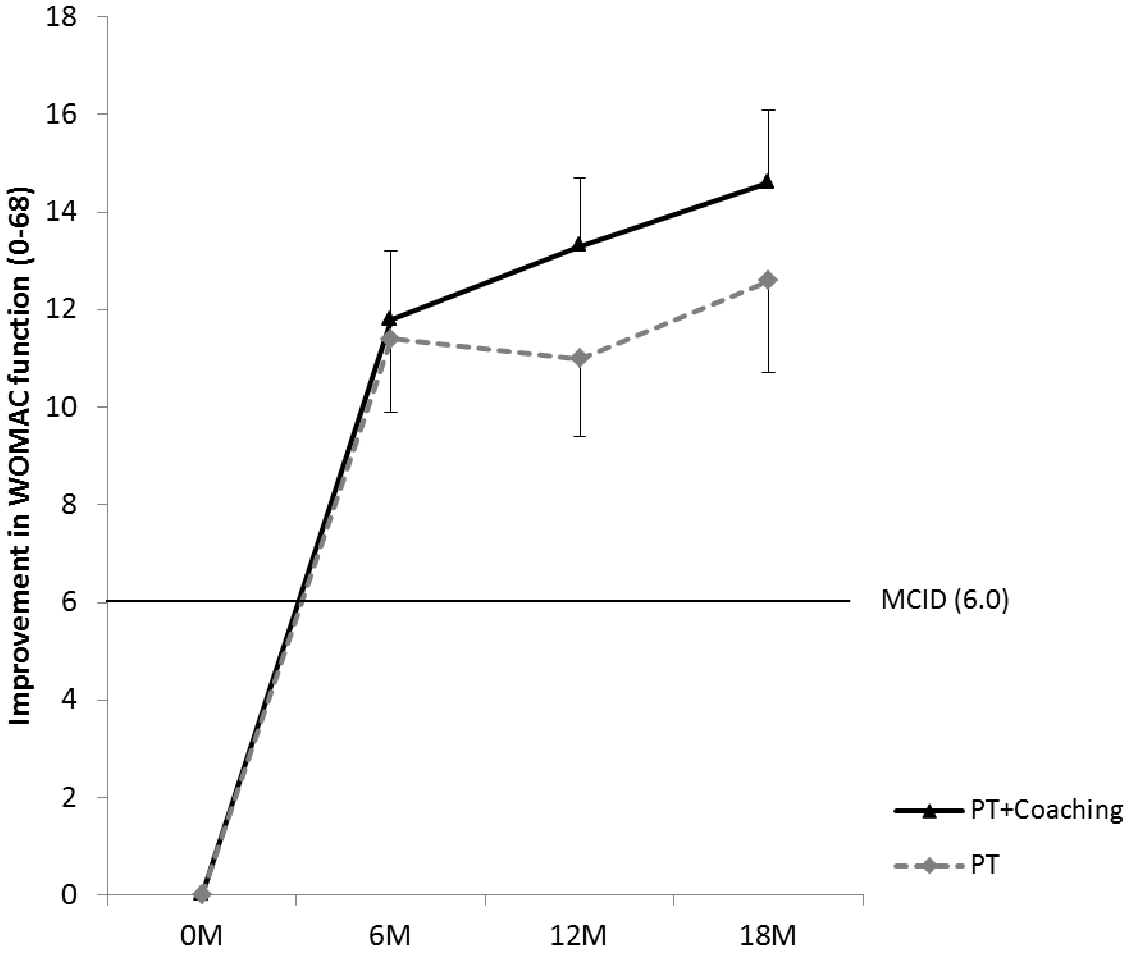
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eTable 1. Pre-specified list of exercises for the home exercise program

Knee extensor strengthening: Every program must include at least three of the following knee extensor strengthening exercises.			
Knee extension	Non weight-bearing	Seated knee extension (with resistance) with 5 second hold	Variation: Use appropriate level of resistance band – red through to black or ankle cuff weight
	Non weight-bearing	Inner range quads over roll (with resistance) in supine with 5 second hold	Variation: Use appropriate level of ankle cuff weight
Straight Leg Raise	Non weight-bearing	Straight Leg Raise in supine (with resistance)	Variations: Add 5 second hold Variation: Use appropriate level of ankle cuff weight
	Non weight-bearing	Straight Leg Raise in standing with resistance band at ankle	Variation: 5 second hold
Resisted knee extension in standing	Weight-bearing	Resisted inner range knee extension in standing (resistance band around back of knee)	Variation: Increase weight taken on arthritis leg until standing on one leg to do the exercise
Partial Squats	Weight-bearing	Partial wall squats with weight distributed bilaterally (feet approximately 30cm out from wall)	Variations: 5 second hold, more weight on arthritis leg
Steps	Weight-bearing	Step-ups (affected leg on the step, control knee straightening, lower to start position by controlling knee bending)	Variations: step height, holding extra weight (in hands or backpack)
	Weight-bearing	Forward touchdowns from a step (affected leg on the step, control knee bending to lightly tap floor in front with toes of non-affected leg, return to start by controlling knee straightening)	Variations: step height, holding extra weight (in hands or backpack), don't touch down
Sit-to-stand	Weight-bearing	Sit to stand from a standard height chair without using hands/arms	Variations: chair height, hover above the seat without touching down, more weight on arthritis leg
Forward-backwards exercise (with knee bend)	Weight-bearing	Sliding (slide non-affected side foot along the floor to the front and then to the back, bend and straighten affected knee with control and neutral alignment)	
	Weight-	Stepping (step non-affected side foot to the front and then to the back,	

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	bearing	bend and straighten affected knee with control and neutral alignment)	
Hip abductor strengthening: Every program must include <u>at least one</u> of the following hip abductor strengthening exercises.			
Side-lying hip abduction	Non weight-bearing	Side-lying bent-leg hip abduction (clams) with resistance band around knees	Variation: Use appropriate level of resistance band – red through to black or ankle weight
	Non weight-bearing	Side leg raise (hip abduction) with resistance	Variation: Use appropriate level of ankle cuff weight Do not use if painful hip OA.
Standing hip abduction	Non weight-bearing	Standing side leg side raises with resistance band	Variation: Use appropriate level of resistance band – red through to black or ankle weight
	Weight-bearing	Wall push standing on arthritis leg (non-affected leg bent at hip and knee, push thigh against a wall to activate hip abductor muscles)	Variation: Increase arthritis leg knee bend to 30°
Side stepping	Weight-bearing	Crab walk (side stepping) with resistance band around thighs or ankles	
Hip abduction dips	Weight-bearing	Hip abductor dips (standing on affected leg, lower non-affected leg by frontal plane pelvic tilting)	

* Participants were provided with written exercise sheets detailing the exercises and including diagram

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eTable 2: Adjusted mean (95% confidence interval) difference in change between groups for continuous primary and secondary outcome measures for multiply imputed data, adjusting for baseline value and age, sex, employment status, symptom duration and including random effects for health coach and physiotherapist. Also, odds ratios (95% confidence intervals) for improvement comparing the PT+coaching group to the PT group, adjusting for age, sex, employment status, symptom duration and including random effects for health coach and physiotherapist. Odds ratios greater than 1 favour the PT+coaching group.

Primary outcomes	**Timeframe**	**Difference in change between-groups ‡**
		PT+coaching vs PT
NRS overall pain †	Month 0-6	0.5 (-0.4, 1.1)
	Month 0-12	0.6 (-0.4, 1.6)
	Month 0-18	0.6 (-0.3, 1.5)
WOMAC function †	Month 0-6	1.8 (-2.1, 5.6)
	Month 0-12	3.7 (-0.6, 8.0)
	Month 0-18	3.5 (-1.5, 8.6)
Secondary outcomes		
NRS walking pain†	Month 0-6	0.2 (-0.7, 1.0)
	Month 0-12	0.7 (-0.2, 1.6)
	Month 0-18	0.3 (-0.6, 1.3)
WOMAC pain†	Month 0-6	0.7 (-0.6, 2.0)
	Month 0-12	1.4 (-0.6, 3.3)
	Month 0-18	0.2 (-1.4, 1.9)
AQoL II^	Month 0-6	0.0 (-0.1, 0.0)
	Month 0-12	0.0 (-0.1, 0.1)
	Month 0-18	0.0 (-0.1, 0.0)
PASE^	Month 0-6	-26 (-55, 0.2)
	Month 0-12	-6 (-37, 25)
	Month 0-18	-21 (-54, 12)
AAS Total Activity Time^	Month 0-6	-2.6 (-6.5, 1.3)
	Month 0-12	2.2 (-2.5, 6.8)
	Month 0-18	-1.7 (-2.5, 6.8)
AP time stepping (hrs/day)^	Month 0-6	-0.1 (-0.4, 0.2)
AP steps (n per day)^	Month 0-6	-771 (-2404, 862)
Global Change Improvements		**Odds Ratio (95% CI) ‡**

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Global change in pain	Month 6	1.6 (0.7, 3.4)
	Month 12	2.3 (0.9, 5.4)
	Month 18	1.0 (0.5, 2.2)
Global change in function	Month 6	3.4 (1.5, 7.8) œ
	Month 12	2.5 (1.2, 5.4) *
	Month 18	2.3 (1.1, 5.1) *
Global change overall	Month 6	2.1 (1.0, 4.4) *
	Month 12	2.6 (1.2, 5.8) *
	Month 18	2.1 (1.0, 4.9) *

† For difference in change between-groups, positive difference favors PT+coaching while a negative difference favors PT.
^ For change within groups, negative change means improvement. For difference in change between-groups, negative difference in change between-groups favors PT+coaching while a positive difference favors PT.
‡ Odds ratio >1 favours PT+coaching
*p<0.05; œ p<0.01; ¥ p<0.001
NRS=Numeric Rating Scale (0-10); WOMAC=Western Ontario and McMaster Universities Osteoarthritis Index, physical function (0-68), pain (0-20); AQoL II=Assessment of Quality of Life Version 2, (-0.04-1.0); PASE=Physical Activity Scale for the Elderly (0->400); AAS=Active Australia Survey; AAS Total Activity Time = Active Australia Survey total activity time in the last week; AP=ActivPAL. Note: analyses for AAS total activity time was performed on a square-root transformed scale as assumptions of normality were violated.

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eTable 3: Hypothetical complete adherence analysis for difference in change between groups for primary outcome measures using multiply imputed data, assuming a linear effect of number of health coach calls on outcome, with full results shown for 6 health coach calls. A two-stage least squares instrumental variable approach accounting for clustering within physiotherapist and health coach was used.

Primary outcomes	Timeframe	Difference in change between-groups ‡
		PT+coaching vs PT
NRS overall pain †	Month 0-6	0.6 (-0.3, 1.4)
	Month 0-12	0.6 (-0.2, 1.5)
	Month 0-18	0.7 (-0.3, 1.8)
WOMAC function †	Month 0-6	2.1 (-2.6, 6.7)
	Month 0-12	4.4 (-0.2, 9)
	Month 0-18	4.6 (-0.1, 9.3)

† For difference in change between-groups, positive difference favors PT+coaching while a negative difference favors PT.

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eTable 4: Complete case analyses. Mean (sd) changes within groups and adjusted mean (95% confidence interval) difference in change between groups for continuous primary and secondary outcome measures. Analyses for AAS total activity time was performed on a square-root transformed scale as assumptions of normality were violated. Number and percentage of participants reporting improvement overall, and with respect to pain and function, in the two groups at three different time points. Odds ratios (95% confidence intervals) for improvement comparing the PT+coaching group to the PT group for the complete case data. Odds ratios greater than 1 favour the PT+coaching group.

Primary outcomes	Timeframe	Change within groups		Difference in change between-groups ‡
		PT+coaching	PT	PT+coaching vs PT
NRS overall pain †	Month 0-6	2.5 (1.9, 3.1)	2.0 (1.3, 2.6)	0.6 (-0.3, 1.5)
	Month 0-12	2.4 (1.7, 3.0)	2.0 (1.4, 2.6)	0.5 (-0.5, 1.5)
	Month 0-18	2.0 (1.3, 2.7)	1.6 (0.8, 2.3)	0.5 (-0.3, 1.4)
WOMAC function †	Month 0-6	12.4 (9.8, 15.0)	11.9 (9.5, 14.3)	1.7 (-1.9, 5.2)
	Month 0-12	13.6 (10.8, 16.4)	12.6 (9.9, 15.3)	2.5 (-1.6, 6.7)
	Month 0-18	14.9 (11.9, 18.0)	13.4 (10.2, 16.6)	3.3 (-1.9, 8.4)
Secondary outcomes				
NRS walking pain†	Month 0-6	2.9 (2.3, 3.5)	2.5 (1.9, 3.2)	0.3 (-0.5, 1.2)
	Month 0-12	2.8 (2.2, 3.4)	2.0 (1.3, 2.7)	0.7 (-0.3, 1.6)
	Month 0-18	2.7 (2.0, 3.3)	2.2 (1.3, 3.0)	0.4 (-0.5, 1.4)
WOMAC pain†	Month 0-6	3.8 (3.0, 4.6)	3.0 (2.1, 3.8)	1.0 (-0.1, 2.2)
	Month 0-12	3.7 (2.8, 4.7)	2.9 (2.0, 3.8)	1.1 (0.0, 2.2) *
	Month 0-18	3.7 (2.7, 4.7)	3.9 (2.8, 5.0)	0.0 (-1.5, 1.5)
AQoL II^	Month 0-6	-0.1 (-0.1, 0.0)	0.0 (-0.1, 0.0)	0.0 (-0.1, 0.0)
	Month 0-12	0.0 (-0.1, 0.0)	0.0 (-0.1, 0.0)	0.0 (-0.1, 0.1)
	Month 0-18	0.0 (-0.1, 0.0)	-0.1 (-0.1, 0.0)	0.0 (-0.1, 0.1)
PASE^	Month 0-6	-32 (-52, -12)	-4 (-19, 10)	-29 (-51, -7) *
	Month 0-12	-18 (-38, 2)	-12 (-29, 5)	-8 (-31, 16)
	Month 0-18	-23 (-46, 0)	-8 (-24, 7)	-17 (-42, 7)
AAS Total Activity Time^¢	Month 0-6	-3.7 (-6.5, -0.9)	-2.9 (-5.6, -0.1)	-1.9 (-4.9, 1.2)
	Month 0-12	-2.2 (-4.9, 0.6)	-4.2 (-7.0, -1.5)	1.5 (-2.6, 5.7)
	Month 0-18	-3.9 (-7.1, -0.7)	-1.9 (-4.2, 0.5)	-2.8 (-6.4, 0.8)
AP time stepping (hrs/day)^	Month 0-6	-0.1 (-0.3, 0.1)	-0.1 (-0.2, 0.0)	0.0 (-0.2, 0.2)
AP steps (n per day)^	Month 0-6	-473 (-1369, 423)	-401 (-1020, 218)	-162 (-1186, 863)
Adherence	**Timeframe**			**Difference in change between-groups ‡**
		PT+coaching	**PT**	**PT+coaching vs PT**
Self-Rated Adherence (0-10)	Months 0 to 6	7.4 (7.0, 7.9)	5.8 (5.0, 6.5)	1.7 (0.9, 2.5) ¥
	Months 6 to 12	4.1 (3.3, 4.9)	3.8 (3.0, 4.6)	0.3 (-0.9, 1.4)

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	Months 12 to 18	3.9 (3.2, 4.6)	3.3 (2.4, 4.2)	0.6 (-0.5, 1.7)
Home Exercise Adherence (%)	Month 0-6	69 (63, 75)	55 (47, 63)	14 (5, 24) œ
	Month 6-12	41 (32, 49)	37 (28, 47)	3 (-10, 15)
	Month 12-18	38 (30, 46)	33 (24, 42)	5 (-7, 17)
Global Change Improvements				
		Number (%) reporting improvement		
		PT+coaching	**PT**	**Odds Ratio (95% CI) ‡**
Global change in pain	Month 6	42/58 (72%)	30/57 (53%)	2.4 (1.1, 5.1) *
	Month 12	38/58 (66%)	25/54 (46%)	2.3 (1.0, 5.0) *
	Month 18	36/58 (62%)	28/52 (54%)	1.4 (0.7, 3.1)
Global change in function	Month 6	45/58 (78%)	26/57 (46%)	4.1 (1.8, 9.3) œ
	Month 12	36/58 (62%)	23/54 (43%)	2.2 (1.0, 4.8) *
	Month 18	39/58 (67%)	24/52 (46%)	2.5 (1.1, 5.6) *
Global change overall	Month 6	43/58 (74%)	30/57 (53%)	2.6 (1.2, 5.7) *
	Month 12	41/58 (71%)	26/54 (48%)	2.6 (1.1, 6.2) *
	Month 18	39/58 (67%)	25/52 (48%)	2.2 (1.0, 4.8) *
Global change in physical activity level	Month 6	37/58 (64%)	25/55 (45%)	2.1 (1.0, 4.5)
	Month 12	27/58 (47%)	19/54 (35%)	1.5 (0.6, 3.7)
	Month 18	37/58 (64%)	21/52 (40%)	2.6 (1.2, 5.6) *

† For change within groups, positive change means improvement. For difference in change between-groups, positive difference favors PT+coaching while a negative difference favors PT.
^ For change within groups, negative change means improvement. For difference in change between-groups, negative difference in change between-groups favors PT+coaching while a positive difference favors PT.
‡ Odds ratio >1 favours PT+coaching
*p<0.05; œ p<0.01; ¥ p<0.001
¢ analyses for AAS total activity time was performed on a square-root transformed scale as assumptions of normality were violated.
NRS=Numeric Rating Scale (0-10); WOMAC=Western Ontario and McMaster Universities Osteoarthritis Index, physical function (0-68), pain (0-20); AQoL II=Assessment of Quality of Life Version 2, (-0.04-1.0); PASE=Physical Activity Scale for the Elderly (0->400); AAS=Active Australia Survey; AAS Total Activity Time = Active Australia Survey total activity time in the last week;. AP=ActivPAL.

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eTable 5: Adverse events and co-interventions data according to group allocation presented as mean (SD) or number (%)

Measure	PT+coaching (n=84)	PT (n=84)
Total number of participants reporting adverse events during treatment phase [b d]	21 (32%)	21 (30%)
Total number of adverse events during treatment phase	23	27
Increased knee pain	17 (26%)	16 (23%)
Pain in other region	4 (6%)	9 (13%)
Swelling/Inflammation	1 (2%)	2 (3%)
Increased stiffness	1 (2%)	0 (0%)
Total number of participants reporting adverse events during months 6 to 18 [c d]	7 (11%)	12 (19%)
Total number of adverse events during months 6 to 18	8	13
Increased knee pain	5 (8%)	9 (15%)
Pain in other region	2 (3%)	4 (6%)
Swelling/Inflammation	1 (2%)	0 (0%)
Any medication use in the past month at month 6	33 (55%)	36 (60%)
Total number of medications used in the past month at month 6	53	62
Analgesia (paracetamol combinations)	18 (30%)	23 (38%)
Non-steroidal anti-inflammatories	9 (15%)	12 (20%)
COX-2 inhibitors	2 (3%)	1 (2%)
Topical anti-inflammatories	5 (8%)	8 (13%)
Oral corticosteroids	1 (2%)	0 (0%)
Glucosamine/chondroitin products	18 (30%)	18 (30%)
Any medication use in the past month at month 12 and 18	39 (64%)	41 (72%)
Total number of medications used in the past month at month 12 and 18	75	82
Analgesia (paracetamol combinations)	26 (43%)	27 (47%)
Non-steroidal anti-inflammatories	11 (18%)	16 (28%)
COX-2 inhibitors	5 (8%)	7 (12%)
Topical anti-inflammatories	9 (15%)	11 (19%)
Oral opioids	2 (3%)	0 (0%)
Glucosamine/chondroitin products	22 (36%)	21 (37%)
Number of participants reporting use of other health professionals during treatment phase [b]	60 (91%)	50 (71%) œ
Total number of other health professionals during treatment phase	118	92
General Practitioner	53 (80%)	43 (61%) *
Orthopaedic Surgeon	7 (11%)	3 (4%)
Rheumatologist	0 (0%)	1 (1%)
Musculoskeletal Doctor	2 (3%)	1 (1%)
Dentist	25 (38%)	22 (31%)
Allied Health [e]	31 (47%)	22 (31%)

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Number of participants reporting use of other health professionals during months 6 to 18 [c]	61 (97%)	57 (92%)
Total number of other health professionals during months 6 to 18	156	125
General Practitioner	58 (92%)	56 (90%)
Orthopaedic Surgeon	11 (17%)	5 (8%)
Rheumatologist	3 (5%)	2 (3%)
Musculoskeletal Doctor	4 (6%)	1 (2%)
Sports Physician	6 (10%)	4 (6%)
Dentist	31 (49%)	25 (40%)
Allied Health [e]	43 (68%)	32 (52%)

Abbreviation: COX=cyclooxygenase.
[a] Home exercise adherence was assessed by asking people how many times they had completed the exercises in the last two weeks (maximum of 6).
[b] Data obtained at months 3 and 6 and combined/averaged
[c] Data obtained at month 9, 12, 15 and 18 and combined/averaged
[d] An adverse event was defined as any problem from the treatment that lasted for more than two days and/or caused participant to take medication or seek other treatment.
[e] Allied Health includes Dietician, Occupational Therapist, Optometrist, Physiotherapist, Podiatrist, Psychologist, Social Worker and Acupuncturist.
*p<0.05; œ p<0·01; ¥ p<0·001

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