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Supplementary appendix

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

Supplement to: Holden MA, Hattle M, Runhaar J, et al. Moderators of the effect of therapeutic exercise for knee and hip osteoarthritis: a systematic review and individual participant data meta-analysis. *Lancet* 2023; published online June 12. https://doi.org/10.1016/S2665-9913(23)00122-4.

Appendix Table 1: Systematic review full search strategies for Medline and Embase

Medline search	Embase search
1. randomized controlled trial.pt. 2. controlled clinical trial.pt. 3. randomized.ab. 4. placebo.ab. 5. drug therapy.fs. 6. randomly.ab. 7. trial.ab. 8. groups.ab. 9. therapy.fs. 10. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 11. limit 10 to humans 12. exp Exercise Movement Techniques/ or exp Exercise/ or exp Exercise Therapy/ 13. ((strength$ or isometric$ or isotonic$ or isokinetic$ or endurance or weight$) adj5 train$).ti,ab. 14. (resistance adj5 (exercis$ or train$)).ti,ab. 15. ((physical$ or motion$) adj5 (fit$ or therap$)).ti,ab. 16. (physical$ adj5 activ$).ti,ab. 17. physiotherap$.ti,ab. 18. kinesiotherap$.ti,ab. 19. rehab$.mp. 20. exp Physical Fitness/ 21. (walk$ or jog$ or run$ or cycl$ or swim$ or treadmill$ or gym$ or bicycl$ or skat$ or row$).ti,ab. 22. exp Sports/ 23. sport$.ti,ab. 24. exercise$.ti,ab. 25. aerobic$.ti,ab. 26. yoga.mp. or (tai adj1 (chi or ji)).ti,ab. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier] 27. danc$.ti,ab. 28. (aqua$ or water).ti,ab. 29. hydro$.ti,ab. 30. exp Hydrotherapy/ 31. (stretch$ or flexib$ or balanc$ or propriocept$).ti,ab. 32. (circuit$ adj1 train$).ti,ab. 36. 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32	1. crossover procedure/ 2. double-blind procedure/ 3. randomized controlled trial/ 4. single-blind procedure/ 5. random$.ti,ab. 6. factorial$.ti,ab. 7. crossover$.ti,ab. 8. cross over$.ti,ab. 9. placebo$.ti,ab. 10. (doubl$ adj blind$).ti,ab. 11. (singl$ adj blind$).ti,ab. 12. assign$.ti,ab. 13. allocat$.ti,ab. 14. volunteer$.ti,ab. 15. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 16. exp exercise/ 17. exp kinesiotherapy/ 18. fitness/ 19. ((strength$ or isometric$ or isotonic$ or isokinetic$ or endurance or weight$) adj5 train$).ti,ab. 20. (resistance adj5 (exercis$ or train$)).ti,ab. 21. ((physical$ or motion$) adj5 (fit$ or therap$)).ti,ab. 22. (physical$ adj5 activ$).ti,ab. 23. physiotherap$.ti,ab. 24. kinesiotherap$.ti,ab. 25. rehab$.mp. 26. (walk$ or jog$ or run$ or cycl$ or swim$ or treadmill$ or gym$ or bicycl$ or skat$ or row$).ti,ab. 27. sport$.ti,ab. 28. exp SPORT/ 29. exercise$.ti,ab. 30. aerobic$.ti,ab. 31. (yoga or (tai adj1 (chi or ji))).ti,ab. 32. danc$.ti,ab. 33. (aqua$ or water).ti,ab. 34. hydro$.ti,ab. 35. exp hydrotherapy/ 36. (stretch$ or flexib$ or balanc$ or propriocept$).ti,ab. 37. (circuit$ adj1 train$).ti,ab. 38. or/16–37 39. exp OSTEOARTHRITIS/

37. exp Osteoarthritis/ 38. osteoarthr$.ti,ab. 39. OA.ti,ab. 40. degenerative arthritis.mp. 41. arthrosis.mp. 42. 37 or 38 or 40 or 41 43. exp Knee Joint/ or exp Knee/ 44. exp Hip Joint/ or exp Hip/ 45. (knee$ or hip$).ti,ab. 46. 43 or 44 or 45 47. 42 and 46 48. ((knee$ or hip$) adj5 pain).ti,ab. 49. 47 or 48 50. 11 and 36 and 49	40. osteoarthr$.ti,ab. 41. OA.ti,ab. 42. degenerative arthritis.mp. 43. arthrosis.mp. 44. 39 or 40 or 41 or 42 or 43 45. exp knee/ 46. exp HIP/ 47. (knee$ or hip$).ti,ab. 48. 45 or 46 or 47 49. 44 and 48 50. ((knee$ or hip$) adj5 pain).ti,ab. 51. 49 or 50 52. 15 and 38 and 51 53. limit 52 to human

Appendix Table 2: Systematic review eligibility criteria

	Inclusion criteria	Exclusion criteria
Population	● Knee and/or hip pain in adults aged 45 years and over (mean age over 45 years) ● Knee and/ or hip OA diagnosed by x-ray ● Knee and/ or hip OA diagnosed according to clinical criteria ● Knee and/ or hip OA diagnosed by health care professional ● Self-reported knee and/ or hip OA N.B: If population is mixed (e.g. OA and rheumatoid arthritis (RA), include if over 50% of participants have OA	● Knee and/ or hip pain attributable to conditions other than OA ● Non-musculoskeletal conditions ● Rheumatoid arthritis/ other defined inflammatory rheumatological problems ● Pre-operative patients (people on waiting lists for knee/hip surgery, including total joint replacement) ● Post-operative patients (immediately following knee/hip surgery, including total joint replacement) ● People with 'patellofemoral pain syndrome' (overall a different problem to 'OA') ● Animal based studies ● Studies of children
Intervention	● Any therapeutic exercise* intervention (land or water based), regardless of content, duration, frequency, or intensity	● Non exercise interventions ● Advice only to exercise or increase physical activity, including within wider OA self-management programmes ● Exercise or physical activity that was not specifically applied to improve OA symptoms and function ● Exercise combined with other treatment modalities other than advice/ education/ self-management/ motivational techniques ● Pre/post-operative exercise therapy, i.e. exercise

		immediately before, or following knee/hip surgery
Comparator	● Other forms of exercise (i.e. different type, duration, frequency or intensity of exercise if sufficiently different from the intervention arm), or no exercise control group (including usual care, waiting list, placebo, attention control, or no treatment) ● Sham treatment (e.g. sham ultrasound)	● If intervention groups receive identical therapeutic exercise interventions (i.e. no contrast existing between the intervention groups) ● If the comparator is a different intervention other than usual care (for example manual therapy, ultrasound, intra-articular injection, opioids, weight loss etc.), waiting list, placebo, attention control, or no treatment
Outcome measure	● Any self-reported measure of pain and/or physical function	● No measure of self-reported pain and/or physical function
Study design	● Randomised controlled trial ● Quasi-randomised controlled trial (where the method of allocation is known, but is not considered strictly random, e.g. alternation, date of birth, medical record number).	● Non-randomised controlled trial study design ● Other study designs e.g. surveys, observational studies, pre-post experiments (without a control group), qualitative studies ● Systematic reviews ● RCT protocols

Process of identifying potential moderators to include in our analyses

Prior to obtaining IPD and data analyses, a consensus process was undertaken with a large international group of STEER OA collaborators to rank the importance of potential treatment effect moderators. The 10 characteristics most frequently rated as being "most important" for moderating the effect of *either* pain or function following therapeutic exercise were then selected for inclusion in our meta-analysis [1] (11 potential moderators in total, see Appendix Tables 3 and 4 below). However, three potential moderators were not measured, or only measured in one included RCT that shared IPD (motivation to exercise, outcome expectations, instability (buckling), and were thus not able to be analysed. We therefore selected the next 3 most highly ranked potential moderators for pain and physical function outcomes. As a number of potential moderators were jointly ranked as 11th, 12th, and 13th, we explored the availability of all of these in the IPD datasets. Where measured in a sufficient number of RCTs, or in a consistent enough way to enable meaningful harmonisation of data, these potential moderators were then selected for inclusion in our analyses. The final potential moderators that were included in our analyses were: pain severity, physical function, age, body mass index (BMI), physical activity, arthritis self-efficacy, mental wellbeing, co-morbidity, muscle strength (quadriceps), educational attainment (as a proxy measure of socioeconomic status), pain duration, and radiographic joint structure.

The results of the moderator ranking exercise, and the final potential moderators available for inclusion in our analyses are shown in Table 3 and 4. Methods of harmonisation for potential moderators included in our analyses are shown in Table 5.

Appendix Table 3: Potential moderators ranked most highly for pain outcomes

Potential moderator	**Order of ranking of importance for potentially moderating pain outcomes**	**Measured in included RCTs that shared IPD to be able to be included in analyses (Yes/ No)**
Motivation to exercise	1	No
Outcome expectations	2	No
Pain severity*	3	Yes
Body mass index*	4	Yes
Anxiety/ depression (mental well being)*	5	Yes
Self-efficacy (arthritis self-efficacy)*	6	Yes
Strength of lower limb musculature*	7	Yes
Co-morbidities*	8	Yes
Age*	9	Yes
Instability (buckling)	10	No
Baseline physical activity level*	11	Yes
Pain elsewhere*	11	(Yes, analysed under co-morbidity)
Central pain sensitisation	11	No

Static/ dynamic alignment	11	No
Frailty	12	No
Socioeconomic status (education)*	12	Yes
Social support	12	No
Pain duration*	12	Yes
Physical function*	12	Yes
Radiographic joint structure*	12	Yes
Pain bothersomeness	13	No
Proprioception	13	No (too heterogenous to meaningfully combine)

* Potential moderator included in our analyses

Appendix Table 4: Potential moderators ranked most highly for physical function outcomes

Potential moderator	**Order of ranking of importance for potentially moderating physical function**	**Measured in included RCTs that shared IPD to be able to be included in analyses (Yes/ No)**
Motivation to exercise	1	No
Outcome expectations	2	No
Strength of lower limb musculature*	3	Yes
Body mass index*	4	Yes
Baseline physical activity level*	5	Yes
Age*	6	Yes
Co-morbidities*	7	Yes
Self-efficacy (arthritis self-efficacy)*	8	Yes
Pain severity*	9	Yes
Instability (buckling)	10	No
Frailty	11	No
Anxiety/ depression (mental well being)*	11	
Physical function*	11	Yes
Proprioception	12	No (too heterogenous to meaningfully combine)
Socioeconomic status (education)*	13	Yes
Pain elsewhere*	13	Yes (as co-morbidity)
Pain duration*	13	Yes

* Potential moderator included in our analyses

Appendix Table 5: Moderators prioritised that were available for harmonisation, and harmonisation methods

Potential moderator	Harmonisation methods	For pain outcome		For physical function outcome	
		Number of RCTS	Number of participants*	Number of RCTS	Number of participants*
Pain severity	If more than one pain score was reported, the highest in the hierarchy of outcome measures, as recommended by the Cochrane Musculoskeletal Review Group was chosen. All measures were continuous. Measures were converted such that low values meant no pain and high values meant most pain. Measures were then scaled to a 0 to 100 scale.	31	3955	30	3910
Physical function	If more than one physical function score was reported, the highest in the hierarchy of outcome measures, as recommended by the Cochrane Musculoskeletal Review Group was chosen. All measures were continuous. Measures were converted such that low values meant good physical function and high values meant poor physical function. Measures were then scaled to a 0 to 100 scale.	30	3921	30	3910
Age	Measured in years.	31	3955	30	3910
Body Mass Index	Used as reported or calculated from weight and height variables. Measured in kg/m^2.	28	3681	27	3635
Physical activity	Physical activity was harmonised using Physical Activity Scale for the Elderly (PASE) [2] scores where available. PASE score ranges from 0 to 400 or more, where higher scores indicate greater physical activity.	6	654	6	653
Arthritis self-efficacy	Arthritis self-efficacy score was harmonised to a 10-100 scale, where 10 is very uncertain and 100 is very certain.	3m: 4 6m: 2 12m: 3	3m: 521 6m: 235 12m: 479	3m: 4 6m: 2 12m: 3	3m: 528 6m: 243 12m: 486

Mental well being	Anxiety and depression measures were harmonised to a mental wellbeing variable. Separate measures for anxiety and depression were combined with equal weighting. Measures were converted such that low values represented good mental health and high values represented poor mental health. Measures were then scaled to a 0 to 100 scale.	15	2663	15	2663
Co-morbidity a) count	Counts were either recorded in the data or were summarised from comorbidities available in the data.	14	1933	14	1928
b) Presence of cardiac co-morbidity	Harmonised to binary yes/no. For studies with multiple cardiac problems recorded, if one or more was present then harmonised to yes.	10	1185	10	1194
c) Presence of respiratory co-morbidity	Harmonised to binary yes/no. For studies with multiple respiratory conditions recorded, if one or more was present then harmonised to yes.	9	1155	9	1149
d) Presence of other musculoskeletal co-morbidity	Harmonised to binary yes/no. For studies with multiple MSK conditions recorded, if one or more was present then harmonised to yes.	7	830	8	865
e) Presence of diabetes co-morbidity	Harmonised to binary yes/no.	5	715	5	721
f) Presence of mental health co-morbidity	Harmonised to binary yes/no. For studies with multiple cardiac problems, if one or more was present then harmonised to yes. It was decided to not use cut offs from anxiety/depression scores as there is no consensus in the literature.	5	608	5	614
Muscle strength (quadriceps)	Muscle strength was harmonised for quadriceps strength in Nm/kg. For studies that measured quadriceps strength in kg, these were converted to N by multiplying by 9.80665. Following studies also measured in N and kg (converted to N) were harmonised using the participant's weight measures and an approximation for the shank length (using lower limb length calculated from participant's height, age and sex [3].	11	1423	10	1385

Educational attainment	Recorded education categories were harmonised to a binary variable such that 0 was no higher education and 1 was any higher education.	3m: 5 6m: 4 12m: 2	3m: 547 6m: 438 12m: 291	3m: 4 6m: 3 12m: 2	3m: 511 6m: 402 12m: 288
Pain duration	Measured or converted to years. Pain duration harmonised as continuous were possible. Additionally harmonised as categorical: less than 1 year; 1-5 years; 5-10 years; over 10 years	13	1838	13	1833
Radiographic joint Structure	Measured using Kellgren-Lawrence grade [4].	3m: 4 6m: 2 12m: 4	3m: 364 6m: 264 12m: 411	3m: 4 6m: 2 12m: 4	3m: 364 6m: 264 12m: 412

For analyses using univariate meta-analyses, the number of RCTs and participants were recorded for each analysis at each time-point.

*The number of participants is the number that contributed to the analysis, the number that had follow-up data available.

Appendix Table 6: Summary of key baseline characteristics of participants in RCTs included in the IPD meta-analyses

Study ID	Intervention	N (%) female[a,b]	Age Years (standard deviation (SD))[a,b]	BMI Mean (standard deviation (SD))[a,b]
Allen 2018	I1: Internet-based exercise training	98 (69.01)	65.29 (11.46)	31.46 (7.78)
	I2: Wait list control	53 (77.94)	64.25 (12.21)	30.09 (7.26)
Bearne 2011	I1: Rehabilitation group	15 (62.50)	65.17 (6.72)	27.29 (4.53)
	I2: Usual GP care	19 (79.17)	67.17 (8.13)	26.88 (4.43)
Bennell 2010	I1: Hip strengthening group	23 (51.11)	64.52 (9.05)	27.51 (4.69)
	I2: No intervention	20 (45.45)	64.59 (7.55)	28.38 (4.12)
Bossen 2013	I1: Automated web-based physical activity intervention	60 (60.00)	60.96 (5.92)	27.65 (4.55)
	I2: Waiting list control	69 (69.70)	62.54 (5.36)	27.48 (4.49)
Brosseau 2012	I1: Walking and behavioural intervention	51 (73.91)	63.94 (8.21)	30.28 (5.62)
	I2: Walking intervention	55 (69.62)	63.92 (10.37)	29.42 (5.44)
	I3: Educational pamphlet	47 (63.51)	62.28 (6.77)	29.86 (5.34)
Cochrane 2005	I1: Water-based exercise	97 (63.40)	69.86 (6.82)	29.73 (5.05)

	I2: Usual care	99 (62.26)	69.63 (6.26)	29.79 (5.13)
de Rooij 2017	I1: Individualized, co-morbidity adapted exercise program	49 (77.78)	63.21 (8.38)	35.96 (6.76)
	I2: Current medical care	46 (73.02)	64.94 (9.43)	35.00 (7.58)
Fernandes 2010	I1: Patient education + supervised exercise	31 (56.36)	58.40 (10.00)	24.66 (3.21)
	I2: Patient education alone	28 (51.85)	57.21 (9.82)	24.92 (3.79)
Fransen 2007	I1: Hydrotherapy classes	34 (82.93)	70.00 (6.27)	29.99 (5.00)
	I2: Tai Chi classes	38 (67.86)	70.77 (6.32)	29.64 (5.85)
	I3: Waiting list control	34 (82.93)	69.61 (6.10)	30.65 (5.00)
French 2013	I1: Exercise therapy	34 (75.56)	61.76 (9.49)	29.67 (7.93)
	I2: Waiting list control	23 (53.49)	60.37 (9.91)	30.45 (5.98)
Hale 2012	I1: Water-based program	18 (78.26)	73.57 (7.30)	NS
	I2: Control (time-matched computer training program)	12 (75.00)	75.19 (4.58)	NS
Hay 2006	I1: Community physical therapy	71 (65.14)	67.94 (8.54)	28.02 (4.69)
	I2: Control (advice leaflet reinforced by telephone call)	70 (64.81)	68.232 (7.98)	29.22 (5.75)
Henriksen 2014	I1: Supervised exercise therapy	22 (88.00)	65.03 (8.91)	28.91 (4.13)
	I2: No attention control	17 (73.91)	61.30 (7.06)	28.18 (4.64)

Hinman 2007	I1: Aquatic physical therapy	24 (66.67)	63.34 (9.55)	33.75 (6.52)
	I2: Control (continue with usual daily activities and medication)	24 (68.57)	61.53 (7.80)	32.92 (6.60)
Hopman-Rock M 2000	I1: Self-management and exercise program	44 (78.57)	65.43 (5.27)	28.18 (4.73)
	I2: Control group	43 (87.76)	65.20 (5.73)	26.68 (3.48)
Hurley 2007	I1: Individual rehabilitation program	104 (71.23)	65.52 (8.51)	30.03 (5.39)
	I2: Group rehabilitation program	94 (71.21)	67.63 (7.83)	30.18 (5.59)
	I3: Usual primary care	96 (68.57)	66.76 (8.72)	30.26 (5.41)
Krauß 2014	I1: Exercise therapy	29 (40.85)	57.79 (10.42)	26.91 (3.68)
	I2: Placebo ultrasound treatment	32 (41.03)	58.19 (10.71)	26.84 (4.28)
	I3: No treatment control	28 (40.58)	60.14 (9.07)	27.52 (3.21)
Levinger 2018	I1: High speed resistance training	4 (44.44)	67.78 (6.28)	28.24 (5.63)
	I2: High speed resistance training plus balance exercises	6 (60.00)	65.1 (4.77)	33.99 (8.68)
	I3: Usual activities control	5 (55.56)	70.44 (7.83)	28.36 (3.87)
Lim 2008	I1: Quadriceps strengthening group	30 (56.60)	65.62 (8.21)	28.57 (4.52)
	I2: Control (no intervention)	29 (53.70)	63.56 (8.73)	29.33 (5.17)
Messier 2004	I1: Exercise only	20 (25.00)	69.02 (6.55)	34.21 (4.79)

	I2: Control (education)	25 (32.05)	68.61 (6.13)	34.26 (4.96)
Multanen 2014	I1: Supervised progressive exercise	40 (100.00)	57.25 (3.98)	27.23 (3.09)
	I2: No intervention control	40 (100.00)	58.2 (4.26)	26.74 (4.19)
Munukka 2016	I1: Supervised aquatic resistance training sessions	43 (100.00)	63.81 (2.41)	26.61 (3.81)
	I2: Control (usual level of physical activity)	44 (100.00)	63.91 (2.36)	27.10 (3.53)
Simão 2012	I1: Squat exercises on a vibratory platform	8 (72.73)*	75.27 (7.36)	30.32 (3.52)
	I2: Squat exercises without vibration	9 (90.00)	69.3 (3.68)	29.84 (2.53)
	I3: Control	10 (90.91)	71.18 (5.25)	26.70 (2.74)
Tak 2005	I1: Strength training	36 (65.45)	66.85 (7.41)	26.27 (3.47)
	I2: Control	39 (72.22)	68.60 (6.87)	26.62 (4.18)
Takacs 2017	I1: Dynamic balance and strength training	19 (95.00)	66.14 (8.74)	28.47 (5.35)
	I2: No intervention	13 (65.00)	67.10 (5.36)	28.89 (4.49)
Talbot 2003	I1: Pedometer-driven walking program with arthritis self-management	13 (76.47)	69.59 (6.60)	31.01 (5.76)
	I2: Self-management education	13 (76.47)	70.76 (4.62)	32.64 (6.76)
Teirlinck 2016	I1: Exercise therapy + GP care	63 (62.38)	64.18 (8.52)	27.38 (3.89)

	I2: GP care	56 (54.90)	66.59 (9.56)	28.26 (4.11)
Thomas 2002	I1: Exercise therapy	149 (63.40)*	61.54 (9.58)	28.02 (4.18)
	I3: No intervention	100 (64.10)	61.89 (9.59)	28.00 (5.17)
Tsai 2013	I1: Sun style Tai Chi classes	22 (78.57)	78.89 (6.91)	NS
	I2: Health education classes	18 (66.67)	78.93 (8.30)	NS
Van Baar 2001	I1: GP treatment + physical therapist-led exercise	76 (77.55)	68.29 (8.45)	NS
	I2: GP treatment	81 (79.41)	67.78 (9.22)	NS
Wallis 2017	I1: Intensive aquatic resistance training	9 (39.13)	67.57 (7.86)	34.16 (5.23)
	I2: Control (normal physical activity)	11 (47.83)	66.78 (7.27)	34.39 (7.42)

a. Unless otherwise stated
b. Where IPD were available, data shown in the table is derived from this. Some slight discrepancies may therefore exist between data in the table and published report

*1 missing sex information

Abbreviations: NS = Not stated

Appendix Table 7: Summary of therapeutic exercise interventions in RCTs included in the IPD meta-analyses

Study ID	Intervention	Duration (weeks)	Total no. exercise sessions	No. sessions per week	Booster sessions: yes (Y)/ no (N)	Predominant type of exercise[a]: (if strengthening predominant type)	Predominant intensity: (low (L), moderate (M), high (H)[b]	Predominant impact: (Low (L), high (H)[c]	Water (W), land-based (L), mixed (M)	Group (G), individual (I), mixed (M)	Supervis-ed (S), completed at home (H), mixed (M)	Face to face (F), remote (R), mixed (M)	Delivered by[d]:
Allen 2018	I1: Internet-based exercise training	16	At least 156	At least 3	N	Mixed	M	L	L	I	H	R	NA
Bearne 2011	I1: Rehabilitation group	5	10	2	N	Mixed	M	L	L	G	S	F	HCP
Bennell 2010	I1: Hip strengthening group	12	60	5	N	Strengthening (non-weight bearing/open kinetic chain)	M	L	L	I	H	F	HCP
Bossen 2013	I1: Automated web-based physical activity intervention	9	NS	NS	N	General aerobic	NS	NS	NS (based on preference)	I	H	R	Not applicable
Brosseau 2012	I1: Walking and behavioural intervention	52	Unclear	Unclear	N	General aerobic	M	L	L	NS	S	M	Exercise specialist

	I2: Walking intervention	52	156	3	N	General aerobic	M	L	L	NS	S	F	Exercise specialist
Cochrane 2005	I1: Water-based exercise	52	At least 84	At least 2	N	Mixed	M	L	W	G	S	F	Exercise specialist
de Rooij 2016	I1: Individualized, co-morbidity adapted exercise program	20	40 (140 inc. home exercise)	2 (7 inc. home exercises 5 times per wk)	N	Mixed	M	L	L	I	M	F	HCP
Fernandes 2010	I1: Patient education + supervised exercise	12	24-36	2-3	N	Mixed	M	L	L	I	M	F	HCP
Fransen 2007	I1: Hydrotherapy classes	12	24	2	N	Strengthening (mixed)	M	L	W	G	S	F	HCP
	I2: Tai Chi classes	12	24	2	N	Mind body	L	L	L	G	S	F	Exercise specialist
French 2013	I1: Exercise therapy	8	8 +HEP	6-8	N	Mixed	M	L	L	I	S	F	HCP
Hale 2012	I1: Water-based program	12	24	2	N	Mixed	M	L	W	G	S	F	Exercise specialist
Hay 2006	I1: Community physical therapy	10	3-6	NS	N	Mixed	M	L	L	I	S	F	HCP
Henriksen 2014	I1: Supervised exercise therapy	12	36	3	N	Strengthening (mixed)	M	L	L	G	S	F	HCP
Hinman 2007	I1: Aquatic physical therapy	6	12	2	N	Strengthening (mixed)	M	L	W	G	S	F	HCP

Hopman-Rock M 2000	I1: Self-management and exercise program	6	6	1 +HEP	N	Strengthening (mixed)	M	L	L	G	S	F	HCP
Hurley 2007	I1: Individual rehabilitation program	6	12	2	N	Mixed	M	L	L	I	S	F	HCP
	I2: Group rehabilitation program	6	12	2	N	Mixed	M	L	L	G	S	F	HCP
Krauß 2014	I1: Exercise therapy	12	36	3	N	Strengthening (mixed)	M	L	L	M	M	F	NS
Levinger 2018	I1: High speed resistance training	8	16	2	N	Strengthening (weight bearing/ closed kinetic chain)	M	L	L	I	S	F	Exercise specialist
	I2: High speed resistance training plus balance exercises	8	16	2	N	Mixed	M	L	L	I	S	F	Exercise specialist
Lim 2008	I1: Quadriceps strengthening group	12	60	5	N	Strengthening (non-weightbearing/open kinetic chain)	M	L	L	I	M	F	HCP
Messier 2004	I1: Exercise only	78	234	3	N	Mixed	M	L	L	M	M	M	NS
Multanen 2014	I1: Supervised progressive exercise	52	156	3	N	general (e.g. walking)	H	H	L	G	S	F	Exercise specialist
Munukka 2016	I1: Aquatic resistance exercise	16	48	3	N	strenghtening (non-weightbearing/open	H	L	W	G	S	F	NS

						kinetic chain)							
Simão 2012	I1: Squat exercises on a vibratory platform	12	36	3	N	Strengthening (weightbearing/closed kinetic chain)	M	L	L	G	S	F	Unclear
	I2: Squat exercises without vibration	12	36	3	N	Strengthening (weightbearing/closed kinetic chain)	M	L	L	G	S	F	Unclear
Tak 2005	I1: Strength training	8	8	1	N	Strengthening (mixed)	M	L	L	G	S	F	HCP
Takacs 2017	I1: Dynamic balance and strength training	10	40	4	N	Mixed	M	L	L	I	M	F	Exercise Specialist
Talbot 2003	I1: Pedometer-driven walking program with arthritis self-management	12	NS	NS	N	General (e.g. walking)	M	L	L	I	H	F	HCP
Teirlinck 2016	I1: Exercise therapy + GP care	12	12	1	Y	Mixed	M	L	L	I	M	F	HCP
Thomas 2002	I1: Exercise therapy	104	728	7	N	Strengthening (NS)	M	L	L	I	H	F	Study team member
Tsai 2013	I1: Sun style Tai Chi classes	20	60	3	N	mind-body (e.g. yoga)	L	L	L	G	S	F	Exercise specialist

Van Baar 2001	I1: GP treatment + physical therapist-led exercise	12	12-36	1-3	N	Mixed (NS)	NS	NS	L	I	S	F	HCP
Wallis 2017	I1: Walking program	12	NS	NS (70 min in total per wk)	N	General Aerobic	M	L	L	Either (based on preference)	S	F	HCP

a: Type of exercise categorised as: strengthening (either non-weight bearing/open kinetic chain; weight bearing/ closed kinetic chain; mixed), general aerobic (e.g. walking), mind-body (e.g. yoga), mixed, other

b: Intensity category based upon published information regarding target heart rate or Metabolic Equivalent (MET) score. High intensity = >70–85% Maximum Heart Rate (MHR) or MET score of >6; moderate intensity = 50–70% MHR or MET score of 3–6; Low intensity = <50% of MHR or MET score of <3

c: Low or high impact was categorised based on the likely amount of compressive load and whether both feet were intermittently off the ground. For example, cycling, swimming and walking = low impact; jogging, running and jumping = high impact.

d: Exercise deliverer categorised as: Health Care Professional (HCP); lay member; exercise specialist; study team member; automated (e.g. website)

Abbreviations: GP =General Practitioner; HCP = Health Care Professional; NS = Not stated

Appendix Table 8: Summary of risk of bias of RCTs included in the IPD meta-analyses

Study ID	Random Sequence generation	Allocation concealment	Blinding of outcome assessors*	Incomplete outcome data	Selective reporting	Other sources of bias
Allen 2018	Low	Low	Low	Low	Low	Low
Bearne 2011	Low	Low	Low	Unclear	Low	Low
Bennell 2010	Low	Low	Low	Low	Low	Low
Bossen 2013	Low	Low	Unclear	High	Low	Low
Brosseau 2012	Low	Low	Low	High	Low	Low
Cochrane 2005	Low	Low	Low	Low	Low	Low
de Rooij 2017	Low	Low	Low	Low	Low	Low
Fernandes 2010	Unclear	Unclear	Low	High	Low	Low
Fransen 2007	Low	Low	Low	Low	Low	Low
French 2013	Low	Low	Low	Low	Low	Low
Hale 2012	Low	Low	Low	Low	Low	Low
Hay 2006	Low	Low	Low	Low	Low	Low
Henriksen 2014	Low	Low	Low	Unclear	Low	Low
Hinman 2007	Low	Low	Low	Low	Low	Unclear
Hopman-Rock 2000	Unclear	Unclear	High	Low	Low	Unclear
Hurley 2007	Low	Low	Low	Low	Low	Unclear
Krauß 2014	Low	Low	Low	Low	Low	Low
Levinger 2018	Low	Low	Unclear	Low	Low	Low
Lim 2008	Low	Low	Low	Low	Low	Low
Messier 2004	Low	Low	Low	Unclear	Low	Low
Multanen 2014	Low	Low	Low	Low	Low	Low
Munukka 2016	Low	Low	Low	Low	Low	Low
Simão 2012	Low	Low	Low	Low	Low	Unclear
Tak 2005	Low	Unclear	High	Low	Low	Unclear
Takacs 2017	Low	Low	Low	Low	Low	Low
Talbot 2003	Low	Unclear	Low	Low	Low	Low
Teirlinck 2016	Low	Low	High	Low	Low	Low
Thomas 2002	Low	Unclear	Low	High	Unclear	Unclear
Tsai 2013	Low	Unclear	Low	Low	Low	Low
Van Baar 2001	Low	Low	Low	Low	Low	Low
Wallis 2017	Low	Low	Low	High	Low	Low

Assessed via the Cochrane Collaboration's tool (version 1.0) for assessing risk of, graded as unclear, high, or low risk of bias. Studies were not assessed for risk of bias against the criteria "blinding of participants and personnel" due to being unable to blind either participants or intervention deliverers to either receiving or delivering exercise.

* Where outcome measurement was collected via self-reported postal questionnaire, this was classed as low risk of bias.

Appendix Table 9: Summary of RCTs that were not included in the IPD meta-analyses

Study ID	Country	OA Site[a]	OA Diagnosis[b]	Total Participants	Intervention(s)	Pain outcome[c]	Function outcome[d]	Follow-up data available Short- (S)/ medium - (M)/ long- (L) term[e]	Funding source
Abbott 2013	New Zealand	Mixed	Clinical	206 (102 relevant)	I1: UC + Multi-modal exercise I2: UC	Pain overall (VAS)	WOMAC global scale	L	Health Research Council of New Zealand; New Zealand Lottery Grants Board
Aglamis 2008	Turkey	Knee	Comb.	34	I1: Exercise program I2: Control (1hr education)	Pain on walking (VAS)	Composite disability score other than WOMAC (SF-36 physical function subscale)	S	Not stated
Baker 2001	USA	Knee	X-ray	46	I1: Progressive strength training program I2: Attention control (nutrition education program)	WOMAC pain subscale	WOMAC disability subscale	M	Arthritis Foundation; American Federation of Aging Research; Life Fitness Academy; Farnsworth

									Trust Medical Foundation; Brookdale Foundation; USDA Cooperative Agreement; National Institutes of Health
Bautch 1997	USA	Knee	Comb.	34	I1: Exercise program I2: Minimal treatment group (12-wk, weekly educational program)	Pain overall (VAS)	Composite disability score other than WOMAC (AIMS)	S	Arthritis Foundation; Nurses Foundation of Wisconsin; University of Wisconsin-Madison School of Nursing Helen Denne Schulte Research Fund; National Aeronautics and Space Administration
Brismee 2007	USA	Knee	Clinical	41	I1: Tai chi exercise program I2: Attention control (group activities)	Pain overall (VAS)	WOMAC disability subscale	S	Lubbock Endowed Professorship Earnings; Texas Tech University Health Sciences Center School of Allied Health Sciences students' funding
Callaghan 1995	UK	Knee	Comb.	27	I1: Supervised exercise sessions I2: Advice and instruction session + functional home exercise regime I3: Control (sham electrical stimulation)	Pain overall (VAS)	Not measured	S	Not stated

Cheung 2014	USA	Knee	Clinical	36	I1: Yoga program I2: Waiting list control	WOMAC pain subscale	WOMAC disability subscale	S	the John A Hartford Foundation, Atlantic Philanthropies, Midwest Nursing Research Society Joanne Stevenson Seed Grant, and St. Catherine University
Cheung 2017	USA	Knee	Clinical	83	I1: Hatha yoga I2: Aerobic/strengthening exercises I3: Education control	Pain overall (VAS)	WOMAC disability subscale	S	the University of Iowa Hartford Center Geriatric Nursing Excellent Pilot Grant, and Deborah E. Powell Center of Mature Women's Health and Research Grants; the National Center for Advancing Translational Sciences Award
Chopp-Hurley 2017	Canada	Mixed	Clinical	24	I1: Exercise I2: No exercise (maintain existing physical activity level)	Other algo-functional scale (HOOS/ KOOS)	Other algofunctional scale (HOOS/ KOOS)	S	Labarge optimal Aging Effort fund, Centre of Research Expertise for the Prevention of MSK Disorders
da Silva 2015	Brazil	Knee	Clinical	41	I1: Group rehabilitation program I2: Education leaflet	Lequesne OA index global score	Lequense OA index function subscale score	S	Unfunded

de Oliveira 2012	Brazil	Knee	Clinical	100	I1: Exercise Group I2: Instruction Group (advice manual)	WOMAC pain subscale	WOMAC disability subscale	S	São Paulo Research Support Foundation Paulo
DeVita 2018	Denmark & USA	Knee	Comb.	30	I1: Quadriceps strengthening program I2: No attention control group	WOMAC pain subscale	WOMAC disability subscale	S	Biomechanics Laboratory in the Department of Kinesiology at East Carolina University, The Danish Rheumatism Association and The Oak Foundation.
Dias 2003	Brazil	Knee	Clinical	50	I1: Exercise and walking protocol I2: Control (education)	Lequesne OA index global score	Composite disability scores other than WOMAC (HAQ)	S,M	Grants from the Brazilian Government Funding Agency
Dias 2017	Brazil	Knee	Comb.	73	I1: Hydrotherapy I2 Control (education)	WOMAC pain subscale	WOMAC disability subscale	S	Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) and Coordenac ̧ão de Aperfeic ̧oamento de Pessoal de Nível Superior (CAPES).
Ettinger 1997	USA	Knee	X-ray	439	I1: Aerobic exercise program I2: Resistance exercise program I3: Health education program	Pain on activities other than walking (VAS)	Composite disability score other than WOMAC (Self-developed)	S,M,L	Claude D. Pepper Older Americans Independence Center of Wake Forest University through grant the National Institutes of Health;

									the General Clinical Research Center grant
Farr 2010	USA	Knee	Comb.	293	I1: Resistance training I2: Self-management I3: Combined treatment	WOMAC pain subscale	Not measured	S,L	National Institutes of Health/National Institute of Arthritis and Musculoskeletal and Skin Diseases grant
Foley 2003	Australia	Mixed	X-ray	105	I1: Hydrotherapy I2: Gym I3: Control (telephone calls)	WOMAC pain subscale	WOMAC disability subscale	S	Not Stated
Gür 2002	Turkey	Knee	Comb.	23	I1: concentric I2: Concentric-eccentric I3: Non-treatment	Pain overall (VAS)	Walking disability (VAS)	S	Not Stated
Halbert 2001	Australia	Mixed	self-reported OA/ pain	69	I1: Individualized physical activity advice I2: Control (usual GP care)	WOMAC pain subscale	WOMAC disability subscale	S,M,L	JH & JC Gunn Medical Research Foundation; National Health and Medical Research Council, Department of Health, Housing, Local Government and Community Services
Hartman 2000	USA	Mixed	Clinical and/ or X-ray	35	I1: Tai Chi classes I2: Control (usual physical activities and routine care)	Other algofunctional scale (AIMS 2 pain)	Not Measured	S	Not stated
Holsgaard-Larsen 2017	Denmark	Knee	Clinical	93	I1: Neuro-muscular exercise therapy program	Other algofunctio	Composite disability	S	Region of Southern Denmark

					I2: Instruction on optimized analgesics and anti-inflammatory drug use	nal scale (KOOS)	score other than WOMAC (KOOS)		PhD Fund; Region of Southern Denmark Research Fund; Danish Rheumatism Association; Danish Rheumatism Association Ryholts grant; University of Southern Denmark Scholarship; Association of Danish Physiotherapists; Odense University Hospital free research funds; Family Hede Nielsens Fund
Hughes 2004	USA	Mixed	Clinical	215	I1: Multiple-component training program followed + home-based adherence I2: Waiting list control	WOMAC pain subscale	WOMAC disability subscale	S,M,L	Chicago Chapter of the Arthritis Foundation; National Institute on Arthritis and Musculoskeletal Disease; National Institute on Aging and the Royal Center for Research on Applied Gerontology
Imoto 2012	Brazil	Knee	Comb.	100	I1: Exercise Group I2: Orientation Group (education)	Pain overall (NRS)	Composite disability score other than WOMAC (SF-36	S	Not Stated

							physical function)		
Jenkinson 2009	UK	Knee	self-reported OA/pain	389 (158 relevant)	I1: Quadriceps strengthening exercises alone I2: Advice leaflet only	WOMAC pain subscale	WOMAC disability subscale	S,M,L	Arthritis Research Campaign
Jorge 2015	Brazil	Knee	Comb.	60	I1: Progressive resistance exercise I2: Waiting list control	Pain overall (VAS)	WOMAC disability subscale	S	Brazilian fostering agencies - Fundação de Amparo à Pesquisa do Estado de São Paulo; Coordenação de Aperfeiçoamento de Pessoal de Nível Superior
Keefe 2004	USA	Knee	Clinical	72 (54 relevant)	I1: Spouse-assisted pain coping skills training + exercise therapy I2: Exercise therapy alone I3: Standard care	Other algo-functional scale (AIMS pain)	Not measured	S	National Institute of Arthritis and Musculoskeletal Diseases
Kim 2013	Japan	Knee	Self-reported OA/pain	150 (74 relevant)	I1: Exercise I2: Health education	Pain overall (VAS)	composite disability score other than WOMAC (JKOM difficulties with general activities)	S	Ministry of Health and Welfare of Japan, a Grant-in-Aid for Scientific Research B of the Japan Society for the Promotion of Science; Tokyo Research Laboratories of Kao Corporation

Kovar 1992	USA	Knee	Comb.	102	I1: Supervised fitness walking I2: Standard routine medical care	Other algo-functional scale (AIMS pain)	Composite disability scores other than WOMAC (AIMS physical domain)	S	Arthritis Foundation; National Institute for Arthritis and Musculoskeletal and Skin Diseases
Kuntz 2018	Canada	Knee	Clinical	31	I1: Biomechanically-based yoga exercise I2: Traditional exercise I3: No-exercise attention-equivalent control	Other algofunctional scale (KOOS)	composite disability score other than WOMAC (KOOS)	S	Canadian Institutes for Health Research Bridge Grant; Canada Foundation for Innovation and the Ontario Research Fund
Kuptniratsaikul 2002	Thailand	Knee	X-ray	392	I1: Group-based exercise I2: Control (education)	Other algo-functional scale (AIMS pain)	Global disability score	S,M,L	National Research Council of Thailand
Lee 2009	South Korea	Knee	Comb.	44	I1: Tai Chi Qigong training program I2: Waiting list control	WOMAC pain subscale	WOMAC disability subscale	S	Korea Science and Engineering Foundation grant funded by the Korean government
Li 2018	Canada	Knee	Clinical	61	I1: Physical activity education + Fitbit Flex + individual counselling I2: Control (no treatment)	Other algo-functional scale (KOOS)	Composite disability score other than WOMAC (KOOS)	S, M	Vancouver Coastal Health Research Institute Innovation & Translational Research Award

Lin 2009	Taiwan	Knee	Comb.	108	I1: Proprioceptive training I2: Strength training I3: Control (no intervention)	WOMAC pain subscale	WOMAC disability subscale	S	Health Promotion Fund 2005, Ministry of Health and Welfare, Republic of Korea
Lund 2008	Denmark	Knee	Clinical	79	I1: Aquatic exercise I2: Land-based exercise I3: Control (continue usual treatment)	Pain overall (VAS)	Composite disability score other than WOMAC (KOOS ADL subscale)	S	The Oak foundation; Research Foundation of the Danish Physiotherapy Association; Danish Rheumatism Association; Spies Foundation; H:S Central Research Fund
Mazloum 2018	Iran	Knee	Comb.	62	I1: Pilates I2: Conventional therapeutic exercise I3: Control (maintain usual routines)	Lequesne OA index global score	Lequesne OA index global score	S	This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors
McIlroy 2017	UK	Knee	Clinical	14	I1: Aquatic therapy I2: Control (usual care)	Pain overall (VAS)	Composite disability score other than WOMAC (SF-12 disability)	S	University College London Hospital Foundation NHS trust; Chartered Society of Physiotherapy Charitable Trust
Messier 1997	USA	Knee	Comb.	103	I1: Aerobic walking I2: Weight training I2: Health education control	Pain on walking (NRS)	Not measured	S,M,L	Not stated

Moonaz 2015	Canada	Knee	Clinical	75	I1: Yoga I2: Waiting list control	Other algo-functional scale (SF-36 pain)	WOMAC disability subscale	S,L	National Center for Complementary and Alternative Medicine pilot project; National Institute of Health; Arthritis Foundation doctoral dissertation award
O'Reilly 1999	UK	Knee	Clinical	191	I1: Exercise I2: No intervention	Pain on walking (VAS)	WOMAC disability subscale	S,M	Arthritis and Rheumatism Council for Research, UK
Park 2017	USA	Mixed	Clinical	131	I1: Chair yoga I2: Health education program	WOMAC pain subscale	WOMAC disability subscale	S,M	the National Institutes of Health, National Center for Complementary and Integrative Health
Patrick 2001	USA	Mixed	Clinical	249	I1: Aquatic exercise I2: Control (usual activities)	Other algo-functional scale (HAQ pain subscale)	Composite disability score other than WOMAC (HAQ disability subscale)	M	Centers for Disease Control and Prevention
Peloquin 1999	Canada	Knee	X-ray	137	I1: Supervised exercise I2: Control (usual activities)	Other algo-functional scale (AIMS 2 pain)	Composite disability score other than WOMAC (AIMS 2 walking and bending subscale)	S	Not stated

Poulsen 2013	Denmark	Hip	X-ray	118 (75 relevant)	I1: Hip school I2: Control (minimal intervention)	Pain overall (NRS)	Composite disability score other than WOMAC (HOOS)	S,M,L	Danish Foundation for Chiropractic Research and Postgraduate Education, Region of Southern Denmark, Danish Rheumatism Association and University of Southern Denmark
Rogers 2012	USA	Knee	Clinical	44	I1: Kinesthesia, balance and agility exercise program (KBA) I2: Resistance exercise training (RT) I3: KBA+RT I4: Control (inert lotion daily)	WOMAC pain subscale	WOMAC disability subscale	S	The TheraBand® Academy
Rogind 1998	Denmark	Knee	Comb.	25	I1: General physical training program I2: Control (not stated)	Pain overall (NRS)	Other algo-functional scale (Algofunctional Index)	S,L	Helsefonden; Kommunehospitalets Jublilaeumsfond
Rosedale 2014	Canada	Knee	Comb.	180	I1: Evidence based-exercise I2: Control (no exercise)	Pain overall (P4 pain scale)	Composite disability score other than WOMAC (KOOS)	S	The International MDT Research Foundation provided funding
Salacinski 2012	USA	Knee	X-ray	37	I1: Cycling I2: Control (continue usual activity)	Pain overall (VAS)	WOMAC disability subscale	S	PNC Bank Arthritis Research Fund (Pittsburgh, PA); Mad Dogg Athletics, Inc. (Mad Dogg Athletics played no role in study

									design, conduct, interpretation of the data, and publication of the study)
Salli 2010	Turkey	Knee	Comb.	71	I1: Combined concentric-eccentric isokinetic exercise I2: Isometric isokinetic exercise I3: Control (paracetamol)	Pain on activities other than walking (VAS)	WOMAC disability subscale	S,M	Not stated
Samut 2015	Turkey	Knee	Comb.	42	I1: Isokinetic exercise I2: Aerobic exercise I3: Control (education)	Pain overall (VAS)	WOMAC disability subscale	S	Hacettepe University Research Centre
Sayers 2012	USA	Knee	Clinical	33	I1: High-speed power training I2: Slow-speed strength training I3: Control (stretching exercise)	WOMAC pain subscale	WOMAC disability subscale	S	American College of Rheumatology; Arthritis Foundation
Schilke 1996	USA	Knee	Clinical	23	I1: Isokinetic muscle-strength-training program I2: Control (continue usual activities)	Other algofunctional scale (OA Screening Index pain subscale)	Composite disability score other than WOMAC (OA Screening Index mobility subscale)	S	Not stated
Segal 2015	USA	Knee	Comb.	56	I1: Individualized gait training I2: Usual care	Other algo-functional scale (KOOS)	Composite disability scores other than WOMAC (LLFDI Basic lower	S,M,L	Paul B. Beeson Career Development Award in Aging Research

							limb function score)		
Taglietti 2018	Brazil	Knee	Comb.	60	I1: Aquatic exercises I2: Educational program	Pain overall (VAS)	WOMAC disability subscale	S	Araucaria Research Foundation; National Council for Scientific and Technological Development
Thorstensson 2005	Sweeden	Knee	X-ray	61	I1: Short-term, high-intensity exercise program I2: Non-intervention control	Other algo-functional scale (KOOS)	Composite disability score other than WOMAC (KOOS ADL subscale)	S,M	Vårdal Foundation, Sweden; Swedish Rheumatism Association in Stockholm; Swedish Rheumatism Associa-tion in Gothenburg; Swedish Research Council; Department of Research and Development at Spenshult Hospital for Rheumatic Diseases, Halmstad, Sweden
Topp 2002	USA	Knee	Clinical	102	I1: Isometric resistance training I2: Dynamic resistance training I3: Control	WOMAC pain subscale	WOMAC disability subscale	S	National Institute for Nursing Research
Wang 2007	USA	Mixed	Clinical	42	I1: Aquatic program I2: Control (no intervention)	Pain overall (VAS)	Composite disability scores other than WOMAC (Multidime nsional Health Assessment	S	Biobehavioral Nursing Research Training Grant; Women's Health Nursing Research Training Grant; Hester McLaw Nursing Scholarship;

							Questionnaire activities of daily living subscale)		deTornyay Center for Health Aging Scholarship from the University of Washington
Wang 2009	USA	Knee	Comb.	40	I1: Tai Chi I2: Attention control	Pain overall (VAS)	WOMAC disability subscale	S,M,L	National Center for Complementary and Alternative Medicine of the NIH
Wang 2011	Taiwan	Knee	Comb.	84	I1: Aquatic exercise I2: Land-based exercise I3: Control (not stated)	Other algofunctional scale (KOOS pain)	Composite disability score other than WOMAC (KOOS function)	S	National Science Council of Republic of China
Wortley 2013	USA	Knee	Comb.	39	I1: Tai Ji program I2: Resistance training program I3: Control (usual physical activity and medication)	WOMAC pain subscale	WOMAC disability subscale	S	UTK Office of Research, College of Education, Health and Human Sciences, and University of Tennessee Medical Center, The University of Tennessee
Zhu 2017	China	Knee	Comb.	46	I1: Taijiquan (Tai Chi) exercise I2: Control (wellness education)	WOMAC pain subscale	WOMAC disability subscale	M	Shanghai City Committee of Science and Technology Key Project; Innovation Program of Shanghai Municipal Education Commission

a: Osteoarthritis (OA) site categorised as: knee; hip; mixed (knee and hip).

b: OA diagnosis categorised as: radiographic (X-ray); clinical, combined radiographic and clinical (comb.); self-reported OA/ pain.

c: Pain outcome chosen in accordance with the hierarchy recommended by the Cochrane Musculoskeletal Review Group [5], as follows: (1) pain overall; (2) pain on walking; (3) Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pain subscale; (4) pain on activities other than walking; (5) WOMAC global scale; (6) Lequesne osteoarthritis index global score; (7) other algofunctional scale; (8) patient's global assessment; (9) physician's global assessment (10) other outcome; (11) no continuous outcome reported.

d: Physical function outcome chosen in accordance with the hierarchy recommended by the Cochrane Musculoskeletal Review Group [5], as follows: (1) global disability score; (2) walking disability; (3) WOMAC disability subscore; (4) composite disability scores other than WOMAC; (5) disability other than walking; (6) WOMAC global scale; (7) Lequesne osteoarthritis index global score; (8) other algofunctional scale.

e: Follow-up time period categorised as: short-term (S) = nearest time-point to 12 weeks; medium-term (M) nearest time-point to 6 months; long-term (L) = nearest time-point to 12 months.

Abbreviations: AIMS = Arthritis Impact Measurement Scale; Comb. = Combined; GP = General Practitioner; HAQ = Health Assessment Questionnaire; HOOS = Hip Disability and Osteoarthritis Outcome Score; JKOM = Japanese Knee Osteoarthritis Measure; KOOS = Knee Injury and Osteoarthritis Outcome Score; LLFDI = Late-Life Function and Disability Instrument; NRS = Numeric Rating Scale; PA = Physical Activity; UC = Usual Care; UK = United Kingdom; USA = United States of America; VAS = Visual Analogue Scale; WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index.

Appendix Table 10: Summary of participant level characteristics of RCTs that were not included in the IPD meta-analyses

Study ID	Intervention	N (%) female[a,b]	Age Years (standard deviation (SD))[a,b]	BMI Mean (standard deviation (SD))[a,b]
Abbott 2013	I1: UC + Multi-modal exercise	32 (62.7)	66.9 (8.2)	29.3 (6.0)
	I2: UC	25 (49)	66.1 (10.7)	29.5 (5.8)
Aglamis 2008	I1: Exercise program	17 (100)	56.8 (6.0)	34.2 (5.1)
	I2: Control (1hr education)	14 (100)	54.4 (3.0)	32.1 (4.6)
Baker 2001	I1: Progressive strength training program	17 (73.9)	69 (6.0)	31 (4.0)
	I2: Attention control (nutrition education program)	19 (86.4)	68 (6.0)	68 (6.0)
Bautch 1997	I1: Exercise program	4 (66.7)	66 2.4)	32.59 (1.1)
	I2: Minimal treatment group (12-wk, weekly educational program)	4 (80)	70 (2.1)	24.92 (1.4)
Brismee 2007	I1: Tai chi exercise program	19 (86.4)	70.89 (9.8)	27.96 (5.92)
	I2: Attention control (group activities)	15 (78.9)	68.89 (8.9)	27.7 (6.57)
Callaghan 1995	I1: Supervised exercise sessions	4 (50)	Median (range) 59 (35-80)	NS
	I2: Advice and instruction session + functional home exercise regime	2 (100)	Median (range) 49 (29-78)	NS

	I3: Control (sham electrical stimulation)	5 (55.6)	Median (range) 52 (41-77)	NS
Cheung 2014	I1: Yoga program	18 (100)	71.9 (95% CI: 69.3, 74.6)	29.1 (95% CI: (26.7, 31.7)
	I2: Waiting list control	18 (100)	71.9 (95% CI:69.0, 75.0)	28.8 (95% CI:26.0, 31.7)
Cheung 2017	I1: Hatha yoga	NS	68.9 (7.7)	29.8 (6.3)
	I2: Aerobic/strengthening exercises	NS	74.4 (7.5)	29.2 (7.1)
	I3: Education control	NS	71.8 (8.0)	27.8 (7.9)
Chopp-Hurley 2017	I1: Exercise	10 (83)	52.8 (6.4)	30.7 (6.8)
	I2: No exercise (maintain existing physical activity level)	9 (75)	54.9 (6.7)	27.6 (3.4)
da Silva 2015	I1: Group rehabilitation program	13 (86.87)	57 (6.01)	29.37 (4.10)
	I2: Education leaflets	13 (86.67)	60 (7.76)	29.29 (5.00)
DeVita 2018	I1: Quadriceps strengthening program	10 (66.7)	58.1 (6.5)	26.4 (4.0)
	I2: No attention control group	8 (53.3)	56.2 (8.9)	27.9 (3.9)
de Oliveira 2012	I1: Exercise Group	45 (90)	61.50 (6.94)	29.72 (4.11)
	I2: Instruction Group	47 (94)	58.78 (9.60)	30.00 (5.05)

Dias 2003	I1: Exercise and walking protocol	21 (84)	Median (interquartile range) 74 (65–89)	NS
	I2: Control (education)	23 (92)	Median (interquartile range) 76 (65–83)	NS
Dias 2017	I1: Hydrotherapy	37 (100)	70.8 (5.0)	30.5 (4.3)
	I2 Control (education)	36 (100)	71.0 (5.2)	30.0 (5.2)
Ettinger 1997	I1: Aerobic exercise program	99 (69)	69 (6)	NS
	I2: Resistance exercise program	107 (73)	68 (6)	NS
	I3: Health education program	102 (69)	69 (6)	NS
Farr 2010	I1: Resistance training	N=NS (73)	55.5 (7.3)	27.5 (4.5)
	I2: Self-management	N=NS (72)	55.8 (6.1)	28.0 (4.0)
	I3: Combined treatment	N=NS (79)	54.2 (7.3)	27.2 (4.2)
Foley 2003	I1: Hydrotherapy	15 (43)	73.0 (8.2)	NS
	I2: Gym	17 (49)	69.8 (9.2)	NS
	I3: Control (telephone calls)	20 (57)	69.8 (9.0)	NS
Gür 2002	I1: concentric	NS	56 (12.0)	NS

	I2: Concentric-eccentric	NS	55 (12.0)	NS
	I3: Non-treatment	NS	57 (9.0)	NS
Halbert 2001	I1: Individualized physical activity advice	24 (65)	68.3 (6.0)	27.9 (4.1)
	I2: Control (usual GP care)	17 (53)	69.7 (5.7)	27.7 (3.8)
Hartman 2000	I1: Tai Chi classes	15 (83)	68.6 (7.9)	NS
	I2: Control (usual physical activities and routine care)	13 (87)	67.5 (6.1)	NS
Holsgaard-Larsen 2017	I1: Neuro-muscular exercise therapy program	26 (62)	57.9 (7.9)	26.8 (3.3)
	I2: Instruction on optimized analgesics and anti-inflammatory drug use	25 (54)	58.3 (8.1)	27.0 (2.9)
Hughes 2004	I1: Multiple-component training program followed + home-based adherence	N=NS (81)	73.5 (6.75)	NS
	I2: Waiting list control	N=NS (87.1)	73.7 (6.32)	NS
Imoto 2012	I1: Exercise Group	N=NS (90)	61.50 (6.94)	29.72 (4.11)
	I2: Orientation Group (education)	N=NS (94)	58.78 (9.60)	30.00 (5.05)
Jenkinson 2009	I1: Quadriceps strengthening exercises alone	56 (68)	61.1 (9.8)	Median (IQR) 34.8 (6.6)
	I2: Advice leaflet only	49 (65)	61.5 (9.2)	Median (IQR) 33.0 (6.5)
Jorge 2015	I1: Progressive resistance exercise	29 (100)	61.7 (6.4)	30.6 (5.75)

	I2: Waiting list control	31 (100)	59.9 (7.5)	31.4 (4.42)
Keefe 2004	I1: Spouse-assisted pain coping skills training + exercise therapy	13 (65)	60.20 (9.09)	NS
	I2: Exercise therapy alone	6 (37.5)	60.25 (8.74)	NS
	I3: Standard care	11 (61.1)	57.56 (14.27)	NS
Kim 2013	I1: Exercise	37 (100)	80.86 (2.30)	23.67 (3.20)
	I2: Health education	37 (100)	80.54 (2.70)	23.59 (3.09)
Kovar 1992	I1: Supervised fitness walking	40 (76.9)	70.38 (9.11)	NS
	I2: Standard routine medical care	45 (90)	68.48 (11.32)	NS
Kuntz 2018	I1: Biomechanically-based yoga exercise	10 (100)	65.5 (5.6)	30.1 (3.8)
	I2: Traditional exercise	11 (100)	63.7 (8.9)	28.9 (6.4)
	I3: No-exercise attention-equivalent control	10 (100)	71.1 (9.3)	32.3 (5.7)
Kuptniratsaikul 2002	I1: Group-based exercise	158 (79.4)	67.9 (5.7)	NS
	I2: Control	148 (76.7)	67.6 (6.1)	NS
Lee 2009	I1: Tai Chi Qigong training program	27 (93.1)	70.2 (4.8)	26.0 (3.8)
	I2: Waiting list control	14 (93.3)	66.9 (6.0)	26.0 (2.8)

Li 2018	I1: Physical activity education + Fitbit Flex + individual counselling	22 (73)	61.3 (9)	29.2 (5.5)
	I2: Control (no treatment)	28 (90)	62.1 (9)	29.2 (4.8)
Lin 2009	I1: Proprioceptive training	25 (69.4)	63.7 (8.2)	NS
	I2: Strength training	24 (66.7)	61.6 (7.2)	NS
	I3: Control (no exercise)	26 (72.2)	62.2 (6.7)	NS
Lund 2008	I1: Aquatic exercise	22 (83)	65 (12.6)	NS
	I2: Land-based exercise	22 (88)	68 (9.5)	NS
	I3: Control	18 (66)	70 (9.9)	NS
Mazloum 2018	I1: Pilates	NS	55.0 (8.2)	NS
	I2: Conventional therapeutic exercise	NS	50.3 (8.3)	NS
	I3: Control	NS	50.8 (9.9)	NS
McIlroy 2017	I1: Aquatic therapy	7 (100)	64.3 (8.7)	32.4 (6.2)
	I2: Control (usual care)	7(100)	62.3 (6.6)	34.6 (10.3)
Messier 1997	I1: Aerobic walking	27 (81.8)	70.3 Standard Error SE (1.3)	31.4 (1.0)
	I2: Weight training	23 (67.6)	67.2 (SE 0.9)	30.1 (0.9)
	I3: Health education control	28 (37.8)	69.2 (SE1.0)	32.5 (0.9)

Moonaz 2015	I1: Yoga	40 (100)	49.2 (13.2)	NS
	I2: Waiting list control	32 (91)	55.9 (8.9)	NS
O'Reilly 1999	I1: Exercise	N=NS (64.8)	61.94 (10.01)	NS
	I2: No intervention	N=NS (68.1)	62.15 (9.73)	NS
Park 2017	I1: Chair yoga	44 (69.8)	75.9 (8.2)	NS
	I2: Health education program	41 (83.5)	74.5 (6.5)	NS
Patrick 2001	I1: Aquatic exercise	N=NS (85.3)	65.7 (SD NS)	NS
	I2: Control (usual activities)	N=NS (87.1)	66.1 (SD NS)	NS
Peloquin 1999	I1: Supervised exercise	42 (71.19)	65.64 (7.4)	29.79 (4.51)
	I2: Control (usual activities)	45 (69.23)	66.43 (8.29)	29.77 (4.83)
Poulsen 2013	I1: Hip school	14 (38)	65.5 (7.3)	27.4 (3.4)
	I2: Control (minimal intervention)	17 (47)	62.5 (9.4)	26.7 (4.2)
Rogers 2012	I1: Kinesthesia, balance and agility exercise program (KBA)	N=NS (69)	70.7 (10.7)	28.9 (SD NS)
	I2: Resistance exercise training (RT)	N=NS (70)	70.8 (6.5)	28.2 (SD NS)
	I3: KBA+RT	N=NS (75)	68.8 (10.1)	29.2 (SD NS)
	I4: Control (inert lotion daily)	N=NS (67)	71.2 (10.9)	30.8 (SD NS)

Rogind 1998	I1: General physical training program	10 (90.9)	69.3 (8.2)	27.4 (4.0)
	I2: Control	11 (91.7)	73.0 (6.5)	26.8 (3.2)
Rosedale 2014	I1: Evidence based-exercise	55 (56)	66 (10)	31.4 (7.7)
	I2: Control (no exercise)	34 (60)	64 (11)	30.7 (5.3)
Salacinski 2012	I1: Cycling	15 (79)	55.1 (10.5)	22.4 (3.3)
	I2: Control (continue usual activity)	12 (67)	60.6 (8.4)	25.7 (6.3)
Salli 2010	I1: Combined concentric-eccentric isokinetic exercise	Unclear	Unclear	Unclear
	I2: Isometric isokinetic exercise	Unclear	Unclear	Unclear
	I3: Control (paracetamol)	Unclear	Unclear	Unclear
Samut 2015	I1: Isokinetic exercise	NS	62.46 (7.71)	30.54 (4.45)
	I2: Aerobic exercise	NS	57.57 (5.79)	33.94 (7.33)
	I3: Control (education)	NS	60.92 (8.85)	30.36 (5.67)
Sayers 2012	I1: High-speed power training	9 (75)	66.9 (4.9)	28.4 (5.7)
	I2: Slow-speed strength training	8 (80)	65.9 (8.3)	33.1 (8.9)
	I3: Control	8 (72.7)	68.4 (8.1)	30.8 (6.8)
Schilke 1996	I1: Isokinetic muscle-strength-training program	NS	NS	NS

	I2: Control (continue usual activities)	NS	NS	NS
Segal 2015	I1: Individualized gait training	22 (75.9)	69.1 (7.3)	NS
	I2: Usual care	10 (52.6)	69.6 (6.4)	NS
Taglietti 2018	I1: Aquatic exercises	23 (74.2)	67.3 (5.9)	29.2 (0.8)
	I2: Educational program	18 (62.1)	68.7 (6.7)	30.4 (0.9)
Thorstensson 2005	I1: Short-term, high-intensity exercise program	15 (50)	54.8 (7.1)	29.6 (4.5)
	I2: Non-intervention control	16 (52)	57.3 (4.7)	29.5 (5.1)
Topp 2002	I1: Isometric resistance training	21 (66)	63.53 (1.90)	NS
	I2: Dynamic resistance training	25 (71)	65.57 (1.82)	NS
	I3: Control	28 (80)	60.94 (1.82)	NS
Wang 2007	I1: Aquatic program	16 (80)	69.3 (13.3)	NS
	I2: Non-exercise control	16 (88.9)	62.7 (10.7)	NS
Wang 2009	I1: Tai Chi	16 (80)	63 (8.1)	30.0 (5.2)
	I2: Attention control	14 (70)	68 (7.0)	29.8 (4.3)
Wang 2011	I1: Aquatic exercise	22 (84.6)	66.7 (5.6)	26.6 (2.5)
	I2: Land-based exercise	23 (88.5)	68.3 (6.4)	25.4 (2.4)

	I3: Control	22 (84.6)	67.9 (5.9)	26.6 (2.08)
Wortley 2013	I1: Tai Ji program	9 (75)	68.1 (5.3)	35.1 (5.9)
	I2: Resistance training program	9 (69.2)	69.5 (6.7)	30.5 (6.0)
	I3: Control (usual physical activity and medication)	2 (33.3)	70.5 (5.0)	30.0 (6.2)
Zhu 2017	I1: Taijiquan (Tai Chi) exercise	23 (100)	64.6 (3.4)	25.2 (3.5)
	I2: Control (wellness education)	23 (100)	64.5 (3.4)	25.0 (3.4)

Abbreviations: NS = Not stated

Appendix Table 11: Description of therapeutic exercise interventions tested in RCTs that were not included in the IPD meta-analyses

Study ID	Intervention	Duration (weeks)	Total no. exercise sessions	No. sessions per week	Booster sessions: yes (Y)/ no (N)	Predominant type of exercise[a]: (if strengthening predominant type)	Predominant intensity: (low (L), moderate (M), high (H)[b]	Predominant impact: (Low (L), high (H)[c]	Water (W), land-based (L), mixed (M)	Group (G), individual (I), mixed (M)	Supervis-ed (S), completed at home (H), mixed (M)	Face to face (F), remote (R), mixed (M)	Delivered by[d]:
Abbott 2013	I1: UC + Multi-modal exercise	16 (9 wks, boosters at 16 wks)	9 (7 + 2 boosters)	7 over wks 1-9, 2 at wk 16	Y	Mixed	M	L	L	I	M	F	HCP
Aglamis 2008	I1: Exercise program	12	36	3	N	Mixed	M	L	L	I	S	F	Exercise specialist
Baker 2001	I1: Progressive strength training program	16	48	3	N	Strengthening (mixed)	M	L	L	I	M	F	NS
Bautch 1997	I1: Exercise program	12	36	3	N	General aerobic	L	L	L	I	S	F	Study team member
Brismee 2007	I1: Tai chi exercise program	12	36	3	N	Mind Body	L	L	L	M	M	F	Exercise specialist
Callaghan 1995	I1: Supervised exercise sessions	4	8	2	N	Strengthening (non-weight bearing/open kinetic chain)	L	L	L	I	S	F	HCP
	I2: Advice and instruction session + functional home exercise regime	4	28	7	N	Strengthening (weight bearing/	M	L	L	I	H	F	HCP

						closed kinetic chain)							
Cheung 2014	I1: Yoga program	8	40	5	N	Mind-body	L	L	L	M	M	F	Exercise specialist
Cheung 2017	I1: Hatha yoga	8	40	5	N	Mind body	L	L	L	Mixed	M	F	Exercise specialist
	I2: Aerobic/strengthening exercises	8	40	5	N	Mixed	M	L	L	Mixed	M	F	Exercise specialist
Chopp-Hurley 2017	I1: Exercise	12	36	3	N	Strengthening (mixed)	M	L	L	G	S	F	Exercise specialist
da Silva 2015	I1: Group rehabilitation program	8	16	2	N	Mixed	M	L	L	G	S	F	HCP
de Oliveira 2012	I1: Exercise Group	8	16	2	N	Mixed	M	L	L	NS	NS	NS	NS
DeVita 2018	I1: Quadriceps strengthening program	12	36	3	N	Strengthening (mixed)	M	L	L	NS	S	F	NS
Dias 2003	I1: Exercise and walking protocol	Not clear	Not clear	Not clear	N	Mixed	Not clear	L	L	NS	M	F	HCP
Dias 2017	I1: Hydrotherapy	6	12	2	N	Strengthening (mixed)	M	L	W	G	S	F	Study Team Member
Ettinger 1997	I1: Aerobic exercise program	72	216	3	N	General (aerobic)	M	L	L	M	M	M	Exercise specialist
	I2: Resistance exercise program	72	216	3	N	Strengthening (mixed)	M	L	L	M	M	M	Exercise specialist
Farr 2010	I1: Resistance training	36	108	3	N	Mixed	M	L	L	G	S	F	Exercise specialist
Foley 2003	I1: Hydrotherapy	6	18	3	N	Strengthening (non-weight	M	L	W	NS	NS	NS	NS

						bearing/open kinetic chain)							
	I2: Gym	6	18	3	N	Strengthening (mixed)	M	L	L	NS	NS	NS	NS
Gür 2002	I1: concentric	8	24	3	N	Strengthening (non-weight bearing/open kinetic chain)	M	L	L	I	S	F	NS
	I2: Concentric-eccentric	8	24	3	N	Strengthening (non-weight bearing/open kinetic chain)	M	L	L	I	S	F	NS
Halbert 2001	I1: Individualized physical activity advice	52	156	3	Y	General aerobic	M	L	L	I	H	F	Exercise specialist
Hartman 2000	I1: Tai Chi classes	12	24	2 + daily Tai Chi practice	N	mind-body (e.g. yoga)	L	L	L	G	S	F	Exercise specialist
Holsgaard-Larsen 2017	I1: Neuro-muscular exercise therapy program	8	16	2	N	Mixed	M	L	L	G	S	F	HCP
Hughes 2004	I1: Multiple-component training program followed + home-based adherence	8	24	3	N	Mixed	M	L	L	G	S	F	HCP
Imoto 2012	I1: Exercise Group	8	16	2	N	Strengthening (non-weightbearing/open kinetic chain)	M	L	L	G	NS	NS	NS
Jenkinson 2009	I1: Quadriceps strengthening exercises alone	104	728	7	N	Strengthening (mixed)	M	L	L	I	H	F	Study team member

Jorge 2015	I1: Progressive resistance exercise	12	24	2	N	Strengthening (unclear)	M	L	L	NS	NS	F	HCP
Keefe 2004	I1: Spouse-assisted pain coping skills training + exercise therapy	Not clear	12	Not clear	N	Mixed	M	L	L	G	S	F	HCP
	I2: Exercise therapy alone	12	36	3	N	Mixed	M	L	L	G	S	F	Exercise specialist
Kim 2013	I1: Exercise	12	24	2	N	Strengthening (non-weightbearing/open kinetic chain)	M	L	L	G	S	F	Exercise specialist
Kovar 1992	I1: Supervised fitness walking	8	24	3	N	general (e.g. walking)	M	L	L	G	S	F	HCP
Kuntz 2018	I1: Biomechanically-based yoga exercise	12	36	3	N	Mind-body	L	L	L	G	S	F	ES
	I2: Traditional exercise	12	36	3	N	Strengthening (mixed)	M	L	L	NS	S	F	ES and HCPs
Kuptnirats aikul 2002	I1: Group-based exercise	8	16	2	N	Strengthening (NS)	NS	NS	L	G	S	F	HCP
Lee 2009	I1: Tai Chi Qigong training program	8	16	2	N	mind-body (e.g. yoga)	M	L	L	G	S	F	NS
Li 2018	I1: Physical activity education + Fitbit Flex + individual counselling	Unclear	Unclear	Unclear	N	General aerobic	Unclear	Unclear	L	M	M	M	HCP
Lin 2009	I1: Proprioceptive training	8	24	3	N	Other	L	L	L	I	NS	NS	NS
	I2: Strength training	8	24	3	N	Strengthening (non-weightbearin	M	L	L	I	NS	NS	NS

						g/open kinetic chain)							
Lund 2008	I1: Aquatic exercise	8	16	2	N	Mixed	M	L	W	G	S	F	HCP
	I2: Land-based exercise	8	16	2	N	Mixed	M	L	L	G	S	F	HCP
Mazloum 2018	I1: Pilates	8	24	3	N	Mind-body	L	L	L	NS	S	F	NS
	I2: Conventional therapeutic exercise	8	24	3	N	Mixed	L	L	L	NS	NS	NS	NS
McIlroy 2017	I1: Aquatic therapy	6	6	1	N	Strength (mixed)	M	L	W	G	S	F	HCP
Messier 1997	I1: Aerobic walking	78	234	3	N	general (e.g. walking)	M	L	L	M	M	M	NS
	I2: Weight training	78	234	3	N	Strengthening (Mixed)	M	L	L	M	M	M	NS
Moonaz 2015	I1: Yoga	8	16	2	N	mind-body (e.g. yoga)	L	L	L	G	S	F	Exercise specialist
O'Reilly 1999	I1: Exercise	24	168	7	N	Strengthening (mixed)	M	L	L	I	H	F	HCP
Park 2017	I1: Chair yoga	8	16	2	N	Mind-body	L	L	L	G	S	F	Exercise specialist
Patrick 2001	I1: Aquatic exercise	20	varied	2-7	N	Mixed	NS	NS	W	G	S	F	Exercise specialist
Peloquin 1999	I1: Supervised exercise	12	36	3	N	Mixed	M	L	L	G	S	F	NS
Poulsen 2013	I1: Hip school	6	5	0-1	N	Other	L	L	L	M	M	F	HCP
Rogers 2012	I1: Kinesthesia, balance and agility exercise program (KBA)	8	24	3	N	Mixed	M	L	L	I	M	M	Study team member
	I2: Resistance exercise training (RT)	8	24	3	N	Strengthening (non-weightbearin	M/L	L	L	I	M	M	Study team member

						g/open kinetic chain)							
	I3: KBA+RT	8	24	3	N	Mixed	M	L	L	I	M	M	Study team member
Rogind 1998	I1: General physical training program	12	varied	2-6	N	Mixed	M	L	L	I	M	F	HCP
Rosedale 2014	I1: Evidence based-exercise	2	8-12	4-6	N	Other	L	L	L	I	S	F	HCP
Salacinski 2012	I1: Cycling	12	24	2	N	General (e.g. walking)	H	L	L	G	S	F	Exercise specialist
Salli 2010	I1: Combined concentric-eccentric isokinetic exercise	8	24	3	N	Strengthening (non-weightbearing/open kinetic chain)	M	L	L	I	S	F	HCP
	I2: Isometric isokinetic exercise	8	24	3	N	Strengthening (non-weightbearing/open kinetic chain)	M	L	L	I	S	F	HCP
Samut 2015	I1: Isokinetic exercise	6	18	3	N	Strengthening (non-weightbearing/open kinetic chain)	M	L	L	Unclear	S	F	Unclear
	I2: Aerobic exercise	6	18	3	N	general (e.g. walking)	M	L	L	Unclear	S	F	Unclear
Sayers 2012	I1: High-speed power training	12	36	3	N	Strengthening (non-weightbearing/open kinetic chain)	M	L	L	I	S	F	HCP
	I2: Slow-speed strength training	12	36	3	N	Strengthening (non-weightbearing/open kinetic chain)	M	L	L	I	S	F	HCP

Schilke 1996	I1: Isokinetic muscle-strength-training program	8	24	3	N	Strengthening (unclear)	unclear	unclear	unclear	unclear	unclear	unclear	Unclear
Segal 2015	I1: Individualized gait training	12	24	2	N	General (e.g. walking)	L	L	L	I	M	M	HCP
Taglietti 2018	I1: Aquatic exercises	8	16	2	N	Mixed	M	L	W	I	S	F	HCP
Thorstensson 2005	I1: Short-term, high-intensity exercise program	6	12	2	N	Mixed	H	L	L	G	M	F	HCP
Topp 2002	I1: Isometric resistance training	16	48	3	N	Strengthening (NS)	M	L	L	M	M	F	Study team member
	I2: Dynamic resistance training	16	48	3	N	Strengthening (NS)	M	L	L	M	M	F	Study team member
Wang 2007	I1: Aquatic program	12	36	3	N	Mixed	M	L	W	G	S	F	Exercise specialist
Wang 2009	I1: Tai Chi	12	24	2	N	Mind-body (eg yoga)	L	L	L	NS	S	F	Exercise specialist
Wang 2011	I1: Aquatic exercise	12	36	3	N	Mixed	M	L	W	G	S	F	Exercise specialist
	I2: Land-based exercise	12	36	3	N	Mixed	M	L	L	G	S	F	Exercise specialist
Wortley 2013	I1: Tai Ji program	10	20	2	N	Mind-body (eg yoga)	L	L	L	G	S	F	Exercise specialist
	I2: Resistance training program	10	20	2	N	Strengthening (non-weightbearing/open kinetic chain)	M	L	L	NS	NS	NS	NS
Zhu 2017	I1: Taijiquan (Tai Chi) exercise	24	72	3	N	Mind body	L	L	L	G	S	F	NS

a: Type of exercise categorised as: strengthening (either non-weight bearing/open kinetic chain; weight bearing/ closed kinetic chain; mixed), general aerobic (e.g. walking), mind-body (e.g. yoga), mixed, other.

b: Intensity category based upon published information regarding target heart rate or Metabolic Equivalent (MET) score. High intensity = >70–85% Maximum Heart Rate (MHR) or MET score of >6; moderate intensity = 50–70% MHR or MET score of 3–6; Low intensity = <50% of MHR or MET score of <3.

c: Low or high impact was categorised based on the likely amount of compressive load and whether both feet were intermittently off the ground. For example, cycling, swimming and walking = low impact; jogging, running and jumping = high impact.

d: Exercise deliverer categorised as: Health Care Professional (HCP); lay member; exercise specialist; study team member; automated (e.g. website)

Abbreviations: NS = Not stated; UC = Usual Care.

Appendix Table 12: Risk of bias of RCTs that were not included in the IPD meta-analyses

Study ID	Random Sequence generation	Allocation concealment	Blinding of outcome assessors*	Incomplete outcome data	Selective reporting	Other sources of bias
Abbott 2013	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Aglamis 2008	Low risk	Low risk	Low risk	High risk	Low risk	Low risk
Baker 2001	Low risk	Unclear risk	High risk	Low risk	Low risk	Low risk
Bautch 1997	Unclear risk	Unclear risk	High risk	Low risk	Low risk	Low risk
Brismee 2007	Low risk	Unclear risk	Low risk	Low risk	Low risk	Low risk
Callaghan 1995	Unclear risk	Unclear risk	Low risk	Unclear risk	Low risk	Low risk
Cheung 2014	Low risk	Unclear risk	Low risk	Low risk	Low risk	Low risk
Cheung 2017	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Chopp-Hurley 2017	Low risk	Unclear risk	Low risk	Low risk	Low risk	Low risk
da Silva 2015	Low risk	Low risk	Unclear risk	Unclear risk	Low risk	Unclear risk
de Oliveira 2012	Low risk	Low risk	Low risk	High risk	Low risk	Low risk
DeVita 2018	Low risk	Unclear risk	Unclear	Low risk	Low risk	Low risk
Dias 2003	Low risk	Unclear risk	Low risk	Low risk	Low risk	Low risk
Dias 2017	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Ettinger 1997	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk

Farr 2010	Low risk	Low risk	High risk	Unclear risk	Unclear risk	Unclear risk
Foley 2003	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Gür 2002	Unclear risk	Unclear risk	Unclear risk	Low risk	Low risk	Low risk
Halbert 2001	Unclear risk	Unclear risk	High risk	Low risk	Unclear risk	Low risk
Hartman 2000	Low risk	Unclear risk	Low risk	Low risk	Low risk	Unclear risk
Holsgaard-Larsen 2017	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Hughes 2004	Low risk	Unclear risk	High risk	Low risk	Low risk	Low risk
Imoto 2012	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Jenkinson 2009	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Jorge 2015	Low	Low risk	Low risk	Low risk	Low risk	Unclear risk
Keefe 2004	Unclear risk	Unclear risk	High risk	Unclear risk	Low risk	Unclear risk
Kim 2013	Low risk	Unclear risk	Low risk	Low risk	Low risk	Low risk
Kovar 1992	Low risk	Unclear risk	High risk	Low risk	Low risk	Low risk
Kuntz 2018	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Kuptniratsaikul 2002	Unclear	Unclear	Unclear	Low risk	Low risk	Unclear risk
Lee 2009	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Li 2018	Low risk	Unclear risk	Unclear risk	Low risk	Low risk	Low risk
Lin 2009	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Lund 2008	Unclear	Low risk	Low risk	Unclear risk	Low risk	Low risk

Mazloum 2018	Unclear risk	Unclear risk	Low risk	Unclear risk	Unclear risk	Low risk
McIlroy 2017	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Messier 1997	Unclear	Unclear	Unclear	Unclear risk	Unclear risk	Unclear risk
Moonaz 2015	Low risk	Low risk	Low risk	High risk	Low risk	Low risk
O'Reilly 1999	Low risk	Low risk	High risk	Low risk	Low risk	Low risk
Park 2017	Low risk	Low risk	Low risk	Unclear	Low risk	Unclear risk
Patrick 2001	Low risk	Unclear risk	Unclear risk	Unclear risk	Low risk	Low risk
Peloquin 1999	Low risk	Unclear risk	Low risk	Low risk	Low risk	Low risk
Poulsen 2013	Low risk	Low risk	Low risk	Low risk	Low risk	High risk
Rogers 2012	Low risk	Low risk	High risk	Low risk	Low risk	Unclear risk
Rogind 1998	Low risk	Unclear risk	Low risk	Low risk	Low risk	Unclear risk
Rosedale 2014	Low risk	Low risk	Low risk	High risk	Low risk	Low risk
Salacinski 2012	Low risk	Low risk	Unclear risk	Low risk	Low risk	Low risk
Salli 2010	Unclear risk	Low risk	Low risk	Low risk	Low risk	Unclear risk
Samut 2015	Unclear risk	Unclear risk	Unclear risk	Low risk	Low risk	Low risk
Sayers 2012	Low risk	Low risk	Low risk	High risk	Low risk	Low risk
Schilke 1996	Low risk	Unclear risk	Low risk	Low risk	Low risk	Unclear risk
Segal 2015	Low risk	Low risk	Unclear risk	High risk	Low risk	Low risk
Taglietti 2018	Low risk	Low risk	Low risk	High risk	Low risk	Unclear risk
Thorstensson 2005	Low risk	Unclear risk	Unclear risk	Low risk	Low risk	Low risk

Topp 2002	Unclear risk	Unclear risk	High risk	Low risk	Low risk	Unclear risk
Wang 2007	Unclear risk	Unclear risk	Low risk	High risk	Low risk	Low risk
Wang 2009	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Wang 2011	Low risk	Unclear risk	Low risk	Low risk	Unclear	Low risk
Wortley 2013	Unclear risk	Unclear risk	Unclear risk	Unclear risk	Unclear risk	Low risk
Zhu 2017	Low risk	Low risk	Low risk	Unclear risk	Low risk	Low risk

Assessed via the Cochrane Collaboration's tool (version 1.0) for assessing risk of, graded as unclear, high, or low risk of bias. Studies were not assessed for risk of bias against the criteria "blinding of participants and personnel" due to being unable to blind either participants or intervention deliverers to either receiving or delivering exercise.

* Where outcome measurement was collected via self-reported postal questionnaire, this was classed as low risk of bias.

Appendix Table 13: Comparisons between characteristics of RCTs that were and were not included in the IPD meta-analyses

	IPD obtained and usable (n=31) N (%)	**IPD not obtained/ unusable (n=60)**
Year of publication		
1990-1995	0 (0)	2 (3.33)
1996-2000	1 (3.23)	8 (13.33)
2001-2005	6 (19.36)	11 (18.33)
2006-2010	7 (22.58)	10 (16.67)
2011-2015	10 (32.26)	17 (28.33)
2016-2019	7 (22.58)	12 (20.0)
Range	2000-2018	1992-2018
Continent *(n)*		
Europe	18 (58.07)	10 (16.67)
Australasia	6 (19.36)	3 (5.0)
North/South America	7 (22.58)	36 (60.0)
Asia	0 (0)	11 (18.33)
Length of follow-up		
Short-term	27 (87.10)	56 (93.33)
Medium-term	14 (45.16)	18 (30.0)
Long-term	13 (41.94)	13 (21.67)
Number of participants per RCT		
Up to 50	7 (22.58)	24 (40.0)
51-99	6 (19.36)	16 (26.67)
100 or above	18 (58.07)	20 (33.33)
Range	32 to 786	14 to 439
Overall eligible to be included in IPD meta-analyses	4241	5278
Site of OA		
Knee	18 (58.07)	50 (83.33)
Hip	6 (19.35)	1 (1.67)
Mixed	7 (22.58)	9 (15.0)
Baseline characteristics		
% Female		33.3 to 100
Mean age *(range)*	57.21 to 78.93	49.0 to 80.86
Mean Body Mass Index *(range)*	24.66 to 35.96	22.4 to 35.1

Percentages may not total 100 due to rounding

Appendix Table 14: Comparisons between exercise interventions tested in RCTs that were and were not included in the IPD meta-analyses

	IPD obtained and usable (n of exercise interventions tested = 37) N (%)	IPD not obtained/ unusable (n of exercise interventions tested = 79)
Exercise type		
Strengthening	14 (37.84)	31 (37.98)
Mixed	15 (40.54)	24 (30.78)
General (aerobic) eg walking	6 (16.22)	9 (11.39)
Mind body	2 (5.41)	12 (15.19)
Other	0	3 (3.80)
Not stated	0	0
Weeks duration		
Up to (and including) 12 weeks	27 (72.97)	62 (78.48)
Over 12 weeks	10 (27.03)	14 (17.72)
Not stated/ unclear	0	3 (3.80)
Range	*4 to 104*	*2 to 104*
Total number of exercise sessions		
Range	*3-6 to 234*	*5 to 728*
Sessions per week		
Range	*1 to 7*	*1 to 7*
Booster sessions		
No	36 (97.30)	77 (97.47)
Yes	1 (2.70)	2 (2.53)
Not stated/ unclear	0	0
Intensity		
Moderate	31 (83.78)	54 (68.35)
Low	2 (5.41)	18 (22.78)
High	2 (5.41)	2 (2.53)
Not stated/ unclear	2 (5.41)	5 (6.33)
Impact		
Low	34 (91.89)	75 (94.94)
High	1 (2.70)	0
Not stated/ unclear	2 (5.41)	4 (5.06)
Water/land based		
Land	31 (83.78)	70 (88.61)
Water	5 (13.51)	8 (10.13)
Mixed	1 (2.70)	0
Not stated/ unclear	0	1 (1.27)
Group/individual		
Group	15 (40.54)	29 (36.71)
Individual	17 (45.95)	24 (30.38)
Mixed	2 (5.41)	12 (15.19)
Not stated/ unclear	2 (5.41)	14 (17.72)
Either	1 (2.70)	
Supervision		

Supervised	24 (64.87)	44 (55.70)
Unsupervised home-based	6 (16.22)	4 (5.06)
Mixed	7 (18.92)	21 (26.58)
Not stated/ unclear	0	10 (12.66)
Delivery		
Face-to-face	33 (89.19)	61 (77.22)
Remote	2 (5.41)	0
Mixed	2 (5.41)	9 (11.39)
Not stated/ unclear	0	9 (11.39)
Deliverer		
Health care professional	19 (51.35)	26 (32.91)
Exercise specialist	10 (27.03)	23 (29.11)
Study team member	1 (2.70)	8 (10.13)
Mixed	0	1 (1.27)
Not stated/ unclear	7 (18.91)	21 (26.58)

Percentages may not total 100 due to rounding

Table A8.3: Non-exercise controls

	IPD obtained and usable (n=31) N (%)	**IPD not obtained/ unusable (n=60) N (%)**
Waiting list/ no intervention	14 (45)	14 (23.33)
Education/ advice	6 (19)	18 (30.0)
Usual medical care	5 (16)	9 (15.0)
Maintaining usual medication/ activities	4 (13)	9 (15.0)
Other attention control	2 (7)	5 (8.33)
Placebo/inert treatment	0	2 (3.33)
Not stated	0	3 (5.0)

Percentages may not total 100 due to rounding

Appendix Table 15: Comparisons between risk of bias of RCTs that were and were not included in the IPD meta-analyses

	IPD obtained and usable (n=31) N (%)	IPD not obtained/ unusable (n=60)
Random Sequence generation		
Low	29 (93.55)	46 (76.67)
High	0	0
Unclear	2 (6.45)	14 (23.33)
Allocation concealment		
Low	25 (80.65)	31 (51.67)
High	0	0
Unclear	6 (19.36)	29 (48.33)
Blinding of outcome assessors*		
Low	26 (83.87)	38 (63.33)
High	3 (9.68)	10 (16.67)
Unclear	2 (6.45)	12 (20.0)
Incomplete outcome data		
Low	23 (74.19)	41 (68.33)
High	5 (16.13)	8 (13.33)
Unclear	3 (9.68)	11 (18.33)
Selective reporting		
Low	30 (96.77)	54 (90.0)
High	0	0
Unclear	1 (3.23)	6 (10.0.)
Other sources of bias		
Low	25 (80.65)	45 (75)
High	0	1 (1.67)
Unclear	6 (19.36)	14 (23.33)
All domains low risk of bias	14 (45.16)	14 (23.33)

Percentages may not total 100 due to rounding

* Where outcome measurement was collected via self-reported this was classed as low risk of bias

Data showing testing of other potential moderators on the effect of therapeutic exercise compared to non-exercise controls on pain and physical function

Appendix Table 16: Moderator: Age (years)

	PAIN (RCTs n=31, participants n=3955)				PHYSICAL FUNCTION (RCTs n=30, participants n=3910)			
Time-point nearest to:	**Interaction**	**95% CI**	**Tau^2**	**BoS**	**Interaction**	**95% CI**	**Tau^2**	**BoS**
12-weeks (short-term)	-0.025	-0.200, 0.150	0.025	9.7%	-0.002	-0.137, 0.132	0.010	7.6%
6 months (medium-term)	0.137	-0.097, 0.370	0.021	14.9%	0.178	-0.038, 0.394	0.034	11.0%
12 months (long-term)	-0.049	-0.248, 0.151	0.009	3.6%	-0.021	-0.214, 0.171	0.011	11.0%

Pain scores and physical function scores were standardised to a 0-100 scale (where pain; 0=low pain, 100 = high pain, and physical function; 0 = best physical function, 100 = worst physical function)

CI = Confidence Interval; Tau^2 = the estimate of the between-study variance; Bos = Borrowing of strength statistic (percentage of information gained by analysing all time-points together rather than separately)

Appendix Table 17: Moderator: Body Mass Index (BMI)

	PAIN (RCTs n=28, participants n=3681)				PHYSICAL FUNCTION (RCTs n=, participants n=3635)			
Time-point nearest to:	**Interaction**	**95% CI**	**Tau^2**	**BoS**	**Interaction**	**95% CI**	**Tau^2**	**BoS**
12-weeks (short-term)	-0.067	-0.288, 0.154	0.002	6.7%	-0.056	-0.231, 0.119	0.015	8.3%
6 months (medium-term)	-0.479	-0.859, -0.100	0.070	12.1%	-0.232	-0.517, 0.053	0.044	21.4%
12 months (long-term)	-0.181	-0.531, 0.168	0.032	10.0%	-0.202	-0.514, 0.111	0.098	15.4%

Pain scores and physical function scores were standardised to a 0-100 scale (where pain; 0=low pain, 100 = high pain, and physical function; 0 = best physical function, 100 = worst physical function)

CI = Confidence Interval; Tau^2 = the estimate of the between-study variance; Bos = Borrowing of strength statistic (percentage of information gained by analysing all time-points together rather than separately)

Appendix Table 18: Moderator: Physical activity (Physical Activity Scale for the Elderly (PASE, PASE scale: 0 – 400+)

	PAIN (RCTs n=6, participants n=654)				PHYSICAL FUNCTION (RCTs n=6, participants n=653)			
Time-point nearest to:	**Interaction**	**95% CI**	**Tau^2**	**BoS**	**Interaction**	**95% CI**	**Tau^2**	**BoS**
12-weeks (short-term)	-0.043	-0.072, -0.014	0.000	0.0%	-0.022	-0.051, 0.006	0.000	0.7%
6 months (medium-term)	-	-	-	-	-	-	-	-
12 months (long-term)	-0.047	-0.132, 0.038	0.003	1.3%	-0.023	-0.094, 0.048	0.001	2.1%

Pain scores and physical function scores were standardised to a 0-100 scale (where pain; 0=low pain, 100 = high pain, and physical function; 0 = best physical function, 100 = worst physical function)

CI = Confidence Interval; Tau^2 = the estimate of the between-study variance; Bos = Borrowing of strength statistic (percentage of information gained by analysing all time-points together rather than separately)

Appendix Table 19: Moderator: Arthritis Self Efficacy (Arthritis Self Efficacy Scale (scale: 10 – 100))

	PAIN (RCTs n=2 to 4)				PHYSICAL FUNCTION (RCTs n=2 to 4)			
Time-point nearest to:	**Interaction**	**95% CI**	**Tau^2**	**BoS**	**Interaction**	**95% CI**	**Tau**	**BoS**
12-weeks (short-term)	-0.128	-0.493, 0.237	0.020	-	-0.032	-0.310, 0.246	0.011	-0.032
6 months (medium-term)	-0.354	-2.580, 1.872	0.000	-	-0.175	-1.765, 1.415	0.000	-0.175
12 months (long-term)	0.003	-0.539, 0.545	0.010	-	0.006	-0.509, 0.520	0.016	0.006

Pain scores and physical function scores were standardised to a 0-100 scale (where pain; 0=low pain, 100 = high pain, and physical function; 0 = best physical function, 100 = worst physical function)

CI = Confidence Interval; Tau^2 = the estimate of the between-study variance; Bos = Borrowing of strength statistic (percentage of information gained by analysing all time-points together rather than separately)

BoS statistic is unavailable for pain since each point analysed separately in a univariate meta-analysis due to the number of RCTs reporting Arthritis Self Efficacy.

Appendix Table 20: Moderator: Mental wellbeing (Scale: 0 = good mental wellbeing to 100 =poor mental wellbeing)

	PAIN (RCTs n=15, participants n=2663)				PHYSICAL FUNCTION (RCTs n=15, participants n=2663)			
Time-point nearest to:	**Interaction**	**95% CI**	**Tau^2**	**BoS**	**Interaction**	**95% CI**	**Tau^2**	**BoS**
12-weeks (short-term)	0.008	-0.104, 0.119	0.013	14.0%	0.009	-0.071, 0.088	0.001	11.0%
6 months (medium-term)	-0.037	-0.125, 0.051	0.002	7.9%	-0.035	-0.138, 0.067	0.009	9.3%
12 months (long-term)	-0.059	-0.170, 0.051	0.005	11.0%	-0.073	-0.198, 0.052	0.013	14.1%

Pain scores and physical function scores were standardised to a 0-100 scale (where pain; 0=low pain, 100 = high pain, and physical function; 0 = best physical function, 100 = worst physical function)

CI = Confidence Interval; Tau^2 = the estimate of the between-study variance; Bos = Borrowing of strength statistic (percentage of information gained by analysing all time-points together rather than separately)

Appendix Table 21: Moderator: Co-morbidity count (number of co-morbidities)

	PAIN (RCTs n=14, participants n= 1933)				PHYSICAL FUNCTION (RCTs n=14, participants n=1928)			
Time-point nearest to:	**Interaction**	**95% CI**	**Tau^2**	**BoS**	**Interaction**	**95% CI**	**Tau^2**	**BoS**
12-weeks (short-term)	-0.487	-2.128, 1.155	2.370	8.0%	-0.142	-1.269, 0.985	1.288	2.8%
6 months (medium-term)	-0.549	-2.829, 1.731	6.221	20.3%	-1.018	-2.220, 0.185	0.021	8.7%
12 months (long-term)	-1.283	-3.153, 0.587	0.282	3.3%	-0.116	-1.569, 1.338	0.092	10.1%

Pain scores and physical function scores were standardised to a 0-100 scale (where pain; 0=low pain, 100 = high pain, and physical function; 0 = best physical function, 100 = worst physical function)

CI = Confidence Interval; Tau^2 = the estimate of the between-study variance; Bos = Borrowing of strength statistic (percentage of information gained by analysing all time-points together rather than separately)

Appendix Table 22: Moderator: Presence of cardiac co-morbidities (Reference group: No cardiac co-morbidity)

	PAIN (RCTs n=10, participants n= 1185)				PHYSICAL FUNCTION (RCTs n=10, participants n= 1194)			
Time-point nearest to:	**Interaction**	**95% CI**	**Tau^2**	**BoS**	**Interaction**	**95% CI**	**Tau^2**	**BoS**
12-weeks (short-term)	-0.684	-5.201, 3.833	0.190	2.0%	-0.492	-3.631, 2.646	3.319	1.7%
6 months (medium-term)	-1.247	-8.145, 5.651	12.420	9.9%	-5.741	-10.457, -1.025	5.278	25.6%
12 months (long-term)	-6.024	-13.290, 1.241	7.079	12.0%	-2.039	-6.815, 2.738	2.264	17.8%

Pain scores and physical function scores were standardised to a 0-100 scale (where pain; 0=low pain, 100 = high pain, and physical function; 0 = best physical function, 100 = worst physical function)

CI = Confidence Interval; Tau^2 = the estimate of the between-study variance; Bos = Borrowing of strength statistic (percentage of information gained by analysing all time-points together rather than separately)

Appendix Table 23: Moderator: Presence of respiratory co-morbidities (Reference group: No respiratory co-morbidity)

	PAIN (RCTs n=9, participants n= 1155)				PHYSICAL FUNCTION (RCTs n=9, participants n=1149)			
Time-point nearest to:	**Interaction**	**95% CI**	**Tau^2**	**BoS**	**Interaction**	**95% CI**	**Tau^2**	**BoS**
12-weeks (short-term)	3.430	-5.288, 12.149	53.806	7.5%	2.623	-2.185, 7.430	3.228	1.9%
6 months (medium-term)	9.461	-0.904, 19.885	32.250	15.6%	7.569	0.716, 14.423	22.178	6.5%
12 months (long-term)	3.121	-9.472, 15.713	55.415	15.5%	2.811	-6.231, 11.854	42.415	9.0%

Pain scores and physical function scores were standardised to a 0-100 scale (where pain; 0=low pain, 100 = high pain, and physical function; 0 = best physical function, 100 = worst physical function)

CI = Confidence Interval; Tau^2 = the estimate of the between-study variance; Bos = Borrowing of strength statistic (percentage of information gained by analysing all time-points together rather than separately)

Appendix Table 24: Moderator: Presence of other musculoskeletal conditions as a co-morbidity (Reference group: no other musculoskeletal conditions)

	PAIN (RCTs n=7, participants n=830)				PHYSICAL FUNCTION (RCTs n=8, participants n=865)			
Time-point nearest to:	**Interaction**	**95% CI**	**Tau^2**	**BoS**	**Interaction**	**95% CI**	**Tau^2**	**BoS**
12-weeks (short-term)	3.660	-2.102, 9.421	5.001	1.9%	0.021	-3.621, 3.662	1.313	1.1%
6 months (medium-term)	1.405	-6.493, 9.302	10.101	5.1%	-0.716	-7.103, 5.671	14.721	17.6%
12 months (long-term)	6.621	-4.253, 17.495	18.372	14.6%	1.657	-5.952, 9.265	3.426	18.7%

Pain scores and physical function scores were standardised to a 0-100 scale (where pain; 0=low pain, 100 = high pain, and physical function; 0 = best physical function, 100 = worst physical function)

CI = Confidence Interval; Tau^2 = the estimate of the between-study variance; Bos = Borrowing of strength statistic (percentage of information gained by analysing all time-points together rather than separately)

Appendix Table 25: Moderator: Presence of diabetes as a co-morbidity (Reference group: not diabetic co-morbidity)

	PAIN (RCTs n=5, participants n=715)				PHYSICAL FUNCTION (RCTs n=5, participants n=721)			
Time-point nearest to:	**Interaction**	**95% CI**	**Tau^2**	**BoS**	**Interaction**	**95% CI**	**Tau^2**	**BoS**
12-weeks (short-term)	-4.871	-14.448, 4.706	8.805	3.8%	-6.765	-13.764, 0.233	0.129	7.1%
6 months (medium-term)	-11.789	-24.968, 1.391	13.267	5.6%	-3.237	-11.769, 5.294	0.708	9.8%
12 months (long-term)	-6.995	-22.218, 8.228	15.595	6.9%	-0.972	-10.668, 8.723	0.781	6.5%

Pain scores and physical function scores were standardised to a 0-100 scale (where pain; 0=low pain, 100 = high pain, and physical function; 0 = best physical function, 100 = worst physical function)

CI = Confidence Interval; Tau^2 = the estimate of the between-study variance; Bos = Borrowing of strength statistic (percentage of information gained by analysing all time-points together rather than separately)

Appendix Table 26: Moderator: Presence of mental health co-morbidity (Reference group: no mental health condition)

	PAIN (RCTs n=5, participants n=608)				PHYSICAL FUNCTION (RCTs n=5, participants n=614)			
Time-point nearest to:	**Interaction**	**95% CI**	**Tau^2**	**BoS**	**Interaction**	**95% CI**	**Tau^2**	**BoS**
12-weeks (short-term)	0.225	-12.683, 13.133	95.917	0.5%	1.904	-5.772, 9.580	7.390	0.5%
6 months (medium-term)	-6.091	-22.282, 10.099	15.193	16.2%	-4.229	-16.980, 8.522	3.163	20.0%
12 months (long-term)	-6.372	-35.218, 22.473	513.623	21.7%	-9.093	-24.876, 6.692	36.893	7.0%

Pain scores and physical function scores were standardised to a 0-100 scale (where pain; 0=low pain, 100 = high pain, and physical function; 0 = best physical function, 100 = worst physical function)

CI = Confidence Interval; Tau^2 = the estimate of the between-study variance; Bos = Borrowing of strength statistic (percentage of information gained by analysing all time-points together rather than separately)

Appendix Table 27: Moderator: Muscle strength (Quadriceps) (Z score)

	PAIN (RCTs n=11, participants n= 1423)				PHYSICAL FUNCTION (RCTs n=10, number =1385)			
Time-point nearest to:	**Interaction**	**95% CI**	**Tau^2**	**BoS**	**Interaction**	**95% CI**	**Tau^2**	**BoS**
12-weeks (short-term)	2.348	-0.994, 5.689	16.091	12.3%	2.231	-0.243, 4.704	6.790	11.0%
6 months (medium-term)	2.394	-2.422, 7.211	3.976	3.0%	2.381	-0.134, 4.895	2.474	32.1%
12 months (long-term)	0.848	-7.498, 9.193	97.687	43.3%	1.957	-2.344, 6.258	12.773	33.1%

Pain scores and physical function scores were standardised to a 0-100 scale (where pain; 0=low pain, 100 = high pain, and physical function; 0 = best physical function, 100 = worst physical function)

CI = Confidence Interval; Tau^2 = the estimate of the between-study variance; Bos = Borrowing of strength statistic (percentage of information gained by analysing all time-points together rather than separately)

Appendix Table 28: Educational attainment (Reference group: no higher education)

	PAIN (RCTs n=2 to 5)				PHYSICAL FUNCTION (RCTs n=2 to 4)			
Time-point nearest to:	**Interaction**	**95% CI**	**Tau^2**	**BoS**	**Interaction**	**95% CI**	**Tau^2**	**BoS**
12-weeks (short-term)	2.574	-6.680, 11.827	8.623	-	0.394	-9.799, 10.586	13.117	-
6 months (medium-term)	-5.904	-17.310, 5.502	0.000	-	-4.597	-23.185, 13.990	18.350	-
12 months (long-term)	1.471	-74.348, 77.291	17.349	-	-1.371	-56.985, 54.243	1.790	-

Pain scores and physical function scores were standardised to a 0-100 scale (where pain; 0=low pain, 100 = high pain, and physical function; 0 = best physical function, 100 = worst physical function)

CI = Confidence Interval; Tau^2 = the estimate of the between-study variance; Bos = Borrowing of strength statistic (percentage of information gained by analysing all time-points together rather than separately)

BoS statistic is unavailable for pain and physical function since each point analysed separately in a univariate meta-analysis due to the number of RCTs recording educational attainment.

Appendix Table 29: Pain duration (years)

	PAIN (RCTs n=13, participants =1838)				PHYSICAL FUNCTION (RCTs n=13, participants =1833)			
Time-point nearest to:	**Interaction**	**95% CI**	**Tau^2**	**BoS**	**Interaction**	**95% CI**	**Tau^2**	**BoS**
12-weeks (short-term)	0.018	-0.299, 0.336	0.047	2.6%	0.032	-0.175, 0.238	0.028	2.0%
6 months (medium-term)	0.435	-0.662, 1.533	0.497	17.1%	-0.103	-0.357, 0.151	0.012	31.1%
12 months (long-term)	-0.051	-0.313, 0.211	0.002	3.7%	0.028	-0.180, 0.236	0.001	2.3%

Pain scores and physical function scores were standardised to a 0-100 scale (where pain; 0=low pain, 100 = high pain, and physical function; 0 = best physical function, 100 = worst physical function)

CI = Confidence Interval; Tau^2 = the estimate of the between-study variance; Bos = Borrowing of strength statistic (percentage of information gained by analysing all time-points together rather than separately)

Appendix Table 30: Moderator: Radiographic joint structure (Kellgren-Lawrence (KL) grade, reference group: KL grade 0 or 1)

	PAIN (RCTs n=2 to 4)				PHYSICAL FUNCTION (RCTs n=2 to 4)			
Time-point nearest to:	**Interaction**	**95% CI**	**Tau^2**	**BoS**	**Interaction**	**95% CI**	**Tau^2**	**BoS**
12-weeks (short-term)	-0.919	-8.243, 6.405	0.000	-	-1.467	-8.279, 5.345	0.000	-
6 months (medium-term)	3.321	-60.498, 67.139	0.000	-	7.475	-49.067, 64.018	0.000	-
12 months (long-term)	1.335	-7.898, 10.569	0.000	-	0.042	-8.262, 8.346	0.000	-

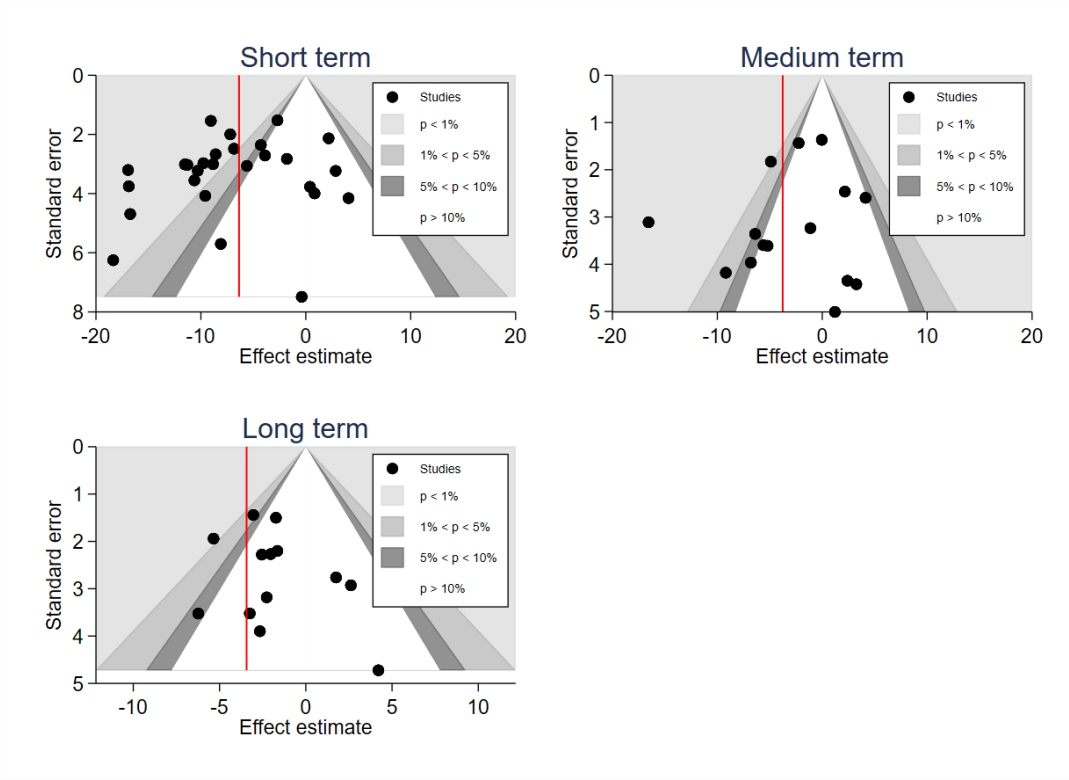
Pain scores and physical function scores were standardised to a 0-100 scale (where pain; 0=low pain, 100 = high pain, and physical function; 0 = best physical function, 100 = worst physical function)

CI = Confidence Interval; Tau^2 =the estimate of the between-study variance; Bos = Borrowing of strength statistic (percentage of information gained by analysing all time-points together rather than separately)

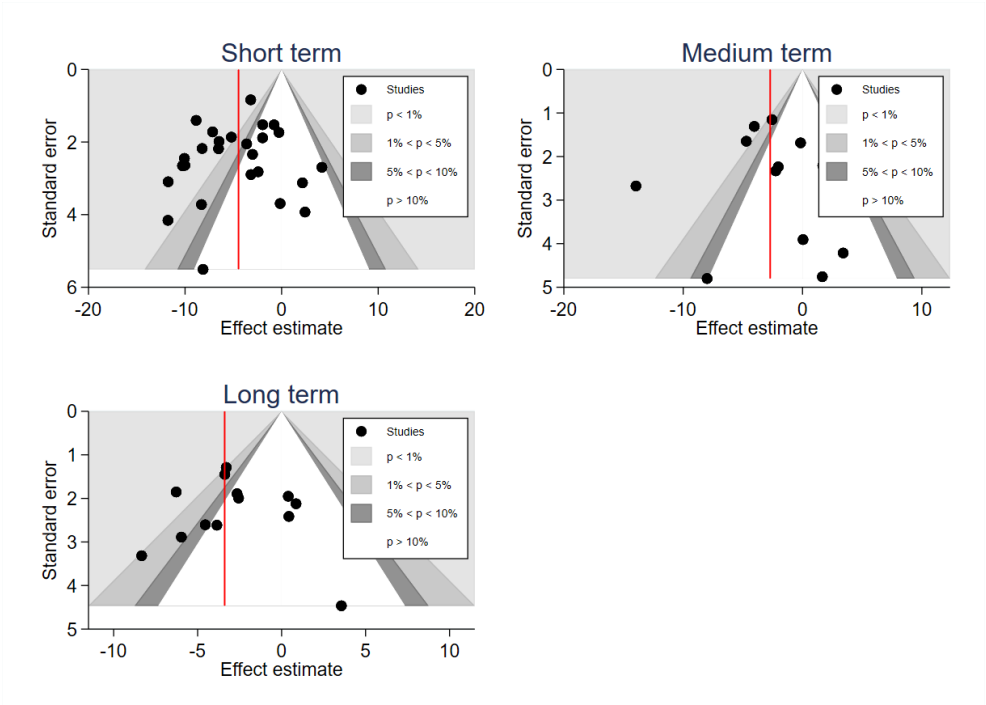
BoS statistic is unavailable for pain and physical function since each point analysed separately in a univariate meta-analysis due to the number of RCTs recording the radiographic joint structure.

Appendix Figure 1: Contour funnel plots to examine small-study effects and potential publication bias on overall effects of therapeutic exercise versus non-exercise controls for pain and physical function outcomes at time points nearest to 12 weeks (short-term), 6 months (medium-term), and 12 months (long-term) in RCTs included in the IPD meta-analysis

A: Pain outcomes



B: Function outcomes



References for RCTs that compared therapeutic exercise to a non-exercise control and did not share IPD/ IPD was unable to be included in the meta-analyses

Abbott 2013: Abbott JH, Robertson MC, Chapple C, et al. Manual therapy, exercise therapy, or both, in addition to usual care, for osteoarthritis of the hip or knee: a randomized controlled trial. 1: clinical effectiveness. Osteoarthritis Cartilage. 2013;21(4):525-34.

Ağlamış 2008: Ağlamış B, Toraman NF, Yaman H. The effect of a 12-week supervised multicomponent exercise program on knee OA in Turkish women. Journal of Back and Musculoskeletal Rehabilitation. 2008;21:121-8.

Baker 2001: Baker KR, Nelson ME, Felson DT, Layne JE, Sarno R, Roubenoff R. The efficacy of home based progressive strength training in older adults with knee osteoarthritis: a randomized controlled trial. J Rheumatol. 2001;28(7):1655-65.

Bautch 1997: Bautch JC, Malone DG, Vailas AC. Effects of exercise on knee joints with osteoarthritis: a pilot study of biologic markers. Arthritis Care Res. 1997;10(1):48-55.

Brismée 2007: Brismée JM, Paige RL, Chyu MC, et al. Group and home-based tai chi in elderly subjects with knee osteoarthritis: a randomized controlled trial. Clin Rehabil. 2007;21(2):99-111.

Callaghan 1995: Callaghan M, Oldham J. An evaluation of exercise regimes for patients with osteoarthritis of the knee: a single-blind randomized controlled trial. Clinical Rehabilitation. 1995;9(3):213-8.

Cheung 2014: Cheung C, Wyman JF, Resnick B, Savik K. Yoga for managing knee osteoarthritis in older women: a pilot randomized controlled trial. BMC Complement Altern Med. 2014;14:160.

Cheung 2017: Cheung C, Wyman JF, Bronas U, McCarthy T, Rudser K, Mathiason MA. Managing knee osteoarthritis with yoga or aerobic/strengthening exercise programs in older adults: a pilot randomized controlled trial. Rheumatol Int. 2017;37(3):389-398.

Chopp-hurley 2017: Chopp-Hurley JN, Brenneman EC, Wiebenga EG, Bulbrook B, Keir PJ, Maly MR. Randomized Controlled Trial Investigating the Role of Exercise in the Workplace to Improve Work Ability, Performance, and Patient-Reported Symptoms Among Older Workers With Osteoarthritis. J Occup Environ Med. 2017;59(6):550-556.

da Silva 2015: da Silva FS, de Melo FE, do Amaral MM, et al. Efficacy of simple integrated group rehabilitation program for patients with knee osteoarthritis: Single-blind randomized controlled trial. J Rehabil Res Dev. 2015;52(3):309-22.

de Oliveira 2012: de Oliveira AMI, Peccin MS, Silva KNG, Pedro de Paiva Teixeira LEP, Trevisani VFM. Impact of exercise on the functional capacity and pain of patients with knee osteoarthritis: a randomized clinical trial. Rev Bras Reumatol. 2012;52(6):876-82.

DeVita 2018: deVita P, Aaboe J, Bartholdy C, Leonardis JM, Bliddal H, Henriksen M. Quadriceps-strengthening exercise and quadriceps and knee biomechanics during walking in knee osteoarthritis: A two-centre randomized controlled trial. Clin Biomech. 2018;59:199-206.

Dias 2003: Dias RC, Dias JM, Ramos LR. Impact of an exercise and walking protocol on quality of life for elderly people with OA of the knee. Physiother Res Int. 2003;8(3):121-30.

Dias 2017: Dias JM, Cisneros L, Dias R, et al. Hydrotherapy improves pain and function in older women with knee osteoarthritis: a randomized controlled trial. Braz J Phys Ther. 2017;21(6):449-456.

Ettinger 1997: Ettinger WH, Burns R, Messier SP, et al. A randomized trial comparing aerobic exercise and resistance exercise with a health education program in older adults with knee osteoarthritis. The Fitness Arthritis and Seniors Trial (FAST). JAMA. 1997;277(1):25-31.

Farr 2010: Farr JN, Going SB, McKnight PE, Kasle S, Cussler EC, Cornett M. Progressive resistance training improves overall physical activity levels in patients with early osteoarthritis of the knee: a randomized controlled trial. Phys Ther. 2010;90(3):356-66.

Foley 2003: Foley A, Halbert J, Hewitt T, Crotty M. Does hydrotherapy improve strength and physical function in patients with osteoarthritis--a randomised controlled trial comparing a gym based and a hydrotherapy based strengthening programme. Ann Rheum Dis. 2003;62(12):1162-7.

Gür 2002: Gür H, Cakin N, Akova B, Okay E, Küçükoğlu S. Concentric versus combined concentric-eccentric isokinetic training: effects on functional capacity and symptoms in patients with osteoarthrosis of the knee. Arch Phys Med Rehabil. 2002;83(3):308-16.

Halbert 2001: Halbert J, Crotty M, Weller D, Ahern M, Silagy C. Primary care-based physical activity programs: effectiveness in sedentary older patients with osteoarthritis symptoms. Arthritis Rheum. 2001;45(3):228-34.

Hartman 2000: Hartman CA, Manos TM, Winter C, Hartman DM, Li B, Smith JC. Effects of T'ai Chi training on function and quality of life indicators in older adults with osteoarthritis. J Am Geriatr Soc. 2000;48(12):1553-9.

Holsgaard-Larsen 2017: Holsgaard-Larsen A, Clausen B, Søndergaard J, Christensen R, Andriacchi TP, Roos EM. The effect of instruction in analgesic use compared with neuromuscular exercise on knee-joint load in patients with knee osteoarthritis: a randomized, single-blind, controlled trial. Osteoarthritis Cart. 2017;25(4):470-480.

Hughes 2004: Hughes SL, Seymour RB, Campbell R, Pollak N, Huber G, Sharma L. Impact of the fit and strong intervention on older adults with osteoarthritis. Gerontologist 2004;44(2):217-28.

Imoto 2012: Imoto AM, Peccin MS, Trevisani VF. Quadriceps strengthening exercises are effective in improving pain, function and quality of life in patients with osteoarthritis of the knee. Acta Ortop Bras. 2012;20(3):174-9.

Jenkinson 2009: Jenkinson CM, Doherty M, Avery AJ, et al. Effects of dietary intervention and quadriceps strengthening exercises on pain and function in overweight people with knee

pain: randomised controlled trial. BMJ. 2009;339:b3170.

Jorge 2015: Jorge RT, Souza MC, Chiari A, et al. Progressive resistance exercise in women with osteoarthritis of the knee: a randomized controlled trial. Clin Rehabil. 2015;29(3):234-43.

Keefe 2004: Keefe FJ, Blumenthal J, Baucom D, et al. Effects of spouse-assisted coping skills training and exercise training in patients with osteoarthritic knee pain: a randomized controlled study. Pain. 2004;110(3):539-49.

Kim 2013: Kim H, Suzuki T, Saito K, et al. Effectiveness of exercise with or without thermal therapy for community-dwelling elderly Japanese women with non-specific knee pain: a randomized controlled trial. Arch Gerontol Geriatr. 2013;57(3):352-9.

Kovar 1992: Kovar PA, Allegrante JP, MacKenzie CR, Peterson MG, Gutin B, Charlson ME. Supervised fitness walking in patients with osteoarthritis of the knee. A randomized, controlled trial. Ann Intern Med. 1992;116(7):529-34.

Kuntz 2018: Kuntz AB, Chopp-Hurley JN, Brenneman EC, et al. Efficacy of a biomechanically-based yoga exercise program in knee osteoarthritis: A randomized controlled trialPLoS One. 2018 17;13(4):e0195653.

Kuptniratsaikul 2002: Kuptniratsaikul V, Tosayanonda O, Nilganuwong S, Thamalikitkul V. The efficacy of a muscle exercise program to improve functional performance of the knee in patients with osteoarthritis. J Med Assoc Thai. 2002;85(1):33-40.

Lee 2009: Lee HJ, Park HJ, Chae Y, et al. Tai Chi Qigong for the quality of life of patients with knee osteoarthritis: a pilot, randomized, waiting list controlled trial. Clin Rehabil. 2009;23(6):504-11.

Li 2018: Li LC, Sayre EC, Xie H, et al. Efficacy of a Community-Based Technology-Enabled Physical Activity Counseling Program for People With Knee Osteoarthritis: Proof-of-Concept Study. J Med Internet Res. 2018;20(4):e159.

Lin 2009: Lin DH, Lin CH, Lin YF, Jan MH. Efficacy of 2 non-weight-bearing interventions, proprioception training versus strength training, for patients with knee osteoarthritis: a randomized clinical trial. J Orthop Sports Phys Ther. 2009;39(6):450-7.

Lund 2008: Lund H, Weile U, Christensen R, et al. A randomized controlled trial of aquatic and land-based exercise in patients with knee osteoarthritis. J Rehabil Med. 2008;40(2):137-44.

Mazloum 2018: Mazloum V, Rabiei P, Rahnama N, Sabzehparvar E. The comparison of the effectiveness of conventional therapeutic exercises and Pilates on pain and function in patients with knee osteoarthritis. Complement Ther Clin Pract. 2018;31:343-348.

McIlroy 2017: McIlroy S, Sayliss L, Browning P, Bearne LM. Aquatic therapy for people with persistent knee pain: A feasibility study. Musculoskeletal Care. 2017 Dec;15(4):350-355.

Messier 1997: Messier S, Thompson C, Ettinger Jr W. Effects of Long-Term Aerobic or Weight Training Regimens on Gait in an Older, Osteoarthritic Population. Journal of Applied Biomechanics. 1997;13:205-22.

Moonaz 2015: Moonaz SH, Bingham CO, Wissow L, Bartlett SJ. Yoga in Sedentary Adults with Arthritis: Effects of a Randomized Controlled Pragmatic Trial. J Rheumatol. 2015;42(7):1194-202.

O'Reilly 1999: O'Reilly SC, Muir KR, Doherty M. Effectiveness of home exercise on pain and disability from osteoarthritis of the knee: a randomised controlled trial. Ann Rheum Dis. 1999;58(1):15-9.

Park 2017: Park J, McCaffrey R, Newman D, Liehr P, Ouslander JG. A Pilot Randomized Controlled Trial of the Effects of Chair Yoga on Pain and Physical Function Among Community-Dwelling Older Adults With Lower Extremity Osteoarthritis. J Am Geriatr Soc. 2017;65(3):592-597.

Patrick 2001: Patrick DL, Ramsey SD, Spencer AC, Kinne S, Belza B, Topolski TD. Economic evaluation of aquatic exercise for persons with osteoarthritis. Med Care. 2001;39(5):413-24.

Péloquin 1999: Péloquin L, Bravo G, Gauthier P, Lacombe G, Billiard JS. Effects of a cross-training exercise program in persons with osteoarthritis of the knee a randomized controlled trial. J Clin Rheumatol. 1999;5(3):126-36.

Poulsen 2013: Poulsen E, Hartvigsen J, Christensen HW, Roos EM, Vach W, Overgaard S. Patient education with or without manual therapy compared to a control group in patients with osteoarthritis of the hip. A proof-of-principle three-arm parallel group randomized clinical trial. Osteoarthritis Cart. 2013;21(10):1494-503.

Rogers 2012: Rogers MW, Tamulevicius N, Semple SJ, Krkeljas Z. Efficacy of home-based kinesthesia, balance & agility exercise training among persons with symptomatic knee osteoarthritis. J Sports Sci Med. 2012;11(4):751-8.

Røgind 1998: Røgind H, Bibow-Nielsen B, Jensen B, Møller HC, Frimodt-Møller H, Bliddal H. The effects of a physical training program on patients with osteoarthritis of the knees. Arch Phys Med Rehabil. 1998;79(11):1421-7.

Rosedale 2014: Rosedale R, Rastogi R, May S, et al. Efficacy of exercise intervention as determined by the McKenzie System of Mechanical Diagnosis and Therapy for knee osteoarthritis: a randomized controlled trial. J Orthop Sports Phys Ther. 2014;44(3):173-81, A1-6.

Salacinski 2012: Salacinski AJ, Krohn K, Lewis SF, Holland ML, Ireland K, Marchetti G. The effects of group cycling on gait and pain-related disability in individuals with mild-to-moderate knee osteoarthritis: a randomized controlled trial. J Orthop Sports Phys Ther. 2012;42(12):985-95.

Salli 2010: Salli A, Sahin N, Baskent A, Ugurlu H. The effect of two exercise programs on

various functional outcome measures in patients with osteoarthritis of the knee: A randomized controlled clinical trial. Isokinetics and Exercise Science. 2010;18:201-9.

Samut 2015: Samut G, Dincer F, Ozdemir O. The effect of isokinetic and aerobic exercises on serum interleukin-6 and tumor necrosis factor alpha levels, pain, and functional activity in patients with knee osteoarthritis. Mod Rheumatol. 2015;25(6):919-24.

Sayers 2012: Sayers SP, Gibson K, Cook CR. Effect of high-speed power training on muscle performance, function, and pain in older adults with knee osteoarthritis: a pilot investigation. Arthritis Care Res. 2012;64(1):46-53.

Schilke 1996: Schilke JM, Johnson GO, Housh TJ, O'Dell JR. Effects of muscle-strength training on the functional status of patients with osteoarthritis of the knee joint. Nurs Res. 1996;45(2):68-72.

Segal 2015: Segal NA, Glass NA, Teran-Yengle P, Singh B, Wallace RB, Yack HJ. Intensive Gait Training for Older Adults with Symptomatic Knee Osteoarthritis. Am J Phys Med Rehabil. 2015;94(10 Suppl 1):848-58.

Taglietti 2018: Taglietti M, Facci LM, Trelha CS, et al. Effectiveness of aquatic exercises compared to patient-education on health status in individuals with knee osteoarthritis: a randomized controlled trial. Clin Rehabil. 2018;32(6):766-776.

Thorstensson 2005: Thorstensson CA, Roos EM, Petersson IF, Ekdahl C. Six-week high-intensity exercise program for middle-aged patients with knee osteoarthritis: a randomized controlled trial [ISRCTN20244858]. BMC Musculoskelet Disord. 2005;6:27.

Topp 2002: Topp R, Woolley S, Hornyak J, Khuder S, Kahaleh B. The effect of dynamic versus isometric resistance training on pain and functioning among adults with osteoarthritis of the knee. Arch Phys Med Rehabil. 2002;83(9):1187-95.

Wang 2007: Wang TJ, Belza B, Elaine Thompson F, Whitney JD, Bennett K. Effects of aquatic exercise on flexibility, strength and aerobic fitness in adults with osteoarthritis of the

hip or knee. J Adv Nurs. 2007;57(2):141-52.

Wang 2009: Wang C, Schmid CH, Hibberd PL, et al. Tai Chi is effective in treating knee osteoarthritis: a randomized controlled trial. Arthritis Rheum. 2009;61(11):1545-53.

Wang 2011: Wang TJ, Lee SC, Liang SY, Tung HH, Wu SF, Lin YP. Comparing the efficacy of aquatic exercises and land-based exercises for patients with knee osteoarthritis. J Clin Nurs. 2011;20(17-18):2609-22.

Wortley 2013: Wortley M, Zhang S, Paquette M, et al. Effects of resistance and Tai Ji training on mobility and symptoms in knee osteoarthritis patients. Journal of Sport and Health Science. 2013;2:209-14.

Zhu 2017: Zhu Q, Huang L, Wu X, Zhang Y, Min F, Li J. Effect of Taijiquan practice versus wellness education on knee proprioception in patients with knee osteoarthritis: a randomized controlled trial. J Tradit Chin Med. 2017;37(6):774-781.

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Appendix references

1. Holden MA, Runhaar J, Burke DL, et al. In collaboration with the OA Trial Bank. Subgrouping and Targeted Exercise Programmes for Knee and Hip Osteoarthritis (STEER OA) Individual Participant Data Meta-analysis. Progress update and selection of potential moderators for analyses. Osteoarthritis Cartilage 2019; 27(S1): S446.

2. Washburn RA, Smith KW, Jette AM, Janney CA. The Physical Activity Scale for the Elderly (PASE): development and evaluation. J Clin Epidemiol. 1993;46(2):153–62

3. Chumlea WC, Guo SS, K Wholihan K, et al. Stature prediction equations for elderly non-Hispanic white, non-Hispanic black, and Mexican-American persons developed from NHANES III data. J Am Diet Assoc. 1998;98(2):137-42.

4. Kellgren JH, Lawrence JS. Radiological assessment of osteo arthrosis. Ann Rheum Dis. 1957;16:494–502.

5. Cochrane Musculoskeletal Group. Proposed Outcomes. http://musculoskeletal.cochrane.org/proposed-outcomes [accessed 28 July 2022].