WEB APPENDICES

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Web appendix 1. Deviations from protocol

During the course of the study, we processed small changes to our prespecified plan. Firstly, during the search and selection of RCTs, we decided to exclude RCTs with one or more treatment arms having < 10 participants at follow-up. We took this pragmatic decision to avoid resource intensive work for little gain; small trials will have little power to detect clinically relevant between-group differences.

Secondly, we removed adverse effects as an outcome of interest after data extraction, because we discovered very few trials reporting them. This removed the high likelihood of drawing causal inferences had we proceeded as planned.

Thirdly, we refrained from conducting our planned threshold analyses, as they may be less suitable when there is substantial overlap in credible intervals from the NMA, and no obvious recommendation can be made regarding the best treatment. Instead, we appraised the certainty of the evidence with the GRADE approach, which is commonly accepted for the purpose of assessing the certainty of evidence.

WEB APPENDIX 2. EXCLUDED STUDIES AND REASONS FOR EXCLUSION

Study identifier	***Reason(s) for exclusion***
Abrahams et al. 2003	Wrong outcomes: the modified functional index questionnaire
Abtahi et al. 2010	Duration of symptoms < 6 weeks (i.e. 5 weeks)
Abyaneh et al. 2016	Unclear criterion on duration of symptoms Wrong outcomes: VAS (not specified) Duration of follow-up < 6 weeks (i.e. 2 weeks)
Ahmed Hamada et al. 2017	Wrong outcomes: Kujala score
Akarcali et al. 2002	Wrong outcomes: VAS (average of 3 activities) Personal communication 5 June 2018: VAS value presented in results is average of stair up, stair down and squat. No raw VAS values per activity available.
Al Abbad 2014	Wrong outcomes: LEFS, patient specific functional scale, VAS (not specified) Duration of follow-up < 6 weeks (i.e. 1 week)
Alshaharani 2019	Duration of symptoms < 6 weeks (i.e. 1 month)
Antich et al. 1986	Unclear inclusion criteria and no description of pain as behind or around the patella. Unclear criterion on duration of symptoms Duration of follow-up < 6 weeks (i.e. 1.5 week)
Araújo et al. 2016	(no description of pain as behind or around the patella) Duration of follow-up < 6 weeks (i.e. pre-post on the same day) Wrong outcomes: EMG
Arrebola et al. 2019	<10 participants per treatment arm (upon follow-up) Wrong outcomes: NPRS (0-100) during most painful 'effort', NPRS at rest (0-100)
Ashraf et al. 2017	Wrong outcomes: VAS (unspecified), WOMAC
Ashraf et al. 2018	Wrong outcomes (no patient-rated outcomes)
Avraham et al. 2007	(no description of pain as behind or around the patella) Duration of follow-up < 6 weeks (i.e. 3 weeks) Wrong outcomes: VAS (not specified); Patellofemoral evoluation scale
Aytar et al. 2011	Duration of follow-up < 6 weeks (i.e. pre-post study; 45 minutes)
Bagheri et al. 2017	Wrong outcomes: VAS during hip exercises
Bakhtiary et al. 2008	(no description of pain as behind or around the patella) Duration of follow-up < 6 weeks (i.e. 5 weeks) Wrong outcomes: VAS (not specified)
Balci et al. 2009	Wrong outcomes: VAS (not specified); Kujala
Baldon et al. 2015	Wrong outcomes: no PROM used
Behrangrad & Kamali 2017	Wrong outcomes: VAS pain (not specified); Kujala
Bentley et al. 1981	Wrong outcomes: clinician-rated improvement
Battacharya & Reddy 2015	Wrong outcomes: EMG Duration of follow-up < 6 weeks (i.e. 1 day)
Bily et al. 2008	(no description of pain as behind or around the patella)

	Wrong outcomes: VAS (mean of activities of daily living, sporting activities. Personal communication MW with Walter Bily 7/6/2018: no VAS values for specific activities were obtained); Kujala score
Bolgla et al. 2016	Wrong study question: mediator question instead of treatment response Duration of symptoms < 6 weeks (i.e. 4 weeks) Wrong outcomes: VAS during activity (not specified); anterior knee pain score
Bonacci et al. 2018	< 10 patients per treatment arm
Brantingham et al. 2009	Wrong study population: RCT includes patients with a traumatic onset of pain
Cabral et al. 2007	Wrong study design: non-randomised controlled trial Wrong outcomes: VAS (not specified); Lysholm scale; Patellofemoral joint assessment scale
Callaghan & Oldham 2004	Wrong outcomes: VAS (not specified); Kujala
Callaghan et al. 2001	Wrong outcomes: VAS (not specified); Kujala
Can et al. 2003	Wrong outcomes: VAS (not specified); Lysholm, 4-item activity scale
Chevidikunnan et al. 2016	(no description of pain as behind or around the patella) Duration of symptoms < 6 weeks (i.e. 4 weeks) Wrong outcomes: VAS (not specified) Duration of follow-up < 6 weeks (i.e. 4 weeks)
Christou 2004	Wrong study design: case control / cross-over trial within subjects Wrong outcomes: McGill pain questionnaire Duration of follow-up < 6 weeks (i.e. 1 day)
Clark	Wrong outcomes: 0 - 200 VAS scale, combining climbing stairs and walking on the flat.
Colon et al. 1988	Wrong study population: Giving away and locking were symptoms in this group of patients (described as patellofemoral chondrosis) Unclear duration of symptoms Wrong outcomes: Cybex/knee function and strength outcomes only
Contreras A. 2004	Unpublished study. Manuscript and data no longer available. Personal communication MW with Andrew Contreras on 11/06/2018
Corum et al. 2018	Wrong outcomes: Kujala, SF-36, average VAS in the past week
Cowan et al. 2002	Duration of symptoms: < 6 weeks (i.e. 1 month) Wrong outcomes: no patient-reported outcomes
Cowan et al. 2003	Duration of symptoms: < 6 weeks (i.e. 1 month) Wrong outcomes: no patient-reported outcomes
Crossley et al. 2002	Duration of symptoms < 6 weeks (i.e. 1 month)
Crossley et al. 2005	Duration of symptoms < 6 weeks (i.e. 1 month)
Darracott 1973	Wrong study population: for >50% onset was due to trauma or surgery.
Das (Rajesh Kumar) et al. 2016	Wrong outcomes (pain on VAS, not specified; Kujala score) Follow-up < 6 weeks
De-La-Llave-Rincon et al., 2016	Personal communication with César Fernández de

	las Peñas on 22 May 2018: trial terminated (ed. reason unknown); no full text.
Denton et al. 2005	(no description of pain as behind or around the patella) Duration of symptoms < 6 weeks (i.e. 4 weeks) Wrong outcomes: Kujala; lateral step-up test
Dolak et al. 2012 Personal communication MW with Kim Dolak 20/06/2018.	Duration of symptoms < 6 weeks (i.e. 4 weeks)
Dolder & Roberts 2006	Duration of follow-up < 6 weeks (i.e. Wrong outcomes: Patellofemoral pain severity questionnaire
Dos Santos et al. 2019	< 10 patients per study arm (i.e. 6)
Earl (thesis) 2002	Wrong study design: case series
Eburne & Bannister 1996	(no description of pain as behind or around the patella) Wrong study design: quasi-randomised controlled trial Wrong outcomes: McConnell's critical (pain) test
Elhafz et al. 2011	(no description of pain as behind or around the patella) Wrong outcomes: visual analogue scale (VAS) (not specified) Duration of follow-up < 6 weeks (i.e. 4 weeks)
Erel & Özkan 2011	Wrong outcomes: VAS (not specified); WOMAC
Espí-López et al. 2017	Wrong study population?: Anterior or retropatellar pain? Wrong outcomes: KOOS pain subscale; function, disability, and symptom severity KOOS subscale; IKDC; NPRS (not specified)
Evcik et al.	Wrong study population?: Anterior or retropatellar pain? Duration of symptoms < 6 weeks (i.e. 1 week) Wrong outcomes: VAS (not specified); WOMAC pain scale; WOMAC functional capacity index; Fulkerson-Shea Patellofemoral Evaluation
Farzaneh et al. 2018	Wrong outcomes: no patient-rated outcome (Unclear duration of follow-up)
Ferber et al. 2015	(no description of pain as behind or around the patella) Duration of symptoms < 6 weeks (i.e. 4 weeks)
Ferreira et al. 2016a *Taping and postural control*	Study completed: full text not available. Personal communication with Christiane de Souza Guerino Macedo and Marinus Winters: Duration of follow-up < 6 weeks (i.e. 1 day) Wrong outcomes: VAS, Kujala score
Finestone et al. 1993	(no description of pain as behind or around the patella) Unclear criterion for symptom duration Wrong outcomes: pain on a 1-4 scale
Froehling (thesis) 1996	(no description of pain as behind or around the patella) Wrong outcomes: Hughston VAS
Fukuda et al. 2010	(no description of pain as behind or around the

	patella) Duration of follow-up < 6 weeks (i.e. 4 weeks)
Fulkerson et al. 1986	(no description of pain as behind or around the patella) Unclear criterion for symptom duration Wrong study design: quasi-randomised controlled trial Duration of follow-up < 6 weeks (i.e. 5 days) Unclear outcomes (pain, not specified)
Gaffney et al. 1992	Unclear criterion for symptom duration Wrong outcomes: VAS (general)
Ghasemi et al. 2015	Wrong study population?: retropatellar or anterior knee pain? Wrong outcomes: VAS (not specified) Duration of follow-up < 6 weeks (i.e. 3 weeks)
Ghourbanpour et al. 2017	(no description of pain as behind or around the patella) Duration of symptoms < 6 weeks (i.e. 4 weeks) Duration of follow-up < 6 weeks (i.e. 4 weeks) Wrong outcomes: VAS (not specified); Kujala
Glaviano et al. 2016	Wrong outcomes: VAS (not specified) Duration of follow-up < 6 weeks (i.e. within an hour)
Glaviano & Saliba 2016	Wrong outcomes: VAS (not specified) Duration of follow-up < 6 weeks (i.e. within an hour)
Gobbi et al. 2019	Wrong outcomes: Kujala (n.b. outcomes were obtained on the level of the knee – not the patient)
Gobelet et al. 1992	Unclear duration of symptoms Wrong outcome: Arpege score Duration of follow-up < 6 weeks (i.e. 4 weeks)
Goldberg et al. 2002	Note: poster presentation (no full text available): Unclear duration of symptoms Unclear outcomes (NRS was not specified) Wrong outcomes: McGill Outcome questionnaire, PFP scale Duration of follow-up < 6 weeks (i.e. 2 weeks)
Golpayegani & Emami 2017	Wrong outcomes: VAS (unspecified); Kujala
Grindstaff et al. 2012	(no description of pain as behind or around the patella) Duration of follow-up < 6 weeks (i.e. within an hour) Wrong outcomes: no pain/function/patient-reported outcome measures
Gülbahar et al. 2000	Duration of follow-up < 6 weeks (i.e. 3 weeks)
Güney et al. 2014	No patient-reported outcomes measures
Gunay et al. 2017	(no description of pain as behind or around the patella) Wrong outcomes: VAS (not specified) Kujala score
Gutiérrez-Mendoza 2009	Wrong study population?: Lateral hyper-pressure syndrome patients with Outerbridge chondromalacia grade 1-3 Wrong outcomes: VAS (not specified) Duration of follow-up < 6 weeks (i.e. 24hrs)
Hafez et al. 2012	(no description of pain as behind or around the patella; “Chondromalacia patellae”) Unclear criterion for symptom duration

	Wrong outcomes: WOMAC; VAS (not specified)
Halabchi et al. 2015	Wrong outcomes: Kujala score and VAS for usual pain in the last week
Hains & Hains 2010	Wrong study design: cross-over trial Wrong outcomes: VAS (not specified)
Hamstra-Wright 2017	Ancillary analysis (No RCT question) of excluded RCT (Ferber 2015)
Harris & Suter 2009	Study protocol only, study was never performed (personal communication with dr. Lisa Suter 7/6/2018).
Harrison et al. 1999	Wrong study population: patients with an acute or traumatic onset were included Wrong outcomes: Functional index questionnaire; a global rating of change scale was used (3=point outcome worse/no improvement, some improvement, substantial improvement); time to pain while stepping up and down/severity of pain while stepping up; Patellofemoral Scale.
Hejgaard & Watt-Boolsen	(no description of pain as behind or around the patella) Wrong outcomes: surgeon-rated treatment success
Herrington et al. 2007	Duration of symptoms < 6 weeks (i.e. 4 weeks)
Holmes et al. 2004	Personal communication Holmes and Marinus Winters 23 May 2018: Study did not reach full publication; author has no full text available.
Huang et al. 2014	Duration of follow-up < 6 weeks (i.e. max. 2 weeks) Wrong outcomes: VAS (not specified)
Huang et al. 2015	Unclear duration of symptoms Duration of follow-up < 6 weeks (i.e. 40 days)
Iammarrone et al. 2016	(no description of pain as behind or around the patella) Wrong outcomes: VISA-P, Feller's Patella Score, VAS (not specified)
Ismail et al. 2013	Wrong outcomes: VAS (average in the previous week); Kujala
Jahaani et al. 2018 [Unpublished] Obtained via personal communication MW with Ali Mazaherinezhad on 9/6/2018	Wrong outcomes: VAS (not specified); Kujala; Functional Index Questionnaire; 6-minute walking test; timed-up-and-go-test; sit-up-test
Jensen et al. 1999	(no description of pain as behind or around the patella) Unclear criterion for duration of symptoms Wrong outcomes: VAS during stairs-hopple test (12 jumps up one stair), VAS after the stairs-hopple test, and VAS rest in the evening after the test.
Jun 2014 [thesis]	<10 patients per treatment arm Wrong study design: cross-over RCT Wrong outcomes: VAS (not specified), LEFS, Kujala score, IKDC
Kang et al. 2013	(no description of pain as behind or around the patella) Unclear criterion for symptom duration. Wrong outcomes: EMG

Kannus et al. 1992 Kannus et al. 1999	Wrong outcomes: VAS (not specified); Knee status; Lysholm, Tegner; physician-reported patient recovery
Karakus et al. 2014	Wrong outcomes: Kujala scale
Kaya et al. 2013	Wrong outcomes: VAS during specific step-test LEFS
Keays et al. 2015	Wrong study population: study included patients with PFP and PF OA Duration of symptoms < 6 weeks (i.e. 1 month) Duration of follow-up < 6 weeks (i.e. 4 weeks)
Keays et al. 2016	Wrong study population: study included patients with PFP and PF OA Duration of symptoms < 6 weeks (i.e. 1 month)
Kettunen et al. 2005	Wrong study design: non-randomised controlled trial Wrong outcomes: Kujala
Khayambashi et al. 2012	Wrong study design: quasi-randomised controlled study Wrong outcomes: VAS (average on provocative activities in the previous week); WOMAC
Khayambashi et al. 2014	Wrong study design: non-randomised controlled study Wrong outcomes: VAS during ADL (not specified); WOMAC
Khojaste et al. 2016	Wrong study design: non-randomised controlled trial Wrong outcomes: VAS (not specified); KOOS
Kim et al. 2016	Wrong outcomes: VAS (not specified); UCLA scale
Korakakis et al. 2018	Duration of follow-up < 6 weeks (i.e. 1 day).
Korakakis et al. 2019	Duration of follow-up < 6 weeks (i.e. 1 day) (after personal contact first author on 9/8/2019)
Kowall et al. 1996	(no description of pain as behind or around the patella) Duration of symptoms < 6 weeks (i.e. 1 month) Wrong outcomes: VAS (not specified); Duration of follow-up < 6 weeks (i.e. 4 weeks)
Kumar et al. 2013	(no description of pain as behind or around the patella) Unclear duration of symptoms Wrong outcomes: VAS (not specified) Duration of follow-up < 6 weeks (i.e. 4 weeks)
Kumar et al. 2015	Duration of follow-up < 6 weeks (i.e. 1 day)
Kumar et al. 2017	Wrong study population: PF OA Unclear duration of symptoms Wrong outcomes: VAS at rest, Oxford knee scoring Unclear duration of follow-up
Kumar et al. 2018	(Unclear how PFP was defined) Wrong outcomes: Kujala and VAS (none-specified) Duration of follow-up < 6 weeks (i.e. 4 weeks)
Kurt et al. 2016	(no description of pain as behind or around the patella) Duration of follow-up < 6 weeks (i.e. 2 days)
Kuru et al. 2012	Wrong study population?: anterior or retropatellar pain

	Wrong outcomes: VAS (not specified); Kujala, SF-36
Lack et al. 2016[thesis]	<10 patients per treatment arm
Lankhorst et al. 2016	Wrong study design: prospective cohort study (question)
Lewinson et al. 2015	Duration of symptoms < 6 weeks (i.e. 1 month)
Liu et al. 2017	Unclear criterion for duration of symptoms Wrong outcomes: VAS (not specified)
Loudon et al. 2004	Wrong outcomes: VAS (not specified); Kujala
Lun et al. 2005	Duration of symptoms < 6 weeks (i.e. 3 weeks)
Macmull et al. 2012	Wrong study population: patients with chondral or subchondral defects secondary to chondromalacia patellae Wrong study design: retrospective study on prospective cohort data Wrong data: VAS (not specified); Modified Cincinnati Rating System
Marchese et al. 1998	After full text appraisal, and personal communication dr. Angela Marchese and Marinus Winters 29/5/2018: Duration of follow-up < 6 weeks: Data for 15 day follow-up is available only. Outcome data for T60 (60days) is no longer available and not presented in the full text.
Mason et al. 2011	Duration of symptoms < 6 weeks (i.e. 4 weeks) Duration of follow-up < 6 weeks (i.e. 2 weeks)
Matoso 1980	Unclear criterion for symptom duration Wrong study design: non-controlled trial (patients were free to choose between chloroquine tablet or placebo Wrong outcomes: pain during pressure of the patella, on palpation of the posterior side of the patella, during resistance of knee extension and during an isometric contraction of the Qceps; all measured on a 3-point 0-1 scale (0, 0.5, 1) or 0-3 scale (0, 1.5, 3).
Mazloum et al. 2014	Duration of symptoms unclear Wrong outcomes: VAS (not specified)
McMullen et al. 1990	Wrong study design: non-randomised controlled trial Duration of symptoms < 6 weeks (i.e. 10 days) Wrong outcomes: Cincinnati Rating System Duration of follow-up < 6 weeks (i.e. 4 weeks)
Melo et al. 2018	Duration of symptoms < 6 weeks Duration of follow-up < 6 weeks Wrong outcomes: Kujala, NPRS (unspecified)
Miller et al. 2013	Wrong study population?: anterior knee pain (not specified) Duration of symptoms < 6 weeks (i.e. 2 weeks) Duration of follow-up < 6 weeks (i.e. 3 days)
Miller et al. 1997	(no description of pain as behind or around the patella) Unclear criterion for symptom duration Wrong outcomes: VAS with activity (not specified)

Mohammadi et al. 2018	Wrong outcomes: VAS (unspecified)
Mølgaard et al. 2016	Wrong outcomes: KOOS
Møller & Krebs 1986	Wrong study population (study included patients with traumatic onset Wrong outcomes (clinician-judged improvement)
Monika et al. 2016	(no description of pain as behind or around the patella) Duration of follow-up < 6 weeks (4 weeks)
Motealleh et al. 2016	Duration of follow-up < 6 weeks (pre-post design on the same day) Wrong outcomes: pain after a stepping up/down test
Motealleh et al. 2019	Duration of follow-up < 6 weeks Wrong outcomes: Kujala, VAS (unspecified)
Moyano et al. 2013	(no description of pain as behind or around the patella) Wrong outcomes (AKPS/general VAS)
Mousavi et al. 2011	Wrong outcomes: VAS (not specified)
Naidu et al. 2018	Wrong outcomes: VAS (not specified), Kujala score Duration of follow-up < 6 weeks (i.e. 10 days)
Nakagawa et al. 2008	Duration of symptoms < 6 weeks < 10 patients per treatment arm
Nakhostin-Roohi et al. 2016	(no description of pain as behind or around the patella) Wrong study population?: stated as “anterior knee pain” Wrong outcomes: WOMAC Duration of follow-up < 6 weeks (i.e. 2 weeks)
Näslund et al. 2002	(no description of pain as behind or around the patella) Wrong outcomes: “daily worst VAS”
Noehren & Davis 2010	Wrong study design: case series
Nouri et al. 2019	Wrong outcomes: Kujala, WOMAC, VAS (unspecified)
O’Neill 1997	(no description of pain as behind or around the patella) Wrong study design: quasi-RCT Wrong outcomes: Lysholm
Ojaghi et al. 2015	Duration of symptoms < 6 weeks (i.e. 1 month) Duration of follow-up < 6 weeks (pre-post design) Wrong outcomes: VAS pain (not-specified)
Orscelik & Yildiz 2015	(no description of pain as behind or around the patella) Wrong outcomes: Kujala score Other concerns: Unclear if RCT; none-treatment legs served as a control + 2 treatment groups highly unbalanced
Østeras et al. 2013	Wrong outcomes: VAS at rest; Functional Index Questionnaire
Pagenstert et al. 2012	Wrong study population (exclusively pain on the lateral margin of the patella? Wrong study design: non-randomised controlled trial Wrong outcomes: Kujala

Park et al. 2012	(no description of pain as behind or around the patella) Duration of symptoms < 6 weeks (2 weeks) Follow-up < 6 weeks (i.e. 30 min) Wrong outcomes (no patient-reported/clinical outcome measures)
Patle & Bhave 2015	(no description of pain as behind or around the patella) Unclear criterion for symptom duration Follow-up duration < 6 weeks (i.e. 2 weeks)
Persson et al. 2011	No full text available. Personal communication CBL with Persson on 31/05/2018: VAS was obtained (not specified to activity)
Priore et al. 2019 [Unpublished]	Wrong outcomes: Kujala, self-reported kinesiophobia Duration of follow-up < 6 weeks
Qiu et al. 2006	(no description of pain as behind or around the patella) Unclear duration of symptoms Duration of follow-up < 6 weeks (i.e. 4 weeks)
Qiu et al. 2009	(no description of pain as behind or around the patella) Unclear criterion for the duration of symptoms Follow-up duration < 6 weeks (i.e. 21 days) Wrong outcomes: pain on a 11 point scale (not specified for activity)
Raatikainen et al. 1990	(no description of pain as behind or around the patella) Wrong outcomes: clinician-judged pain on a 0-3 scale
Rabelo et al. 2017	(no description of pain as behind or around the patella) Wrong outcomes: pain, NPRS, in past 14 days
Rangole et al. 2015	(no description of pain as behind or around the patella) Unclear criterion for the duration of symptoms Follow-up duration < 6 weeks (i.e. 2 weeks) Wrong outcomes (VAS, not specified; Kujala score)
Razeghi et al. 2010	Duration of symptoms < 6 weeks (i.e. 4 weeks) Follow-up duration < 6 weeks (i.e. 4 weeks) Wrong outcomes (VAS, not specified)
Rogvi-Hansen et al. 1991	(no description of pain as behind or around the patella) Unclear if right population: inclusion based on chondromalacia on arthroscopy Unclear criterion for the duration of symptoms Follow-up duration < 6 weeks (i.e. 5 weeks) Wrong outcomes: VAS, not specified
Roper et al. 2016	(no description of pain as behind or around the patella (“patellofemoral pain”) <10 patients per treatment arm Unclear criterion for the duration of symptoms Follow-up duration < 6 weeks (i.e. 1 month)

Roush et al. 2000	Wrong study population: patellar tendinitis, quadriceps tendinitis, patellofemoral syndrome, chondromalacia patella, idiopathic knee pain, Osgood–Schlatter disease, and plica syndrome. Unclear criterion for the duration of symptoms Wrong outcomes: pain during activity (not specified; unclear pain scale)
Rowlands & Brantingham 1999	Unclear criterion for the duration of symptoms Follow-up < 6 weeks (i.e. 1 month) Wrong outcomes: McGill pain index, NPRS (not specified)
Saad et al. 2018	Wrong outcomes: VAS (not specified); Kujala
Sahin et al. 2016	Duration of symptoms < 6 weeks (i.e. 4 weeks)
Sanchez et al. 2017	(no description of pain as behind or around the patella) Wrong study design: non-randomised controlled trial (“randomization was performed by alternate inclusion in the groups”) Unclear duration of symptoms Wrong outcomes: VAS (not specified), Lysholm score Duration of follow-up < 6 weeks (i.e. 4 weeks)
Schneider et al. 2001	Wrong outcomes: VAS at rest and after peak torque test (cybex), 100-point scale according to Besette and Hunter.
Sellhorst et al. 2019	Duration of symptoms: no criterion; minimal duration in the sample was 3 weeks.
Shetty et al. 2016	(no description of pain as behind or around the patella) Duration of symptoms < 6 weeks (i.e. 1 month) Follow-up < 6 weeks (i.e. 4 weeks) Wrong outcomes: AKPS, LEFS and 11-point NPRS “during ascending and descending functional activity” (not specified).
Shih et al. 2011	Wrong study population: mix of patellofemoral pain and plantar heel pain patients with pronated feet Follow-up < 6 weeks (i.e. 2 weeks) Wrong outcomes: Duration to onset of pain on a treadmill test and pain at onset of pain during the treadmill test.
Sinclair et al. 2019	Wrong design: case series Wrong outcomes: KOOS-PF Duration of follow-up < 6 weeks
Singer et al. 2015	Wrong study design (Review)
Singer et al. 2011	< 10 patients per treatment arm at eligible follow-ups
Smith et al. 2019	< 10 patients per treatment arm
Soleimani et al. 2017	Follow-up duration < 6 weeks (i.e. 4 weeks)
Stakes et al. 2006	Unclear duration of symptoms Duration of follow-up < 6 weeks (i.e. 4 weeks)
Stein et al. 2002	Unclear if right population: “chrondromalacia” with no description of symptom presentation Wrong study design: quasi-randomised controlled study (alternate way, determined by non-blinded researcher) Wrong outcomes: Lysholm score

Stiene et al. 1996	Wrong study population: patients with patella instability/luxation were eligible Wrong study design: non-randomised controlled trial Duration of symptoms < 6 weeks (i.e. 4 weeks) Wrong outcomes: study questionnaire scoring system
Strecker et al. 2015	Wrong study design: review
Suter et al. 1998	Wrong study design: Case series
Sutlive et al. 2018	(Unclear duration of symptoms) Duration of follow-up < 6 weeks (i.e. 72 hrs)
Syed et al. 2018	Unclear criterion for duration of symptoms Wrong outcomes: VAS (not specified); KOOS. Duration of follow-up < 6 weeks (i.e. 2 weeks)
Syme et al. 2009	Wrong outcomes: McGill pain questionnaire, Modified Functional Index Questionnaire, SF-36, Patient Generated Index and Numeral rating scale – 101 for pain ("average pain intensity in the previous one month"
Tang et al. 2008	Wrong outcomes: Hospital Special Surgery Scoring System
Taylor & Brantingham	< 10 patients per treatment arm Duration of symptoms < 6 weeks (i.e. 1 month) Follow-up duration < 6 weeks (i.e. 5 weeks) Wrong outcomes: NPRS (pain at its worst (not specified)), the patient-specific functional scale, the short-form McGill pain questionnaire
Telles et al. 2016	< 10 patients per treatment arm Duration of symptoms < 6 weeks (i.e. 4 weeks) Follow-up duration < 6 weeks (i.e. 5 weeks) Wrong outcomes: NPRS (not specified); LEFS
Thomee 1997	Wrong study design: quasi-randomised study
Timm 1998	Wrong study design: quasi-randomised trial Follow-up duration < 6 weeks (i.e. 4 weeks) Duration of symptoms < 6 weeks (i.e. no description given, table 1: range 5-19 weeks)
Tunay et al. 2003	Duration of symptoms: unclear Wrong outcomes: VAS (not specified) Follow-up duration < 6 weeks (i.e. 4 weeks)
Uboldi et al. 2018	(Unclear duration of symptoms) Wrong outcomes: Kujala and VAS (not specified)
Valenza et al. 2016	Wrong outcomes: Pressure pain measures, ROM, vertical jump Duration of follow-up < 6 weeks (i.e. 6 minutes)
Van de Dolder & Roberts 2005	(no description of pain as behind or around the patella) Unclear criterion for the duration of symptoms Follow-up < 6 weeks (i.e. 2 weeks)
Van Tiggelen et al. 2011	Wrong study design: not an RCT; not a curative study (i.e. preventative study)
Vengust et al. 2001	<10 patients per treatment arm Wrong study population: inclusion of patients after patella dislocation Wrong study design: case series

	Wrong outcomes (Kujala) Duration of follow-up < 6 weeks (7 days)
Verma & Krishnan 2012	Duration of symptoms < 6 weeks Wrong outcomes: "Jette Functional Status Index" Follow-up duration < 6 weeks (i.e. 2 weeks)
Werner et al. 1993	Wrong study design: cross-over study
Werner & Eriksson	Wrong study design: non-randomised comparative study (between/within participants)
Whittingham et al. 2004	(no description of pain as behind or around the patella) Wrong study population?: "acute PFP" (not specified) Duration of follow-up < 6 weeks (i.e. 4 weeks)
Wiener-Ogilvie & Jones, 2004	Wrong patient population; patients of all ages with anterior-medial knee pain with no restriction to a specific diagnosis. Table 1: 1/3 of subjects had PF OA or osteoporosis
Wijnen et al. 1996	(no description of pain as behind or around the patella) < 10 per treatment arm
Wu et al. 2009	(no description of pain as behind or around the patella) Wrong study design: quasi-randomised controlled trial Wrong outcomes: Kujala
Yalvani et al. 2018	Wrong outcomes: VAS (unspecified)
Yang et al. 2014	Duration of follow-up < 6 weeks (i.e. 6 days)
Yip & Ng 2006	Wrong outcomes: Patellofemoral Pain Syndrome Severity Scale (A 10-cm scale that ranges from no pain to unbearable pain)
Zahednejad et al. 2017	Unclear duration of symptoms; Duration of follow-up < 6 weeks
Zemadanis et al.	Criterion for duration of symptoms was 2 months, however, mean duration of symptoms in the sample was 8 weeks. Unclear if minimal duration of symptoms of 6 weeks is met by the whole sample. Wrong outcomes: VAS (not specified), LEFS

References to excluded studies in web appendix 2

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Web appendix 3: Studies found through database searches, awaiting classification

Study identifier	Comment
Akbaş et al. 2011	Unclear diagnostic criteria. Unclear minimum duration of symptoms. Contact not established.
Bolulu Çubukçu et al. 2004	No full text made available upon contact/request
Ferreira et al. 2016b	No full text made available. No response to emails. Study status unknown
Lee et al. 2014	Activity-specific VAS values requested, no reply. General VAS values reported only.
Mucha 1990 (journal unknown: researchgate)	No full text made available
Muthukumaran et al 2017	No full text made available.
Qi & Ng 2007	Unclear duration of symptoms, the nature of symptoms, availability/existence of raw 'pain severity scores' Author not reached through available email address and researchgate, after multiple attempts June 2018
Sker et al. 2015	Unclear duration of symptoms. Request for information, and for raw VAS scores (listed but not reported). No response to emails June/July 2018.
Song et al. 2009	Unclear duration of symptoms. No response to emails June 2018.

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Web appendix 4: Potentially eligible trials from trial registers

	Trial identifier	Treatment comparison	Status	Comments
1	IRCT2014090719073N1	Open vs closed chain exercises	Completed / Full text obtained.	Excluded, see Jahaani et al., web appendix 2
2	ISRCTN84641129	Insoles PFP vs sham	Completed.	No full text. Funded. Personal communication on 1/6/2018: “completed but underpowered”.
3	IRCT201101201675N5	Closed vs open chain exercises	Completed	
4	IRCT201111168117N1	Knee Qceps exercises versus core stability exercises	Completed	
5	IRCT2016062028542N1	Trigger point pressure vs dry needling	Completed	
6	IRCT201701242445N4	Electroacupuncture vs sham electroacupuncture	Completed	
7	NCT01434966	Lumbar manipulation vs lumbar tens vs local knee tens	Completed	
8	NCT01691170	Qceps strengthening vs hamstring stretches	Completed	
9	NCT02118246	Dry needling vs kinesio tape	Completed	No full text. Personal communication on 4/6/2018: paper is under review.
10	NCT03099512	Short foot exercises vs other exercises?	Completed	No full text. Personal communication on 24/08/2019. Paper in preparation.
11	NCT00736736	Leg press vs leg press and hip muscle strengthening	Completed	
12	NCT03771495	Hip mobilization techniques versus sham mobilization techniques	Completed	Personal communication on 30/07/2019: manuscript in preparation.
13	NCT02597673	Home exercise program vs portable neuromuscular electrical stimulation vs portable transcutaneous electrical nerve stimulation	Completed	Personal communication on 30/07/2019. Full text submitted.
14	RBR-2dy25r	Brace therapy versus Wait-and-see	Completed; full text obtained.	Excluded, see Priore et al., web appendix 2
15	NCT02123602	Trunk vs lower limb exercises	Trial stopped prior to completion	Personal contact on 30/07/2019: Trial stopped.
16	NCT02854774	Hip vs knee exercises	Suspended	No funding available to complete study
17	NCT03069547	Quadriceps vs hip exercise program	Ongoing	
18	NCT02845869	Light therapy (THOR Laser LX2) vs sham therapy	Ongoing	
19	RBR-8c7267	Neuromuscular training + conventional exercise therapy vs	Ongoing	

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		conventional exercise therapy alone		
20	NCT03784339	Education + physiotherapy vs physiotherapy only	Ongoing	
21	CTRI/2018/04/013216	Comparison of two exercise regimes	Ongoing	
22	NCT03468491	MTP joint mobilisation + biomechanical taping + foot exercises + lower extremity neuromuscular exercises vs vs lower extremity neuromuscular exercises alone	Ongoing	
23	IRCT20150131020888N9	Low-level laser therapy + exercise therapy versus Placebo laser therapy + exercise therapy Versus Physical therapy only	Ongoing	Personal communication on 30/07/2019: status = ongoing.
24	IRCT20170516034003N6	Light therapy, transcutaneous electrical nerve stimulation (TENS) and exercise therapy *versus* Light therapy, transcutaneous electrical nerve stimulation (TENS), exercise therapy and laser therapy	Ongoing	
25	ChiCTR1900023068	Hip-knee muscle strengthening training versus Hip-knee muscle strengthening training + whole-body vibration training	Ongoing	
26	IRCT20180416039324N1	Lumbosacral manipulation + knee exercises versus knee exercises only	Ongoing	
27	TCTR20190309001	Movement retraining (neuromuscular training) *versus* Usual care (i.e. education leaflet, exercise therapy, TENS, taping, bracing, short wave diathermy, ultrasound therapy, interferential current therapy).	Ongoing	
28	NCT03966937	Dry Needling versus control	Ongoing	
29	NCT03918863	Neuromuscular electrical stimulation + exercises versus exercises alone	Ongoing	

30	NCT03515720	Cherry juice versus placebo	Ongoing	
31	NCT03897907	Psychologically-informed video education versus anatomically-informed video education	Ongoing	
32	NCT03717532	Blood flow restriction exercises versus placebo	Ongoing	
33	RBR-7w4cp9	Osteopathic treatment versus physiotherapy	Unknown	
34	NCT03324204	Shockwave therapy versus neuromuscular training	Unknown	
35	NCT03620799	Manual therapy versus control	unknown	
36	NCT03515720	Neuroprolotherapy + exercises versus exercises only	Unknown	
37	DRKS00011240	Exercise vs exercise + brace	Unknown	
38	NCT03184545	Electrostimulation vs physiotherapy	Unknown	
39	NCT00451347	Strength training vs taping vs exercise	Unknown	last updated 2007
40	NCT03163290	Posterolateral hip complex exercises vs anteromedial hip complex exercises	Unknown	
41	NCT01811654	Intra-Articular Hyaluronan vs standard care	Unknown	
42	RBR-2cxrpp	Lumbo-pelvic exercises vs knee exercises	Unknown	
43	NCT02250144	Morpho-specific vs placebo orthoses	Unknown	
44	NCT01771952	Synvisc-One™ vs sham	Unknown	

WEB APPENDIX 5. CHARACTERISTICS OF INCLUDED STUDIES

Table 1. Study characteristics

RCT	Type of population	Sample size	Main baseline characteristics	Treatments	Outcome measures	Follow-ups
Baldon 2014	• Recreational athletes	Total n = 31 Group 1: 15 Group 2: 16	***Variable*** — *Group 1* — *Group 2* *Sex, female %* — 100% — 100% *Worst pain, VAS 0-10 past week, mean (SD)* — 6.6 (1.1) — 6.1 (1.8) *Duration of symptoms (months), mean (range)* — 60.0 (3 -156) — 27.0 (3-180)	Group 1: Hip/knee/trunk exercises Group 2: Hip/knee exercises	• Any improvement (GROC) • Worst pain in the past week	• 9 weeks • 22 weeks
Collins 2008	• Active/sedentary population: ?	Total n = 179 Group 1: 44 Group 2: 45 Group 3: 46 Group 4: 44	***Variable*** — *Group 1* — *Group 2* — *Group 3* — *Group 4* *Sex, female %* — 59.1% — 64.4% — 54.3% — 45.5% *Worst pain, VAS 0-100 past week, mean (SD)* — 64.8 (17.0) — 61.4 (15.6) — 59.4 (15.3) — 56.6 (14.9) *Duration of symptoms (months), median (range)* — 24 (9-60) — 37 (12-85) — 42 (12-96) — 24 (12-71)	Group 1: Education + exercise + patellar taping/mobilisations + orthotics Group 2: Education + exercise + patellar taping/mobilisations Group 3: Education + orthotics Group 4: Education	• Any improvement (GROC) • Worst pain in the past week	• 6 weeks • 12 weeks • 52 weeks
Demirci 2017	• Active/sedentary population: ?	Total n = 35 Group 1: 18 Group 2: 17	***Variable*** — *Group 1* — *Group 2* *Sex, female %* — 100% — 100% *Pain descending stairs, VAS 0-10, mean (SD)* — 5.8 (1.7) — 5.5 (1.4) *Duration of symptoms (months), mean (range)* — ? — ?	Group 1: Mobilisation with movement + hip/knee exercises Group 2: Kinesio tape + hip/knee exercises	• Pain ascending stairs • Pain descending stairs	• 6 weeks
Drew 2017	• Participants with hip abductor weakness • Active/sedentary population: ?	Total n = 26 Group 1: 14 Group 2: 12	***Variable*** — *Group 1* — *Group 2* *Sex, female* — 50% — 66.7% *Worst pain, 0-10 VAS past week, mean (SD)* — 4.7 (1.68) — 5.4 (2.3) *Duration of symptoms (months), mean (IQ range)* — 30 (17 – 75) — 33 (11 – 54)	Group 1: Hip/knee exercises Group 2: Wait-and-see	• Any improvement (GROC) • Worst pain in the past week	• 8 weeks
Emamvirdi 2018	• Female volleyball players	Total n = 64 Group 1: 32 Group 2: 32	***Variable*** — *Group 1* — *Group 2* *Sex, female %* — *32* — *32* *Worst pain, 0-10 VAS past week, mean (SD)* — *6.1 (1.18)* — *6.0 (1.35)* *Duration of symptoms (months), mean (SD)* — *?* — *?*	Group 1: Hip/knee exercises Group 2: Wait-and-see	• Worst pain in the past week	• 6 weeks
Eng 1993	• Active/sedentary population: ?	Total n = 20 Group 1: 10 Group 2: 10	***Variable*** — *Group 1* — *Group 2* *Sex, female %* — 100% — 100% *Pain descending stairs, VAS 0-10, mean (SD)* — ? — ? *Duration of symptoms (months), mean (SD)* — ? — ?	Group 1: Foot orthosis + hip/knee exercises Group 2: Hip/knee exercises	• Pain walking • Pain ascending stairs • Pain descending stairs • Pain sitting • Pain running • Pain squatting	• 6 weeks • 8 weeks
Esculier 2018	• Running athletes	Total n = 69 Group 1: 23 Group 2: 23 Group 3: 23	***Variable*** — *Group 1* — *Group 2* — *Group 3* *Sex, female %* — 65% — 61% — 61% *Worst pain, VAS 0-10 past week, mean (SD)* — 5.8 (1.8) — 7.0 (1.4) — 6.0 (2.0) *Duration of symptoms mean months (SD)* — 16.4 (16.3) — 42.2 (47.4) — 28.0 (42.4)	Group 1: Education Group 2: Education + exercise Group 3: Education + Gait retraining	• Worst pain in the past week • Pain running	• 8 weeks • 20 weeks
Fouroughi 2018	• Active women	Total n = 40 Group 1: 20 Group 2: 20	***Variable*** — *Group 1* — *Group 2* *Sex, female %* — 100% — 100% *Worst pain, VAS 0 – 100 past week, mean (SD)* — 75.25 (5.10) — 76.23 (4.77)	Group 1: Hip/knee/trunk exercises Group 2: Hip/knee exercises	• Worst pain in the past week	• 13 weeks

			Duration of symptoms (months), mean (SD)	?	?			
Fukuda 2012	• Active/sedentary population: sedentary	Total n = 54 Group 1: 26 Group 2: 28	***Variable*** *Sex, female %* *Pain descending stairs, VAS 0 - 10, mean (SD)* *Duration of symptoms (months), mean (SD)*	*Group 1* 100% 6.4 (1.4) 21.0 (17.7)	*Group 2* 100% 5.8 (1.2) 23.2 (19)	Group 1: Hip/knee exercises Group 2: Hip/knee/trunk exercises	• Pain ascending stairs • Pain descending stairs	• 13 weeks • 26 weeks • 52 weeks
Glaviano 2019	• Active population?	Total n = 21 Group 1: 11 Group 2: 10	***Variable*** *Sex, female %* *Worst pain, VAS 0 – 10 past week, mean (SD)* *Duration of symptoms (months), mean (SD)*	*Group 1* *72.2%* *4.2 (1.1)* *26.3 (26.3)*	*Group 2* *80%* *5.6 (1.2)* *23.0 (27.8)*	Group 1: Electrical neuromuscular stimulation + exercise Group 2: Sham electrical neuromuscular stimulation + exercise	• Any improvement (GROC) • Worst pain in the past week	• 26 weeks • 52 weeks
Giles 2017	• Active/sedentary population: ?	Total n = 79 Group 1: 40 Group 2: 39	***Variable*** *Sex, female %* *Worst pain, VAS 0-100 past week, mean (SD)* *Duration of symptoms (months), mean (SD)*	*Group 1* 60% 55.7 (13.9) 31.6 (40.9)	*Group 2* 49% 51.4 (15.3) 37.8 (55.5)	Group 1: Hip/knee exercises with blood flow restriction Group 2: Hip/knee exercises	• Any improvement (GROC) • Worst pain in the past week	• 8 weeks • 26 weeks
Hart 2019	• Active/sedentary population: ?	Total n = 86 Group 1: 45 Group 2: 41	***Variable*** *Sex, female %* *Pain during single leg squat, VAS 0-10, mean (SD)* *Duration of symptoms (months), mean (SD)*	*Group 1* *75.6%* *5.6 (1.9)** *?*	*Group 2* *75.6%* *5.2 (1.7)** *?*	Group 1: Hyaluronic acide Injection + hip/knee exercises Group 2: Sham injection + hip/knee exercises	• Pain during a single leg squat (VAS, 0 – 10)	• 13 weeks • 26 weeks
Hott 2019	• Active/sedentary population: ?	Total n = 112 Group 1: 39 Group 2: 37 Group 3: 36	***Variable*** *Group 1* *Sex, female %* 64.1% *Worst pain, VAS 0-100 past week, mean (95%CI)* 6.5 (5.8 – 7.1) *Duration of symptoms (months), n* *3 – 6 months* 1 *6 – 12 months* 5 *12 – 24 months* 10 *>24 months* 23	*Group 2* 64.9% 6.0 (5.2 – 6.8) 2 7 8 20	*Group 3* 66.7% 5.8 (5.1 – 6.5) 5 11 6 14	Group 1: Education + hip exercises Group 2: Education + knee exercises Group 3: Education	• Worst pain in the past week	• 6 weeks • 13 weeks
Kettunen 2007	• Active/sedentary population: ?	Total n = 56 Group 1: 28 Group 2: 28	***Variable*** *Sex, female %* *Pain descending stairs, VAS 0-100, mean (SD)* *Duration of symptoms (months), mean (SD)*	*Group 1* 61% 43.3 (27.2) 54.9 (73.4)	*Group 2* 64% 35.0 (26.9) 45.0 (74.9)	Group 1: Arthroscopy + hip/knee exercises Group 2: Hip/knee exercises	• Pain standing up from sitting • Pain ascending stairs • Pain descending stairs	• 39 weeks • 104 weeks • 260 weeks
Matthews 2020	• Active/sedentary population: ?	Total n = 218 Group 1: 109 Group 2: 109	***Variable*** *Sex, female %* *Worst pain, VAS past week, mean (SD)* *Duration of symptoms (months), mean (range)*	*Group 1* 64.2% 6.3 (2.0) 52.3 (61.9)	*Group 2* 74.3% 6.3 (2.0) 55.4 (60.8)	Group 1: Hip/knee exercises Group 2: Orthoses	• Any improvement (GROC)	• 6 weeks • 12 weeks
Mills 2011	• Active/sedentary population: ?	Total n = 40 Group 1: 20 Group 2: 20	***Variable*** *Sex, female %* *Worst pain, VAS 0 - 100 past week, mean (SD)* *Duration of symptoms (months), median (IQ range)*	*Group 1* 75% 50.3 (20.2) 36 (12-96)	*Group 2* 70% 56.7 (19.4) 48 (24-98)	Group 1: Orthosis Group 2: Wait-and-see	• Any improvement (GROC) • Worst pain in the past week	• 6 weeks
Petersen	• Active/sedentary	Total n = 156	***Variable***	*Group 1*	*Group 2*	Group 1: Patellar brace + hip/knee	• Any improvement	• 6 weeks

2016	population: ?	Group 1: 78 Group 2: 78	*Sex, female %* *Worst pain, VAS past week, mean (SD)* *Duration of symptoms (months), mean (range)*	65.8% ? ?	78.9% ? ?	exercises Group 2: Hip/knee exercises	(GROC) • Worst pain in the past week	• 12 weeks • 54 weeks
Rathleff 2015	• Adolescents, 15-19 years • Active/sedentary population: 33% participated in sports	Total n = 121 Group 1: 59 Group 2: 61	***Variable*** *Sex, female %* *Worst pain, VAS 0 - 100 past week, median (IQ range)* *Duration of symptoms, n* *2 - 6 months* *6 – 12 months* *>12 months*	*Group 1* 86% 47 (33-69) 1 5 53	*Group 2* 74% 48 (34-64) 5 5 52	Group 1: Education Group 2: Education + exercise + patellar taping/mobilisations	• Any improvement (GROC) • Worst pain in the past week	• 13 weeks • 26 weeks • 52 weeks • 104 weeks
Riel 2018	• Adolescents 15-19 years of age • Active/sedentary population: ?	Total n = 40 Group 1: 20 Group 2: 20	***Variable*** *Sex, female %* *Worst pain, VAS past week, mean (SD)* *Duration of symptoms (months), mean (range)*	*Group 1* 95% ? ?	*Group 2* 80% ? ?	Group 1: Hip/knee exercises with feedback Group 2: Hip/knee exercises	• Any improvement (GROC)	• 6 weeks
Van Linschoten 2009	• Active/sedentary population: 75.5% participated in sports	Total n = 131 Group 1: 65 Group 2: 66	***Variable*** *Sex, female %* *Pain at rest, VAS 0 - 10, mean (SD)* *Duration of symptoms, n* *2-6 months* *6-24 months*	*Group 1* 64.6% 4.14 (2.3) 45 20	*Group 2* 63.6% 4.03 (2.3) 44 22	Group 1: Education + exercise + patellar taping/mobilisations Group 2: Education	• Any improvement (GROC)	• 13 weeks • 52 weeks
Witvrouw 2000	• Active/sedentary population: ?	Total n = 60 Group 1: 30 Group 2: 30	***Variable*** *Sex, female %* *Worst pain, VAS past week, mean (SD)* *Duration of symptoms (months), mean (range)*	*Group 1* 67% 5.0 (3.3) ?	*Group 2* 67% 5.3 (3.2) ?	Group 1: Minimal hip/knee exercises Group 2: Hip/knee exercises	• Worst pain in the past week • Pain prolonged sitting • Pain walking • Pain ascending stairs • Pain descending stairs • Pain running • Pain jumping • Pain squatting	• 13 weeks • 260 weeks
Yılmaz Yelvar 2015	Active/sedentary population: ?	Total n = 52 Group 1: 26 Group 2: 26	***Variable*** *Sex, female %* *Pain descending stairs, VAS 0-10, mean (SD)* *Duration of symptoms (months), mean (range)*	*Group 1* 100% ? 12.5 (7.8)	*Group 2* 100% ? 15.3 (9.3)	Group 1: Hip/knee/trunk exercises Group 2: Hip/knee exercises	• Pain ascending stairs • Pain descending stairs	• 6 weeks • 12 weeks

RCT = randomised controlled trial, n= number, SD = standard deviation GROC = global rating of change scale, IQ = interquartile, ? = unknown. * = obtained from authors

Table 2. Study characteristics (extended)

Study	Baldon et al. 2014
Methods	*Design:* Randomised Controlled Trial *Number of randomised participants:* Group 1: 15 Group 2: 16
Recruitment of participants	*Study period:* March 2012 – February 2013 *Eligibility criteria:* Patients were included in the study if they were female and had anterior knee pain of 3 or greater on the 10-cm VAS for a minimum of 8 weeks before assessment. Additional inclusion criteria were anterior or retropatellar knee pain during at least 3 of the following activities-ascending/descending stairs, squatting, running, kneeling, jumping, and prolonged sitting - and an insidious onset of symptoms unrelated to trauma. Patients were excluded if they had intra-articular pathology; involvement of cruciate or collateral ligaments; patellar instability; Osgood-Schlatter or Sinding-Larsen-Johansson syndrome; hip pain; knee joint effusion; previous surgery in the lower limb; or if palpation of the patellar tendon, iliotibial band, or pes anserinus tendons reproduced the pain.
Treatments	*Setting of the treatment:* This study was performed at the Laboratory of Intervention and Assessment in Orthopedics and Traumatology of the São Carlos Federal University. **Group 1: Hip/knee/trunk exercises** **Group 2: Hip/knee exercises** **Group 1:** **Exercise therapy** - 3 physiotherapist-supervised sessions per week, for 8 weeks with at least 24hrs rest between sessions - No unsupervised home exercise sessions - First 2 weeks: no physical activities that could cause pain - Exercise load based on a 1-repetition maximum, with pain <3 on 0-10. - Progression of loads if exercise did not cause exacerbation, excessive fatigue or local muscle pain beyond 48hrs after the training session. - Duration of the sessions: 90 – 120 minutes - Goal first 2 weeks: to enhance motor control of the trunk and hip muscles - Goal subsequent 3 weeks: increase strength of the trunk and hip muscles, and to continue improving motor control using weight-bearing activities + teaching how dynamic lower-limb misalignment could increase patellofemoral stress and knee pain - Final 3 weeks: increment of exercise difficulty and education of lower extremity alignment in neutral frontal plane *Exercises* - Following exercises were done: o Transverse abdominis and multifidus muscle training o Lateral bridge and ventral bridge

	○ Trunk extension on swiss ball ○ Isometric hip abduction/lateral rotation while standing ○ Hip abduction/lateral rotation/extension in sidelying ○ Hip extension/lateral rotation in prone ○ Clams with theraband ○ Pelvic drop while standing ○ Hip lateral rotation in closed kinetic chain ○ Single leg deadlift ○ Single leg squat ○ Forward lunge ○ Prone knee flexion ○ Seated knee extension ○ Single leg standing on unstable platform **Group 2:** **Exercise therapy** - 3 physiotherapist-supervised sessions per week, for 8 weeks with at least 24hrs rest between sessions - No unsupervised home exercise sessions - First 2 weeks: no physical activities that could cause pain - Exercise load based on a 1-repetition maximum, with pain <3 on 0-10. - Progression of loads if exercise did not cause exacerbation, excessive fatigue or local muscle pain beyond 48hrs after the training session. - Duration of the sessions: 75 – 90 minutes *Exercises* - Stretching and traditional weight-bearing and non–weight-bearing exercises emphasizing quadriceps strengthening. - Following exercises were done: ○ Quadriceps and lateral retinaculum stretches ○ Hamstring, soleus, gastrocnemius and iliotibial band stretches ○ Straight leg raise in supine ○ Seated knee extension ○ Leg press ○ Wall squat ○ Step-ups and step-downs from a 20cm step ○ Single leg standing on unstable platform *The authors provide appendices (A and B) with images of the exercises, and repetitions and sets per week. Please see Baldon et al. (2014)*

Study	Collins 2008
Methods	*Design:* Randomised Controlled Trial *Number of randomised participants:* Group 1: 44 Group 2: 45 Group 3: 46 Group 4: 44
Participants	*Study period:* May 2004 – June 2007 *Eligibility criteria:* Inclusion: Age 18-40 years; insidious onset of anterior knee or retropatellar pain of greater than six weeks' duration and provoked by at least two of prolonged sitting or kneeling, squatting, running, hopping, or stair walking; tenderness on palpation of the patella, or pain with step down or double leg squat; and worst pain over the previous week of at least 30mm on a 100 mm visual analogue scale. Exclusion: Exclusion criteria were concomitant injury or pain from the hip, lumbar spine, or other knee structures; previous knee surgery; patellofemoral instability; knee joint effusion; any foot condition that precluded use of foot orthoses; allergy to strapping tape; use of physiotherapy or foot orthoses within the previous year; or use of anti-inflammatory drugs

Treatments	*Setting of the treatment:*
	Community based settings (not specified)
	
	Group 1: Education + exercise therapy + patellar taping/mobilisations +orthosis
	Group 2: Education + exercise therapy + patellar taping/mobilisations
	Group 3: Education + orthosis
	Group 4: Education
	
	Group 1:
	Education
	- Education package including general information on PFP, and advice on activity.
	- The advice on activity entailed an encouragement to continue exercise and participate in activities that did not provoke pain, and to avoid aggravating activities particularly if the provoked pain persists longer than several minutes after cessation of the activity
	
	Exercise therapy
	- 6 appointments of 20-60 minutes in 6 weeks
	- A progressive program of vasti muscle retraining exercises with electromyographic feedback
	  o Hip external rotation retraining (3x20seconds)
	  o Isometric VMO contraction (3x10 reps)
	  o Inner range knee flexion (3x10 reps)
	  o Progressive step downs (if >4 steps = pain free)
	  ▪ Slow eccentric lowering on affected from 10cm step 3x10 reps
	  ▪ Increased step height (20cm) 3x10reps
	  ▪ Alternating speed (down slow, up fast, down fast, up slow) 3x10reps

	- Hamstring and anterior hip stretches (3x20seconds bilaterally)
	
	Patellar mobilization
	- Passive patellar medial glide and tilt combined with transverse friction massage of the lateral retinaculum
	
	Patellar taping
	- Daily application for 6 weeks
	- Medial tilt and posterior tilt/medial glide and posterior tilt/fat pad unloading/medial rotation
	
	Home programme (2x/day)
	Exercise therapy (as above)
	Patellar mobilization (as above)
	Patellar taping (as above)
	
	Foot orthoses
	- Physiotherapists fitted prefabricated foot orthoses (Vasyli International, Labrador, Australia), and a pair of orthosis-like contoured sandals.
	- Orthosis were manufactured and designed from ethylene-vinyl acetate with an inbuilt arch support and a manufacturer specified 6° varus wedge.
	- The orthoses were constructed in 3 different levels of hardness [high (Shore A 75°), medium (Shore A 60°) or low (Shore A 52°)].
	- A standardized fitting process was followed that prioritized comfort, with scope to review size, length and hardness.
	- To maximise comfort, orthoses were modified by heat moulding and/or trialing various medial wedges to the rear foot (2° or 4° inclination) and/or forefoot (4° or 6° inclination) and/or heel raise (4, 6 or 8 mm in height).
	
	Group 2:
	Education
	- Education package including general information on PFP, and advice on activity.
	- The advice on activity entailed an encouragement to continue exercise and participate in activities that did not provoke pain, and to avoid aggravating activities particularly if the provoked pain persists longer than several minutes after cessation of the activity
	
	Exercise therapy
	- 6 appointments of 20-60minutes in 6 weeks
	- A progressive program of vasti muscle retraining exercises with electromyographic feedback
	  - Hip external rotation retraining (3x20seconds)
	  - Isometric VMO contraction (3x10 reps)
	  - Inner range knee flexion (3x10 reps)
	  - Progressive step downs (if >4 steps = pain free)
	  - Slow eccentric lowering on affected from 10cm step 3x10 reps
	  - Increased step height (20cm) 3x10reps
	  - Alternating speed (down slow, up fast, down fast, up slow) 3x10reps
	- Hamstring and anterior hip stretches (3x20seconds bilaterally)
	
	Patellar mobilization

	- Passive patellar medial glide and tilt combined with transverse friction massage of the lateral retinaculum **Patellar taping** - Daily application for 6 weeks - Medial tilt and posterior tilt/medial glide and posterior tilt/fat pad unloading/medial rotation **Home programme (2x/day)** Exercise therapy (as above) Patellar mobilization (as above) Patellar taping (as above) **Group 3:** **Education** - Education package including general information on PFP, and advice on activity. - The advice on activity entailed an encouragement to continue exercise and participate in activities that did not provoke pain, and to avoid aggravating activities particularly if the provoked pain persists longer than several minutes after cessation of the activity **Foot orthoses** - Physiotherapists fitted prefabricated foot orthoses (Vasyli International, Labrador, Australia), and a pair of orthosis-like contoured sandals. - Orthosis were manufactured and designed from ethylene-vinyl acetate with an inbuilt arch support and a manufacturer specified 6° varus wedge. - The orthoses were constructed in 3 different levels of hardness [high (Shore A 75°), medium (Shore A 60°) or low (Shore A 52°)]. - A standardized fitting process was followed that prioritized comfort, with scope to review size, length and hardness. - To maximise comfort, orthoses were modified by heat moulding and/or trialing various medial wedges to the rear foot (2° or 4° inclination) and/or forefoot (4° or 6° inclination) and/or heel raise (4, 6 or 8 mm in height). **Group 4:** **Education** - Education package including general information on PFP, and advice on activity. - The advice on activity entailed an encouragement to continue exercise and participate in activities that did not provoke pain, and to avoid aggravating activities particularly if the provoked pain persists longer than several minutes after cessation of the activity **Flat inserts** Flat inserts were provided and a limited number of home exercises were given: minimal balance training (standing on one leg with handrail to standing without support and with the eyes closed).

Study	Demirci 2017
Methods	*Design:* Randomised Controlled Trial *Number of randomised participants:* Group 1: 21 Group 2: 20
Participants	*Study period:* Not reported *Eligibility criteria:* Patients diagnosed with PFP by a specialist of orthopedics and traumatology. Inclusion criteria were: (i) durations lasting longer than two months, (ii) pain scoring three or more according to Visual Analogue Scale (VAS) during at least two activities (prolonged sitting, ascending-descending stairs, squatting, kneeling and jumping-running), (iii) age between 20 and 45 (to reduce the risk of osteoarthritic changes in patellofemoral joint). Patients who had meniscus tear, bursitis, ligament injury, patellar tendon lesions, joint degeneration, patellofemoral dislocation and/or recurrent subluxation as well as those who had undergone lower extremity surgery were excluded. Patient with knee pain caused by the hip, lumbar spine or ankle joint were also excluded.
Treatments	*Setting of the treatment:* Not reported **Group 1: Mobilisation with movement + hip/knee exercises** **Group 2: Kinesio tape + hip/knee exercises** **Group 1:** **Mobilisation with movement** Two techniques were performed - Straight Leg-Raise with Traction: "The extremity on which the practice would be performed in supine position was grasped from the ankle level and was, then, subjected to traction longitudinally. Afterward, the knee was lifted up passively while in extension and was kept for waiting for a few seconds at the point where tension was felt and was, then, returned to its initial position. The practice was repeated 10 times, and 3 sets of practice at 1-min-intervals were performed" - Tibial Gliding: "The patients were asked whether or not they felt any pain in the course of the active knee flexion-extension movement while in supine position. In the patients who had pain, the treatment was started on in the position in which no load was transferred onto the knee joint. Each patient was tested in every direction in the course of the active knee flexion-extension movement so as to find out the best pain-free gliding direction (medial-lateral part of the tibia, anterior-posterior, internal-external rotation). While a hand femur was being fixated in accordance with the treatment direction selected by the therapist, the other hand was subjected to gliding towards tibia, and at that moment, the patient was asked to perform 10 repetitive active knee flexion-extension. The practice was performed by doing 10 repetitions for 3 sets and by providing 1-min-resting time between the sets. Throughout the treatment process, particular attention was paid to allowing the position of the hands, the gliding direction and force to remain the same all through the movement process. If the patient felt no pain in supine position both during and after the practice, the

	position in which weight/load was conveyed was started to be performed. This group of patients was also given an additional home exercise program specific to the technique and in the direction selected for the treatment." **Hip/knee exercises** Home exercise program - Hamstring muscle stretching (8e10reps of 20 s hold) - Straight leg raise (3 sets 10 reps) - Bridge exercise(3 sets 10 reps) - Clamshell exercise for gluteus medius (3 sets 10reps) - 4-way- hip strengthening exercises with elastic bands (2 sets 10 reps), - Terminal knee extension with elastic band while patients were in standing position (2 sets 10 reps) - Mini-squatting exercises (2 sets 10 reps). - "They were asked to do these exercises in 3 sets a day along with 10 repetitions for a period of 6 weeks." **Group 2:** **Kinesio tape** - Y-shaped kinesio tape was used using the 'muscle technique' - "2 pieces 'I'-shaped tapes were stretched by 75% through the mechanical correction technique and were applied around the patellar circumference in the way that it would allow the patella to move naturally in the femoral cavity while the knee was in 45 degrees flexion." **Hip/knee exercises** Home exercise program - Hamstring muscle stretching (8e10reps of 20 s hold) - Straight leg raise (3 sets 10 reps) - Bridge exercise(3 sets 10 reps) - Clamshell exercise for gluteus medius (3 sets 10reps) - 4-way- hip strengthening exercises with elastic bands (2 sets 10 reps), - Terminal knee extension with elastic band while patients were in standing position (2 sets 10 reps) - Mini-squatting exercises (2 sets 10 reps). - "They were asked to do these exercises in 3 sets a day along with 10 repetitions for a period of 6 weeks."

Study	Drew 2017
Methods	*Design:* Randomised Controlled Trial *Number of randomised participants:* Group 1: 14 Group 2: 12
Participants	*Study period:* November 2014 – April 2016 *Eligibility criteria:* "Inclusion: - Aged 18-40 years - Reported insidious (nontraumatic) onset of anterior or retropatellar knee pain - Pain on 2 or more of : prolonged sitting, kneeling, squatting, running, patella palpation, hopping, stair walking, stepping down or isometric quadriceps contraction - Peak hip abduction torque values: Females (18-29 yrs) less than or equal to 94.1Nm; females (30-39 years) less than or equal to 75.8Nm; Males (18-29 yrs) less than or equal to 144.1Nm; Males (30-39 yrs) less than or equal to 139Nm Exclusion: - Presence of inflammatory arthritis, knee pain referred from the hip or lumbar spine; any history of significant knee surgery; other causes of knee pain such as, but not restricted to: meniscal pathologies, quadriceps tendon injuries, patella tendinopathy, tibial tubercle apophysitis; bursitis - Received any treatment within the last 3 months including physiotherapy, podiatry etc."
Treatments	*Setting of the treatment:* Local Hospital - Chapel Allerton Hospital (UK) **Group 1: Hip/knee exercises** **Group 2: Wait-and-see** **Group 1:** **Exercise therapy** - 6 physiotherapist-supervised one-on-one sessions, approximately 30min duration once per week for 6 weeks. - Two non-supervised home exercise session on non-consecutive days - Participants were issued yellow (least resistance), red or green (most resistance) resistance tubing (66fit Ltd.™) and were allowed to take it home. - Load was progressed when a Borg Rate of Perceived Exertion scale was 6 or less. - Each week at least one of the exercises would change with the aim of providing variation and minimizing tedium. - Participants were required to perform 10 repetitions within three sets. - Participants were advised to ensure the time under tension was 8 s (3 s concentric, 2 s isometric hold and 3 s eccentric contraction). Strengthening was performed on each leg alternatively providing a standardised rest between sets. *Exercise*

	- The following exercises were performed, aimed at coronal, sagittal and transverse strength of the hip using resistance bands: o Side lying abduction o Bridge o Side lying clam o Hip extension in prone o Step down o Isometric hip abduction/lateral rotation while standing o Standing hip extension o Side step abduction o Diagonal forward/backward step o Hip extension in quadrupled position *(see appendix 1 of Drew et al. 2017 for all exercises, examples and instructions)* **Group 2:** **Wait-and-see** - Participants continued with the same management of their condition as they were planning to receive prior to the commencement of the study. This included planned physiotherapy, podiatry or no intervention, depending upon participant preference.

Study	Emamvirdi 2018
Methods	*Design:* Randomised Controlled Trial *Number of randomised participants:* Group 1: 32 Group 2: 32
Participants	*Study period:* Not reported *Eligibility criteria:* "Patients were included in the study if they had anterior knee pain of 3 or greater on a 10-cm visual analog scale (VAS) 8,36 for a minimum of 8 weeks before the assessment or anterior or retropatellar knee pain during at least 3 of the following activities: ascending/descending stairs, squatting, running, kneeling, jumping, and prolonged sitting. Patients also must have presented with an insidious onset of symptoms unrelated to trauma and positive Clark test. Exclusion criteria included intra-articular pathology, patellar instability, Osgood-Schlatter or Sinding-Larsen-Johansson syndrome, hip pain, knee joint effusion, and previous surgery in the lower limb. Patients were also excluded if palpation of the patellar tendon, iliotibial band, or pes anserinus tendons reproduced the pain."

Treatments	*Setting of the treatment:*
	University setting
	
	Group 1: Hip/knee exercises
	Group 2: Wait-and-see
	
	Group 1:
	Exercise therapy
	- 3 supervised sessions per week, for 6 weeks (minimally 24hrs between sessions).
	- Participants were encouraged to maintain their regular daily activities
	- Exercises were aimed at major neuromuscular, strength and stability, and mobility limitations.
	- Verbal and visual (a mirror) feedback methods were used to control movement of the pelvis and the knee in the frontal plane.
	- The patient was encouraged to perform an exercise correctly and control pelvic and knee movements by applying instructions like "keep your knees toward the toes," "stop your knees from rotating internally," and "keep the pelvis at a symmetric level
	- The intensity of exercise was increased every 2 weeks. Usually, each exercise was performed in 3 sets, and for the first week, each new exercise was repeated 6, 8, and 4 times per set to familiarize the patient with the correct technique. After learning the correct technique, the volume and intensity of the exercise increased based on the valgus control instruction.
	
	Exercises
	The program included the following exercises
	- 15 minute warm-up (simple aerobic movements)
	- 45 minutes prescribed exercises;
	  o Squat in front mirror
	  o Squat
	  o Lateral walk with elastic resistance around the forefoot
	  o Trendelenburg hip abductors

	○ Squat with elastic bands ○ Squat on bosu ball ○ Forward lunge in front of mirror ○ Forward lunge ○ Balance exercise on bosu ball ○ Single leg balance at 30 degrees knee flexion ○ Squat with elastic band on bosu ball ○ Unipodal squat on bosu ball ○ Modified forward lunge with elastic band ○ Romanian deadlift ○ Lateral sliding without jumping ○ Hip lateral rotation - 15 minute cool-down (simple aerobic movements) *See Emamvirdi et al. 2019 for all exercise details.* **Group 2:** **Wait-and-see** - Written instructions including postural corrections and tips for improving general health. - Participants received one or twice a week heat or ice treatment according to their needs.

Study	Eng 1993
Methods	*Design:* Randomised Controlled Trial *Number of randomised participants:* Group 1: 10 Group 2: 10
Participants	*Study period:* Not reported *Eligibility criteria:* "The initial clinical diagnosis of PFPS was based on a dual examination by a physical therapist and a physician in which both examiners agreed on the diagnosis. The following criteria were used for inclusion in this study: duration of signs and symptoms greater than 6 weeks; history of bilateral retropatellar pain; insidious onset not related to trauma; and retropatellar tenderness on palpation, pain on patellar compression, or patellar crepitus. Excluded from this study were subjects who had had previous physical therapy or orthotic treatment, those with leg-length discrepancies greater than 1 cm, and those possessing any known pathological or neurological disorders that could affect their gait patterns."
Treatments	*Setting of the treatment:* Not reported **Group 1: Foot orthosis + hip/knee exercises** **Group 2: Hip/knee exercises** **Group 1:** **Foot orthosis** - Soft orthotics, constructed from a flat insole and posted medially with rubber wedges in the hindfoot and forefoot to position the subtalar joint toward a neutral position. - The forefoot posting ranged from 4 to 6 cm in length and extended proximally from the heads of the metatarsals. - The hindfoot posting ranged from 6 to 8 cm in length and extended distally from the calcaneus. With calcaneal valgus between 4 and 6 degrees, a 2degree hindfoot posting was used. - With forefoot varus between 6 and 10 degrees, a 2-degree forefoot posting was used. - If forefoot varus was greater than 10 degrees, 4- to 6 degree forefoot and 2- to 4-degree hindfoot postings were used. - The maximal posting was 6 degrees in the forefoot and 4 degrees in the hindfoot. - The orthotic insole was worn whenever wearing shoes and could be transferred into different shoes (e.g., running shoes, school shoes), depending on the subject's needs. **Hip/knee exercises** The following home exercises were included in the program: - Isometric quadriceps femoris - Straight leg raising in supine positions - Quadriceps femoris stretches - Hamstring stretches - Resisted straight leg raising using elastic bands - Hamstring resisted strengthening using elastic bands **Group 2:**

	Flat inserts - Flat insoles were inserted into participants' shoes **Hip/knee exercises** The following home exercises were included in the program: - Isometric quadriceps femoris - Straight leg raising in supine positions - Quadriceps femoris stretches - Hamstring stretches - Resisted straight leg raising using elastic bands - Hamstring resisted strengthening using elastic bands

Winters M, *et al. Br J Sports Med* 2021; 55:369–377. doi: 10.1136/bjsports-2020-102819

Study	Esculier 2018
Methods	*Design:* Randomised Controlled Trial *Number of randomised participants:* Group 1: 23 Group 2: 23 Group 3: 23
Participants	*Study period:* July 2014 – (approx.) May 2016 *Eligibility criteria:* Inclusion: (1) Aged between 18- 40 years (2) report a minimal weekly running distance of 15 km (3) present with PFP for at least 3 months (4) experience minimum pain levels of 3/10 on a VAS during running and during three tasks among stairs, kneeling, aquatting and resisted knee extension, (5) score a maximum of 85/100 on the Knee Outcome Survey of the Activities of Daily Living Scale (KOS-ADLS) Exclusion: (1) symptom onset following an acute trauma (2) symptoms believed to originate from patellar tendon or menisci (3) concurrent lower limb injuries (4) past history of patellar dislocation or lower limb surgery (5) presence of rheumatoid, neurological or degenerative diseases.
Treatments	*Setting of the treatment:* Physiotherapy Clinic **Group 1: Education** **Group 2: Education + exercise therapy** **Group 3: Education + gait retraining** **Group 1:** **Education** - Participants attended 5 physiotherapy sessions in weeks 1, 2, 3, 5 and 7, during the 8- week treatment period. - "Runners received education on load management and were instructed to self-modify running training according to symptoms. - They were asked to increase the frequency of their weekly trainings, to decrease each session's duration and speed and to avoid downhill and stairs running. - Run–walk intervals were allowed. Runners were instructed to maintain PFP level at no more than 2/10 during running. - Pain had to return to pretraining levels within 60 min post-training, without increases in symptoms the following morning. - Individualised weekly programmes, which could be modified by runners depending on symptoms, were designed by the treating physiotherapists and progressed based on the evolution of symptoms. Gradually, running distance was increased according to symptoms, before adding speed and hills." **Group 2:** **Education** - Participants attended 5 physiotherapy sessions in weeks 1, 2, 3, 5 and 7, during the 8- week treatment period.

	- "Runners received education on load management and were instructed to self-modify running training according to symptoms. - They were asked to increase the frequency of their weekly trainings, to decrease each session's duration and speed and to avoid downhill and stairs running. - Run–walk intervals were allowed. Runners were instructed to maintain PFP level at no more than 2/10 during running. - Pain had to return to pretraining levels within 60 min post-training, without increases in symptoms the following morning. - Individualised weekly programmes, which could be modified by runners depending on symptoms, were designed by the treating physiotherapists and progressed based on the evolution of symptoms. Gradually, running distance was increased according to symptoms, before adding speed and hills." **Exercise therapy** - Standardised home exercise programme aimed at improving strength, capacity to sustain mechanical load and dynamic control of the lower limbs. - The personalised programme included 4 phases of 2 weeks and gradually progressed through higher difficulty under physiotherapist guidance. - Three to four exercises were performed three times per week (maximum 20 min/session), and one exercise (lower limb control) was performed daily (i.e. step up). - The following exercises were part of the program o Side lying abduction o Clams with elastic band o Double and single leg bridges o Step up o Squat o Step down o 4-way straight leg movement in standing (elastic band) o Prone and side plank from knees/feet o Single leg squat o Step down with an elastic band pulling the knee inwards o Single leg squat with trunk rotation o Single leg jump from step (also with elastic band) **Group 3:** **Education** - Participants attended 5 physiotherapy sessions in weeks 1, 2, 3, 5 and 7, during the 8- week treatment period. - "Runners received education on load management and were instructed to self-modify running training according to symptoms. - They were asked to increase the frequency of their weekly trainings, to decrease each session's duration and speed and to avoid downhill and stairs running. - Run–walk intervals were allowed. Runners were instructed to maintain PFP level at no more than 2/10 during running. - Pain had to return to pretraining levels within 60 min post-training, without increases in symptoms the following morning. - Individualised weekly programmes, which could be modified by runners depending on symptoms, were designed by the treating physiotherapists and progressed based on the evolution of symptoms. Gradually, running distance was increased according to symptoms, before adding speed and hills."

	Gait retraining - Personalised advice on running gait modifications. - Runners were asked to increase step rate by 7.5%–10% - If deemed necessary by the physiotherapist (no significant reduction of impact or runner unable to increase step rate), runners were also asked to run softer and to adopt a non-rearfoot strike pattern. - Participants had a 10-minute treadmill session with physiotherapist feedback at every visit to the clinic.

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Study	Foroughi 2018
Methods	*Design:* Randomised Controlled Trial *Number of randomised participants:* Group 1: 20 Group 2: 20
Participants	*Study period:* May 2017 – October 2017 *Eligibility criteria:* "Inclusion: - Women aged 18-30 years. - Unilateral or bilateral nontraumatic anterior knee pain for the last 3 months, provoked by at least 2 of the following activities: prolonged sitting, ascending or descending stairs, squatting, kneeling, jumping, running. - Pain on palpation of the medial and lateral patellar facets, and positive patellar grinding test - Average pain level of at least 3 out of 10 on an NRS during the previous week - Active for at least 30 min daily, but not professional athletes Exclusion: - History of knee joint pathologies such as meniscus, tendon or ligament injuries - Self-reported history of patellar subluxation or dislocations - Any lumbopelvic-hip complex pathology - Any spinal or lower extremity fractures - Knee surgery within the previous year - Neuromuscular or metabolic disease"
Treatments	*Setting of the treatment:* Research Centre in Rehabilitation Sciences **Group 1: Hip/knee/trunk exercises** **Group 2: Hip/knee exercises** **Group 1:** **Exercise therapy** - 3 physiotherapist-supervised sessions per week, for 4 weeks (total 12 sessions). - Stretching and strengthening exercises for hip/knee/trunk - Session duration was 30-45 minutes - Exercise intensity was progressed by increasing the number of repetitions and the level of resistance through the 12 treatment sessions *Exercises* - Stretching exercises: o Hamstrings o Iliotibial band o Calf - Strengthening exercises o Clams o Side hip abduction o Seated hip external rotation o Terminal hip extension o Seated leg extension

	- Core postural control exercises on an unstable seat:
	  - Three levels of seat instability were provided by 3 different diameters of the hemisphere (50, 30, 22 cm). Exercise difficulty was progressed from the most stable condition (50 cm in diameter) to the least stable condition (22 cm in diameter).
	  - To increase perturbation intensity in each set of exercises, patients were asked to move their arms in different directions from the second week. Each postural control session lasted 15 minutes, and 3 sets of 5 minutes each with a 2-minute rest interval between sets were used. In the last 3 minutes of each session the participants were asked to keep their balance with their eyes closed.
	
	Group 2:
	Exercise therapy
	- 3 physiotherapist-supervised sessions per week, for 4 weeks (total 12 sessions).
	- Stretching and strengthening exercises for hip/knee/trunk
	- Session duration was 30-45 minutes
	- Exercise intensity was progressed by increasing the number of repetitions and the level of resistance through the 12 treatment sessions
	
	Exercises
	- Stretching exercises:
	  - Hamstrings
	  - Iliotibial band
	  - Calf
	- Strengthening exercises
	  - Clams
	  - Side hip abduction
	  - Seated hip external rotation
	  - Terminal hip extension
	  - Seated leg extension

Study	Fukuda 2012
Methods	*Design:* Randomised Controlled Trial *Number of randomised participants:* Group 1: 26 Group 2: 28
Participants	*Study period:* Not reported *Eligibility criteria:* "Women 20 to 40 years of age who had a history of anterior knee pain for at least 3 months and reported increasing pain in 2 or more activities that commonly provoke PFPS. These activities included ascending and descending stairs, squatting, kneeling, jumping, long sitting, isometric knee extension contraction at 60° of knee flexion, and pain on palpation of the medial and/ or lateral facet of the patella. All patients included in the trial were sedentary, defined as not having practiced physical activity (aerobic and strengthening exercises) any day of the week for at least 6 months previously. Participants were excluded if they had a neurological disorder; injury to the lumbosacral region, hip, or ankle; rheumatoid arthritis, a heart condition, or previous surgery involving the lower extremities; or were pregnant or using corticosteroids or anti-inflammatory medication. Women who had other knee pathologies, such as patellar instability, patellofemoral dysplasia, meniscal or ligament tears, osteoarthritis, or tendinopathies, were also excluded. A standard knee clinical examination was performed to rule out concomitant pathology of the lower extremities."

Treatments	*Setting of the treatment:*
	Not reported.
	
	Group 1: Hip/knee exercises
	Group 2: Hip/knee/trunk exercises
	
	Group 1:
	Exercise therapy
	- 3 physiotherapist-supervised sessions per week, for 4 weeks (12 sessions in total)
	- The load during training was standardized to 70% of the estimated 1-repetition maximum, defined as the maximum load with which 1 repetition of the exercise could be completed without pain.
	- Non–weight-bearing exercises were initiated using ankle weights and progressed to a knee extension machine, based on the patient's tolerance.
	- Exercises utilizing elastic resistance were standardized to the maximum resistance at which each patient was able to perform 10 repetitions of the exercise.
	- The maximum load and resistance for all strengthening exercises were evaluated during the first treatment session and reviewed weekly to adjust as needed.
	
	Exercises
	- Stretching exercises of the following muscles:
	  o Hamstrings
	  o Plantar ankle flexors
	  o Quadriceps
	  o Iliotibial band

	- Strengthening exercises
	  o Seated knee extension from 90° to 45°, 3 sets of 10 repetitions
	  o Leg press from 0° to 45°, 3 sets of 10 repetitions
	  o Squatting from 0° to 45°, 3 sets of 10 repetitions
	  o Single-leg calf raises, 3 sets of 10 repetitions
	  o Prone knee flexion,† 3 sets of 10 repetitions
	
	Group 2:
	Exercise therapy
	- 3 physiotherapist-supervised sessions per week, for 4 weeks (12 sessions in total)
	- The load during training was standardized to 70% of the estimated 1-repetition maximum, defined as the maximum load with which 1 repetition of the exercise could be completed without pain.
	- Non–weight-bearing exercises were initiated using ankle weights and progressed to a knee extension machine, based on the patient's tolerance.
	- Exercises utilizing elastic resistance were standardized to the maximum resistance at which each patient was able to perform 10 repetitions of the exercise.
	- The maximum load and resistance for all strengthening exercises were evaluated during the first treatment session and reviewed weekly to adjust as needed.
	
	Exercises
	- Stretching exercises of the following muscles:
	  o Hamstrings
	  o Plantar ankle flexors
	  o Quadriceps
	  o Iliotibial band
	- Strengthening exercises
	  o Seated knee extension from 90° to 45°, 3 sets of 10 repetitions
	  o Leg press from 0° to 45°, 3 sets of 10 repetitions
	  o Squatting from 0° to 45°, 3 sets of 10 repetitions
	  o Single-leg calf raises, 3 sets of 10 repetitions
	  o Prone knee flexion,† 3 sets of 10 repetitions
	  o Hip abduction with weights (side-lying), 3 sets of 10 repetitions
	  o Hip abduction against elastic band (standing), 3 sets of 10 repetitions
	  o Hip lateral rotation against elastic band (sitting), 3 sets of 10 repetitions
	  o Hip extension (machine), 3 sets of 10 repetitions

Study	Giles 2017
Methods	*Design:* Randomised Controlled Trial *Number of randomised participants:* Group 1: 40 Group 2: 39
Participants	*Study period:* October 2014 – October 2015 *Eligibility criteria:* "Participants between 18 and 40 years were included if they experienced PFP as evidenced by the following: atraumatic onset of anterior knee pain for greater than 8 weeks; pain with any two activities, including running, jumping, squatting, kneeling, stair ascent/descent or prolonged sitting; pain with any two of patellar compression; palpation of the peripatellar region; and resisted isometric knee extension when sitting. Participants were excluded if they had coexisting pathology around the knee, including patellar subluxation or dislocation, other sources of anterior knee pain (bursa, fat pad), knee surgery, or if they participated in weight training of the legs within the past 6 months. Participants were excluded on suspicion of patellar tendinopathy, with strong consideration of pain localised to the patellar tendon, increased symptoms with dynamic loads and pain reduction with sustained isometric contraction. Participants were excluded from the study if they were found to be at elevated risk of venous thrombosis (lower limb surgery in the past 6 months, cardiovascular conditions, including high blood pressure (>140/90)), diabetes, unexplained chest pain or heart condition, fainting or dizzy spells during physical activity/exercise that causes loss of balance, pregnancy, or if exercise was contraindicated."
Treatments	*Setting of the treatment:* Physiotherapy Clinic **Group 1: Blood flow-restricted hip/knee exercises** **Group 2: Hip/knee exercises** **Group 1:** **Exercise therapy + blood flow restriction** - 6 one-on-one physiotherapist-supervised sessions: 3 sessions in the first week, then at a 2-week intervals. The remainder of the sessions were group session. - Total number of sessions: ? - After 8 weeks, participants continued exercises of their own volition. - Participants were permitted to maintain current activity, unless knee symptoms were aggravated. - Exercise resistance was based on a 7-10 repetitions resistance test. - Exercises were performed with a little pain, and if pain was greater than 2/10 on the VAS, the load was reduced by 20%. *Exercises* - 5 min light intensity exercise bike warm up - Pneumatic cuff was placed on the proximal thigh and inflated according to prescribed pressure for the leg press and leg extension exercises. - Leg press between 0° and 60° knee flexion - Leg extension from 90° to 45° knee flexion.

	- Exercises were performed at 30% of 1RM with the cuff inflated. - One set of 30 repetitions (or volitional fatigue), then 3 sets of 15 reps were done. The cuff remained on for the 30 seconds rest between sets. **Group 2:** **Exercise therapy** - 6 one-on-one physiotherapist-supervised sessions: 3 sessions in the first week, then at a 2-week intervals. The remainder of the sessions were group session. - Total number of sessions: ? - After 8 weeks, participants continued exercises of their own volition. - Participants were permitted to maintain current activity, unless knee symptoms were aggravated. - Exercise resistance was based on a 7-10 repetitions resistance test. - Exercises were performed with a little pain, and if pain was greater than 2/10 on the VAS, the load was reduced by 20%. *Exercises* - 5 min light intensity exercise bike warm up - Leg press between 0° and 60° knee flexion - Leg extension from 90° to 45° knee flexion. - 3 sets of 7-10 repetitions (approximately 70% of 1 repetition-maximum) with a placebo blood flow restriction cuff. - The placebo cuff was a 5 cm elastic cuff placed firmly around the proximal thigh, with room for two fingers between the skin and the cuff. *For all details on the blood flow restriction, see Giles et al.*

Study	Glaviano 2019
Methods	*Design:* Randomised Controlled Trial *Number of randomised participants:* Group 1: 11 Group 2: 10
Participants	*Study period:* March 2015 – December 2017 *Eligibility criteria:* "The diagnosis of PFP was determined during the study screening via a score of less than 85% on the Anterior Knee Pain Scale and evaluation by a certified athletic trainer to assess whether volunteers met the inclusion or exclusion criteria. Volunteers were also screened for contraindications to electrical stimulation: biomedical device implants, history of neuropathy, hyper-sensitivity to electrical stimulation, lower extremity muscular abnormality, or active infection in the lower limb. Inclusion: - Nontraumatic peripatellar or retropatellar pain for 3 months - Worst pain over last week 3/10 assessed by visual analog scale - Pain with 2 of the following activities: o Stair ambulation o Running o Jumping o Prolonged sitting o Quadriceps contraction o Kneeling o Pressure over the patella Exclusion - Previous knee surgery - Ligamentous instability defined by orthopaedic special tests (anterior and posterior drawer, valgus and varus stress test) - Additional source of anterior knee pain (e.g., tendinitis, bursitis, patellar subluxation) - Lower extremity or back injury or concussion in the year before the study."
Treatments	*Setting of the treatment:* Not reported. **Group 1: Electrical neuromuscular stimulation** **Group 2: Sham electrical neuromuscular stimulation** **Group 1:** **Electrical neuromuscular stimulation (ENS)** - 3 sessions per week for 4 weeks (12 sessions) by an Athletic Trainer - Sessions lasted 15 minutes - ENS was administered using the Omnistim FX 2 (Accelerated Care Plus, Reno, NV). The device uses a 50-Hz pulse frequency, 70- l s phase duration, and 200- millisecond stimulus train with an asymmetric biphasic square-waved stimulus. Alternating rhythmic contractions were generated using 2 stimulation patterns to target the agonist muscles (vastus medalis oblique and gluteus medius) and antagonist muscles (hamstrings and adductors). - Four 3- X 5-in (7.62- 3 12.70-cm) self-adherent electrodes were placed over these muscles to deliver a 200-millisecond stimulus to

	the agonist muscles, a 200-millisecond stimulus to the antagonist muscles, and a 120-millisecond stimulus to the agonist muscles. To achieve a strong motor response during the treatment, the stimulus intensity was increased. **Exercise therapy** - 3 sessions (± 1 hour) per week for 4 weeks (12 sessions) by an Athletic Trainer - Strengthening and balance exercises of knee, hip and core, and to address individual impairments of range of motion, patellar mobility and pronated foot. - Functional retraining tasks from the seventh visit. - Exercises were performed for a total of 4 seconds: 2 seconds each for the concentric and eccentric contractions. They rested for 1 minute between sets and approximately 2 minutes between exercises. - All strengthening exercises were individualized to a percentage of the maximal strength measure collected during the initial testing session. - All exercises were progressed throughout the rehabilitation program based on the clinical judgment of the Athletic Trainer, with the goal of repetition to failure without increased pain. Pain was assessed during each rehabilitation session to provide additional insight into daily modifications of the program to mimic clinical practice. *Exercises* - 4 way straight-leg raise - Seated knee flexion and extension - Wall squats - Isometric hip abduction and external rotation - Clam shells - Pelvic tilt prone - Pelvic tilt on Swiss ball - Single-legged balance (eyes open) - Single-legged balance (eyes closed) - Steps-ups and steps-downs - Lateral rotation in closed kinetic chain - Pelvic drops - Planks (anterior and lateral) - Trunk extension on swiss ball - Single-legged squat with mirror training - Lunge with mirror training - Single-legged deadlift with mirror training **Group 2:** **Sham electrical neuromuscular stimulation** - 3 sessions per week for 4 weeks (12 sessions) by an Athletic Trainer - Sessions lasted 15 minutes - ENS was administered using the Omnistim FX 2 (Accelerated Care Plus, Reno, NV). - Participants received a minimal stimulation treatment (1 mA) during which all the machine's lights and timers were operating and visible to the participants. - Participants were informed that they would receive a subsensory stimulation treatment. **Exercise therapy** - 3 sessions (± 1 hour) per week for 4 weeks (12 sessions) by an Athletic Trainer

	- Strengthening and balance exercises of knee, hip and core, and to address individual impairments of range of motion, patellar mobility and pronated foot. - Functional retraining tasks from the seventh visit. - Exercises were performed for a total of 4 seconds: 2 seconds each for the concentric and eccentric contractions. They rested for 1 minute between sets and approximately 2 minutes between exercises. - All strengthening exercises were individualized to a percentage of the maximal strength measure collected during the initial testing session. - All exercises were progressed throughout the rehabilitation program based on the clinical judgment of the Athletic Trainer, with the goal of repetition to failure without increased pain. Pain was assessed during each rehabilitation session to provide additional insight into daily modifications of the program to mimic clinical practice. *Exercises* - 4 way straight-leg raise - Seated knee flexion and extension - Wall squats - Isometric hip abduction and external rotation - Clam shells - Pelvic tilt prone - Pelvic tilt on Swiss ball - Single-legged balance (eyes open) - Single-legged balance (eyes closed) - Steps-ups and steps-downs - Lateral rotation in closed kinetic chain - Pelvic drops - Planks (anterior and lateral) - Trunk extension on swiss ball - Single-legged squat with mirror training - Lunge with mirror training - Single-legged deadlift with mirror training *See Glaviano et al. 2019 for the full program, including repetitions*

Study	Hart 2019
Methods	*Design:* Randomised Controlled Trial *Number of randomised participants:* Group 1: 45 Group 2: 41
Participants	*Study period:* March 2010 – April 2016 *Eligibility criteria:* Inclusion: "Patients qualified if they were 15 to 45 years old, with a history and clinical diagnosis of anterior knee pain for longer than 3 months, pain and crepitus with patellar grind, 4 or greater pain ratings (out of 10), and a minimum of 4 weeks of failed physical therapy." Exclusion: "Patients were excluded if they had any of the following: joint effusion, patellar maltracking or instability, patellar tendinitis, any evidence of tibiofemoral or patellofemoral joint space narrowing or osteoarthritis(defined as greater than grade II Kellgren-Lawrence rating) confirmed on radiographs at the time of enrollment, any indications for arthroscopy (e.g., meniscus tear or instability), prior steroid injection within 6 months, any prior use of visco supplementation, allergy to avian products, body mass index>40, prior knee surgery, evidence of hip injury, inflammatory arthritis, or other comorbid or known psychiatric conditions."
Treatments	*Setting of the treatment:* Not reported **Group 1: Hyaluronic Acide Injection + Hip/knee exercises** **Group 2: Sham injection + Hip/knee exercises** **Group 1:** **Hyaluronic Acide Injection** - Injection of 6 mL of Hyaluronic Acide (Synvisc-One; Sanofi-Aventis Inc.) - Under a sterile technique, a 21-gauge needle was inserted into the intra-articular space via a superolateral approach **Home exercises** - Instructions to perform home stretching and strengthening exercises 4 times per week for the first month post injection - Following exercises were given: o Quadriceps o Straight-legged raises (hip flexion) o Side-lying hip abduction o Seathed isometric hamstring contractions o Standing calf raises o Prone bent knee hip adduction o Static stretching of calf, hamstring and quadriceps **Group 2:** **Sham Injection** - Sham injection (needle stick); the needle was left in place and removed for a similar length of time to simulate injection **Home exercises**

	- Instructions to perform home stretching and strengthening exercises 4 times per week for the first month post injection
	- Following exercises were given:
	  o Quadriceps
	  o Straight-legged raises (hip flexion)
	  o Side-lying hip abduction
	  o Seated isometric hamstring contractions
	  o Standing calf raises
	  o Prone bent knee hip adduction
	  o Static stretching of calf, hamstring and quadriceps
	
	See Hart et al. 2019 for details on exercises

Study	Hott 2019
Methods	*Design:* Randomised Controlled Trial *Number of randomised participants:* Group 1: 39 Group 2: 37 Group 3: 36
Participants	*Study period:* September 2014 – September 2017 *Eligibility criteria:* "Patients were considered eligible if they were 16 to 40 years old with a minimum 3-month history of PFP (pain, 3 or more on 0-10 scale) reproduced by at least 2 activities (stair ascent/descent, hopping, running, prolonged sitting, squatting, kneeling) and present on at least 1 clinical test (compression of the patella, palpation of the patellar facets). For patients with bilateral pain, the worst knee was included. Exclusion criteria included (1) clinical, radiographic, or MRI findings indicative of other specific pathology, including meniscal, ligament, or cartilage injury, as well as osteoarthritis, epiphysitis, significant knee joint effusion, or recurrent patellar subluxation or dislocation; (2) significant pain from hip or back hindering the ability to perform the prescribed exercises; (3) previous surgery to the knee joint; (4) nonsteroidal anti-inflammatory drug or cortisone use over an extended period; (5) previous trauma to the knee joint with an effect on the presenting clinical condition; and (6) physiotherapy or other similar exercises for PFP syndrome within the previous 3 months."
Treatments	*Setting of the treatment:* Outpatient clinic at the Department of Physical Medicine and Rehabilitation at Sørlandet Hospital **Group 1: Education + hip/knee exercises** **Group 2: Education + hip/knee exercises** **Group 3: Education** **Group 1:** **Education** Aim was to reduce kinesiophobia and encourage self-management of symptoms. Standardised oral and written information was provided through a 1-hour consultation with a specialist in physical medicine and rehabilitation, and the same information was again provided in a next 30min session. Key elements of the education was: - PFP = loading pain, not injury - Muscle strength and coordination to control the kneecap is important - Advise: gradually increase physical activity without excessively provoking the pain. **Exercise therapy** - 3 sessions of exercise therapy per week, for 6 weeks (1 supervised/2non-supervised), 1 day rest between sessions minimally - Dosage 3x10 reps, increased gradually to 3x20. Repetitions were performed dynamically for 2-3 second, with a 2-second hold between reps and a 30sec set-pause. - Dosage was chosen based on difficulty and ability to control/perform movement with high quality

	- Dosage was set so below the patient's limit of tolerance (in contrast to training up to pain threshold) *Hip exercises* - Side-lying hip abduction, - Hip external rotation (clam shell) - Prone extension **Group 2:** **Education** Aim was to reduce kinesiophobia and encourage self-management of symptoms. Standardised oral and written information was provided through a 1-hour consultation with a specialist in physical medicine and rehabilitation, and the same information was again provided in a next 30min session. Key elements of the education was: - PFP = loading pain, not injury - Muscle strength and coordination to control the kneecap is important - Advise: gradually increase physical activity without excessively provoking the pain. **Exercise therapy** - 3 sessions of exercise therapy per week, for 6 weeks (1 supervised/2non-supervised), 1 day rest between sessions minimally - Dosage 3x10 reps, increased gradually to 3x20. Repetitions were performed dynamically for 2-3second, with a 2-second hold between reps and a 30sec set-pause. - Dosage was chosen based on difficulty and ability to control/perform movement with high quality - Dosage was set so below the patient's limit of tolerance (in contrast to training up to pain threshold) *Knee exercises* - Straight-leg raises in the supine position - Supine terminal knee extension (from 10 degrees of flexion to full extension) - Mini-squat (45 degrees of flexion) with the back supported against the wall **Group 3:** **Education** Aim was to reduce kinesiophobia and encourage self-management of symptoms. Standardised oral and written information was provided through a 1-hour consultation with a specialist in physical medicine and rehabilitation, and the same information was again provided in a next 30min session. Encouragement to be physically active as per the information provided above. Key elements of the education was: - PFP = loading pain, not injury - Muscle strength and coordination to control the kneecap is important - Advise: gradually increase physical activity without excessively provoking the pain.

Study	Kettunen 2007
Methods	*Design:* Randomised Controlled Trial *Number of randomised participants:* Group 1: 28 Group 2: 28
Participants	*Study period:* May 2003 – (+/-) May 2008 *Eligibility criteria:* Inclusion: "Age 18-40 years; Female or male; characteristic history of PFPS and symptoms lasting at least 6 months; PFP during knee loading physical activity, such as jumping, running, squatting, or going up or down stairs; PFP when the knee kept in flexion for prolonged period, with relief on extension; cleared the Orthopaedic surgeon examination and cleared the X-ray findings." Exclusion: "Disabling general illness; reported knee ligamentous or meniscal injuries; previous knee surgery; physician diagnosed knee osteoarthritis; history of patellar dislocation (subluxation included); other knee problems than PFPS diagnosed clinically (e.g. jumpers knee); other knee problems than PFPS diagnosed radiographically (e.g. osteochondritis dissecans); physical therapy for PFPS within previous 4 weeks: pregnancy: competitive athlete."

Treatments	*Setting of the treatment:*
	Orthopaedic hospital and outpatient clinics.
	
	Group 1: Arthroscopy + hip/knee exercises
	Group 2: Hip/knee exercises
	
	Group 1:
	Arthroscopy
	- All knee compartments were examined systematically and pathological findings were recorded.
	- If justified on the basis of the arthroscopic findings and according to pre-determined guidelines, the following procedures were performed:
	  o Resection of inflamed/scarred medial plicae
	  o Abrasion of chondral lesions
	  o Shaving of excessive and inflamed synovium.
	  o Minor corrections of the PF articulation were performed, such as lateral capsular discision in the case of clear lateral patellar subluxation in the beginning of knee flexion.
	  o Possible meniscal tears were treated
	
	Exercise therapy
	- Home exercise program consisting of strengthening and stretching exercises for lower-limb muscles, which were instructed by a physiotherapist
	- The program duration was about 30 minutes, and had to be performed daily for 8 weeks:
	  o Twice daily the first 2 weeks
	  o 4x/day in week 3 and 4
	  o Twice daily in week 5 and 6 (start 2nd part of the program)
	  o 4x/day in week 7 and 8
	- Participants were instructed to avoid symptom-producing activities during the intervention.

	Exercises The following exercises were included in the home program: - Standing knee flexion (isometric hamstring) - Horizontal hip abduction on all fours - Terminal knee extension - Straight leg raise - Calf stretch - Hamstring stretch in supine - Prone quadriceps stretch - Standing hip extension with resistance band - Standing hip/knee extension from hip/knee in 90degrees with resistance band - Standing knee extension with resistance band - Squat **Group 2:** **Exercise therapy** - Home exercise program consisting of strengthening and stretching exercises for lower-limb muscles, which were instructed by a physiotherapist - The program duration was about 30 minutes, and had to be performed daily for 8 weeks: o Twice daily the first 2 weeks o 4x/day in week 3 and 4 o Twice daily in week 5 and 6 (start 2nd part of the program) o 4x/day in week 7 and 8 - Participants were instructed to avoid symptom-producing activities during the intervention. *Exercises* The following exercises were included in the home program: - Standing knee flexion (isometric hamstring) - Horizontal hip abduction on all fours - Terminal knee extension - Straight leg raise - Calf stretch - Hamstring stretch in supine - Prone quadriceps stretch - Standing hip extension with resistance band - Standing hip/knee extension from hip/knee in 90degrees with resistance band - Standing knee extension with resistance band - Squat *See Kettunen et al. 2007 for all information*

Study	Matthews 2020
Methods	*Design:* Randomised Controlled Trial *Number of randomised participants:* Group 1: 109 Group 2: 109
Participants	*Study period:* June 2014 – December 2016 *Eligibility criteria:* "Inclusion criteria were: age 18-40 years; insidious onset of anterior, retro or peri-patellar pain aggravated by at least two of: climbing or descending stairs, crouching or squatting, running, or prolonged sitting; self-reported worst pain over the last 7 days of at least 3 out of 10 on a numerical pain rating scale (10 representing worse pain imaginable); greater than six weeks' duration and; tenderness on palpation of the patellar borders with reproduction of pain completing a step down or double leg squat. Participants were excluded if they reported traumatic onset of symptoms; concomitant injuries or pain from the hip, lumbar spine, or other knee structures that manifested with similar symptoms; patellar dislocation or instability; previous knee surgery; evidence of knee joint effusion; any foot condition that precluded use of foot orthoses; the use of anti-inflammatory drugs or corticosteroid medication; or previous treatment for PFP that included foot orthoses or hip exercises."

Treatments	*Setting of the treatment:*
	Primary Care
	
	Group 1: Hip/knee exercises
	Group 2: Orthoses
	
	Group 1:
	Exercise therapy
	- 3 physiotherapist-supervised one-on-one exercise session per week, for four weeks (12 sessions total)
	- At each session, lengths and grade of elasticated bands were determined to provide sufficient resistance for participants to achieve a maximum of 10 repetitions and rate a perceived exertion of 5 to 7/10 (*Hard* to *Very hard*) per exercise.
	- Participants were encouraged to remain physically active provided that their chosen activities did not provoke pain that persisted after ceasing their activities, and there was no general deterioration of symptoms during or after the cessation of activity.
	
	Exercises
	- The following progressive resisted hip exercises were done bilaterally, with a focus on:
	  o Hip abductors
	  o External rotators
	  o Hip extensors
	- Knee strengthening exercises
	- Stretching of quadriceps, hamstrings and triceps surae muscles.
	- For the strengthening exercises: the contraction phase for each repetition was 2s concentric, 1s isometric, 2s eccentric and 1s rest; with approximately a 90s rest between each set of 10 repetitions, while training the contralateral side.

	Group 2: **Orthoses** - Physiotherapists fitted prefabricated foot orthoses (Vasyli International, Labrador, Australia), and a pair of orthosis-like contoured sandals. - Orthosis were manufactured and designed from ethylene-vinyl acetate with an inbuilt arch support and a manufacturer specified 6° varus wedge. - The orthoses were constructed in 3 different levels of hardness [high (Shore A 75°), medium (Shore A 60°) or low (Shore A 52°)]. - A standardized fitting process was followed that prioritized comfort, with scope to review size, length and hardness. - To maximise comfort, orthoses were modified by heat moulding and/or trialing various medial wedges to the rear foot (2° or 4° inclination) and/or forefoot (4° or 6° inclination) and/or heel raise (4, 6 or 8 mm in height). - Participants performed a home exercise program twice per day, consisting of calf stretches and anti-pronation foot exercises, aimed to improve the participant's foot posture awareness. - No instructions were given with regards to continuing or discontinuing foot orthoses after the six sessions. *See Matthews et al. (2017/2020) for all information.*

Study	Mills 2011
Methods	*Design:* Randomised Controlled Trial *Number of randomised participants:* Group 1: 20 Group 2: 20
Participants	*Study period:* August 2009 – June 2010 *Eligibility criteria:* Inclusion: "(1) age 18–40 years; (2) anterior or retropatellar knee pain of a non-traumatic origin with duration exceeding 6 weeks; (3) aggravated by at least two of the following activities: running, hopping, hill or stair walking, prolonged sitting or kneeling, or squatting and (4) pain of palpation of the patellar facet or double leg squat. In addition, we also included only those who demonstrated at least two of the following: a more mobile foot as defined by greater than 10.96-mm change in midfoot width from weight-bearing to non-weight-bearing position as per a previously described protocol; pain severity less than 53/100 mm on a visual analogue scale; older than 25 years; and shorter than 165 cm. Exclusion criteria were (1) concomitant pain or injury in the hip, pelvis or lumbar spine; (2) damage to any knee structures or indications of patella tendinosis; (3) chronic patella instability (4) knee effusion; (5) any foot conditions that would preclude the use of orthoses; (6) the use of physiotherapy treatment for knee pain or foot orthoses in the previous 3 years or (7) previous lower limb surgery."
Treatments	*Setting of the treatment:* Australian Institute of Sport **Group 1: Education + orthoses** **Group 2: Wait-and-see** **Group 1:** **Foot orthoses** - Physiotherapists fitted prefabricated foot orthoses (Vasyli International, Labrador, Australia). - Orthosis were manufactured and designed from ethylene-vinyl acetate with an inbuilt arch support and a manufacturer specified 6° varus wedge. - The orthoses were constructed in 3 different levels of hardness [high (Shore A 75°), medium (Shore A 60°) or low (Shore A 52°)]. A fourth orthosis featured identical Shore A value to the soft orthosis but was of uniform thick-ness (3 mm) along its length - Orthosis were chosen based on comfortability - Orthosis were customized which involved ensuring that the medial longitudinal arch of the orthoses did not impede motion of the first metatarsal head. - Varying sizes were trialed in order to optimise fit, and some trimming of the orthoses where required was done to fit into the shoe. - No heat moulding was performed and no additions applied. **Group 2:** - Continued with their current footwear

Study	Petersen 2016
Methods	*Design:* Randomised Controlled Trial *Number of randomised participants:* Group 1: 78 Group 2: 78
Participants	*Study period:* April 2012 – October 2014 *Eligibility criteria:* "Inclusion criteria consisted of a patient age between 18 and 50 years and the presence of three of the following symptoms lasting longer than 2 months but not longer than 2 years: anterior knee pain when running, climbing stairs, cycling, sitting with a bent knee, or performing squats. Exclusion criteria consisted of the following: Kellgren-Lawrence grade 3 to grade 4 osteoarthritis, local grade 3 to grade 4 cartilage damage as noted on magnetic resonance imaging an measured using the Gluckert grading system, subluxation of the patella, a history of a previous knee injury (such as to the cruciate ligaments), tendinosis of the patellar tendon, a history or active diagnosis of Osgood–Schlatter disease, osteochondritis dissecans, a varus knee with an intercondylar distance greater than 2 fingerbreadths, and a valgus knee an intermalleolar distance greater than 3 fingerbreadths."

Treatments	*Setting of the treatment:*
	Not reported
	
	Group 1: Patellar brace + hip/knee exercises
	Group 2: Hip/knee exercises
	
	Group 1:
	Patellar brace
	- Patellar Pro Brace; medially directed force applied to the patella
	- Patient-customised brace issued by the study physician
	- Participants were instructed to wear the brace for minimally 6 weeks, 6 hours a day.
	
	Exercise therapy
	- 12 sessions of 60 minutes duration, for 6 weeks
	- Supervised exercises targeted at improving strength, coordination, endurance and flexibility of the lower extremity and hip muscles.
	- The program was an individually customized training program based on the physiotherapist's analysis
	  o Following exercises were prescribed:
	  ▪ Functional leg press
	  ▪ Treadmill,
	  ▪ Ergometer
	  ▪ Stepper
	  ▪ Angle table
	  ▪ Vertical pull apparatus.
	
	- Home exercise program
	  o Daily for 15 minutes, for 6 weeks
	  o Following exercises were done:
	  ▪ Sitting and flexing the knee
	  ▪ Sitting and tensing the quadriceps

	▪ Two-legged stance and squat, ▪ One-legged stance and squat ▪ One-legged stance and lateral pressure. **Group 2:** **Exercise therapy** - 12 sessions of 60 minutes duration, for 6 weeks - Supervised exercises targeted at improving strength, coordination, endurance and flexibility of the lower extremity and hip muscles. - The program was an individually customized training program based on the physiotherapist's analysis o Following exercises were prescribed: ▪ Functional leg press ▪ Treadmill, ▪ Ergometer ▪ Stepper ▪ Angle table ▪ Vertical pull apparatus. - Home exercise program o Daily for 15 minutes, for 6 weeks o Following exercises were done: ▪ Sitting and flexing the knee ▪ Sitting and tensing the quadriceps ▪ Two-legged stance and squat, ▪ One-legged stance and squat ▪ One-legged stance and lateral pressure.

Study	Rathleff 2015
Methods	*Design:* Cluster Randomised Controlled Trial *Number of randomised participants:* Group 1: 62 Group 2: 59
Participants	*Study period:* September 2011 – February 2014 *Eligibility criteria:* Inclusion: "Insidious onset of anterior knee or retro-patellar pain of more than 6 weeks duration and provoked by at least two of the following situations: prolonged sitting or kneeling, squatting, running, hopping or stair climbing; tenderness on palpation of the patella, pain when stepping down or double leg squatting; and worst pain during the previous week of more than 30 mm on a 100 mm visual analogue scale (VAS)." Exclusion: "Concomitant injury or pain from the hip, lumbar spine or other knee structures; previous knee surgery; self-reported patellofemoral instability; knee joint effusion; use of physiotherapy for treating knee pain within the previous year; or at least weekly use of anti-inflammatory drugs."
Treatments	*Setting of the treatment:* Secondary schools **Group 1: Education** **Group 2: Education + exercise therapy + patellar taping** **Group 1:** **Education** - 30 min standardised patient education to adolescent + parent by one physiotherapist, including: o Pain management o Activity modification using pacing and load management strategies o Information on optimal kneel alignment during daily tasks o Leaflet containing the above information **Group 2:** **Education** - 30 min standardised patient education to adolescent + parent by one physiotherapist, including: o Pain management o Activity modification using pacing and load management strategies o Information on optimal kneel alignment during daily tasks - Leaflet containing the above information **Exercise therapy** - Exercises every day/but not on supervised days - 3 supervised sessions per week - Unsupervised home exercises: 15min daily *Exercises* Supervised: - Neuromuscular exercises for muscles around the foot, knee and hip

	- Strength training for the knee and hip - Stretching the muscles around the hip and knee - Exercise progression based on the patient's level Unsupervised: - Quadriceps and hip muscle retraining and stretching **Patellar taping** Corrections for anterior tilt, medial tilt, glide and fat pad unloading (if minimally a 50% pain on the VAS was reached while doing a 2-leg squat)

Study	Riel 2018
Methods	*Design:* Randomised Controlled Trial *Number of randomised participants:* Group 1: 20 Group 2: 20
Participants	*Study period:* February 2016 – October 2016 *Eligibility criteria:* "Inclusion criteria were as follows: 15 to 19 year of age; anterior knee pain of nontraumatic origin, which is provoked by at least two of the following activities—prolonged sitting with bent knees or kneeling, squatting, running, jumping, or ascending or descending stairs; tenderness on palpation of the peripatellar borders; pain of more than 6 wk duration; and self-reported worst pain during the previous week ≥30 mm on a 100-mm visual analog scale (VAS). Exclusion criteria were as follows: concomitant pain from other structures in the knee (e.g., ligament, tendon, or cartilage), the hip, or the lumbar spine; previous knee surgery; and self-reported patellofemoral joint instability."
Treatments	*Setting of the treatment:* University Hospital **Group 1: Hip/knee exercises with feedback** **Group 2: Hip/knee exercises** **Group 1:** **Exercise therapy** - 3 exercise sessions per week, for 6 weeks; 1 weekly physiotherapist-supervised session and 2 home exercise sessions. - Participants were advised to continue participating in physical activity if (a) their pain was no higher than 30 mm on a 100-mm VAS during the activity, (b) their knee pain did not outlast the physical activity, and (c) there was no strong increase in symptoms post-activity. - 10–12 repetition maximum was determined by shortening the elastic band to a length where the participant would not be able to perform >10 repetitions. When the exercise was performed correctly, the pulling force was measured at the end position when the pulling force was at its highest by the BandCizeri and used as the recommended initial minimum pulling force in the app. - When more than 10 repetitions per set could be performed, the load was increased by shortening the band or changing to a different color of band. - All participants were told that adherence to exercises was important and would improve their odds of recovery. *Exercises* - Participants received real-time feedback on visual and auditory feedback on contraction time and pulling force from the BandCizer app on an iPad - The following exercises were done: o Seated knee extension o Freestanding hip abduction o Freestanding hip extension **Group 2:**

	Exercise therapy - 3 exercise sessions per week, for 6 weeks; 1 weekly physiotherapist-supervised session and 2 home exercise sessions. - Participants were advised to continue participating in physical activity if (a) their pain was no higher than 30 mm on a 100-mm VAS during the activity, (b) their knee pain did not outlast the physical activity, and (c) there was no strong increase in symptoms post-activity. - 10–12 repetition maximum was determined by shortening the elastic band to a length where the participant would not be able to perform >10 repetitions. When the exercise was performed correctly, the pulling force was measured at the end position when the pulling force was at its highest by the BandCizeri and used as the recommended initial minimum pulling force in the app. - When more than 10 repetitions per set could be performed, the load was increased by shortening the band or changing to a different color of band. - All participants were told that adherence to exercises was important and would improve their odds of recovery. *Exercises* - Participants received real-time feedback on visual and auditory feedback on pulling force from the BandCizer app on an iPad - The following exercises were done: o Seated knee extension o Freestanding hip abduction o Freestanding hip extension

Study	Van Linschoten 2009
Methods	*Design:* Randomised Controlled Trial *Number of randomised participants:* Group 1: 65 Group 2: 66
Participants	*Study period:* April 2005 – April 2008 *Eligibility criteria:* "Inclusion criteria comprised the presence of at least three of the following symptoms: pain when walking up or down stairs; pain when squatting; pain when running; pain when cycling; pain when sitting with knees flexed for a pro-longed period of time; grinding of the patella; and a positive clinical patellar test (such as Clarke's test or patellar femoral grinding test).Symptoms had to have persisted for longer than 2 months but not longer than 2 years. Patients were excluded if they had knee osteoarthritis, patellar tendinopathy, Osgood-Schlatter disease, or other defined pathological conditions of the knee, or had previous knee injuries or surgery. Patients were also excluded if they had already been treated with supervised exercise therapy."

Treatments	*Setting of the treatment:*
	General Practices and Sports Medical Centres
	
	Group 1: Education + exercise therapy
	Group 2: Education
	
	Group 1:
	Education
	- Standardised information (leaflet) and advice by GP or sport physician about:
	  o 'Background patellofemoral pain'
	  o Patellofemoral pain's good prognosis
	  o Advice to refrain from sports activities that provoked pain
	  o Daily isometric quadriceps contractions
	
	Exercise therapy
	- 9 physiotherapist-supervised 25 minute-sessions in 6 weeks
	- Daily unsupervised 25 minute-session for 3 months
	- Standardised exercise protocol, tailored to the individual
	- Load was increased every 2 weeks during the first 6 weeks by increasing repetitions or the intensity. Adaptation was based on pain reaction by exertion
	
	Exercises
	- Stationary bike warm-up
	- Static and dynamic muscular exercises for
	  o Quadriceps muscles
	  o Adductor muscles
	  o Gluteal muscles
	
	Pain medicine
	"Patients were recommended to use a simple analgesic such as paracetamol when pain was severe and to find alternative ways to keep in shape."
	
	Group 2:

	Education - Standardised information (leaflet) and advice by GP or sport physician about: o 'Background patellofemoral pain' o Patellofemoral pain's good prognosis o Advice to refrain from sports activities that provoked pain o Daily isometric quadriceps contractions

Study	Witvrouw 2000
Methods	*Design:* Randomised Controlled Trial *Number of randomised participants:* Group 1: 30 Group 2: 30
Participants	*Study period:* November 1995 – (+/-) May 2002 *Eligibility criteria:* "To be eligible for the study, subjects had to have experienced anterior knee pain for more than 6 weeks and had to exhibit two of the following criteria on initial assessment: pain on direct compression of the patella against the femoral condyles with the knee in full extension, tenderness on palpation of the posterior surface of the patella, pain on resisted knee extension, and pain with isometric quadriceps muscle contraction against suprapatellar resistance with the knee in slight flexion. Patients with knee problems other than patellofemoral pain were excluded from the study. Also excluded from this study were patients with a history of a knee operation."

Treatments	*Setting of the treatment:*
	Physical therapy department of a University Hospital
	
	Group 1: Minimal hip/knee exercises
	Group 2: Hip/knee exercises
	
	Group 1:
	Exercise therapy
	- 3 physiotherapist-supervised training sessions, for 5 weeks.
	- Session duration was 30-45 minutes
	- During the 5-week training program, patients were not allowed to participate in sports.
	- A 10-repetition maximum was determined before the start of the exercise program. Patients were instructed to train at 60% of their maximum. A new 10-repetition maximum was established at the end of a week of training.
	- Exercises were repeated 3 sets of 10 repetitions. The patients rested 1 minute after the conclusion of each set.
	
	Exercises
	- Each exercise was held isometrically for a count of 6 seconds with a 3-second rest between repetitions.
	- The following exercises were performed:
	  o Maximal static quadriceps muscle contractions (quadriceps muscle setting) with the knee in full extension
	  o Straight-leg raises with the patient supine
	  o Short arc movements from 10° of knee flexion to terminal extension
	  o Leg adduction exercises in the lateral decubitus position.
	  o Participants were also instructed to perform the conventional static quadriceps, hamstring, and gastrocnemius muscle stretching exercises after each training session. All subjects were instructed to perform three repetitions of a 30-second static stretch of these muscle groups.
	
	Group 2:

	Exercise therapy - 3 physiotherapist-supervised training sessions, for 5 weeks. - Session duration was 30-45 minutes - During the 5-week training program, patients were not allowed to participate in sports. - A 10-repetition maximum was determined before the start of the exercise program. Patients were instructed to train at 60% of their maximum. A new 10-repetition maximum was established at the end of a week of training. - Exercises were repeated 3 sets of 10 repetitions. The patients rested 1 minute after the conclusion of each set. *Exercises* - Each exercise was performed dynamically with a 3-second rest between repetitions. - The following exercises were performed: o Seated leg presses o One-third knee bends on one leg and on both legs o Stationary bicycling o Rowing-machine exercises o Step-up and step-down exercises o Progressive jumping exercises o Participants were also instructed to perform the conventional static quadriceps, hamstring, and gastrocnemius muscle stretching exercises after each training session. All subjects were instructed to perform three repetitions of a 30-second static stretch of these muscle groups.

Study	Yılmaz Yelvar 2015
Methods	*Design:* Randomised Controlled Trial *Number of randomised participants:* Group 1: 26 Group 2: 26
Participants	*Study period:* Not reported. *Eligibility criteria:* "Subjects were included if they had retropatellar pain of more than 6 months duration brought on by two (or more) of the following symptoms without traumatic onset: prolonged sitting, stair climbing and descending, running, kneeling, hopping/jumping, pain on palpation of patellar facets, a step down. Subjects clinically diagnosed with PFPS by physician had received physical therapy for the first time Exclusion criteria were: a) a current or previous record of knee pain, trauma, surgery and other joint disease, b) injury or dysfunction in the knee ligament, bursae, menisci and synovial plicae, c) involvement in competitive sports, d) radiographic evidence of osteoarthritis of the knee joint, e) a neurological problem affecting walking, f) pregnancy. Subjects were instructed to avoid taking analgesics or anti-inflammatory medications during the study."

Treatments	*Setting of the treatment:*
	Physiotherapy Clinic
	
	Group 1: Hip/knee/trunk exercises
	Group 2: Hip/knee exercises
	
	Group 1:
	Exercise therapy
	- 3 physiotherapist-supervised sessions a week, for 6 weeks.
	- Exercises were done 5 times using their own body weight for the first 2 weeks.
	- An elastic band was issued for weeks 3 - 6
	
	Exercises
	- Patients received core activation exercises, for the following muscles:
	  o Transversus abdominis
	  o Pelvic floor
	  o Multifidus
	  o Diaphragm muscles work together
	- Patients were asked to imagine putting the spine in a straight line, and correct their posture in supine, prone and standing position.
	- They were also asked to perform posterior pelvic tilt, and scapular stabilization and chin retraction, which enabled the spine to remain in neutral position.
	- Stabilization exercises were done with diaphragmatic breathing to increase the efficiency of activation in the core, facilitate movement, enhance mobility, improve lung capacity and enhance focusing.
	
	Home exercises (3x/day 10 repetitions for each exercise, for 6 weeks)
	- Stretching hip flexors, hamstrings, iliotibial band and lumbal extensors
	- Curl-ups
	- Bridge exercise
	- Straight leg raising in supine

	- Isometric quadriceps strengthening (250times/day) - Isometric adductor strengthening (250 times/day) - Strengthening of the hip muscles - Weight bearing on one leg - Heel and toe walking on a soft surface **Group 2:** **Home exercise therapy** - Home exercise program for 6 weeks - Weekly visit to the clinic and contacted by phone 3x/week - Exercises were to be performed 3x/day and times for each exercise using their own body weight for the first 2 weeks. - An elastic band was issued for weeks 3 - 6 *Exercises* - Stretching hip flexors, hamstrings, iliotibial band and lumbal extensors - Curl-ups - Bridge exercise - Straight leg raising in supine - Isometric quadriceps strengthening (250times/day) - Isometric adductor strengthening (250 times/day) - Strengthening of the hip muscles - Weight bearing on one leg - Heel and toe walking on a soft surface

WEB APPENDIX 6. RISK OF BIAS FINDINGS

Content:

Winters M, *et al. Br J Sports Med* 2021; 55:369–377. doi: 10.1136/bjsports-2020-102819

Tabel 1. Domain-based risk of bias assessment for each outcome within a study

Study	Outcomes	Treatments	Follow-up assessment time-points	Bias arising from the randomization process	Bias due to deviation from intended interventions	Bias due to missing outcome data	Bias due to measurement of the outcome	Bias due to selection of the reported result	OVERALL RISK OF BIAS
Baldon et al. 2014	• GROC • Worst pain	Group 1: Hip/knee/trunk exercises Group 2: Hip/knee exercises	• 9 weeks • 22 weeks	Some Concerns	Some Concerns	Low Risk	Some Concerns	Some Concerns	**All outcomes: Some Concerns**
Collins et al. 2008	• GROC • Worst pain in the past week	Group 1: Education + exercise therapy + patellar taping/mobilisations + orthotics Group 2: Education + exercise therapy + patellar taping/mobilisations Group 3: Education + orthotics Group 4: Education	• 6 weeks • 12 weeks • 52 weeks	Low Risk	Some Concerns	Low Risk	Some Concerns	GROC: Some Worst pain: High	**GROC: Some Concerns** **Worst pain: High Risk**
Demirci et al. 2017	• Pain ascending stairs • Pain descending stairs	Group 1: Mobilisation with movement + hip/knee exercises Group 2: Kinesio tape + hip/knee exercises	• 6 weeks	Some concerns	Some Concerns	Low Risk	Some Concerns	Some Concerns	**All outcomes: Some Concerns**
Drew et al. 2017	• GROC • Worst pain	Group 1: Hip/knee exercises Group 2: Wait-and-see	• 8 weeks	Some Concerns	Some Concerns	Low Risk	High Risk	Some Concerns	**All outcomes: High Risk**
Emamvirdi 2018	• Worst pain	Group 1: Hip/knee exercises Group 2: Wait-and-see	• 6 weeks	Some Concerns	High Risk	Low Risk	High Risk	Some Concerns	**High Risk**
Eng et al. 1993	• Pain walking • Pain ascending stairs • Pain descending stairs • Pain sitting • Pain running • Pain squatting	Group 1: Foot orthosis + hip/knee exercises Group 2: Hip/knee exercises	• 6 weeks • 8 weeks	Some Concerns	High Risk	High Risk	High Risk	Some Concerns	**All outcomes: High Risk**
Esculier et al. 2018	• Worst pain • Pain running	Group 1: Education Group 2: Education + exercise therapy Group 3: Gait retraining	• 8 weeks • 20 weeks	Low Risk	Low Risk	Low Risk	High Risk	Some Concerns	**All outcomes: High Risk**
Foroughi 2019	• Worst pain	Group 1: Hip/knee/trunk exercises Group 2: Hip/knee exercises	• 13 weeks	Some Concerns	High Risk	High Risk	Some Concerns	Some Concerns	**High Risk**
Fukuda et al. 2012	• Pain ascending stairs • Pain descending stairs	Group 1: Hip/knee exercises Group 2: Hip/knee/trunk exercises	• 13 weeks • 26 weeks • 52 weeks	Some Concerns	Some Concerns	High Risk	Some Concerns	Some Concerns	**All outcomes: High Risk**
Glaviano 2019	• GROC • Worst pain	Group 1: Electrical neuromuscular stimulation +	• 26 weeks • 52 weeks	Some Concerns	Some Concerns	Low Risk	Some Concerns	Some Concerns	**All outcomes: Some**

		exercise therapy Group 2: sham electrical neuromuscular stimulation + exercise therapy							**Concerns**
Giles et al. 2017	• GROC • Worst pain	Group 1: Hip/knee exercises with blood flow restriction Group 2: Hip/knee exercises	• 8 weeks • 26 weeks	Some Concerns	Some Concerns	Low Risk	Some Concerns	GROC: Some Concerns Worst pain: High Risk	**GROC: Some Concerns** **Worst pain: High Risk**
Hart 2019	• Pain during a single leg squat	Group 1: Hyaluronic Acide Injection + Hip/knee exercises Group 2: Sham injection + Hip/knee exercises	• 13 weeks • 26 weeks	Some Concerns	High Risk	Low Risk	Low Risk	Some Concerns	**High Risk**
Hott 2019	• Worst pain	Group 1: Education + hip exercises Group 2: Education + knee exercises Group 3: Education	• 6 weeks • 13 weeks	Low Risk	High Risk	Low Risk	*Group 1 vs. group 2*: Some concerns *Group 1 & Group 2 vs. Group 3*: High Risk	High Risk	**All comparisons: High Risk**
Kettunen et al. 2007	• Pain standing up from sitting • Pain ascending stairs • Pain descending stairs	Group 1: Arthroscopy + hip/knee exercises Group 2: Hip/knee exercises	• 39 weeks • 104 weeks • 260 weeks	High Risk	Low Risk	High Risk	High Risk	High Risk	**All outcomes: High Risk**
Matthews et al. 2020	• GROC • Worst pain	Group 1: Hip/knee exercises Group 2: Orthosis	• 6 weeks • 12 weeks	Low Risk	Low Risk	**6 weeks** Low Risk **12 weeks** Some Concerns	Some Risk	Low Risk	**All outcomes: 6 weeks Low Risk** **All outcomes: 12 weeks Some Concerns**
Mills et al. 2011	• GROC • Worst pain	Group 1: Orthosis Group 2: Wait-and-see	• 6 weeks	Some Concerns	Some Concerns	Low Risk	High Risk	Some Concerns	**All outcomes: High Risk**
Petersen et al. 2016	• GROC • Worst pain	Group 1: Patellar brace + hip/knee exercises Group 2: Hip/knee exercises	• 6 weeks • 12 weeks • 54 weeks	Some Concerns	High Risk	High Risk	High Risk	Some Concerns	**All outcomes: High Risk**
Rathleff et al. 2015	• GROC • Worst pain	Group 1: Education Group 2: Education + exercise therapy + patellar taping	• 13 weeks • 26 weeks • 52 weeks • 104 weeks	High Risk	**12 weeks** **GROC:** Some Concerns **Worst pain:** Some Concerns **26 weeks: GROC:** Some Concerns **26 weeks: Worst pain:** High Risk	High Risk	High Risk	Low Risk	**All outcomes: High Risk**

					52 weeks: **GROC:** High Risk **Worst pain:** High Risk **104 weeks:** **GROC:** High Risk **Worst pain:** High Risk				
Riel et al. 2018	• GROC	Group 1: Hip/knee exercises with feedback Group 2: Hip/knee exercises	• 6 weeks	Low Risk	Some Concerns	Low Risk	Some Concerns	Low Risk	**Some Concerns**
Van Linschoten et al. 2009	• GROC	Group 1: Education + exercise therapy Group 2: Education	• 13 weeks • 52 weeks	Some Concerns	High Risk	Low Risk	High Risk	High Risk	**High Risk**
Witvrouw et al. 2000	• Worst pain • Pain prolonged sitting • Pain walking • Pain ascending stairs • Pain descending stairs • Pain running • Pain jumping • Pain squatting	Group 1: Minimal hip/knee exercises Group 2: Hip/knee exercises	• 12 weeks • 260 weeks	High Risk	High Risk	High Risk	Some Concerns	Some Concerns	**All outcomes: High Risk**
Yılmaz Yelvar et al. 2015	• Pain ascending stairs • Pain descending stairs	Group 1: Hip/knee/trunk exercises Group 2: Hip/knee exercises	• 6 weeks • 12 weeks	Some Concerns	High Risk	Low Risk	Some Concerns	Some Concerns	**All outcomes: High Risk**

Table 1. Risk of bias judgements per outcome for each study. Risk of bias assessment applies to all outcomes and follow-ups listed in the outcome & follow-up measurement columns, unless otherwise specified in the table. GROC = global rating of change scale, pain was measured on a 0-10 or 0-100 visual analogue scale, or numerical rating of pain scale.

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Table 2. Risk of bias judgements + support for their judgements

Comparison: Hip/knee/trunk exercises (group 1) versus hip/knee exercises (group 2) **Outcomes: Global rating of Change scale; worst pain in the past week**						
Study	**ROB domain** **Signalling Q.**	**Judgement per follow-up**				**Support for judgements**
Baldon 2014		***9 weeks***	***22 weeks***	***NA***	***NA***	
	Bias arising from the randomisation process					
	1.1	PY	PY			"Randomization was performed in blocks of 4. Consecutively numbered, opaque envelopes were prepared ahead of time and randomly assigned by a computer- generated table of random numbers."
	1.2	NI	NI			Unclear description of the entire procedure, making it impossible to judge this item. Unclear is whether the envelopes were sealed.
	1.3	PN	PN			A number of variables' estimate seem to be somewhat different but the SD's and confidence intervals show that they sufficiently overlap to regard this as due to chance.
	Risk of bias	*Some*	*Some*			Predicted direction of bias: unpredictable
	Bias due to deviations from intended interventions					
	2.1	Y	Y			Patients could not be blinded to the intervention they received
	2.2	Y	Y			Carers could not be blinded
	2.3	NI	NI			<u>All follow-ups:</u> *Received intervention as allocated:* No information *Non-Adherence:* No information *Contamination/Switching:* No information *Lost to follow-up:* Group 1: n = 0 Group 2: n =1 at 9 weeks and 22 weeks
	2.4	NA	NA			
	2.5	NA	NA			
	2.6	Y	Y			An intention-to-treat analysis was used
	2.7	NA	NA			
	Risk of bias	*Some*	*Some*			Predicted direction of bias: unpredictable
	Bias due to missing outcome data					

	3.1	Y	Y		See 2.3. 1/31 (3.2%) of the participants was missing at follow-up.
	3.2	NA	NA		
	3.3	NA	NA		
	3.4	NA	NA		
	Risk of bias	*Low*	*Low*		Predicted direction of bias: unpredictable
	Bias in measurement of the outcome				
	4.1	N	N		The outcomes used were valid and reliable
	4.2	N	N		It is unlikely that outcomes were assessed differently between groups.
	4.3	Y	Y		A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.4	Y	Y		A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.5	N	N		Two exercise interventions were compared, and it's unlikely that patients had strong beliefs about the beneficial or harmful effect of one intervention compared to the other.
	Risk of bias	*Some*	*Some*		Predicted direction of bias: unpredictable
	Bias in selection of the reported results				
	5.1	NI	NI		No protocol/analysis plan could be retrieved in trial registers.
	5.2	NI	NI		No protocol/analysis plan could be retrieved in trial registers.
	5.3	NI	NI		No protocol/analysis plan could be retrieved in trial registers.
	Risk of bias	*Some*	*Some*		Predicted direction of bias: unpredictable
	OVERALL RISK OF BIAS	High	High		Predicted direction of bias: unpredictable

Comparison: Education + exercise therapy + patellar taping/mobilisations + orthotics (group 1) versus education + exercise therapy + patellar taping/mobilisations (group 2) versus education + orthotics (group 3) versus education (group 4) **Outcome: Global rating of change scale; worst pain in the past week**						
Study	**ROB domain Signalling Q.**	**Judgement per follow-up**				**Support for judgements**
Collins 2008		***6 weeks***	***12 weeks***	***52 weeks***	***NA***	
	Bias arising from the randomisation process					
	1.1	PY	PY	PY		"The Queensland Clinical Trial Centre, an independent off-site body, [was …] responsible for generating and maintaining the randomisation sequence". A random number generator was used, in blocks of eight with no stratification
	1.2	PY	PY	PY		"The Queensland Clinical Trial Centre, an independent off-site body, [was …] responsible for generating and maintaining the randomisation sequence".
	1.3	N	N	N		There were no apparent differences between groups at baseline, beyond what would be expected based on chance.
	Risk of bias	*Low*	*Low*	*Low*		Predicted direction of bias: unpredictable
	Bias due to deviations from intended interventions					
	2.1	Y	Y	Y		Patients could not be blinded.
	2.2	Y	Y	Y		Carers could not be blinded
	2.3	PY	PY	PY		<u>All follow-ups:</u> *Received intervention as allocated:* Group 1: 39/44 (88.6%) Group 2: 41/45 (91.1%) Group 3: 41/46 (89.1%) Group 4: 36/44 (81.8%) *Non-Adherence:* No information *Contamination/Switching:* 33% of the trial participants used co-interventions. There was insufficient information about when these were provided. The rates were as follows: Group 1: 22.5%; group 2: 37.2%; group 3: 35%, group 4: 38.5% *Proportion available for follow-up:* 6 weeks: Group 1: n = 42/44; Group 2: 41/45; Group 3: 41/46; Group 4: 40/44. 12 weeks:

						Group 1: n = 40/44; Group 2: 41/45; Group 3: 42/46; Group 4: 38/44. 52 weeks: Group 1: n = 43/44; Group 2: 42/45; Group 3: 45/46; Group 4: 41/44.
	2.4	Group 1 versus, group 2, 3 and 4: PY Group 2 vs group 3 vs group 4: N	Group 1 versus, group 2, 3, 4: PY Group 2 vs group 3 vs group 4: N	Group 1 versus, group 2, 3, 4: PY Group 2 vs group 3 vs group 4: N		All follow-ups: See 2.3, contamination. There was higher number of co-interventions used in group 2, 3 and 4 compared to group 1, but there was no difference in the use of co-interventions between group 2, 3 and 4.
	2.5	PN	PN	PN		Group 1 vs other groups: probably no meaningful effect on estimate. NA for group 2 vs group 3 vs group 4.
	2.6	Y	Y	Y		Patients were analysed in the group they were assigned to.
	2.7	NA	NA	NA		
	Risk of bias	*Some*	*Some*	*Some*		Predicted direction of bias: in favour of group 2, 3 and 4
	Bias due to missing outcome data					
	3.1	GROC: PY Worst pain: NI	GROC: PY Worst pain: NI	GROC: PY Worst pain: NI		Available patients for GROC are specified per follow-up and are all well around and above 90%. For worst pain, there is no information regarding any missing outcome data.
	3.2	GROC: NA Worst pain: N	GROC: NA Worst pain: N	GROC: NA Worst pain: N		Worst pain: no sensitivity analyses was presented were the effect of potential missing data was tested.
	3.3	GROC: NA Worst pain: PN	GROC: NA Worst pain: PN	GROC: NA Worst pain: PN		It is unlikely that any potential missing data was dependent on its true value. The GROC numbers show that most patients were still in the trial, or returned (if missing), upon a following assessment. Any non-specified missing outcome data is probably random.
	3.4	NA	NA	NA		
	Risk of bias	All outcomes: *Low*	All outcomes: *Low*	All outcomes: *Low*		Predicted direction of bias: unpredictable
	Bias in measurement of the outcome					
	4.1	N	N	N		

	4.2	N	N	N		
	4.3	Y	Y	Y		A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.4	Y	Y	Y		The patient's judgement about their improvement and pain could be influenced by having knowledge of the intervention received.
	4.5	PN	PN	PN		There is no indication that levels of belief about the treatments' effects differed between groups
	Risk of bias	*Some*	*Some*	*Some*		Predicted direction of bias: unpredictable
	Bias in selection of the reported results					
	5.1	NI	NI	NI		There was a protocol in ISRCT trial register: ACTRN012605000463673 However, it was not prospectively registered.
	5.2	**GROC:** NI **Worst pain:** PY	**GROC:** NI **Worst pain:** PY	**GROC:** NI **Worst pain:** PY		There was a protocol in ISRCT trial register: ACTRN012605000463673 However, it was not prospectively registered. The trial registration reports that the McGill pain questionnaire was used but this outcome was not reported. This suggests that outcomes for the domain pain may have been selected on the basis of the outcome.
	5.3	NI	NI	NI		There was a protocol in ISRCT trial register: ACTRN012605000463673 However, it was not prospectively registered.
	Risk of bias	**GROC:** *Some* **Worst pain:** *High*	**GROC:** *Some* **Worst pain:** *High*	**GROC:** *Some* **Worst pain:** *High*		Predicted direction of bias: unpredictable
	OVERALL RISK OF BIAS	**GROC:** Some **Worst pain:** High	**GROC:** Some **Worst pain:** High	**GROC:** Some **Worst pain:** High		Predicted direction of bias: unpredictable

Comparison: Mobilisation with movement + hip/knee exercises (group 1) versus kinesio tape + hip/knee exercises (group 2) Outcomes: Pain while ascending stairs; pain while descending stairs (VAS 0-10)						
Study	**ROB domain Signalling Q.**	**Judgement per follow-up**				**Support for judgements**
Demirci 2017		***6 weeks***	***NA***	***NA***	***NA***	
	Bias arising from the randomisation process					
	1.1	Y				"Thirty-five female patients diagnosed with unilateral PFP were randomized into 2 groups with the help of a computer-generated randomization."
	1.2	NI				No information on how the concealment of allocation was ensured.
	1.3	N				There are no apparent differences in group size or in baseline variables between groups.
	Risk of bias	*Some*				Predicted direction of bias: unpredictable
	Bias due to deviations from intended interventions					
	2.1	Y				Patients could not be blinded to the intervention they received
	2.2	Y				Carers could not be blinded
	2.3	NI				<u>All follow-ups:</u> *Received intervention as allocated:* No information *Non-Adherence:* No information *Contamination/Switching:* No information *Lost to follow-up:* Group 1: n = 3/21 Group 2: n = 3/20 No reasons for loss to follow-up have been provided.
	2.4	NA				
	2.5	NA				
	2.6	PY				The flow diagram suggest that a modified intention to treat analysis was used
	2.7	NA				
	Risk of bias	*Some*				Predicted direction of bias: unpredictable
	Bias due to missing outcome data					
	3.1	N				6/41 (14.6%) of the participants were lost to follow-up.
	3.2	N				There is no evidence provided that results were not biased by any (potential) missing data.
	3.3	PN				The number of patients lost to follow-up was similar in both

				groups; Group 1: n = 3/21 vs Group 2: n = 3/20, and the reasons were mostly related to the experimental context. Any missing values in the remaining patients was probably random.
	3.4	NA		
	Risk of bias	*Low*		Predicted direction of bias: unpredictable
	Bias in measurement of the outcome			
	4.1	N		
	4.2	N		
	4.3	Y		A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.4	Y		The patient's judgement about their improvement and pain could be influenced by having knowledge of the intervention received.
	4.5	PN		There is no indication that levels of belief about the treatments' effects differed between groups
	Risk of bias	*Some*		Predicted direction of bias: Unpredictable
	Bias in selection of the reported results			
	5.1	NI		A protocol was found in clinicaltrials.gov (NCT02707679), however, it was registered retrospectively.
	5.2	NI		A protocol was found in clinicaltrials.gov (NCT02707679), however, it was registered retrospectively.
	5.3	NI		A protocol was found in clinicaltrials.gov (NCT02707679), however, it was registered retrospectively.
	Risk of bias	*Some*		Predicted direction of bias: unpredictable
	OVERALL RISK OF BIAS	High		Predicted direction of bias: unpredictable

Comparison: Hip/knee exercises (group 1) versus wait-and-see (group 2) **Outcome: Global rating of change scale; worst NPRS (0-10) in the past week**						
Study	**ROB domain** **Signalling Q.**	**Judgement per follow-up**				**Support for judgements**
Drew 2017		***8 weeks***	***NA***	***NA***	***NA***	
	Bias arising from the randomisation process					
	1.1	Y				"The random allocation sequence was made according to the output from a random number generator…"
	1.2	NI				"The random allocation sequence was made according to the output from a random number generator and concealed within pre-sealed, opaque envelopes [37]. All allocation and randomisation was conducted by the lead author (BD)." Envelopes should be numbered and it's unclear if they were.
	1.3	PN				1/10 variables (i.e. uni/bilateral pain) seems different between groups but this was judged as due to chance.
	Risk of bias	*Some*				Predicted direction of bias: unpredictable
	Bias due to deviations from intended interventions					
	2.1	Y				Patients could not be blinded.
	2.2	Y				Carers could not be blinded
	2.3	NI				*Received intervention as allocated/Non-Adherence* Group 1: The overall average adherence to treatment was 94%, and the appointment adherence was 92%. Group 2: adherence to usual care ("any") was not measured as any was accepted and considered a product of 'usual care'. *Contamination/Switching:* No information *Lost to follow-up:* 2 patients were lost to follow-up (8%)
	2.4	NA				Not applicable as any deviation in group 2 was considered 'usual care'
	2.5	NA				
	2.6	Y				All patients were analysed in the group they were assigned to
	2.7	NA				
	Risk of bias	*Some*				Predicted direction of bias: unpredictable
	Bias due to missing outcome data					
	3.1	Y				All patient outcome data were available, except for those (n=2, 8%) lost to follow-up; "All questionnaires were completed fully

				without any missing data yielding a missing data indicator of 0%."
	3.2	NA		
	3.3	NA		
	3.4	NA		
	Risk of bias	*Low*		Predicted direction of bias: unpredictable
	Bias in measurement of the outcome			
	4.1	N		
	4.2	N		
	4.3	Y		A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.4	Y		The patient's judgement about their improvement and pain could be influenced by having knowledge of the intervention received.
	4.5	Y		Within, the trial it reasonable to think that beliefs about the treatments (hip-focused exercise regimen compared to 'usual care') differed between groups.
	Risk of bias	*High*		Predicted direction of bias: unpredictable
	Bias in selection of the reported results			
	5.1	NI		There was a protocol in ISRCT trial register: ISRCTN74560952 However, it was not prospectively registered.
	5.2	NI		There was a protocol in ISRCT trial register: ISRCTN74560952 However, it was not prospectively registered.
	5.3	NI		There was a protocol in ISRCT trial register: ISRCTN74560952 However, it was not prospectively registered.
	Risk of bias	*Some*		Predicted direction of bias: unpredictable
	OVERALL RISK OF BIAS	High		Predicted direction of bias: unpredictable

Comparison: Hip/knee exercises (group 1) versus wait-and-see (group 2)
Outcomes: Worst pain

Study	ROB domain Signalling Q.	Judgement per follow-up				Support for judgements
Emamvirdi 2018		***6 weeks***	***NA***	***NA***	***NA***	
	Bias arising from the randomisation process					
	1.1	Y				A computer generated a table of random numbers.
	1.2	NI				Lack of information on the exact procedure: - Envelopes need to be numbered, opaque and sealed to ensure allocation concealment. - How the investigator who performed the randomisation procedure was blinded to the patient at randomisation is unclear.
	1.3	N				Baseline measures seem balanced between groups
	Risk of bias	*Some*				Predicted direction of bias: unpredictable
	Bias due to deviations from intended interventions					
	2.1	Y				Patients could not be blinded to the intervention they received
	2.2	Y				Carers could not be blinded to the intervention
	2.3	NI				Per follow-up *Received intervention as allocated:* Group 1: 32 (100%), Group 2: 32 (100%) *Non-Adherence:* Not reported *Contamination:* ? *Switching:* None *Lost to follow-up:* None
	2.4	NI				No information on how the excluded participants could have affected the outcome; no information on contamination, and how this could have affected the outcome.
	2.5	NI				It's unclear if potential contamination of interventions outside the trial context could have influenced the outcome.
	2.6	PY				Lack of information – not described if an intention-to-treat analysis was performed. All patients were still in the study, in a well-defined context..
	2.7	NA				
	Risk of bias	*High*				Predicted direction of bias: unpredictable
	Bias due to missing outcome data					
	3.1	Y				100% follow-up. It's unlikely there was missing data other than for random reasons.

	3.2	NA		
	3.3	NA		
	3.4	NA		
	Risk of bias	*Low*		Predicted direction of bias: unpredictable
	Bias in measurement of the outcome			
	4.1	N		
	4.2	N		
	4.3	Y		A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.4	Y		The patient's judgement about their pain could be influenced by having knowledge of the intervention received.
	4.5	Y		There may be different levels of belief about the treatments' effectiveness as the two group received distinct approaches.
	Risk of bias	*High*		Predicted direction of bias: unpredictable
	Bias in selection of the reported results			
	5.1	NI		No trial protocol registration could be found in clinicaltrials.gov, ISRCTN or Who trial registry.
	5.2	NI		No trial protocol registration could be found in clinicaltrials.gov, ISRCTN or Who trial registry.
	5.3	NI		No trial protocol registration could be found in clinicaltrials.gov, ISRCTN or Who trial registry.
	Risk of bias	*Some*		Predicted direction of bias: unpredictable
	OVERALL RISK OF BIAS	*High*		

Winters M, *et al. Br J Sports Med* 2021; 55:369–377. doi: 10.1136/bjsports-2020-102819

Comparison: Foot orthosis + hip/knee exercises (group 1) versus hip/knee exercises (group 2) **Outcomes: Pain during walking, during stairs ascent, during stairs descent, during sitting, during running and during squatting (All VAS 0-10)**						
Study	**ROB domain Signalling Q.**	**Judgement per follow-up**				**Support for judgements**
Eng 1993		***6 weeks***	***8 weeks***	***NA***	***NA***	
	Bias arising from the randomisation process					
	1.1	NI	NI			Insufficient information about the sequence generation: "Subjects were randomly assigned to either a control group (n= 10) o r a treatment group (n=10)"
	1.2	NI	NI			Insufficient information about the sequence generation and concealment of allocation: "Subjects were randomly assigned to either a control group (n= 10) o r a treatment group (n=10)"
	1.3	N	N			There were no apparent differences between groups at baseline, beyond what would be expected based on chance.
	Risk of bias	*Some*	*Some*			Predicted direction of bias: unpredictable
	Bias due to deviations from intended interventions					
	2.1	Y	Y			Patients could not be blinded.
	2.2	Y	Y			Carers could not be blinded
	2.3	NI	NI			All follow-ups: *Received intervention as allocated:* No information *Non-Adherence:* No information *Contamination/Switching:* No information *Lost to follow-up:* No information.
	2.4	NA	NA			
	2.5	NA	NA			
	2.6	NI	NI			No information on how participants were analysed.
	2.7	NI	NI			
	Risk of bias	*High*	*High*			Predicted direction of bias: unpredictable
	Bias due to missing outcome data					
	3.1	NI	NI			All follow-ups: No information regarding missing outcome data was provided. Table 2 suggests data for all participants were analysed, however, it's unclear if data was imputed for missing values or if there was no missing data.
	3.2	N	N			There was no evidence that results were not biased by potential missing outcome data.
	3.3	NI	NI			Insufficient information to judge the item.

	3.4	NI	NI		Insufficient information to judge the item.
	Risk of bias	*High*	*High*		Predicted direction of bias: unpredictable
	Bias in measurement of the outcome				
	4.1	N	N		
	4.2	N	N		
	4.3	Y	Y		A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.4	Y	Y		The patient's judgement about their improvement and pain could be influenced by having knowledge of the intervention received.
	4.5	PY	PY		An exercise program was compared to exercise + orthotics. There is potential for patients in the orthotics group to have different beliefs about the treatment's effectiveness compared to the exercise group.
	Risk of bias	*High*	*High*		Predicted direction of bias: in favour of the orthoses group
	Bias in selection of the reported results				
	5.1	NI	NI		No protocol could be retrieved in trial registers.
	5.2	NI	NI		No protocol could be retrieved in trial registers.
	5.3	NI	NI		No protocol could be retrieved in trial registers.
	Risk of bias	*Some*	*Some*		Predicted direction of bias: unpredictable
	OVERALL RISK OF BIAS	High	High		Predicted direction of bias: unpredictable

Comparison: Education (group 1) versus education + exercise therapy (group 2) versus education + gait retraining (group 3) **Outcomes: Worst pain in the past week; pain during running (both VAS 0-10)**						
Study	**ROB domain Signalling Q.**	**Judgement per follow-up**				**Support for judgements**
Esculier 2018		***8 weeks***	***20 weeks***	***NA***	***NA***	
	Bias arising from the randomisation process					
	1.1	Y	Y			"A scientist not involved in data collection generated randomisation lists using a random number generator (block randomisation; block size of 3–12). Randomisation was stratified according to sex (male/female) and foot strike pattern (rearfoot/non-rearfoot)."
	1.2	Y	Y			"Group allocations were concealed in sequentially numbered sealed opaque envelopes, which were opened by one member of the research team not involved in data collection following baseline assessment."
	1.3	PN	PN			2/20 variables were potentially different between groups (age & duration of symptoms), which were expected to be due to chance.
	Risk of bias	*Low*	*Low*			Predicted direction of bias: unpredictable
	Bias due to deviations from intended interventions					
	2.1	Y	Y			Patients could not be blinded to the intervention they received
	2.2	Y	Y			Carers could not be blinded
	2.3	N	N			<u>All follow-ups:</u> *Received intervention as allocated:* Group 1: 21/23 Group 2: 22/23 Group 3: 19/23 62/69 = 90% *Non-Adherence:* 11.1%, absence rate = 5.5% *Contamination/Switching:* "No participant declared implementing additional therapeutics (e.g. medications and manual therapy)" *Lost to follow-up:* <u>8 weeks:</u> Group 1: n = 2 (unsatisfied with treatment/time constraints) Group 2: n = 1 (time constraints) Group 3: n = 4 (time constraints, bike accident, severe ankle sprain, undisclosed reason)

					20 weeks: Group 1: n = 1 (1 in addition to the 2 at 8 weeks) Group 2: n = 1 (1 in addition to the 1 at 8 weeks) Group 3: n = 1 (1 in addition to the 4 at 8 weeks) Reasons for loss to follow-up at 20 weeks: not described
	2.4	NA	NA		
	2.5	NA	NA		
	2.6	Y	Y		Patients were analysed in the group they were assigned to.
	2.7	NA	NA		
	Risk of bias	*Low*	*Low*		Predicted direction of bias: unpredictable
	Bias due to missing outcome data				
	3.1	NI	NI		Lost to follow-up All follow-ups: No information regarding missing outcome data was provided.
	3.2	N	N		No sensitivity analysis (e.g. best/worst case scenario's), or analysis correcting for bias were presented.
	3.3	PN	PN		The number of patients lost to follow-up was similar in all groups 3/23 vs 2/23 vs. 5/23, and the reasons were mostly related to the experimental context. Any missing values in the remaining patients was probably random.
	3.4	NA	NA		
	Risk of bias	*Low*	*Low*		Predicted direction of bias: unpredictable
	Bias in measurement of the outcome				
	4.1	N	N		
	4.2	N	N		
	4.3	Y	Y		A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.4	Y	Y		The patient's judgement about their improvement and pain could be influenced by having knowledge of the intervention received.
	4.5	PY	PY		There may be different levels of belief about the treatments' effectiveness and this may have impacted the outcome in favour of group 2 and 3.
	Risk of bias	*High*	*High*		Predicted direction of bias: in favour of group 2 and 3.
	Bias in selection of the reported results				
	5.1	NI	NI		A trial registration (NCT02352909) was retrieved through

					clinicaltrials.gov, and a protocol was published in BMC medicine (Esculier 2016, DOI 10.1186/s12891-015-0859-9). However, both were registered/submitted after the trial's start.
	5.2	NI	NI		A trial registration (NCT02352909) was retrieved through clinicaltrials.gov, and a protocol was published in BMC medicine (Esculier 2016, DOI 10.1186/s12891-015-0859-9). However, both were registered/submitted after the trial's start.
	5.3	NI	NI		A trial registration (NCT02352909) was retrieved through clinicaltrials.gov, and a protocol was published in BMC medicine (Esculier 2016, DOI 10.1186/s12891-015-0859-9). However, both were registered/submitted after the trial's start.
	Risk of bias	*Some*	*Some*		Predicted direction of bias: unpredictable
	OVERALL RISK OF BIAS	High	High		Predicted direction of bias: unpredictable

Comparison: Hip/knee/trunk exercises versus hip/knee exercises
Outcomes: Worst pain 3 months

Study	ROB domain Signalling Q.	Judgement per follow-up				Support for judgements
Foroughi 2019		***13 weeks***	***NA***	***NA***	***NA***	
	Bias arising from the randomisation process					
	1.1	NI				No description on the randomization procedure was provided. "…, the participants were randomly allocated to either the control or experimental group with a block permutation method (block size = 4)."
	1.2	NI				It was not described how the allocation procedure was concealed.
	1.3	PN				1/11 baseline variables was different between groups which is likely due to chance.
	Risk of bias	*Some*				Predicted direction of bias: unpredictable
	Bias due to deviations from intended interventions					
	2.1	Y				Patients could not be blinded to the intervention they received
	2.2	Y				Carers could not be blinded
	2.3	PY				Per follow-up *Received intervention as allocated:* Group 1: 20, Group 2: 20 *Non-Adherence:* ? *Contamination:* Not reported *Switching:* Not reported *Lost to follow-up:* Group 1: 3/20, group 2: 4/20
	2.4	NI				No information on how the excluded participants could have affected the outcome; no information on contamination and switching, and how this could have affected the outcome.
	2.5	NI				It's unclear if potential contamination of interventions outside the trial context could have influenced the outcome. The excluded patients were balanced between groups.
	2.6	PY				Not described explicitly. From the flow diagram it seems that a modified intention to treat analysis was used.
	2.7	NA				
	Risk of bias	*High*				Predicted direction of bias: unpredictable
	Bias due to missing outcome data					
	3.1	N				7/40 = 17.5% of patients were excluded and not used for the analyses.

	3.2	N		No sensitivity analysis (e.g. best/worst case scenario's), or analysis correcting for bias were presented.
	3.3	PY		Participants dropped out of the study due to the time constraints in group 1. In group 2, participants stopped for personal reasons.
	3.4	PY		Participants dropped out of the study due to the time constraints in group 1. In group 2, participants stopped for personal reasons.
	Risk of bias	*High*		Predicted direction of bias: in favour of experimental group
	Bias in measurement of the outcome			
	4.1	N		
	4.2	N		
	4.3	Y		A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.4	Y		The patient's judgement about their improvement and pain could be influenced by having knowledge of the intervention received
	4.5	PN		Similar treatments were followed in both groups. It's unlikely that patients had different levels of belief about the treatments' effectiveness.
	Risk of bias	*Some*		Predicted direction of bias: unpredictable
	Bias in selection of the reported results			
	5.1	NI		No analysis plan could be retrieved in the prospective trial registration (IRCT2016120415932N12).
	5.2	N		All planned outcomes and follow-ups have been reported
	5.3	NI		Unclear as no statistical analysis plan was provided in the registration.
	Risk of bias	*Some*		Predicted direction of bias: unpredictable
	OVERALL RISK OF BIAS	High		

Comparison: Hip/knee exercises (group 1) versus hip/knee/trunk exercises (group 2) **Outcomes: NPRS while ascending & descending stairs**						
Study	**ROB domain Signalling Q.**	**Judgement per follow-up**				**Support for judgements**
Fukuda 2012		***13 weeks***	***26 weeks***	***52 weeks***		
	Bias arising from the randomisation process					
	1.1	NI	NI	NI		Insufficient information. Text states that sealed opaque envelopes were randomly picked by a third person, not involved in the study. However, it is unclear whether envelopes were numbered, hence if concealment could be breached and the random sequence distorted.
	1.2	NI	NI	NI		"The assignment of subjects to the 2 groups was performed randomly using opaque, sealed envelopes, each containing the name of one of the groups (KE or KHE). The envelopes were picked by an individual not involved in the study." Unclear whether envelopes were numbered, hence if concealment could be breached and the random sequence distorted.
	1.3	N	N	N		10 baseline variables available for judgement. There seems to be no difference between groups on any of the variables.
	Risk of bias	*Some*	*Some*	*Some*		Predicted direction of bias: unpredictable
	Bias due to deviations from intended interventions					
	2.1	Y	Y	Y		Patients could not be blinded
	2.2	Y	Y	Y		Carers could not be blinded
	2.3	NI	NI	NI		All follow-ups: Received intervention as allocated: Group 1: 24/26 Group 2: 25/26 *Non-adherence:* no information *Contamination/Switching groups*: no information *Lost to follow-up*: Group 1: 2/26 Group 2: 3/28 All loss to follow-up was due to missing 2 or more treatments, these participants were excluded.

	2.4	NA	NA	NA		
	2.5	NA	NA	NA		
	2.6	Y	Y	Y		The flow diagram suggests that all patients were analysed in the group they were assigned to.
	2.7	NA	NA	NA		
	Risk of bias	*Some*	*Some*	*Some*		Predicted direction of bias: unpredictable
	Bias due to missing outcome data					
	3.1	NI	NI	NI		9.3% of the patients were lost-to-follow-up, for which no data was available. The proportion of missing data for those still in the study was unclear for all follow-ups.
	3.2	N	N	N		There was no evidence that results were not biased by potential missing outcome data.
	3.3	PN	PN	PN		The number of patients lost to follow-up was similar in all groups, 2/26 vs 3/28, and the reasons were mostly related to the experimental context. Any missing values in the remaining patients was probably random.
	3.4	NA	NA	NA		
	Risk of bias	*High*	*High*	*High*		Predicted direction of bias: unpredictable
	Bias in measurement of the outcome					
	4.1	N	N	N		
	4.2	N	N	N		
	4.3	Y	Y	Y		A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.4	Y	Y	Y		The patient's judgement about their improvement and pain could be influenced by having knowledge of the intervention received.
	4.5	PN	PN	PN		There is no indication that levels of belief about the treatments' effects differed between groups, both groups received similar treatments.
	Risk of bias	*Some*	*Some*	*Some*		Predicted direction of bias: unpredictable
	Bias in selection of the reported results					
	5.1	NI	NI	NI		No trial registration could be found in clinicaltrials.gov, isrctn.org, or WHO registry.
	5.2	NI	NI	NI		No trial registration could be found in clinicaltrials.gov, isrctn.org, or WHO registry.
	5.3	NI	NI	NI		No trial registration could be found in clinicaltrials.gov,

						isrctn.org, or WHO registry.
	Risk of bias	*Some*	*Some*	*Some*		Predicted direction of bias: unpredictable
	OVERALL RISK OF BIAS	High	High	High		Predicted direction of bias: unpredictable

Comparison: Hip/knee exercises with blood flow restriction (group 1) versus hip/knee exercises (group 2) **Outcomes: Global rating of change scale; worst pain in the past week (VAS, 0 - 100)**						
Study	**ROB domain Signalling Q.**	**Judgement per follow-up**				**Support for judgements**
Giles 2017		***8 weeks***	***26 weeks***	***NA***	***NA***	
	Bias arising from the randomisation process					
	1.1	PY	PY			"Participants were randomly allocated to one of the two treatment groups. The randomisation was performed by a person independent to the study in lots of 20 at a 1:1 ratio by drawing group allocation from a concealed box; the box was replenished before each lot had been used."
	1.2	NI	NI			It's unclear how the box was concealed. It is also unclear what was taken out of the box, and how was ensured that the group allocation was permanent after drawing group allocation from the box. Furthermore, it was unclear if the person performing the randomisation procedure was blinded to the participant at randomisation.
	1.3	N	N			There are no apparent differences between groups
	Risk of bias	*Some*	*Some*			Predicted direction of bias: unpredictable
	Bias due to deviations from intended interventions					
	2.1	Y	Y			Patients could not be blinded to the intervention they received
	2.2	Y	Y			Carers could not be blinded
	2.3	NI	NI			<u>All follow-ups:</u> *Received intervention as allocated:* No information *Adherence:* Group 1: 83% Group 2: 80% *Contamination/Switching:* No information *Lost to follow-up, at 9 weeks and 26 weeks:* Group 1: n = 5/40, "due to difficulty making the sessions" Group 2: n =5/39; 3 "due to difficulty making the sessions", 2 "due to illness"
	2.4	NA	NA			
	2.5	NA	NA			
	2.6	Y	Y			Participants were analysed in the group they were assigned to.
	2.7	NA	NA			
	Risk of bias	*Some*	*Some*			Predicted direction of bias: unpredictable

	Bias due to missing outcome data				
	3.1	N	N		10/79 (12.7%) of the participants was lost to follow-up at 9 weeks, and 26 weeks.
	3.2	N	N		"The last reported scores of the non-completers were carried forward." It is unclear how this impacted the study findings, no worse/best case scenarios were presented. It's also unclear which previous scores were used as, according to the paper, there were 3 measurements; baseline, 9 weeks and 26 weeks.
	3.3	PN	PN		The number of patients lost to follow-up was similar between groups, group 1: n = 5/40, group 2: n =5/39, and the reasons were similar as well ("due to difficulty making the sessions", and "due to illness") Any missing values in the remaining patients was probably random.
	3.4	NA	NA		
	Risk of bias	*Low*	*Low*		Predicted direction of bias: unpredictable
	Bias in measurement of the outcome				
	4.1	N	N		
	4.2	N	N		
	4.3	Y	Y		A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.4	Y	Y		The patient's judgement about their improvement and pain could be influenced by having knowledge of the intervention received.
	4.5	PN	PN		
	Risk of bias	*Some*	*Some*		Predicted direction of bias: unpredictable
	Bias in selection of the reported results				
	5.1	N	N		A prospective trial registration was found in WHO registry (ACTRN12614001164684) but not all outcomes have been presented.
	5.2	GROC: N Worst pain: Y	GROC: N Worst pain: Y		A prospective trial registration was found in WHO registry (ACTRN12614001164684). All outcomes have been reported, although in a different order. One follow-up, i.e. worst pain at 4 weeks, was not reported.
	5.3	GROC: NI Worst pain: N	GROC: NI Worst pain: N		GROC was not specified in the plan. Pain was analysed according to the registration.

	Risk of bias	*GROC: some Worst pain: High*	*GROC: Some Worst pain: High*		Predicted direction of bias: unpredictable
	OVERALL RISK OF BIAS	GROC: Some Worst pain: High	GROC: Some Worst pain: High		Predicted direction of bias: unpredictable

Comparison: Electrical neuromuscular stimulation + exercise therapy (group 1) versus sham electrical neuromuscular stimulation + exercise therapy (group 2). | Outcomes: Global rating of change scale; worst pain in the past week

Study	ROB domain Signalling Q.	Judgement per follow-up				Support for judgements
Glaviano 2010		***26 weeks***	***52 weeks***	***NA***	***NA***	
	Bias arising from the randomisation process					
	1.1	Y	Y			"Before study enrollment, we used a random number generator (Excel; Microsoft Corp, Redmond, WA) to randomize the assignment of PENS or sham treatments for all participants. A 4-block randomization scheme was performed with group allocation concealed in envelopes."
	1.2	NI	NI			Unclear if envelopes were numbered, opaque and sealed.
	1.3	N	N			None of the baseline variables differed, or group sizes, differed between the two groups.
	Risk of bias	*Some*	*Some*			Predicted direction of bias: unpredictable
	Bias due to deviations from intended interventions					
	2.1	PY	PY			Treatment protocols differed – patients could have detected whether they received the intervention or control: "To achieve a strong motor response during the treatment, we increased the stimulus intensity for the PENS group. The sham-group participants received a minimal stimulation treatment (1 mA) during which all the machine's lights and timers were operating and visible to the participants, and they were informed that they would receive a subsensory stimulation treatment. Treatment setups for all participants were identical, and 15 minutes of the intervention were administered before therapeutic exercise."
	2.2	PY	PY			Caregivers were unlikely to be blinded.
	2.3	NI	NI			<u>All follow-ups:</u> *Received intervention as allocated:* *Group 1: 100%* *Group 2: 100%* *Non-Adherence: NA* *Contamination:* Group 1, group 2: not described if any treatments/interventions were used by individuals, outside the study. *Lost to follow-up:* 26 weeks: Group 1: 1/11

					Group 2: 0/10 52 weeks: Group 1: 1/11 Group 2: 1/10 Judgements: • Adherence was excellent and lost to follow-up was low. • No information on contamination was provided, e.g. if, and the extent to which, any treatments outside the study were used.
	2.4	NA	NA		
	2.5	NA	NA		
	2.6	Y	Y		An intention-to-treat analysis was performed.
	2.7	NA	NA		
	Risk of bias	*Some*	*Some*		Predicted direction of bias: unpredictable
	Bias due to missing outcome data				
	3.1	Y	Y		At 6 months, for 20/21 (95%) of the participants data was available. At 12 months, data was available for 19/21 (90.5%) participants.
	3.2	NA	NA		
	3.3	NA	NA		
	3.4	NA	NA		
	Risk of bias	*Low*	*Low*		Predicted direction of bias: unpredictable
	Bias in measurement of the outcome				
	4.1	N	N		
	4.2	N	N		
	4.3	PY	PY		See 2.1. Blinding of participants who rated their own outcomes could not be ensured; it is likely that they were aware of the treatment received.
	4.4	Y	Y		The patient's judgement about their improvement and pain could be influenced by having knowledge of the intervention received.
	4.5	N	N		Given there were no differences between groups on GROC and worst pain, bias probably did not inflate the comparative effect estimate.

	Risk of bias	*Some*	*Some*		Predicted direction of bias: unpredictable
	Bias in selection of the reported results				
	5.1	NI	NI		No data analysis plan was provided; unclear if protocol was registered prior to the study's start. Starting date of the trial was not provided.
	5.2	NI	NI		No data analysis plan was provided; unclear if protocol was registered prior to the study's start. Starting date of the trial was not provided.
	5.3	NI	NI		No data analysis plan was provided; unclear if protocol was registered prior to the study's start. Starting date of the trial was not provided.
	Risk of bias	*Some*	*Some*		Predicted direction of bias: unpredictable
	OVERALL RISK OF BIAS	Some	Some		Predicted direction of bias: unpredictable

Comparison: Hyaluronic Acide Injection + Hip/knee exercises (group 1) versus Sham injection + Hip/knee exercises (group 2)
Outcomes: Pain during a single leg squat (VAS 0-10)

Study	ROB domain Signalling Q.	Judgement per follow-up				Support for judgements
Hart 2019		***13 weeks***	***26 weeks***	***NA***	***NA***	
	Bias arising from the randomisation process					
	1.1	Y	Y			A random number generator was used
	1.2	NI	NI			Envelopes were not described as sealed, opaque and consecutively numbered.
	1.3	N	N			There were no baseline differences between groups.
	Risk of bias	Some	Some			*Predicted direction of bias:* unpredictable
	Bias due to deviations from intended interventions					
	2.1	PN	PN			Patients were probably blinded. Small doubt about needle stick being adequate placebo.
	2.2	Y	Y			Carers were not blinded
	2.3	NI	NI			Per follow-up *Received intervention as allocated:* Unclear *Non-Adherence:* Unclear *Contamination:* Unclear *Switching:* Unclear *Lost to follow-up:* Group 1: 3/45 and Group 2: 3/41
	2.4	NI	NI			Unclear how adherence, contamination may have affected outcomes
	2.5	NI	NI			Unclear how adherence, contamination differed between groups
	2.6	Y	Y			A modified intention-to-treat analysis was performed, and it seems no patients switched groups.
	2.7	NA	NA			
	Risk of bias	High	High			*Predicted direction of bias:* unpredictable
	Bias due to missing outcome data					
	3.1	Y	Y			Only 7% missing data due to loss to follow-up. Any potential missing data was considered as at random.
	3.2	NA	NA			
	3.3	NA	NA			
	3.4	NA	NA			
	Risk of bias	Low	Low			*Predicted direction of bias:* unpredictable
	Bias in measurement of the outcome					

	4.1	N	N		
	4.2	N	N		
	4.3	N	N		Patients seemed blinded.
	4.4	NA	NA		
	4.5	NA	NA		
	Risk of bias	Low	Low		*Predicted direction of bias:* unpredictable
	Bias in selection of the reported results				
	5.1	NI	NI		There is a record available in clinicaltrials.gov (NCT01771952) but it does not detail the analysis plan.
	5.2	N	N		All outcomes and follow-ups were reported.
	5.3	NI	NI		There is a record available in clinicaltrials.gov (NCT01771952) but it does not detail the analysis plan.
	Risk of bias	Some	Some		*Predicted direction of bias:* unpredictable
	OVERALL RISK OF BIAS	High	High		

Comparison: Education + hip exercises (group 1) vs education + knee exercises ("Knee exercises") (group 2) vs education (group 3)
Outcomes: Worst pain

Study	ROB domain Signalling Q.	Judgement per follow-up				Support for judgements
Hott 2019		***6 weeks***	***13 weeks***	***NA***	***NA***	
	Bias arising from the randomisation process					
	1.1	Y	Y			A computer generated a random sequence
	1.2	Y	Y			"Sealed opaque randomization envelopes with a study-specific patient number will be supplied by an external statistician. The randomization sequence is computer-generated with randomization blocks of a variable size which is unknown to any of the research team. A nurse not otherwise involved in the research study will take the sealed opaque numbered envelopes in order, by number, and deliver the correct envelope to the treating physiotherapist. The envelope contains a piece of paper which is labeled with the same patient specific number, plus the group assignment (H, Q or C)."
	1.3	N	N			Groups seem balanced in terms of baseline information and group size
	Risk of bias	Low	Low			Predicted direction of bias: unpredictable
	Bias due to deviations from intended interventions					
	2.1	Y	Y			Patients could not be blinded to the treatment received
	2.2	Y	Y			Carers could not be blinded
	2.3	NI	NI			Per follow-up *Received intervention as allocated:* Group 1: 100%, group 2: 100%, group 3: 100% *Non-Adherence:* group 1: 92%, group 2: 84%, group 3: 92% *Contamination:* Unclear if any participant received treatment outside of the trial. *Switching:* None *Lost to follow-up:* 6 weeks: Group 1: 3/39, Group 2: 4/37, Group 3: 4/36 12 weeks: Group 1: 3/39, Group 2: 6/37, Group 3: 3/36
	2.4	NI	NI			Unclear – contamination by treatments received outside the trial was not reported. Unable to judge the extent to which this may have had an impact on worst pain.
	2.5	NI	NI			Unclear. There's no description of any treatment received outside the trial.
	2.6	Y	Y			A modified intention-to-treat analysis was performed.

	2.7	NA	NA		
	Risk of bias	High	High		Predicted direction of bias: unpredictable
	Bias due to missing outcome data				
	3.1	Y	Y		At 6 weeks and 12 week, 9.8% and 10.7% of the patients were lost to follow-up, respectively. Any other missing data was not described. It is assumed that any additional missing data was missing at random.
	3.2	NA	NA		
	3.3	NA	NA		
	3.4	NA	NA		
	Risk of bias	Low	Low		Predicted direction of bias: unpredictable
	Bias in measurement of the outcome				
	4.1	N	N		
	4.2	N	N		
	4.3	Y	Y		A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.4	Y	Y		The patient's judgement about their pain could be influenced by having knowledge of the intervention received.
	4.5	Group 1 versus group 2: PN Group 1 and 2 versus group 3: PY	Group 1 versus group 2: PN Group 1 and 2 versus group 3: PY		Group 1 and 2 received similar treatments, therefore, it's unlikely that participants had distinct levels of belief about the effectiveness of the treatments. Group 3 received education only and no exercise therapy. This may have influenced the way they rated their outcome.
	Risk of bias	*Group 1 vs Group 2:* Some *Group 1 and 2 versus 3:* High	*Group 1 vs Group 2:* Some *Group 1 and 2 versus 3:* High		Predicted direction of bias, group 1 versus 2: unpredictable Predicted direction of bias, group 1 and 2 versus group 3: in favour of group 1 and 2.
	Bias in selection of the reported results				
	5.1	N	N		A trial registration (NCT02114294) was retrieved through clinicaltrials.gov, and a protocol was submitted in BMC medicine (Hott 2015, DOI 10.1186/s12891-015-0493-6)

					previous to the study's start. The findings at 6 weeks and 3 months were partially analysed according to the pre-specified analysis plan. Indeed, an analysis of covariance model was used. A seemingly non-planned analysis using paired samples t-test were used to test improvements from baseline. The planned time course analysis was not reported.
	5.2	NI	NI		It was not described at which follow-ups worst pain was measured – most other outcomes were assessed at 6 weeks, 3 months and 12 months. Only the 6 weeks and 3 months follow-ups were reported.
	5.3	Y	Y		See 5.1
	Risk of bias	High	High		Predicted direction of bias: unpredictable
	OVERALL RISK OF BIAS	All comparisons: High	All comparisons: High		

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Comparison: Arthroscopy + hip/knee exercises (group 1) versus hip/knee exercises (group 2) **Outcomes: VAS when standing up from sitting, VAS ascending stairs, VAS descending stairs**					
Study	**ROB domain** **Signalling Q.**	**Judgement per follow-up**			**Support for judgements**
Kettunen 2007		***39 weeks***	***104 weeks***	***260 weeks***	
	Bias arising from the randomisation process				
	1.1	Y	Y	Y	"The randomization process was carried out using a computer-generated randomization list stratified by gender."
	1.2	PN	PN	PN	"Sealed, sequentially numbered envelopes containing information on the treatment group were prepared and given to the assisting nurse, who opened the envelopes in numerical order after recruitment so that concealment of allocation was successful in all cases." Note that envelopes can be held up to light banks and breach concealment.
	1.3	N	N	N	There are no apparent imbalances across groups.
	Risk of bias	*High*	*High*	*High*	Predicted direction of bias: unpredictable
	Bias due to deviations from intended interventions				
	2.1	Y	Y	Y	Patients could not be blinded
	2.2	Y	Y	Y	Carers could not be blinded
	2.3	PN	PN	PN	<u>All follow-ups:</u> *Received intervention as allocated (8 weeks)*: 52/56 = 93% (drop-outs, n = 4, 1 in group 1, and 3 in group 2) *Adherence to exercise (8 weeks)*: mean weekly exercise frequency, group 1: 5.0, group 2: 5.2. *Contamination/switching:* Use of oral anti-inflammatory analgesics in the first 39 weeks (during/after 8-week treatment period): Group 1: 10/27 (37%) Group 2: 5/25 (20%) <u>39 weeks::</u> 3 patients in the control group received arthroscopy *after* the exercise therapy program but *before* the 9-month follow-up, totalling 22/28 (78%) that adhered to the intervention in group 2. 1 patient did not adhere to the exercise program after arthroscopy (group 1) <u>104 weeks and 260 weeks:</u> A total of 4 patients in the control group (including the 3 at 39 weeks) received arthroscopy after the exercise program but before 104 weeks,

					totaling 21/28 (75%) that adhered to the intervention in group 2. *Lost to follow-up:* 9 months: Group 1: n= 1, group 2: n = 3 24 months: Group 1: n =3, group 2: n = 5 5 years: Group 1: n = 4, group 2: n = 8 <u>Justification:</u> • Medication use is expected to differ between groups, as often taken/supplied after surgery. This is judged as normal use in practice, and not due to the experimental context. • Adherence and contamination was similar across groups. • Participants lost to follow-up was 7%, 14% and 21% at 39 weeks, 104 weeks and 260 weeks follow-up respectively, and similar across groups.
	2.4	NA	NA	NA	
	2.5	NA	NA	NA	
	2.6	Y	Y	Y	Patients were analysed in the group they were assigned to
	2.7	NA	NA	NA	
	Risk of bias	*Low*	*Low*	*Low*	<u>All follow-ups:</u> Predicted direction of bias: unpredictable
	Bias due to missing outcome data				
	3.1	N	N	N	At least 7%, 14% and 21% of the data was missing corresponding to the number lost to follow-up at 39 weeks, 104 weeks and 260 weeks respectively, and there are differences between groups.
	3.2	N	N	N	There was no evidence that results were not biased by potential missing outcome data.
	3.3	NI	NI	NI	Insufficient information on missing data to judge item.
	3.4	NI	NI	NI	Insufficient information on missing data. Lost to follow-up is similar for all follow-ups: 39 weeks: Group 1: n= 1 (3.6%), group 2: n = 3 (10.7%) 104 weeks: Group 1: n =3 (10.7%), group 2: n = 5 (17.9%) 260 weeks: Group 1: n = 4 (14.3%), group 2: n = 8 (28.6%) Unclear: there is insufficient information whether missing outcome data is

					related to its true value
	Risk of bias	*High*	*High*	*High*	Predicted direction of bias: unpredictable
	Bias in measurement of the outcome				
	4.1	N	N	N	
		N	N	N	
	4.2	Y	Y	Y	A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.3	Y	Y	Y	The patient's judgement about their improvement and pain could be influenced by having knowledge of the intervention received.
	4.5	Y	Y	Y	There may be differences between groups regarding levels of beliefs about the treatments' effect, since group 1 received exercise therapy + arthroscopy and the control received exercise therapy only
	Risk of bias	*High*	*High*	*High*	Predicted direction of bias: in favour of group 1.
	Bias in selection of the reported results				
	5.1	NI	NI	NI	A trial registration (ISRCTN41800323) was retrieved in the ISRCTN registry, however the trial was registered retrospectively.
	5.2	PY	PY	PY	Although the trial was registered (ISRCTN41800323) retrospectively, two follow-ups seemed to have been planned (i.e. 11 weeks and 63 weeks after randomisation) but these were not reported without explanation.
	5.3	NI	NI	NI	A trial registration (ISRCTN41800323) was retrieved in the ISRCTN registry, however the trial was registered retrospectively.
	Risk of bias	*High*	*High*	*High*	Predicted direction of bias: unpredictable
	OVERALL RISK OF BIAS	High	High	High	Predicted direction of bias: unpredictable

Comparison: Hip/knee exercises (group 1) versus foot orthoses (group 2)

Outcome: Global rating of change scale; worst pain in the past week

Study	ROB domain Signalling Q.	Judgement per follow-up			Support for judgements
Matthews 2020		***6 weeks***	***12 weeks***		
	Bias arising from the randomisation process				
	1.1	Y	Y		"An independent off-site body generated a randomization schedule by computer for all participants at both the Australian and Danish sites. Allocation to each treatment via sealed envelopes was done 1:1 with stratification by site and midfoot width mobility."
	1.2	Y	Y		Sealed, numbered and opaque envelopes were prepared in advance by an off-site body.
	1.3	N	N		Figure 1 and Table 1 suggest there are no imbalances between groups
	Risk of bias	*Low*	*Low*		Predicted direction of bias: unpredictable
	Bias due to deviations from intended interventions				
	2.1	Y	Y		Patients could not be blinded.
	2.2	Y	Y		Carers could not be blinded
	2.3	N	N		<u>After randomisation</u> *Received intervention as allocated:* Group 1: 108/109 (99.1%) Group 2: 109/109 (100%) *Adherence:* Group 1: 3/109 (2.8%) patients did not attend their treatment Mean 5.5/6 (92%) sessions were attended in all others; self-reported worn of foot orthoses for 74% of waking hours. Group 2: 7/109 (6.4%) patients did not attend their treatment Mean 10.1/12 (84%) sessions were attended in all others. *Switching:* Group 1: one participants received hip exercises (treatment in group 2) instead of orthoses. <u>6 weeks:</u> *Contamination:* Group 1: 1/109 commenced yoga between 6 and 12 weeks Another participant (Group = unclear) used knee wraps while exercising with heavy weights. *Lost to follow-up:*

					Group 1: 5/109 (4.6%): unable to contact, n = 2; withdrew, n = 3 Group 2: 6/109 (5.5%): unable to contact, n = 6 In addition: those that did not provide GROC values, were considered lost to follow-up; For a total of 197/218 (90.4%) outcome data were available at the 6 weeks follow-up <u>12 weeks:</u> *Lost to follow-up:* Group 1: 3/109 (2.8%): unable to contact, n =1 ; other reasons not stated Group 2: 4/109 (3.7%): unable to contact, n = 4 In addition: those that did not provide GROC values, were considered lost to follow-up; For a total of 192/218 (88.1%) outcome data were available at the 12 weeks follow-up. <u>Judgements:</u> • The proportion of participants that received the intervention as allocated was very high • The adherence was equal and high in both groups • Switching and contamination was almost absent in both groups • Lost to follow-up was low in both groups.
	2.4	NA	NA		
	2.5	NA	NA		
	2.6	Y	Y		Patients were analysed in the group they were assigned to.
	2.7	NA	NA		
	Risk of bias	*Low*	*Low*		Predicted direction of bias: unpredictable
	Bias due to missing outcome data				
	3.1	Y	N		See 2.3. At 6 weeks >90% of the data was available, at 12 weeks 88% of the data was available.
	3.2	NA	N		No sensitivity analysis (e.g. best/worst case scenario's), or analysis correcting for bias were presented.
	3.3	NA	NI		At 12 weeks: Insufficient detail was provided with regards to the reasons for missing information.
	3.4	NA	PN		At 12 weeks: For 7/218 reasons for missing data was stated.

					The other 21/218 for which no outcome data was available was not further specified. However, it seems that these participants were still in the trial. Therefore, it seems unlikely that missing data depended on its true value. Rather, missing data seems at random.
	Risk of bias	*Low*	*Some*		Predicted direction of bias: unpredictable
	Bias in measurement of the outcome				
	4.1	N	N		
	4.2	N	N		
	4.3	Y	Y		A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.4	Y	Y		The patient's judgement about their improvement and pain could be influenced by having knowledge of the intervention received.
	4.5	PN	PN		There is no indication that levels of belief about the treatments' effects differed between groups
	Risk of bias	*Some*	*Some*		Predicted direction of bias: unpredictable
	Bias in selection of the reported results				
	5.1	Y	Y		A pre-specified analysis plan and protocol were published in a journal and online at https://www.anzctr.org.au/Trial/Registration/TrialReview/FOHX_trial (ACTRN: 12614000260628). The analyses kept with this prespecified plan.
	5.2	N	N		The outcome domain recovery was pre-specified as to be evaluated with the GROC scale, and this outcome measure was reported.
	5.3	N	N		There were no changes with regards to the planned analyses.
	Risk of bias	*Low*	*Low*		Predicted direction of bias: unpredictable
	OVERALL RISK OF BIAS	Low	Some		Predicted direction of bias: unpredictable

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Comparison: Orthoses (group 1) versus wait-and-see (group 2) **Outcomes: Global rating of change scale; worst pain in the previous week**				
Study	**ROB domain Signalling Q.**	**Judgement per follow-up**		**Support for judgements**
Mills 2012		***6 weeks***		
	Bias arising from the randomisation process			
	1.1	Y		"Upon enrolment into the study, participants were randomly assigned to the intervention or control group with a computer-generated randomisation method (Math.random in JavaScript)"
	1.2	NI		Insufficient information: "An automated data file was used to preserve allocation concealment."
	1.3	PN		1/18 variables may be different between groups ("Usual pain"), which is considered to be due to chance.
	Risk of bias	*Some*		Predicted direction of bias: unpredictable
	Bias due to deviations from intended interventions			
	2.1	Y		Patients could not be blinded
	2.2	Y		Carers could not be blinded
	2.3	NI		*Received intervention as allocated:* Group 1: 20/20 Group 2: 20/20 *Non-Adherence:* No information *Contamination/Switching:* No information *Lost to follow-up:* Group 1: 1/20 (episode of traumatic back pain (car accident)) Group 2: 0/20
	2.4	NA		
	2.5	NA		
	2.6	PY		All patients, except for the one lost to follow-up, were analysed in the group they were allocated to.
	2.7	NA		
	Risk of bias	*Some*		Predicted direction of bias: unpredictable
	Bias due to missing outcome data			
	3.1	GROC: Y Worst pain: NI		Available patients for GROC are specified and for only one patient no outcome data was available. For worst pain, there is no information regarding any missing outcome data.

	3.2	GROC: NA Worst pain: N		Worst pain: no sensitivity analyses was presented were the effect of potential missing data was tested.
	3.3	GROC: NA Worst pain: PN		It is unlikely that any potential missing data was dependent on its true value. The GROC numbers show that, except for one, all patients were still in the trial upon assessment.
	3.4	NA		
	Risk of bias	All outcomes: *Low*		Predicted direction of bias: unpredictable
	Bias in measurement of the outcome			
	4.1	N		
	4.2	N		
	4.3	Y		A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.4	Y		A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.5	PY		There are reasons to assume that the levels of beliefs about the treatments' effects differed between groups, given that a orthosis was supplied in group 1 and group 2 received no treatment.
Comparison: Patella brace + hip/knee exercises (group 1) versus hip/knee exercises (group 2) **Outcomes: Global rating of change scale; worst pain (VAS, 0 - 100) in the past week**				
	Risk of bias	*High*		Predicted direction of bias: unpredictable
	Bias in selection of the reported results			
	5.1	NI		A trial registration (ACTRN12611000492954) was retrieved in the WHO registry, however the trial was registered retrospectively.
	5.2	NI		A trial registration (ACTRN12611000492954) was retrieved in the WHO registry, however the trial was registered retrospectively
	5.3	NI		A trial registration (ACTRN12611000492954) was retrieved in the WHO registry, however the trial was registered retrospectively
	Risk of bias	*Some*		Predicted direction of bias: unpredictable
	OVERALL RISK OF BIAS	High		Predicted direction of bias: unpredictable

Study	ROB domain Signalling Q.	Judgement per follow-up				Support for judgements
Petersen 2016		***6 weeks***	***12 weeks***	***54 weeks***	***NA***	
	Bias arising from the randomisation process					
	1.1	NI	NI	NI		"…all patients were randomized into two treatment groups." Unclear how a random allocation sequence was generated
	1.2	NI	NI	NI		"…all patients were randomized into two treatment groups." Unclear if and how any person performing the randomisation procedure was blinded to the participant at randomisation, and how it was ensured this person had no foreknowledge about the sequence.
	1.3	PN	PN	PN		There are no apparent differences between groups (see table 1, figures 3 and 4)
	Risk of bias	*Some*	*Some*	*Some*		Predicted direction of bias: unpredictable
	Bias due to deviations from intended interventions					
	2.1	Y	Y	Y		Patients could not be blinded to the intervention they received
	2.2	Y	Y	Y		Carers could not be blinded
	2.3	PY	PY	PY		6 weeks: *Received intervention as allocated:* no information *Adherence:* Group 1: 68/78 (87.2%) Group 2: 59/64 (75.6%) *Lost to follow-up and discontinuation:* Group 1: 8/78 (10.3%) Group 2: 14/78 (17.9%) *Contamination:* Group 1: NSAIDs, n = 12/78 (15.4%); topical agents, n = 2 (2.6%) Group 2: NSAIDs, n = 14 (17.9%); topical agents, n = 3 (3.8%) *Switching: no information* 12 weeks: *Lost to follow-up and discontinuation:* Group 1: 9/78 (11.5%) Group 2: 15/78 (19.2%) *Contamination:* Group 1: NSAIDs, n = 8 (10.3%); topical agents, n = 2 (2.6%) Group 2: NSAIDs, n = 11 (14.1%); topical agents, n = 2 (2.6%) *Switching: no information*

						54 weeks: *Lost to follow-up and discontinuation:* Group 1: 10/78 (12.8%) Group 2: 16/78 (20.5%) *Contamination:* Group 1: NSAIDs, n = 3 (3.8%); topical agents, n = 1 (1.3%) Group 2: NSAIDs, n = 3 (3.8%); topical agents, n = 1 (1.3%) *Switching: no information*
	2.4	Y	Y	Y		See 2.3
	2.5	NA	NA	NA		
	2.6	NI	NI	NI		It is unclear if all participants were analysed in the group they were randomised to.
	2.7	NI	NI	NI		Unclear if there was group switching between trial arms.
	Risk of bias	*High*	*High*	*High*		Predicted direction of bias: unpredictable
	Bias due to missing outcome data					
	3.1	N	N	N		For a large proportion of the participants no outcome data was available due to dropping out of the study: *Lost to follow-up* 6 weeks: Group 1: 8/78 (10.3%) Group 2: 14/78 (17.9%) 12 weeks: Group 1: 9/78 (11.5%) Group 2: 15/78 (19.2%) 54 weeks: Group 1: 10/78 (12.8%) Group 2: 16/78 (20.5%)
	3.2	N	N	N		No sensitivity analysis (e.g. best/worst case scenario's), or analysis correcting for bias were presented.
	3.3	NI	NI	NI		Insufficient information to judge. After 6 weeks there were 2 participants in group 1, and 5 participants in group 2 that were excluded for violating the treatment protocol. Otherwise, reasons for lost to follow-up/discontinuation were not provided.
	3.4	NI	NI	NI		The proportions of lost to follow-up are different in both groups, see 3.1. It's unclear if the missing data is related to the true

						value
	Risk of bias	*High*	*High*	*High*		Predicted direction of bias: unpredictable
	Bias in measurement of the outcome					
	4.1	N	N	N		
	4.2	N	N	N		
	4.3	Y	Y	Y		A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.4	Y	Y	Y		The patient's judgement about their improvement and pain could be influenced by having knowledge of the intervention received.
	4.5	PY	PY	PY		There may be differences between groups regarding levels of beliefs about the treatments' effect, since group 1 received exercise therapy + brace and the control group received exercise only
	Risk of bias	*High*	*High*	*High*		Predicted direction of bias: unpredictable
	Bias in selection of the reported results					
	5.1	Y	Y	Y		A prospective trial registration was found in WHO registry (DRKS00003291) and all outcomes + follow-ups have been reported.
	5.2	N	N	N		A prospective trial registration was found in WHO registry (DRKS00003291) and all outcomes + follow-ups have been reported.
	5.3	NI	NI	NI		The trial registration does not provide a statistical analysis plan. It is therefore unclear to what extent the analysis performed was pre-specified.
	Risk of bias	*Some*	*Some*	*Some*		Predicted direction of bias: unpredictable
	OVERALL RISK OF BIAS	High	High	High		Predicted direction of bias: unpredictable

Comparison: Education (group 1) versus education + exercise therapy + patellar taping (group 2) **Outcomes: Global rating of change scale / worst pain in the previous week**						
Study	**ROB domain Signalling Q.**	**Judgement per follow-up**				**Support for judgements**
Rathleff 2015		***13 weeks***	***26 weeks***	***52 weeks***	***104 weeks***	
	Bias arising from the randomisation process					
	1.1	Y	Y	Y	Y	"The four schools were randomised either to patient education or patient education and exercise therapy using a computer generated sequence developed by the main investigator"
	1.2	PN	PN	PN	PN	It's likely that the main investigator who organized the cohort, in which the RCT was nested, was not blinded to the schools at randomisation.
	1.3	NI	NI	NI	NI	There is insufficient information for judging the imbalances across the units of allocation (i.e. schools).
	Risk of bias	*High*	*High*	*High*	*High*	Predicted direction of bias: unpredictable
	Bias due to deviations from intended interventions					
	2.1	Y	Y	Y	Y	Patients could not be blinded
	2.2	Y	Y	Y	Y	Carers could not be blinded
	2.3	PY	PY	PY	PY	*Received intervention as allocated:* 117/121 (96.7%) *Adhered to the intervention:* All follow-ups: Group 1: 59/59 Group 2: 58/62; Supervised training sessions, median participation: 8.5 of 42 sessions possible (20.2%) Home-based exercise sessions: median 25 of 69 possible sessions (36%) 28/62 (45%) patients received patellar taping which was planned for those with at least 50% pain reduction directly after application. *Contamination:* <u>13 weeks:</u> Medication use, n (%): Group 1: ? (23%), Group 2: ? (18%) Other therapies, (additional) physiotherapy, orthoses, acupuncture), n (%): Group 1: ? (19%), Group 2: ? (16%) <u>26 weeks:</u>

						Medication use, n (%): Group 1: ? (30%), Group 2: ? (16%) Other therapies, (additional) physiotherapy, orthoses, acupuncture), n (%): Group 1: ? (21%), Group 2: ? (19%) <u>52 weeks:</u> Medication use, n (%): Group 1: ? (29%), Group 2: ? (31%) Other therapies, (additional) physiotherapy, orthoses, acupuncture), n (%): Group 1: ? (34%), Group 2: ? (20%) <u>104 weeks:</u> Medication use, n (%): Group 1: ? (18%), Group 2: ? (13%) Other therapies, (additional) physiotherapy, orthoses, acupuncture), n (%): Group 1: ? (33%), Group 2: ? (10%) *Lost to follow-up:* 13 weeks: 20/121 = 16.5% 26 weeks: 37/121 = 30.6% 52 weeks: 11/121= 9.1% 104 weeks: 22/121= 18.2% <u>Judgements:</u> • The intervention (exercise) is probably the reason for the occurred non-adherence but not beyond what would be expected in clinical practice, taking the age group and the nature of the intervention (active, required self-efficacy) into account. • The use of co-interventions seems high and the actual frequency in numbers is unclear. There is insufficient description of which co-interventions were followed, and how this differed between groups. • It's apparent that there is a difference between groups in terms of analgesic co-interventions at 26 weeks which may have an effect on worst pain, but not on GROC. • It's apparent that at 52 weeks and 104 weeks follow-up the frequency of use of 'other therapies' was substantially different between groups, and this could affect pain and the GROC.
	2.4	Y	N	N	N	Follow-up 13 weeks: Deviations seem balanced between the groups at 13 weeks Follow-ups 26 weeks, 52 weeks and 104 weeks: see 2.3

	2.5	NA	**GROC:** PN **Worst pain:** PY	**GROC:** PY **Worst pain:** PY	**GROC:** PY **Worst pain:** PY	See 2.3
	2.6	Y	Y	Y	Y	Patients were analysed in the group they were assigned to.
	2.7	NA	NA	NA	NA	
	Risk of bias	*Some*	**GROC:** *Some* **Worst pain:** *High*	*High*	*High*	Predicted direction of bias: unpredictable
	Bias due to missing outcome data					
	3.1	N	N	N	N	Number of participants lost to follow-up was substantial on all follow-ups (see 3.4)
	3.2	N	N	N	N	No sensitivity analysis (e.g. best/worst case scenario's), or analysis correcting for bias were presented.
	3.3	NI	NI	NI	NI	Unclear; no reasons for lost to follow-up/missing values were provided.
	3.4	NI	NI	Y	NI	Insufficient information. Lost to follow-up is similar for all follow-ups, except 52 weeks where there is evidence that the proportion of missing data must be different between groups. *Participants in the study:* 13 weeks: Group 1: 52/59 (88.1%), Group 2: 49/62 (79.0%) 26 weeks: Group 1: 40/59, (67.8%) Group 2: 44/62 (71.0%) 52 weeks: Group 1: 58/59 (98.3%), Group 2: 52/62 (83.9%) 104 weeks: Group 1: 52/59, (88.1%) Group 2: 48/62 (77.4%) Unclear: there is insufficient information whether missing outcome data is related to its true value.
	Risk of bias	*High*	*High*	*High*	*High*	Predicted direction of bias: unpredictable
	Bias in measurement of the outcome					
	4.1	N	N	N	N	
	4.2	N	N	N	N	
	4.3	Y	Y	Y	Y	A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.4	Y	Y	Y	Y	The patient's judgement about their improvement and pain could be influenced by having knowledge of the intervention

						received.
	4.5	Y	Y	Y	Y	There is no indication that levels of belief about the treatments' effects differed between groups; treatments were similar
	Risk of bias	*High*	*High*	*High*	*High*	Predicted direction of bias: unpredictable
	Bias in selection of the reported results					
	5.1	Y	Y	Y	Y	A registration (NCT01438762) was retrieved in Clinicaltrials.gov. It was registered in September 2011, and according to the registration, the trial started in June 2011. However, Rathleff 2013 [REF] states that the trial started in the autumn of 2011, which makes sense as the schools have annual leave in the summer in Denmark. All outcomes and follow-ups listed in the registration have been reported
	5.2	N	N	N	N	A registration (NCT01438762) was retrieved in Clinicaltrials.gov. It was registered in September 2011, and according to the registration, the trial started in June 2011. However, Rathleff 2013 [REF] states that the trial started in the autumn of 2011, which makes sense as the schools have annual leave in the summer in Denmark. All outcomes and follow-ups listed in the registration have been reported.
	5.3	N	N	N	N	An analysis plan was provided in the protocol publication. The protocol was received with the journal in December 2011 which is before or around the 3 month follow-up for the first patients in the trial. Therefore, we deem the pre-defined.
	Risk of bias	*Low*	*Low*	*Low*	*Low*	Predicted direction of bias: unpredictable
	OVERALL RISK OF BIAS	**GROC:** High **Worst pain:** High	**GROC:** High **Worst pain:** High	**GROC:** High **Worst pain:** High	**GROC:** High **Worst pain:** High	Predicted direction of bias: unpredictable

REF: Rathleff MS, Skuldbøl SK, Rasch MN, et al. Care-seeking behaviour of adolescents with knee pain: a population-based study among 504 adolescents. BMC Musculoskelet Disord. 2013 Jul 30;14:225. doi: 10.1186/1471-2474-14-225.

Comparison: Hip/knee exercises + feedback (group 1) versus hip/knee exercises (group 2) **Outcomes: Global rating of change scale**				
Study	**ROB domain Signalling Q.**	**Judgement per follow-up**		**Support for judgements**
Riel 2018		***6 weeks***		
	Bias arising from the randomisation process			
	1.1	Y		"Adolescents were block randomised in block sizes of 2 to 8 (1:1) into 2 parallel groups of 20 adolescents using a random number generator on www.random.org. A researcher not involved in the data collection or analysis generated the allocation sequence and was the only person who knew the block sizes. After all baseline measurements were made, the assessor took a sequentially numbered opaque sealed envelope in which allocation was indicated."
	1.2	Y		"A researcher not involved in the data collection or analysis generated the allocation sequence and was the only person who knew the block sizes." And "After all baseline measurements were made, the assessor took a sequentially numbered opaque sealed envelope in which allocation was indicated"
	1.3	PN		Only 6 baseline variables are presented (which is a low number to judge this item). The variables seem balanced across groups.
	Risk of bias	*Low*		Predicted direction of bias: unpredictable
	Bias due to deviations from intended interventions			
	2.1	Y		Patients could not be blinded
	2.2	Y		Carers could not be blinded
	2.3	NI		*Received intervention as allocated/Non-Adherence:* Table 3 in the paper suggests adherence was similar and otherwise due to the treatment under study. *Contamination/Switching:* No information *Lost to follow-up:* Group 1: n = 1 (not willing to participate in isometric strength testing) Group 2: n = 1 (did not want to participate in follow-up)
	2.4	NA		

	2.5	NA		
	2.6	Y		Patients were analysed in the group they were assigned to.
	2.7	NA		
	Risk of bias	*Some*		Predicted direction of bias: unpredictable
	Bias due to missing outcome data			
	3.1	Y		Only 1 GROC value for one participant was missing
	3.2	NA		
	3.3	NA		
	3.4	NA		
	Risk of bias	*Low*		Predicted direction of bias: unpredictable
	Bias in measurement of the outcome			
	4.1	N		
	4.2	N		
	4.3	Y		A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.4	Y		A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.5	PN		There is no indication that levels of belief about the treatments' effects differed between groups; treatments were similar
	Risk of bias	*Some*		Predicted direction of bias: unpredictable
	Bias in selection of the reported results			
	5.1	Y		A prospective trial registration was found (NCT02674841) and GROC was pre-specified as their secondary outcome measure. All planned outcomes were reported.
	5.1	N		A prospective trial registration was found (NCT02674841) and GROC was pre-specified as their secondary outcome measure. All planned outcomes and follow-ups were reported.
	5.2	N		A prospective trial protocol was published in April 2016. Recruitment started in February 2016. Data was analysed as planned and we deem it unlikely the statistical analysis plan was changed between February and April 2016.
	Risk of bias	*Low*		Predicted direction of bias: unpredictable
	OVERALL RISK OF BIAS	Some		Predicted direction of bias: unpredictable

Comparison: Education + exercise therapy (group 1) versus education (group 2) **Outcomes: Global rating of change scale**					
Study	**ROB domain Signalling Q.**	**Judgement per follow-up**			**Support for judgements**
Van Linschoten 2009		***13 weeks***	***52 weeks***		
	Bias arising from the randomisation process				
	1.1	Y	Y		".., patients were randomly allocated to the intervention (exercise therapy) or the control (usual care). The randomization was done by an independent researcher who used a computer generated list in which patients were stratified by age (14-17 years or 18 years and older) and by recruiting physician (GP or sport physician). A block size of eight was used within the four strata."
	1.2	NI	NI		It is unclear how the independent researcher was blinded to the participant at randomization.
	1.3	N	N		13 baseline variables available for judgement. There are no differences between groups on any of the variables.
	Risk of bias	*Some*	*Some*		Predicted direction of bias: unpredictable
	Bias due to deviations from intended interventions				
	2.1	Y	Y		Patients could not be blinded
	2.2	Y	Y		Carers could not be blinded
	2.3	PY	PY		**13 weeks:** *Non-Adherence/'switching':* Group 1: did not receive physical therapy, n 6/65 = 9.2% Group 2: received physical therapy, n 8/66 = 12.1% *Contamination: additional interventions:* Group 1: NSAIDs, N=4; topical agents, N = 2, bandages/braces, n = 13; insoles, n = 9; additional physical therapy, n=0. Total n of additional treatments = 28 Group 2: NSAIDs, N = 10; topical agents, n = 8; bandages/braces, n = 20; insoles, n =7; physical therapy, n =8 Total n of additional treatments = 53 *Lost to follow-up:* Group 1: n = 2; due to lack of motivation, n = 1 at 6 weeks, unreachable, n = 1 at 3 months

					Group 2: n = 4; due to lack of motivation, n = 2 at 6 weeks and n = 1 at 3 months; moved abroad, n =1 (at 6 weeks). **52 weeks:** *Non-Adherence: not applicable (intervention took place in the first 6 weeks)* *Contamination: additional interventions:* Group 1: NSAIDs, N=2; topical agents, N = 2, bandages/braces, n = 5; insoles, n = 0; additional physical therapy, n=13. Total n of additional treatments = 21 Group 2: NSAIDs, N = 5; topical agents, n = 3; bandages/braces, n = 8; insoles, n =6; physical therapy, n = 8 Total n of additional treatments = 30 *Lost to follow-up:* Group 1: n = 5: poor communication/unreachable, n=2 at 26 weeks, n = 1 at 39 weeks and n = 2 at 52 weeks . Group 2: n = 3: lacked motivation, n = 1 at 26 weeks; moved = 1 at 39 weeks; unreachable, n = 1 at 52 weeks . <u>Judgements:</u> • The proportion that did not receive the intervention as allocated is around 10% in both groups. • The non-adherence to the treatment allocated is unclear in group 1; how much of the planned exercises were done is not reported. • The use of co-interventions seems high and different between groups at 13 weeks in favour of the control group, but seems to be similar at 52 weeks. • It is unclear if the units in the flow diagram presenting the co-interventions are persons or the frequency of which treatments were used (i.e. the numbers presented participants using multiple co-interventions). • Lost-to-follow-up was low and similar between groups; 6/133 (4.5%) at 13 weeks and 8/133 (6.0%) at 52 weeks .
	2.4	N	PN		See support for judgements 2.3
	2.5	PY	PY		Taken the differences in co-interventions in the first 13 weeks into account, this may have biased the outcomes at 13 weeks and 52 weeks in favour of the control arm.

	2.6	Y	Y		Patients were analysed in the group they were assigned to.
	2.7	NA	NA		
	Risk of bias	*High*	*High*		Predicted direction of bias: in favour of control group
	Bias due to missing outcome data				
	3.1	Y	Y		Data was available for 62/65 at 13 weeks, and 58/65 at 52 weeks in group 1. In the control group (group 2), data availability was 60/66 at 13 weeks and 59/66 at 52 weeks.
	3.2	NA	NA		
	3.3	NA	NA		
	3.4	NA	NA		
	Risk of bias	*Low*	*Low*		Predicted direction of bias: unpredictable
	Bias in measurement of the outcome				
	4.1	N	N		
	4.2	N	N		
	4.3	Y	Y		A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.4	Y	Y		The patient's judgement about their improvement and pain could be influenced by having knowledge of the intervention received.
	4.5	Y	Y		It is likely that there are differences between groups regarding levels of beliefs about the treatments' effect, since group 1 received exercise therapy and the control received no intervention.
	Risk of bias	*High*	*High*		Predicted direction of bias: In favour of intervention group
	Bias in selection of the reported results				
	5.1	NI	NI		A trial registration was found in the ISRCTN register (ISRCTN83938749). However, it was registered 6 months after the study's start (October 2005).
	5.2	Y	Y		A trial registration was found in the ISRCTN register (ISRCTN83938749). However, it was registered 6 months after the study's start (October 2005). A number of follow-ups (i.e. 6 weeks, 26 weeks, 39 weeks) were planned according to the trial registration, published protocol and final publication. However, the results were not reported.
	5.3	NI	NI		A trial registration was found in the ISRCTN register (ISRCTN83938749). However, it was registered 6 months after

					the study's start (October 2005).
	Risk of bias	*High*	*High*		Predicted direction of bias: unpredictable
	OVERALL RISK OF BIAS	High	High		Predicted direction of bias: Unpredictable

Comparison: Minimal hip/knee exercises (group 1) versus hip/knee exercises (group 2) **Outcomes: Worst pain in the past week; pain during prolonged sitting; pain during walking, pain ascending stairs, pain descending stairs, pain during running, pain during jumping, pain during squatting**					
Study	**ROB domain Signalling Q.**	**Judgement per follow-up**			**Support for judgements**
Witvrouw 2000		***13 weeks***	***260 weeks***		
	Bias arising from the randomisation process				
	1.1	NI	NI		Unclear if sequence was random; how the sequence was generated: [patients, ed] "…with patellofemoral pain were randomized, by opening a sealed and numbered envelope, into a 5-week rehabilitation protocol that consisted of only closed kinetic chain exercises (N = 30) or only open kinetic chain exercises (N = 30)"
	1.2	PN	PN		Non-opaque envelopes can be hold up to light banks, and concealment can be broken in this way.
	1.3	N	N		There are no unexpected differences between groups in terms of group sizes or baseline variables.
	Risk of bias	*High*	*High*		Predicted direction of bias: unpredictable
	Bias due to deviations from intended interventions				
	2.1	Y	Y		Patients could not be blinded
	2.2	Y	Y		Carers could not be blinded
	2.3	NI	NI		13 weeks: *Non-Adherence/'switching':* No information *Contamination: additional interventions:* No information *Lost to follow-up:* No information 260 weeks: *Non-Adherence/'switching': not applicable (intervention took place in the first 5 weeks)* *Contamination: additional interventions:* No information *Lost to follow-up:* Group 1: 6/30 (20%) Group 2: 5/30 (16.7%)

	2.4	NA	NA		
	2.5	NA	NA		
	2.6	NI	NI		Insufficient information; unclear if participants were analysed in the group they were allocated to.
	2.7	NI	NI		Unclear. Insufficient information available to judge the item
	Risk of bias	*High*	*High*		Predicted direction of bias: in favour of the control group
	Bias due to missing outcome data				
	3.1	NI	N		The lost to follow-up was not described for 13 weeks. 18.3% of the participants was lost to follow-up at 260 weeks Group 1: 6/30 (20%) Group 2: 5/30 (16.7%) Any missing data is not described.
	3.2	N	N		No sensitivity analysis (e.g. best/worst case scenario's), or analysis correcting for bias were presented.
	3.3	NI	NI		Unclear; no reasons for lost to follow-up/missing values were provided.
	3.4	NI	NI		Insufficient information. Lost to follow-up is similar for all follow-ups. Unclear: there is insufficient information whether missing outcome data is related to its true value.
	Risk of bias	*High*	*High*		Predicted direction of bias: unpredictable
	Bias in measurement of the outcome				
	4.1	N	N		
	4.2	N	N		
	4.3	Y	Y		A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.4	Y	Y		A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.5	PN	PN		There is no indication that levels of belief about the treatments' effects differed between groups; treatments were similar
	Risk of bias	*Some*	*Some*		Predicted direction of bias: unpredictable
	Bias in selection of the reported results				
	5.1	NI	NI		No trial protocol registration could be found in clinicaltrials.gov, ISRCTN or Who trial registry.
	5.2	NI	NI		No trial protocol registration could be found in clinicaltrials.gov, ISRCTN or Who trial registry.

	5.3	NI	NI		No trial protocol registration could be found in clinicaltrials.gov, ISRCTN or Who trial registry.
	Risk of bias	*Some*	*Some*		Predicted direction of bias: unpredictable
	OVERALL RISK OF BIAS	High	High		Predicted direction of bias: unpredictable

Comparison: Hip/knee/trunk exercises (group 1) versus hip/knee exercises (group 2) Outcomes: Pain during ascending and descending stairs					
Study	**ROB domain Signalling Q.**	**Judgement per follow-up**			**Support for judgements**
Yılmaz Yelvar 2015		***6 weeks***	***12 weeks***		
	Bias arising from the randomisation process				
	1.1	NI	NI		Unclear if sequence was random; how the sequence was generated: "Before treatment, patients were assigned sequentially into 2 groups by the second author, who was blinded for the evaluation."
	1.2	NI	NI		Unclear if/how the researcher performing the randomization procedure was blinded to the patient at randomization/had for knowledge of the randomization sequence. "Before treatment, patients were assigned sequentially into 2 groups by the second author, who was blinded for the evaluation."
	1.3	N	N		There are no unexpected differences between groups in terms of group sizes or baseline variables.
	Risk of bias	*Some*	*Some*		Predicted direction of bias: unpredictable
	Bias due to deviations from intended interventions				
	2.1	Y	Y		Patients could not be blinded
	2.2	Y	Y		Carers could not be blinded
	2.3	NI	NI		<u>All follow-ups:</u> *Non-Adherence/'switching':* No information *Contamination: additional interventions:* No information *Lost to follow-up (at 6 weeks):* Group 1: n = 4 (all: personal causes) Group 2: n = 6 (all: personal causes)
	2.4	NA	NA		
	2.5	NA	NA		
	2.6	NI	NI		Insufficient information; unclear if participants were analysed in the group they were allocated to.
	2.7	NI	NI		Insufficient detail to judge this item.

	Risk of bias	*High*	*High*		Predicted direction of bias: unpredictable
	Bias due to missing outcome data				
	3.1	N	N		The lost to follow-up was 10/52 (19.2%). Any missing data were not described.
	3.2	N	N		No sensitivity analysis (e.g. best/worst case scenario's), or analysis correcting for bias were presented.
	3.3	PN	PN		The number of patients lost to follow-up was similar between groups, group 1: n = 4 (all: personal causes), group 2: n = 6 (all: personal causes). Any missing values in the remaining patients was probably random.
	3.4	NA	NA		
	Risk of bias	*Low*	*Low*		Predicted direction of bias: unpredictable
	Bias in measurement of the outcome				
	4.1	N	N		
	4.2	N	N		
	4.3	Y	Y		A patient-rated outcome was used, and patients were not blinded to the intervention received
	4.4	Y	Y		The patient's judgement about their improvement and pain could be influenced by having knowledge of the intervention received.
	4.5	PN	PN		There is no indication that levels of belief about the treatments' effects differed between groups; treatments were similar
	Risk of bias	*Some*	*Some*		Predicted direction of bias: unpredictable
	Bias in selection of the reported results				
	5.1	NI	NI		No trial protocol registration could be found in clinicaltrials.gov, ISRCTN or Who trial registry.
	5.2	NI	NI		No trial protocol registration could be found in clinicaltrials.gov, ISRCTN or Who trial registry.
	5.3	NI	NI		No trial protocol registration could be found in clinicaltrials.gov, ISRCTN or Who trial registry.
	Risk of bias	*Some*	*Some*		Predicted direction of bias: unpredictable
	OVERALL RISK OF BIAS	High	High		Predicted direction of bias: unpredictable

Web appendix 7. Certainty of the Evidence (GRADE approach)

Comparison	Odds Ratio (95% credible interval)	Risk of bias	Inconsistency[a]	Indirectness[b]	Imprecision	Publication bias[c]	Quality of evidence
Any improvement at 3 months							
Wait-and-see vs Education	9.6 (2.1 to 48.8)	Very serious	NA	No serious indirectness	Yes	?	Very low
Wait-and-see vs Exercise hip/knee	12.1 (3.4 to 51.1)	Very serious	NA	No serious indirectness	Yes	?	Very low
Wait-and-see vs Exercise hip/knee with blood flow restriction	15.6 (3.8 to 83.6)	Very serious	NA	No serious indirectness	Yes	?	Very low
Wait-and-see vs Exercise hip/knee with real-time feedback	13.9 (3.0 to 89.2)	Very serious	NA	No serious indirectness	Yes	?	Very low
Wait-and-see vs Exercise hip/knee/trunk	11.0 (1.2 to 69.5)	Very serious	NA	No serious indirectness	Yes	?	Very low
Wait-and-see vs Education + orthosis	16.5 (4.9 to 65.8)	Very serious	NA	No serious indirectness	Yes	?	Very low
Wait-and-see vs Education + Exercise therapy + Patellar taping/mobilisations	25.2 (5.7 to 130.3)	Very serious	NA	No serious indirectness	Yes	?	Very low
Wait-and-see vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	38.8 (7.3 to 236.9)	Very serious	NA	No serious indirectness	Yes	?	Very low
Education vs Exercise hip/knee	1.3 (0.5 to 3.4)	Serious	NA	No serious indirectness	Yes	?	Low
Education vs Exercise hip/knee with blood flow restriction	1.6 (0.5 to 6.3)	Serious	NA	No serious indirectness	Yes	?	Low
Education vs Exercise hip/knee with real-time feedback	1.4 (0.4 to 6.7)	Serious	NA	No serious indirectness	Yes	?	Low
Education vs Exercise hip/knee/trunk	1.1 (0.1 to 5.5)	Serious	NA	No serious indirectness	Yes	?	Low
Education vs Education + orthosis	1.7 (0.8 to 4.0)	Serious	NA	No serious indirectness	Yes	?	Low
Education vs Education + Exercise therapy + Patellar taping/mobilisations	2.6 (1.7 to 4.2)	Very serious	No	No serious indirectness	No	?	Low
Education vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	4.0 (1.5 to 11.8)	Serious	NA	No serious indirectness	Yes	?	Low
Exercise hip/knee vs Exercise hip/knee with blood flow restriction	1.2 (0.7 to 3.1)	Serious	NA	No serious indirectness	Yes	?	Low

Exercise hip/knee vs Exercise hip/knee with real-time feedback	1.1 (0.5 to 3.8)	Serious	NA	No serious indirectness	Yes	?	Low
Exercise hip/knee vs Exercise hip/knee/trunk	1.0 (0.1 to 3.0)	Serious	NA	No serious indirectness	Yes	?	Low
Exercise hip/knee vs Education + orthosis	1.4 (0.8 to 2.4)	Serious	NA	No serious indirectness	No	?	Moderate
Exercise hip/knee vs Education + Exercise therapy + Patellar taping/mobilisations	2.1 (0.8 to 5.7)	Serious	NA	No serious indirectness	Yes	?	Low
Exercise hip/knee vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	3.2 (0.9 to 11.4)	Serious	NA	No serious indirectness	Yes	?	Low
Exercise hip/knee with blood flow restriction vs Exercise hip/knee with real-time feedback	1.0 (0.3 to 2.9)	Serious	NA	No serious indirectness	Yes	?	Low
Exercise hip/knee with blood flow restriction vs Exercise hip/knee/trunk	0.8 (0.1 to 2.2)	Serious	NA	No serious indirectness	Yes	?	Low
Exercise hip/knee with blood flow restriction vs Education + orthosis	1.1 (0.4 to 2.5)	Serious	NA	No serious indirectness	Yes	?	Low
Exercise hip/knee with blood flow restriction vs Education + Exercise therapy + Patellar taping/mobilisations	1.6 (0.4 to 5.4)	Serious	NA	No serious indirectness	Yes	?	Low
Exercise hip/knee with blood flow restriction vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	2.5 (0.6 to 10.7)	Serious	NA	No serious indirectness	Yes	?	Low
Exercise hip/knee with real-time feedback vs Exercise hip/knee/trunk	0.9 (0.1 to 3.0)	Serious	NA	No serious indirectness	Yes	?	Low
Exercise hip/knee with real-time feedback vs Education + orthosis	1.2 (0.3 to 3.4)	Serious	NA	No serious indirectness	Yes	?	Low
Exercise hip/knee with real-time feedback vs Education + Exercise therapy + Patellar taping/mobilisations	1.8 (0.4 to 7.0)	Serious	NA	No serious indirectness	Yes	?	Low
Exercise hip/knee with real-time feedback vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	2.8 (0.5 to 13.2)	Serious	NA	No serious indirectness	Yes	?	Low
Exercise hip/knee/trunk vs Education + orthosis	1.5 (0.4 to 10.8)	Serious	NA	No serious indirectness	Yes	?	Low
Exercise hip/knee/trunk vs Education + Exercise therapy + Patellar taping/mobilisations	2.3 (0.5 to 18.7)	Serious	NA	No serious indirectness	Yes	?	Low
Exercise hip/knee/trunk vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	3.5 (0.6 to 32.6)	Serious	NA	No serious indirectness	Yes	?	Low

Education + orthosis vs Education + Exercise therapy + taping/mobilisations	1.5 (0.7 to 3.6)	Serious	NA	No serious indirectness	Yes	?	Low
Education + orthosis vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	2.3 (0.8 to 7.5)	Serious	NA	No serious indirectness	Yes	?	Low
Education + Exercise therapy + Patellar taping/mobilisations vs vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	1.5 (0.6 to 4.6)	Serious	NA	No serious indirectness	Yes	?	Low
Any improvement at 12 months				No serious indirectness			
Education vs Education + Exercise therapy + Patellar taping/mobilisations	1.5 (0.9 to 2.4)	Very serious	No	No serious indirectness	no	?	Low
Education vs Education + orthosis	2.3 (1.0 to 6.2)	Serious	NA	No serious indirectness	yes	?	Low
Education vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	1.9 (0.8 to 4.9)	Serious	NA	No serious indirectness	yes	?	Low
Education + Exercise therapy + Patellar taping/mobilisations vs Education + orthosis	1.5 (0.6 to 4.2)	Serious	NA	No serious indirectness	yes	?	Low
Education + Exercise therapy + Patellar taping/mobilisations vs vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	1.3 (0.5 to 3.3)	Serious	NA	No serious indirectness	yes	?	Low
Education + orthosis vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	0.8 (0.3 to 2.4)	Serious	NA	No serious indirectness	yes	?	Low
Comparison	**Mean difference (95% credible interval)**						
Worst pain at 3 months				No serious indirectness			
Wait-and-see vs Education	0.7 (-3.7 to 3.3)	Very serious	NA	No serious indirectness	Yes	?	Very low
Wait-and-see vs Exercises hip/knee	-1.6 (-3.6 to 0.4)	Very serious	No	No serious indirectness	Yes	?	Very low
Wait-and-see vs Minimal exercises hip/knee	-1.5 (-4.1 to 1.2)	Very serious	NA	No serious indirectness	Yes	?	Very low
Wait-and-see vs Exercises hip/knee with blood flow restriction	-1.6 (-4.3 to 1.1)	Very serious	NA	No serious indirectness	Yes	?	Very low
Wait-and-see vs Exercises hip/knee/trunk	-1.3 (-3.7 to 1.3	Very serious	NA	No serious indirectness	Yes	?	Very low

Wait-and-see vs Education + exercises hip/knee	-1.0 (-5.4 to 4.2)	Very serious	NA	No serious indirectness	Yes	?	Very low
Wait-and-see vs Education + orthosis	-1.0 (-3.6 to 1.3)	Very serious	NA	No serious indirectness	Yes	?	Very low
Wait-and-see vs Education + Exercise therapy + Patellar taping/mobilisations	-1.6 (-5.0 to 2.7)	Very serious	NA	No serious indirectness	Yes	?	Very low
Wait-and-see vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	-1.4 (-4.9 to 3.4)	Very serious	NA	No serious indirectness	Yes	?	Very low
Education vs Exercise hip/knee	-1.1 (-5.1 to 2.1)	Very serious	NA	No serious indirectness	Yes	?	Very low
Education vs minimal hip/knee exercises	-1.0 (-5.4 to 2.7)	Very serious	NA	No serious indirectness	Yes	?	Very low
Education vs Exercise hip/knee with blood flow restriction	-1.1 (-5.5 to 2.6)	Very serious	NA	No serious indirectness	Yes	?	Very low
Education vs Exercise hip/knee/trunk	-0.9 (-5.1 to 2.8)	Very serious	NA	No serious indirectness	Yes	?	Very low
Education vs Education + exercises hip/knee	-0.5 (-3.7 to 2.7)	Very serious	NA	No serious indirectness	Yes	?	Very low
Education vs Education + orthosis	-0.5 (-3.4 to 1.8)	Very serious	NA	No serious indirectness	Yes	?	Very low
Education vs Education + Exercise therapy + Patellar taping/mobilisations	-1.0 (-3.6 to 1.3)	Very serious	No	No serious indirectness	Yes	?	Very low
Education vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	-1.0 (-3.4 to 2.2)	Very serious	NA	No serious indirectness	Yes	?	Very low
Exercise hip/knee vs Minimal exercises hip/knee	0.0 (-1.8 to 2.0)	Very serious	NA	No serious indirectness	Yes	?	Very low
Exercise hip/knee vs Exercise hip/knee with blood flow restriction	0.0 (-1.9 to 1.9)	Very serious	NA	No serious indirectness	Yes	?	Very low
Exercise hip/knee vs Exercise hip/knee/trunk	0.2 (-1.1 to 2.0)	Very serious	No	No serious indirectness	Yes	?	Very low
Exercise hip/knee vs education + exercise hip/knee	0.7 (-3.9 to 5.8)	Very serious	NA	No serious indirectness	Yes	?	Very low
Exercise hip/knee vs Education + orthosis	0.6 (-1.8 to 3.0)	Very serious	NA	No serious indirectness	Yes	?	Very low
Exercise hip/knee vs Education + Exercise therapy + Patellar taping/mobilisations	0.0 (-3.4 to 4.3)	Very serious	NA	No serious indirectness	Yes	?	Very low

Exercise hip/knee vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	0.3 (-3.3 to 4.7)	Very serious	NA	No serious indirectness	Yes	?	Very low
Minimal exercises hip/knee vs Exercise hip/knee with blood flow restriction	0.0 (-2.5 to 2.2)	Very serious	NA	No serious indirectness	Yes	?	Very low
Minimal exercises hip/knee vs Exercise hip/knee/trunk	0.1 (-1.9 to 2.6)	Very serious	NA	No serious indirectness	Yes	?	Very low
Minimal exercises hip/knee vs education hip/knee	0.6 (-4.3 to 6.0)	Very serious	NA	No serious indirectness	Yes	?	Very low
Minimal exercises hip/knee vs Education + orthosis	0.5 (-2.5 to 3.5)	Very serious	NA	No serious indirectness	Yes	?	Very low
Minimal exercises hip/knee vs Education + Exercise therapy + Patellar taping/mobilisations	-0.1 (-3.8 to 4.6)	Very serious	NA	No serious indirectness	Yes	?	Very low
Minimal exercises hip/knee vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	0.2 (-3.8 to 5.0)	Very serious	NA	No serious indirectness	Yes	?	Very low
Exercise hip/knee with blood flow restriction vs Exercise hip/knee/trunk	0.10 (-1.7 to 2.8)	Very serious	NA	No serious indirectness	Yes	?	Very low
Exercise hip/knee with blood flow restriction vs Education + exercises hip/knee	0.6 (-4.2 to 6.1)	Very serious	NA	No serious indirectness	Yes	?	Very low
Exercise hip/knee with blood flow restriction vs Education + orthosis	0.6 (-2.4 to 3.6)	Very serious	NA	No serious indirectness	Yes	?	Very low
Exercise hip/knee with blood flow restriction vs Education + Exercise therapy + Patellar taping/mobilisations	0.0 (-3.7 to 4.6)	Very serious	NA	No serious indirectness	Yes	?	Very low
Exercise hip/knee with blood flow restriction vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	0.3 (-3.7 to 5.1)	Very serious	NA	No serious indirectness	Yes	?	Very low
Exercise hip/knee/trunk vs Education + exercises hip/knee	0.4 (-4.4 to 5.7)	Very serious	NA	No serious indirectness	Yes	?	Very low
Exercise hip/knee/trunk vs Education + orthosis	0.3 (-2.6 to 3.1)	Very serious	NA	No serious indirectness	Yes	?	Very low
Exercise hip/knee/trunk vs Education + Exercise therapy + Patellar taping/mobilisations	-0.3 (-3.9 to 4.3)	Very serious	NA	No serious indirectness	Yes	?	Very low
Exercise hip/knee/trunk vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	0.0 (-3.9 to 4.7)	Very serious	NA	No serious indirectness	Yes	?	Very low
Education + Exercises hip/knee vs Education + Orthosis	-0.1 (-4.5 to 3.9)	Very serious	NA	No serious indirectness	Yes	?	Very low

Education + Exercises hip/knee vs Education + Exercise therapy + Patellar taping/mobilisations	-0.5 (-4.5 to 3.3)	Very serious	NA	No serious indirectness	Yes	?	Very low
Education + Exercises hip/knee vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	-0.4 (-4.5 to 4.0)	Very serious	NA	No serious indirectness	Yes	?	Very low
Education + orthosis vs Education + Exercise therapy + Patellar taping/mobilisations	-0.6 (-2.9 to 3.1)	Very serious	NA	No serious indirectness	Yes	?	Very low
Education + orthosis vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	-0.3 (-3.1 to 3.4)	Very serious	NA	No serious indirectness	Yes	?	Very low
Education + Exercise therapy + Patellar taping/mobilisations vs vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	0.2 (-2.9 to 3.7)	Very serious	NA	No serious indirectness	Yes	?	Very low
Worst pain at 12 months	**Mean difference (95% credible interval)**						
Education vs Education + Exercise therapy + Patellar taping/mobilisations	-0.8 (-1.5 to 0.0)	Very serious	No	No serious indirectness	No	?	Low
Education vs Education + orthosis	-0.1 (-1.0 to 0.9)	Very serious	NA	No serious indirectness	No	?	Low
Education vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	-0.9 (-1.9 to 0.0)	Very serious	NA	No serious indirectness	No	?	Low
Education + Exercise therapy + Patellar taping/mobilisations vs Education + orthosis	0.7 (-0.2 to 1.7)	Very serious	NA	No serious indirectness	No	?	Low
Education + Exercise therapy + Patellar taping/mobilisations vs vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	-0.2 (-1.1 to 0.8)	Very serious	NA	No serious indirectness	No	?	Low
Education + orthosis vs Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	-0.9 (-1.9 to 0.1)	Very serious	NA	No serious indirectness	No	?	Low
Pain while descending stairs at 3 months	**Mean difference (95% credible interval)**						
Minimal hip/knee exercises vs hip/knee exercises	0.5 (-0.2 to 1.2)	Very serious	NA	No serious indirectness	No	?	Low
Minimal hip/knee exercises vs hip/knee/trunk exercises	-2.6 (-3.5 to -1.8)	Very serious	NA	No serious indirectness	No	?	Low
Hip/knee exercises vs hip/knee/trunk exercises	-3.2 (-3.7 to -2.6)	Very serious	No	No serious indirectness	No	?	Low

Pain while descending stairs at 12 months	**Mean difference (95% credible interval)**						
Hip/knee exercises vs arthroscopy +hip/knee exercises	0.3 (-1.0 to 1.6)	Very serious	NA	No serious indirectness	No	?	Low
Hip/knee exercises vs hip/knee/trunk exercises	-3.9 (-4.5 to -3.4)	Very serious	No	No serious indirectness	No	?	Low
Arthroscopy +hip/knee exercises vs Hip/knee/trunk exercises	-4.2 (-5.6 to -2.8)	Very serious	NA	No serious indirectness	No	?	Low

Abbreviations: GRADE = Grading of Recommendations Assessment, Development, and Evaluation; NA = Not applicable;

a Only 4 treatment comparisons were studied in multiple trials. Where this was the case, estimates and credible intervals showed substantial overlap.

b Populations, treatments and outcomes measures followed those used in clinical practice, hence there was no indication of indirectness in the evidence.

c Publication bias could not be assessed as there were <10 trials available for each of the comparisons.

Web appendix 8. Summary of analyses and model performances

Outcome	Time	Model	Datapoints	Totdesrev (median)	DIC	PD	SD (median)	Convergence
GROC	3 months	FE binominal consistency		19.34	110.52	17.13	-	10000
GROC	3 months	RE binominal consistency		19.23	112.09	18.81	0.45	10000
GROC	3 months	FE binominal inconsistency		20.16	112.19	17.98	-	10000
GROC	3 months	RE binominal inconcistency	**20**	20.06	113.78	19.63	0.52	10000
GROC	3 months	FE Binominal Consistency + hierarchical class		17.88	107.26	15.38	-	10000
GROC	3 months	RE Binominal Consistency + hierarchical class		17.64	108.45	16.81	0.34	20000
GROC	3 months	FE Binominal Consistency + fixed class		17.57	105.73	14.09	-	10000
GROC	3 months	RE Binominal Consistency + fixed class		17.39	107.27	15.87	0.29	10000
GROC	12 months	FE Binominal consistency	**8**	7.23	47.19	6.03	-	10000
GROC	12 months	RE Binominal consistency		7.05	48.18	7.24	0.48	10000
Worst pain_MD	3 months	FE Consistency		55.32	71.81	19.97	-	10000
Worst pain_MD	3 months	FE Inconsistency		54.73	72.17	20.98	-	10000
Worst pain_MD	3 months	RE Consistency		23.51	43.95	23.87	2.07	10000
Worst pain_MD	3 months	RE Inconsistency	**24**	23.42	43.84	23.88	1.49	10000
Worst pain_MD	3 months	FE Consistency + Fixed class		92.68	106.05	16.87	-	10000
Worst pain_MD	3 months	FE Consistency + Random class		55.35	71.66	19.81	-	40000
Worst pain_MD	3 months	RE Consistency + Fixed class		23.26	42.88	23.10	1.40	10000
Worst pain_MD	3 months	RE Consistency + Random class		23.52	43.30	23.30	1.47	40000
Worst pain_MD	12 months	FE Consistency	**6**	5.47	10.44	4.97	-	10000
Worst pain_MD	12 months	RE Consistency		Too few trials for RE, n = 2				
Pain at descending stairs_MD	3 months	FE Consistency	**6**	6.29	7.68	4.99	-	10000
Pain at descending stairs_MD	3 months	RE Consistency		Too few trials for RE, n = 3				

Pain at descending stairs_MD	12 months	FE Consistency	**4**	3.38	5.73	3.99	-	10000
Pain at descending stairs_MD	12 months	FE Consistency		too few trials for RE, n = 2				
Bivariate - worst pain + descending stairs_SMD	3 months	FE Consistency		**Model did not converge**				
Bivariate - worst pain + descending stairs_SMD	3 months	RE Consistency		29.61	97.72	29.84	1.36	20000
Bivariate - worst pain + descending stairs_SMD	3 months	FE Consistency + random class	**30**	**Model did not converge**				
Bivariate - worst pain + descending stairs_SMD	3 months	RE Consistency + random class		**Model did not converge**				

SENSITIVITY ANALYSIS FOR THE PRIMARY OUTCOME

Outcome	**Time**	**Model**	**Datapoints**	**Totdesrev (median)**	**DIC**	**PD**	**SD (median)**	**Convergence**
GROC	3 months	FE binominal consistency		18.98	111.02	17.97	NA	10000
GROC	3 months	RE binominal consistency		19.08	111.87	18.83	0.53	10000
GROC	3 months	FE binominal inconsistency		20.01	113.19	19.02	NA	10000
GROC	3 months	RE binominal inconcistency		19.78	113.56	19.69	0.71	10000
GROC	3 months	FE Binominal Consistency + hierarchical class	**20**	17.71	108.15	16.38	NA	10000
GROC	3 months	RE Binominal Consistency + hierarchical class		18.20	109.86	17.64	**Model did not converge**	
GROC	3 months	FE Binominal Consistency + fixed class		17.42	106.64	15.12	NA	10000
GROC	3 months	RE Binominal Consistency + fixed class		17.61	108.26	16.69	0.36	10000
GROC	12 months	FE Binominal consistency	**8**	6.65	47.73	7.10	NA	10000
GROC	12 months	RE Binominal consistency		7.06	48.61	7.62	0.61	10000

Note: *Model selections are highlighted in green. Where fixed (FE) and random (RE) models showed similar fits, we chose the simpler models (fixed effects), or a the model that could provide estimates for both research questions on treatment and class (i.e. estimates from a hierarchical model). Totresdev = total residual deviance; DIC = deviance information criterion; PD = posterior mean of the deviance; SD = standard deviation; GROC = global rating of change scale (i.e. any improvement), MD = mean difference, SMD, standardised MD; n= number.*

WEB APPENDIX 9 DATA ANALYSIS, TREATMENT LEVEL RESULTS AND SECONDARY OUTCOMES

Primary outcome, treatment level results

Table 1. Comparative treatment effects expressed with an odds ratio for any improvement at 3 months (fixed effects model with a random between treatment within class effect)

Wait-and-see								
9.6 (2.2 to 48.8)	**Education**							
12.1 (3.4 to 51.1)	1.4 (0.5 to 3.4)	**Exercise hip/knee**						
15.6 (3.8 to 83.6)	1.6 (0.5 to 6.3)	1.2 (0.7 to 3.1)	**Exercise hip/knee with blood flow restriction**					
13.9 (3.0 to 89.2)	1.43 (0.4 to 6.7)	1.1 (0.5 to 3.8)	1.0 (0.3 to 2.9)	**Exercise hip/knee with real-time feedback**				
11.0 (1.2 to 69.5)	1.1 (0.14 to 5.5)	1.0 (0.1 to 3.0)	0.8 (0.1 to 2.2)	0.9 (0.1 to 3.0)	**Exercise hip/knee/trunk**			
16.5 (4.9 to 65.8)	1.7 (0.8 to 4.0)	1.4 (0.8 to 2.4)	1.1 (0.4 to 2.5)	1.2 (0.3 to 3.4)	1.5 (0.4 to 10.8)	**Education + orthosis**		
25.2 (5.7 to 130.3)	**2.6 (1.7 to 4.2)**	2.1 (0.8 to 5.7)	1.6 (0.4 to 5.4)	1.8 (0.4 to 7.0)	2.3 (0.5 to 18.7)	1.5 (0.7 to 3.6)	**Education + Exercise therapy + Patellar taping/mobilisations**	
38.8 (7.3 to 236.9)	**4.0 (1.5 to 11.8)**	3.2 (0.9 to 11.4)	2.5 (0.6 to 10.7)	2.8 (0.5 to 13.2)	3.5 (0.6 to 32.6)	2.3 (0.8 to 7.5)	1.5 (0.6 to 4.6)	**Education + Exercise therapy + Patellar taping/mobilisations + Orthosis**

Odds ratio's with their 95% credible intervals from the network meta-analysis are shown. For any cell, an odds ratio <1 favours the upper-left treatment, and an odds ratio > 1 favours the lower-right treatment. Comparative treatment effect differences are shown in bold.

Table 2. Treatment rankings from the network meta-analyses for any improvement at 3 months (fixed effects model with a random between treatment within class effect)

Treatments	**3 months**	
	Mean ranks	**Median rank (95% CrI)**
Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	1.59	1 (1 to 5)
Education + Exercise therapy + Patellar taping/mobilisations	2.60	2 (1 to 7)
Education + Orthosis	4.03	4 (2 to 7)
Exercise hip/knee with blood flow restriction	4.42	4 (1 to 8)
Exercise hip/knee with real-time feedback	4.97	5 (1 to 8)
Exercise hip/knee/trunk	5.87	6 (1 to 8)
Exercises hip/knee	5.91	6 (3 to 8)
Education	6.63	7 (3 to 8)
Wait-and-see	8.98	9 (9 to 9)

Secondary outcomes

Worst pain at 3 months and 12 months (table 3a, 3b, 3c)

Figure 1 shows direct treatment comparisons in the field of PFP for worst pain. Eleven studies could be included in the NMA at 3 months, and two studies could be included in the NMA at 12 months. The random effects model with random between treatment within class effect shows that none of the treatments (categories) were superior to any other treatment (category), or to wait-and-see on worst pain at 3 months. At 12 months, the fixed effects model (without class) shows that education plus exercise plus patellar taping/mobilisations appears superior to education alone (mean difference -0.8, 95%CrI -1.5 to 0.0). Education plus exercise plus patellar taping/mobilisations plus orthosis appears better than to education alone (-0.9, 95%CrI -1.9 to 0.00), but was not found to be superior to education plus exercise plus patellar taping/mobilisations (-0.2, 95%CrI -1.1 to 0.8).

Treatment rankings worst pain (table 4, table 5)

At 3 months, all treatments yielded similar treatment rankings. At 12 months, education plus exercise plus patellar taping/mobilisations, either with or without orthosis, seemed the best combination of treatments for PFP (median ranking 1, median's 95%CrI 1 to 3; and, 1.71, 2, 95%CrI 1 to 3, respectively).

Pain while walking stairs at 3 months and 12 months (table 6a and 6b)

Figure 2 shows direct treatment comparisons in the field of PFP for pain while descending stairs. Three studies could be included in the NMA at 3 months, and two studies were included in the NMA at 12 months. Analyses were performed using fixed effects models (without class effect). Three treatments could be compared in both networks. At 3 months, an exercise program including hip, knee and trunk exercises was superior to hip and knee exercises alone (mean difference -3.2, 95%CrI -3.7 to -2.6), and to a program including 'minimal' hip/knee exercises (-2.6, 95%CrI -3.5 to -1.8). No difference was found between minimal hip/knee exercises and usual hip/knee exercises. At 12 months, hip, knee and trunk exercises was superior to a combination of hip/knee exercises and arthroscopy (mean difference -4.2, 95%CrI -5.6 to -2.8), and also superior to hip/knee exercises alone (-3.9, 95%CrI -4.5 to -3.4). No difference was found between hip/knee exercises plus arthroscopy or hip/knee exercises alone (0.3, 95%CrI -1.0 to 1.6).

Treatment rankings pain while walking stairs (table 7)

An exercise program including hip, knee and trunk exercises was found the best treatment for walking stairs at 3 months and 12 months (both time points: median ranking 1, median's 95%CrI 1 to 1). At 3 months, minimal hip/knee exercises and usual hip/knee exercises were ranked 2nd and 3rd (2, 95%CrI 2 to 3; and, 3, 95%CrI 2 to 3, respectively). At 12 months, hip/knee exercises were ranked 2nd (2, 95%CrI 2 to 3) and hip/knee exercises in combination with arthroscopy 3rd (3, 95%CrI 2 to 3).

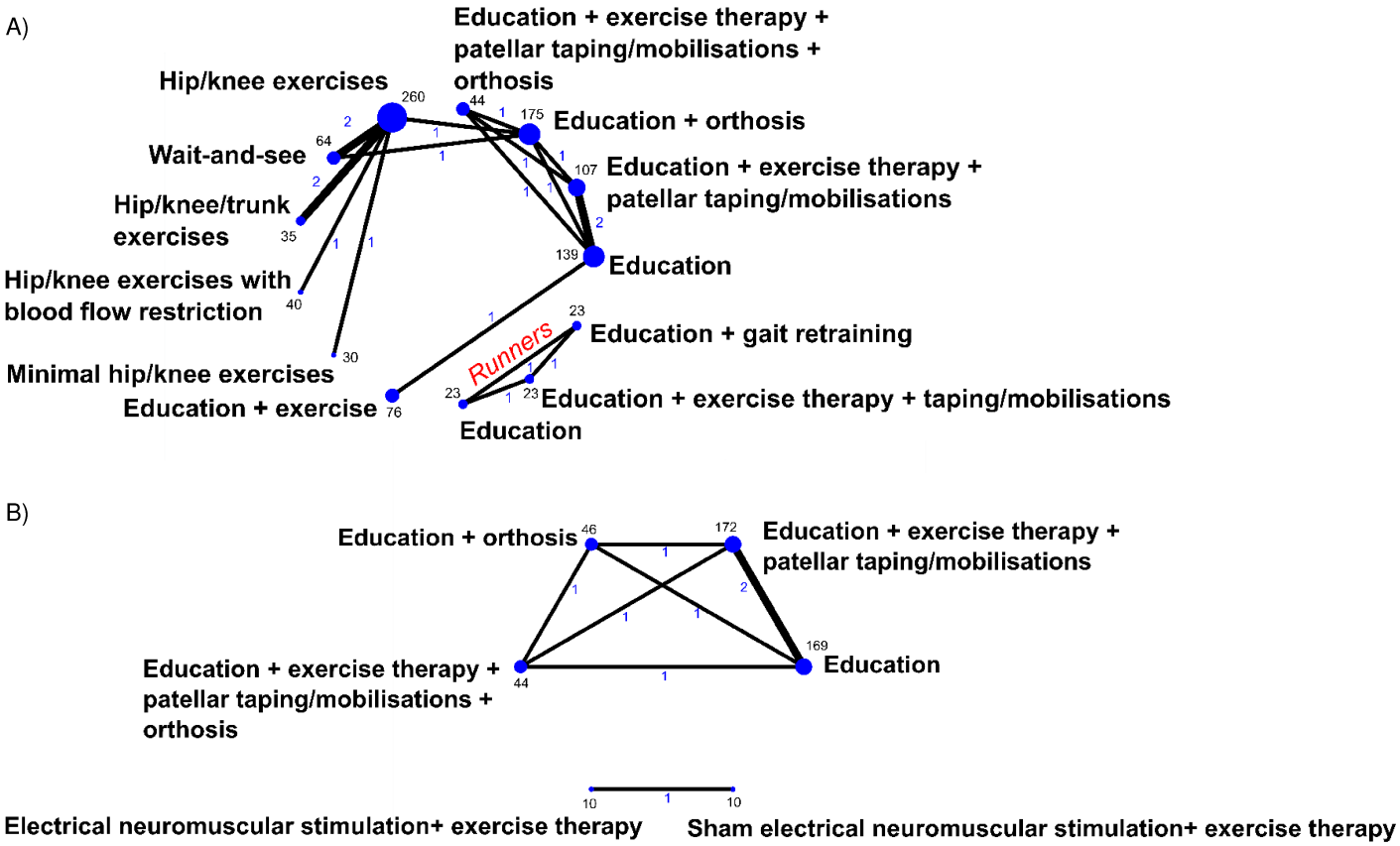


Figure 1. Network graphs for direct treatment comparisons for 'worst pain' at 3 months (A) and 12 months (B)

Blue text represents the number of treatment comparisons, and the text in black represents the number of participant that received the respective treatment. The thickness of the lines and the size of the dots are proportional to the number of trial comparisons and the number of participants in the treatment arms, respectively.

Table 3. Comparative treatment effectiveness for 'worst pain' at 3 months (A+B) and 12 months (C)

A) Comparative treatment class level effects for worst pain at 3 months (random effects model with random between treatment within class effect)

Wait-and-see						
-0.7 (-3.7 to 3.3)	**Education**					
-1.5 (-4.0 to 1.1)	-1.0 (-5.3 to 2.6)	**Exercise**				
-0.9 (-6.2 to 4.9)	-0.5 (-4.6 to 3.6)	0.6 (-4.8 to 6.5)	**Education + exercise**			
-1.0 (-3.6 to 1.3)	-0.5 (-3.4 to 1.8)	0.5 (-2.4 to 3.4)	-0.1 (-5.3 to 4.6)	**Education + Orthosis**		
-1.6 (-5 to 2.7)	-1.0 (-3.6 to 1.3)	-0.1 (-3.8 to 4.5)	-0.5 (-5.3 to 4.1)	-0.6 (-2.9 to 3.1)	**Education + Exercise + Patellar taping/mobilisations**	
-1.4 (-4.9 to 3.4)	-1.0 (-3.4 to 2.2)	0.2 (-3.8 to 4.9)	-0.4 (-5.3 to 4.7)	-0.3 (-3.1 to 3.4)	0.2 (-2.9 to 3.7)	**Education + Exercise + Patellar taping/mobilisations + Orthosis**

Mean differences (MD) on a VAS 0-10 scale with their 95% credible intervals from the network meta-analysis are shown in the lower left triangle. For any cell, a positive MD favours the upper-left treatment, and a negative MD favours the lower-right treatment.

B) Comparative treatment level effects for worst pain at 3 months (random effects model with random between treatment within class effect)

Wait-and-see									
-0.7 (-3.7 to 3.3)	**Education**								
-1.6 (-3.6 to 0.4)	-1.1 (-5.1 to 2.1)	**Exercises hip/knee**							
-1.5 (-4.1 to 1.2)	-1.0 (-5.4 to 2.7)	0.04 (-1.8 to 2.0)	**Minimal hip/knee exercises**						
-1.6 (-4.3 to 1.1)	-1.1 (-5.5 to 2.6)	0.01 (-1.9 to 1.9)	0 (-2.5 to 2.2)	**Exercises hip/knee with blood flow restriction**					
-1.3 (-3.7 to 1.3)	-0.9 (-5.1 to 2.8)	0.2 (-1.1 to 2.0)	0.1 (-1.9 to 2.6)	0.1 (-1.7 to 2.8)	**Exercises hip/knee/trunk**				
-1.0 (-5.4 to 4.2)	-0.5 (-3.7 to 2.7)	0.7 (-3.9 to 5.8)	0.6 (-4.3 to 6.0)	0.6 (-4.2 to 6.1)	0.4 (-4.4 to 5.7)	**Education + exercises hip/knee**			
-1.0 (-3.6 to 1.3)	-0.5 (-3.4 to 1.8)	0.6 (-1.8 to 3.0)	0.5 (-2.5 to 3.5)	0.6 (-2.4 to 3.6)	0.3 (-2.6 to 3.1)	-0.1 (-4.5 to 3.9)	**Education + Orthosis**		
-1.6 (-5.0 to 2.7)	-1.0 (-3.6 to 1.3)	0.02 (-3.4 to 4.3)	-0.1 (-3.8 to 4.6)	0.02 (-3.7 to 4.6)	-0.4 (-3.9 to 4.3)	-0.5 (-4.5 to 3.3)	-0.6 (-2.9 to 3.1)	**Education + Exercise therapy + Patellar taping/mobilisations**	
-1.4 (-4.9 to 3.4)	-1.0 (-3.4 to 2.2)	0.3 (-3.3 to 4.7)	0.2 (-3.8 to 5.0)	0.3 (-3.7 to 5.1)	0.0 (-3.9 to 4.7)	-0.4 (-4.5 to 4.0)	-0.3 (-3.1 to 3.4)	0.2 (-2.9 to 3.7)	**Education + Exercise therapy + Patellar taping/mobilisations + Orthosis**

Mean differences (MD) on a VAS 0-10 scale with their 95% credible intervals from the network meta-analysis are shown in the lower left triangle. For any cell, a positive MD favours the upper-left treatment, and a negative MD favours the lower-right treatment.

C) Comparative treatment effects for worst pain at 12 months (fixed effects model without class effect)

Education			
-0.8 (-1.5 to 0)	**Education + Exercise + Patellar taping/mobilisations**		
-0.1 (-1.0 to 0.9)	0.7 (-0.2 to 1.7)	**Education + Orthosis**	
-0.9 (-1.9 to 0.0)	-0.2 (-1.1 to 0.8)	-0.9 (-1.9 to 0.1)	**Education + Exercise + Patellar taping/mobilisations + Orthosis**

Mean differences (MD) on a VAS 0-10 scale with their 95% credible intervals from the network meta-analysis are shown in the lower left triangle. For any cell, a positive MD favours the upper-left treatment, and a negative MD favours the lower-right treatment.

Table 4. Treatment class level rankings from the network meta-analyses for worst pain at 3 months (random effects model with random between treatment within class effect)

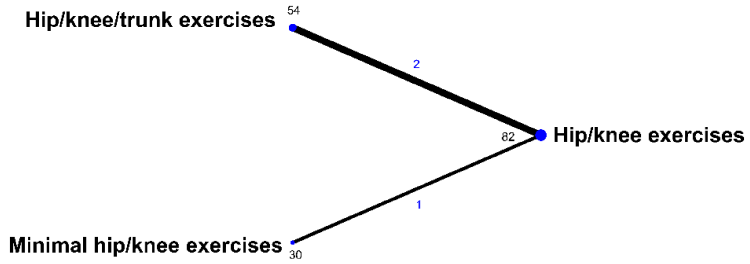
Treatment Class	3 months	
	Mean ranks	Median rank (95% CrI)
Education + Exercise + Patellar taping/mobilisations + Orthosis	3.47	3 (1 to 7)
Education + Exercise + Patellar taping/mobilisations	3.45	3 (1 to 7)
Education + Orthosis	4.04	4 (1 to 7)
Exercise	3.81	4 (1 to 7)
Education	4.32	4 (1 to 7)
Wait-and-see	5.07	6 (1 to 7)

Table 5. Treatment rankings from the network meta-analyses for worst pain at 3 months and 12 months

Treatments	3 months*		12 months#	
	Mean ranks	Median rank (95% CrI)	Mean ranks	Median rank (95% CrI)
Exercises hip/knee	4.27	4 (1 to 8)	NA	NA
Exercises hip/knee with blood flow restriction	4.49	4 (1 to 9)	NA	NA
Education + Exercise therapy + Patellar taping/mobilisations	4.56	4 (1 to 10)	1.71	2 (1 to 3)
Exercises hip/knee (minimal loading)	4.65	4 (1 to 10)	NA	NA
Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	5.10	5 (1 to 10)	1.44	1 (1 to 3)
Exercises hip/knee/trunk	5.21	5 (1 to 10)	NA	NA
Education + Orthosis	5.92	6 (1 to 9)	3.36	3 (2 to 4)
Education	7.04	8 (2 to 10)	3.49	4 (2 to 4)
Wait-and-see	8.01	9 (3 to 10)	NA	NA

* Results from the random effects model with random between treatment within class effect, # results from a fixed effects model without class effect

A)



B)

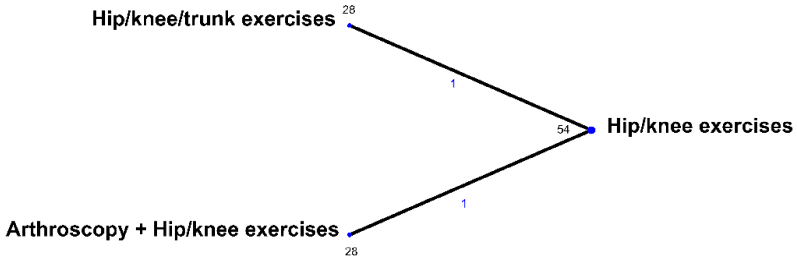


Figure 2. Network graphs for direct treatment comparisons for 'pain while descending stairs' at 3 months (A) and 12 months (B)

Blue text represents the number of treatment comparisons, and the text in black represents the number of participant that received the respective treatment. The thickness of the lines and the size of the dots are proportional to the number of trial comparisons and the number of participants in the treatment arms, respectively.

Table 6. Comparative treatment effects for pain while descending stairs at 3 months (A) and 12 months (B) (both from fixed effects models without class effect)

A)

Minimal hip/knee exercises		
0.5 (-0.2 to 1.2)	**Hip/knee exercises**	
-2.6 **(-3.5 to -1.8)**	**-3.2** **(-3.7 to -2.6)**	**Hip/knee/trunk exercises**

Mean differences (MD) on a VAS 0-10 scale with their 95% credible intervals from the network meta-analysis are shown. For any cell, a positive MD favours the upper-left treatment, and a negative MD favours the lower-right treatment

B)

Hip/knee exercises		
0.3 (-1.0 to 1.6)	**Arthroscopy + hip/knee exercises**	
-3.9 **(-4.5 to -3.4)**	**-4.2** **(-5.6 to -2.8)**	**Hip/knee/trunk exercises**

Mean differences (MD) on a VAS 0-10 scale with their 95% credible intervals from the network meta-analysis are shown. For any cell, a positive MD favours the upper-left treatment, and a negative MD favours the lower-right treatment

Table 7. Treatment rankings from the network meta-analyses for pain while descending stairs at 3 months and 12 months (both from fixed effects models without class effect)

Treatment Class	**3 months**		**12 months**	
	Mean ranks	**Median rank (95% CrI)**	**Mean ranks**	**Median rank (95% CrI)**
Hip/knee/trunk exercises	1.00	1 (1 to 1)	1.00	1 (1 to 1)
Minimal knee/hip exercises	2.08	2 (2 to 3)	NA	NA
Hip/knee exercises	2.92	3 (2 to 3)	2.32	2 (2 to 3)
Arthroscopy + hip/knee exercises	NA	NA	2.68	3 (2 to 3)

Web appendix 10. Descriptive synthesis of studies not included in the network meta-analysis

Six studies could not be included in any of the analyses. Two studies could not be included due to unavailability of data. Eng & Pierrynowski (1993) compared the effects of soft foot orthoses plus exercise therapy versus exercise therapy alone in 20 participants on various pain scales. The authors concluded that foot orthoses plus exercises were more effective than exercises alone on pain while sitting for an 1h, while walking, while walking stairs, while squatting and while running (all at 6 and 8 weeks). Petersen et al. (2016) compared the effects of a stabilization brace in addition to exercise therapy versus exercise therapy alone in 156 participants. They found no significant differences between groups in the proportion of patients being 'recovered', or with pain while walking or walking stairs, at 6, 12 and 54 weeks. We could not include this study in the analysis as we did not manage to acquire numbers per outcome category for any improvement, and no central estimates and measures of dispersion were provided for the pain scores.

Esculier et al. (2018) compared education (group 1) with education + exercise therapy (group 2) and education + gait retraining (group 3) in runners with PFP. We could not include this study as the assumption of exchangeability was not met; participants in the other studies were not necessarily runners which would make it unlikely for them to be randomised to a gait retraining program. Mean (SD) worst pain scores (0-10) did not differ between groups at 8 weeks; 2.4 (1.9), 3.1 (2.4) and 3.0 (2.7) for the education group, education + exercise therapy group and education + gait retraining group, respectively. After 20 weeks, the worst pain scores were also similar, 2.3 (1.8), 2.7 (2.7) and 3.2 (3.0), respectively.

Glaviano et al. (2019) investigated the effects of electrical neuromuscular stimulation in addition to exercise therapy (n=10), and compared these to sham electrical neuromuscular stimulation in addition to exercise therapy (n=10). On the global rating of change scale, patients in the experimental group reported to have 'marked improvement' (n=5), 'moderate improvement' (n=4) and 'no change' (n=1) at 6 months, versus 'marked improvement' (n=4), 'moderate improvement' (n=4), 'no change' (n=1), and 'moderate worsening' (n=1) in the sham group. At 12 months, similar changes were observed in both groups: experimental group; 'marked improvement' (n=4), 'moderate improvement' (n=3) and 'no change' (n=3), and control group: 'marked improvement' (n=3), 'moderate improvement' (n=4), 'no change' (n=1), and 'moderate worsening (n=1) (lost-to-follow-up, n=1). Worst pain scores were comparable between groups. At 6 months: 1.2 (SD 1.0) in the experimental group, and 2.6 (2.5) in the sham group; at 12 months: 1.3 (1.5) in the experimental group, and 2.3 (2.1) in the control group.

Hart et al. (2019) compared Hyaluronic acide injection + hip/knee exercises versus a sham injection + hip/knee exercises. After 13 weeks, mean pain scores during a single leg squat were 3.6 (SD 2.5) in the

experimental group and 2.2 (2.1) in the sham group. After 26 weeks, pain during the same activity was 2.9 (2.4) in the experimental group versus 2.3 (1.9) in the sham group.

Lastly, Demirci et al. (2017) compared mobilisations with movement + exercise therapy (group 1) to kinesio tape + exercise therapy (group 2) on pain while ascending and descending stairs at 6 weeks. Both treatments were investigated in this trial only, which caused for a disconnect with the rest of the network. Mean pain (SD) scores (0-10) while descending and ascending stairs were similar for both groups, group 1: 1.5 (1.4) and 1.9 (1.5), respectively, and 1.8 (1.8) and 2.1 (1.8) respectively for group 2.

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WEB APPENDIX 11. SENSITIVITY ANALYSIS PRIMARY OUTCOME

This appendix shows the findings from the sensitivity analysis where treatment arms in the study by Linschoten et al. (2009) are considered as education and education + exercise therapy. This is in contrast to our main analysis where we deemed the education + exercise arm similar to the education + exercise + patellar treatment arms in Rathleff et al. (2015) and Collins et al. (2008).

Web appendix 8 details the summary of analysis and model fit statistics for the sensitivity analysis for the primary outcome. The sensitivity analysis show that our main findings are robust for the decision to pool the education + exercise arm with the education + exercise + patellar treatment arms. Handling the treatment arm in Linschoten et al. as a separate treatment node (education + exercise), does not change our conclusions; the main findings, point estimates and 95% credible intervals show substantial overlap in both the class, as treatment level analyses. Table 1 to table 4 show all estimates for the class and treatment level analyses.

Comparative estimates for education + exercise suggest that patellar treatments may add little benefit over education + exercise alone. Similar to our main findings, there is a lack of precision in estimating which treatment is superior to another (or best of all), as evidenced by the wide credible intervals for all treatment comparisons.

At 12 months, exercise + education may be better than education alone but the 95% credible interval includes differences that are arguably irrelevant for clinical practice (i.e. lower bound OR = 1.03). All other findings from the sensitivity analysis, at 12 months, are consistent with our main findings.

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Table 1.

A) Comparative treatment class effects for any improvement at 3 months (fixed-effects model with random between treatment within class effect)

Wait-and-see						
10.48 (2.29 to 53.11)	**Education**					
12.74 (2.49 to 78.19)	1.23 (0.29 to 5.19)	**Exercise**				
38.29 (6.99 to 227.3)	**3.62 (1.72 to 7.87)**	2.96 (0.59 to 15.13)	**Education + exercise**			
16.26 (4.81 to 65.62)	1.56 (0.70 to 3.81)	1.28 (0.38 to 4.46)	0.43 (0.14 to 1.37)	**Education + Orthosis**		
22.14 (4.47 to 116.08)	**2.12 (1.17 to 3.91)**	1.73 (0.40 to 7.66)	0.58 (0.22 to 1.54)	2.31 (0.73 to 7.10)	**Education + Exercise + Patellar taping/ mobilisations**	
38.49 (7.38 to 226.5)	**3.66 (1.38 to 11.13)**	2.99 (0.61 to 15.16)	0.98 (0.27 to 3.50)	1.72 (0.62 to 5.34)	2.34 (0.79 to 7.40)	**Education + Exercise + Patellar taping/mobilisations + Orthosis**

Odds ratio's with their 95% credible intervals from the NMA are shown. For any cell, an odds ratio <1 favours the upper-left treatment, and an odds ratio > 1 favours the lower-right treatment. Comparative treatment effect differences are shown in bold.

B) Comparative treatment effects for any improvement at 12 months (fixed effects model without class effect)

Education				
2.42 (1.03 to 6.02)	**Education + exercise**			
1.22 (0.69 to 2.19)	0.50 (0.17 to 1.41)	**Education + Exercise + Patellar taping/mobilisations**		
2.10 (0.85 to 5.80)	0.87 (0.24 to 3.22)	1.72 (0.68 to 4.69)	**Education + Orthosis**	
1.71 (0.68 to 4.57)	0.71 (0.20 to 2.63)	1.39 (0.56 to 3.65)	0.81 (0.27 to 2.38)	**Education + Exercise + Patellar taping/mobilisations + Orthosis**

Odds ratio's with their 95% credible intervals from the NMA are shown in the lower left triangle, and odds ratio's with their 95% credible intervals from the pairwise meta-analyses (i.e., direct evidence from randomised controlled trials) in the upper right triangle. For any cell, an odds ratio <1 favours the upper-left treatment, and an odds ratio > 1 favours the lower-right treatment.

Table 2. Sensitivity analysis; treatment rankings from the network meta-analyses for any improvement.

Treatment (class)	3 months*	
	Mean rank	Median rank (95% CrI)
Education + Exercise	1.81	2 (1 to 4)
Education + Exercise + Patellar taping/mobilisations + Orthosis	1.79	2 (1 to 4)
Education + Exercise + Patellar taping/mobilisations	3.18	3 (1 to 5)
Education + Orthosis	4.05	4 (2 to 6)
Exercise	4.73	5 (1 to 6)
Education	5.46	6 (4 to 6)
Wait-and-see	6.99	7 (7 to 7)

95% CrI = 95% credible interval, * results from a fixed-effects model with random between treatment within class effect,

Treatment	12 months#	
	Mean rank	Median rank (95% CrI)
Education + Exercise	1.83	1 (1 to 4)
Education + Orthosis	2.12	2 (1 to 5)
Education + Exercise + Patellar taping/mobilisations + Orthosis	2.72	3 (1 to 5)
Education + Exercise + Patellar taping/mobilisations	3.78	4 (2 to 5)
Education	4.55	5 (3 to 5)

95% CrI = 95% credible interval, # results from a fixed effects model without class effect

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Table 3. Comparative treatment level effects for any improvement at 3 months (fixed-effects model with random between treatment within class effect)

Wait-and-see									
10.48 (2.29 to 53.11)	**Education**								
11.96 (3.42 to 50)	1.14 (0.45 to 3.17)	**Exercise hip/knee**							
15.45 (3.72 to 78.37)	1.48 (0.46 to 5.45)	1.21 (0.67 to 3.09)	**Exercise hip/knee with blood flow restriction**						
13.62 (2.83 to 80.14)	1.32 (0.35 to 5.58)	1.08 (0.44 to 3.52)	0.95 (0.25 to 2.77)	**Exercise hip/knee with real-time feedback**					
11.02 (1.37 to 69.5)	1.06 (0.15 to 4.69)	0.98 (0.15 to 3.02)	0.83 (0.09 to 2.25)	0.91 (0.10 to 3.16)	**Exercise hip/knee/trunk**				
38.29 (6.99 to 227.30)	**3.62 (1.72 to 7.87)**	3.16 (0.88 to 10.77)	2.45 (0.55 to 10.10)	2.75 (0.55 to 12.90)	3.43 (0.66 to 26.65)	**Education + exercise**			
16.26 (4.81 to 65.62)	1.56 (0.70 to 3.81)	1.36 (0.79 to 2.37)	1.09 (0.38 to 2.48)	1.22 (0.35 to 3.53)	1.44 (0.41 to 9.10)	0.43 (0.14 to 1.37)	**Education + Orthosis**		
22.14 (4.77 to 116.08)	**2.12 (1.17 to 3.91)**	1.84 (0.65 to 5.06)	1.44 (0.37 to 4.78)	1.62 (0.37 to 6.50)	1.98 (0.44 to 14.30)	0.58 (0.22 to 1.54)	2.34 (0.79 to 7.40)	**Education + Exercise + Patellar taping/ mobilisations**	
38.49 (7.38 to 226.5)	**3.66 (1.38 to 11.13)**	3.19 (0.95 to 11.17)	2.49 (0.57 to 10.14)	2.80 (0.58 to 13.57)	3.44 (0.67 to 27.86)	1.02 (0.29 to 3.77)	2.31 (0.73 to 7.10)	1.72 (0.62 to 5.34)	**Education + Exercise + Patellar taping/mobilisations + Orthosis**

Odds ratio's with their 95% credible intervals from the NMA are shown. For any cell, an odds ratio <1 favours the upper-left treatment, and an odds ratio > 1 favours the lower-right treatment. Comparative treatment effect differences are shown in bold.

Table 4. Sensitivity analysis; treatment level rankings from the network meta-analyses for any improvement at 3 months.

Treatments	**3 months**	
	Mean ranks	**Median rank (95% CrI)**
Education + Exercise therapy + Patellar taping/mobilisations + Orthosis	2.01	2 (1 to 6)
Education + Exercise therapy	2.06	2 (1 to 7)
Education + Exercise therapy + Patellar taping/mobilisations	3.81	3 (1 to 8)
Education + Orthosis	4.92	5 (2 to 8)
Exercise hip/knee with blood flow restriction	5.31	5 (1 to 9)
Exercise hip/knee with real-time feedback	5.90	6 (1 to 9)
Exercise hip/knee/trunk	6.77	7 (2 to 9)
Exercises hip/knee	6.88	7 (4 to 9)
Education	7.36	8 (4 to 9)
Wait-and-see	9.98	10 (10 to 10)

95% CrI = 95% credible interval, * results from a fixed-effects model with random between treatment within class effect.