Supplemental Online Content

Saueressig T, Owen PJ, Zebisch J, Herbst M, Belavy DL. Evaluation of exercise interventions and outcomes after hip arthroplasty: a systematic review and meta-analysis. *JAMA Netw Open*. 2021;4(2):e210254. doi:10.1001/jamanetworkopen.2021.0254

This supplemental material has been provided by the authors to give readers additional information about their work.

Appendix 1. Search Strategy

Date	Database (filters)	Search Terms	Number of articles
13.03.2020	PubMed/MEDLINE (None)	Arthroplasty, Replacement, Prostheses, Hip, Exercise Therapy, Exercise, Physical Therapy Modalities, Exercise Movement Techniques, Preoperative Care, Perioperative Care, Postoperative Care, Prehabilitation	**300**
13.03.2020	CENTRAL (trials)	Arthroplasty, Replacement, Prostheses, Hip, Exercise Therapy, Exercise, Physical Therapy Modalities, Exercise Movement Techniques, Preoperative Care, Perioperative Care, Postoperative Care, Prehabilitation	**302**
14.03.2020	CINAHL (none)	hip replacement, hip arthroplasty, hip replacement surgery, exercise, physical activity, rehabilitation, treatment, therapy	**102**
14.03.2020	EMBASE (MEDLINE was excluded from search)	Arthroplasty, Replacement, Prostheses, Hip, Exercise Therapy, Exercise, Physical Therapy Modalities, Exercise Movement Techniques, Preoperative Care, Perioperative Care, Postoperative Care, Prehabilitation	**101**

Full Search strategy for PubMed (example)

((((((("arthroplasty"[MeSH Terms] OR "arthroplasty"[All Fields]) OR "arthroplasties"[All Fields]) OR (((((((("replace"[All Fields] OR "replaceable"[All Fields]) OR "replaced"[All Fields]) OR "replaces"[All Fields]) OR "replacing"[All Fields]) OR "replacment"[All Fields]) OR "replantation"[MeSH Terms]) OR "replantation"[All Fields]) OR "replacement"[All Fields]) OR "replacements"[All Fields])) OR "Protheses"[All Fields]) AND ("hip"[MeSH Terms] OR "hip"[All Fields])) AND (((((("exercise therapy"[MeSH Terms] OR ("exercise"[All Fields] AND "therapy"[All Fields])) OR "exercise therapy"[All Fields]) OR ((((((((("exercise"[MeSH Terms] OR "exercise"[All Fields]) OR "exercises"[All Fields]) OR "exercise therapy"[MeSH Terms]) OR ("exercise"[All Fields] AND "therapy"[All Fields])) OR "exercise therapy"[All Fields]) OR "exercise s"[All Fields]) OR "exercised"[All Fields]) OR "exerciser"[All Fields]) OR "exercisers"[All Fields]) OR "exercising"[All Fields])) OR (("physical therapy modalities"[MeSH Terms] OR (("physical"[All Fields] AND "therapy"[All Fields]) AND "modalities"[All Fields])) OR "physical therapy modalities"[All Fields])) OR ((((((((((("exercise"[MeSH Terms] OR "exercise"[All Fields]) OR "exercises"[All Fields]) OR "exercise therapy"[MeSH Terms]) OR ("exercise"[All Fields] AND "therapy"[All Fields])) OR "exercise therapy"[All Fields]) OR "exercise s"[All Fields]) OR "exercised"[All Fields]) OR "exerciser"[All Fields]) OR "exercisers"[All Fields]) OR "exercising"[All Fields]) AND (((("movement"[MeSH Terms] OR "movement"[All Fields]) OR "movements"[All Fields]) OR "movement s"[All Fields]) AND (((((("methods"[MeSH Subheading] OR "methods"[All Fields]) OR "techniques"[All Fields]) OR "methods"[MeSH Terms]) OR "technique"[All Fields]) OR "technique s"[All Fields])))) AND (((((("preoperative care"[MeSH Terms] OR ("preoperative"[All Fields] AND "care"[All Fields])) OR "preoperative care"[All Fields]) OR (("perioperative care"[MeSH Terms] OR ("perioperative"[All Fields] AND "care"[All Fields])) OR "perioperative care"[All Fields])) OR (("postoperative care"[MeSH Terms] OR ("postoperative"[All Fields] AND "care"[All Fields])) OR "postoperative care"[All Fields])) OR ("prehabilitation"[All Fields] OR "prehabilitative"[All Fields]))

Appendix 2. Summary of Excluded Studies With Reason

Preoperative Studies	
Citation	**Excluded with reason(s)**
Crowe, J., & Henderson, J. (2003). Pre-arthroplasty rehabilitation is effective in reducing hospital stay. *Canadian journal of occupational therapy*, *70*(2), 88-96.	Intervention was education.
Fernandes, Linda, et al. "Supervised neuromuscular exercise prior to hip and knee replacement: 12-month clinical effect and cost-utility analysis alongside a randomised controlled trial." *BMC musculoskeletal disorders* 18.1 (2017): 5.	No separate outcomes for hip.
Gilbey, H. J., Ackland, T. R., Wang, A. W., Morton, A. R., Trouchet, T., & Tapper, J. (2003). Exercise improves early functional recovery after total hip arthroplasty. *Clinical Orthopaedics and Related Research®*, *408*, 193-200.	Added hydrotherapy to intervention.
Hansen, T. B., Bredtoft, H. K., & Larsen, K. (2012). Preoperative physical optimization in fast-track hip and knee arthroplasty. *Dan Med J*, *59*(2), A4381.	Intervention was education.
Hermann, A., Holsgaard-Larsen, A., Zerahn, B., Mejdahl, S., & Overgaard, S. (2016). Preoperative progressive explosive-type resistance training is feasible and effective in patients with hip osteoarthritis scheduled for total hip arthroplasty–a randomized controlled trial. *Osteoarthritis and cartilage*, *24*(1), 91-98.	All relevant outcomes are already included in Holsgaard-Larsen (2020).
Hoogeboom, Thomas J., et al. "Preoperative therapeutic exercise in frail elderly scheduled for total hip replacement: a randomized pilot trial." *Clinical rehabilitation* 24.10 (2010): 901-910.	Did not evaluate postoperative outcomes.
McGregor, A. H., Rylands, H., Owen, A., Doré, C. J., & Hughes, S. P. (2004). Does preoperative hip rehabilitation advice improve recovery and patient satisfaction? *The Journal of arthroplasty*, *19*(4), 464-468.	Intervention is mainly education. Exercises are not specified.
Pour, Aidin Eslam, et al. "Minimally invasive hip arthroplasty: what role does patient preconditioning play?." *JBJS* 89.9 (2007): 1920-1927.	Intervention is surgery. Exercises not specified.
Rooks, Daniel S., et al. "Effect of preoperative exercise on measures of functional status in men and women undergoing total hip and knee arthroplasty." *Arthritis Care & Research: Official Journal of the American College of Rheumatology* 55.5 (2006): 700-708.	Water-based intervention added.
Saw, M. M., et al. "Significant improvements in pain after a six-week physiotherapist-led exercise and education intervention, in patients with	No separate outcomes for hip.

osteoarthritis awaiting arthroplasty, in South Africa: a randomised controlled trial." *BMC musculoskeletal disorders* 17.1 (2016): 236.	
Siggeirsdottir, Kristin, et al. "Short hospital stay augmented with education and home-based rehabilitation improves function and quality of life after hip replacement: randomized study of 50 patients with 6 months of follow-up." *Acta orthopaedica* 76.4 (2005): 555-562.	Intervention was predominantly education. Exercises were done after surgery.
Wijgman, A. J., et al. "No positive effect of preoperative exercise therapy and teaching in patients to be subjected to hip arthroplasty." *Nederlands tijdschrift voor geneeskunde* 138.19 (1994): 949.	Dutch language.

Postoperative Studies	
Citation	**Excluded with reason(s)**
Abbas, C., and J. Daher. "Pilot study: post-operative rehabilitation pathway changes and implementation of functional closed kinetic chain exercise in total hip and total knee replacement patient." *Journal of Bodywork and Movement Therapies* 21.4 (2017): 823-829.	No RCT.
Aprile, I., et al. "Group rehabilitation versus individual rehabilitation following knee and hip replacement: a pilot study with randomized, single-blind, cross-over design." *Eur J Phys Rehabil Med* 47.4 (2011): 551-559.	No separate outcomes for hip.
Beaupre, Lauren A., et al. "A randomized pilot study of a comprehensive postoperative exercise program compared with usual care following primary total hip arthroplasty in subjects less than 65 years of age: feasibility, selection of outcome measures and timing of assessment." *BMC musculoskeletal disorders* 15.1 (2014): 192.	Aquatic component.
Correia, Fernando Dias, et al. "Digital Versus Conventional Rehabilitation After Total Hip Arthroplasty: A Single-Center, Parallel-Group Pilot Study." *JMIR rehabilitation and assistive technologies* 6.1 (2019): e14523.	No RCT. Assignment via geographical location.
Chen, Antonia F., et al. "Effect of immediate postoperative physical therapy on length of stay for total joint arthroplasty patients." *The Journal of arthroplasty* 27.6 (2012): 851-856.	No RCT. Prospective cohort study.
Eichler, Sarah, et al. "The Effectiveness of Telerehabilitation as a Supplement to Rehabilitation in Patients After Total Knee or Hip Replacement: Randomized Controlled Trial." *JMIR rehabilitation and assistive technologies* 6.2 (2019): e14236.	No separate outcomes for hip.
Giaquinto, S., et al. "Hydrotherapy after total hip arthroplasty: a follow-up study." *Archives of gerontology and geriatrics* 50.1 (2010): 92-95.	Intervention group received massage for 20 min.

Hesse, S., Werner, C., Seibel, H., von Frankenberg, S., Kappel, E. M., Kirker, S., & Käding, M. (2003). Treadmill training with partial body-weight support after total hip arthroplasty: a randomized controlled trial. *Archives of physical medicine and rehabilitation*, *84*(12), 1767-1773.	30-minute sessions of occupational therapy and passive PT (eg, massage, heat, ultrasound), and 25-minute sessions of group therapy in the swimming pool for 10 days.
Heiberg, Kristi E., and Wender Figved. "Physical Functioning and Prediction of Physical Activity After Total Hip Arthroplasty: Five-Year Follow up of a Randomized Controlled Trial." *Arthritis care & research* 68.4 (2016): 454-462.	No relevant outcomes for this systematic review that are not Heiberg et al. (2012).
Jogi, Pankaj, et al. "Effectiveness of balance exercises in the acute post-operative phase following total hip and knee arthroplasty: A randomized clinical trial." *SAGE open medicine* 3 (2015): 2050312115570769.	No separate outcomes for the hip joint.
Li-hua, Huang, et al. "Comparison of different intervention time of systematic rehabilitation following total hip replacement." *Journal of Clinical Rehabilitative Tissue Engineering Research* 13.9 (2009): 1755-1758.	This study is in Chinese and not in German or English language.
Mahomed, Nizar N., et al. "Inpatient compared with home-based rehabilitation following primary unilateral total hip or knee replacement: a randomized controlled trial." *JBJS* 90.8 (2008): 1673-1680.	No separate outcomes for the hip joint.
Matheis, Clarissa, and Thomas Stöggl. "Strength and mobilization training within the first week following total hip arthroplasty." *Journal of bodywork and movement therapies* 22.2 (2018): 519-527.	Therapy was only conducted in the hospital. Therapy was not conducted after leaving the hospital.
Moffet, Hélène, et al. "Patient satisfaction with in-home telerehabilitation after total knee arthroplasty: results from a randomized controlled trial." *Telemedicine and e-Health* 23.2 (2017): 80-87.	Total Knee Arthroplasty.
Möller, Gudrun, Ian Goldie, and Egon Jonsson. "Hospital care versus home care for rehabilitation after hip replacement." *International journal of technology assessment in health care* 8.1 (1992): 93-101.	No RCT.
NAKANOWATARI, Tatsuya, Yoshimi SUZUKAMO, and Shin-Ichi IZUMI. "The Effectiveness of Specific Exercise Approach or Modifiable Heel Lift in the Treatment of Functional Leg Length Discrepancy in Early Post-surgery Inpatients after Total Hip Arthroplasty: A Randomized Controlled Trial with a PROBE design." *Physical therapy research* 19.1 (2016): 39-49.	Therapy was only conducted in the hospital. Therapy was not conducted after leaving the hospital.
Oldmeadow, Leonie B., et al. "Targeted postoperative care improves discharge outcome after hip or knee arthroplasty." *Archives of physical medicine and rehabilitation* 85.9 (2004): 1424-1427.	No RCT.
Patterson, A. J., et al. "The effect of minimal exercise on fitness in elderly women after hip surgery." *The Ulster medical journal* 64.2 (1995): 118.	No RCT. Assignment via geographical location.

Rahmann, Ann E., Sandra G. Brauer, and Jennifer C. Nitz. "A specific inpatient aquatic physiotherapy program improves strength after total hip or knee replacement surgery: a randomized controlled trial." *Archives of physical medicine and rehabilitation* 90.5 (2009): 745-755.	Therapy was only conducted in the hospital. Therapy was not conducted after leaving the hospital.
Rapp, Walter, et al. "Improvement of walking speed and gait symmetry in older patients after hip arthroplasty: a prospective cohort study." *BMC musculoskeletal disorders* 16.1 (2015): 291.	No RCT.
Sashika, Hironobu, Yoshiko Matsuba, and Yuka Watanabe. "Home program of physical therapy: effect on disabilities of patients with total hip arthroplasty." *Archives of physical medicine and rehabilitation* 77.3 (1996): 273-277.	No RCT.
Schache, Margaret B., Jodie A. McClelland, and Kate E. Webster. "Incorporating hip abductor strengthening exercises into a rehabilitation program did not improve outcomes in people following total knee arthroplasty: a randomised trial." *Journal of physiotherapy* 65.3 (2019): 136-143.	Knee Arthroplasty
Stockton, Kellie A., and Kerrie A. Mengersen. "Effect of multiple physiotherapy sessions on functional outcomes in the initial postoperative period after primary total hip replacement: a randomized controlled trial." *Archives of physical medicine and rehabilitation* 90.10 (2009): 1652-1657.	Therapy was only conducted in the hospital. Therapy was not conducted after leaving the hospital.
Ström, H., Huss, K., & Larsson, S. (2006). Unrestricted weight bearing and intensive physiotherapy after uncemented total hip arthroplasty. *Scandinavian journal of surgery*, *95*(1), 55-60.	Included water exercises.
Suetta, Charlotte, et al. "Resistance training induces qualitative changes in muscle morphology, muscle architecture, and muscle function in elderly postoperative patients." *Journal of applied physiology* 105.1 (2008): 180-186.	No relevant additional outcome data in comparison to Suetta et al. (2004).
Umpierres, C. S. A., Ribeiro, T. A., Marchisio, Â. E., Galvão, L., Borges, Í. N. K., de Souza Macedo, C. A., & Galia, C. R. (2014). Rehabilitation following total hip arthroplasty evaluation over short follow-up time: Randomized clinical trial. *Journal of Rehabilitation Research & Development*, *51*(10).	Therapy was only conducted in the hospital. Therapy was not conducted after leaving the hospital.
Uy, Cesar, Susan E. Kurrle, and Ian D. Cameron. "Inpatient multidisciplinary rehabilitation after hip fracture for residents of nursing homes: a randomised trial." *Australasian journal on ageing* 27.1 (2008): 43-44.	Trial was not finished.

Perioperative Studies	
Citation	**Excluded with reason(s)**
Larsen, Kristian, et al. "Cost-effectiveness of accelerated perioperative care and rehabilitation after total hip and knee arthroplasty." *JBJS* 91.4 (2009): 761-772.	Outcomes not measured separately for knee and hip arthroplasty. No relevant outcomes for analysis.
Sigurdsson, Eyjolfur, et al. "Early discharge and home intervention reduces unit costs after total hip replacement: results of a cost analysis in a randomized study." *International journal of health care finance and economics* 8.3 (2008): 181-192.	Only cost-analysis. No separate outcome data for the score. Very unclear description of intervention.
Wang, A. W., Gilbey, H. J., & Ackland, T. R. (2002). Perioperative exercise programs improve early return of ambulatory function after total hip arthroplasty: a randomized, controlled trial. *American journal of physical medicine & rehabilitation*, *81*(11), 801-806.	Included hydrotherapy.

Appendix 3. Risk of Bias Assessment for All Outcomes

Risk of Bias Assessment of preoperative studies

Abbreviation

D1: Bias due to randomization

D2: Bias due to deviations from intended intervention

D3: Bias due to missing data

D4: Bias due to outcome measurement

D5: Bias due to selection of results

Function

Closest to 1-year (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Bitterli	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns
Holsgaard-Larsen	Low	Some concerns	Low	Some concerns	High	High
Gocen	High	Some concerns	Low	Some concerns	Some concerns	High
Vukomanovic	High	Some concerns	Some concerns	Some concerns	Some concerns	High

Closest to 26 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Holsgaard-Larsen	Low	Some concerns	Low	Some concerns	High	High

Closest to 12 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Bitterli	Low	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns
Doiron-Cadrin	Low	Low	Low	Some concerns	Some concerns	Some concerns
Ferrara	High	Some concerns	High	Some concerns	Some concerns	High
Gocen	High	Some concerns	Low	Some concerns	Some concerns	High
Holsgaard-Larsen	Low	Some concerns	Low	Some concerns	High	High
Villadsen	Low	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns

Closest to 12 weeks (active control)

Study	D1	D2	D3	D4	D5	Overall
Doirin-Cadrin	Low	Low	Low	Some concerns	Some concerns	Some concerns
Gill	Low	Some concerns	Low	Low	Some concerns	Some concerns

Closest to 4 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Oosting	Low	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns
Villadsen	Low	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns

Closest to 4 weeks (active control)

Study	D1	D2	D3	D4	D5	Overall
Gill	Low	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns

Closest to after the intervention (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Gocen	High	Some concerns	Low	Some concerns	Some concerns	High
Vukomanović	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns

Pain Intensity

Closest to 12 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Ferrara	Some concerns	Low	Some concerns	Some concers	Some concerns	Some concerns

Closest to 4 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Oosting	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns

Closest to after the intervention (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Gocen	High	Some concerns	Low	Some concerns	Some concerns	High
Vukomanovic	High	Some concerns	Some concerns	Some concerns	Some concerns	High

Quality of life

Closest to 1-year (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Bitterli	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns

Closest to 12 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Bitterli	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns
Doiron-Cadrin	Low	Some concerns	Low	Some concerns	Some concerns	Some concerns
Ferrara	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns
Villadsen	Low	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns

Closest to 12 weeks (active control)

Study	D1	D2	D3	D4	D5	Overall
Doiron-Cadrin	Low	Some concerns	Low	Some concerns	Some concerns	Some concerns
Gill	Low	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns

Closest to 4 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Villadsen	Low	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns

Closest to 4 weeks (active control)

Study	D1	D2	D3	D4	D5	Overall
Gill	Low	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns

Gait Speed

Closest to 1-year (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Holsgaard-Larsen	Low	Some concerns	Low	Some concerns	High	High

Closest to 12 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Doirin-Cadrin	Low	Some concerns	Low	Low	Some concerns	Some concerns
Holsgaard-Larsen	Low	Some concerns	Low	Some concerns	High	High

Closest to 12 weeks (active control)

Study	D1	D2	D3	D4	D5	Overall
Doirin-Cadrin	Low	Some concerns	Low	Low	Some concerns	Some concerns
Gill	Low	Some concerns	Some concerns	Low	Some concerns	Some concerns

Closest to 4 weeks (active control)

Study	D1	D2	D3	D4	D5	Overall
Gill	Low	Some concerns	Some concerns	Low	Some concerns	Some concerns

Strength

Closest to 1-year (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Holsgaard-Larsen	Low	Some concerns	Low	Some concerns	High	High

Closest to 12 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Doirin-Cadrin	Low	Some concerns	Low	Low	Some concerns	Some concerns
Holsgaard-Larsen	Low	Some concerns	Low	Some concerns	High	High

Closest to 12 weeks (active control)

Study	D1	D2	D3	D4	D5	Overall
Doirin-Cadrin	Low	Some concerns	Low	Low	Some concerns	Some concerns
Gill	Low	Some concerns	Some concers	Low	Some concerns	Some concerns

Closest to 4 weeks (active control)

Study	D1	D2	D3	D4	D5	Overall
Gill	Low	Some concerns	Some concers	Low	Some concerns	Some concerns

Range of Motion

Closest to 12 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Ferrara	Some concerns	Some concerns	Low	Low	Some concerns	Some concerns

Length of stay in the hospital

Study	D1	D2	D3	D4	D5	Overall
Bitterli	Low	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns
Oosting	Low	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns
Vukomanovic	High	Some concerns	Some concerns	Some concerns	Some concerns	High

Risk of Bias Assessment of postoperative studies

Abbreviation

D1: Bias due to randomization

D2: Bias due to deviations from intended intervention

D3: Bias due to missing data

D4: Bias due to outcome measurement

D5: Bias due to selection of results

Function

Closest to 1-year (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Austin	Low	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns
Beck	Some concerns	High	Some concerns	Some concerns	High	High
Heiberg	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns
Mikkelsen 2014	Low	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns
Winther	Some concerns	Some concerns	Low	Some concerns	High	High

Closest to 1-year (active control)

Study	D1	D2	D3	D4	D5	Overall
Boden	Low	High	Low	Some concerns	Some concerns	High
Maire	High	High	Low	Some concerns	Some concerns	High
Monticone	Low	Some concerns	Low	Some concerns	Some concerns	Some concerns

Closest to 26 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Beck	Some concerns	High	Some concerns	Some concerns	High	High
Coulter	Low	Some concerns	Low	Some concerns	Some concerns	Some concerns
Heiberg	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns
Mikkelsen 2014	Low	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns
Monaghan	Low	Some concerns	Low	Some concerns	Some concerns	Some concerns

Closest to 26 weeks (active control)

Study	D1	D2	D3	D4	D5	Overall
Nelson	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns

Closest to 12 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Coulter	Low	Some concerns	Low	Some concerns	Some concerns	Some concerns
Mikkelsen 2012	Low	Some concerns	Low	Some concerns	Some concerns	Some concerns
Mikkelsen 2014	Low	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns
Winther	Some concerns	Some concerns	Low	Some concerns	High	High

Closest to 12 weeks (active control)

Study	D1	D2	D3	D4	D5	Overall
Maire	High	Some concerns	Low	Some concerns	Some concerns	High
Mitrovic	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns

Closest to 4 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Austin	Low	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns
Coulter	Low	Some concerns	Low	Some concerns	Some concerns	Some concerns
Mikkelsen 2012	Low	Some concerns	Low	Some concerns	Some concerns	Some concerns
Mikkelsen 2014	Low	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns

Closest to 4 weeks (active control)

Study	D1	D2	D3	D4	D5	Overall
Maire	High	Some concerns	Low	Some concerns	Some concerns	High
Nelson	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns

Closest to after the intervention (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Galea	High	Some concerns	Low	Some concerns	Some concerns	High
Jan	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns

Closest to after the intervention (active control)

Study	D1	D2	D3	D4	D5	Overall
Mitrovic	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns
Monticone	Low	Some concerns	Low	Some concerns	Some concerns	Some concerns
Trudelle-Jackson	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns

Pain Intensity

Closest to 1-year (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Beck	Some concerns	High	Some concerns	Some concerns	High	High
Winther	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns

Closest to 1-year (active control)

Study	D1	D2	D3	D4	D5	Overall
Monticone	Low	Some concerns	Low	Some concerns	Some concerns	Some concerns

Closest to 26 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Beck	Some concerns	High	Some concerns	Some concerns	High	High
Monaghan	Low	Some concerns	Low	Some concerns	Some concerns	Some concerns
Winther	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns

Closest to 12 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Winther	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns

Closest to after the intervention (active control)

Study	D1	D2	D3	D4	D5	Overall
Monticone	Low	Some concerns	Low	Some concerns	Some concerns	Some concerns
Nankaku	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns

Quality of life

Closest to 1-year (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Austin	Low	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns
Beck	Some concerns	High	Some concerns	Some concerns	Some concerns	High
Husby	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns

Closest to 1-year (active control)

Study	D1	D2	D3	D4	D5	Overall
Monticone	Low	Some concerns	Low	Some concerns	Some concerns	Some concerns

Closest to 26 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Beck	Some concerns	High	Some concerns	Some concerns	Some concerns	High
Coulter	Low	Some concerns	Low	Some concerns	Some concerns	Some concerns
Husby	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns
Monaghan	Low	Some concerns	Low	Some concerns	Some concerns	Some concerns

Closest to 26 weeks (active control)

Study	D1	D2	D3	D4	D5	Overall
Nelson	Some concerns	Some concerns	Low	Some concerns	High	High

Closest to 12 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Coulter	Low	Some concerns	Low	Some concerns	Some concerns	Some concerns
Mikkelsen 2012	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns

Closest to 12 weeks (active control)

Study	D1	D2	D3	D4	D5	Overall
Mitrovic	High	Some concerns	Low	Some concerns	Some concerns	High

Closest to 4 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Austin	Low	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns
Coulter	Low	Some concerns	Low	Some concerns	Some concerns	Some concerns
Husby	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns
Mikkelsen 2012	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns

Closest to 4 weeks (active control)

Study	D1	D2	D3	D4	D5	Overall
Nelson	Some concerns	Some concerns	Low	Some concerns	High	High

Closest to after the intervention (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Galea	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns
Husby	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns

Closest to after the intervention (active control)

Study	D1	D2	D3	D4	D5	Overall
Mitrovic	High	Some concerns	Low	Some concerns	Some concerns	High
Monticone	Low	Some concerns	Low	Some concerns	Some concerns	Some concerns

Gait Speed

Closest to 26 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Mikkelsen 2014	Low	Some concerns	Some concerns	Low	Some concerns	Some concerns

Closest to 12 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Mikkelsen 2012	Some concerns	Some concerns	Low	Low	Some concerns	Some concerns
Mikkelsen 2014	Low	Some concerns	Some concerns	Low	Some concerns	Some concerns
Suetta	High	Some concerns	Some concerns	Some concerns	Some concerns	High

Closest to 12 weeks (active control)

Study	D1	D2	D3	D4	D5	Overall
Suetta	High	Some concerns	Some concerns	Some concerns	Some concerns	High

Closest to 4 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Mikkelsen 2012	Some concerns	Some concerns	Low	Low	Some concerns	Some concerns
Mikkelsen 2014	Low	Some concerns	Some concerns	Low	Some concerns	Some concerns
Suetta	High	Some concerns	Some concerns	Some concerns	Some concerns	High

Closest to 4 weeks (active control)

Study	D1	D2	D3	D4	D5	Overall
Suetta	High	Some concerns	Some concerns	Some concerns	Some concerns	High

Closest to after the intervention (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Jan	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns
Unlu	Some concerns	Some concerns	Low	Low	Some concerns	Some concerns

Closest to after the intervention (active control)

Study	D1	D2	D3	D4	D5	Overall
Unlu	Some concerns	Some concerns	Low	Low	Some concerns	Some concerns

Hip Strength

Closest to 1-year (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Beck	Some concerns	High	Some concerns	Some concerns	High	High
Heiberg	Low	Some concerns	Low	Low	Some concerns	Some concerns
Husby	High	Some concerns	Low	Some concerns	Some concerns	High
Winther	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns

Closest to 1-year (active control)

Study	D1	D2	D3	D4	D5	Overall
Okoro	High	Some concerns	High	Low	Some concerns	High

Closest to 26 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Beck	Some concerns	High	Some concerns	Some concerns	High	High
Heiberg	Low	Some concerns	Low	Low	Some concerns	Some concerns
Husby	High	Some concerns	Low	Some concerns	Some concerns	High
Johnsson	High	High	Some concerns	Some concerns	Some concerns	High
Mikkelsen 2014	Low	Some concerns	Some concerns	Low	Some concerns	Some concerns
Winther	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns

Closest to 26 weeks (active control)

Study	D1	D2	D3	D4	D5	Overall
Nelson	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns

Closest to 12 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Mikkelsen 2012	Low	Some concerns	Low	Low	Some concerns	Some concerns
Mikkelsen 2014	Low	Some concerns	Some concerns	Low	Some concerns	Some concerns
Suetta	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns
Winther	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns

Closest to 12 weeks (active control)

Study	D1	D2	D3	D4	D5	Overall
Suetta	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns

Closest to 4 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Husby	High	Some concerns	Low	Some concerns	Some concerns	High
Mikkelsen 2012	Low	Some concerns	Low	Low	Some concerns	Some concerns
Mikkelsen 2014	Low	Some concerns	Some concerns	Low	Some concerns	Some concerns
Suetta	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns

Closest to 4 weeks (active control)

Study	D1	D2	D3	D4	D5	Overall
Nelson	Some concerns	Some concerns	Low	Some concerns	Some concerns	Some concerns
Suetta	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns

Closest to after the intervention (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Galea	High	Some concerns	Low	Some concerns	Some concerns	High
Husby	High	Some concerns	Low	Some concerns	Some concerns	High
Jan	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns
Morishima	High	Some concerns	Low	Some concerns	Some concerns	High
Nankaku	High	Some concerns	Low	Some concerns	Some concerns	High
Unlu	Some concerns	Some concerns	Low	Low	Some concerns	Some concerns

Closest to after the intervention (active control)

Study	D1	D2	D3	D4	D5	Overall
Trudelle-Jackson	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns
Unlu	Some concerns	Some concerns	Low	Low	Some concerns	Some concerns

Range of Motion

Closest to 1-year (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Heiberg	Low	Some concerns	Low	Low	Some concerns	Some concerns

Closest to 26 weeks (usual care or no/minimal intervention)

Study	D1	D2	D3	D4	D5	Overall
Heiberg	Low	Some concerns	Low	Low	Some concerns	Some concerns
Johnsson	High	High	Some concerns	Some concerns	Some concerns	High

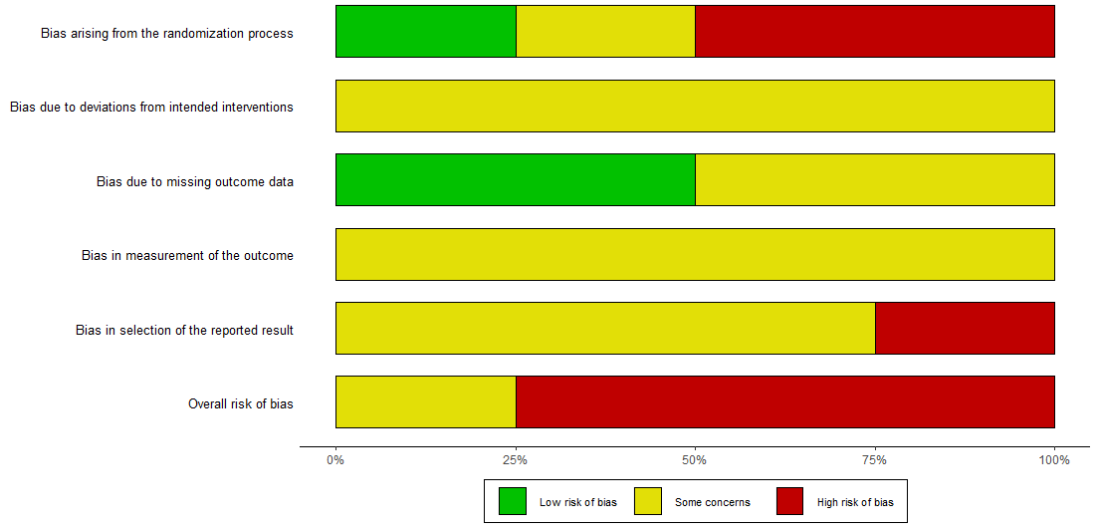
Closest to after the intervention (active control)

Study	D1	D2	D3	D4	D5	Overall
Nankaku	High	Some concerns	Low	Some concerns	Some concerns	High

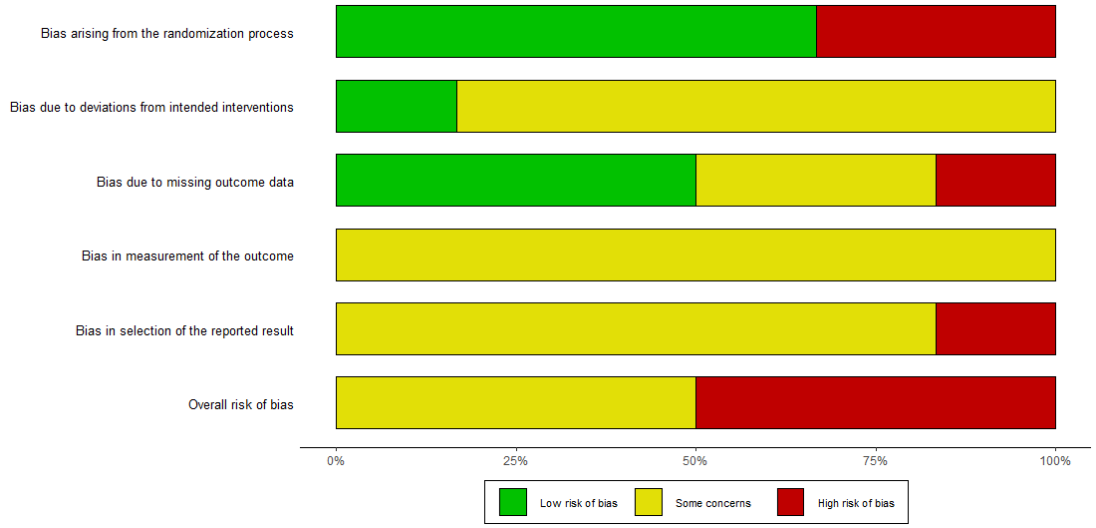
Appendix 4. Summary Plots for Risk of Bias Assessment for Meta-analytic Results

Preoperative studies

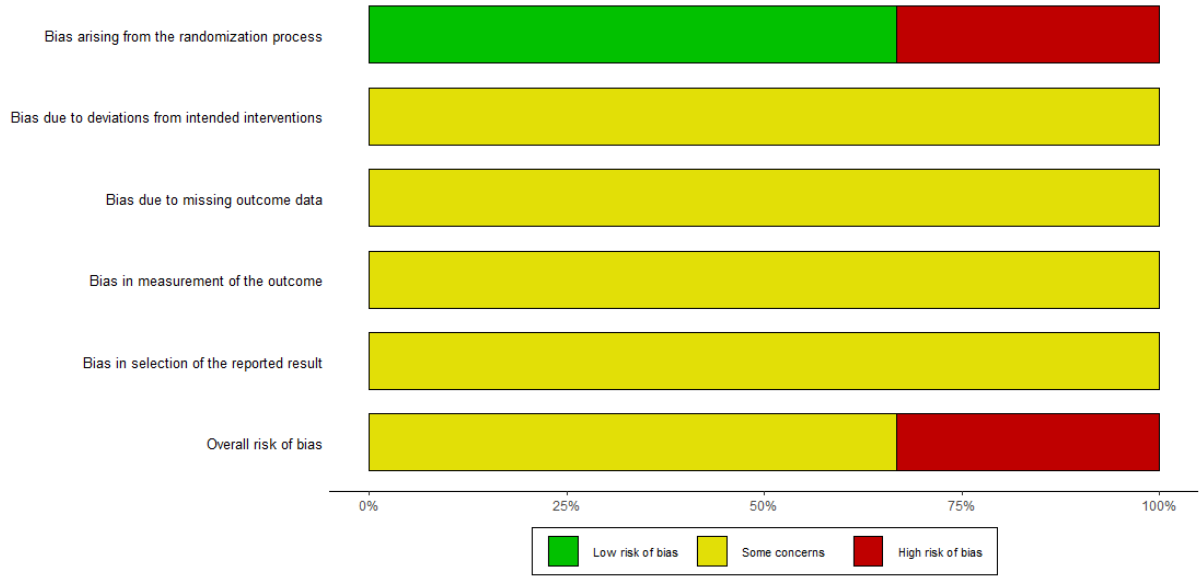
Function – 1 year (usual care or no/minimal intervention)



Function - 12 weeks (usual care or no/minimal intervention)

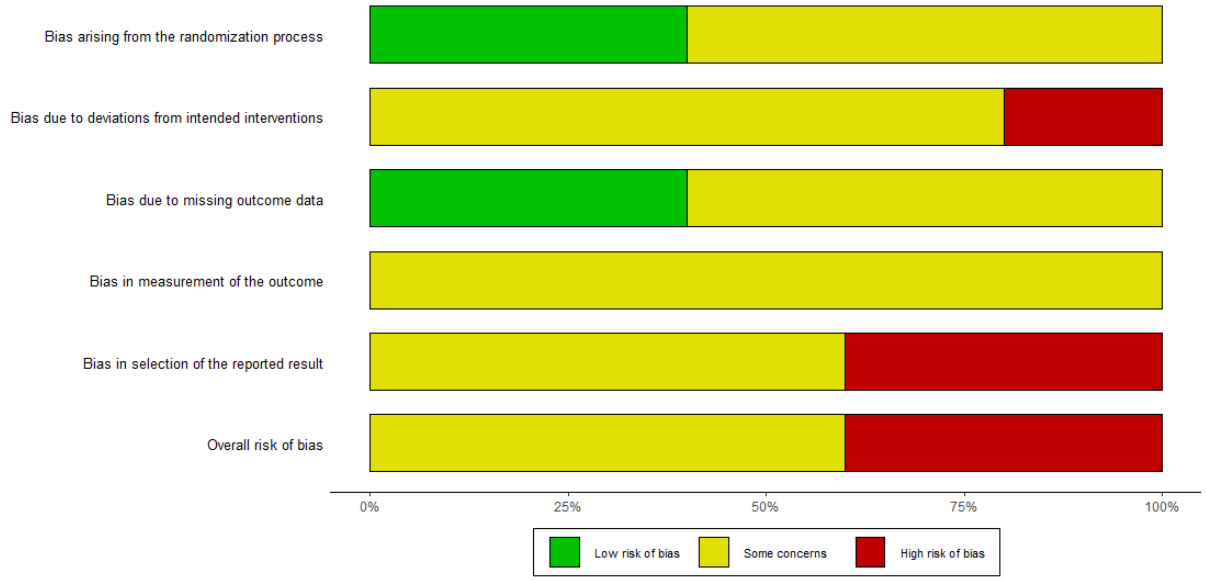


Length of stay in the hospital

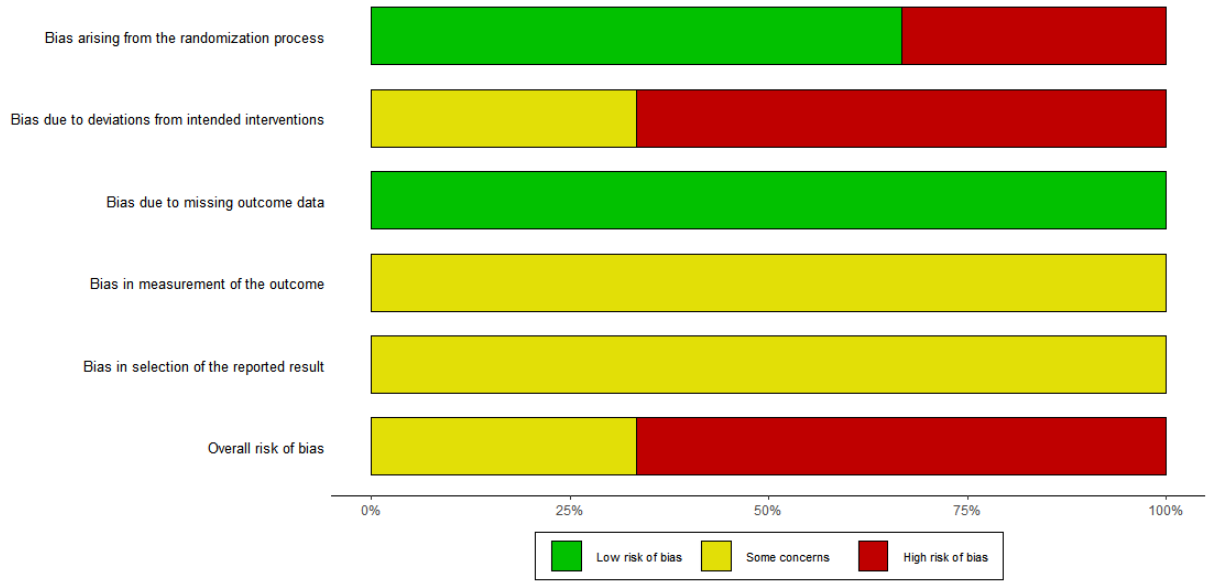


Postoperative studies

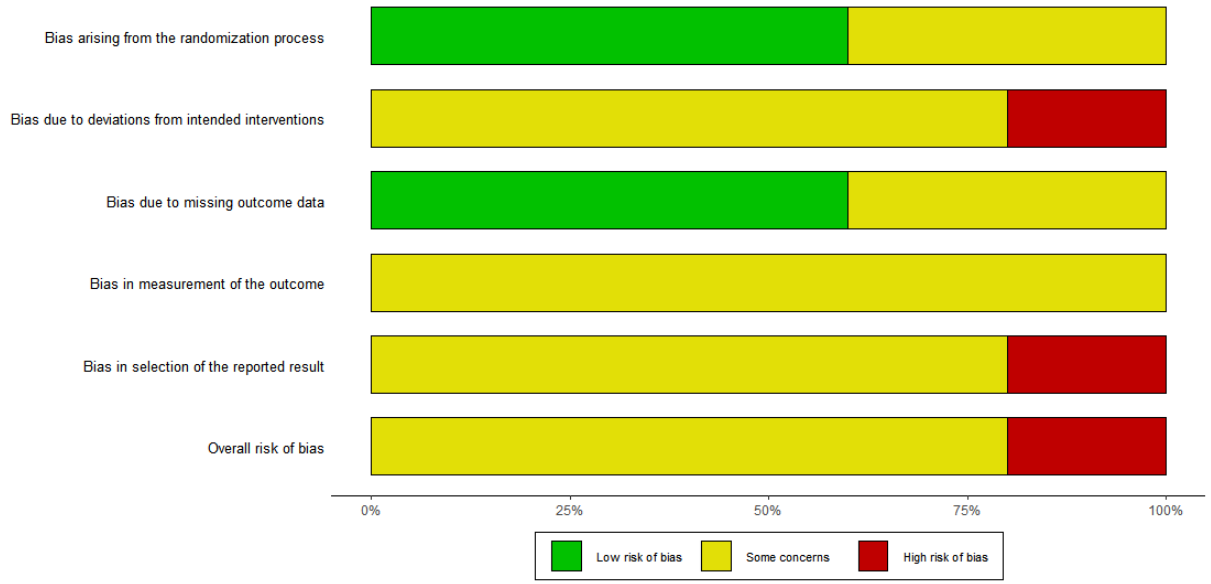
Function – Closest to 1 year (usual care or no/minimal intervention)



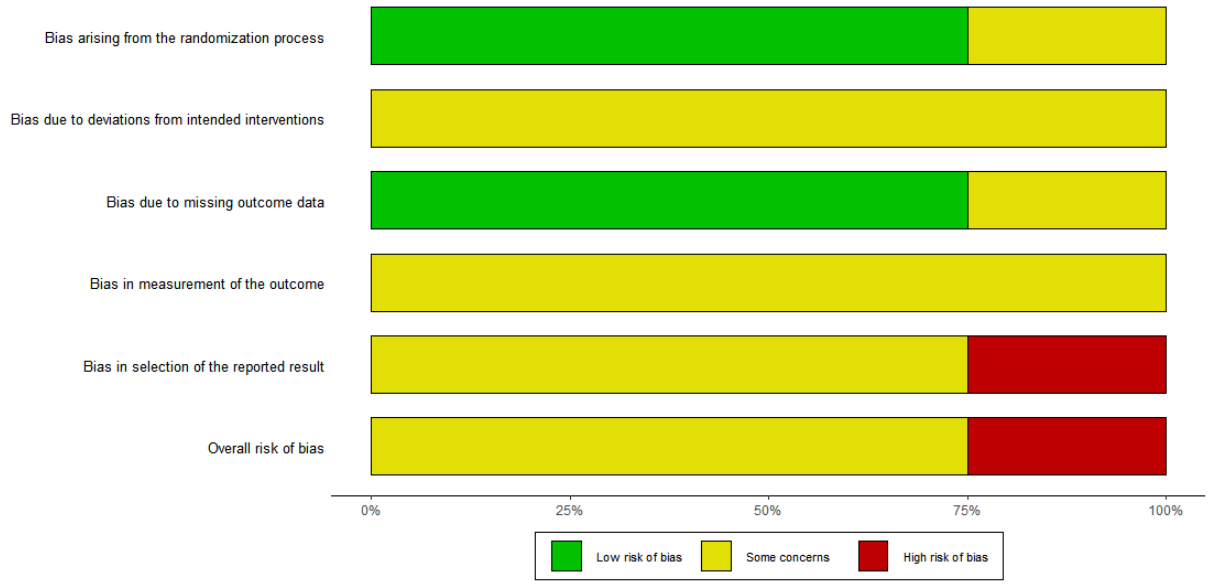
Function – Closest to 1 year (active control)



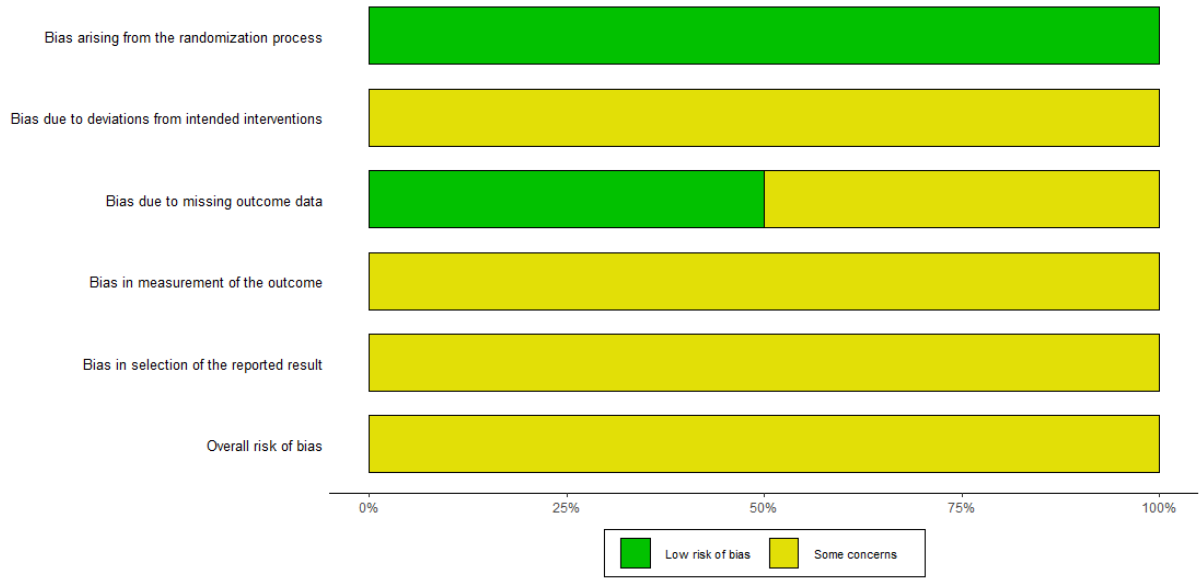
Function – Closest to 26 weeks (usual care or no/minimal intervention)



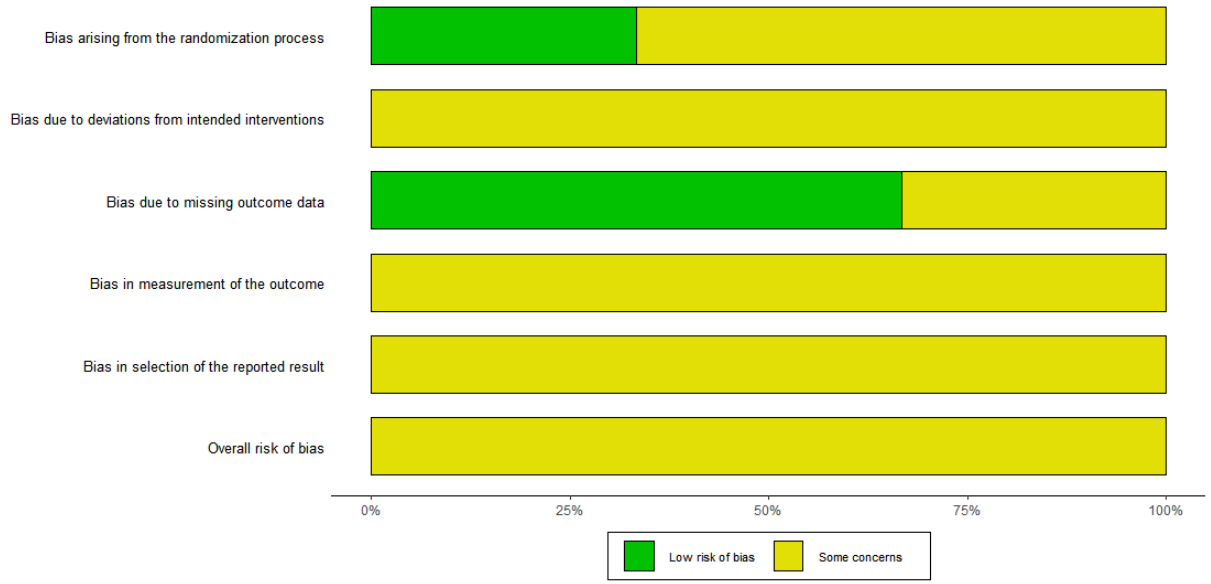
Function – Closest to 12 weeks (usual care or no/minimal intervention)



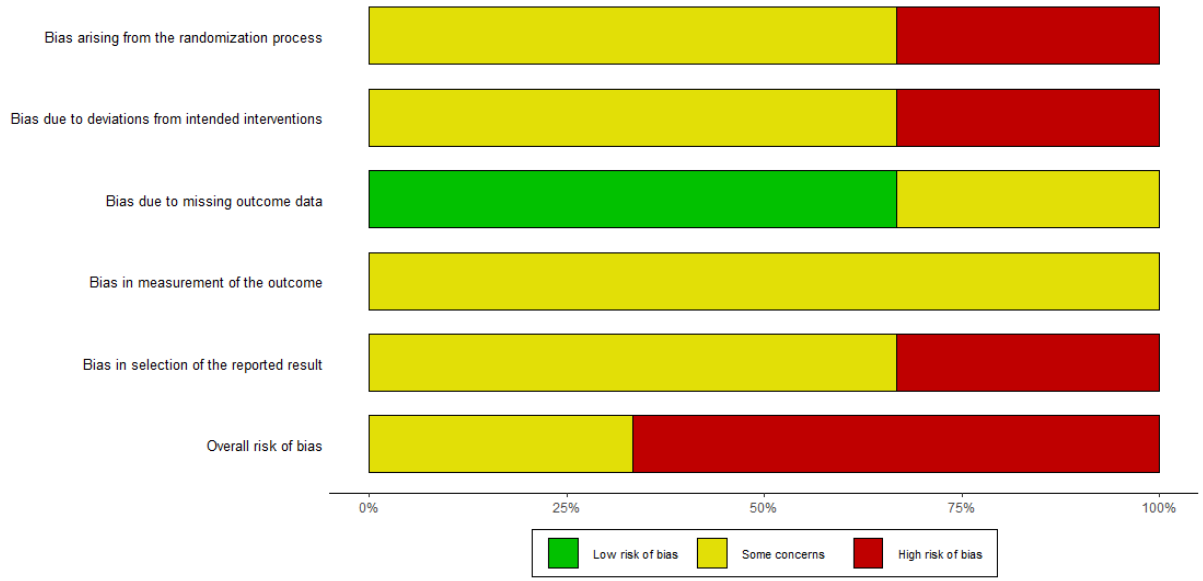
Function – Closest to 4 weeks (usual care or no/minimal intervention)



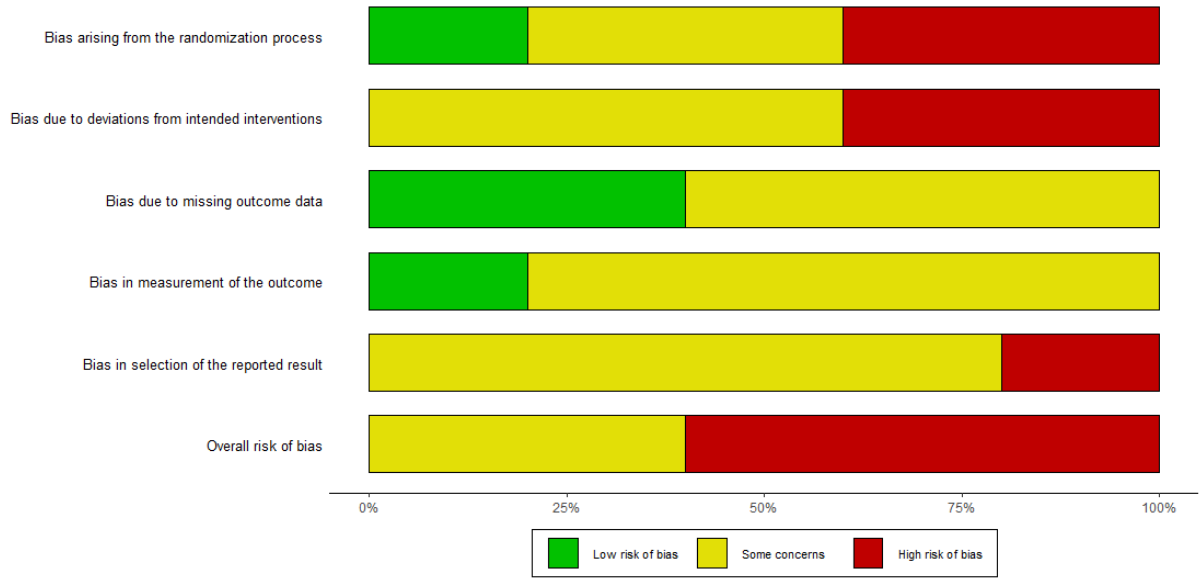
Function – Closest to after the intervention (active comparator)



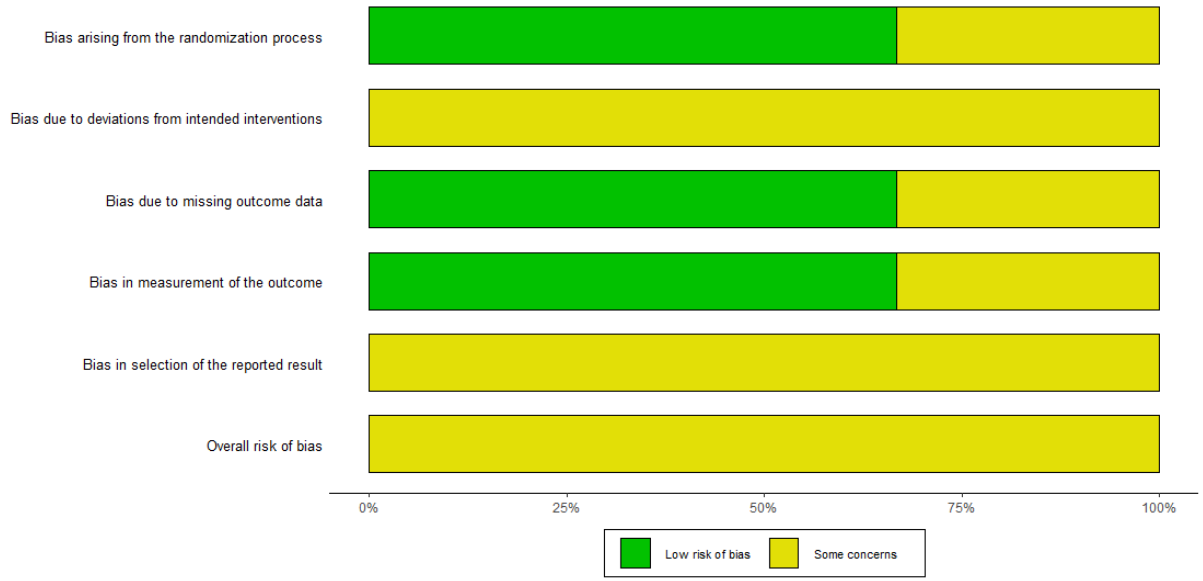
Hip Abduction Strength - Closest to 1 year (usual care or no/minimal intervention)



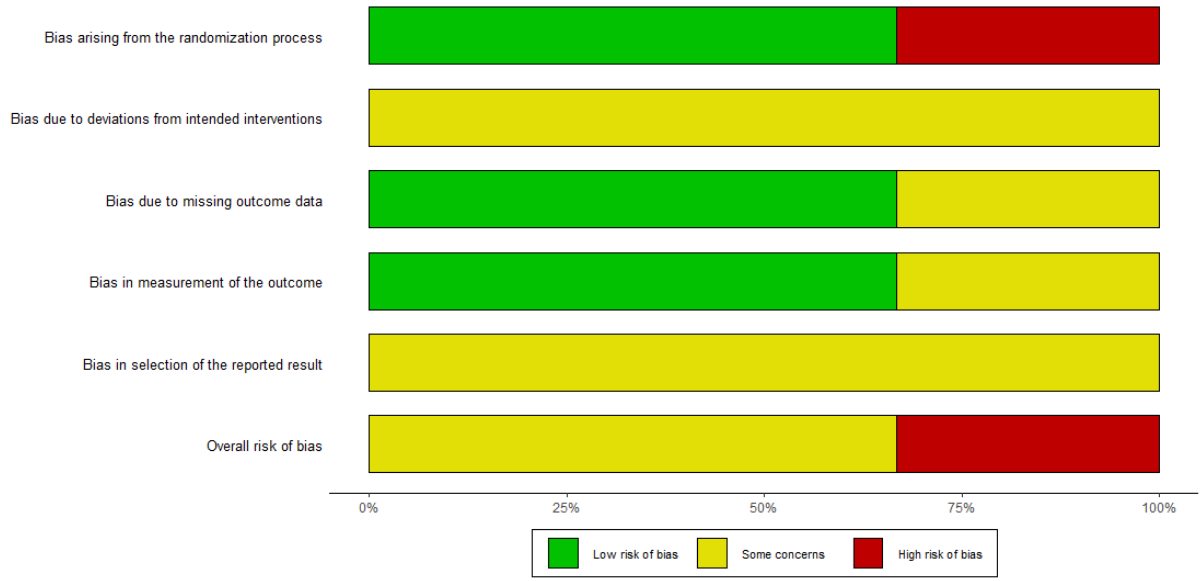
Hip Abduction Strength and Hip Flexion Strength - Closest to 26 weeks (usual care or no/minimal intervention)



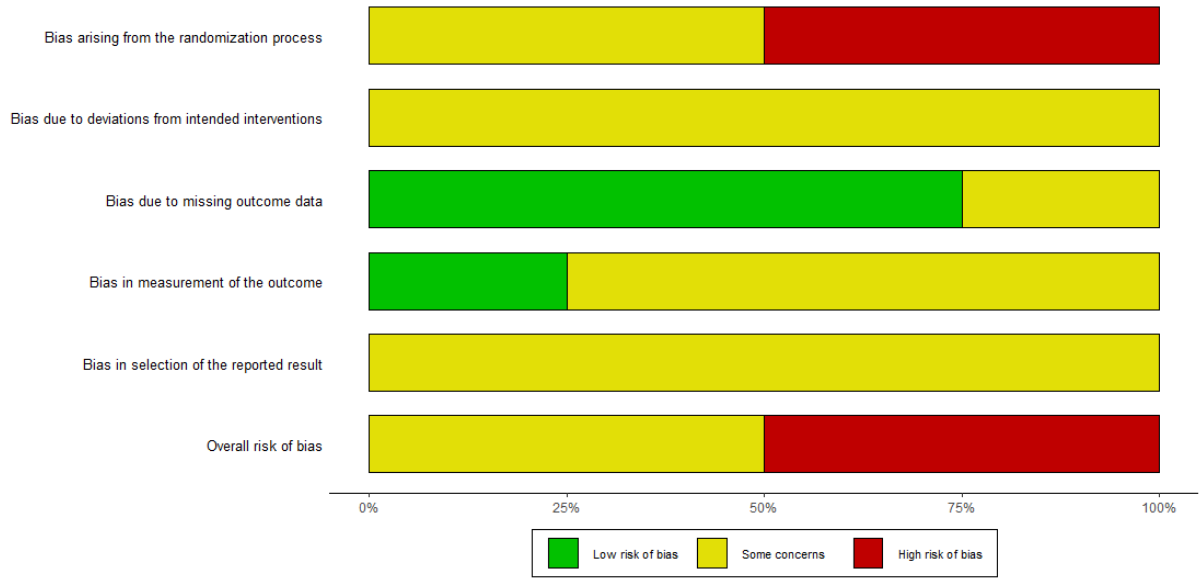
Hip Abduction Strength - Closest to 12 weeks (usual care or no/minimal intervention)



Hip Abduction Strength - Closest to 4 weeks (usual care or no/minimal intervention)



Hip Abduction Strength - Closest to after the intervention (usual care or no/minimal intervention)



Appendix 5. GRADE Assessment of Meta-analytic Results

Preoperative exercise

Outcome	Risk of Bias	Inconsistency	Indirectness	Imprecision	Publication bias	Result
Function Closest to 1 year (usual care or no/minimal intervention)	Downgraded by two level. Serious limitation from bias due to randomization and bias in selection of the reported results.	Downgraded by one level. Heterogeneity cannot be explained. I^2=34%	No evidence of indirectness.	Downgraded by one level. The confidence interval is consistent with an effect for and against the intervention.	Assessment not possible.	**Very Low** (⊙○○○)
Function Closest to 12 weeks (usual care or no/minimal intervention)	Downgraded by one level. Serious limitation from bias due to randomization, bias due to missing data and bias in selection of the reported results.	Downgraded by one level. Heterogeneity cannot be explained. I^2=52%	No evidence of indirectness.	Downgraded by one level. The confidence interval is consistent with an effect for and against the intervention.	Assessment not possible.	**Very Low** (⊙○○○)
Length of stay (usual care or no/minimal intervention)	Downgraded by one level. Serious limitation from bias due to randomization.	No downgrade. Low degree of heterogeneity. I^2 = 0%	No evidence of indirectness.	No downgrade. The confidence interval does not entail a clinical meaningful result	Assessment not possible.	**Moderate** (⊙⊙⊙○)

Postoperative exercise

Outcome	Risk of Bias	Inconsistency	Indirectness	Imprecision	Publication bias	Result
Function Closest to 1 year (usual care or no/minimal intervention)	Downgraded by one level. Serious limitation from bias due deviations from intended interventions and bias in selection of reported results.	No downgrade. Low degree of heterogeneity. $I^2 = 0\%$	No evidence of indirectness.	Downgraded by one level. The confidence interval for the effect estimate is consistent with an effect for and against the intervention. Sensitivity analysis for CI of pooled effect shows a wider confidence interval.	Assessment not possible.	**Low** (⊙⊙○○)
Function Closest to 1 year (active control)	Downgraded by one level. Serious limitation from bias due randomization, bias due to deviations from intended interventions and bias due to randomization	Downgraded by one level. Heterogeneity cannot be explained. $I^2=52\%$	No evidence of indirectness.	Downgraded by two levels. The confidence interval is very wide and the effect estimate is consistent with an effect for and against the intervention. An Influential study was found that impacted on results.	Assessment not possible.	**Very Low** (⊙○○○)
Function	No downgrade.	No downgrade.	No evidence of indirectness.	Downgraded by one level.	Assessment not possible.	**Moderate** (⊙⊙⊙○)

Closest to 26 weeks (usual care or no/minimal intervention)	Most information is from results with some concerns.	Low degree of heterogeneity. $I^2 = 0\%$		The confidence interval for the effect estimate is consistent with an effect for and against the intervention.		
Function Closest to 12 weeks (usual care or no/minimal intervention)	No downgrade. Most information is from results with some concerns.	No downgrade. Low degree of heterogeneity. $I^2 = 0\%$	No evidence of indirectness.	Downgraded by one level. The confidence interval for the effect estimate is consistent with an effect for and against the intervention. Sensitivity analysis for CI of pooled effect shows a wider confidence interval.	Assessment not possible.	**Moderate** (⊙⊙⊙○)
Function Closest to 4 weeks (usual care or no/minimal intervention)	No downgrade. All information is from results with some concerns.	No downgrade. Low degree of heterogeneity. $I^2 = 0\%$	No evidence of indirectness.	Downgraded by one level. The confidence interval for the effect estimate is consistent with an effect for and against the intervention.	Assessment not possible.	**Moderate** (⊙⊙⊙○)
Function	No downgrade. All	Downgraded by one level.	No evidence of indirectness.	Downgraded by two levels.	Assessment not possible.	**Very Low** (⊙○○○)

Closest to after the intervention (active control)	information is from results with some concerns.	Heterogeneity cannot be explained. I^2=38%		The confidence interval is very wide and the effect estimate is consistent with an effect for and against the intervention. An Influential study was found that impacted on results.		
Hip abduction strength Closest to 1 year (usual care or no/minimal intervention)	Downgraded by two level. Serious limitation from bias due to randomization, bias in selection of the reported results and bias due to deviations from intended interventions.	No downgrade. Low degree of heterogeneity. I^2 = 0%	No evidence of indirectness.	Downgraded by two levels. The confidence interval is very wide and the effect estimate is consistent with an effect for and against the intervention.	Assessment not possible.	**Very Low** (⊙○○○)
Hip abduction strength Closest to 26 weeks (usual care or no/minimal intervention)	Downgraded by two level. Serious limitation from bias due to randomization, bias in selection of the reported results and bias due to deviations from intended interventions.	Downgraded by one level. Heterogeneity cannot be explained. I^2=54.7%	No evidence of indirectness.	Downgraded by two levels. The confidence interval is very wide and the effect estimate is consistent with an effect for and against the intervention. An	Assessment not possible.	**Very Low** (⊙○○○)

				Influential study was found that impacted on results.		
Hip flexion strength Closest to 26 weeks (usual care or no/minimal intervention)	Downgraded by two level. Serious limitation from bias due to randomization, bias in selection of the reported results and bias due to deviations from intended interventions.	Downgraded by one level. Heterogeneity cannot be explained. I^2=57.8%	No evidence of indirectness.	Downgraded by two levels. The confidence interval is very wide and the effect estimate is consistent with an effect for and against the intervention.	Assessment not possible.	**Very Low** (⊙○○○)
Hip abduction strength Closest to 12 weeks (usual care or no/minimal intervention)	No downgrade. All information is from results with some concerns.	Downgraded by one level. Heterogeneity cannot be explained. I^2=54.4%	No evidence of indirectness.	Downgraded by two levels. The confidence interval is very wide and the effect estimate is consistent with an effect for and against the intervention.	Assessment not possible.	**Very Low** (⊙○○○)
Hip abduction strength Closest to 4 weeks (usual care or no/minimal intervention)	Downgraded by one level. Serious limitation from bias due randomization.	Downgraded by one level. Heterogeneity cannot be explained. I^2=79.4%	No evidence of indirectness.	Downgraded by two levels. The confidence interval is very wide and the effect estimate is consistent with an effect for and against the	Assessment not possible.	**Very Low** (⊙○○○)

				intervention. An Influential study was found that impacted on results.		
Hip abduction strength Closest to after the intervention (usual care or no/minimal intervention)	Downgraded by one level. Serious limitation from bias due randomization.	Downgraded by one level. Heterogeneity cannot be explained. I^2=64.8%	No evidence of indirectness.	Downgraded by two levels. The confidence interval is very wide and the effect estimate is consistent with an effect for and againt the intervention. An Influential study was found that impacted on results.	Assessment not possible.	**Very Low** (⊙○○○)

The quality of evidence is categorized as follows:

- **High** (⊙⊙⊙⊙): further research is very unlikely to change the confidence in the estimate of effect.
- **Moderate** (⊙⊙⊙○): further research is likely to have an important impact in the confidence in the estimate of effect.
- **Low** (⊙⊙○○): further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
- **Very Low** (⊙○○○): any estimate of effect is very uncertain.

Appendix 6. Structured Reporting of Effects

Preoperative outcomes

Function

Outcome (scale details)	Intervention (n)	Control (n)	SMD/MD (95% Confidence Interval)	Overall risk of bias
Closest to 26 weeks (usual care or no/minimal intervention)				
Holsgaard-Larsen 2020 (HOOS ADL)	**30**	**36**	SMD -0.1199 [-0.6048; 0.3650]	**High**
Closest to 12 weeks (active control)				
Doirin-Cadrin 2019 (WOMAC function)	6	6	SMD 1.0523 [-0.1678; 2.2724]	**Some Concerns**
Gill 2009 (WOMAC function)	34	32	SMD -0.0341 [-0.5168; 0.4486]	**Some concerns**
Closest to 4 weeks (active control)				
Gill 2009 (WOMAC function)	36	39	SMD -0.2654 [-0.7205; 0.1897]	**Some concerns**
Closest to 4 weeks (usual care or no/minimal intervention)				
Oosting 2012 (HOOS ADL)	14	12	SMD -0.2822 [-1.0574; 0.4930]	**Some concerns**
Villadsen 2014 (HOOS ADL)	43	41	SMD -0.1130 [-0.5413; 0.3153]	**Some concerns**
After Intervention (usual care or no/minimal intervention)				
Gocen 2004 (HHS)	30	30	SMD -0.1775 [-0.6845; 0.3295]	**High**
Vukomanović 2008 (HHS)	20	20	SMD -0.1749 [-0.7960; 0.4462]	**Some concerns**

Pain Intensity

Outcome (scale details)	Intervention (n)	Control (n)	SMD/MD (95% Confidence Interval)	Overall risk of bias
Closest to 12 weeks (usual care or no/minimal intervention)				
Ferrara 2008 (VAS with activity)	11	12	SMD -0.8199 [-1.7144; 0.0746]	**Some concerns**
Closest to 4 weeks (usual care or no/minimal intervention)				
Oosting 2012 (Pain Score)	14	12	SMD -0.1138 [-0.8854; 0.6578]	**Some concerns**
After Intervention (usual care or no/minimal intervention)				
Gocen 2004 (VAS with activity)	30	30	SMD -0.0355 [-0.5459; 0.4749]	**High**
Vukomanović 2008 (VAS with activity)	20	20	SMD -0.0707 [-0.6906; 0.5492]	**High**

Quality of life

Outcome (scale details)	Intervention (n)	Control (n)	SMD/MD (95% Confidence Interval)	Overall risk of bias
Closest to 1 year (usual care or no/minimal intervention)				
Bitterli 2011 (Single score of SF-36-physical function)	30	32	SMD 0.3824 [-0.1203; 0.8851]	**Some concerns**
Closest to 12 weeks (active control)				
Doirin-Cadrin 2019 (SF-36 PCS)	6	6	SMD -0.3406 [-1.4817; 0.8005]	**Some concerns**
Doirin-Cadrin 2019 (SF-36 MCS)	6	6	SMD -0.9684 [-2.1753; 0.2385]	**Some concerns**
Gill 2009 (SF-36 MCS)	34	32	SMD 0.0609 [-0.4220; 0.5438]	**Some concerns**
Closest to 12 weeks (usual care or no/minimal intervention)				
Bitterli 2011 (Single score of SF-36-physical function)	30	32	SMD 0.4888 [0.0026; 0.9750]	**Some concerns**
Doirin-Cadrin 2019 (SF-36 PCS)	12	5	SMD -0.3569 [-1.1820; 0.4682]	**Some concerns**
Doirin-Cadrin 2019 (SF-36 MCS)	12	5	SMD -1.0644 [-2.1737; 0.0449]	**Some concerns**
Ferrara 2008 (SF-36 PCS)	11	10	SMD -0.6155 [-1.4936; 0.2626]	**Some concerns**
Ferrara 2008	11	10	SMD -0.2084	**Some concerns**

(SF-36 MCS)			[-1.0673; 0.6505]	
Villadsen 2014 (EQ-5D)	43	41	SMD -0.3129 [-0.7433; 0.1175]	**Some concerns**
Closest to 4 weeks (usual care or no/minimal intervention)				
Villadsen 2014 (EQ-5D)	43	41	SMD -0.5214 [-0.9526; -0.0902]	**Some concerns**
Closest to 4 weeks (active control)				
Gill 2009 (SF-36 MCS)	34	32	SMD -0.4910 [-0.9812; -0.0008]	**Some concerns**

Gait speed

Outcome (scale details)	Intervention (n)	Control (n)	SMD/MD (95% Confidence Interval)	Overall risk of bias
Closest to one year (usual care or no/minimal intervention)				
Holsgaard-Larsen 2020 (25 m, max speed (m/s))	34	34	SMD -0.1482 [-0.6243; 0.3279]	**High**
Closest to 12 weeks (active control)				
Doirin-Cadrin 2019 (Self-paced Walking Test in s)	6	6	MD -4.2000 [-8.9960; 0.5960]	**Some concerns**
Gill 2009 (50-Foot Timed Walk in s)	34	32	MD -0.5000 [-2.8480; 1.8480]	**Some concerns**
Closest to 12 weeks (usual care or no/minimal intervention)				
Doirin-Cadrin 2019 (Self-paced Walking Test in s)	12	5	MD -3.5000 [-10.4108; 3.4108]	**Some concerns**
Holsgaard-Larsen 2020 (25 m, max speed (m/s))	36	38	SMD -0.2123 [-0.6694; 0.2448]	**High**
Closest to 4 weeks (active control				
Gill 2009 (50-Foot Timed Walk in s)	36	39	MD -0.5000 [-2.3620; 1.3620]	**Some concerns**

Lower body strength

Outcome (scale details)	Intervention (n)	Control (n)	SMD/MD (95% Confidence Interval)	Overall risk of bias
Closest to 1 year (usual care or no/minimal intervention)				
Holsgaard-Larsen 2020 (Chair rise in (s))	34	34	SMD -0.0565 [-0.5320; 0.4190]	**High**
Holsgaard-Larsen 2020 (Knee extension (Nm/s))	34	34	SMD -0.1797 [-0.6560; 0.2966]	**High**
Holsgaard-Larsen 2020 (Hip extension (Nm/s))	34	34	SMD -0.1373 [-0.6132; 0.3386]	**High**
Closest to 12 weeks (active control)				
Doirin-Cadrin 2019 (Stair Test in s)	6	6	MD -4.8000 [-10.2977; 0.6977]	**Some concerns**
Gill 2009 (30-second Chair Stand Test)	34	32	MD 1.5000 [-0.6344; 3.6344]	**Some concerns**
Closest to 12 weeks (usual care or no/minimal intervention)				
Doirin-Cadrin 2019 (Stair Test in s)	12	5	MD -1.2000 [-6.2175; 3.8175]	**Some concerns**
Holsgaard-Larsen 2020 (Chair rise in (s))	36	38	SMD -0.2466 [-0.7043; 0.2111]	**High**
Holsgaard-Larsen 2020 (Knee extension (Nm/s))	36	38	SMD -0.3547 [-0.8141; 0.1047]	**High**
Holsgaard-Larsen 2020 (Hip extension (Nm/s))	36	38	SMD -0.1628 [-0.6195; 0.2939]	**High**
Closest to 4 weeks (active control)				
Gill 2009 (30-second Chair Stand Test)	36	39	MD 1.9000 [0.0224; 3.7776]	**Some concerns**

If applicable the operated side was chosen.

Lower Body Range of motion

Outcome (scale details)	Intervention (n)	Control (n)	SMD/MD (95% Confidence Interval)	Overall risk of bias
Closest to 12 weeks (usual care or no/minimal intervention)				
Ferrara 2008 (Hip Abduction in °)	11	10	MD -3.9100 [-8.6022; 0.7822]	**Some concerns**
Ferrara 2008 (Hip External Rotation in °)	11	10	MD 0.1400 [-0.9693; 1.2493]	**Some concerns**

Postoperative outcomes

Function

Outcome (scale details)	Intervention (n)	Control (n)	SMD/MD (95% Confidence Interval)	Overall risk of bias
Closest to 26 weeks (active control)				
Nelson 2019 (HOOS ADL)	35	34	SMD -0.2822 [-0.7532; 0.1888]	**Some concerns**
Closest to 12 weeks (active control)				
Maire 2002-2006 (WOMAC Global Score)	7	7	SMD -0.2569 [-1.3094; 0.7956]	**High**
Mitrovic 2016 (HHS)	35	35	SMD-0.5497 [-1.0271; -0.0723]	**Some concerns**
Closest to 4 weeks (active control)				
Maire 2003-2006 (WOMAC Global Score)	7	7	SMD -0.2569 [-1.3094; 0.7956]	**High**
Nelson 2019 (HOOS ADL)	35	34	SMD 0.0758 [-0.3964; 0.5480]	**Some concerns**
Closest to after the Intervention (usual care or no/minimal intervention)				
Galea 2008	11	12	SMD -0.3796 [-1.2055; 0.4463]	**High**
Jan 2004 (HHS Functional activity part)	13+13=26	27	SMD -0.6638 [-1.2175; -0.1101]	**Some concerns**

Pain Intensity

Outcome (scale details)	Intervention (n)	Control (n)	SMD/MD (95% Confidence Interval)	Overall risk of bias
Closest to 1 year (active control)				
Monticone 2014 (NRS)	45	44	SMD -0.2904 [-0.7081; 0.1273]	**Some concerns**
Closest to 1 year (usual care or no/minimal intervention)				
Beck 2019 (VAS)	57	41	SMD -0.3400 [-0.7441; 0.0641]	**High**
Winther 2018 (NRS)	25	25	SMD -0.0954 [-0.6501; 0.4593]	**Some concerns**
Closest to 26 weeks (usual care or no/minimal intervention)				
Winther 2018 (NRS)	26	26	SMD -0.1682 [-0.7237; 0.3873]	**Some concerns**
Closest to 26 weeks (usual care or no/minimal intervention)				
Beck 2019 (VAS)	63	52	SMD 0.0000 [-0.3673; 0.3673]	**High**
Monhagan 2016 (VAS)	32	31	SMD -0.1411 [-0.6356; 0.3534]	**Some concerns**
Closest to 12 weeks (active control)				
Winther 2018 (NRS)	27	27	SMD -0.2262 [-0.7824; 0.3300]	**Some concerns**
Closest to after the intervention (active control)				
Monticone 2014 (VAS)	47	48	SMD -0.5483 [-0.9581; -0.1385]	**Some concerns**
Nankaku 2016 (JOA Subscore for pain)	14	14	SMD -0.6458 [-1.4069; 0.1153]	**Some concerns**

Quality of life

Outcome (scale details)	Intervention (n)	Control (n)	SMD/MD (95% Confidence Interval)	Overall risk of bias
Closest to 1 year (active control)				
Monticone 2014 (Single scores of SF-12-Physical Function)	45	44	SMD - 0.6169 [-1.0424; -0.1915]	**Some concerns**
Monticone 2014 (Single scores of SF-12 – Mental Health)	45	44	SMD -0.4299 [-0.8503; -0.0095]	**Some concerns**
Closest to 1 year (usual care or no/minimal intervention)				
Austin 2017 (PCS)	52	52	SMD -0.2167 [-0.6383; 0.2049]	**Some concerns**
Husby 2010 (SF-36 - PCS)	12	8	SMD 0.0914 [-0.7733; 0.9561]	**Some concerns**
Husby 2010 (SF-36 - MCS)	12	8	SMD -0.3384 [-1.2396; 0.5628]	**Some concerns**
Beck 2019 (EQ-5D)	57	41	SMD -0.0807 [-0.4823; 0.3209]	**High**
Closest to 26 weeks (usual care or no/minimal intervention)				
Husby 2010 (SF-36 - PCS)	12	11	SMD 0.1377 [-0.6816; 0.9570]	**Some concerns**
Husby 2010 (SF-36 - MCS)	12	11	SMD -0.4746 [-1.3050; 0.3558]	**Some concerns**
Closest to 26 weeks (active control)				
Nelson 2019	35	34	SMD -0.3956	**High**

(SF-12 -PCS)			[-0.8687; 0.0775]	
Nelson 2019 (SF-12 – MCS)			SMD -0.3956 [-0.8687; 0.0775]	**High**
Closest to 26 weeks (usual care or no/minimal intervention)				
Beck 2019 (EQ-5D)	63	52	SMD -0.3834 [-0.7540; -0.0128]	**High**
Coulter 2017 (SF-36 PCS)	56	42	SMD -0.3920 [-0.7959; 0.0119]	**Some concerns**
Coulter 2017 (SF-36 MCS)	56	42	SMD -0.1095 [-0.5099; 0.2909]	**Some concerns**
Monhagan 2016 (SF-12 PCS)	32	31	SMD -0.4442 [-0.9485; 0.0601]	**Some concerns**
Monhagan 2016 (SF-12 MCS)	32	31	SMD -0.4442 [-0.9485; 0.0601]	**Some concerns**
Closest to 12 weeks (active control)				
Mitrovic 2016 (Single scores of SF-36- Physic al Function)	35	35	SMD -0.6818 [-1.1640; -0.1996]	**High**
Mitrovic 2016 (Single scores of SF-36- Ment al Function)	35	35	SMD -0.2495 [-0.7199; 0.2209]	**High**
Closest to 12 weeks (usual care or no/minimal intervention)				
Coulter 2017 (SF-36 PCS)	56	42	SMD 0.0035 [-0.3965; 0.4035]	**Some concerns**

Coulter 2017 (SF-36 MCS)	56	42	SMD -0.2079 [-0.6091; 0.1933]	**Some concerns**
Mikkelsen 2012 (EQ-5D)	23	21	SMD -0.9056 [-1.5278; -0.2834]	**Some concerns**
Closest to 4 weeks (active control)				
Nelson 2019 (SF-12 PCS)	35	35	SMD -0.4945 [-0.9704; -0.0186]	**High**
Nelson 2019 (SF-12 MCS)	35	35	SMD 0.0941 [-0.3747; 0.5629]	**High**
Closest to 4 weeks (usual care or no/minimal intervention)				
Austin 2017 (PCS)	43	44	SMD -0.0767 [-0.4612; 0.3078]	**Some concerns**
Coulter 2017 (PCS)	56	42	SMD 0.3012 [-0.1010; 0.7034]	**Some concerns**
Coulter 2017 (MCS)	56	42	SMD 0.1054 [-0.2950; 0.5058]	**Some concerns**
Husby 2009 (SF-36 PCS)	12	12	SMD 0.1748 [-0.6270; 0.9766]	**Some concerns**
Mikkelsen 2012 (EQ-5D)	23	21	SMD -0.4743 [-1.0744; 0.1258]	**Some concerns**
Closest to after the intervention (usual care or no/minimal intervention				
Husby 2009 (SF-36 MCS)	12	12	SMD -1.0039 [-1.8565; -0.1513]	**Some concerns**

Closest to after the intervention (active control)				
Galea 2008 (AQoL)	11	12	SMD -0.2115 [-1.0321; 0.6091]	**Some concerns**
Mitrovic 2016 (Single scores of SF-36- Physical Function)	35	35	SMD -0.9883 [-1.4852; -0.4914]	**High**
Mitrovic 2016 (Single scores of SF-36- Mental Function)	35	35	SMD -0.3392 [-0.8112; 0.1327]	**High**
Monticone 2014 (Single scores of SF-12- Physical Function)	47	48	SMD -0.5722 [-0.9826; -0.1617]	**Some concerns**
Monticone 2014 (Single scores of SF-12- Mental Function)	47	48	SMD -0.7299 [-1.1455; -0.3143]	**Some concerns**
SF-36; PCS: Physical Component Score, MCS: Mental Health Component Score				

Gait speed

Outcome (scale details)	Intervention (n)	Control (n)	SMD/MD (95% Confidence Interval)	Overall risk of bias
Closest to 26 weeks (usual care or no/minimal intervention)				
Mikkelsen 2014 (20 m walk test with max speed (m/s))	32	30	MD -0.2100 [-1.4507;1.0307]	**Some concerns**
Closest to 12 weeks (usual care or no/minimal intervention)				
Mikkelsen 2014 (20m walk test with max spee d (m/s))	32	30	MD -0.9100 [-2.0566; 0.2366]	**Some concerns**
Mikkelsen 2012 (10 m walk test (m/s))	23	21	MD 0.1120 [-1.0816; 1.3056]	**Some concerns**
Suetta 2008 (10 m walk test (m/s))	11	9	MD -0.3300 [-0.7612; 0.1012]	**High**
Closest to 12 weeks (active control)				
Suetta 2008* (10 m walk test (m/s))	11	10	MD 0.0700 [-0.4043; 0.5443]	**High**
Closest to 4 weeks (usual care or no/minimal intervention)				
Mikkelsen 2014 (20m walk test with max spee d (m/s))	32	30	MD 0.1300 [-1.4184;1.6784]	**Some concerns**
Mikkelsen 2012 (10 m walk test (m/s))	23	21	MD 0.0210 [-0.1691; 0.2111]	**Some concerns**
Suetta 2008 (10 m walk test (m/s))	11	9	MD -0.2100 [-0.4785; 0.0585]	**High**

Closest to 4 weeks (active control)				
Suetta 2008* (10 m walk test (m/s))	11	10	MD 0.1100 [-0.2330; 0.4530]	**High**
Closest to after the intervention (active control)				
Unlu 2008 (distance walked in 1 min. (m /min))	8	9	MD 17.6500 [0.6434; 34.6566]	**Some concerns**
Closest to after the intervention (usual care or no/minimal intervention)				
Jan 2004 (Fast walking on level ground; m/s)	13+13 = 26	27	MD -13.1500 [-20.1000; -6.2000]	**Some concerns**
Unlu 2008 (distance walked in 1 min. (m /min))	8	9	3.1000 [-7.1663; 13.3663]	**Some concerns**
* Comparator Neuromuscular Electrical Stimulation				

Lower body strength

Outcome (scale details)	Intervention (n)	Control (n)	SMD/MD (95% Confidence Interval)	Overall risk of bias
Closest to 1 year (active control)				
Okoro 2016 (MVC Quadrizeps)	13	13	MD -7.1000 [-73.4115; 59.2115]	**High**
Okoro 2016 (Sit to stand (repetitions))	13	13	MD 0.9500 [-3.2522; 5.1522]	**High**
Okoro 2016 (Stair Climb test in (s))	13	13	MD 0.6800 [-2.1502; 3.5102]	**High**
Closest to 1 year (usual care or no/minimal intervention)				
Beck 2019 (isokinetic dynamometry hip extension (Nm/kg))	57	41	MD -0.0020 [-0.2019; 0.1979]	**High**
Beck 2019 (isokinetic dynamometry hip flexion (Nm/kg))	57	41	MD -0.0700 [-0.1739; 0.0339]	**High**
Beck 2019 (isokinetic dynamometry hip adduction (Nm/kg))	57	41	MD -0.0330 [-0.0879; 0.0219]	**High**
Heiberg 2012 (stair climb test in (s))	35	33	MD 0.0000 [-1.5423; 1.5423]	**Some concerns**
Husby 2010 (Leg press 1RM in kg)	12	8	MD -11.0000 [-32.3479; 10.3479]	**High**
Winther 2018 (Leg press 1RM in kg)	25	25	MD -1.0000 [-14.3513; 12.3513]	**Some concerns**

Closest to 26 weeks (active control)				
Nelson 2019 (isometric dynamometer (kg) knee extension)	35	34	MD -1.2000 [-3.3481; 0.9481]	**Some concern**
Nelson 2019 (isometric dynamometer (kg) hip extension)	35	34	MD -0.5000 [-1.8249; 0.8249]	**Some concerns**
Nelson 2019 (isometric dynamometer (kg) hip adduction)	35	34	MD -0.4000 [-1.0605; 0.2605]	**Some concerns**
Nelson 2019 (isometric dynamometer (kg) hip abduction)	35	34	MD -0.4000 [-1.2996; 0.4996]	**Some concerns**
Nelson 2019 (isometric dynamometer (kg) hip internal rotation)	35	34	MD -0.1000 [-0.7625; 0.5625]	**Some concerns**
Nelson 2019 (isometric dynamometer (kg) hip external rotation)	35	34	MD -0.3000 [-0.7273; 0.1273]	**Some concerns**
Nelson 2019 (isometric dynamometer (kg) hip flexion)	35	34	MD -0.2000 [-1.2505; 0.8505]	**Some concerns**
Closest to 26 weeks (usual care or no/minimal intervention)				
Beck 2019 (isokinetic dynamometry hip extension (Nm/kg))	63	52	MD -0.2300 [-0.4044; -0.0556]	**High**
Beck 2019 (isokinetic dynamometry hip adduction (Nm/kg))	63	52	MD -0.0500 [-0.1068; 0.0068]	**High**
Heiberg 2012 (stair climb test in (s))	35	33	MD -1.0000 [-2.7813; 0.7813]	**Some concerns**

Husby 2010 (Leg press 1RM in kg)	12	11	MD -11.0000 [-26.4092; 4.4092]	**High**
Johnsson 1998 (maximum isometric via strain gauge hip extensors (N))	14	16	MD -42.0000 [-67.3972; -16.6028]	**High**
Johnsson 1998 (maximum isometric via strain gauge hip adductors(N))	14	16	MD -21.0000 [-38.2810; -3.7190]	**High**
Johnsson 1998 (maximum isometric via strain gauge knee extensors (N))	14	16	MD -32.0000 [-63.2967; -0.7033]	**High**
Johnsson 1998 (maximum isometric via strain gauge knee extensors (N))	14	16	MD -75.0000 [-131.9428; -18.0572]	**High**
Mikkelsen 2014 (Sit to stand test (repetitions))	32	30	MD -0.4000 [-2.7912; 1.9912]	**Some concerns**
Mikkelsen 2014 (Stair climb test (s))	32	30	MD 0.0400 [-1.4065; 1.4865]	**Some concerns**
Winther 2018 (Leg press 1RM in kg)	26	26	MD -30.0000 [-63.3762; 3.3762]	**Some concerns**
Closest to 12 weeks (usual care or no/minimal intervention)				
Mikkelsen 2014 (isometric dynamometer hip flexion (Nm/kg))	32	30	MD 0.0700 [-0.0927; 0.2327]	**Some concerns**
Mikkelsen 2014	32	30	MD -1.2800	**Some concerns**

(Sit to stand test (repetitions))			[-3.3203; 0.7603]	
Mikkelsen 2014 (Stair climb test (s))	32	30	MD -1.0500 [-2.8473; 0.7473]	**Some concerns**
Suetta 2004 (Stair climb test (s))	13	12	MD -1.2000 [-3.1541; 0.7541]	**Some concerns**
Suetta 2004 (Sit to stand x 5 (s))	13	12	MD -4.5000 [-6.7775; -2.2225]	**Some concerns**
Suetta 2004 (isokinetic dynamometry quadriceps at 60°/s (Nm))	13	12	MD -32.5000 [-43.6228; -21.3772]	**Some concerns**
Suetta 2004 (isokinetic dynamometry quadriceps at 180°/s (Nm))	13	12	MD -15.9000 [-24.0162; -7.7838]	**Some concerns**
Winther 2018 (Leg press 1RM in kg)	27	27	MD -43.0000 [-59.2716; -26.7284]	**Some concerns**
Closest to 12 weeks (active control)				
Suetta 2004* (Stair climb test (s))	13	11	MD 0.2000 [-1.9089; 2.3089]	**Some concerns**
Suetta 2004* (Sit to stand x 5 (s))	13	11	MD -1.5000 [-3.9010; 0.9010]	**Some concerns**
Suetta 2004* (isokinetic dynamometry quadriceps at 60°/s (Nm))	13	11	MD -26.7000 [-38.7734; -14.6266]	**Some concerns**
Suetta 2004* (isokinetic dynamometry quadriceps at 180°/s (Nm))	13	11	MD -11.8000 [-20.1377; -3.4623]	**Some concerns**

Closest to 4 weeks (usual care or no/minimal intervention)				
Husby 2009 (Leg press 1RM in kg)	12	12	MD -30.0000 [-43.8119; -16.1881]	**High**
Mikkelsen 2014 (isometric dynamometer hip flexion (Nm/kg))	32	30	MD 0.0900 [-0.0472; 0.2272]	**Some concerns**
Suetta 2004 (Stair climb test (s))	13	12	MD -0.7000 [-3.3009; 1.9009]	**Some concerns**
Suetta 2004 (Sit to stand x 5 (s))	13	12	MD -2.7000 [-4.3131; -1.0869]	**Some concerns**
Suetta 2004 (isokinetic dynamometry quadriceps at 60°/s (Nm))	13	12	MD -22.6000 [-32.6821; -12.5179]	**Some concerns**
Suetta 2004 (isokinetic dynamometry quadriceps at 180°/s (Nm))	13	12	MD -10.7000 [-17.2130; -4.1870]	**Some concerns**
Closest to 4 weeks (active control)				
Nelson 2019 (isometric dynamometer (kg) knee extension)	35	34	MD −0.9000 [−2.6796;0.8796]	**Some concerns**
Nelson 2019 (isometric dynamometer (kg) hip extension)	35	34	MD 0.1000 [-1.2700; 1.4700]	**Some concerns**
Nelson 2019 (isometric dynamometer (kg) hip adduction)	35	34	MD 0.3000 [-0.5330; 1.1330]	**Some concerns**
Nelson 2019 (isometric dynamometer (kg) hip abduction)	35	34	MD 0.0000 [-0.8036; 0.8036]	**Some concerns**
Nelson 2019	35	34	MD 0.1000	**Some concerns**

(isometric dynamometer (kg) hip internal rotation)			[-0.6565; 0.8565]	
Nelson 2019 (isometric dynamometer (kg) hip external rotation)	35	34	MD -0.2000 [-0.5548; 0.1548]	**Some concerns**
Nelson 2019 (isometric dynamometer (kg) hip flexion)	35	34	MD 0.6000 [-0.7014; 1.9014]	**Some concerns**
Suetta 2004* (Stair climb test (s))	13	11	MD 0.7000 [-2.0028; 3.4028]	**Some concerns**
Suetta 2004* (Sit to stand x 5 (s))	13	11	MD -3.2000 [-6.0204; -0.3796]	**Some concerns**
Suetta 2004* (isokinetic dynamometry quadriceps at 60°/s (Nm))	13	11	MD -11.8000 [-22.9365; -0.6635]	**Some concerns**
Suetta 2004* (isokinetic dynamometry quadriceps at 180°/s (Nm))	13	11	MD -2.5000 [-9.8969; 4.8969]	**Some concerns**
Closest to after the intervention (active control)				
Trudelle-Jackson 2004 (Isometric dynamometer knee extensors (Nm))	14	16	MD -25.0000 [-45.0976; -4.9024]	**Some concerns**
Trudelle-Jackson 2004 (Isometric dynamometer hip flexors (Nm))	14	16	MD -5.7000 [-17.5473; 6.1473]	**Some concerns**
Trudelle-Jackson 2004 (Isometric dynamometer hip extensors (Nm))	14	16	MD -24.4000 [-42.9799; -5.8201]	**Some concerns**
Trudelle-Jackson 2004 (Isometric dynamometer hip abductors (Nm))	14	16	MD -22.8000 [-37.9119; -7.6881]	**Some concerns**

Unlu 2007 (isokinetic dynamometry hip abduction (ft/lb))	8	9	MD 8.0000 [-1.9586; 17.9586]	**Some concerns**
Closest to after the intervention (usual care or no/minimal intervention)				
Galea 2008 (Stair climb test in (s))	11	12	MD -0.2000 [-0.5724; 0.1724]	**High**
Husby 2009 (Leg press 1RM in kg)	12	12	MD -5.0000 [-13.0417; 3.0417]	**High**
Jan 2004 (isokinetic dynamometry hip flexors (Nm))	13 + 13 = 26	27	MD -4.6000 [-15.2779; 6.0779]	**Some concerns**
Jan 2004 (isokinetic dynamometry hip extensors (Nm))	13 + 13 = 26	27	MD -1.2000 [-15.9977; 13.5977]	**Some concerns**
Morishima 2014 (isometric dynamometer knee flexors (N/m))	13	14	MD -6.9000 [-8.6757; -5.1243]	**High**
Morishima 2014 (isometric dynamometer knee extensors (N/m))	13	14	MD -18.0000 [-22.7431; -13.2569]	**High**
Nankaku 2016 (isometric dynamometer kne e extension)	14	14	MD -0.0600 [-0.4344; 0.3144]	**High**
Nankaku 2016 (isometric dynamometer hip external rotation)	14	14	MD -0.2700 [-0.5130; -0.0270]	**High**
If applicable we took the values of the operated leg only; kg: kilogram, N: Newton, m: meter; 1RM: one repetition maximum, MVC: Maximal Voluntary Contraction; * Comparator Neuromuscular Electrical Stimulation				

Lower Body Range of motion

Outcome (scale details)	Intervention (n)	Control (n)	SMD/MD (95% Confidence Interval)	Overall risk of bias
Closest to 1 year (usual care or no/minimal intervention)				
Heiberg 2012 (Active hip flexion in °)	35	33	-1.0000 [-6.6518,4.6518]	**Some concerns**
Heiberg 2012 (Active hip extension in °)	35	33	MD 1.0000 [-0.7813; 2.7813]	**Some concerns**
Heiberg 2012 (Active hip abduction in °)	35	33	MD 0.0000 [-6.5678; 6.5678]	**Some concerns**
Closest to 26 weeks (usual care or no/minimal intervention)				
Heiberg 2012 (Active hip flexion in °)	35	33	MD 4.000 [0.0785; 7.9215]	**Some concerns**
Heiberg 2012 (Active hip extension in °)	35	33	MD 3.0000 [0.1297; 5.8703]	**Some concerns**
Heiberg 2012 (Active hip abduction in °)	35	33	MD 1.0000 [-2.5336; 4.5336]	**Some concerns**
Johnsson 1998 (passive hip flexion in °)	14	16	MD -4.0000 [-12.7218; 4.7218]	**High**
Johnsson 1998 (passive extension deficit in °)	14	16	MD 0.0000 [-3.9356; 3.9356]	**High**
Johnsson 1998 (passive hip abduction in °)	14	16	MD -1.0000 [-4.2222; 2.2222]	**High**

Johnsson 1998 (passive hip adduction in °)	14	16	MD -1.0000 [-4.2222; 2.2222]	**High**
Closest to after the intervention (active control)				
Nankaku 2016 (Hip flexion in °)	14	14	MD 4.1000 [-5.4842; 13.6842]	**High**
Nankaku 2016 (Hip abduction in °)	14	14	MD -0.8000 [-7.3698; 5.7698]	**High**

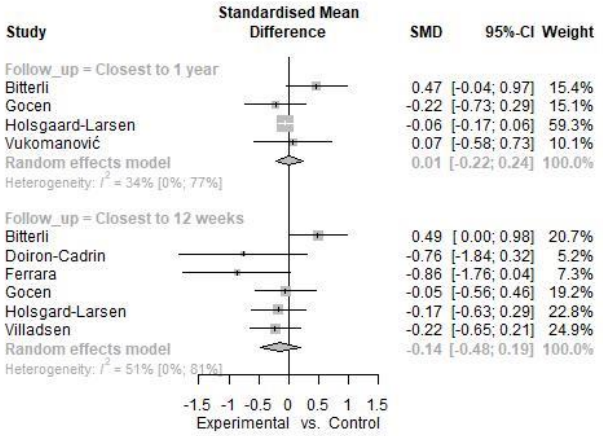
Appendix 7. Sensitivity Analyses

Sensitivity analysis – For the confidence interval of the pooled effect

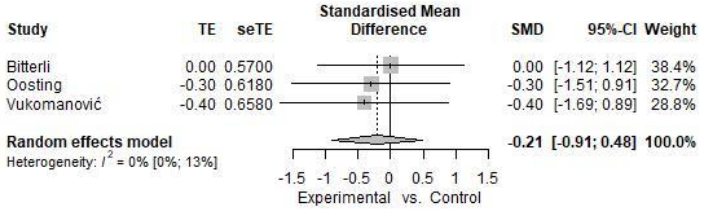
Sensitivity analysis was performed by calculating the standard confidence interval for the pooled effect and comparing these with the results of the primary analysis with the Hartung-Knapp-Sidik-Jonkman correction.

Preoperative physiotherapy

Function - Closest to 1 year and 12 weeks (usual care or no/minimal intervention)



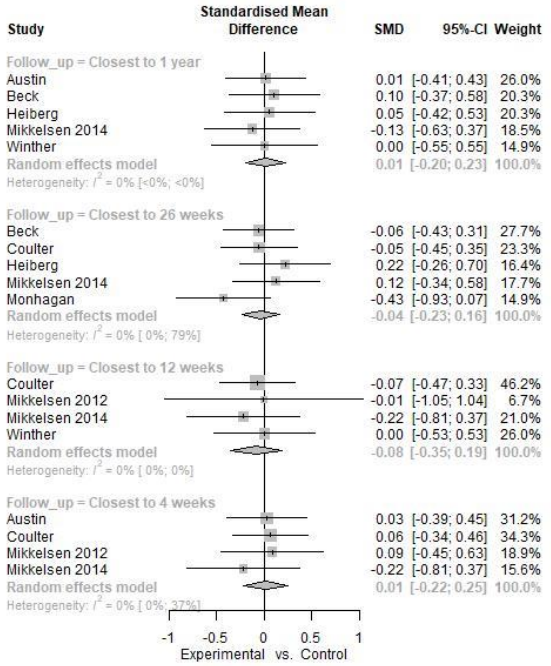
Length of stay in the hospital



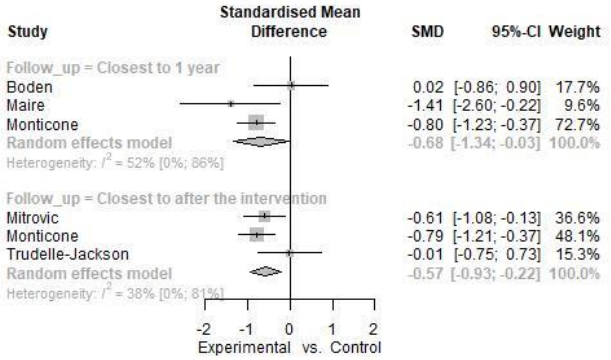
Postoperative

Function - Closest to 1 year, 26 weeks, 12 weeks, and 4 weeks (usual care or no/minimal intervention)

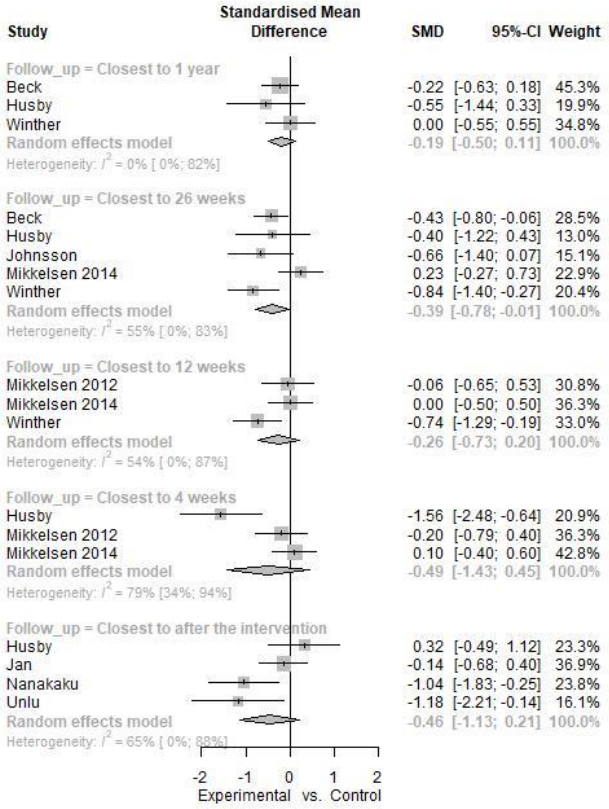
At closest to 1 year and closest to 12 weeks there was no statistical heterogenity ($Tau^2 = 0$; $I^2 = 0\%$). Under this condition the Hartung-Knapp-Sidik-Jonkman correction gives a smaller confidence interval for the pooled effect.



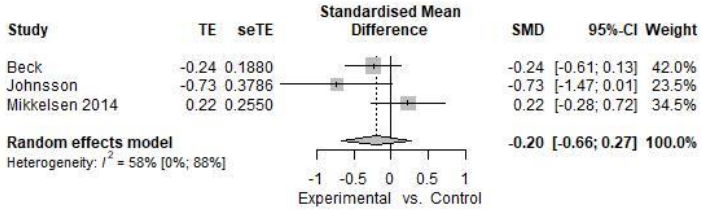
Function - Closest to 1 year and after the intervention (active control)



Hip Abduction Strength - Closest to 1 year, 26 weeks, 12 weeks, 4 weeks and closest to the intervention (usual care or no/minimal intervention)



Hip Flexion Strength - Closest to 26 weeks (usual care or no/minimal intervention)

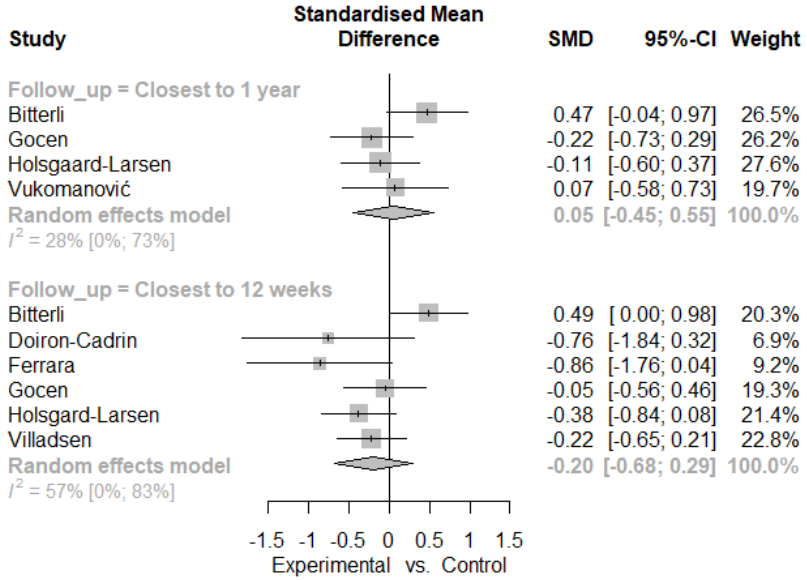


Sensitivity analysis – Influence Analysis

Outcome (type, follow-up time point, comparator)	Excluded influential studies	Meta-analytic result (SMD, 95% CI, number of studies)	Result of sensitivity analysis with influential study removed (SMD, 95% CI, number of studies)	Likely impact on meta-analytic result
Function (preoperative, at closest to 1 year, usual care or no/minimal intervention)	Bitterli et al.	0.01 [-0.37; 0.40] I^2 = 34% N = 4	-0.06 [-0.23; 0.40] I^2 = 0% N = 3	No substantial impact.
Function (postoperative, at closest to 1 year, active control)	Boden et al.	-0.68 [-2.25; 0.88] I^2 = 52% N = 3	-0.92[-4.03; 2.18] I^2 = 0% N = 2	Yes. A shift from a medium to a large effect.
Function (postoperative, at closest to after the intverention, active control)	Trudelle-Jackson et al.	-0.57 [-1.44; 0.30] I^2 = 52% N = 3	-0.71[-1.88; 0.46] I^2 = 0% N = 2	Yes. A shift from a medium to a medium to large effect.
Hip abduction strength (postoperative, closest to 26 weeks, usual care or no/minimal intervention)	Mikkelsen et al. (2014)	-0.39 [-0.91; 0.13] I^2 = 55% N = 5	-0.56 [-0.89; -0.23] I^2 = 0% N = 4	Yes. A shift from a small to a medium effect.

Hip abduction strength (postoperative, closest to 4 weeks usual care or no/minimal intervention)	Husby et al.	-0.49 [-2.61; 1.64] I^2 = 79% N = 3	-0.03 [-1.87; 1.82] I^2 = 0% N = 2	Yes. A shift from a small to no effect.
Hip abduction strength (postoperative, closest to after the intervention, usual care or no/minimal intervention)	Husby et al.	-0.46 [-1.57; 0.65] I^2 = 65% N = 4	-0.69 [-2.14; 0.76] I^2 = 60% N = 3	Yes. A shift from a small to a medium effect.

Sensitivity analysis – with a less conservative correlation coefficient (r=0.5)



Compared to the primary analysis there are no substantial changes in the pooled estimates. For a follow-up closest to 1 year we have $SMD_{r=0.5}$ 0.05, 95%CI (-0.45,0.55) vs. $SMD_{r=0.9}$ 0.01, 95%CI (-0.37,0.40) and for a follow-up closest to 12 weeks we have a $SMD_{r=0.5}$ -0.20, 95%CI (-0.68, 0.29) vs. $SMD_{r=0.9}$ -0.14, 95%CI (-0.61, 0.32).