UHASSELT

KNOWLEDGE IN ACTION

Faculteit Geneeskunde en Levenswetenschappen

master in de revalidatiewetenschappen en de kinesitherapie

Masterthesis

Effects of Exercise Therapy after Total Hip Arthroplasty: A Systematic Review

Vienna Mertens
Lotte Vermeulen

Eerste deel van het scriptie ingediend tot het behalen van de graad van master in de revalidatiewetenschappen en de kinesitherapie

PROMOTOR :
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Effects of Exercise Therapy after Total Hip Arthroplasty: A Systematic Review

Research questions

Which active rehabilitation content including M. Gluteus Medius exercises was offered to persons after total hip arthroplasty?

What were the effects of different active exercise therapy modalities after total hip arthroplasty according to the ICF-model?

Highlights

Following active rehabilitation contents including M. Gluteus Medius exercises are provided to patients after total hip arthroplasty: standard, inpatient, outpatient and home-based rehabilitation.

Improvements on body function and structures level are best obtained by using supervision and/or progression.

For activity level home-based exercises appear to be equally effective to other interventions.

More studies are needed about this topic. Future research should include a detailed description of rehabilitation content, more specifically of exercise volume.

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OUTLINE

This systematic review is situated on the research domain of musculoskeletal rehabilitation. Total hip arthroplasty is performed when severe hip osteoarthritis or traumatic events are present. Weakness of the hip muscles, more specifically the hip abductors, is a common complaint after this surgical procedure. The effects of a weakened M. Gluteus Medius are destabilisation of the pelvis in the frontal plane (e.g. during gait), limping and strength reduction and/or pain when performing hip abduction.

To date the role of M. Gluteus Medius exercises is acknowledged in total hip arthroplasty rehabilitation. However, the effectiveness of different forms of active physical therapy after total hip arthroplasty is not fully understood. There is a lack of evidence concerning to the content of rehabilitation, more specifically the exercise volume. With this systematic review we would like to give an insight in possible active rehabilitation contents, including M. Gluteus Medius exercises, and their effects according to the International Classification of Functioning, Disability and Health.

This systematic review is formerly situated in an ongoing research project named: “M. Gluteus Maximus transfer: patient reported outcomes and gait (17020)”. Research questions for this topic are: “What are the effects of a weakened and/or ruptured M. Gluteus Medius?” and “Which rehabilitation content and training intensity was offered to patients with a weakened and/or ruptured M. Gluteus Medius?”. This research is conducted under the authority of Prof. Dr. K. Corten, Prof. Dr. A. Timmermans and A. Bruijnes (MSc).

Currently this systematic review is part of an ongoing research project named: “Feasibility of an application for mobile monitoring of the functional status in healthy persons and persons with degenerative hip and knee disorders”. This research is conducted under the authority of Prof. Dr. A. Timmermans, Drs. J. Emmerzaal and A. Bruijnes (MSc). Measurements will be performed at REVAL (Studiecentrum voor revalidatieonderzoek - Agoralaan - Gebouw A - 3500 Hasselt).

We opt to choose the Central Format providedby Hasselt University.

The initial research questions are provided by the institution. These are further optimised in deliberation with both the students and promoters. This systematic review is conducted as a duo master thesis. We independently assess search terms, search strategies, selection of articles, quality assessment and data-extraction. When there is disagreement, matters are discussed until an agreement is reached. After reaching an agreement the research itself is written together. Both students have an equal shared part in this systematic review.

In our second master year we will take part in an ongoing research about the feasibility of an application for mobile monitoring of the functional status in healthy persons and persons with degenerative hip and knee disorders. This protocol is already provided to us. The study is currently in its start-up phase.

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PART I: LITERATURE STUDY

1. Abstract

Background: M. Gluteus Medius plays an important role in the rehabilitation following total hip arthroplasty. There is a lack of evidence on the content and effectiveness of active rehabilitation forms after this surgical procedure. This study aims to investigate which rehabilitation contents, including M. Gluteus Medius exercises, are commonly used and are most effective based on the ICF.
Method: Systematic review of randomised controlled trials published between 2007-2018. Databases used are PubMed and WOS. Search terms, search strategies, selection of articles, quality assessment and data-extraction are independently assessed by two researchers. Quality assessment is done according to the GRADE-criteria.
Results: Eight studies are included. Following outcomes are assessed: HHS, WOMAC, quality of life, TUG, 6MWT, gait parameters, negotiating stairs, muscle force, 30 sec sit-to-stand, HOOS, one-legged stance test, compliance, patient satisfaction, global perceived effect of treatment, PAS, pain, ROM and Merle d'Aubigné and Postel Score.
Discussion and conclusion: Standard, inpatient, outpatient and home-based rehabilitation implementing M. Gluteus Medius exercises are offered to persons after total hip arthroplasty. Body functions and structures level is best improved by adding supervision and progression, for activity level home-based exercises are at least equally effective to the other interventions.
Aim of the research: To examine the feasibility of a mobile app to monitor functional status in healthy persons and persons with degenerative hip and knee disorders.
Operationalisation research question: This qualitative research will be conducted in our second master year at REVAL.

Keywords: M. Gluteus Medius, Total Hip Arthroplasty, Active Rehabilitation, ICF, Systematic Review

2. Introduction

Gluteus Medius (GMe) pathologies occur more frequent at age 40 to 50 (Chi et al., 2015; Grimaldi et al., 2015). It is important to acknowledge the role of the GMe in the pathogenesis of pathologies such as: knee osteoarthritis, patellofemoral pain syndrome, chronic low back pain and greater trochanteric pain syndrome. Rehabilitation of GMe pathology might have a positive influence on these syndromes (Ebert, Edwards, Fick, & Janes, 2017; Harrasser et al., 2016; Lindner, Shohat, Botser, Agar, & Domb, 2015).

The GMe functions as a hip abductor and rotator and stabilises the pelvis in the frontal plane (e.g. during gait). The anterior fibres of the muscle account for internal rotation while the posterior fibres perform external rotation at the hip joint (Flack, Nicholson, & Woodley, 2012). There are two ways to confirm GMe pathology: clinical observation and medical imaging.

Inefficient gait mechanics can be seen in GMe pathologies presented as limping and/or a Trendelenburg gait (Ebert, Bucher, Ball, & Janes, 2015; Petis, Howard, Lanting, & Vasarhelyi, 2015). Two studies investigate the passive range of motion (ROM) of the hip joint with GMe pathology (Lachiewicz, 2011; Lindner et al., 2015). One study states that there is a minimally reduced passive hip flexion and internal rotation (Lindner et al., 2015). This is contradicted by another study in which there was a non-impaired passive ROM (Lachiewicz, 2011). When performing active movements against resistance, a strength reduction and/or pain can be observed (Bird, Oakley, Shnier, & Kirkham, 2001; Ebert, Retheesh, Mutreja, & Janes, 2016; Lindner et al., 2015). The following specific tests may be positive: Trendelenburg test (Bird et al., 2001; Lindner et al., 2015) and a single leg stance of <30 seconds (Ebert et al., 2015).

GMe tendinopathy in patients with peritrochanteric lateral hip pain and/or pain in the buttocks and groin can be located by magnetic resonance imaging,, which is the golden standard. (Grimaldi et al., 2015; Kingzett-Taylor et al., 1999). Direct signs of a problem are thickenings of the tendon and soft tissue oedema, an indirect sign is GMe atrophy (Bird et al., 2001). Ultrasound is a cheaper and more accessible evaluation tool which can additionally detect tendon calcifications (Grimaldi et al., 2015). Results of X-rays are mostly negative in patients with chronic tears. Sometimes osteophytes on the anterior side of the greater trochanter are reported (Lachiewicz, 2011).

The pathogenesis GMe pathologies is not yet fully understood. Several hypotheses are pending:

1. Micro traumas, which may be caused by an increased intensity or frequency of tensile forces on tendons. Besides, an increased compression force on the muscle created by other muscle- and bone structures and the joint position can provoke complaints in the lateral hip reagion (Grimaldi & Fearon, 2015; Grimaldi et al., 2015; Lachiewicz, 2011).
2. Degenerative disorders of the hip joint e.g. osteoarthritis (Grimaldi et al., 2009).
3. Surgical management of hip pathology. Three surgical interventions who are known to result in GMe pathology are: gluteal tendon repair, internal fixation of femoral neck fractures and total hip arthroplasty (THA) (Lachiewicz, 2011). THA can be performed via three different

approaches: direct anterior, lateral and posterior. There are several advantages and disadvantages for each technique and there is a chance for creating postoperative GMe weakness, tendinopathy or ruptures (Capogna, Shenoy, Youm, & Stuchin, 2017; Petis et al., 2015). Lachiewicz (2011) indicates that an avulsion of the abductor tendons is possible after anterolateral or transgluteal THA.

4. Traumatic events. (e.g. motor accident) (Lindner et al., 2015).

GMe pathologies can be treated in several ways: pharmacological treatment, medical treatment (e.g. shockwave therapy or surgery) or active rehabilitation. Pharmacological treatment consists of corticosteroid injections, which only have a short-term effect. Shockwave therapy uses ultrasound waves to initiate and enhance the natural healing process, which is effective in the long term. (Brinks et al., 2011; J. P. Furia, J. D. Rompe, & N. Maffulli, 2009; J. D. Rompe et al., 2009) With regard to surgery, there are two options: open surgical procedures (iliotibial band release or bursectomy, trochanteric reduction osteotomy) or endoscopic procedures (iliotibial band release or bursectomy). However, it remains unclear which surgical procedure gives the most long-lasting results.(Grimaldi & Fearon, 2015; Grimaldi et al., 2015; Lindner et al., 2015)

Besides pharmacological and medical–interventions, GMe pathologies can be treated with active rehabilitation (Brinks et al., 2011; J. P. Furia et al., 2009; J. D. Rompe et al., 2009). A systematic review about the effectiveness of physical therapy exercises after THA states that exercising the GMe plays an important role in rehabilitation (M. Di Monaco & Castiglioni, 2013). Yet, evidence on the effectiveness of different forms of physical therapy after THA is lacking (Lowe, Davies, Sackley, & Barker, 2015; Minns Lowe, Barker, Dewey, & Sackley, 2009). Besides, detailed information about the protocols (type of exercises) and volumes of these interventions are poorly described in interventional studies (M. Di Monaco, Vallero, Tappero, & Cavanna, 2009; Lowe et al., 2015). This systematic review aims to investigate which rehabilitation contents, including GMe exercises, are most commonly used after THA and which of them are the most effective in improving different aspects of the ICF.

Note: Figures, tables and list of abbreviations can be found in the appendix of the literature study.

3. Methodology

3.1. Research questions

The objective of this systematic review is to answer the following research questions.

1. Which active rehabilitation content including GMe exercises was offered to persons after THA?
2. What were the effects of different active exercise therapy modalities after THA according to the international classification of functioning, disability and health (ICF)-model?

The PICO for these research questions is:

- P: adults who underwent THA and reported with GMe pathologies and/or lateral hip pain, pre- and/or postsurgical
- I: active physical therapy involving the GMe muscles
- C: other active and physical therapies involving the GMe muscles
- O: outcomes must involve at least one of the aspects of the ICF-model and can possibly be influenced by active physical therapy

3.2. Literature search

The following databases were used: PubMed and Web of Science (WOS).
Based on our PICO we used the following search terms.

PubMed: Hip [MeSH], Buttocks [MeSH], Tendon injuries [MeSH], Muscle weakness [MeSH], Sprains and strains [MeSH], Soft tissue injuries [MeSH], Musculoskeletal pain [MeSH], Rupture [MeSH], Lacerations [MeSH], Skeletal muscle [MeSH], Gluteal [Title/Abstract], Rehabilitation [MeSH], Adult [MeSH], Therapeutics [MeSH], Musculoskeletal physiological phenomena [MeSH], Recovery of function [MeSH], Biomechanical phenomena [MeSH], Proprioception [MeSH], Human activities [MeSH], Social participation [MeSH], Hip [Title/Abstract], Surgery [Title/Abstract], Rehabilitation [Title/Abstract], Gluteus Medius [Title/Abstract], Lateral hip pain [Title/Abstract], Tendon tears [Title/Abstract], Strain [Title/Abstract], Physiotherapy [Title/Abstract], Exercise therapy [MeSH], Surgical interventions [Title/Abstract], Corticosteroid injections [Title/Abstract], No intervention [Title/Abstract] and pharmaceutics [Title/Abstract].

WOS: All terms were entered as (topic) and RCT (topic) was added to every search term. Search terms: hip, buttocks, tendon injuries, muscle weakness, sprains and strains, soft tissue injuries, musculoskeletal pain, rupture, lacerations, skeletal muscle, gluteal, rehabilitation, adult, therapeutics, musculoskeletal physiological phenomena, recovery of function, biomechanical phenomena, proprioception, human activities, gluteus medius, lateral hip pain, tendon tears, strain, physiotherapy, exercise therapy, surgical interventions, corticosteroid injections, no intervention and pharmaceutics.

3.3. Selection criteria

Inclusion criteria:

- Randomised controlled trial (RCT)
- Published maximum ten years ago
- Published in Dutch or English
- Adults (+18)
- Persons who already underwent THA
- Clearly described intervention- and control group
- At least one active physiotherapeutic exercise in the intervention group
- Pre- and post-intervention measures, as well as at least one postoperative measure
- At least short-term follow-up, preferably long-term

Exclusion criteria:

- Comorbidities that prevent proper participation in the intervention group (heart diseases, cancer, neural disorders, cognitive disorders, etc.)
- Articles who described an intervention that may, or may not include training of the GMe, in order to treat another pathology
- Inaccurate description of the following: inclusion- and exclusion criteria, protocol and follow-up.
- Low quality studies

3.4. Quality assessment

First each article was implemented in the risk of bias (RoB)-table, which is a part of the Grading of Recommendations Assessment, Development and Evaluation (GRADE) criteria. Using this tool, two independent assessors evaluated the following items for each included study: random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment (subjective), blinding of outcome assessment (objective), incomplete outcome data, selective reporting and other bias. These items were given a green, yellow or red score. A green score was given when bias was not present. When not specifically mentioned in the text, an item was given a yellow score. Red scores were assigned when bias was present. The item 'other bias' was scored green when the article's sample size was above 30 subjects and in absence of financial funding from universities, hospitals or companies who might have an influence on the outcome of the research. Score yellow was given when the sample size was below 30 subjects or there was financial funding. A red score was assigned when both small sample size and financial funding were present.

Thereafter, 16 outcome measures were assessed according to the GRADE-criteria: study design, RoB, inconsistency, indirectness, imprecision, publication bias and other. Each outcome started as high quality of evidence because the studies were RCT's. The quality of evidence was downgraded one or two levels when the GRADE-criteria were not met. Possible categories are: high, moderate, low or very low. Strength of the outcome measure is determined by the quality of the articles implementing this measure. (Ryan, 2016)

Besides assessing the presence of RoB and the quality evidence of the outcomes, we described the strengths and weaknesses of each included study.

3.5. Data extraction

To get to know which active rehabilitation content was offered to persons with postsurgical GMe weakness or rupture after THA we summarised the interventions in four categories. We would like to obtain information about the effects of active training on the different levels of the ICF-model. These ICF-levels were: body function and structures level, activity level, participation level, person level and environmental level. The outcome measures of interest were: gait parameters, muscle strength, pain, hip ROM, stiffness, symptoms, hip functions, functional activities and activities of daily living (ADL) (e.g. chair raises, negotiating stairs, walking, turning), quality of life, physical and mental health, compliance and patient satisfaction and global perceived effects. These outcomes were analysed ~~by~~ using the following measurements: 10- and 20 Meter Walk Test (10- or 20MWT), Hand Held Dynamometry (HHD), Kendall's Criteria, Japanese Orthopaedic Association Score (JOA), goniometry, Merle d'Aubigné and Postel score, Assessment of Quality of Life (AQoL), Timed Up and Go test (TUG), Six Minute Walking Test (6MWT), One-legged stance test, negotiating stairs, 30s sit-to-stand test, Physical Activity Scale (PAS), Harris Hip Score (HHS), Western Ontario and McMaster Universities Osteoarthritis index (WOMAC), Hip Disability and Osteoarthritis Outcome Score (HOOS), EuroQol 5-dimensions (EQ5D), Short Form health survey (SF-36), questionnaire about compliance and patient satisfaction and a 5 point-scale for global perceived effect of treatment. In this way we would receive information about the effects of active training according to the ICF-model.

4. Results

4.1. Results study selection

With the previously summarised search terms we made various combinations (Table 1). Within each aspect of the PICO we combined the search terms with 'OR' and between the aspects we combined them with 'AND'. After establishing the search terms for each database, we used the search terms and their combinations in both databases to make sure every article about the subject was covered. We conducted our first search in November 2017 and repeated this in March 2018. Using this method, we found a total of 1587 articles of which 848 were duplicates. From the 739 articles, 148 were derived from PubMed and 591 from WOS. These articles were individually checked by two independent assessors for compliance with our PICO and our inclusion/exclusion criteria. When there was disagreement, both assessors read the abstract. Based on title, we excluded 447 articles. Reasons for exclusion were: trial protocols, designs of an RCT, study designs other than RCT, medical, pharmacological, passive and non-physical therapy interventions as primary therapy, preventive, preoperative or non-surgical interventions, no intervention, other pathologies, neurological conditions, cancer, primary vascular and internal diseases, physiological or psychiatric disorders, children and animal studies. Two hundred and five articles were excluded based on their abstract, because of the following reasons: no active (exercise) therapy as intervention, no GMe involvement in the intervention, no THA, other study design, active intervention combined with a passive intervention whereby a valid statement about the active intervention cannot be made, non-physical therapy related outcomes, preventive interventions, psychological or psychiatric disorders, population <18 years. We found 38 studies implementing GMe exercise therapy for other pathologies such as: patellofemoral pain syndrome, anterior cruciate ligament reconstruction, hip osteoarthritis, knee osteoarthritis, general osteoarthritis, plantar fasciitis, non-specific low back pain, total knee arthroplasty, lumbar disc surgery, medial tibial stress syndrome, anterior knee pain. Those were also excluded. From the remaining 49 studies, we excluded 41 articles, based on their full text. Reasons for these exclusions were**:** no THA, pre-surgical interventions, control group without THA, no within group analysis, THA mixed with other surgical interventions, no pre- and post-intervention measures, no control group, outcome is not directly related to active rehabilitation, no active intervention, occupational therapy as the intervention, no implementation of GMe exercises, trial protocol and the use of a language other than Dutch, English, French or German. (Table 2) There was 90,26% correspondence about the exclusion of articles between the two independent assessors. For the remaining 9.74% a consensus was reached. At this point eight articles were left for inclusion (Figure 1).

4.2. Results quality assessment

Using the RoB-table, we evaluated each included study for RoB (Table 3). One study had a high RoB because of a red score for several domains (M. S. Austin et al., 2017). Two studies were given an unknown RoB because of several yellow scores (Galea et al., 2008; Nankaku et al., 2016). The other five studies had a low RoB (L. R. Mikkelsen et al., 2014; L. R. Mikkelsen, Mikkelsen, & Christensen, 2012; Monticone et al., 2014; Okoro et al., 2016; Umpierres et al., 2014). When implementing this tool in the GRADE-criteria we downgraded one outcome with two levels. Four of the sixteen outcomes were downgraded one level for serious RoB. The other eleven outcomes were not downgraded for

RoB. There was no inconsistency and indirectness found in the outcome measures. Imprecision was downgraded one level for each outcome measure. Publication bias was undetected for all outcome measures. We were not able to upgrade levels. Sixteen outcomes were assessed, of which 11 had a moderate quality of evidence. Four other outcomes were of low quality. One outcome had a very low quality (Table 4). Several strengths and weaknesses were found in the articles. A summary of these can be found in table 5.

4.3. Results data extraction

4.3.1. Used active rehabilitation contents including GMe exercises after THA

The four interventions used in the included articles were: standard (L. R. Mikkelsen et al., 2012; Nankaku et al., 2016; Okoro et al., 2016), inpatient (Monticone et al., 2014; Umpierres et al., 2014), outpatient (M. S. Austin et al., 2017; Galea et al., 2008; L. R. Mikkelsen et al., 2014) and home-based rehabilitation (M. S. Austin et al., 2017; Galea et al., 2008; L. R. Mikkelsen et al., 2014; L. R. Mikkelsen et al., 2012; Okoro et al., 2016). All post-operative THA interventions implemented analytical strengthening exercises, functional exercises and additional biking and walking. Stretching of the hip flexors was present in the standard and home-based rehabilitation modalities. Inpatient rehabilitation specifically implemented gait/walking training. Home-based rehabilitation was the only intervention that did not use balance training. All interventions used isometric, concentric and eccentric exercise modalities, except for the inpatient rehabilitation (Monticone et al., 2014; Umpierres et al., 2014). Inpatient, outpatient and home-based rehabilitation interventions specifically mentioned the use of open and closed kinetic chain exercises. Standard rehabilitation was performed both supervised or unsupervised while inpatient and outpatient rehabilitation were always supervised. Home-based exercises were performed unsupervised. (Table 6)

4.3.2. Effects of interventions linked to the ICF-model

The outcomes mentioned below were classified according to the ICF-model. When an outcome coincided with multiple levels we assigned the outcome to a level based on existing literature (Alviar, Olver, Brand, Hale, & Khan, 2011; Hoang-Kim, Schemitsch, Kulkarni, & Beaton, 2014). In addition, we counted the number of items to see which ICF-level was represented the most. Results of the literature and the counting were checked for analogy. All results described below are supported by table 7.

4.3.2.1. Body function and structures level

<u>10m walk test, 20m walk test, walking speed, cadence, step length, step time, percentage in step time, single-support time, double-support time, symmetry index</u>

Walking speed improved using home-based exercises (Galea et al., 2008; L. R. Mikkelsen et al., 2014; L. R. Mikkelsen et al., 2012). L. R. Mikkelsen et al. (2014) stated that home-based exercises with additional supervised progressive resistance training (PRT) was superior to home-based exercises alone. A significant decrease ($p<0.01$) in walking speed was found using standard rehabilitation without progression (L. R. Mikkelsen et al., 2012). Supervised centre-based exercises were effective in improving walking speed but are not superior to home-based exercises ($p>0.05$) (Galea et al., 2008).

With regard to other gait parameters, more gait parameters in total could be improved using a supervised centre-based therapy (Galea et al., 2008).

Hand Held Dynamometry, Kendall's criteria

Supervised and non-supervised home-based therapy, whether or not combined with PRT or hip external rotation exercises, and a THA with or without supervision were effective in improving hip abduction strength (L. R. Mikkelsen et al., 2014; L. R. Mikkelsen et al., 2012; Nankaku et al., 2016; Umpierres et al., 2014). Conventional rehabilitation without progression did not improve hip abduction strength (Nankaku et al., 2016). Additional external rotation exercises would preserve external rotation strength compared to conventional rehabilitation in which external rotation strength significantly decreased ($p<0.05$) (Nankaku et al., 2016). Hip flexion strength improved ($p<0.05$) when using supervised in- or out-patient therapy (L. R. Mikkelsen et al., 2014; Umpierres et al., 2014). A supervised rehabilitation program was superior to a non-supervised rehabilitation program for improving hip adduction ($p=0.003$), internal rotation ($p<0.001$) and extension ($p<0.001$) strength (Umpierres et al., 2014).

Japanese Orthopaedic Association Score

The use of hip external rotation exercises in addition to conventional rehabilitation, as well as conventional rehabilitation gave a significant difference for pain ($p<0.05$). There was no between group information. (Nankaku et al., 2016)

Goniometry

Range of motion of hip flexion and abduction improved significantly ($p<0.05$, $p<0.001$) when an external rotation exercise therapy, conventional therapy or THA-protocol with supervision was applied (Nankaku et al., 2016; Umpierres et al., 2014). Hip extension, adduction, internal and external rotation improved ($p<0.001$) due to adding supervision to THA-protocol. Without supervision only extension ($p=0.001$), adduction ($p<0.001$) and internal rotation ($p<0.001$) improved. Significant differences were found between abduction and adduction in favour of the supervised intervention (Umpierres et al., 2014).

Merle d'Aubigné and Postel Score

When a supervised rehabilitation program was applied, there were significant improvements for motor performance evaluation ($p=0.03$), pain clinical evaluation ($p<0.01$), mobility clinical evaluation ($p<0.001$) and global clinical evaluation ($p=0.007$). Gait clinical evaluation did not improve significantly ($p=0.17$). Pain clinical evaluation ($p<0.001$) and gait clinical evaluation ($p=0.004$) improved significantly when no supervision was present. Non-significant p-values were found for motor performance evaluation ($p=0.16$), mobility clinical evaluation ($p=0.08$) and global clinical evaluation ($p=0.10$). The supervised group had more benefit on the following items: pain clinical evaluation ($p=0.02$), mobility clinical evaluation ($p=0.01$) and global clinical evaluation ($p<0.01$). (Umpierres et al., 2014)

Assessment of Quality of Life

The scores of the AQoL improved significantly (p=0.02) in the supervised centre-based group and the home based-intervention groups. There were no significant differences between both groups (p=0.121). (Galea et al., 2008)

4.3.2.2. Activity level

Timed Up and Go test

Time to complete the TUG decreased significantly in the supervised centre-based group (p=0.003), home-based exercises with (p=0.0001) or without (p=0.002) PRT or when adding external rotation exercises (p<0.05) to a conventional rehabilitation protocol. Standard or conventional rehabilitation caused improvement in the Okoro et al. (2016) study (p=0.0001) but not in the Nankaku et al. (2016) study (p=0.352). Home-based exercises were superior to supervised centre-based exercises (p=0.042) at two months follow-up (Galea et al., 2008).

Six Minute Walking Test

Supervised centre-based exercises (p=0.02), home-based exercises with (p=0.0001) or without (p=0.001) PRT and standard rehabilitation (p=0.0001) ensured a significant improvement in walking distance. Standard rehabilitation was more effective than home-based exercises (p=0.004) which were equally effective as the supervised centre-based exercises (p=0.121). (Galea et al., 2008; Okoro et al., 2016)

One-legged stance test

A significant improvement (p<0.05) in the operated and non-operated leg was found in both groups at 12 weeks. No significant differences in both legs between groups were found. This means that intensified home-based exercises and standard rehabilitation were effective but not superior to one another (p>0.05). (L. R. Mikkelsen et al., 2012)

Negotiating stairs

Supervised centre-based exercises (p<0.05), standard rehabilitation (p=0.0001) and home-based exercises (p<0.05) with or without (supervised) PRT (p<0.05, p<0.05, p=0.0001) were effective in improving stair negotiating performance. Standard rehabilitation was more effective than home-based exercises with additional PRT (p=0.038) which was in turn more effective than home-based rehabilitation alone (p=0.04). The latter was equal to supervised centre-based therapy (p=0.121). (Galea et al., 2008; L. R. Mikkelsen et al., 2014; Okoro et al., 2016)

30s sit-to-stand test

Home-based therapy with or without (supervised) PRT (p<0.05, p=0.0001) and standard care (p=0.0001) had improved the amount of executed repetitions. No between group differences were found (p=0.12, p=0.239). (L. R. Mikkelsen et al., 2014; Okoro et al., 2016)

Physical Activity Scale

No significant differences were found between intensified home-based exercises and standard care (p=0.07) (L. R. Mikkelsen et al., 2012).

Harris Hip Score

One study used the HHS as an outcome measure to evaluate pain, function and hip ROM (M. S. Austin et al., 2017). Significant outcome measures (p<0,001) were found at one month, six and 12 months. There were no significant differences between groups (p=0.82). This study stated that both unsupervised home-based therapy and formal outpatient therapy were equally effective in improving the total score. A higher score meant a decrease in pain and an increase in function and hip ROM.

Western Ontario and McMaster Universities Osteoarthritis index

The WOMAC assessed pain, stiffness and function of the hip. Four studies included the WOMAC. M.S. Austin et al. (2017) and L.R. Mikkelsen et al (2012) found improvement (p<0.001) of all these aspects by doing exercises in a home-based setting without supervision while the unsupervised home-based exercise therapy in Galea et al. (2008) only improved function (p=0.002). Both intensified home-based exercises as well as non-intensified exercises proved to be effective (L. R. Mikkelsen et al., 2012). Home-based, standard and centre-based/outpatient rehabilitation were proved to be equally effective. None of these interventions were superior to one another. Monticone et al. (2014) stated that task-oriented exercises were more effective (p<0.001) than open chain exercises to improve pain, stiffness and function.

Hip Disability and Osteoarthritis Outcome Score

Home-based therapy with or without addition of supervised PRT exercises ensured an improvement of symptoms, pain, ADL, sports and recreation and quality of life (p<0.05) in the short-term. This was not retained in the long term (p>0.05). The addition of supervised PRT exercises did not necessarily ensure a greater improvement (p=0.31-0.90). (L. R. Mikkelsen et al., 2014)

EuroQol 5-Dimensions, Short Form health survey

L. R. Mikkelsen et al. (2012) used the EQ-5D to assess health status, by making use of a questionnaire and a visual analogue scale (VAS). The health status was significantly improved in the intensified home exercise group and the standard rehabilitation group. Improvements were found at four weeks follow-up for health status (p<0.001) and VAS (p<0.05). No differences were found between groups at twelve weeks for health status (p=0.89) and VAS (p=0.31). Three studies used the SF-36 to assess physical and mental health (M. S. Austin et al., 2017; Monticone et al., 2014) (Umpierres et al., 2014). Some of the results were contradictory. M. S. Austin et al. (2017) stated that there was improvement of physical health in the unsupervised home-based therapy and the formal outpatient therapy. No improvements were found in mental health. This was contradicted by the following two studies. (Monticone et al., 2014) found a significant improvement for all items using task oriented and open kinetic chain exercises. A supervised rehabilitation program improved (p<0.05) bodily pain, general health, vitality, social functioning and mental health. No significant differences were found for physical functioning (p>0.99), role physical (p>0.99) and role emotional (p>0.99). For rehabilitation without supervision, significant differences (p<0.05) were found for bodily pain, vitality, social functioning and mental health. In this group no significant differences were found for physical functioning (p>0.99), role physical (p>0.99), general health (p=0.09) and role emotional (p>0.99). (Umpierres et al., 2014) A significant difference in favour of the task-oriented exercise group was found for all items except for social function (p=0.264) and emotional role

(p=0.075) (Monticone et al., 2014). One study found a significant between group difference for bodily pain in favour of the supervised rehabilitation program (p=0.01) (Umpierres et al., 2014).

4.3.2.3. Participation level

Due to our classification according to the ICF-model based on existing literature, certain outcome measures which included some items on participation level, were placed elsewhere. (Alviar et al., 2011; Hoang-Kim et al., 2014)

4.3.2.4. Person level

Compliance and patient Satisfaction and Global Perceived Effect of Treatment using a 5-point scale

There were no significant differences between intensified home-based exercises and standard rehabilitation for training compliance for performances/week (p=0.37), walking/stationary biking (p=0.19) or extra training (p=0.86).
Significant differences between groups were found in subjective experience of the difficulty of the exercises (p=0.021), showing that the exercises in the intensified exercises group were experienced as too difficult in the beginning and gradually more easily. The majority of the patients in the standard rehabilitation group experienced the exercises as difficult enough in the beginning and later as too easy. No significant difference between groups about satisfaction (p=0.095) and meaningfulness (p=0.747) were found. (L. R. Mikkelsen et al., 2012)
Global perceived effect of treatment was assessed by Monticone et al. (2014), using a 5-point scale. There was a between group difference (p<0.001) with a greater perceived effect in the task-oriented exercise group compared to the open kinetic chain exercise group.

4.3.2.5. Environmental level

Due to our classification according to the ICF-model based on existing literature, certain outcome measures which included some items on environmental level, were placed elsewhere. (Alviar et al., 2011; Hoang-Kim et al., 2014)

5. Discussion

5.1. Reflection on the quality of the included studies and outcomes

5.1.1. Quality assessment of the studies

Based on the RoB-tool, one study has a high RoB. This is due to the presence of a selection, performance and detection bias (M. S. Austin et al., 2017). Two other studies have an unknown RoB because of random sequence generation, allocation concealment, and not mentioning blinding of participants and personnel and blinding of assessment of outcome (Galea et al., 2008; Nankaku et al., 2016). The remainder of the studies have a low RoB (table 3) (L. R. Mikkelsen et al., 2014; L. R. Mikkelsen et al., 2012; Monticone et al., 2014; Okoro et al., 2016; Umpierres et al., 2014).

5.1.2. Quality assessment of the outcomes

The lack of inconsistency and indirectness is the result of our careful selection of articles based, on our in- and exclusion criteria. Surgical approach is not seen as an inconsistency because this is a part of interest. Imprecision is found for all outcome measures because the sum of sample sizes of the selected studies for these items is less than n=400. Because of small sample sizes it does not necessarily mean that data was withheld, so publication bias is undetected for all outcome measures. We are not able to upgrade levels because effect sizes, dose responses or plausible confounders are not mentioned. Sixteen outcomes are assessed, of which 11 have a moderate quality of evidence. Four outcomes are given a low quality of evidence score and one outcome has a very low quality of evidence.

5.2. Reflection on the findings in function of the research questions

5.2.1. Reflection on used active rehabilitation contents including GMe exercises after THA

The first aim of this study is to describe which rehabilitation contents, including GMe training, are most commonly used after THA. We notice that standard rehabilitation, inpatient and outpatient rehabilitation and home-based rehabilitation, are recently used in research including GMe exercises. When inspecting the interventions related to the surgical approach, we notice that the surgical approach is not of importance for the prescribed type of intervention in this systematic review. The only surgical approach known in the inpatient rehabilitation is the postero-lateral approach. When comparing early functional recovery, a difference is found between the direct anterior and postero-lateral approach. This difference disappears after six months follow-up (H. Y. Zhao et al., 2017). Apart from surgical approach, inpatient rehabilitation is the only intervention that does not specifically make use of eccentric exercises. While a study from M. Di Monaco et al. (2009) state that eccentric hip exercises are an important component of late-phase protocols.
Exercise volume is not discussed in this review, nor described in table 6 because of heterogeneity and lack of a detailed description in all studies. When exercise volume is mentioned in an individual study, it is described in table 7. (M. S. Austin et al., 2017; Galea et al., 2008; L. R. Mikkelsen et al., 2014; L. R. Mikkelsen et al., 2012; Monticone et al., 2014; Nankaku et al., 2016; Okoro et al., 2016; Umpierres et al., 2014)

5.2.2. Reflection on effects of interventions linked to the ICF-model

The second aim of this study is to assess the effects of the active rehabilitation contents according the levels of the ICF-model. We find that there is a trend towards supervised rehabilitation contents and/or implementation of progression being more effective in improving aspects of the body functions and structures level. With regard to the activity level we find a trend towards home-based therapy being at least equally effective as standard, in- and outpatient therapy for most of the outcomes. When taking a closer look at the results for outcomes on participation, person and environmental level, we are not able to make a conclusion because a lack of strong evidence and/or only summary scores are mentioned. So, we could not extract data for the specific items belonging to these three levels.

5.2.2.1. Body function and structures level

All interventions from studies describing an outcome measure related to pain give a significant improvement (M. S. Austin et al., 2017; L. R. Mikkelsen et al., 2014; L. R. Mikkelsen et al., 2012; Monticone et al., 2014; Nankaku et al., 2016; Umpierres et al., 2014). No detailed information about pain medication is described, therefore caution is needed when interpreting the outcomes related to pain. Results of the JOA describe an improvement. However, some of the items in this questionnaire are related to the Asian lifestyle which makes it not generalisable to other cultures. (Matsumoto et al., 2012) Furthermore pain is also described in in the following questionnaires: HHS, WOMAC, HOOS, SF-36 and Merle d'Aubigné and Postel score (M. S. Austin et al., 2017; Galea et al., 2008; L. R. Mikkelsen et al., 2014; L. R. Mikkelsen et al., 2012; Monticone et al., 2014; Umpierres et al., 2014). The studies using these questionnaires specifically indicate an improvement in pain however the sub score on the item 'pain' is not known.

Rehabilitation with supervision ensures improvement of hip ROM in all directions measured with goniometry (Nankaku et al., 2016; Umpierres et al., 2014). Exercises to specifically improve ROM are not used in these studies. Based on these results, the principle of 'specificity' does not necessarily apply to improve range of motion after THA. Without supervision only extension, adduction and internal rotation improve (Umpierres et al., 2014). M. S. Austin et al. (2017) states that with regard to the HHS, hip ROM significantly improves using both unsupervised home-based therapy and supervised formal outpatient therapy. This is contradictory to the previously described results, but the quality of evidence of the HHS is very low (Table 4).

Regarding muscle strength, all supervised interventions with progression, improve the strength of hip flexion, extension, abduction, adduction and internal rotation. These improvements are independent of the surgical approach. (L. R. Mikkelsen et al., 2014; L. R. Mikkelsen et al., 2012; Nankaku et al., 2016; Umpierres et al., 2014) External rotation is preserved by the use of a specific external rotation exercise program in addition to conventional rehabilitation. Conventional rehabilitation without progression, does not improve hip abduction strength. (Nankaku et al., 2016)

Specific gait parameters can be improved by using a supervised and progressive rehabilitation program.

Using supervised PRT in addition to home-based exercises gives the best improvement for gait speed compared to other interventions (Galea et al., 2008; L. R. Mikkelsen et al., 2014; L. R. Mikkelsen et al., 2012). This is probably due to a transfer from the supervised PRT to the gait speed. When using

standard rehabilitation without progression, a decrease in gait speed is found (L. R. Mikkelsen et al., 2012). All interventions ensure an improvement in gait speed when adding supplementary walking (Galea et al., 2008; L. R. Mikkelsen et al., 2014; L. R. Mikkelsen et al., 2012). Merle d'Aubigné and Postel score is placed by us under body function and structures level according to existing literature (Alviar et al., 2011; Hoang-Kim et al., 2014). More items from this questionnaire improve using supervised interventions (Umpierres et al., 2014). According to Galea et al. (2008), patients did not experience a difference on the AQoL between home-based and supervised centre-based rehabilitation.

5.2.2.2. Activity level

For all outcomes, except for negotiation stairs, 6MWT and SF-36, home-based therapy is at least equally effective as standard therapy, in- and outpatient therapy. It can be noticed that in every rehabilitation content functional exercises related to ADL are used (M. S. Austin et al., 2017; Galea et al., 2008; L. R. Mikkelsen et al., 2014; L. R. Mikkelsen et al., 2012; Monticone et al., 2014; Nankaku et al., 2016; Okoro et al., 2016; Umpierres et al., 2014). Negotiating stairs (Galea et al., 2008; L. R. Mikkelsen et al., 2014) and 6MWT (Galea et al., 2008) support the above described finding concerning home-based therapy. This is not in accordance to the finding of Okoro et al. (2016) in which walking capacity and negotiation stairs improves more with standard rehabilitation. This could possibly be due to the type of exercises. The exercises used in the standard rehabilitation address aspects that can be helpful in improving walking capacity (e.g. weight bearing performed against gravity, postural exercises). Because of the heterogeneity of interventions which are used in the articles describing SF-36, the results are contradictory and inconclusive. Therefore, we are not able to mention which rehabilitation content is more effective or improves physical and mental health effectively. Furthermore, each study uses another surgical approach. Which could be a possible explanation for the differences in results. (M. S. Austin et al., 2017; Monticone et al., 2014; Umpierres et al., 2014)
The following described outcomes are in accordance to our previously described statement in which home-based therapy appears to be at least equally effective as the other interventions. With regard to the TUG only Galea et al. (2008) find that home-based exercises are superior to supervised centre-based exercises. Although the AQoL between the groups remains the same (Galea et al., 2008). In the two other studies using the TUG, between group results are not interpretable because they are not given or only given at one specific time point (Nankaku et al., 2016; Okoro et al., 2016).
We categorize the one-legged stance test as a test on activity level because multiple skills (e.g. muscle force, balance, muscle endurance, …) must be implemented correctly to perform this test. One-legged stance time improves in the home-based and standard therapy groups, but no differences between groups are found. Caution is needed when interpreting this result because of its low evidence based on the GRADE-criteria due to small sample size and RoB (Table 4). When looking at the amount of physical activity, the quality of life and the training compliance and patient satisfaction, no differences between groups are found. This might possibly declare the results of the one-legged stance test. (L. R. Mikkelsen et al., 2012)

All interventions are equally effective in improving 30s sit-to-stand performance. L. R. Mikkelsen et al. (2014) find improvements after ten weeks but this is not preserved at long-term follow up at six months. This is contradictory to the findings of Okoro et al. (2016), who describes an improvement at long-term follow up at 9-12 months. Because of the heterogeneity of the follow-up time a generalised conclusion concerning improvements in time cannot be made. (L. R. Mikkelsen et al., 2014; Okoro et al., 2016)

The three items (pain, range of motion, function) of the HHS improve. Unsupervised home-based therapy as well as formal outpatient therapy are equally effective. Results of the HHS need to be interpreted with caution because of its score on the GRADE, which is very low Table 4). Besides this, the HHS is known to have a floor and ceiling effect, which can limit the potential of measuring more subtle differences. (M. S. Austin et al., 2017)

Pain, stiffness and function can be measured using the WOMAC, most items are categorised under activity level (Alviar et al., 2011). These aspects can be improved using both home-based therapy as well as standard, in- and outpatient therapy (M. S. Austin et al., 2017; L. R. Mikkelsen et al., 2012). It seems that more improvement can be reached when using task-oriented exercises instead of open chain exercises. This might be declared by the results of the global perceived effect with the task-oriented exercise group having a greater perceived effect (Monticone et al., 2014). Results need to be interpreted with caution because of low evidence according to the GRADE-criteria (Table 4). The WOMAC is known for having a possible floor and ceiling effect which can limit the potential of measuring more subtle differences. (M. S. Austin et al., 2017)

The HOOS-items improve in the short-term using home-based therapy. These differences are not preserved in the long term (L. R. Mikkelsen et al., 2014). In this study the addition of supervised PRT to home-based exercises gives no additional improvement. Caution is needed when interpreting these results because of moderate evidence according to the GRADE-criteria, because of small sample sizes. (Table 4) The HOOS-items cover every ICF-level which makes it a valuable summary score, but it is only used in one study.

Health status, measured with the EQ-5D, improves at four weeks using intensified home-based exercises and standard rehabilitation. There is no difference between groups. (L. R. Mikkelsen et al., 2012)

With regard to different surgical approaches, (Engdal, Foss, Taraldsen, Husby, & Winther, 2017) conclude that there are no differences in daily physical activity early after surgery. Surgical interventions included in this study are the direct anterior, lateral and posterior approach.

5.2.2.3 Participation level

When outcome measures can be applied to more than one level of the ICF-model, we categorise the outcomes to existing literature (Alviar et al., 2011; Hoang-Kim et al., 2014) and according to the number of items related to each ICF-level. Following questionnaires contain items on participation level but are categorised and discussed elsewhere. The WOMAC, HOOS, SF-36, AQoL and EQ-5D each have items on participation level. The scores of these individual items are not discussed because only a total score is given.

5.2.2.4. Person level

The AQoL questionnaire has a few items on person level. This questionnaire describes items on body function and structures level and activity level. Most items account for body function and structures level, where the summary score is discussed. (Galea et al., 2008) Training compliance, patient satisfaction (L. R. Mikkelsen et al., 2012) and global perceived effect of treatment (Monticone et al., 2014) are difficult to generalise because they are each used in one study only. These results are not discussed here, but they are linked to other outcome measures on different ICF-levels to explain their results.

5.2.2.5. Environmental level

When outcome measures can be applied to more than one level of the ICF-model, we categorise the outcomes to existing literature (Alviar et al., 2011; Hoang-Kim et al., 2014) and according to the number of items related to each ICF-level. The following questionnaires contain items on participation level but are categorised and discussed elsewhere: the HHS and Merle d'Aubigné and Postel Score. They each have an item on environmental level. The scores of this individual item are not discussed because only a total score is given. (M. S. Austin et al., 2017; Umpierres et al., 2014)

5.3. Reflection on the strengths and weaknesses of the literature study

Our study has several strengths. Two independent assessors execute a search with their own search terms. A search is performed in November 2017 and March 2018 to make sure we implemented the latest evidence. Search strategies are compared and merged with each other. The literature search spans two databases: PubMed and WOS. When all references of both databases were joint, 848 duplicates were removed. This indicates a large overlap which means we cover as many articles as possible about the domain of interest. After duplicates are removed both assessors individually selected articles for in- and exclusion based on the extensively described in- and exclusion criteria. There is 90,26% correspondence for selection of articles, a consensus is found for the remainder 9,74%. All eight included articles are randomised controlled trials from the last ten years. A quality assessment of the included articles is executed by two independent assessors according to the GRADE-criteria, which is a practical supplement to the advice in the Cochrane handbook to assess quality of outcomes implemented in a review. Eleven of the 16 outcomes are of moderate evidence, four of them are scored with low evidence and only one is of very low evidence. All information about literature search, exclusion and quality of articles is displayed in a clear flow chart (fig 1). Data extraction is performed by two independent assessors. When there is disagreement, data is discussed until an agreement is reached. A few weaknesses can be found in our study. We are not able to describe the volumes of the interventions because lack of information hereabout in the included articles. Not all operative methods are described because lack of information in the included articles. No conclusions are made about the effect of rehabilitation content on the participation and environmental ICF-level because only summary scores of the outcomes on these levels are given. At last, caution is needed when interpreting our results because of small sample sizes.

5.4. Recommendations for further research

In general, more (recent) studies are needed about rehabilitation including GMe exercises. The sample sizes, from the studies which are included in this systematic review, are too small to make

valid generalisations about the found results. More large-sample size studies are needed in the future. Besides, some studies do not clearly describe their follow-up times, or they are from a short duration. Long-term follow-up studies would be valuable to add to this topic. As mentioned in the introduction, a detailed description of exercise content and more specifically volume is lacking. We would highly recommend future researchers to include this in their studies, so more clear and generalised guidelines about the rehabilitation can be developed. Monitoring of how much patients actually perform their exercises, would be a valuable addition to future research f.e. by implementing E-Health. The surgical method from certain studies could not be obtained. This makes interpreting results less valid because surgical approach, as mentioned in the discussion, can have an influence on the rehabilitation. Lastly, some studies only give the summary scores from their used questionnaires. This provokes difficulties when categorising effects according to the ICF-levels because some questionnaires are situated on multiple ICF-levels. We would recommend that if possible the sub scores are at least described in an added table.

6. Conclusion

In conclusion standard, inpatient, outpatient and home-based rehabilitation implementing GMe exercises were offered to persons after THA. Body functions and structures level was best improved by adding supervision and progression, for activity level home-based exercises were at least equally effective to the other interventions, for the other three levels no statement could be made.

7. Reference list: literature study

Alviar, M. J., Olver, J., Brand, C., Hale, T., & Khan, F. (2011). Do patient-reported outcome measures used in assessing outcomes in rehabilitation after hip and knee arthroplasty capture issues relevant to patients? Results of a systematic review and ICF linking process. *J Rehabil Med, 43*(5), 374-381. doi:10.2340/16501977-0801

*Austin, M. S., Urbani, B. T., Fleischman, A. N., Fernando, N. D., Purtill, J. J., Hozack, W. J., . . . Rothman, R. H. (2017). Formal Physical Therapy After Total Hip Arthroplasty Is Not Required A Randomized Controlled Trial. *Journal of Bone and Joint Surgery-American Volume, 99*(8), 648-655. doi:10.2106/jbjs.16.00674

Austin, M. S., Urbani, B. T., Fleischman, A. N., Fernando, N. D., Purtill, J. J., Hozack, W. J., . . . Rothman, R. H. (2017). Formal Physical Therapy After Total Hip Arthroplasty Is Not Required: A Randomized Controlled Trial. *J Bone Joint Surg Am, 99*(8), 648-655. doi:10.2106/JBJS.16.00674

Bennell, K. L., O'Donnell, J. M., Takla, A., Spiers, L. N., Hunter, D. J., Staples, M., & Hinman, R. S. (2014). Efficacy of a physiotherapy rehabilitation program for individuals undergoing arthroscopic management of femoroacetabular impingement - the FAIR trial: a randomised controlled trial protocol. *BMC Musculoskelet Disord, 15*, 58. doi:10.1186/1471-2474-15-58

Bird, P. A., Oakley, S. P., Shnier, R., & Kirkham, B. W. (2001). Prospective evaluation of magnetic resonance imaging and physical examination findings in patients with greater trochanteric pain syndrome. *Arthritis Rheum, 44*(9), 2138-2145. doi:10.1002/1529-0131(200109)44:9<2138::AID-ART367>3.0.CO;2-M

Brinks, A., van Rijn, R. M., Willemsen, S. P., Bohnen, A. M., Verhaar, J. A., Koes, B. W., & Bierma-Zeinstra, S. M. (2011). Corticosteroid injections for greater trochanteric pain syndrome: a randomized controlled trial in primary care. *Ann Fam Med, 9*(3), 226-234. doi:10.1370/afm.1232

Busato, M., Quagliati, C., Magri, L., Filippi, A., Sanna, A., Branchini, M., . . . Stecco, A. (2016). Fascial Manipulation Associated With Standard Care Compared to Only Standard Postsurgical Care for Total Hip Arthroplasty: A Randomized Controlled Trial. *Pm&R, 8*(12), 1142-1150. doi:10.1016/j.pmrj.2016.04.007

Capogna, B. M., Shenoy, K., Youm, T., & Stuchin, S. A. (2017). Tendon Disorders After Total Hip Arthroplasty: Evaluation and Management. *J Arthroplasty, 32*(10), 3249-3255. doi:10.1016/j.arth.2017.04.015

Chi, A. S., Long, S. S., Zoga, A. C., Read, P. J., Deely, D. M., Parker, L., & Morrison, W. B. (2015). Prevalence and pattern of gluteus medius and minimus tendon pathology and muscle atrophy in older individuals using MRI. *Skeletal Radiol, 44*(12), 1727-1733. doi:10.1007/s00256-015-2220-7

Di Monaco, M., & Castiglioni, C. (2013). Which type of exercise therapy is effective after hip arthroplasty? A systematic review of randomized controlled trials. *Eur J Phys Rehabil Med, 49*(6), 893-907, quiz 921-893.

Di Monaco, M., Vallero, F., Tappero, R., & Cavanna, A. (2009). Rehabilitation after total hip arthroplasty: a systematic review of controlled trials on physical exercise programs. *Eur J Phys Rehabil Med, 45*(3), 303-317.

Ebert, J. R., Bucher, T. A., Ball, S. V., & Janes, G. C. (2015). A review of surgical repair methods and patient outcomes for gluteal tendon tears. *Hip Int, 25*(1), 15-23. doi:10.5301/hipint.5000183

Ebert, J. R., Edwards, P. K., Fick, D. P., & Janes, G. C. (2017). A Systematic Review of Rehabilitation Exercises to Progressively Load the Gluteus Medius. *J Sport Rehabil, 26*(5), 418-436. doi:10.1123/jsr.2016-0088

Ebert, J. R., Retheesh, T., Mutreja, R., & Janes, G. C. (2016). THE CLINICAL, FUNCTIONAL AND BIOMECHANICAL PRESENTATION OF PATIENTS WITH SYMPTOMATIC HIP ABDUCTOR TENDON TEARS. *Int J Sports Phys Ther, 11*(5), 725-737.

Engdal, M., Foss, O. A., Taraldsen, K., Husby, V. S., & Winther, S. B. (2017). Daily Physical Activity in Total Hip Arthroplasty Patients Undergoing Different Surgical Approaches: A Cohort Study. *Am J Phys Med Rehabil, 96*(7), 473-478. doi:10.1097/phm.0000000000000657

Flack, N. A., Nicholson, H. D., & Woodley, S. J. (2012). A review of the anatomy of the hip abductor muscles, gluteus medius, gluteus minimus, and tensor fascia lata. *Clin Anat, 25*(6), 697-708. doi:10.1002/ca.22004

Furia, J. P., Rompe, J. D., & Maffulli, N. (2009). Low-energy extracorporeal shock wave therapy as a treatment for greater trochanteric pain syndrome. *Am J Sports Med, 37*(9), 1806-1813. doi:10.1177/0363546509333014

*Galea, M. P., Levinger, P., Lythgo, N., Cimoli, C., Weller, R., Tully, E., . . . Westh, R. (2008). A targeted home- and center-based exercise program for people after total hip replacement: A randomized clinical trial. *Archives of Physical Medicine and Rehabilitation, 89*(8), 1442-1447. doi:10.1016/j.apmr.2007.11.058

Grimaldi, A., & Fearon, A. (2015). Gluteal Tendinopathy: Integrating Pathomechanics and Clinical Features in Its Management. *J Orthop Sports Phys Ther, 45*(11), 910-922. doi:10.2519/jospt.2015.5829

Grimaldi, A., Mellor, R., Hodges, P., Bennell, K., Wajswelner, H., & Vicenzino, B. (2015). Gluteal Tendinopathy: A Review of Mechanisms, Assessment and Management. *Sports Med, 45*(8), 1107-1119. doi:10.1007/s40279-015-0336-5

Grimaldi, A., Richardson, C., Stanton, W., Durbridge, G., Donnelly, W., & Hides, J. (2009). The association between degenerative hip joint pathology and size of the gluteus medius, gluteus minimus and piriformis muscles. *Man Ther, 14*(6), 605-610. doi:10.1016/j.math.2009.07.004

Harrasser, N., Banke, I., Gollwitzer, H., Wilken, F., Toepfer, A., von Eisenhart-Rothe, R., & Hauschild, M. (2016). [Gluteal insufficiency: Pathogenesis, Diagnosis and Therapy]. *Z Orthop Unfall, 154*(2), 140-147. doi:10.1055/s-0041-110812

Hoang-Kim, A., Schemitsch, E., Kulkarni, A. V., & Beaton, D. (2014). Methodological challenges in the use of hip-specific composite outcomes: linking measurements from hip fracture trials to the International Classification of Functioning, Disability and Health Framework. *Arch Orthop Trauma Surg, 134*(2), 219-228. doi:10.1007/s00402-013-1824-4

Kingzett-Taylor, A., Tirman, P. F., Feller, J., McGann, W., Prieto, V., Wischer, T., . . . Genant, H. K. (1999). Tendinosis and tears of gluteus medius and minimus muscles as a cause of hip pain: MR imaging findings. *AJR Am J Roentgenol, 173*(4), 1123-1126. doi:10.2214/ajr.173.4.10511191

Lachiewicz, P. F. (2011). Abductor tendon tears of the hip: evaluation and management. *J Am Acad Orthop Surg, 19*(7), 385-391.

Lindner, D., Shohat, N., Botser, I., Agar, G., & Domb, B. G. (2015). Clinical presentation and imaging results of patients with symptomatic gluteus medius tears. *J Hip Preserv Surg, 2*(3), 310-315. doi:10.1093/jhps/hnv035

Lowe, C. J., Davies, L., Sackley, C. M., & Barker, K. L. (2015). Effectiveness of land-based physiotherapy exercise following hospital discharge following hip arthroplasty for osteoarthritis: an updated systematic review. *Physiotherapy, 101*(3), 252-265. doi:10.1016/j.physio.2014.12.003

Matsumoto, T., Kaneuji, A., Hiejima, Y., Sugiyama, H., Akiyama, H., Atsumi, T., . . . Yamaguchi, M. (2012). Japanese Orthopaedic Association Hip Disease Evaluation Questionnaire (JHEQ): a patient-based evaluation tool for hip-joint disease. The Subcommittee on Hip Disease Evaluation of the Clinical Outcome Committee of the Japanese Orthopaedic Association. *J Orthop Sci, 17*(1), 25-38. doi:10.1007/s00776-011-0166-8

*Mikkelsen, L. R., Mechlenburg, I., Soballe, K., Jorgensen, L. B., Mikkelsen, S., Bandholm, T., & Petersen, A. K. (2014). Effect of early supervised progressive resistance training compared to unsupervised home-based exercise after fast-track total hip replacement applied to patients with preoperative functional limitations. A single-blinded randomised controlled trial. *Osteoarthritis Cartilage, 22*(12), 2051-2058. doi:10.1016/j.joca.2014.09.025

*Mikkelsen, L. R., Mikkelsen, S. S., & Christensen, F. B. (2012). Early, intensified home-based exercise after total hip replacement--a pilot study. *Physiother Res Int, 17*(4), 214-226. doi:10.1002/pri.1523

Minns Lowe, C. J., Barker, K. L., Dewey, M. E., & Sackley, C. M. (2009). Effectiveness of physiotherapy exercise following hip arthroplasty for osteoarthritis: a systematic review of clinical trials. *BMC Musculoskelet Disord, 10*, 98. doi:10.1186/1471-2474-10-98

*Monticone, M., Ambrosini, E., Rocca, B., Lorenzon, C., Ferrante, S., & Zatti, G. (2014). Task-oriented exercises and early full weight-bearing contribute to improving disability after total hip replacement: a randomized controlled trial. *Clin Rehabil, 28*(7), 658-668. doi:10.1177/0269215513519342

*Nankaku, M., Ikeguchi, R., Goto, K., So, K., Kuroda, Y., & Matsuda, S. (2016). Hip external rotator exercise contributes to improving physical functions in the early stage after total hip arthroplasty using an anterolateral approach: a randomized controlled trial. *Disability and Rehabilitation, 38*(22), 2178-2183. doi:10.3109/09638288.2015.1129453

*Okoro, T., Whitaker, R., Gardner, A., Maddison, P., Andrew, J. G., & Lemmey, A. (2016). Does an early home-based progressive resistance training program improve function following total hip

replacement? Results of a randomized controlled study. *BMC Musculoskelet Disord, 17*, 173. doi:10.1186/s12891-016-1023-x
Petis, S., Howard, J. L., Lanting, B. L., & Vasarhelyi, E. M. (2015). Surgical approach in primary total hip arthroplasty: anatomy, technique and clinical outcomes. *Can J Surg, 58*(2), 128-139.
Rompe, J. D., Segal, N. A., Cacchio, A., Furia, J. P., Morral, A., & Maffulli, N. (2009). Home training, local corticosteroid injection, or radial shock wave therapy for greater trochanter pain syndrome. *Am J Sports Med, 37*(10), 1981-1990. doi:10.1177/0363546509334374
Ryan, R. a. H., S. (2016). How to GRADE the quality of the evidence. In: Consumers and Communication Group.
*Umpierres, C. S., Ribeiro, T. A., Marchisio, A. E., Galvao, L., Borges, I. N., Macedo, C. A., & Galia, C. R. (2014). Rehabilitation following total hip arthroplasty evaluation over short follow-up time: randomized clinical trial. *J Rehabil Res Dev, 51*(10), 1567-1578. doi:10.1682/JRRD.2014.05.0132
Zhao, H. Y., Kang, P. D., Xia, Y. Y., Shi, X. J., Nie, Y., & Pei, F. X. (2017). Comparison of Early Functional Recovery After Total Hip Arthroplasty Using a Direct Anterior or Posterolateral Approach: A Randomized Controlled Trial. *J Arthroplasty, 32*(11), 3421-3428. doi:10.1016/j.arth.2017.05.056

References of excluded articles:

Aaboud, M., Aad, G., Abbott, B., Abdallah, J., Abdinov, O., Abeloos, B., . . . Collaboration, A. (2016). Charged-particle distributions at low transverse momentum in [Formula: see text] TeV pp interactions measured with the ATLAS detector at the LHC. *Eur Phys J C Part Fields, 76*(9), 502. doi:10.1140/epjc/s10052-016-4335-y
Aasvang, E. K., Jorgensen, C. C., Laursen, M. B., Madsen, J., Solgaard, S., Kroigaar, M., . . . Kehlet, H. (2017). Safety Aspects of Postanesthesia Care Unit Discharge without Motor Function Assessment after Spinal Anesthesia A Randomized, Multicenter, Semiblinded, Noninferiority, Controlled Trial. *Anesthesiology, 126*(6), 1043-1052. doi:10.1097/aln.0000000000001629
Abbott, J. H., Chapple, C. M., Fitzgerald, G. K., Fritz, J. M., Childs, J. D., Harcombe, H., & Stout, K. (2015). The Incremental Effects of Manual Therapy or Booster Sessions in Addition to Exercise Therapy for Knee Osteoarthritis: A Randomized Clinical Trial. *Journal of Orthopaedic & Sports Physical Therapy, 45*(12), 975-983. doi:10.2519/jospt.2015.6015
Abbott, J. H., Robertson, M. C., Chapple, C., Pinto, D., Wright, A. A., de la Barra, S. L., . . . Team, M. O. A. T. (2013). Manual therapy, exercise therapy, or both, in addition to usual care, for osteoarthritis of the hip or knee: a randomized controlled trial. 1: clinical effectiveness. *Osteoarthritis and Cartilage, 21*(4), 525-534. doi:10.1016/j.joca.2012.12.014
Abbott, J. H., Robertson, M. C., McKenzie, J. E., Baxter, G. D., Theis, J.-C., Campbell, A. J., & Team, M. O. A. T. (2009). Exercise therapy, manual therapy, or both, for osteoarthritis of the hip or knee: a factorial randomised controlled trial protocol. *Trials, 10*. doi:10.1186/1745-6215-10-11
Aerts, I., Cumps, E., Verhagen, E., Wuyts, B., De Gucht, S. V., & Meeusen, R. (2015). The Effect of a 3-Month Prevention Program on the Jump-Landing Technique in Basketball: A Randomized Controlled Trial. *Journal of Sport Rehabilitation, 24*(1), 21-30. doi:10.1123/jsr.2013-0099
Ageberg, E., Link, A., & Roos, E. M. (2010). Feasibility of neuromuscular training in patients with severe hip or knee OA: The individualized goal-based NEMEX-TJR training program. *Bmc Musculoskeletal Disorders, 11*. doi:10.1186/1471-2474-11-126
Aggarwal, A. K., Shashikanth, V. S., & Marwaha, N. (2014). Platelet-rich plasma prevents blood loss and pain and enhances early functional outcome after total knee arthroplasty: a prospective randomised controlled study. *International Orthopaedics, 38*(2), 387-395. doi:10.1007/s00264-013-2136-6
Aghazadeh, J., Ghaderi, M., Azghani, M. R., Khalkhali, H. R., Allahyari, T., & Mohebbi, I. (2015). Anti-fatigue mats, low back pain, and electromyography: An interventional study. *Int J Occup Med Environ Health, 28*(2), 347-356. doi:10.13075/ijomeh.1896.00311

Agosti, J. K., Chandler, L. A., Anderton, C. M., & Clark, R. M. (2013). Serial Sharp Debridement and Formulated Collagen Gel to Treat Pressure Ulcers in Elderly Long-term Care Patients: A Case Study. *Ostomy Wound Management, 59*(11), 43-49.

Aguilar, A. J., DiStefano, L. J., Brown, C. N., Herman, D. C., Guskiewicz, K. M., & Padua, D. A. (2012). A dynamic warm-up model increases quadriceps strength and hamstring flexibility. *J Strength Cond Res, 26*(4), 1130-1141. doi:10.1519/JSC.0b013e31822e58b6

Akamatsu, F. E., Yendo, T. M., Rhode, C., Itezerote, A. M., Hojaij, F., Andrade, M., . . . Jacomo, A. L. (2017). Anatomical Basis of the Myofascial Trigger Points of the Gluteus Maximus Muscle. *Biomed Research International*. doi:10.1155/2017/4821968

Akazawa, N., Okawa, N., Tamura, K., & Moriyama, H. (2017). Relationships between intramuscular fat, muscle strength and gait independence in older women: A cross-sectional study. *Geriatrics & Gerontology International, 17*(10), 1683-1688. doi:10.1111/ggi.12869

Al-Abdulwahab, S. S., & Al-Khatrawi, W. M. (2009). Neuromuscular electrical stimulation of the gluteus medius improves the gait of children with cerebral palsy. *NeuroRehabilitation, 24*(3), 209-217. doi:10.3233/nre-2009-0470

Al-Khlaifat, L., Herrington, L. C., Tyson, S. F., Hammond, A., & Jones, R. K. (2016). The effectiveness of an exercise programme on dynamic balance in patients with medial knee osteoarthritis: A pilot study. *Knee, 23*(5), 849-856. doi:10.1016/j.knee.2016.05.006

Alfirevic, Z., Milan, S. J., & Livio, S. (2012). Caesarean section versus vaginal delivery for preterm birth in singletons. *The Cochrane database of systematic reviews*(6), CD000078-CD000078. doi:10.1002/14651858.CD000078.pub2

Alfirevic, Z., Milan, S. J., & Livio, S. (2013). Caesarean section versus vaginal delivery for preterm birth in singletons. *Cochrane Database of Systematic Reviews*(9). doi:10.1002/14651858.CD000078.pub3

Alves Araujo, C. G., Guerino Macedo, C. d. S., Ferreira, D., Shigaki, L., & da Silva, R. A. (2016). Mcconnell's patellar taping does not alter knee and hip muscle activation differences during proprioceptive exercises: A randomized placebo-controlled trial in women with patellofemoral pain syndrome. *Journal of Electromyography and Kinesiology, 31*, 72-80. doi:10.1016/j.jelekin.2016.09.006

Alviar, M. J., Olver, J., Brand, C., Hale, T., & Khan, F. (2011). Do patient-reported outcome measures used in assessing outcomes in rehabilitation after hip and knee arthroplasty capture issues relevant to patients? Results of a systematic review and ICF linking process. *J Rehabil Med, 43*(5), 374-381. doi:10.2340/16501977-0801

Ambardekar, S., Shochet, T., Bracken, H., Coyaji, K., & Winikoff, B. (2014). Calibrated delivery drape versus indirect gravimetric technique for the measurement of blood loss after delivery: a randomized trial. *Bmc Pregnancy and Childbirth, 14*. doi:10.1186/1471-2393-14-276

Amiri-Khorasani, M., Abu Osman, N. A., & Yusof, A. (2011). Acute effect of static and dynamic stretching on hip dynamic range of motion during instep kicking in professional soccer players. *J Strength Cond Res, 25*(6), 1647-1652. doi:10.1519/JSC.0b013e3181db9f41

Andersson, J., Hulander, E., Rothenberg, E., & Iversen, P. O. (2017). EFFECT ON BODY WEIGHT, QUALITY OF LIFE AND APPETITE FOLLOWING INDIVIDUALIZED, NUTRITIONAL COUNSELLING TO HOME-LIVING ELDERLY AFTER REHABILITATION - AN OPEN RANDOMIZED TRIAL. *Journal of Nutrition Health & Aging, 21*(7), 811-818. doi:10.1007/s12603-016-0825-8

Ang, D. C., Bair, M. J., Damush, T. M., Wu, J., Tu, W., & Kroenke, K. (2010). Predictors of Pain Outcomes in Patients with Chronic Musculoskeletal Pain Co-morbid with Depression: Results from a Randomized Controlled Trial. *Pain Medicine, 11*(4), 482-491. doi:10.1111/j.1526-4637.2009.00759.x

Antony, B., & Ding, C. (2017). *Vitamin D Deficiency in Joint Pain: Effects of Vitamin D Supplementation*.

Araujo, C. G., de Souza Guerino Macedo, C., Ferreira, D., Shigaki, L., & da Silva, R. A. (2016). Mcconnell's patellar taping does not alter knee and hip muscle activation differences during proprioceptive exercises: A randomized placebo-controlled trial in women with

patellofemoral pain syndrome. *J Electromyogr Kinesiol, 31*, 72-80. doi:10.1016/j.jelekin.2016.09.006

Arden, N. K., Cro, S., Sheard, S., Dore, C. J., Bara, A., Tebbs, S. A., . . . Keen, R. (2016). The effect of vitamin D supplementation on knee osteoarthritis, the VIDEO study: a randomised controlled trial. *Osteoarthritis and Cartilage, 24*(11), 1858-1866. doi:10.1016/j.joca.2016.05.020

Arjmandi, B. H., Ormsbee, L. T., Elam, M. L., Campbell, S. C., Rahnama, N., Payton, M. E., . . . Daggy, B. P. (2014). A Combination of Scutellaria Baicalensis and Acacia Catechu Extracts for Short-Term Symptomatic Relief of Joint Discomfort Associated with Osteoarthritis of the Knee. *Journal of Medicinal Food, 17*(6), 707-713. doi:10.1089/jmf.2013.0010

Arumugam, A., Milosavljevic, S., Woodley, S., & Sole, G. (2015). Effects of external pelvic compression on electromyographic activity of the hamstring muscles during unipedal stance in sportsmen with and without hamstring injuries. *Man Ther, 20*(3), 412-419. doi:10.1016/j.math.2014.10.011

Ashraf, A., Zarei, F., Hadianfard, M. J., Kazemi, B., Mohammadi, S., Naseri, M., . . . Sayadi, M. (2014). Comparison the effect of lateral wedge insole and acupuncture in medial compartment knee osteoarthritis: A randomized controlled trial. *Knee, 21*(2), 439-444. doi:10.1016/j.knee.2013.12.002

Auffarth, A., Resch, H., Lederer, S., Karpik, S., Hitzl, W., Bogner, R., . . . Matis, N. (2011). Does the Choice of Approach for Hip Hemiarthroplasty in Geriatric Patients Significantly Influence Early Postoperative Outcomes? A Randomized-Controlled Trial Comparing the Modified Smith-Petersen and Hardinge Approaches. *Journal of Trauma-Injury Infection and Critical Care, 70*(5), 1257-1262. doi:10.1097/TA.0b013e3181eded53

Auld, M. L., & Johnston, L. M. (2014). "Strong and steady": a community-based strength and balance exercise group for children with cerebral palsy. *Disability and Rehabilitation, 36*(24), 2065-2071. doi:10.3109/09638288.2014.891054

Austin, M. S., Urbani, B. T., Fleischman, A. N., Fernando, N. D., Purtill, J. J., Hozack, W. J., . . . Rothman, R. H. (2017). Formal Physical Therapy After Total Hip Arthroplasty Is Not Required A Randomized Controlled Trial. *Journal of Bone and Joint Surgery-American Volume, 99*(8), 648-655. doi:10.2106/jbjs.16.00674

Austin, M. S., Urbani, B. T., Fleischman, A. N., Fernando, N. D., Purtill, J. J., Hozack, W. J., . . . Rothman, R. H. (2017). Formal Physical Therapy After Total Hip Arthroplasty Is Not Required: A Randomized Controlled Trial. *J Bone Joint Surg Am, 99*(8), 648-655. doi:10.2106/JBJS.16.00674

Avraham, F., Aviv, S., Ya'akobi, P., Faran, H., Fisher, Z., Goldman, Y., . . . Carmeli, E. (2007). The efficacy of treatment of different intervention programs for patellofemoral pain Syndrome - A single blinded randomized clinical trial. Pilot study. *Thescientificworldjournal, 7*, 1256-1262. doi:10.1100/tsw.2007.167

Awad, I. T., Cheung, J. J. H., Al-Allaq, Y., Conroy, P. H., & McCartney, C. J. (2013). Low-dose spinal bupivacaine for total knee arthroplasty facilitates recovery room discharge: a randomized controlled trial. *Canadian Journal of Anesthesia-Journal Canadien D Anesthesie, 60*(3), 259-265. doi:10.1007/s12630-012-9867-5

Ayanniyi, O., Ukpai, B. O. O., & Adeniyi, A. F. (2010). Differences in prevalence of self-reported musculoskeletal symptoms among computer and non-computer users in a Nigerian population: a cross-sectional study. *Bmc Musculoskeletal Disorders, 11*. doi:10.1186/1471-2474-11-177

Bade, M. J., Kittelson, J. M., Kohrt, W. M., & Stevens-Lapsley, J. E. (2014). Predicting Functional Performance and Range of Motion Outcomes After Total Knee Arthroplasty. *American Journal of Physical Medicine & Rehabilitation, 93*(7), 579-585. doi:10.1097/phm.0000000000000065

Bagatin, E., Miot, H. A., Soares, J. L., Sanudo, A., Afonso, J. P., de Barros Junior, N., & Talarico, S. (2013). Long-wave infrared radiation reflected by compression stockings in the treatment of

cellulite: a clinical double-blind, randomized and controlled study. *Int J Cosmet Sci, 35*(5), 502-509. doi:10.1111/ics.12073

Bai, X. (2009). [Clinical effects of comprehensive rehabilitation after minimally invasive total hip arthroplasty]. *Zhongguo Gu Shang, 22*(6), 417-420.

Baker, K., Goggins, J., Xie, H., Szumowski, K., LaValley, M., Hunter, D. J., & Felson, D. T. (2007). A randomized crossover trial of a wedged insole for treatment of knee osteoarthritis. *Arthritis and Rheumatism, 56*(4), 1198-1203. doi:10.1002/art.22516

Baldon Rde, M., Piva, S. R., Scattone Silva, R., & Serrao, F. V. (2015). Evaluating eccentric hip torque and trunk endurance as mediators of changes in lower limb and trunk kinematics in response to functional stabilization training in women with patellofemoral pain. *Am J Sports Med, 43*(6), 1485-1493. doi:10.1177/0363546515574690

Baldon Rde, M., Serrao, F. V., Scattone Silva, R., & Piva, S. R. (2014). Effects of functional stabilization training on pain, function, and lower extremity biomechanics in women with patellofemoral pain: a randomized clinical trial. *J Orthop Sports Phys Ther, 44*(4), 240-a248. doi:10.2519/jospt.2014.4940

Baldon, R. d. M., Piva, S. R., Silva, R. S., & Serrao, F. V. (2015). Evaluating Eccentric Hip Torque and Trunk Endurance as Mediators of Changes in Lower Limb and Trunk Kinematics in Response to Functional Stabilization Training in Women With Patellofemoral Pain. *American Journal of Sports Medicine, 43*(6), 1485-1493. doi:10.1177/0363546515574690

Baldon, R. d. M., Serrao, F. V., Scattone Silva, R., & Piva, S. R. (2014). Effects of functional stabilization training on pain, function, and lower extremity biomechanics in women with patellofemoral pain: a randomized clinical trial. *The Journal of orthopaedic and sports physical therapy, 44*(4), 240-A248. doi:10.2519/jospt.2014.4940

Baldon, R. d. M., Serrao, F. V., Silva, R. S., & Piva, S. R. (2014). Effects of Functional Stabilization Training on Pain, Function, and Lower Extremity Biomechanics in Women With Patellofemoral Pain: A Randomized Clinical Trial. *Journal of Orthopaedic & Sports Physical Therapy, 44*(4), 240-251. doi:10.2519/jospt.2014.4940

Banerjee, P., & McLean, C. (2011). The Efficacy of Multimodal High-volume Wound Infiltration in Primary Total Hip Replacement. *Orthopedics, 34*(9), E522-E529. doi:10.3928/01477447-20110714-11

Barlow, G., Donovan, L., Hart, J. M., & Hertel, J. (2015). Effect of lace-up ankle braces on electromyography measures during walking in adults with chronic ankle instability. *Phys Ther Sport, 16*(1), 16-21. doi:10.1016/j.ptsp.2014.02.002

Bartels, N. G., Luennemann, L., Stroux, A., Kottner, J., Serrano, J., & Blume-Peytavi, U. (2014). Effect of Diaper Cream and Wet Wipes on Skin Barrier Properties in Infants: A Prospective Randomized Controlled Trial. *Pediatric Dermatology, 31*(6), 683-691. doi:10.1111/pde.12370

Bastos de Oliveira, N. T., Sbeghen Ferreira Freitas, S. M., Fuhro, F. F., da Luz, M. A., Jr., Amorim, C. F., & Nunes Cabral, C. M. (2017). Muscle Activation During Pilates Exercises in Participants With Chronic Nonspecific Low Back Pain: A Cross-Sectional Case-Control Study. *Archives of Physical Medicine and Rehabilitation, 98*(1), 88-95. doi:10.1016/j.apmr.2016.09.111

Bay, C., Vissing, A.-C., Thaysen-Petersen, D., Lerche, C. M., Togsverd-Bo, K., Heydenreich, J., & Haedersdal, M. (2017). Skin Reactions After Photodynamic Therapy are Unaffected by 839nm Photobiomodulation Therapy: A Randomized, Double-Blind, Placebo-Controlled, Clinical Trial. *Lasers in Surgery and Medicine, 49*(9), 810-818. doi:10.1002/lsm.22690

Bazett-Jones, D. M., Huddleston, W., Cobb, S., O'Connor, K., & Earl-Boehm, J. E. (2017). Acute Responses of Strength and Running Mechanics to Increasing and Decreasing Pain in Patients With Patellofemoral Pain. *Journal of Athletic Training, 52*(5), 411-421. doi:10.4085/1062-6050-53.3.04

Becchi, C., Al Malyan, M., Coppini, R., Campolo, M., Magherini, M., & Boncinelli, S. (2008). Opioid-free analgesia by continuous psoas compartment block after total hip arthroplasty. A randomized study. *Eur J Anaesthesiol, 25*(5), 418-423. doi:10.1017/s026502150700302x

Bejek, Z., Paroczai, R., Szendroi, M., & Kiss, R. M. (2011). Gait analysis following TKA: comparison of conventional technique, computer-assisted navigation and minimally invasive technique combined with computer-assisted navigation. *Knee Surg Sports Traumatol Arthrosc, 19*(2), 285-291. doi:10.1007/s00167-010-1219-9

Bell, D. R., Kulow, S. M., Stiffler, M. R., & Smith, M. D. (2014). Squatting Mechanics in People With and Without Anterior Cruciate Ligament Reconstruction The Influence of Graft Type. *American Journal of Sports Medicine, 42*(12), 2979-2987. doi:10.1177/0363546514552630

Benito-Ruiz, P., Camacho-Zambrano, M. M., Carrillo-Arcentales, J. N., Mestanza-Peralta, M. A., Vallejo-Flores, C. A., Vargas-Lopez, S. V., . . . Zurita-Gavilanes, L. A. (2009). A randomized controlled trial on the efficacy and safety of a food ingredient, collagen hydrolysate, for improving joint comfort. *International Journal of Food Sciences and Nutrition, 60*, 99-113. doi:10.1080/09637480802498820

Benjamin, N. C., Andersen, C. R., Herndon, D. N., & Suman, O. E. (2015). The effect of lower body burns on physical function. *Burns, 41*(8), 1653-1659. doi:10.1016/j.burns.2015.05.020

Benjaminse, A., Lemmink, K. A. P. M., Diercks, R. L., & Otten, B. (2010). An investigation of motor learning during side-step cutting, design of a randomised controlled trial. *Bmc Musculoskeletal Disorders, 11*. doi:10.1186/1471-2474-11-235

Bennell, K. L., Egerton, T., Bills, C., Gale, J., Kolt, G. S., Bunker, S. J., . . . Hinman, R. S. (2012). Addition of telephone coaching to a physiotherapist-delivered physical activity program in people with knee osteoarthritis: A randomised controlled trial protocol. *Bmc Musculoskeletal Disorders, 13*. doi:10.1186/1471-2474-13-246

Bennell, K. L., Egerton, T., Martin, J., Abbott, J. H., Metcalf, B., McManus, F., . . . Buchbinder, R. (2014). Effect of Physical Therapy on Pain and Function in Patients With Hip Osteoarthritis A Randomized Clinical Trial. *Jama-Journal of the American Medical Association, 311*(19), 1987-1997. doi:10.1001/jama.2014.4591

Bennell, K. L., Egerton, T., Pua, Y.-H., Abbott, J. H., Sims, K., & Buchbinder, R. (2011). Building the Rationale and Structure for a Complex Physical Therapy Intervention Within the Context of a Clinical Trial: A Multimodal Individualized Treatment for Patients With Hip Osteoarthritis. *Physical Therapy, 91*(10), 1525-1541. doi:10.2522/ptj.20100430

Bennell, K. L., Kyriakides, M., Metcalf, B., Egerton, T., Wrigley, T. V., Hodges, P. W., . . . Hinman, R. S. (2014). Neuromuscular Versus Quadriceps Strengthening Exercise in Patients With Medial Knee Osteoarthritis and Varus Malalignment. *Arthritis & Rheumatology, 66*(4), 950-959. doi:10.1002/art.38317

Bennell, K. L., O'Donnell, J. M., Takla, A., Spiers, L. N., Hunter, D. J., Staples, M., & Hinman, R. S. (2014). Efficacy of a physiotherapy rehabilitation program for individuals undergoing arthroscopic management of femoroacetabular impingement - the FAIR trial: a randomised controlled trial protocol. *BMC Musculoskelet Disord, 15*, 58. doi:10.1186/1471-2474-15-58

Benson, M., Marangou, A., Russo, M. A., Durocher, J., Collaku, A., & Starkey, Y. Y. (2009). Patient Preference for Sustained-release versus Standard Paracetamol (Acetaminophen): a Multicentre, Randomized, Open-label, Two-way Crossover Study in Subjects with Knee Osteoarthritis. *Journal of International Medical Research, 37*(5), 1321-1335. doi:10.1177/147323000903700507

Bentsen, S. B., Rustoen, T., Klopstad, A., & Miaskowski, C. (2008). The pain experience and future expectations of chronic low back pain patients following spinal fusion. *Journal of Clinical Nursing, 17*(7B), 153-159. doi:10.1111/j.1365-2702.2007.02234.x

Bergstrom, I., Landgren, B. M., Brinck, J., & Freyschuss, B. (2008). Physical training preserves bone mineral density in postmenopausal women with forearm fractures and low bone mineral density. *Osteoporosis International, 19*(2), 177-183. doi:10.1007/s00198-007-0445-6

Bern, M., Deshmukh, R. V., Nelson, R., Bierbaum, B., Sevier, N., Howie, N., . . . Katz, J. N. (2007). Low-dose warfarin coupled with lower leg compression is effective prophylaxis against thromboembolic disease after hip arthroplasty. *Journal of Arthroplasty, 22*(5), 644-650. doi:10.1016/j.arth.2006.07.001

Beselga, C., Neto, F., Alburquerque-Sendin, F., Hall, T., & Oliveira-Campelo, N. (2016). Immediate effects of hip mobilization with movement in patients with hip osteoarthritis: A randomised controlled trial. *Manual Therapy, 22*, 80-85. doi:10.1016/j.math.2015.10.007

Beyer-Westendorf, J., Bogorad, V., Tautenhahn, I., Marten, S., & Schellong, S. M. (2013). Predictors of deep venous thrombosis in patients admitted to rehabilitation clinics after major orthopaedic surgery. *Vasa-European Journal of Vascular Medicine, 42*(1), 40-49. doi:10.1024/0301-1526/a000246

Bhimani, R. H., Cross, L. J. S., Taylor, B. C., Meis, L. A., Fu, S. S., Allen, K. D., . . . Burgess, D. J. (2017). Taking ACTION to reduce pain: ACTION study rationale, design and protocol of a randomized trial of a proactive telephone-based coaching intervention for chronic musculoskeletal pain among African Americans. *Bmc Musculoskeletal Disorders, 18*. doi:10.1186/s12891-016-1363-6

Bird, P. A., Oakley, S. P., Shnier, R., & Kirkham, B. W. (2001). Prospective evaluation of magnetic resonance imaging and physical examination findings in patients with greater trochanteric pain syndrome. *Arthritis Rheum, 44*(9), 2138-2145. doi:10.1002/1529-0131(200109)44:9<2138::AID-ART367>3.0.CO;2-M

Bitterli, R., Sieben, J. M., Hartmann, M., & de Bruin, E. D. (2011). Pre-Surgical Sensorimotor Training for Patients Undergoing Total Hip Replacement: A Randomised Controlled Trial. *International Journal of Sports Medicine, 32*(9), 725-732. doi:10.1055/s-0031-1271696

Black, J., Clark, M., Dealey, C., Brindle, C. T., Alves, P., Santamaria, N., & Call, E. (2015). Dressings as an adjunct to pressure ulcer prevention: consensus panel recommendations. *International Wound Journal, 12*(4), 484-488. doi:10.1111/iwj.12197

Black, J. A., Herbison, G. P., Lyons, R. A., Polinder, S., & Derrett, S. (2011). Recovery After Injury: An Individual Patient Data Meta-Analysis of General Health Status Using the EQ-5D. *Journal of Trauma-Injury Infection and Critical Care, 71*(4), 1003-1010. doi:10.1097/TA.0b013e3182238833

Blanc-Bisson, C., Dechamps, A., Gouspillou, G., Dehail, P., & Bourdel-Marchasson, I. (2008). A randomized controlled trial on early physiotherapy intervention versus usual care in acute car unit for elderly: Potential benefits in light of dietary intakes. *Journal of Nutrition Health & Aging, 12*(6), 395-399. doi:10.1007/bf02982673

Blandfort, S., Gregersen, M., Borris, L. C., & Damsgaard, E. M. (2017). Blood transfusion strategy and risk of postoperative delirium in nursing homes residents with hip fracture. A post hoc analysis based on the TRIFE randomized controlled trial. *Aging Clinical and Experimental Research, 29*(3), 459-466. doi:10.1007/s40520-016-0587-5

Bolgla, L. A., Earl-Boehm, J., Emery, C., Hamstra-Wright, K., & Ferber, R. (2015). Comparison of hip and knee strength in males with and without patellofemoral pain. *Physical Therapy in Sport, 16*(3), 215-221. doi:10.1016/j.ptsp.2014.11.001

Bolton, K. L., Egerton, T., Wark, J., Wee, E., Matthews, B., Kelly, A., . . . Bennell, K. L. (2012). Effects of exercise on bone density and falls risk factors in post-menopausal women with osteopenia: a randomised controlled trial. *J Sci Med Sport, 15*(2), 102-109. doi:10.1016/j.jsams.2011.08.007

Bonjour, J.-P., Benoit, V., Rousseau, B., & Souberbielle, J.-C. (2012). Consumption of Vitamin D-and Calcium-Fortified Soft White Cheese Lowers the Biochemical Marker of Bone Resorption TRAP 5b in Postmenopausal Women at Moderate Risk of Osteoporosis Fracture. *Journal of Nutrition, 142*(4), 698-703. doi:10.3945/jn.111.153692

Borgwardt, L., Zerahn, B., Bliddal, H., Christiansen, C., Sylvest, J., & Borgwardt, A. (2009). Similar clinical outcome after unicompartmental knee arthroplasty using a conventional or accelerated care program A randomized, controlled study of 40 patients. *Acta Orthopaedica, 80*(3), 334-337. doi:10.3109/17453670903035559

Bourke, L., Thompson, G., Gibson, D. J., Daley, A., Crank, H., Adam, I., . . . Saxton, J. (2011). Pragmatic lifestyle intervention in patients recovering from colon cancer: a randomized controlled pilot study. *Arch Phys Med Rehabil, 92*(5), 749-755. doi:10.1016/j.apmr.2010.12.020

Bourne, M. N., Duhig, S. J., Timmins, R. G., Williams, M. D., Opar, D. A., Al Najjar, A., . . . Shield, A. J. (2017). Impact of the Nordic hamstring and hip extension exercises on hamstring architecture and morphology: implications for injury prevention. *British Journal of Sports Medicine, 51*(5), 469-477. doi:10.1136/bjsports-2016-096130

Bourne, M. N., Williams, M. D., Opar, D. A., Al Najjar, A., Kerr, G. K., & Shield, A. J. (2017). Impact of exercise selection on hamstring muscle activation. *British Journal of Sports Medicine, 51*(13), 1021-U1062. doi:10.1136/bjsports-2015-095739

Braid, V., Barber, M., Mitchell, S. L., Martin, B. J., Granat, M., & Stott, D. J. (2008). Randomised controlled trial of electrical stimulation of the quadriceps after proximal femoral fracture. *Aging Clinical and Experimental Research, 20*(1), 62-66.

Brantingham, J. W., Parkin-Smith, G., Cassa, T. K., Globe, G. A., Globe, D., Pollard, H., . . . Korporaal, C. (2012). Full Kinetic Chain Manual and Manipulative Therapy Plus Exercise Compared With Targeted Manual and Manipulative Therapy Plus Exercise for Symptomatic Osteoarthritis of the Hip: A Randomized Controlled Trial. *Archives of Physical Medicine and Rehabilitation, 93*(2), 259-267. doi:10.1016/j.apmr.2011.08.036

Brennan, K. L., Allen, B. C., & Maldonado, Y. M. (2017). Dry Needling Versus Cortisone Injection in the Treatment of Greater Trochanteric Pain Syndrome: A Noninferiority Randomized Clinical Trial. *J Orthop Sports Phys Ther, 47*(4), 232-239. doi:10.2519/jospt.2017.6994

Brinks, A., van Rijn, R. M., Willemsen, S. P., Bohnen, A. M., Verhaar, J. A., Koes, B. W., & Bierma-Zeinstra, S. M. (2011). Corticosteroid injections for greater trochanteric pain syndrome: a randomized controlled trial in primary care. *Ann Fam Med, 9*(3), 226-234. doi:10.1370/afm.1232

Broadbent, S., Rousseau, J. J., Thorp, R. M., Choate, S. L., Jackson, F. S., & Rowlands, D. S. (2010). Vibration therapy reduces plasma IL6 and muscle soreness after downhill running. *Br J Sports Med, 44*(12), 888-894. doi:10.1136/bjsm.2008.052100

Brown, C. H., LaFlam, A., Max, L., Wyrobek, J., Neufeld, K. J., Kebaish, K. M., . . . Riley, L. H. (2016). Delirium After Spine Surgery in Older Adults: Incidence, Risk Factors, and Outcomes. *Journal of the American Geriatrics Society, 64*(10), 2101-2108. doi:10.1111/jgs.14434

Bruce-Brand, R. A., Walls, R. J., Ong, J. C., Emerson, B. S., O'Byrne, J. M., & Moyna, N. M. (2012). Effects of home-based resistance training and neuromuscular electrical stimulation in knee osteoarthritis: a randomized controlled trial. *Bmc Musculoskeletal Disorders, 13*. doi:10.1186/1471-2474-13-118

Buchecker, M., Lindinger, S., Pfusterschmied, J., & Mueller, E. (2013). Effects of age on lower extremity joint kinematics and kinetics during level walking with Masai barefoot technology shoes. *European Journal of Physical and Rehabilitation Medicine, 49*(5), 675-686.

Buhagiar, M. A., Naylor, J. M., Harris, I. A., Xuan, W., Kohler, F., Wright, R. J., & Fortunato, R. (2013). Hospital Inpatient versus HOme-based rehabilitation after knee arthroplasty (The HIHO study): study protocol for a randomized controlled trial. *Trials, 14*. doi:10.1186/1745-6215-14-432

Burgers, P. T., Hoogendoorn, M., Van Woensel, E. A., Poolman, R. W., Bhandari, M., Patka, P., & Van Lieshout, E. M. (2016). Total medical costs of treating femoral neck fracture patients with hemi- or total hip arthroplasty: a cost analysis of a multicenter prospective study. *Osteoporos Int, 27*(6), 1999-2008. doi:10.1007/s00198-016-3484-z

Busato, M., Quagliati, C., Magri, L., Filippi, A., Sanna, A., Branchini, M., . . . Stecco, A. (2016). Fascial Manipulation Associated With Standard Care Compared to Only Standard Postsurgical Care for Total Hip Arthroplasty: A Randomized Controlled Trial. *Pm&R, 8*(12), 1142-1150. doi:10.1016/j.pmrj.2016.04.007

Calvo, R., Jose Martinez-Zapata, M., Urrutia, G., Gich, I., Jordan, M., Del Arco, A., . . . Bonfill, X. (2012). Low- vs. high-pressure suction drainage after total knee arthroplasty: a double-blind randomized controlled trial. *Journal of Advanced Nursing, 68*(4), 758-766. doi:10.1111/j.1365-2648.2011.05760.x

Capogna, B. M., Shenoy, K., Youm, T., & Stuchin, S. A. (2017). Tendon Disorders After Total Hip Arthroplasty: Evaluation and Management. *J Arthroplasty, 32*(10), 3249-3255. doi:10.1016/j.arth.2017.04.015

Carda, S., Invernizzi, M., Cognolato, G., Piccoli, E., Baricich, A., & Cisari, C. (2012). Efficacy of a Hip Flexion Assist Orthosis in Adults With Hemiparesis After Stroke. *Physical Therapy, 92*(5), 734-739. doi:10.2522/ptj.20110112

Carli, F., Clemente, A., Asenjo, J. F., Kim, D. J., Mistraletti, G., Gomarasca, M., . . . Tanzer, M. (2010). Analgesia and functional outcome after total knee arthroplasty: periarticular infiltration vs continuous femoral nerve block. *British Journal of Anaesthesia, 105*(2), 185-195. doi:10.1093/bja/aeq112

Castro-Sanchez, A. M., Aguilar-Ferrandiz, M. E., Mataran-Penarrocha, G. A., del Mar Sanchez-Joya, M., Arroyo-Morales, M., & Fernandez-de-las-Penas, C. (2014). Short-term Effects of a Manual Therapy Protocol on Pain, Physical Function, Quality of Sleep, Depressive Symptoms, and Pressure Sensitivity in Women and Men With Fibromyalgia Syndrome A Randomized Controlled Trial. *Clinical Journal of Pain, 30*(7), 589-597.

Castro-Sanchez, A. M., Mataran-Penarrocha, G. A., Arroyo-Morales, M., Saavedra-Hernandez, M., Fernandez-Sola, C., & Moreno-Lorenzo, C. (2011). Effects of myofascial release techniques on pain, physical function, and postural stability in patients with fibromyalgia: a randomized controlled trial. *Clin Rehabil, 25*(9), 800-813. doi:10.1177/0269215511399476

Cavill, S., McKenzie, K., Munro, A., McKeever, J., Whelan, L., Biggs, L., . . . Haines, T. P. (2016). The effect of prehabilitation on the range of motion and functional outcomes in patients following the total knee or hip arthroplasty: A pilot randomized trial. *Physiother Theory Pract, 32*(4), 262-270. doi:10.3109/09593985.2016.1138174

Ceca, D., Elvira, L., Guzman, J. F., & Pablos, A. (2017). Benefits of a self-myofascial release program on health-related quality of life in people with fibromyalgia: a randomized controlled trial. *Journal of Sports Medicine and Physical Fitness, 57*(7-8), 993-1002. doi:10.23736/s0022-4707.17.07025-6

Chalidis, B. E., Petsatodis, G., Christodoulou, A. G., Christoforidis, J., Papadopoulos, P. P., & Pournaras, J. (2010). Is Obesity a Contraindication for Minimal Invasive Total Knee Replacement? A Prospective Randomized Control Trial. *Obesity Surgery, 20*(12), 1633-1641. doi:10.1007/s11695-009-9968-6

Chance-Larsen, K., Littlewood, C., & Garth, A. (2010). Prone hip extension with lower abdominal hollowing improves the relative timing of gluteus maximus activation in relation to biceps femoris. *Man Ther, 15*(1), 61-65. doi:10.1016/j.math.2009.07.001

Chaudhari, A. M. W., Jamison, S. T., McNally, M. P., Pan, X., & Schmitt, L. C. (2014). Hip adductor activations during run-to-cut manoeuvres in compression shorts: implications for return to sport after groin injury. *Journal of Sports Sciences, 32*(14), 1333-1340. doi:10.1080/02640414.2014.889849

Cheatham, S. W., Stull, K. R., & Kolber, M. J. (2017). Comparison of a Vibrating Foam Roller and a Non-vibrating Foam Roller Intervention on Knee Range of Motion and Pressure Pain Threshold: A Randomized Controlled Trial. *Journal of sport rehabilitation*, 1-23. doi:10.1123/jsr.2017-0164

Chen, C. H., Chen, T. C., Jan, M. H., & Lin, J. J. (2015). Acute effects of static active or dynamic active stretching on eccentric-exercise-induced hamstring muscle damage. *Int J Sports Physiol Perform, 10*(3), 346-352. doi:10.1123/ijspp.2014-0206

Cheng, C.-M., Chiu, M.-J., Wang, J.-H., Liu, H.-C., Shyu, Y.-I. L., Huang, G.-H., & Chen, C. C.-H. (2012). Cognitive stimulation during hospitalization improves global cognition of older Taiwanese undergoing elective total knee and hip replacement surgery. *Journal of Advanced Nursing, 68*(6), 1322-1329. doi:10.1111/j.1365-2648.2011.05842.x

Cheng, S.-T., Chan, K. L., Lam, R. W. L., Mok, M. H. T., Chen, P. P., Chow, Y. F., . . . Tam, C. W. C. (2017). A multicomponent intervention for the management of chronic pain in older adults: study protocol for a randomized controlled trial. *Trials, 18*. doi:10.1186/s13063-017-2270-3

Chi, A. S., Long, S. S., Zoga, A. C., Read, P. J., Deely, D. M., Parker, L., & Morrison, W. B. (2015). Prevalence and pattern of gluteus medius and minimus tendon pathology and muscle atrophy in older individuals using MRI. *Skeletal Radiol, 44*(12), 1727-1733. doi:10.1007/s00256-015-2220-7

Childs, J. D., Teyhen, D. S., Casey, P. R., McCoy-Singh, K. A., Feldtmann, A. W., Wright, A. C., . . . George, S. Z. (2010). Effects of Traditional Sit-up Training Versus Core Stabilization Exercises on Short-Term Musculoskeletal Injuries in US Army Soldiers: A Cluster Randomized Trial. *Physical Therapy, 90*(10), 1404-1412. doi:10.2522/ptj.20090389

Chlebowski, R. T., Pettinger, M., Johnson, K. C., Wallace, R., Womack, C., Mossavar-Rahmani, Y., . . . Kooperberg, C. L. (2013). Calcium Plus Vitamin D Supplementation and Joint Symptoms in Postmenopausal Women in the Women's Health Initiative Randomized Trial. *Journal of the Academy of Nutrition and Dietetics, 113*(10), 1302-1310. doi:10.1016/j.jand.2013.06.007

Cho, M. K., Kim, J. H., Chung, Y., & Hwang, S. (2015). Treadmill gait training combined with functional electrical stimulation on hip abductor and ankle dorsiflexor muscles for chronic hemiparesis. *Gait Posture, 42*(1), 73-78. doi:10.1016/j.gaitpost.2015.04.009

Cho, S., Lee, D. H., Won, C.-H., Kim, S. M., Lee, S., Lee, M.-J., & Chung, J. H. (2010). Differential Effects of Low-Dose and High-Dose Beta-Carotene Supplementation on the Signs of Photoaging and Type I Procollagen Gene Expression in Human Skin in vivo. *Dermatology, 221*(2), 160-171. doi:10.1159/000305548

Choi, W. J., Hoffer, J. A., & Robinovitch, S. N. (2010). The effect of positioning on the biomechanical performance of soft shell hip protectors. *Journal of Biomechanics, 43*(5), 818-825. doi:10.1016/j.jbiomech.2009.11.023

Christiansen, C. L. (2008). The effects of hip and ankle stretching on gait function of older people. *Arch Phys Med Rehabil, 89*(8), 1421-1428. doi:10.1016/j.apmr.2007.12.043

Cibulka, M. T., & Woehrle, J. (2013). Conservative Treatment Options for Osteoarthritis of the Hip. *Topics in Geriatric Rehabilitation, 29*(4), 227-238. doi:10.1097/TGR.0b013e3182933e2d

Cipriani, D. J., Terry, M. E., Haines, M. A., Tabibnia, A. P., & Lyssanova, O. (2012). Effect of stretch frequency and sex on the rate of gain and rate of loss in muscle flexibility during a hamstring-stretching program: a randomized single-blind longitudinal study. *J Strength Cond Res, 26*(8), 2119-2129. doi:10.1519/JSC.0b013e31823b862a

Claerbout, M., Gebara, B., Ilsbroukx, S., Verschueren, S., Peers, K., Van Asch, P., & Feys, P. (2012). Effects of 3 weeks' whole body vibration training on muscle strength and functional mobility in hospitalized persons with multiple sclerosis. *Multiple Sclerosis Journal, 18*(4), 498-505. doi:10.1177/1352458511423267

Clarke, H., Page, G. M., McCartney, C. J. L., Huang, A., Stratford, P., Andrion, J., . . . Katz, J. (2015). Pregabalin reduces postoperative opioid consumption and pain for 1 week after hospital discharge, but does not affect function at 6 weeks or 3 months after total hip arthroplasty. *British Journal of Anaesthesia, 115*(6), 903-911. doi:10.1093/bja/aev363

Clarke, H., Woodhouse, L. J., Kennedy, D., Stratford, P., & Katz, J. (2011). Strategies Aimed at Preventing Chronic Post-surgical Pain: Comprehensive Perioperative Pain Management after Total Joint Replacement Surgery. *Physiotherapy Canada, 63*(3), 289-304. doi:10.3138/ptc.2009-49P

Clarke, H. A., Katz, J., McCartney, C. J. L., Stratford, P., Kennedy, D., Page, M. G., . . . Kay, J. (2014). Perioperative gabapentin reduces 24 h opioid consumption and improves in-hospital rehabilitation but not post-discharge outcomes after total knee arthroplasty with peripheral nerve block. *British Journal of Anaesthesia, 113*(5), 855-864. doi:10.1093/bja/aeu202

Clarke, S. P., Poulis, N., Moreton, B. J., Walsh, D. A., & Lincoln, N. B. (2017). Evaluation of a group acceptance commitment therapy intervention for people with knee or hip osteoarthritis: a pilot randomized controlled trial. *Disabil Rehabil, 39*(7), 663-670. doi:10.3109/09638288.2016.1160295

Clausen, B., Holsgaard-Larsen, A., & Roos, E. M. (2017). An 8-Week Neuromuscular Exercise Program for Patients With Mild to Moderate Knee Osteoarthritis: A Case Series Drawn From a

Registered Clinical Trial. *Journal of Athletic Training, 52*(6), 592-605. doi:10.4085/1062-6050-52.5.06

Clayton, H. M., Kaiser, L. J., Lavagnino, M., & Stubbs, N. C. (2012). Evaluation of intersegmental vertebral motion during performance of dynamic mobilization exercises in cervical lateral bending in horses. *American Journal of Veterinary Research, 73*(8), 1153-1159. doi:10.2460/ajvr.73.8.1153

Cleton, A., Rossenu, S., Crauwels, H., Berwaerts, J., Hough, D., Gopal, S., . . . Rosso, C. M. (2014). A single-dose, open-label, parallel, randomized, dose-proportionality study of paliperidone after intramuscular injections of paliperidone palmitate in the deltoid or gluteal muscle in patients with schizophrenia. *J Clin Pharmacol, 54*(9), 1048-1057. doi:10.1002/jcph.295

Cochrane, D. J., Harnett, M. C., & Pinfold, S. C. (2017). Does short-term gluteal activation enhance muscle performance? *Res Sports Med, 25*(2), 156-165. doi:10.1080/15438627.2017.1282358

Coelho, C. d. F., Leal-Junior, E. C. P., Biasotto-Gonzalez, D. A., Bley, A. S., de Carvalho, P. d. T. d. C., Politti, F., . . . Gomes, C. A. F. d. P. (2014). Effectiveness of phototherapy incorporated into an exercise program for osteoarthritis of the knee: study protocol for a randomized controlled trial. *Trials, 15*, 221-221. doi:10.1186/1745-6215-15-221

Colon-Emeric, C. S., Lyles, K. W., Su, G., Pieper, C. F., Magaziner, J. S., Adachi, J. D., . . . Trial, H. R. F. (2011). Clinical Risk Factors for Recurrent Fracture after Hip Fracture: A Prospective Study. *Calcified Tissue International, 88*(5), 425-431. doi:10.1007/s00223-011-9474-4

Cook, W. L., Khan, K. M., Bech, M. H., Brasher, P. M., Brown, R. A., Bryan, S., . . . Ashe, M. C. (2011). Post-discharge management following hip fracture - get you back to B4: A parallel group, randomized controlled trial study protocol. *Bmc Geriatrics, 11*. doi:10.1186/1471-2318-11-30

Coppack, R. J., Bilzon, J. L., Wills, A. K., McCurdie, I. M., Partridge, L., Nicol, A. M., & Bennett, A. N. (2016). A comparison of multidisciplinary team residential rehabilitation with conventional outpatient care for the treatment of non-arthritic intra-articular hip pain in UK Military personnel - a protocol for a randomised controlled trial. *Bmc Musculoskeletal Disorders, 17*. doi:10.1186/s12891-016-1309-z

Coulter, C., Perriman, D. M., Neeman, T. M., Smith, P. N., & Scarvell, J. M. (2017). Supervised or Unsupervised Rehabilitation After Total Hip Replacement Provides Similar Improvements for Patients: A Randomized Controlled Trial. *Archives of Physical Medicine and Rehabilitation, 98*(11), 2253-2264. doi:10.1016/j.apmr.2017.03.032

Courteix, D., Valente-dos-Santos, J., Ferry, B., Lac, G., Lesourd, B., Chapier, R., . . . Dutheil, F. (2015). Multilevel Approach of a 1-Year Program of Dietary and Exercise Interventions on Bone Mineral Content and Density in Metabolic Syndrome - the RESOLVE Randomized Controlled Trial. *Plos One, 10*(9). doi:10.1371/journal.pone.0136491

Crossley, K. M., Vicenzino, B., Lentzos, J., Schache, A. G., Pandy, M. G., Ozturk, H., & Hinman, R. S. (2015). Exercise, education, manual-therapy and taping compared to education for patellofemoral osteoarthritis: a blinded, randomised clinical trial. *Osteoarthritis and Cartilage, 23*(9), 1457-1464. doi:10.1016/j.joca.2015.04.024

Cumps, E., Verhagen, E. A., Duerinck, S., Deville, A., Duchene, L., & Meeusen, R. (2008). Effect of a preventive intervention programme on the prevalence of anterior knee pain in volleyball players. *European Journal of Sport Science, 8*(4), 183-192. doi:10.1080/17461390802067711

Curwin, S., Allt, J., Szpilfogel, C., & Makrides, L. (2013). The Healthy LifeWorks Project The Effect of a Comprehensive Workplace Wellness Program on the Prevalence and Severity of Musculoskeletal Disorders in a Canadian Government Department. *Journal of Occupational and Environmental Medicine, 55*(6), 628-633. doi:10.1097/JOM.0b013e31829889c1

Czyzewska, A., Glinkowski, W. M., Walesiak, K., Krawczak, K., Cabaj, D., & Gorecki, A. (2014). Effects of preoperative physiotherapy in hip osteoarthritis patients awaiting total hip replacement. *Archives of Medical Science, 10*(5), 985-991. doi:10.5114/aoms.2014.46218

Davenport, K. L., Campos, J. S., Nguyen, J., Saboeiro, G., Adler, R. S., & Moley, P. J. (2015). Ultrasound-Guided Intratendinous Injections With Platelet-Rich Plasma or Autologous Whole

Blood for Treatment of Proximal Hamstring Tendinopathy. *Journal of Ultrasound in Medicine, 34*(8), 1455-1463. doi:10.7863/ultra.34.8.1455

Davis Hammonds, A. L., Laudner, K. G., McCaw, S., & McLoda, T. A. (2012). Acute lower extremity running kinematics after a hamstring stretch. *J Athl Train, 47*(1), 5-14.

de Campos, G. C., Rezende, M. U., Pasqualin, T., Frucchi, R., & Neto, R. B. (2015). Lateral wedge insole for knee osteoarthritis: randomized clinical trial. *Sao Paulo Medical Journal, 133*(1), 13-19. doi:10.1590/1516-3180.2013.6750002

de Carvalho, M. E., de Carvalho, R. M., Jr., Marques, A. P., de Carvalho Lucio, L. M., de Oliveira, A. C., Neto, O. P., . . . de Lima, C. J. (2016). Low intensity laser and LED therapies associated with lateral decubitus position and flexion exercises of the lower limbs in patients with lumbar disk herniation: clinical randomized trial. *Lasers Med Sci, 31*(7), 1455-1463. doi:10.1007/s10103-016-2009-5

de Castro, E. B., Teatin Juliato, C. R., Salao Piedemonte, L. A., & dos Santos Junior, L. C. (2016). Impact of Sacrospinous Colpopexy Associated with Anterior Colporrhaphy for the Treatment of Dome Prolapse on all Three Vaginal Compartments. *Revista Brasileira De Ginecologia E Obstetricia, 38*(2), 77-81. doi:10.1055/s-0035-1571264

de Castro Lacaze, D. H., Sacco, I. d. C. N., Rocha, L. E., de Braganca Pereira, C. A., & Casarotto, R. A. (2010). STRETCHING AND JOINT MOBILIZATION EXERCISES REDUCE CALL-CENTER OPERATORS' MUSCULOSKELETAL DISCOMFORT AND FATIGUE. *Clinics, 65*(7), 657-662. doi:10.1590/s1807-59322010000700003

de Putter, C. E., Selles, R. W., Haagsma, J. A., Polinder, S., Panneman, M. J. M., Hovius, S. E. R., . . . van Beeck, E. F. (2014). Health-related quality of life after upper extremity injuries and predictors for suboptimal outcome. *Injury-International Journal of the Care of the Injured, 45*(11), 1752-1758. doi:10.1016/j.injury.2014.07.016

Dempsey, P. C., Larsen, R. N., Sethi, P., Sacre, J. W., Straznicky, N. E., Cohen, N. D., . . . Dunstan, D. W. (2016). Benefits for Type 2 Diabetes of Interrupting Prolonged Sitting With Brief Bouts of Light Walking or Simple Resistance Activities. *Diabetes Care, 39*(6), 964-972. doi:10.2337/dc15-2336

den Hertog, A., Gliesche, K., Timm, J., Muehlbauer, B., & Zebrowski, S. (2012). Pathway-controlled fast-track rehabilitation after total knee arthroplasty: a randomized prospective clinical study evaluating the recovery pattern, drug consumption, and length of stay. *Archives of Orthopaedic and Trauma Surgery, 132*(8), 1153-1163. doi:10.1007/s00402-012-1528-1

Deng, S. L. (2013). Muscle strength training helps to reduce bone loss in early postmenopausal women. *Science & Sports, 28*(5), 260-266. doi:10.1016/j.scispo.2012.05.003

Deyle, G. D., Gill, N. W., Allison, S. C., Hando, B. R., & Rochino, D. A. (2012). Knee OA: Which patients are unlikely to benefit from manual PT and exercise? *Journal of Family Practice, 61*(1), E1-E8.

Di Monaco, M., & Castiglioni, C. (2013). Which type of exercise therapy is effective after hip arthroplasty? A systematic review of randomized controlled trials. *Eur J Phys Rehabil Med, 49*(6), 893-907, quiz 921-893.

Di Monaco, M., Castiglioni, C., De Toma, E., Gardin, L., Giordano, S., Di Monaco, R., & Tappero, R. (2014). Handgrip Strength but not Appendicular Lean Mass is an Independent Predictor of Functional Outcome in Hip-Fracture Women: A Short-Term Prospective Study. *Archives of Physical Medicine and Rehabilitation, 95*(9), 1719-1724. doi:10.1016/j.apmr.2014.04.003

Di Monaco, M., Vallero, F., Tappero, R., & Cavanna, A. (2009). Rehabilitation after total hip arthroplasty: a systematic review of controlled trials on physical exercise programs. *Eur J Phys Rehabil Med, 45*(3), 303-317.

Dixon, S., Blom, A. W., Whitehouse, M. R., & Wylde, V. (2014). Comparison of patient reported outcomes after Triathlon (R) and Kinemax Plus prostheses. *Annals of the Royal College of Surgeons of England, 96*(1), 61-66. doi:10.1308/003588414x13824511650218

Dolak, K. L., Silkman, C., Medina McKeon, J., Hosey, R. G., Lattermann, C., & Uhl, T. L. (2011). Hip strengthening prior to functional exercises reduces pain sooner than quadriceps

strengthening in females with patellofemoral pain syndrome: a randomized clinical trial. *J Orthop Sports Phys Ther, 41*(8), 560-570. doi:10.2519/jospt.2011.3499

Dolan, C. M., Henning, J. A., Anderson, J. G., Bohay, D. R., Kornmesser, M. J., & Endres, T. J. (2007). Randomized prospective study comparing tri-cortical iliac crest autograft to allograft in the lateral column lengthening component for operative correction of adult acquired flatfoot deformity. *Foot & Ankle International, 28*(1), 8-12. doi:10.3113/fai.2007.0002

Donovan, L., Hart, J. M., & Hertel, J. (2015). Effects of 2 ankle destabilization devices on electromyography measures during functional exercises in individuals with chronic ankle instability. *J Orthop Sports Phys Ther, 45*(3), 220-232. doi:10.2519/jospt.2015.5222

Donovan, L., Hart, J. M., Saliba, S., Park, J., Feger, M. A., Herb, C. C., & Hertel, J. (2016). Effects of ankle destabilization devices and rehabilitation on gait biomechanics in chronic ankle instability patients: A randomized controlled trial. *Physical Therapy in Sport, 21*, 46-56. doi:10.1016/j.ptsp.2016.02.006

Doria, E., Buonocore, D., Michelotti, A., Nobile, V., & Marzatico, F. (2013). EVALUATION OF A PHYTO-SUPPLEMENT EFFICACY AS ADJUVANT IN REDUCING BODY WEIGHT AND FAT MASS IN OVERWEIGHT WOMEN. *Current Topics in Nutraceutical Research, 11*(1-2), 21-27.

dos Anjos Rabelo, N. D., Lima, B., dos Reis, A. C., Bley, A. S., Yi, L. C., Fukuda, T. Y., . . . Garcia Lucareli, P. R. (2014). Neuromuscular training and muscle strengthening in patients with patellofemoral pain syndrome: a protocol of randomized controlled trial. *Bmc Musculoskeletal Disorders, 15*. doi:10.1186/1471-2474-15-157

dos Anjos Rabelo, N. D., Pena Costa, L. O., de Lima, B. M., dos Reis, A. C., Bley, A. S., Fukuda, T. Y., & Garcia Lucareli, P. R. (2017). Adding motor control training to muscle strengthening did not substantially improve the effects on clinical or kinematic outcomes in women with patellofemoral pain: A randomised controlled trial. *Gait & Posture, 58*, 280-286. doi:10.1016/j.gaitpost.2017.08.018

Dos Santos, B., Correa, L. A., Santos, L. T., Meziat Filho, N. A., Lemos, T., & Calazans Nogueira, L. A. (2016). Combination of Hip Strengthening and Manipulative Therapy for the Treatment of Plantar Fasciitis: A Case Report. *Journal of Chiropractic Medicine, 15*(4), 310-313. doi:10.1016/j.jcm.2016.08.001

Dowsey, M. M., Castle, D. J., Knowles, S. R., Monshat, K., Salzberg, M. R., & Choong, P. F. M. (2014). The effect of mindfulness training prior to total joint arthroplasty on post-operative pain and physical function: study protocol for a randomised controlled trial. *Trials, 15*. doi:10.1186/1745-6215-15-208

Drew, B. T., Conaghan, P. G., Smith, T. O., Selfe, J., & Redmond, A. C. (2017). The effect of targeted treatment on people with patellofemoral pain: a pragmatic, randomised controlled feasibility study. *Bmc Musculoskeletal Disorders, 18*. doi:10.1186/s12891-017-1698-7

Duncan, C. M., Moeschler, S. M., Horlocker, T. T., Hanssen, A. D., & Hebl, J. R. (2013). A Self-Paired Comparison of Perioperative Outcomes Before and After Implementation of a Clinical Pathway in Patients Undergoing Total Knee Arthroplasty. *Regional Anesthesia and Pain Medicine, 38*(6), 533-538. doi:10.1097/aap.0000000000000014

Dunkel, B., Pfau, T., Fiske-Jackson, A., Veres-Nyeki, K. O., Fairhurst, H., Jackson, K., . . . Bolt, D. M. (2017). A pilot study of the effects of acupuncture treatment on objective and subjective gait parameters in horses. *Veterinary Anaesthesia and Analgesia, 44*(1), 154-162. doi:10.1111/vaa.12373

Dupont, E., Journet, M., Oula, M.-L., Gomez, J., Leveille, C., Loing, E., & Bilodeau, D. (2014). An integral topical gel for cellulite reduction: results from a double-blind, randomized, placebo-controlled evaluation of efficacy. *Clinical, cosmetic and investigational dermatology, 7*, 73-88. doi:10.2147/ccid.s53580

Durmus, D., Alayli, G., Aliyazicioglu, Y., Buyukakincak, O., & Canturk, F. (2013). Effects of glucosamine sulfate and exercise therapy on serum leptin levels in patients with knee osteoarthritis: preliminary results of randomized controlled clinical trial. *Rheumatology International, 33*(3), 593-599. doi:10.1007/s00296-012-2401-9

Duval, K., Luttin, K., & Lam, T. (2011). Neuromuscular strategies in the paretic leg during curved walking in individuals post-stroke. *J Neurophysiol, 106*(1), 280-290. doi:10.1152/jn.00657.2010

Dwyer, L., Parkin-Smith, G. F., Brantingham, J. W., Korporaal, C., Cassa, T. K., Globe, G., . . . Tong, V. (2015). MANUAL AND MANIPULATIVE THERAPY IN ADDITION TO REHABILITATION FOR OSTEOARTHRITIS OF THE KNEE: ASSESSOR-BLIND RANDOMIZED PILOT TRIAL. *Journal of Manipulative and Physiological Therapeutics, 38*(1), 1-U30. doi:10.1016/j.jmpt.2014.10.002

Dyball, K. M., Taylor, N. F., & Dodd, K. J. (2011). Retest reliability of measuring hip extensor muscle strength in different testing positions in young people with cerebral palsy. *Bmc Pediatrics, 11*. doi:10.1186/1471-2431-11-42

Ebert, J. R., Bucher, T. A., Ball, S. V., & Janes, G. C. (2015). A review of surgical repair methods and patient outcomes for gluteal tendon tears. *Hip Int, 25*(1), 15-23. doi:10.5301/hipint.5000183

Ebert, J. R., Edwards, P. K., Fick, D. P., & Janes, G. C. (2017). A Systematic Review of Rehabilitation Exercises to Progressively Load the Gluteus Medius. *J Sport Rehabil, 26*(5), 418-436. doi:10.1123/jsr.2016-0088

Ebert, J. R., Retheesh, T., Mutreja, R., & Janes, G. C. (2016). The Clinical, Functional and Biomechanical Presentation of Patients with Symptomatic Hip Abductor Tendon Tears. *Int J Sports Phys Ther, 11*(5), 725-737.

Edgren, J., Salpakoski, A., Sihvonen, S. E., Portegijs, E., Kallinen, M., Arkela, M., . . . Sipila, S. (2015). Effects of a home-based physical rehabilitation program on physical disability after hip fracture: a randomized controlled trial. *J Am Med Dir Assoc, 16*(4), 350 e351-357. doi:10.1016/j.jamda.2014.12.015

Edinborough, L., P. Fisher, J., & Steele, J. (2016). A Comparison of the Effect of Kettlebell Swings and Isolated Lumbar Extension Training on Acute Torque Production of the Lumbar Extensors. *Journal of Strength and Conditioning Research, 30*(5), 1189-1195. doi:10.1519/jsc.0000000000001215

Ekeberg, O. M., Bautz-Holter, E., Tveita, E. K., Juel, N. G., Kvalheim, S., & Brox, J. I. (2009). Subacromial ultrasound guided or systemic steroid injection for rotator cuff disease: randomised double blind study. *Bmj, 338*, a3112. doi:10.1136/bmj.a3112

Ekele, B. A., Muhammed, D., Bello, L. N., & Namadina, I. M. (2009). Magnesium sulphate therapy in eclampsia: the Sokoto (ultra short) regimen. *BMC research notes, 2*, 165-165. doi:10.1186/1756-0500-2-165

Elings, J., Van der Sluis, G., Goldbohm, R. A., Garre, F. G., De Gast, A., Hoogeboom, T., & Van Meeteren, N. L. U. (2016). Development of a Risk Stratification Model for Delayed Inpatient Recovery of Physical Activities in Patients Undergoing Total Hip Replacement. *Journal of Orthopaedic & Sports Physical Therapy, 46*(3), 135-+. doi:10.2519/jospt.2016.6124

Engdal, M., Foss, O. A., Taraldsen, K., Husby, V. S., & Winther, S. B. (2017). Daily Physical Activity in Total Hip Arthroplasty Patients Undergoing Different Surgical Approaches: A Cohort Study. *Am J Phys Med Rehabil, 96*(7), 473-478. doi:10.1097/phm.0000000000000657

Ericksen, H. M., Thomas, A. C., Gribble, P. A., Doebel, S. C., & Pietrosimone, B. G. (2015). Immediate effects of real-time feedback on jump-landing kinematics. *J Orthop Sports Phys Ther, 45*(2), 112-118. doi:10.2519/jospt.2015.4997

Eschen, J., Kring, S., Brix, M., Ban, I., & Troelsen, A. (2012). Outcome of an uncemented hydroxyapatite coated hemiarthroplasty for displaced femoral neck fractures: a clinical and radiographic 2-year follow-up study. *Hip International, 22*(5), 574-579. doi:10.5301/hip.2012.9745

Eslamian, F., & Amouzandeh, B. (2015). Therapeutic effects of prolotherapy with intra-articular dextrose injection in patients with moderate knee osteoarthritis: a single-arm study with 6 months follow up. *Therapeutic Advances in Musculoskeletal Disease, 7*(2), 35-44. doi:10.1177/1759720x14566618

Falvey, J. R., Mangione, K. K., & Stevens-Lapsley, J. E. (2015). Rethinking Hospital-Associated Deconditioning: Proposed Paradigm Shift. *Physical Therapy, 95*(9), 1307-1315. doi:10.2522/ptj.20140511

Fary, R. E., Carroll, G. J., Briffa, T. G., Gupta, R., & Briffa, N. K. (2008). Study protocol - The effectiveness of pulsed electrical stimulation (E-PES) in the management of osteoarthritis of the knee: a protocol for a randomised controlled trial. *Bmc Musculoskeletal Disorders, 9*. doi:10.1186/1471-2474-9-18

Fasen, J. M., O'Connor, A. M., Schwartz, S. L., Watson, J. O., Plastaras, C. T., Garvan, C. W., . . . Akuthota, V. (2009). A RANDOMIZED CONTROLLED TRIAL OF HAMSTRING STRETCHING: COMPARISON OF FOUR TECHNIQUES. *Journal of Strength and Conditioning Research, 23*(2), 660-667. doi:10.1519/JSC.0b013e318198fbd1

Fatemi, R., Javid, M., & Najafabadi, E. M. (2015). Effects of William training on lumbosacral muscles function, lumbar curve and pain. *J Back Musculoskelet Rehabil, 28*(3), 591-597. doi:10.3233/bmr-150585

Fearon, A. M., Cook, J. L., Scarvell, J. M., Neeman, T., Cormick, W., & Smith, P. N. (2014). Greater Trochanteric Pain Syndrome Negatively Affects Work, Physical Activity and Quality of Life: A Case Control Study. *Journal of Arthroplasty, 29*(2), 383-386. doi:10.1016/j.arth.2012.10.016

Fearon, A. M., Ganderton, C., Scarvell, J. M., Smith, P. N., Neeman, T., Nash, C., & Cook, J. L. (2015). Development and validation of a VISA tendinopathy questionnaire for greater trochanteric pain syndrome, the VISA-G. *Manual Therapy, 20*(6), 805-813. doi:10.1016/j.math.2015.03.009

Ferber, R., Bolgla, L., Earl-Boehm, J. E., Emery, C., & Hamstra-Wright, K. (2015). Strengthening of the hip and core versus knee muscles for the treatment of patellofemoral pain: a multicenter randomized controlled trial. *J Athl Train, 50*(4), 366-377. doi:10.4085/1062-6050-49.3.70

Ferland, C., Lepage, C., Moffet, H., & Maltais, D. B. (2012). Relationships Between Lower Limb Muscle Strength and Locomotor Capacity in Children and Adolescents with Cerebral Palsy Who Walk Independently. *Physical & Occupational Therapy in Pediatrics, 32*(3), 320-332. doi:10.3109/01942638.2011.631102

Ferrara, P. E., Rabini, A., Maggi, L., Piazzini, D. B., Logroscino, G., Magliocchetti, G., . . . Bertolini, C. (2008). Effect of pre-operative physiotherapy in patients with end-stage osteoarthritis undergoing hip arthroplasty. *Clin Rehabil, 22*(10-11), 977-986. doi:10.1177/0269215508094714

Fersum, K. V., O'Sullivan, P., Skouen, J. S., Smith, A., & Kvale, A. (2013). Efficacy of classification-based cognitive functional therapy in patients with non-specific chronic low back pain: A randomized controlled trial. *European Journal of Pain, 17*(6), 916-928. doi:10.1002/j.1532-2149.2012.00252.x

Fey, N. P., Klute, G. K., & Neptune, R. R. (2011). The influence of energy storage and return foot stiffness on walking mechanics and muscle activity in below-knee amputees. *Clin Biomech (Bristol, Avon), 26*(10), 1025-1032. doi:10.1016/j.clinbiomech.2011.06.007

Flack, N. A., Nicholson, H. D., & Woodley, S. J. (2012). A review of the anatomy of the hip abductor muscles, gluteus medius, gluteus minimus, and tensor fascia lata. *Clin Anat, 25*(6), 697-708. doi:10.1002/ca.22004

Fleischhacker, W. W., Gopal, S., Lane, R., Gassmann-Mayer, C., Lim, P., Hough, D., . . . Eerdekens, M. (2012). A randomized trial of paliperidone palmitate and risperidone long-acting injectable in schizophrenia. *Int J Neuropsychopharmacol, 15*(1), 107-118. doi:10.1017/s1461145711001076

Flodin, L., Cederholm, T., Saaf, M., Samnegard, E., Ekstrom, W., Al-Ani, A. N., & Hedstrom, M. (2015). Effects of protein-rich nutritional supplementation and bisphosphonates on body composition, handgrip strength and health-related quality of life after hip fracture: a 12-month randomized controlled study. *Bmc Geriatrics, 15*. doi:10.1186/s12877-015-0144-7

Foroughi, N., Smith, R. M., Lange, A. K., Baker, M. K., Singh, M. A. F., & Vanwanseele, B. (2011). Lower limb muscle strengthening does not change frontal plane moments in women with knee

osteoarthritis: A randomized controlled trial. *Clinical Biomechanics, 26*(2), 167-174. doi:10.1016/j.clinbiomech.2010.08.011

Foss, N. B., Kristensen, M. T., Jensen, P. S., Palm, H., Krasheninnikoff, M., & Kehlet, H. (2009). The effects of liberal versus restrictive transfusion thresholds on ambulation after hip fracture surgery. *Transfusion, 49*(2), 227-234. doi:10.1111/j.1537-2995.2008.01967.x

Foster, Z. J., Voss, T. T., Hatch, J., & Frimodig, A. (2015). Corticosteroid Injections for Common Musculoskeletal Conditions. *American Family Physician, 92*(8), 694-699.

Foucher, K. C., & Freels, S. (2015). Preoperative factors associated with postoperative gait kinematics and kinetics after total hip arthroplasty. *Osteoarthritis and Cartilage, 23*(10), 1685-1694. doi:10.1016/j.joca.2015.05.005

French, H. P., Cusack, T., Brennan, A., White, B., Gilsenan, C., Fitzpatrick, M., . . . McCarthy, G. M. (2009). Exercise and manual physiotherapy arthritis research trial (EMPART): a multicentre randomised controlled trial. *Bmc Musculoskeletal Disorders, 10*. doi:10.1186/1471-2474-10-9

French, H. P., Galvin, R., Cusack, T., & McCarthy, G. M. (2014). Predictors of Short-Term Outcome to Exercise and Manual Therapy for People With Hip Osteoarthritis. *Physical Therapy, 94*(1), 31-39. doi:10.2522/ptj.20130173

Fu, S.-H., Wang, C.-Y., Yang, R.-S., Wu, F.-L. L., & Hsiao, F.-Y. (2017). Bisphosphonate Use and the Risk of Undergoing Total Knee Arthroplasty in Osteoporotic Patients with Osteoarthritis A Nationwide Cohort Study in Taiwan. *Journal of Bone and Joint Surgery-American Volume, 99*(11), 938-946. doi:10.2106/jbjs.16.00385

Fukuda, T. Y., Melo, W. P., Zaffalon, B. M., Marcondes, F. R., Magalhaes, E., Bryk, F. F., & Martin, R. L. (2012). Hip Posterolateral Musculature Strengthening in Sedentary Women With Patellofemoral Pain Syndrome: A Randomized Controlled Clinical Trial With 1-Year Follow-up. *Journal of Orthopaedic & Sports Physical Therapy, 42*(10), 823-830. doi:10.2519/jospt.2012.4184

Fukuda, T. Y., Melo, W. P., Zaffalon, B. M., Rossetto, F. M., Magalhaes, E., Bryk, F. F., & Martin, R. L. (2012). Hip posterolateral musculature strengthening in sedentary women with patellofemoral pain syndrome: a randomized controlled clinical trial with 1-year follow-up. *J Orthop Sports Phys Ther, 42*(10), 823-830. doi:10.2519/jospt.2012.4184

Fukuda, T. Y., Rossetto, F. M., Magalhaes, E., Bryk, F. F., Garcia Lucareli, P. R., & de Almeida Carvalho, N. A. (2010). Short-Term Effects of Hip Abductors and Lateral Rotators Strengthening in Females With Patellofemoral Pain Syndrome: A Randomized Controlled Clinical Trial. *Journal of Orthopaedic & Sports Physical Therapy, 40*(11), 736-742. doi:10.2519/jospt.2010.3246

Fukumoto, Y., Tateuchi, H., Ikezoe, T., Tsukagoshi, R., Akiyama, H., So, K., . . . Ichihashi, N. (2014). Effects of high- velocity resistance training on muscle function, muscle properties, and physical performance in individuals with hip osteoarthritis: a randomized controlled trial. *Clinical Rehabilitation, 28*(1), 48-58. doi:10.1177/0269215513492161

Furia, J. P., Rompe, J. D., & Maffulli, N. (2009). Low-Energy Extracorporeal Shock Wave Therapy as a Treatment for Greater Trochanteric Pain Syndrome. *American Journal of Sports Medicine, 37*(9), 1806-1813. doi:10.1177/0363546509333014

Furia, J. P., Rompe, J. D., & Maffulli, N. (2009). Low-energy extracorporeal shock wave therapy as a treatment for greater trochanteric pain syndrome. *Am J Sports Med, 37*(9), 1806-1813. doi:10.1177/0363546509333014

Galea, M. P., Levinger, P., Lythgo, N., Cimoli, C., Weller, R., Tully, E., . . . Westh, R. (2008). A targeted home- and center-based exercise program for people after total hip replacement: A randomized clinical trial. *Archives of Physical Medicine and Rehabilitation, 89*(8), 1442-1447. doi:10.1016/j.apmr.2007.11.058

Gallant, K. M. H., Gallant, M. A., Brown, D. M., Sato, A. Y., Williams, J. N., & Burr, D. B. (2014). Raloxifene Prevents Skeletal Fragility in Adult Female Zucker Diabetic Sprague-Dawley Rats. *Plos One, 9*(9). doi:10.1371/journal.pone.0108262

Gamboa, E. O., Rehmus, E. H., & Haller, N. (2010). Fournier's Gangrene as a Possible Side Effect of Bevacizumab Therapy for Resected Colorectal Cancer. *Clinical Colorectal Cancer, 9*(1), 55-60. doi:10.3816/CCC.2010.n.008

Ganderton, C., Semciw, A., Cook, J., & Pizzari, T. (2016). Does menopausal hormone therapy (MHT), exercise or a combination of both, improve pain and function in post-menopausal women with greater trochanteric pain syndrome (GTPS)? A randomised controlled trial. *Bmc Womens Health, 16*. doi:10.1186/s12905-016-0311-9

Garcia Bartels, N., Lunnemann, L., Stroux, A., Kottner, J., Serrano, J., & Blume-Peytavi, U. (2014). Effect of diaper cream and wet wipes on skin barrier properties in infants: a prospective randomized controlled trial. *Pediatr Dermatol, 31*(6), 683-691. doi:10.1111/pde.12370

Garcia Bartels, N., Massoudy, L., Scheufele, R., Dietz, E., Proquitte, H., Wauer, R., . . . Blume-Peytavi, U. (2012). Standardized diaper care regimen: a prospective, randomized pilot study on skin barrier function and epidermal IL-1alpha in newborns. *Pediatr Dermatol, 29*(3), 270-276. doi:10.1111/j.1525-1470.2011.01590.x

Genth, B., Von Duering, M., Von Engelhardt, L. V., Ludwig, J., Teske, W., & Von Schulze-Pellengahr, C. (2012). Analysis of the Sensory Innervations of the Greater Trochanter for Improving the Treatment of Greater Trochanteric Pain Syndrome. *Clinical Anatomy, 25*(8), 1080-1086. doi:10.1002/ca.22035

Gerber, J. P., Marcus, R. L., Dibble, L. E., Greis, P. E., Burks, R. T., & LaStayo, P. C. (2009). Effects of early progressive eccentric exercise on muscle size and function after anterior cruciate ligament reconstruction: a 1-year follow-up study of a randomized clinical trial. *Phys Ther, 89*(1), 51-59. doi:10.2522/ptj.20070189

Ghabach, M. B., Elmawieh, J. M., Matta, M. S., & Helou, M. R. (2016). COMBINED BLOCK OF THE FEMORAL AND LATERAL FEMORAL CUTANEOUS NERVES UNDER ULTRASOUND FOR POST-OPERATIVE ANALGESIA IN PATIENTS UNDERGOING HIP SURGERY: A DOUBLE BLIND RANDOMIZED TRIAL. *Middle East journal of anaesthesiology, 23*(4), 421-426.

Ghedira, M., Albertsen, I. M., Mardale, V., Gracies, J.-M., Bayle, N., & Hutin, E. (2017). Wireless, accelerometry-triggered functional electrical stimulation of the peroneal nerve in spastic paresis: A randomized, controlled pilot study. *Assistive Technology, 29*(2), 99-105. doi:10.1080/10400435.2016.1214933

Gill, S. D., McBurney, H., & Schulz, D. L. (2009). Land-Based Versus Pool-Based Exercise for People Awaiting Joint Replacement Surgery of the Hip or Knee: Results of a Randomized Controlled Trial. *Archives of Physical Medicine and Rehabilitation, 90*(3), 388-394. doi:10.1016/j.apmr.2008.09.561

Glaviano, N. R., & Saliba, S. A. (2016). Immediate Effect of Patterned Electrical Neuromuscular Stimulation on Pain and Muscle Activation in Individuals With Patellofemoral Pain. *J Athl Train, 51*(2), 118-128. doi:10.4085/1062-6050-51.4.06

Glennie, R. A., Korczak, A., Naudie, D. D., Bryant, D. M., & Howard, J. L. (2017). MONOCRYL and DERMABOND vs Staples in Total Hip Arthroplasty Performed Through a Lateral Skin Incision: A Randomized Controlled Trial Using a Patient-Centered Assessment Tool. *Journal of Arthroplasty, 32*(8), 2431-2435. doi:10.1016/j.arth.2017.02.042

Gofeld, M., Jitendra, J., & Faclier, G. (2007). Radiofrequency denervation of the lumbar zygapophysial joints: 10-year prospective clinical audit. *Pain physician, 10*(2), 291-300.

Goldberg, D. J., Yatskayer, M., Raab, S., Chen, N., Krol, Y., & Oresajo, C. (2014). Complementary clinical effects of topical tightening treatment in conjunction with a radiofrequency procedure. *J Cosmet Laser Ther, 16*(5), 236-240. doi:10.3109/14764172.2014.933848

Gonzalez Montalvo, J. I., Gotor Perez, P., Martin Vega, A., Alarcon Alarcon, T., Alvarez de Linera, J. L., Gil Garay, E., . . . Alonso Biarge, J. (2011). [The acute orthogeriatric unit. Assessment of its effect on the clinical course of patients with hip fractures and an estimate of its financial impact]. *Rev Esp Geriatr Gerontol, 46*(4), 193-199. doi:10.1016/j.regg.2011.02.004

Gooch, K. L., Smith, D., Wasylak, T., Faris, P. D., Marshall, D. A., Khong, H., . . . Frank, C. B. (2009). The Alberta Hip and Knee Replacement Project: a model for health technology assessment based

on comparative effectiveness of clinical pathways. *Int J Technol Assess Health Care, 25*(2), 113-123. doi:10.1017/s0266462309090163

Goosen, J. H., Kollen, B. J., Castelein, R. M., Kuipers, B. M., & Verheyen, C. C. (2011). Minimally invasive versus classic procedures in total hip arthroplasty: a double-blind randomized controlled trial. *Clin Orthop Relat Res, 469*(1), 200-208. doi:10.1007/s11999-010-1331-7

Gordon, R. M., Payne, B., Firoz, T., Magee, L., Sawchuck, D., Tu, D., . . . Community Level Intervention for Pre-eclampsia Working, G. (2012). PP164. Magnesium sulphate for prevention and treatment of eclampsia in low and middle income countries: Systematic review of tested regimens. *Pregnancy hypertension, 2*(3), 328-328. doi:10.1016/j.preghy.2012.04.275

Grady, M. V., Mascha, E., Sessler, D. I., & Kurz, A. (2012). The Effect of Perioperative Intravenous Lidocaine and Ketamine on Recovery After Abdominal Hysterectomy. *Anesthesia and Analgesia, 115*(5), 1078-1084. doi:10.1213/ANE.0b013e3182662e01

Grana, E., Verzellotti, S., Grassi, F. A., Ferriero, G., Kristensen, M. T., Cisari, C., & Invernizzi, M. (2016). Cross-cultural validation of the Italian version of the Cumulated Ambulation Score. *International Journal of Rehabilitation Research, 39*(2), 160-164. doi:10.1097/mrr.0000000000000165

Gre, K. G., & Millet, G. P. (2013). Conceptual Framework for Strengthening Exercises to Prevent Hamstring Strains. *Sports Medicine, 43*(12), 1207-1215. doi:10.1007/s40279-013-0097-y

Greenlee, H., Crew, K. D., Shao, T., Kranwinkel, G., Kalinsky, K., Maurer, M., . . . Hershman, D. L. (2013). Phase II study of glucosamine with chondroitin on aromatase inhibitor-associated joint symptoms in women with breast cancer. *Supportive Care in Cancer, 21*(4), 1077-1087. doi:10.1007/s00520-012-1628-z

Gremion, G., Gaillard, D., Leyvraz, P.-F., & Jolles, B. M. (2009). EFFECT OF BIOMAGNETIC THERAPY VERSUS PHYSIOTHERAPY FOR TREATMENT OF KNEE OSTEOARTHRITIS: A RANDOMIZED CONTROLLED TRIAL. *Journal of Rehabilitation Medicine, 41*(13), 1090-1095. doi:10.2340/16501977-0467

Grether-Beck, S., Marini, A., Jaenicke, T., Hoffmann, R., & Krutmann, J. (2017). Randomized, double-blind, placebo-controlled, single-centre, phase I safety study of intradermal injections of autologous fibroblasts isolated from the non-bulbar dermal sheath of the hair follicle to treat skin aging. *Journal of Investigative Dermatology, 137*(10), S196-S196. doi:10.1016/j.jid.2017.07.118

Griffin, D., Wall, P., Realpe, A., Adams, A., Parsons, N., Hobson, R., . . . Donovan, J. (2016). UK FASHIoN: feasibility study of a randomised controlled trial of arthroscopic surgery for hip impingement compared with best conservative care. *Health Technology Assessment, 20*(32), 1-+. doi:10.3310/hta20320

Grimaldi, A., & Fearon, A. (2015). Gluteal Tendinopathy: Integrating Pathomechanics and Clinical Features in Its Management. *J Orthop Sports Phys Ther, 45*(11), 910-922. doi:10.2519/jospt.2015.5829

Grimaldi, A., Mellor, R., Hodges, P., Bennell, K., Wajswelner, H., & Vicenzino, B. (2015). Gluteal Tendinopathy: A Review of Mechanisms, Assessment and Management. *Sports Med, 45*(8), 1107-1119. doi:10.1007/s40279-015-0336-5

Grimaldi, A., Richardson, C., Stanton, W., Durbridge, G., Donnelly, W., & Hides, J. (2009). The association between degenerative hip joint pathology and size of the gluteus medius, gluteus minimus and piriformis muscles. *Man Ther, 14*(6), 605-610. doi:10.1016/j.math.2009.07.004

Groah, S. L., Lichy, A. M., Libin, A. V., & Ljungberg, I. (2010). Intensive electrical stimulation attenuates femoral bone loss in acute spinal cord injury. *Pm r, 2*(12), 1080-1087. doi:10.1016/j.pmrj.2010.08.003

Guney-Deniz, H., Kinikli, G. I., Caglar, O., Atilla, B., & Yuksel, I. (2017). Does kinesiophobia affect the early functional outcomes following total knee arthroplasty? *Physiotherapy Theory and Practice, 33*(6), 448-453. doi:10.1080/09593985.2017.1318988

Gupta, S., Rao, B. K., & Kumaran, S. D. (2011). Effect of strength and balance training in children with Down's syndrome: a randomized controlled trial. *Clinical Rehabilitation, 25*(5), 425-432. doi:10.1177/0269215510382929

Guren, E., Figved, W., Frihagen, F., Watne, L. O., & Westberg, M. (2017). Prosthetic joint infection-a devastating complication of hemiarthroplasty for hip fracture. *Acta Orthopaedica, 88*(4), 383-389. doi:10.1080/17453674.2017.1301009

Gyulai, F., Raba, K., Baranyai, I., Berkes, E., & Bender, T. (2015). BEMER Therapy Combined with Physiotherapy in Patients with Musculoskeletal Diseases: A Randomised, Controlled Double Blind Follow-Up Pilot Study. *Evidence-Based Complementary and Alternative Medicine*. doi:10.1155/2015/245742

Hagan, M. J., & Lambert, S. M. (2008). A randomised crossover study of low-ankle-pressure graduated-compression tights in reducing flight-induced ankle oedema. *Medical Journal of Australia, 188*(2), 81-84.

Hagiwara, Y., Yabe, Y., Yamada, H., Watanabe, T., Kanazawa, K., Koide, M., . . . Itoi, E. (2017). Effects of a wearable type lumbosacral support for low back pain among hospital workers: A randomized controlled trial. *Journal of Occupational Health, 59*(2), 201-209. doi:10.1539/joh.16-0203-OA

Hall, M., Hinman, R. S., Wrigley, T. V., Roos, E. M., Hodges, P. W., Staples, M., & Bennell, K. L. (2012). The effects of neuromuscular exercise on medial knee joint load post-arthroscopic partial medial meniscectomy: 'SCOPEX' a randomised control trial protocol. *Bmc Musculoskeletal Disorders, 13*. doi:10.1186/1471-2474-13-233

Hall, M., Hinman, R. S., Wrigley, T. V., Roos, E. M., Hodges, P. W., Staples, M. P., & Bennell, K. L. (2015). Neuromuscular Exercise post Partial Medial Meniscectomy: Randomized Controlled Trial. *Medicine and Science in Sports and Exercise, 47*(8), 1557-1566. doi:10.1249/mss.0000000000000596

Hall, M., Stevermer, C. A., & Gillette, J. C. (2015). Muscle activity amplitudes and co-contraction during stair ambulation following anterior cruciate ligament reconstruction. *Journal of Electromyography and Kinesiology, 25*(2), 298-304. doi:10.1016/j.jelekin.2015.01.007

Hamel, K. A., Ross, C., Schultz, B., O'Neill, M., & Anderson, D. I. (2016). Older adult Alexander Technique practitioners walk differently than healthy age-matched controls. *Journal of Bodywork and Movement Therapies, 20*(4), 751-760. doi:10.1016/j.jbmt.2016.04.009

Harding, A. T., Weeks, B. K., Watson, S. L., & Beck, B. R. (2017). The LIFTMOR-M (Lifting Intervention For Training Muscle and Osteoporosis Rehabilitation for Men) trial: protocol for a semirandomised controlled trial of supervised targeted exercise to reduce risk of osteoporotic fracture in older men with low bone mass. *Bmj Open, 7*(6). doi:10.1136/bmjopen-2016-014951

Harrasser, N., Banke, I., Gollwitzer, H., Wilken, F., Toepfer, A., von Eisenhart-Rothe, R., & Hauschild, M. (2016). [Gluteal insufficiency: Pathogenesis, Diagnosis and Therapy]. *Z Orthop Unfall, 154*(2), 140-147. doi:10.1055/s-0041-110812

Harris-Hayes, M., Czuppon, S., Van Dillen, L. R., Steger-May, K., Sahrmann, S., Schootman, M., . . . Mueller, M. J. (2016). Movement-Pattern Training to Improve Function in People With Chronic Hip Joint Pain: A Feasibility Randomized Clinical Trial. *J Orthop Sports Phys Ther, 46*(6), 452-461. doi:10.2519/jospt.2016.6279

Haser, C., Stoggl, T., Kriner, M., Mikoleit, J., Wolfahrt, B., Scherr, J., . . . Pfab, F. (2017). Effect of Dry Needling on Thigh Muscle Strength and Hip Flexion in Elite Soccer Players. *Med Sci Sports Exerc, 49*(2), 378-383. doi:10.1249/mss.0000000000001111

Hawker, G. A. (2017). The assessment of musculoskeletal pain. *Clinical and Experimental Rheumatology, 35*(5), S8-S12.

Healy, B., Beasley, R., & Weatherall, M. (2010). Venous thromboembolism following prolonged cast immobilisation for injury to the tendo Achillis. *Journal of Bone and Joint Surgery-British Volume, 92B*(5), 646-650. doi:10.1302/0301-620x.92b5.23241

Heiberg, K. E., Bruun-Olsen, V., & Bergland, A. (2017). The effects of habitual functional training on physical functioning in patients after hip fracture: the protocol of the HIPFRAC study. *Bmc Geriatrics, 17*. doi:10.1186/s12877-016-0398-8

Heikkinen, R., Vihriaelae, E., Vainionpaeae, A., Korpelainen, R., & Jaemsae, T. (2007). Acceleration slope of exercise-induced impacts is a determinant of changes in bone density. *Journal of Biomechanics, 40*(13), 2967-2974. doi:10.1016/j.jbiomech.2007.02.003

Helayel, P. E., Bussman, A. R., da Conceicao, D. B., & de Oliveira Filho, G. R. (2008). Comparison of the plasma levels of 50% enantiomeric excess (S75/R25) 0.5% bupivacaine combined with 1:200,000 epinephrine between the parasacral and infragluteal sciatic nerve blocks. *Rev Bras Anestesiol, 58*(4), 323-329.

Heres, S., Frobose, T., Hamann, J., Leucht, S., Maino, K., Reichhart, T., . . . Kissling, W. (2012). Patients' acceptance of the deltoid application of risperidone long-acting injection. *Eur Neuropsychopharmacol, 22*(12), 897-901. doi:10.1016/j.euroneuro.2012.04.014

Hermann, A., Holsgaard-Larsen, A., Zerahn, B., Mejdahl, S., & Overgaard, S. (2016a). 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 Cartilage, 24*(1), 91-98. doi:10.1016/j.joca.2015.07.030

Hermann, A., Holsgaard-Larsen, A., Zerahn, B., Mejdahl, S., & Overgaard, S. (2016b). 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. doi:10.1016/j.joca.2015.07.030

Herrero, P., Asensio, A., Garcia, E., Marco, A., Olivan, B., Ibarz, A., . . . Casas, R. (2010). Study of the therapeutic effects of an advanced hippotherapy simulator in children with cerebral palsy: a randomised controlled trial. *Bmc Musculoskeletal Disorders, 11*. doi:10.1186/1471-2474-11-71

Heyes, G. J., Tucker, A., Michael, A. L. R., & Wallace, R. G. H. (2015). The incidence of deep vein thrombosis and pulmonary embolism following cast immobilisation and early functional bracing of Tendo Achilles rupture without thromboprophylaxis. *European Journal of Trauma and Emergency Surgery, 41*(3), 273-276. doi:10.1007/s00068-014-0408-5

Hinman, R. S., Heywood, S. E., & Day, A. R. (2007). Aquatic physical therapy for hip and knee osteoarthritis: Results of a single-blind randomized controlled trial. *Physical Therapy, 87*(1), 32-43. doi:10.2522/ptj.20060006

Hinman, R. S., Lawford, B. J., Campbell, P. K., Briggs, A. M., Gale, J., Bills, C., . . . Bennell, K. L. (2017). Telephone-Delivered Exercise Advice and Behavior Change Support by Physical Therapists for People with Knee Osteoarthritis: Protocol for the Telecare Randomized Controlled Trial. *Physical Therapy, 97*(5), 524-536. doi:10.1093/ptj/pzx021

Hinman, R. S., Wrigley, T. V., Metcalf, B. R., Campbell, P. K., Paterson, K. L., Hunter, D. J., . . . Bennell, K. L. (2016). Unloading Shoes for Self-management of Knee Osteoarthritis A Randomized Trial. *Annals of Internal Medicine, 165*(6), 381-+. doi:10.7326/m16-0453

Hinman, R. S., Wrigley, T. V., Metcalf, B. R., Hunter, D. J., Campbell, P., Paterson, K., . . . Bennell, K. L. (2014). Unloading shoes for osteoarthritis of the knee: protocol for the SHARK randomised controlled trial. *Bmc Musculoskeletal Disorders, 15*. doi:10.1186/1471-2474-15-48

Ho, A. W. H., Lee, M. M. L., Chan, E. W. C., Ng, H. M. Y., Lee, C. W., Ng, W. S., & Wong, S. H. (2016). Prevalence of pre-sarcopenia and sarcopenia in Hong Kong Chinese geriatric patients with hip fracture and its correlation with different factors. *Hong Kong Medical Journal, 22*(1), 23-29.

Hoang-Kim, A., Schemitsch, E., Kulkarni, A. V., & Beaton, D. (2014). Methodological challenges in the use of hip-specific composite outcomes: linking measurements from hip fracture trials to the International Classification of Functioning, Disability and Health Framework. *Arch Orthop Trauma Surg, 134*(2), 219-228. doi:10.1007/s00402-013-1824-4

Hoffman, S. L., Johnson, M. B., Zou, D., Harris-Hayes, M., & Van Dillen, L. R. (2011). Effect of classification-specific treatment on lumbopelvic motion during hip rotation in people with low back pain. *Manual Therapy, 16*(4), 344-350. doi:10.1016/j.math.2010.12.007

Hogler, W., Scott, J., Bishop, N., Arundel, P., Nightingale, P., Mughal, M. Z., . . . Crabtree, N. (2017). The Effect of Whole Body Vibration Training on Bone and Muscle Function in Children With Osteogenesis Imperfecta. *Journal of Clinical Endocrinology & Metabolism, 102*(8), 2734-2743. doi:10.1210/jc.2017-00275

Holden, M. A., Burke, D. L., Runhaar, J., van Der Windt, D., Riley, R. D., Dziedzic, K., . . . Bank, O. A. T. (2017). Subgrouping and TargetEd Exercise pRogrammes for knee and hip OsteoArthritis (STEER OA): a systematic review update and individual participant data meta-analysis protocol. *BMJ open, 7*(12), e018971-e018971. doi:10.1136/bmjopen-2017-018971

Holm, B., Kristensen, M. T., Husted, H., Kehlet, H., & Bandholm, T. (2011). Thigh and Knee Circumference, Knee-Extension Strength, and Functional Performance After Fast-Track Total Hip Arthroplasty. *Pm&R, 3*(2), 117-124. doi:10.1016/j.pmrj.2010.10.019

Homma, D., Jigami, H., & Sato, N. (2016). Effects of Nordic walking on pelvis motion and muscle activities around the hip joints of adults with hip osteoarthritis. *Journal of Physical Therapy Science, 28*(4), 1213-1218. doi:10.1589/jpts.28.1213

Hoogeboom, T. J., Stukstette, M. J. P. M., de Bie, R. A., Cornelissen, J., den Broeder, A. A., & van den Ende, C. H. M. (2010). Non-pharmacological care for patients with generalized osteoarthritis: design of a randomized clinical trial. *Bmc Musculoskeletal Disorders, 11*. doi:10.1186/1471-2474-11-142

Hoskins, W., & Pollard, H. (2010). A descriptive study of a manual therapy intervention within a randomised controlled trial for hamstring and lower limb injury prevention. *Chiropractic & osteopathy, 18*, 23-23. doi:10.1186/1746-1340-18-23

Host, H. H., Sinacore, D. R., Bohnert, K. L., Steger-May, K., Brown, M., & Binder, E. F. (2007). Training-induced strength and functional adaptations after hip fracture. *Physical Therapy, 87*(3), 292-303. doi:10.2522/ptj.20050396

Hough, D., Lindenmayer, J. P., Gopal, S., Melkote, R., Lim, P., Herben, V., . . . Eerdekens, M. (2009). Safety and tolerability of deltoid and gluteal injections of paliperidone palmitate in schizophrenia. *Prog Neuropsychopharmacol Biol Psychiatry, 33*(6), 1022-1031. doi:10.1016/j.pnpbp.2009.05.014

Housner, J. A., Jacobson, J. A., & Misko, R. (2009). Sonographically Guided Percutaneous Needle Tenotomy for the Treatment of Chronic Tendinosis. *Journal of Ultrasound in Medicine, 28*(9), 1187-1192. doi:10.7863/jum.2009.28.9.1187

Hsieh, R.-L., & Lee, W.-C. (2016). Clinical effects of lateral wedge arch support insoles in knee osteoarthritis A prospective double-blind randomized study. *Medicine, 95*(27). doi:10.1097/md.0000000000003952

Hu, Z.-j., Chang, G.-q., Li, X.-x., Huang, X.-l., Yin, H.-h., & Wang, S.-m. (2009). Stent-grafting for unfavorable abdominal aortic aneurysm: a practical challenge. *Chinese Medical Journal, 122*(7), 787-792. doi:10.3760/cma.j.issn.0366-6999.2009.07.005

Huang, P.-Y., Chen, W.-L., Lin, C.-F., & Lee, H.-J. (2014). Lower Extremity Biomechanics in Athletes With Ankle Instability After a 6-Week Integrated Training Program. *Journal of Athletic Training, 49*(2), 163-172. doi:10.4085/1062-6050-49.2.10

Huang, P. Y., Chen, W. L., Lin, C. F., & Lee, H. J. (2014). Lower extremity biomechanics in athletes with ankle instability after a 6-week integrated training program. *J Athl Train, 49*(2), 163-172. doi:10.4085/1062-6050-49.2.10

Huang, S. Y., Di Santo, M., Wadden, K. P., Cappa, D. F., Alkanani, T., & Behm, D. G. (2010). Short-duration massage at the hamstrings musculotendinous junction induces greater range of motion. *J Strength Cond Res, 24*(7), 1917-1924. doi:10.1519/JSC.0b013e3181e06e0c

Huang, T.-T., Sung, C.-C., Wang, W.-S., & Wang, B.-H. (2017). The effects of the empowerment education program in older adults with total hip replacement surgery. *Journal of Advanced Nursing, 73*(8), 1848-1861. doi:10.1111/jan.13267

Huizinga, M. R., Brouwer, R. W., & van Raaij, T. M. (2014). High tibial osteotomy: closed wedge versus combined wedge osteotomy. *Bmc Musculoskeletal Disorders, 15*. doi:10.1186/1471-2474-15-124

Hulme, J. A. (2016). Clinical Commentary: Pelvic Organ Prolapse and Incontinence: Theoretical Basis and Case Description of a Novel Conservative Treatment Approach Using Pelvic Muscle Exercise and Pelvic Inversion. *Topics in Geriatric Rehabilitation, 32*(4), E1-E9. doi:10.1097/tgr.0000000000000124

Hung, Y.-C., Hung, I. L., Hu, W.-L., Tseng, Y.-J., Kuo, C.-E., Liao, Y.-N., . . . Su, F.-Y. (2016). Reduction in postpartum weight with laser acupuncture: A randomized control trial. *Medicine, 95*(34). doi:10.1097/md.0000000000004716

Hunt, G. R., Crealey, G., Murthy, B. V. S., Hall, G. M., Constantine, P., O'Brien, S., . . . Salmon, P. (2009). The consequences of early discharge after hip arthroplasty for patient outcomes and health care costs: comparison of three centres with differing durations of stay. *Clinical Rehabilitation, 23*(12), 1067-1077. doi:10.1177/0269215509339000

Hunter, B. V., Thelen, D. G., & Dhaher, Y. Y. (2009). A Three-Dimensional Biomechanical Evaluation of Quadriceps and Hamstrings Function Using Electrical Stimulation. *Ieee Transactions on Neural Systems and Rehabilitation Engineering, 17*(2), 167-175. doi:10.1109/tnsre.2009.2014235

Husby, V. S., Helgerud, J., Bjorgen, S., Husby, O. S., Benum, P., & Hoff, J. (2010). Early postoperative maximal strength training improves work efficiency 6-12 months after osteoarthritis-induced total hip arthroplasty in patients younger than 60 years. *Am J Phys Med Rehabil, 89*(4), 304-314. doi:10.1097/PHM.0b013e3181cf5623

Hussey, M. M., Hussey, S. E., & Mighell, M. A. (2015). Reverse shoulder arthroplasty as a salvage procedure after failed internal fixation of fractures of the proximal humerus OUTCOMES AND COMPLICATIONS. *Bone & Joint Journal, 97B*(7), 967-972. doi:10.1302/0301-620x.97b7.35713

Huterer, S. (2013). Regional anaesthesia and analgesia in fast track knee arthroplasty. *Periodicum Biologorum, 115*(2), 159-165.

Huurnink, A., Fransz, D. P., Kingma, I., Verhagen, E. A. L. M., & van Dieen, J. H. (2014). Postural stability and ankle sprain history in athletes compared to uninjured controls. *Clinical Biomechanics, 29*(2), 183-188. doi:10.1016/j.clinbiomech.2013.11.014

Ilfeld, B. M., Duke, K. B., & Donohue, M. C. (2010). The Association Between Lower Extremity Continuous Peripheral Nerve Blocks and Patient Falls After Knee and Hip Arthroplasty. *Anesthesia and Analgesia, 111*(6), 1552-1554. doi:10.1213/ANE.0b013e3181fb9507

Ilfeld, B. M., Loland, V. J., Sandhu, N. S., Suresh, P. J., Bishop, M. J., Donohue, M. C., . . . Madison, S. J. (2012). Continuous Femoral Nerve Blocks: The Impact of Catheter Tip Location Relative to the Femoral Nerve (Anterior Versus Posterior) on Quadriceps Weakness and Cutaneous Sensory Block. *Anesthesia and Analgesia, 115*(3), 721-727. doi:10.1213/ANE.0b013e318261f326

Ilfeld, B. M., Mariano, E. R., Girard, P. J., Loland, V. J., Meyer, R. S., Donovan, J. F., . . . Ball, S. T. (2010). A multicenter, randomized, triple-masked, placebo-controlled trial of the effect of ambulatory continuous femoral nerve blocks on discharge-readiness following total knee arthroplasty in patients on general orthopaedic wards. *Pain, 150*(3), 477-484. doi:10.1016/j.pain.2010.05.028

Ilfeld, B. M., Meyer, R. S., Le, L. T., Mariano, E. R., Williams, B. A., Vandenborne, K., . . . Gearen, P. F. (2009). Health-Related Quality of Life After Tricompartment Knee Arthroplasty With and Without an Extended-Duration Continuous Femoral Nerve Block: A Prospective, 1-Year Follow-Up of a Randomized, Triple-Masked, Placebo-Controlled Study. *Anesthesia and Analgesia, 108*(4), 1320-1325. doi:10.1213/ane.0b013e3181964937

Ilfeld, B. M., Shuster, J. J., Theriaque, D. W., Mariano, E. R., Girard, P. J., Loland, V. J., . . . Ball, S. T. (2011). Long-Term Pain, Stiffness, and Functional Disability After Total Knee Arthroplasty With and Without an Extended Ambulatory Continuous Femoral Nerve Block A Prospective, 1-Year Follow-Up of a Multicenter, Randomized, Triple-Masked, Placebo-Controlled Trial.

Regional Anesthesia and Pain Medicine, 36(2), 116-120. doi:10.1097/AAP.0b013e3182052505

Ilizaliturri, V. M., Jr., Chaidez, C., Villegas, P., Briseno, A., & Camacho-Galindo, J. (2009). Prospective Randomized Study of 2 Different Techniques for Endoscopic Iliopsoas Tendon Release in the Treatment of Internal Snapping Hip Syndrome. *Arthroscopy-the Journal of Arthroscopic and Related Surgery, 25*(2), 159-163. doi:10.1016/j.arthro.2008.08.009

Imoto, A. M., Peccin, M. S., Pedro de Paiva Teixeira, L. E., Gomes da Silva, K. N., Abrahao, M., & Moca Trevisani, V. F. (2013). Is neuromuscular electrical stimulation effective for improving pain, function and activities of daily living of knee osteoarthritis patients? A randomized clinical trial. *Sao Paulo Medical Journal, 131*(2), 80-87. doi:10.1590/s1516-31802013000100017

Ishoi, L., Sorensen, C. N., Kaae, N. M., Jorgensen, L. B., Hoelmich, P., & Serner, A. (2016). Large eccentric strength increase using the Copenhagen Adduction exercise in football: A randomized controlled trial. *Scandinavian Journal of Medicine & Science in Sports, 26*(11), 1334-1342. doi:10.1111/sms.12585

Ishoi, L., Sorensen, C. N., Kaae, N. M., Jorgensen, L. B., Holmich, P., & Serner, A. (2016). Large eccentric strength increase using the Copenhagen Adduction exercise in football: A randomized controlled trial. *Scand J Med Sci Sports, 26*(11), 1334-1342. doi:10.1111/sms.12585

Ismail, M. M., Gamaleldein, M. H., & Hassa, K. A. (2013). Closed Kinetic Chain exercises with or without additional hip strengthening exercises in management of Patellofemoral pain syndrome: a randomized controlled trial. *European Journal of Physical and Rehabilitation Medicine, 49*(5), 687-698.

Iversen, M. D., Price, L. L., von Heideken, J., Harvey, W. F., & Wang, C. (2016). Physical examination findings and their relationship with performance-based function in adults with knee osteoarthritis. *Bmc Musculoskeletal Disorders, 17*. doi:10.1186/s12891-016-1151-3

Iwamoto, J., Seki, A., Sato, Y., & Matsumoto, H. (2012). Vitamin K-2 Improves Renal Function and Increases Femoral Bone Strength in Rats with Renal Insufficiency. *Calcified Tissue International, 90*(1), 50-59. doi:10.1007/s00223-011-9548-3

Izumi, M., Petersen, K. K., Arendt-Nielsen, L., & Graven-Nielsen, T. (2014). Pain referral and regional deep tissue hyperalgesia in experimental human hip pain models. *Pain, 155*(4), 792-800. doi:10.1016/j.pain.2014.01.008

Jackson, C., Emck, A. J., Hunston, M. J., & Jarvis, P. C. (2009). Pressure measurements and comfort of foam safety cushions for confined seating. *Aviat Space Environ Med, 80*(6), 565-569.

Jackson, R. F., Roche, G. C., & Shanks, S. C. (2013). A double-blind, placebo-controlled randomized trial evaluating the ability of low-level laser therapy to improve the appearance of cellulite. *Lasers in Surgery and Medicine, 45*(3), 141-147. doi:10.1002/lsm.22119

Jacobson, A. F., Umberger, W. A., Palmieri, P. A., Alexander, T. S., Myerscough, R. P., Draucker, C. B., . . . Kirschbaum, C. (2016). Guided Imagery for Total Knee Replacement: A Randomized, Placebo-Controlled Pilot Study. *Journal of Alternative and Complementary Medicine, 22*(7), 563-+. doi:10.1089/acm.2016.0038

Jacobson, J. A., Rubin, J., Yablon, C. M., Kim, S. M., Kalume-Brigido, M., & Parameswaran, A. (2015). Ultrasound-Guided Fenestration of Tendons About the Hip and Pelvis Clinical Outcomes. *Journal of Ultrasound in Medicine, 34*(11), 2029-2035. doi:10.7863/ultra.15.01009

Jakovljevic, M., & Vauhnik, R. (2011). Aquatic exercises versus land based exercises for elderly patients after a total hip replacement. *Zdravniski Vestnik-Slovenian Medical Journal, 80*(4), 240-245.

Jamtvedt, G., Herbert, R. D., Flottorp, S., Odgaard-Jensen, J., Havelsrud, K., Barratt, A., . . . Oxman, A. D. (2010). A pragmatic randomised trial of stretching before and after physical activity to prevent injury and soreness. *British Journal of Sports Medicine, 44*(14), 1002-1009. doi:10.1136/bjsm.2009.062232

Janier, M., Libar, E., Bonnet, A., Meunier, P., Tabet, M., Mathourais, M., . . . Porcher, R. (2012). Treatment of Late Syphilis With 2.4 Million Units Benzathine Penicillin G (BPG): Tolerance of

Single Versus Divided Doses. *Sexually Transmitted Diseases, 39*(5), 359-360. doi:10.1097/OLQ.0b013e318249968c

Jansen, J. A. C. G., Mens, J. M. A., Backx, F. J. G., & Stam, H. J. (2009). Changes in Abdominal Muscle Thickness Measured by Ultrasound Are Not Associated With Recovery in Athletes With Longstanding Groin Pain Associated With Resisted Hip Adduction. *Journal of Orthopaedic & Sports Physical Therapy, 39*(10), 724-732. doi:10.2519/jospt.2009.3068

Jensen, C., Aagaard, P., & Overgaard, S. (2011). Recovery in mechanical muscle strength following resurfacing vs standard total hip arthroplasty - a randomised clinical trial. *Osteoarthritis and Cartilage, 19*(9), 1108-1116. doi:10.1016/j.joca.2011.06.011

Jensen, G. S., Lenninger, M. R., Beaman, J. L., Taylor, R., & Benson, K. F. (2015). Support of Joint Function, Range of Motion, and Physical Activity Levels by Consumption of a Water-Soluble Egg Membrane Hydrolyzate. *Journal of Medicinal Food, 18*(9), 1042-1048. doi:10.1089/jmf.2015.0041

Jensen, J., Holmich, P., Bandholm, T., Zebis, M. K., Andersen, L. L., & Thorborg, K. (2014). Eccentric strengthening effect of hip-adductor training with elastic bands in soccer players: a randomised controlled trial. *Br J Sports Med, 48*(4), 332-338. doi:10.1136/bjsports-2012-091095

Jerosch, J., Stobbe, S., Schmid, G., Schunck, J., & Filler, T. (2012). [Prospective, randomised study of the Bauer and ALMI approaches concerning MRI findings and muscle-specific blood parameters]. *Z Orthop Unfall, 150*(6), 615-623. doi:10.1055/s-0032-1328009

Jolles, B. M., Grzesiak, A., Eudier, A., Dejnabadi, H., Voracek, C., Pichonnaz, C., . . . Martin, E. (2012). A randomised controlled clinical trial and gait analysis of fixed- and mobile-bearing total knee replacements with a five-year follow-up. *Journal of Bone and Joint Surgery-British Volume, 94B*(5), 648-655.

Jones, K. B., Ferguson, P. C., Deheshi, B., Riad, S., Griffin, A., Bell, R. S., & Wunder, J. S. (2010). Complete Femoral Nerve Resection with Soft Tissue Sarcoma: Functional Outcomes. *Annals of Surgical Oncology, 17*(2), 401-406. doi:10.1245/s10434-009-0745-5

Jones, P., Sorinola, I., & Strutton, P. H. (2014). Effect of dual tasking on postural responses to rapid lower limb movement while seated on an exercise ball. *Gait & Posture, 40*(2), 297-304. doi:10.1016/j.gaitpost.2014.04.185

Judd, D. L., Dennis, D. A., Thomas, A. C., Wolfe, P., Dayton, M. R., & Stevens-Lapsley, J. E. (2014). Muscle Strength and Functional Recovery During the First Year After THA. *Clinical Orthopaedics and Related Research, 472*(2), 654-664. doi:10.1007/s11999-013-3136-y

Judd, D. L., Winters, J. D., Stevens-Lapsley, J. E., & Christiansen, C. L. (2016). Effects of neuromuscular reeducation on hip mechanics and functional performance in patients after total hip arthroplasty: A case series. *Clinical Biomechanics, 32*, 49-55. doi:10.1016/j.clinbiomech.2015.12.008

Jung, K., Kim, Y., Cha, Y., In, T. S., Hur, Y. G., & Chung, Y. (2015). Effects of gait training with a cane and an augmented pressure sensor for enhancement of weight bearing over the affected lower limb in patients with stroke: a randomized controlled pilot study. *Clin Rehabil, 29*(2), 135-142. doi:10.1177/0269215514540923

Jung, S.-P., Lee, K.-M., Kang, J.-H., Yun, S.-I., Park, H.-O., Moon, Y., & Kim, J.-Y. (2013). Effect of Lactobacillus gasseri BNR17 on Overweight and Obese Adults: A Randomized, Double-Blind Clinical Trial. *Korean journal of family medicine, 34*(2), 80-89. doi:10.4082/kjfm.2013.34.2.80

Kadooka, Y., Sato, M., Ogawa, A., Miyoshi, M., Uenishi, H., Ogawa, H., . . . Tsuchida, T. (2013). Effect of Lactobacillus gasseri SBT2055 in fermented milk on abdominal adiposity in adults in a randomised controlled trial. *British Journal of Nutrition, 110*(9), 1696-1703. doi:10.1017/s0007114513001037

Kalliokoski, P., Bergqvist, Y., & Lofvander, M. (2013). Physical performance and 25-hydroxyvitamin D: a cross-sectional study of pregnant Swedish and Somali immigrant women and new mothers. *Bmc Pregnancy and Childbirth, 13*. doi:10.1186/1471-2393-13-237

Kamel, M., Salem, E. A., Maarouf, A., Abdalla, M., Ragab, A., & Shahin, A. M. (2015). Supine transgluteal vs prone position in extracorporeal shock wave lithotripsy of distal ureteric stones. *Urology, 85*(1), 51-54. doi:10.1016/j.urology.2014.08.033

Kamonseki, D. H., Goncalves, G. A., Yi, L. C., & Junior, I. L. (2016). Effect of stretching with and without muscle strengthening exercises for the foot and hip in patients with plantar fasciitis: A randomized controlled single-blind clinical trial. *Man Ther, 23*, 76-82. doi:10.1016/j.math.2015.10.006

Kamonseki, D. H., Goncalves, G. A., Yi, L. C., & Lombardi Junior, I. (2016). Effect of stretching with and without muscle strengthening exercises for the foot and hip in patients with plantar fasciitis: A randomized controlled single-blind clinical trial. *Manual Therapy, 23*, 76-82. doi:10.1016/j.math.2015.10.006

Kaneda, K., Sato, D., Wakabayashi, H., & Nomura, T. (2009). EMG activity of hip and trunk muscles during deep-water running. *Journal of Electromyography and Kinesiology, 19*(6), 1064-1070. doi:10.1016/j.jelekin.2008.11.001

Kanti, V., Grande, C., Stroux, A., Buehrer, C., Blume-Peytavi, U., & Bartels, N. G. (2014). Influence of Sunflower Seed Oil on the Skin Barrier Function of Preterm Infants: A Randomized Controlled Trial. *Dermatology, 229*(3), 230-239. doi:10.1159/000363380

Karagulle, M., Kardes, S., & Karagulle, M. Z. (2017). Real-life effectiveness of spa therapy in rheumatic and musculoskeletal diseases: a retrospective study of 819 patients. *International Journal of Biometeorology, 61*(11), 1945-1956. doi:10.1007/s00484-017-1384-3

Katz, B. (2013). Quantitative & qualitative evaluation of the efficacy of a 1440 nm Nd:YAG laser with novel bi-directional optical fiber in the treatment of cellulite as measured by 3-dimensional surface imaging. *J Drugs Dermatol, 12*(11), 1224-1230.

Kaunitz, A. M., Portman, D., Westhoff, C. L., Mishell, D. R., Jr., Archer, D. F., & Foegh, M. (2015). New contraceptive patch wearability assessed by investigators and participants in a randomized phase 3 study. *Contraception, 91*(3), 211-216. doi:10.1016/j.contraception.2014.11.013

Kearns, R. J., Macfarlane, A. J., Anderson, K. J., & Kinsella, J. (2011). Intrathecal opioid versus ultrasound guided fascia iliaca plane block for analgesia after primary hip arthroplasty: study protocol for a randomised, blinded, noninferiority controlled trial. *Trials, 12*, 51. doi:10.1186/1745-6215-12-51

Kelley, T. C., Adams, M. J., Mulliken, B. D., & Dalury, D. F. (2013). Efficacy of Multimodal Perioperative Analgesia Protocol With Periarticular Medication Injection in Total Knee Arthroplasty: A Randomized, Double-Blinded Study. *Journal of Arthroplasty, 28*(8), 1274-1277. doi:10.1016/j.arth.2013.03.008

Kelly, L. A., Racinais, S., Tanner, C. M., Grantham, J., & Chalabi, H. (2010). Augmented Low Dye Taping Changes Muscle Activation Patterns and Plantar Pressure During Treadmill Running. *Journal of Orthopaedic & Sports Physical Therapy, 40*(10), 648-655. doi:10.2519/jospt.2010.3164

Kemmler, W., & von Stengel, S. (2013). Exercise Frequency, Health Risk Factors, and Diseases of the Elderly. *Archives of Physical Medicine and Rehabilitation, 94*(11), 2046-2053. doi:10.1016/j.apmr.2013.05.013

Kendall, K. D., Emery, C. A., Wiley, J. P., & Ferber, R. (2015). The effect of the addition of hip strengthening exercises to a lumbopelvic exercise programme for the treatment of non-specific low back pain: A randomized controlled trial. *J Sci Med Sport, 18*(6), 626-631. doi:10.1016/j.jsams.2014.11.006

Khan, K. J., Ghaffar, A., Choudhry, S., & Irshad, K. (2016). Comparison of Early Outcome between Modified Limberg and Karydakis Flap Procedures in Patients with Sacrococcygeal Pilonidal Sinus. *Pakistan Journal of Medical & Health Sciences, 10*(2), 631-634.

Khan, R. J., Lam, L. O., Breidahl, W., & Blakeney, W. G. (2012). Magnetic resonance imaging features of preserved vs divided and repaired piriformis during total hip arthroplasty: a randomized controlled trial. *J Arthroplasty, 27*(4), 551-558. doi:10.1016/j.arth.2011.06.004

Khan, R. J. K., Lam, L. O., Breidahl, W., & Blakeney, W. G. (2012). Magnetic Resonance Imaging Features of Preserved vs Divided and Repaired Piriformis During Total Hip Arthroplasty A

Randomized Controlled Trial. *Journal of Arthroplasty, 27*(4), 551-558. doi:10.1016/j.arth.2011.06.004

Khayambashi, K., Mohammadkhani, Z., Ghaznavi, K., Lyle, M. A., & Powers, C. M. (2012). The Effects of Isolated Hip Abductor and External Rotator Muscle Strengthening on Pain, Health Status, and Hip Strength in Females With Patellofemoral Pain: A Randomized Controlled Trial. *Journal of Orthopaedic & Sports Physical Therapy, 42*(1), 22-29. doi:10.2519/jospt.2012.3704

Killington, M., Walker, R., & Crotty, M. (2016). The chaotic journey: Recovering from hip fracture in a nursing home. *Arch Gerontol Geriatr, 67*, 106-112. doi:10.1016/j.archger.2016.07.004

Kim, D.-H., Yoon, D. M., & Yoon, K. B. (2016). Ultrasound-Guided Quadratus Femoris Muscle Injection in Patients with Lower Buttock Pain: Novel Ultrasound-Guided Approach and Clinical Effectiveness. *Pain Physician, 19*(6), E863-E870.

Kim, D. H., Lin, Y., Goytizolo, E. A., Kahn, R. L., Maalouf, D. B., Manohar, A., . . . YaDeau, J. T. (2014). Adductor Canal Block versus Femoral Nerve Block for Total Knee Arthroplasty. *Anesthesiology, 120*(3), 540-550. doi:10.1097/aln.0000000000000119

Kim, J., Ho, C. H., Wang, X., & Bogie, K. (2010). The use of sensory electrical stimulation for pressure ulcer prevention. *Physiother Theory Pract, 26*(8), 528-536. doi:10.3109/09593981003587037

Kim, S. G., & Lee, J. H. (2015). The effects of horse riding simulation exercise on muscle activation and limits of stability in the elderly. *Arch Gerontol Geriatr, 60*(1), 62-65. doi:10.1016/j.archger.2014.10.018

Kingzett-Taylor, A., Tirman, P. F., Feller, J., McGann, W., Prieto, V., Wischer, T., . . . Genant, H. K. (1999). Tendinosis and tears of gluteus medius and minimus muscles as a cause of hip pain: MR imaging findings. *AJR Am J Roentgenol, 173*(4), 1123-1126. doi:10.2214/ajr.173.4.10511191

Kita, K., Hujino, K., Nasu, T., Kawahara, K., Sunami, Y., & Japanese Clin Orthopaedic, A. (2007). A simple protocol for preventing falls and fractures in elderly individuals with musculoskeletal disease. *Osteoporosis International, 18*(5), 611-619. doi:10.1007/s00198-006-0288-6

Kivlan, B. R., Carcia, C. R., Clemente, F. R., Phelps, A. L., & Martin, R. L. (2015). The effect of Astym (R) Therapy on muscle strength: a blinded, randomized, clinically controlled trial. *Bmc Musculoskeletal Disorders, 16*. doi:10.1186/s12891-015-0778-9

Klang, E., Aharoni, D., Hermann, K. G., Herman, A., Rimon, U., Shazar, N., & Eshed, I. (2014). Magnetic resonance imaging of pelvic entheses--a systematic comparison between short tau inversion recovery (STIR) and T1-weighted, contrast-enhanced, fat-saturated sequences. *Skeletal Radiol, 43*(4), 499-505. doi:10.1007/s00256-013-1814-1

Knobloch, K., Joest, B., & Vogt, P. M. (2010). Cellulite and extracorporeal Shockwave therapy (CelluShock-2009)--a randomized trial. *BMC Womens Health, 10*, 29. doi:10.1186/1472-6874-10-29

Knobloch, K., Joest, B., & Vogt, P. M. (2010). Cellulite and extracorporeal Shockwave therapy (CelluShock-2009) - a Randomized Trial. *Bmc Womens Health, 10*. doi:10.1186/1472-6874-10-29

Knoop, J., Dekker, J., van der Leeden, M., van der Esch, M., Thorstensson, C. A., Gerritsen, M., . . . Steultjens, M. P. M. (2013). Knee joint stabilization therapy in patients with osteoarthritis of the knee: a randomized, controlled trial. *Osteoarthritis and Cartilage, 21*(8), 1025-1034. doi:10.1016/j.joca.2013.05.012

Knoop, J., Steultjens, M. P. M., Roorda, L. D., Lems, W. F., van der Esch, M., Thorstensson, C. A., . . . Dekker, J. (2015). Improvement in upper leg muscle strength underlies beneficial effects of exercise therapy in knee osteoarthritis: secondary analysis from a randomised controlled trial. *Physiotherapy, 101*(2), 171-177. doi:10.1016/j.physio.2014.06.002

Knoop, J., van der Leeden, M., Roorda, L. D., Thorstensson, C. A., van der Esch, M., Peter, W. F., . . . Steultjens, M. P. M. (2014). KNEE JOINT STABILIZATION THERAPY IN PATIENTS WITH OSTEOARTHRITIS OF THE KNEE AND KNEE INSTABILITY: SUBGROUP ANALYSES IN A RANDOMIZED, CONTROLLED TRIAL. *Journal of Rehabilitation Medicine, 46*(7), 703-707. doi:10.2340/16501977-1809

Knuepfer, S. C., Liechti, M. D., Mordasini, L., Abt, D., Engeler, D. S., Woellner, J., . . . Kessler, T. M. (2014). Protocol for a randomized, placebo-controlled, double-blind clinical trial investigating sacral neuromodulation for neurogenic lower urinary tract dysfunction. *Bmc Urology, 14*. doi:10.1186/1471-2490-14-65

Koh, H. J., Koh, I. J., Kim, M. S., Choi, K. Y., Jo, H. U., & In, Y. (2017). Does Patient Perception Differ Following Adductor Canal Block and Femoral Nerve Block in Total Knee Arthroplasty? A Simultaneous Bilateral Randomized Study. *Journal of Arthroplasty, 32*(6), 1856-1861. doi:10.1016/j.arth.2017.01.025

Kojovic, J., Djuric-Jovicic, M., Dosen, S., Popovic, M. B., & Popovic, D. B. (2009). Sensor-driven four-channel stimulation of paretic leg: Functional electrical walking therapy. *Journal of Neuroscience Methods, 181*(1), 100-105. doi:10.1016/j.jneumeth.2009.04.005

Kon, Y., Ichikawa-Shigeta, Y., Iuchi, T., Nakajima, Y., Nakagami, G., Tabata, K., . . . Sugama, J. (2017). Effects of a Skin Barrier Cream on Management of Incontinence-Associated Dermatitis in Older Women A Cluster Randomized Controlled Trial. *Journal of Wound Ostomy and Continence Nursing, 44*(5), 481-486. doi:10.1097/won.0000000000000353

Konishi, I., Tanabe, N., Seki, N., Suzuki, H., Okamura, T., Shinoda, K., & Hoshin, E. (2009). Physiotherapy Program through Home Visits for Community-Dwelling Elderly Japanese Women with Mild Knee Pain. *Tohoku Journal of Experimental Medicine, 219*(2), 91-99. doi:10.1620/tjem.219.91

Kostopoulos, D., & Rizopoulos, K. (2008). Effect of topical aerosol skin refrigerant (spray and stretch technique) on passive and active stretching. *J Bodyw Mov Ther, 12*(2), 96-104. doi:10.1016/j.jbmt.2007.11.005

Koybasi, M., Borman, P., Kocaoglu, S., & Ceceli, E. (2010). The effect of additional therapeutic ultrasound in patients with primary hip osteoarthritis: a randomized placebo-controlled study. *Clinical Rheumatology, 29*(12), 1387-1394. doi:10.1007/s10067-010-1468-5

Krebs, D. E., Scarborough, D. M., & McGibbon, C. A. (2007). Functional vs. strength training in disabled elderly outpatients. *American Journal of Physical Medicine & Rehabilitation, 86*(2), 93-103. doi:10.1097/PHM.0b013e31802ede64

Krebs, E. E., Bair, M. J., Damush, T. M., Tu, W., Wu, J., & Kroenke, K. (2010). Comparative Responsiveness of Pain Outcome Measures Among Primary Care Patients With Musculoskeletal Pain. *Medical Care, 48*(11), 1007-1014. doi:10.1097/MLR.0b013e3181eaf835

Krebs, E. E., Jensen, A. C., Nugent, S., DeRonne, B., Rutks, I., Leverty, D., . . . Kroenke, K. (2017). Design, recruitment outcomes, and sample characteristics of the Strategies for Prescribing Analgesics Comparative Effectiveness (SPACE) trial. *Contemporary Clinical Trials, 62*, 130-139. doi:10.1016/j.cct.2017.09.003

Kroenke, K., Bair, M. J., Damush, T. M., Wu, J., Hoke, S., Sutherland, J., & Tu, W. (2009). Optimized Antidepressant Therapy and Pain Self-management in Primary Care Patients With Depression and Musculoskeletal Pain A Randomized Controlled Trial. *Jama-Journal of the American Medical Association, 301*(20), 2099-2110. doi:10.1001/jama.2009.723

Kroenke, K., Wu, J., Bair, M. J., Damush, T. M., Krebs, E. E., & Tu, W. (2012). Impact of Depression on 12-Month Outcomes in Primary-Care Patients with Chronic Musculoskeletal Pain. *Journal of Musculoskeletal Pain, 20*(1), 8-17. doi:10.3109/10582452.2011.635844

Kroenke, K., Wu, J., Bair, M. J., Krebs, E. E., Damush, T. M., & Tu, W. (2011). Reciprocal Relationship Between Pain and Depression: A 12-Month Longitudinal Analysis in Primary Care. *Journal of Pain, 12*(9), 964-973. doi:10.1016/j.jpain.2011.03.003

Krommes, K., Bandholm, T., Jakobsen, M. D., Andersen, L. L., Serner, A., Holmich, P., & Thorborg, K. (2017). DYNAMIC HIP ADDUCTION, ABDUCTION AND ABDOMINAL EXERCISES FROM THE HOLMICH GROIN-INJURY PREVENTION PROGRAM ARE INTENSE ENOUGH TO BE CONSIDERED STRENGTHENING EXERCISES - A CROSS-SECTIONAL STUDY. *International Journal of Sports Physical Therapy, 12*(3), 371-380.

Kronborg, L., Bandholm, T., Palm, H., Kehlet, H., & Kristensen, M. T. (2014). Feasibility of Progressive Strength Training Implemented in the Acute Ward after Hip Fracture Surgery. *Plos One, 9*(4). doi:10.1371/journal.pone.0093332

Kruse, D. W. (2008). Intraarticular cortisone injection for osteoarthritis of the hip. Is it effective? Is it safe? *Current reviews in musculoskeletal medicine, 1*(3-4), 227-233. doi:10.1007/s12178-008-9029-0

Krych, A. J., Thompson, M., Knutson, Z., Scoon, J., & Coleman, S. H. (2013). Arthroscopic labral repair versus selective labral debridement in female patients with femoroacetabular impingement: a prospective randomized study. *Arthroscopy, 29*(1), 46-53. doi:10.1016/j.arthro.2012.07.011

Kuenze, C., Hertel, J., Weltman, A., Diduch, D. R., Saliba, S., & Hart, J. M. (2014). Jogging Biomechanics after Exercise in Individuals with ACL-Reconstructed Knees. *Medicine and Science in Sports and Exercise, 46*(6), 1067-1076. doi:10.1249/mss.0000000000000217

Kumar, V. K., Chakrapani, M., & Kedambadi, R. (2016). Motor Imagery Training on Muscle Strength and Gait Performance in Ambulant Stroke Subjects-A Randomized Clinical Trial. *Journal of Clinical and Diagnostic Research, 10*(3), YC1-YC4. doi:10.7860/jcdr/2016/16254.7358

Kutzner, I., Richter, A., Gordt, K., Dymke, J., Damm, P., Duda, G. N., . . . Bergmann, G. (2017). Does aquatic exercise reduce hip and knee joint loading? In vivo load measurements with instrumented implants. *Plos One, 12*(3). doi:10.1371/journal.pone.0171972

Lachiewicz, P. F. (2011). Abductor tendon tears of the hip: evaluation and management. *J Am Acad Orthop Surg, 19*(7), 385-391.

Lang, T. F., Saeed, I. H., Streeper, T., Carballido-Gamio, J., Harnish, R. J., Frassetto, L. A., . . . Cavanagh, P. R. (2014). Spatial heterogeneity in the response of the proximal femur to two lower-body resistance exercise regimens. *J Bone Miner Res, 29*(6), 1337-1345. doi:10.1002/jbmr.2155

Lange, A. K., Vanwanseele, B., Foroughi, N., Baker, M. K., Shnier, R., Smith, R. M., & Singh, M. A. F. (2009). Resistive Exercise for Arthritic Cartilage Health (REACH): a randomized double-blind, sham-exercise controlled trial. *BMC geriatrics, 9*, 1-1. doi:10.1186/1471-2318-9-1

Lansdown, H., Howard, K., Brealey, S., & MacPherson, H. (2009). Acupuncture for pain and osteoarthritis of the knee: a pilot study for an open parallel-arm randomised controlled trial. *Bmc Musculoskeletal Disorders, 10*. doi:10.1186/1471-2474-10-130

LaRoche, D. P., Lussier, M. V., & Roy, S. J. (2008). Chronic stretching and voluntary muscle force. *J Strength Cond Res, 22*(2), 589-596. doi:10.1519/JSC.0b013e3181636aef

Lau, R. W. K., & Pang, M. Y. C. (2009). An assessment of the osteogenic index of therapeutic exercises for stroke patients: relationship to severity of leg motor impairment. *Osteoporosis International, 20*(6), 979-987. doi:10.1007/s00198-008-0773-1

Lauermann, S. P., Lienhard, K., Item-Glatthorn, J. F., Casartelli, N. C., & Maffiuletti, N. A. (2014). Assessment of quadriceps muscle weakness in patients after total knee arthroplasty and total hip arthroplasty: Methodological issues. *Journal of Electromyography and Kinesiology, 24*(2), 285-291. doi:10.1016/j.jelekin.2013.10.018

Lavender, T., Furber, C., Campbell, M., Victor, S., Roberts, I., Bedwell, C., & Cork, M. J. (2012). Effect on skin hydration of using baby wipes to clean the napkin area of newborn babies: assessor-blinded randomised controlled equivalence trial. *Bmc Pediatrics, 12*. doi:10.1186/1471-2431-12-59

Law, R. Y. W., Harvey, L. A., Nicholas, M. K., Tonkin, L., De Sousa, M., & Finniss, D. G. (2009). Stretch Exercises Increase Tolerance to Stretch in Patients With Chronic Musculoskeletal Pain: A Randomized Controlled Trial. *Physical Therapy, 89*(10), 1016-1026. doi:10.2522/ptj.20090056

Leavey, V. J., Sandrey, M. A., & Dahmer, G. (2010). Comparative effects of 6-week balance, gluteus medius strength, and combined programs on dynamic postural control. *J Sport Rehabil, 19*(3), 268-287.

Lechner, M., Steirer, I., Brinkhaus, B., Chen, Y., Krist-Dungl, C., Koschier, A., . . . Zauner-Dungl, A. (2011). Efficacy of individualized Chinese herbal medication in osteoarthrosis of hip and knee: a double-blind, randomized-controlled clinical study. *J Altern Complement Med, 17*(6), 539-547. doi:10.1089/acm.2010.0602

Lee, J. J., Harrison, J. R., Boachie-Adjei, K., Vargas, E., & Moley, P. J. (2016). Platelet-Rich Plasma Injections With Needle Tenotomy for Gluteus Medius Tendinopathy A Registry Study With Prospective Follow-up. *Orthopaedic Journal of Sports Medicine, 4*(11). doi:10.1177/2325967116671692

Lee, K. J., Min, B. W., Bae, K. C., Cho, C. H., & Kwon, D. H. (2009). Efficacy of multimodal pain control protocol in the setting of total hip arthroplasty. *Clin Orthop Surg, 1*(3), 155-160. doi:10.4055/cios.2009.1.3.155

Leech, K. A., Kinnaird, C. R., Holleran, C. L., Kahn, J., & Hornby, T. G. (2016). Effects of Locomotor Exercise Intensity on Gait Performance in Individuals With Incomplete Spinal Cord Injury. *Physical Therapy, 96*(12), 1919-1929. doi:10.2522/ptj.20150646

Leegwater, N. C., Nolte, P. A., de Korte, N., Heetveld, M. J., Kalisvaart, K. J., Schonhuth, C. P., . . . van Royen, B. J. (2016). The efficacy of continuous-flow cryo and cyclic compression therapy after hip fracture surgery on postoperative pain: design of a prospective, open-label, parallel, multicenter, randomized controlled, clinical trial. *BMC Musculoskelet Disord, 17*, 153. doi:10.1186/s12891-016-1000-4

Lei, M., Guo, C., Wang, D., Zhang, C., & Hua, L. (2017). The effect of probiotic Lactobacillus casei Shirota on knee osteoarthritis: a randomised double-blind, placebo-controlled clinical trial. *Beneficial Microbes, 8*(5), 697-703. doi:10.3920/bm2016.0207

Levin, O., Vanwanseele, B., Thijsen, J. R., Helsen, W. F., Staes, F. F., & Duysens, J. (2015). Proactive and reactive neuromuscular control in subjects with chronic ankle instability: evidence from a pilot study on landing. *Gait Posture, 41*(1), 106-111. doi:10.1016/j.gaitpost.2014.09.005

Levy, A., Frank, M. B.-O., & Gefen, A. (2015). The biomechanical efficacy of dressings in preventing heel ulcers. *Journal of Tissue Viability, 24*(1), 1-11. doi:10.1016/j.jtv.2015.01.001

Lewinson, R. T., Collins, K. H., Vallerand, I. A., Wiley, J. P., Woodhouse, L. J., Reimer, R. A., . . . Stefanyshyn, D. J. (2014). Reduced knee joint loading with lateral and medial wedge insoles for management of knee osteoarthritis: a protocol for a randomized controlled trial. *Bmc Musculoskeletal Disorders, 15*. doi:10.1186/1471-2474-15-405

Li, B., Wen, Y., Liu, D., & Tian, L. (2012). The effect of knee position on blood loss and range of motion following total knee arthroplasty. *Knee Surg Sports Traumatol Arthrosc, 20*(3), 594-599. doi:10.1007/s00167-011-1628-4

Li, Y., Cao, C., & Chen, X. (2013). Similar electromyographic activities of lower limbs between squatting on a reebok core board and ground. *J Strength Cond Res, 27*(5), 1349-1353. doi:10.1519/JSC.0b013e318267a5fe

Liao, C.-D., Lin, L.-F., Huang, Y.-C., Huang, S.-W., Chou, L.-C., & Liou, T.-H. (2015). Functional outcomes of outpatient balance training following total knee replacement in patients with knee osteoarthritis: a randomized controlled trial. *Clinical Rehabilitation, 29*(9), 855-867. doi:10.1177/0269215514564086

Lidbeck, C., Tedroff, K., & Bartonek, A. (2015). Muscle strength does not explain standing ability in children with bilateral spastic cerebral palsy: a cross sectional descriptive study. *Bmc Neurology, 15*. doi:10.1186/s12883-015-0441-y

Liebs, T. R., Herzberg, W., Ruther, W., Russlies, M., & Hassenpflug, J. (2016). Quality-Adjusted Life Years Gained by Hip and Knee Replacement Surgery and Its Aftercare. *Arch Phys Med Rehabil, 97*(5), 691-700. doi:10.1016/j.apmr.2015.12.021

Liebs, T. R., Kloos, S. A., Herzberg, W., Ruether, W., & Hassenpflug, J. (2013). The significance of an asymmetric extension gap on routine radiographs after total knee replacement A NEW SIGN AND ITS CLINICAL SIGNIFICANCE. *Bone & Joint Journal, 95B*(4), 472-477. doi:10.1302/0301-620x.95b4.31080

Ligibel, J. A., Campbell, N., Partridge, A., Chen, W. Y., Salinardi, T., Chen, H., . . . Winer, E. P. (2008). Impact of a mixed strength and endurance exercise intervention on insulin levels in breast cancer survivors. *Journal of Clinical Oncology, 26*(6), 907-912. doi:10.1200/jco.2007.12.7357

Lin, C.-W. C., March, L., Crosbie, J., Crawford, R., Graves, S., Naylor, J., . . . Fransen, M. (2009). Maximum recovery after knee replacement - the MARKER study rationale and protocol. *Bmc Musculoskeletal Disorders, 10*. doi:10.1186/1471-2474-10-69

Lindner, D., Shohat, N., Botser, I., Agar, G., & Domb, B. G. (2015). Clinical presentation and imaging results of patients with symptomatic gluteus medius tears. *J Hip Preserv Surg, 2*(3), 310-315. doi:10.1093/jhps/hnv035

Liu, H.-Y., Yang, C.-T., Cheng, H.-S., Wu, C.-C., Chen, C.-Y., & Shyu, Y.-I. L. (2015). Family caregivers' mental health is associated with postoperative recovery of elderly patients with hip fracture: A sample in Taiwan. *Journal of Psychosomatic Research, 78*(5), 452-458. doi:10.1016/j.jpsychores.2015.02.002

Liu, H. Y., Tseng, M. Y., Li, H. J., Wu, C. C., Cheng, H. S., Yang, C. T., . . . Shyu, Y. I. (2014). Comprehensive care improves physical recovery of hip-fractured elderly Taiwanese patients with poor nutritional status. *J Am Med Dir Assoc, 15*(6), 416-422. doi:10.1016/j.jamda.2014.01.009

Liu, J.-T., Tang, D.-Z., Li, X.-F., Zhang, Z.-G., Ji, W.-B., Tao, S., . . . Jiang, H. (2013). Golden plaster for pain therapy in patients with knee osteoarthritis: study protocol for a multicenter randomized, double-blind, placebo-controlled trial. *Trials, 14*. doi:10.1186/1745-6215-14-383

Liu, J., Li, Y. M., Cao, J. G., & Wang, L. (2015). Effects of knee position on blood loss following total knee arthroplasty: a randomized, controlled study. *J Orthop Surg Res, 10*, 69. doi:10.1186/s13018-015-0213-9

Liu, Y.-H., Wei, I. P., Wang, T.-M., Lu, T.-W., & Lin, J.-G. (2017). Immediate Effects of Acupuncture Treatment on Intra- and Inter-Limb Contributions to Body Support During Gait in Patients with Bilateral Medial Knee Osteoarthritis. *American Journal of Chinese Medicine, 45*(1), 23-35. doi:10.1142/s0192415x17500033

Livesey, C., Wylde, V., Descamps, S., Estela, C. M., Bannister, G. C., Learmonth, I. D., & Blom, A. W. (2009). Skin closure after total hip replacement A RANDOMISED CONTROLLED TRIAL OF SKIN ADHESIVE VERSUS SURGICAL STAPLES. *Journal of Bone and Joint Surgery-British Volume, 91B*(6), 725-729. doi:10.1302/0301-620x.91b6.21831

Lluch, E., Duenas, L., Falla, D., Baert, I., Meeus, M., Sanchez-Frutos, J., & Nijs, J. (2018). Preoperative Pain Neuroscience Education Combined With Knee Joint Mobilization for Knee Osteoarthritis: A Randomized Controlled Trial. *Clinical Journal of Pain, 34*(1), 44-52. doi:10.1097/ajp.0000000000000511

Lofgren, H., Engquist, M., Hoffmann, P., Sigstedt, B., & Vavruch, L. (2010). Clinical and radiological evaluation of Trabecular Metal and the Smith-Robinson technique in anterior cervical fusion for degenerative disease: a prospective, randomized, controlled study with 2-year follow-up. *European Spine Journal, 19*(3), 464-473. doi:10.1007/s00586-009-1161-z

Lohmann-Jensen, R., Holsgaard-Larsen, A., Emmeluth, C., Overgaard, S., & Jensen, C. (2014). The efficacy of tourniquet assisted total knee arthroplasty on patient-reported and performance-based physical function: a randomized controlled trial protocol. *Bmc Musculoskeletal Disorders, 15*. doi:10.1186/1471-2474-15-110

Lopez-Liria, R., Padilla-Gongora, D., Catalan-Matamoros, D., Rocamora-Perez, P., Perez-de la Cruz, S., & Fernandez-Sanchez, M. (2015). Home-Based versus Hospital-Based Rehabilitation Program after Total Knee Replacement. *Biomed Research International*. doi:10.1155/2015/450421

Lowe, C. J., Davies, L., Sackley, C. M., & Barker, K. L. (2015). Effectiveness of land-based physiotherapy exercise following hospital discharge following hip arthroplasty for osteoarthritis: an updated systematic review. *Physiotherapy, 101*(3), 252-265. doi:10.1016/j.physio.2014.12.003

Loyd, B. J., Jennings, J. M., Judd, D. L., Kim, R. H., Wolfe, P., Dennis, D. A., & Stevens-Lapsley, J. E. (2017). Influence of Hip Abductor Strength on Functional Outcomes Before and After Total Knee Arthroplasty: Post Hoc Analysis of a Randomized Controlled Trial. *Physical Therapy, 97*(9), 896-903. doi:10.1093/ptj/pzx066

Lui, P. P. Y., Cheng, Y. Y., Yung, S. H., Hung, A. S. L., & Chan, K. M. (2012). A randomized controlled trial comparing bone mineral density changes of three different ACL reconstruction techniques. *Knee, 19*(6), 779-785. doi:10.1016/j.knee.2012.02.005

Lun, V., Marsh, A., Bray, R., Lindsay, D., & Wiley, P. (2015). Efficacy of Hip Strengthening Exercises Compared With Leg Strengthening Exercises on Knee Pain, Function, and Quality of Life in Patients With Knee Osteoarthritis. *Clin J Sport Med, 25*(6), 509-517. doi:10.1097/jsm.0000000000000170

Lund, H., Weile, U., Christensen, R., Rostock, B., Downey, A., Bartels, E. M., . . . Bliddal, H. (2008). A randomized controlled trial of aquatic and land-based exercise in patients with knee osteoarthritis. *Journal of Rehabilitation Medicine, 40*(2), 137-144. doi:10.2340/16501977-0134

Luo, Z. L., Chen, M., Shang, X. F., Hu, F., Ni, Z., Cheng, P., . . . Zhang, X. Q. (2016). [Direct anterior approach versus posterolateral approach for total hip arthroplasty in the lateral decubitus position]. *Zhonghua Yi Xue Za Zhi, 96*(35), 2807-2812. doi:10.3760/cma.j.issn.0376-2491.2016.35.009

Lurie, J., & Tomkins-Lane, C. (2016). Management of lumbar spinal stenosis. *Bmj-British Medical Journal, 352*. doi:10.1136/bmj.h6234

Lyle, M. A., Valero-Cuevas, F. J., Gregor, R. J., & Powers, C. M. (2015). Lower extremity dexterity is associated with agility in adolescent soccer athletes. *Scandinavian Journal of Medicine & Science in Sports, 25*(1), 81-88. doi:10.1111/sms.12162

Lyles, K. W., Colon-Emeric, C. S., Magaziner, J. S., Adachi, J. D., Pieper, C. F., Mautalen, C., . . . Fracture, H. R. (2007). Zoledronic acid and clinical fractures and mortality after hip fracture. *New England Journal of Medicine, 357*(18), 1799-1809. doi:10.1056/NEJMoa074941

Lyp, M., Kaczor, R., Cabak, A., Tederko, P., Wlostowska, E., Stanislawska, I., . . . Tomaszewski, W. (2016). A Water Rehabilitation Program in Patients with Hip Osteoarthritis Before and After Total Hip Replacement. *Med Sci Monit, 22*, 2635-2642.

Madsen, M., Larsen, K., Madsen, I. K., Soe, H., & Hansen, T. B. (2013). Late group-based rehabilitation has no advantages compared with supervised home-exercises after total knee arthroplasty. *Dan Med J, 60*(4), A4607.

Maguire, C., Sieben, J. M., Frank, M., & Romkes, J. (2010). Hip abductor control in walking following stroke -- the immediate effect of canes, taping and TheraTogs on gait. *Clin Rehabil, 24*(1), 37-45. doi:10.1177/0269215509342335

Mahomed, N. N., Davis, A. M., Hawker, G., Badley, E., Davey, J. R., Syed, K. A., . . . Wright, J. G. (2008). Inpatient compared with home-based rehabilitation following primary unilateral total hip or knee replacement: a randomized controlled trial. *J Bone Joint Surg Am, 90*(8), 1673-1680. doi:10.2106/JBJS.G.01108

Mak, J. C., Klein, L. A., Finnegan, T., Mason, R. S., & Cameron, I. D. (2014). An initial loading-dose vitamin D versus placebo after hip fracture surgery: baseline characteristics of a randomized controlled trial (REVITAHIP). *BMC Geriatr, 14*, 101. doi:10.1186/1471-2318-14-101

Mak, J. C., Mason, R. S., Klein, L., & Cameron, I. D. (2016). An initial loading-dose vitamin D versus placebo after hip fracture surgery: randomized trial. *BMC Musculoskelet Disord, 17*, 336. doi:10.1186/s12891-016-1174-9

Mansell, N. S., Rhon, D. I., Marchant, B. G., Slevin, J. M., & Meyer, J. L. (2016). Two-year outcomes after arthroscopic surgery compared to physical therapy for femoracetabular impingement: A protocol for a randomized clinical trial. *Bmc Musculoskeletal Disorders, 17*. doi:10.1186/s12891-016-0914-1

Marchand, A.-A., Suitner, M., O'Shaughnessy, J., Chatillon, C.-E., Cantin, V., & Descarreaux, M. (2015). Effects of a prehabilitation program on patients' recovery following spinal stenosis surgery: study protocol for a randomized controlled trial. *Trials, 16*. doi:10.1186/s13063-015-1009-2

Maria Castro-Sanchez, A., Mataran-Penarrocha, G. A., Arroyo-Morales, M., Saavedra-Hernandez, M., Fernandez-Sola, C., & Moreno-Lorenzo, C. (2011). Effects of myofascial release techniques on

pain, physical function, and postural stability in patients with fibromyalgia: a randomized controlled trial. *Clinical Rehabilitation, 25*(9), 800-813. doi:10.1177/0269215511399476
Marin, R., Chang, A., Cyhan, T., & Dinauer, M. P. (2008). Rehabilitation implications of stepper exercise technique on exertion and hip extensor muscle activation - A small exploratory study. *Journal of Rehabilitation Research and Development, 45*(1), 125-134. doi:10.1682/jrrd.2006.08.0105
Marino, J., Russo, J., Kenny, M., Herenstein, R., Livote, E., & Chelly, J. E. (2009). Continuous Lumbar Plexus Block for Postoperative Pain Control After Total Hip Arthroplasty A Randomized Controlled Trial. *Journal of Bone and Joint Surgery-American Volume, 91A*(1), 29-37. doi:10.2106/jbjs.h.00079
Marques, E. A., Mota, J., & Carvalho, J. (2012). Exercise effects on bone mineral density in older adults: a meta-analysis of randomized controlled trials. *Age, 34*(6), 1493-1515. doi:10.1007/s11357-011-9311-8
Marshall, P. W., Robbins, D. A., Wrightson, A. W., & Siegler, J. C. (2012). Acute neuromuscular and fatigue responses to the rest-pause method. *J Sci Med Sport, 15*(2), 153-158. doi:10.1016/j.jsams.2011.08.003
Marshall, P. W. M., Cashman, A., & Cheema, B. S. (2011). A randomized controlled trial for the effect of passive stretching on measures of hamstring extensibility, passive stiffness, strength, and stretch tolerance. *Journal of Science and Medicine in Sport, 14*(6), 535-540. doi:10.1016/j.jsams.2011.05.003
Marshall, P. W. M., Lovell, R., & Siegler, J. C. (2016). Changes in Passive Tension of the Hamstring Muscles During a Simulated Soccer Match. *International Journal of Sports Physiology and Performance, 11*(5), 594-601. doi:10.1123/ijspp.2015-0009
Martin-Martin, L. M., Valenza-Demet, G., Jimenez-Moleon, J. J., Cabrera-Martos, I., Revelles-Moyano, F. J., & Valenza, M. C. (2014). Effect of occupational therapy on functional and emotional outcomes after hip fracture treatment: a randomized controlled trial. *Clin Rehabil, 28*(6), 541-551. doi:10.1177/0269215513511472
Martin, R., Clayson, P. E., Troussel, S., Fraser, B. P., & Docquier, P.-L. (2011). Anterolateral Minimally Invasive Total Hip Arthroplasty A Prospective Randomized Controlled Study With a Follow-Up of 1 Year. *Journal of Arthroplasty, 26*(8), 1362-1372. doi:10.1016/j.arth.2010.11.016
Mat, S., Tan, P. J., Ng, C. T., Fadzli, F., Rozalli, F. I., Khoo, E. M., . . . Tan, M. P. (2015). Mild Joint Symptoms Are Associated with Lower Risk of Falls than Asymptomatic Individuals with Radiological Evidence of Osteoarthritis. *Plos One, 10*(10). doi:10.1371/journal.pone.0141368
Matsumoto, T., Kaneuji, A., Hiejima, Y., Sugiyama, H., Akiyama, H., Atsumi, T., . . . Yamaguchi, M. (2012). Japanese Orthopaedic Association Hip Disease Evaluation Questionnaire (JHEQ): a patient-based evaluation tool for hip-joint disease. The Subcommittee on Hip Disease Evaluation of the Clinical Outcome Committee of the Japanese Orthopaedic Association. *J Orthop Sci, 17*(1), 25-38. doi:10.1007/s00776-011-0166-8
Mayer-Wagner, S., Ernst, J., Maier, M., Chiquet, M., Joos, H., Mueller, P. E., . . . Hausdorf, J. (2010). The Effect of High-Energy Extracorporeal Shock Waves on Hyaline Cartilage of Adult Rats In Vivo. *Journal of Orthopaedic Research, 28*(8), 1050-1056. doi:10.1002/jor.21074
McKenzie, A. I., Briggs, R. A., Barrows, K. M., Nelson, D. S., Kwon, O. S., Hopkins, P. N., . . . Drummond, M. J. (2017). A pilot study examining the impact of exercise training on skeletal muscle genes related to the TLR signaling pathway in older adults following hip fracture recovery. *Journal of Applied Physiology, 122*(1), 68-75. doi:10.1152/japplphysiol.00714.2016
Mellor, R., Grimaldi, A., Wajswelner, H., Hodges, P., Abbott, J. H., Bennell, K., & Vicenzino, B. (2016). Exercise and load modification versus corticosteroid injection versus 'wait and see' for persistent gluteus medius/minimus tendinopathy (the LEAP trial): a protocol for a randomised clinical trial. *BMC Musculoskelet Disord, 17*, 196. doi:10.1186/s12891-016-1043-6

Mendelsohn, M. E., Overend, T. J., Connelly, D. M., & Petrella, R. J. (2008). Improvement in aerobic fitness during rehabilitation after hip fracture. *Arch Phys Med Rehabil, 89*(4), 609-617. doi:10.1016/j.apmr.2007.09.036

Mendis, M. D., & Hides, J. A. (2016). Effect of motor control training on hip muscles in elite football players with and without low back pain. *J Sci Med Sport, 19*(11), 866-871. doi:10.1016/j.jsams.2016.02.008

Meneghini, R. M., & Smits, S. A. (2009). Early discharge and recovery with three minimally invasive total hip arthroplasty approaches: a preliminary study. *Clin Orthop Relat Res, 467*(6), 1431-1437. doi:10.1007/s11999-009-0729-6

Mens, J. M. (2017). Does a pelvic belt reduce hip adduction weakness in pregnancy-related posterior pelvic girdle pain? A case-control study. *European Journal of Physical and Rehabilitation Medicine, 53*(4), 575-581. doi:10.23736/s1973-9087.17.04442-2

Mercer, V. S., Gross, M. T., Sharma, S., & Weeks, E. (2009). Comparison of Gluteus Medius Muscle Electromyographic Activity During Forward and Lateral Step-up Exercises in Older Adults. *Physical Therapy, 89*(11), 1205-1214. doi:10.2522/ptj.20080229

Merk, J., Winkler, C., Best, R., & Horstmann, T. (2008). Joint function and strength in patients before and after knee replacement surgery. *Deutsche Zeitschrift Fur Sportmedizin, 59*(6), 136-140.

Messier, S. P., Mihalko, S. L., Beavers, D. P., Nicklas, B. J., DeVita, P., Carr, J. J., . . . Loeser, R. F. (2013). Strength Training for Arthritis Trial (START): design and rationale. *Bmc Musculoskeletal Disorders, 14*. doi:10.1186/1471-2474-14-208

Messier, S. P., Mihalko, S. L., Legault, C., Miller, G. D., Nicklas, B. J., DeVita, P., . . . Loeser, R. F. (2013). Effects of Intensive Diet and Exercise on Knee Joint Loads, Inflammation, and Clinical Outcomes Among Overweight and Obese Adults With Knee Osteoarthritis The IDEA Randomized Clinical Trial. *Jama-Journal of the American Medical Association, 310*(12), 1263-1273. doi:10.1001/jama.2013.277669

Mikkelsen, L. R., Mechlenburg, I., Soballe, K., Jorgensen, L. B., Mikkelsen, S., Bandholm, T., & Petersen, A. K. (2014). Effect of early supervised progressive resistance training compared to unsupervised home-based exercise after fast-track total hip replacement applied to patients with preoperative functional limitations. A single-blinded randomised controlled trial. *Osteoarthritis Cartilage, 22*(12), 2051-2058. doi:10.1016/j.joca.2014.09.025

Mikkelsen, L. R., Mikkelsen, S. S., & Christensen, F. B. (2012). Early, intensified home-based exercise after total hip replacement--a pilot study. *Physiother Res Int, 17*(4), 214-226. doi:10.1002/pri.1523

Mikkelsen, L. R., Petersen, A. K., Mechlenburg, I., Mikkelsen, S., Soballe, K., & Bandholm, T. (2017). Description of load progression and pain response during progressive resistance training early after total hip arthroplasty: secondary analyses from a randomized controlled trial. *Clinical Rehabilitation, 31*(1), 11-22. doi:10.1177/0269215516628305

Minns Lowe, C. J., Barker, K. L., Dewey, M. E., & Sackley, C. M. (2009). Effectiveness of physiotherapy exercise following hip arthroplasty for osteoarthritis: a systematic review of clinical trials. *BMC Musculoskelet Disord, 10*, 98. doi:10.1186/1471-2474-10-98

Minns, R. J., Marsh, A. M., Chuck, A., & Todd, J. (2007). Are hip protectors correctly positioned in use? *Age and Ageing, 36*(2), 140-144. doi:10.1093/ageing/afl186

Mishra, M. V., Austin, L., Parvizi, J., Ramsey, M., & Showalter, T. N. (2011). Safety and efficacy of radiation therapy as secondary prophylaxis for heterotopic ossification of non-hip joints. *Journal of Medical Imaging and Radiation Oncology, 55*(3), 333-336. doi:10.1111/j.1754-9485.2011.02275.x

Mistiaen, W., Roussel, N. A., Vissers, D., Daenen, L., Truijen, S., & Nijs, J. (2012). EFFECTS OF AEROBIC ENDURANCE, MUSCLE STRENGTH, AND MOTOR CONTROL EXERCISE ON PHYSICAL FITNESS AND MUSCULOSKELETAL INJURY RATE IN PREPROFESSIONAL DANCERS: AN UNCONTROLLED TRIAL. *Journal of Manipulative and Physiological Therapeutics, 35*(5), 381-389. doi:10.1016/j.jmpt.2012.04.014

Miyara, K., Matsumoto, S., Uema, T., Hirokawa, T., Noma, T., Shimodozono, M., & Kawahira, K. (2014). Feasibility of using whole body vibration as a means for controlling spasticity in post-stroke patients: A pilot study. *Complementary Therapies in Clinical Practice, 20*(1), 70-73. doi:10.1016/j.ctcp.2013.10.002

Mjaaland, K. E., Kivle, K., Svenningsen, S., Pripp, A. H., & Nordsletten, L. (2015). Comparison of Markers for Muscle Damage, Inflammation, and Pain Using Minimally Invasive Direct Anterior Versus Direct Lateral Approach in Total Hip Arthroplasty: A Prospective, Randomized, Controlled Trial. *Journal of Orthopaedic Research, 33*(9), 1305-1310. doi:10.1002/jor.22911

Moe, R. H., Haavardsholm, E. A., Grotle, M., Steen, E., Kjeken, I., Hagen, K. B., & Uhlig, T. (2011). Development of a brief multidisciplinary education programme for patients with osteoarthritis. *Bmc Musculoskeletal Disorders, 12*. doi:10.1186/1471-2474-12-257

Monaghan, B., Grant, T., Hing, W., & Cusack, T. (2012). Functional exercise after total hip replacement (FEATHER): a randomised control trial. *BMC Musculoskelet Disord, 13*, 237. doi:10.1186/1471-2474-13-237

Monticone, M., Ambrosini, E., Rocca, B., Lorenzon, C., Ferrante, S., & Zatti, G. (2014). Task-oriented exercises and early full weight-bearing contribute to improving disability after total hip replacement: a randomized controlled trial. *Clin Rehabil, 28*(7), 658-668. doi:10.1177/0269215513519342

Moore, R. D., Mitchell, G. K., & Miklos, J. R. (2012). Single-incision vaginal approach to treat cystocele and vault prolapse with an anterior wall mesh anchored apically to the sacrospinous ligaments. *International Urogynecology Journal, 23*(1), 85-91. doi:10.1007/s00192-011-1536-7

Moreira-Silva, I., Santos, R., Abreu, S., & Mota, J. (2014). THE EFFECT OF A PHYSICAL ACTIVITY PROGRAM ON DECREASING PHYSICAL DISABILITY INDICATED BY MUSCULOSKELETAL PAIN AND RELATED SYMPTOMS AMONG WORKERS: A PILOT STUDY. *International Journal of Occupational Safety and Ergonomics, 20*(1), 55-64. doi:10.1080/10803548.2014.11077028

Morishima, Y., Mizushima, T., Yamauchi, K., Morikawa, M., Masuki, S., & Nose, H. (2014). Effects of Home-Based Interval Walking Training on Thigh Muscle Strength and Aerobic Capacity in Female Total Hip Arthroplasty Patients: A Randomized, Controlled Pilot Study. *Plos One, 9*(9). doi:10.1371/journal.pone.0108690

Moskal, J. T., & Capps, S. G. (2013). Is Limited Incision Better Than Standard Total Hip Arthroplasty? A Meta-analysis. *Clinical Orthopaedics and Related Research, 471*(4), 1283-1294. doi:10.1007/s11999-012-2717-5

Motealleh, A., Gheysari, E., Shokri, E., & Sobhani, S. (2016). The immediate effect of lumbopelvic manipulation on EMG of vasti and gluteus medius in athletes with patellofemoral pain syndrome: A randomized controlled trial. *Manual Therapy, 22*, 16-21. doi:10.1016/j.math.2016.02.002

Mouilhade, F., Matsoukis, J., Oger, P., Mandereau, C., Brzakala, V., & Dujardin, F. (2011). Component positioning in primary total hip replacement: a prospective comparative study of two anterolateral approaches, minimally invasive versus gluteus medius hemimyotomy. *Orthop Traumatol Surg Res, 97*(1), 14-21. doi:10.1016/j.otsr.2010.05.013

Mudumbai, S. C., Ganaway, T., Kim, T. E., Howard, S. K., Giori, N. J., Shum, C., & Mariano, E. R. (2016). Can bedside patient-reported numbness predict postoperative ambulation ability for total knee arthroplasty patients with nerve block catheters? *Korean Journal of Anesthesiology, 69*(1), 32-36. doi:10.4097/kjae.2016.69.1.32

Mueller, M., Tohtz, S., Springer, I., Dewey, M., & Perka, C. (2011). Randomized controlled trial of abductor muscle damage in relation to the surgical approach for primary total hip replacement: minimally invasive anterolateral versus modified direct lateral approach. *Archives of Orthopaedic and Trauma Surgery, 131*(2), 179-189. doi:10.1007/s00402-010-1117-0

Muller, M., Schwachmeyer, V., Tohtz, S., Taylor, W. R., Duda, G. N., Perka, C., & Heller, M. O. (2012). The direct lateral approach: impact on gait patterns, foot progression angle and pain in comparison with a minimally invasive anterolateral approach. *Arch Orthop Trauma Surg, 132*(5), 725-731. doi:10.1007/s00402-012-1467-x

Muller, M., Tohtz, S., Dewey, M., Springer, I., & Perka, C. (2010). Evidence of reduced muscle trauma through a minimally invasive anterolateral approach by means of MRI. *Clin Orthop Relat Res, 468*(12), 3192-3200. doi:10.1007/s11999-010-1378-5

Muller, M., Tohtz, S., Springer, I., Dewey, M., & Perka, C. (2011). Randomized controlled trial of abductor muscle damage in relation to the surgical approach for primary total hip replacement: minimally invasive anterolateral versus modified direct lateral approach. *Arch Orthop Trauma Surg, 131*(2), 179-189. doi:10.1007/s00402-010-1117-0

Muller, M., Tohtz, S., Winkler, T., Dewey, M., Springer, I., & Perka, C. (2010). MRI findings of gluteus minimus muscle damage in primary total hip arthroplasty and the influence on clinical outcome. *Arch Orthop Trauma Surg, 130*(7), 927-935. doi:10.1007/s00402-010-1085-4

Myint, M. W., Wu, J., Wong, E., Chan, S. P., To, T. S., Chau, M. W., . . . Au, K. S. (2013). Clinical benefits of oral nutritional supplementation for elderly hip fracture patients: a single blind randomised controlled trial. *Age Ageing, 42*(1), 39-45. doi:10.1093/ageing/afs078

Nahm, E.-S., Resnick, B., Orwig, D., Magaziner, J., Bellantoni, M., Sterling, R., & Brennan, P. F. (2012). A Theory-Based Online Hip Fracture Resource Center for Caregivers Effects on Dyads. *Nursing Research, 61*(6), 413-422. doi:10.1097/NNR.0b013e318270712a

Nakagawa, T. H., Muniz, T. B., Baldon Rde, M., Dias Maciel, C., de Menezes Reiff, R. B., & Serrao, F. V. (2008). The effect of additional strengthening of hip abductor and lateral rotator muscles in patellofemoral pain syndrome: a randomized controlled pilot study. *Clin Rehabil, 22*(12), 1051-1060. doi:10.1177/0269215508095357

Nakagawa, T. H., Muniz, T. B., Baldon, R. d. M., Maciel, C. D., de Menezes Reiff, R. B., & Serrao, F. V. (2008). The effect of additional strengthening of hip abductor and lateral rotator muscles in patellofemoral pain syndrome: a randomized controlled pilot study. *Clinical Rehabilitation, 22*(12), 1051-1060. doi:10.1177/0269215508095357

Nakase, J., Inaki, A., Mochizuki, T., Toratani, T., Kosaka, M., Ohashi, Y., . . . Tsuchiya, H. (2013). Whole Body Muscle Activity during the FIFA 11+Program Evaluated by Positron Emission Tomography. *Plos One, 8*(9). doi:10.1371/journal.pone.0073898

Nankaku, M., Ikeguchi, R., Goto, K., So, K., Kuroda, Y., & Matsuda, S. (2016). Hip external rotator exercise contributes to improving physical functions in the early stage after total hip arthroplasty using an anterolateral approach: a randomized controlled trial. *Disability and Rehabilitation, 38*(22), 2178-2183. doi:10.3109/09638288.2015.1129453

Nankaku, M., Tsuboyama, T., Akiyama, H., Kakinoki, R., Fujita, Y., Nishimura, J., . . . Matsuda, S. (2013). Preoperative Prediction of Ambulatory Status at 6 Months After Total Hip Arthroplasty. *Physical Therapy, 93*(1), 88-93. doi:10.2522/ptj.20120016

Nantel, J., Termoz, N., Vendittoli, P.-A., Lavigne, M., & Prince, F. (2009). Gait Patterns After Total Hip Arthroplasty and Surface Replacement Arthroplasty. *Archives of Physical Medicine and Rehabilitation, 90*(3), 463-469. doi:10.1016/j.apmr.2008.08.215

Negus, J. J., Cawthorne, D. P., Chen, J. S., Scholes, C. J., Parker, D. A., & March, L. M. (2015). Patient outcomes using Wii-enhanced rehabilitation after total knee replacement - The TKR-POWER study. *Contemporary Clinical Trials, 40*, 47-53. doi:10.1016/j.cct.2014.11.007

Neves, M., Jr., Gualano, B., Roschel, H., Fuller, R., Benatti, F. B., De Sa Pinto, A. L., . . . Bonfa, E. (2011). Beneficial Effect of Creatine Supplementation in Knee Osteoarthritis. *Medicine and Science in Sports and Exercise, 43*(8), 1538-1543. doi:10.1249/MSS.0b013e3182118592

Ni, M., Mooney, K., Harriell, K., Balachandran, A., & Signorile, J. (2014). Core muscle function during specific yoga poses. *Complementary Therapies in Medicine, 22*(2), 235-243. doi:10.1016/j.ctim.2014.01.007

Ni, M., & Signorile, J. F. (2017). HIGH-SPEED RESISTANCE TRAINING MODIFIES LOAD-VELOCITY AND LOAD-POWER RELATIONSHIPS IN PARKINSON'S DISEASE. *Journal of Strength and Conditioning Research, 31*(10), 2866-2875.

Ni, M., Signorile, J. F., Balachandran, A., & Potiaumpai, M. (2016). Power training induced change in bradykinesia and muscle power in Parkinson's disease. *Parkinsonism & Related Disorders, 23*, 37-44. doi:10.1016/j.parkreldis.2015.11.028

Nicholson, V. P., McKean, M. R., Slater, G. J., Kerr, A., & Burkett, B. J. (2015). Low-Load Very High-Repetition Resistance Training Attenuates Bone Loss at the Lumbar Spine in Active Post-menopausal Women. *Calcified Tissue International, 96*(6), 490-499. doi:10.1007/s00223-015-9976-6

Nicol, L. M., Rowlands, D. S., Fazakerly, R., & Kellett, J. (2015). Curcumin supplementation likely attenuates delayed onset muscle soreness (DOMS). *Eur J Appl Physiol, 115*(8), 1769-1777. doi:10.1007/s00421-015-3152-6

Nielsen, P. R., Andreasen, J., Asmussen, M., & Tonnesen, H. (2008). Costs and quality of life for prehabilitation and early rehabilitation after surgery of the lumbar spine. *Bmc Health Services Research, 8*. doi:10.1186/1472-6963-8-209

Nielsen, P. R., Jorgensen, L. D., Dahl, B., Pedersen, T., & Tonnesen, H. (2010). Prehabilitation and early rehabilitation after spinal surgery: randomized clinical trial. *Clinical Rehabilitation, 24*(2), 137-148. doi:10.1177/0269215509347432

Nielsen, R. O., Parner, E. T., Nohr, E. A., Sorensen, H., Lind, M., & Rasmussen, S. (2014). Excessive Progression in Weekly Running Distance and Risk of Running-Related Injuries: An Association Which Varies According to Type of Injury. *Journal of Orthopaedic & Sports Physical Therapy, 44*(10), 739-747. doi:10.2519/jospt.2014.5164

Niemeyer, P., Schweigler, K., Grotejohann, B., Maurer, J., Angele, P., Aurich, M., . . . Albrecht, D. (2015). The German Cartilage Registry (KnorpelRegister DGOU) for Evaluation of Surgical Treatment for Cartilage Defects: Experience after Six Months Including First Demographic Data. *Zeitschrift Fur Orthopadie Und Unfallchirurgie, 153*(1), 67-74. doi:10.1055/s-0034-1383222

Niitsu, M., Ichinose, D., Hirooka, T., Mitsutomi, K., Morimoto, Y., Sarukawa, J., . . . Yamazaki, K. (2016). Effects of combination of whey protein intake and rehabilitation on muscle strength and daily movements in patients with hip fracture in the early postoperative period. *Clinical Nutrition, 35*(4), 943-949. doi:10.1016/j.clnu.2015.07.006

Nikander, R., Sievanen, H., Ojala, K., Kellokumpu-Lehtinen, P. L., Palva, T., Blomqvist, C., . . . Saarto, T. (2012). Effect of exercise on bone structural traits, physical performance and body composition in breast cancer patients - A 12-month RCT. *Journal of Musculoskeletal & Neuronal Interactions, 12*(3), 127-135.

Nistor, D.-V., Caterev, S., Bolboaca, S.-D., Cosma, D., Lucaciu, D. O. G., & Todor, A. (2017). Transitioning to the direct anterior approach in total hip arthroplasty. Is it a true muscle sparing approach when performed by a low volume hip replacement surgeon? *International Orthopaedics, 41*(11), 2245-2252. doi:10.1007/s00264-017-3480-8

Noehren, B., Abraham, A., Curry, M., Johnson, D., & Ireland, M. L. (2014). Evaluation of Proximal Joint Kinematics and Muscle Strength Following ACL Reconstruction Surgery in Female Athletes. *Journal of Orthopaedic Research, 32*(10), 1305-1310. doi:10.1002/jor.22678

Noh, K.-H., Kang, M.-H., An, S.-J., Kim, M.-H., Yoo, W.-G., & Oh, J.-S. (2012). Effect of Hip joint Position on Hip Abductor Muscle Activity during Lateral Step-up Exercises. *Journal of Physical Therapy Science, 24*(11), 1145-1148. doi:10.1589/jpts.24.1145

Nolan, L. (2012). A training programme to improve hip strength in persons with lower limb amputation. *J Rehabil Med, 44*(3), 241-248. doi:10.2340/16501977-0921

Nussbaum, E. L., Flett, H., Hitzig, S. L., McGillivray, C., Leber, D., Morris, H., & Jing, F. (2013). Ultraviolet-C Irradiation in the Management of Pressure Ulcers in People With Spinal Cord Injury: A Randomized, Placebo-Controlled Trial. *Archives of Physical Medicine and Rehabilitation, 94*(4), 650-659. doi:10.1016/j.apmr.2012.12.003

Nuta, O., Somaiah, N., Boyle, S., Chua, M. L. K., Gothard, L., Yarnold, J., . . . Herskind, C. (2016). Correlation between the radiation responses of fibroblasts cultured from individual patients and the risk of late reaction after breast radiotherapy. *Cancer Letters, 374*(2), 324-330. doi:10.1016/j.canlet.2016.02.036

Nyland, J., Burden, R., Krupp, R., & Caborn, D. N. (2011). Whole body, long-axis rotational training improves lower extremity neuromuscular control during single leg lateral drop landing and stabilization. *Clin Biomech (Bristol, Avon), 26*(4), 363-370. doi:10.1016/j.clinbiomech.2010.11.021

Nyland, J., Love, M., Burden, R., Krupp, R., & Caborn, D. N. (2014). Progressive resistance, whole body long-axis rotational training improves kicking motion motor performance. *Phys Ther Sport, 15*(1), 26-32. doi:10.1016/j.ptsp.2013.01.003

O'Shea, S. D., Taylor, N. F., & Paratz, J. D. (2007). A predominantly home-based progressive resistance exercise program increases knee extensor strength in the short-term in people with chronic obstructive pulmonary disease: a randomised controlled trial. *Australian Journal of Physiotherapy, 53*(4), 229-237. doi:10.1016/s0004-9514(07)70003-x

Ogutluler Ozkara, G., Ozgen, M., Ozkara, E., Armagan, O., Arslantas, A., & Atasoy, M. A. (2015). Effectiveness of Physical Therapy and Rehabilitation Programs Starting Immediately After Lumbar Disc Surgery. *Turkish Neurosurgery, 25*(3), 372-379. doi:10.5137/1019-5149.jtn.8440-13.0

Okamoto, T., Ridley, R. J., Edmondston, S. J., Visser, M., Headford, J., & Yates, P. J. (2016). Day-of-Surgery Mobilization Reduces the Length of Stay After Elective Hip Arthroplasty. *J Arthroplasty, 31*(10), 2227-2230. doi:10.1016/j.arth.2016.03.066

Okoro, T., Morrison, V., Maddison, P., Lemmey, A. B., & Andrew, J. G. (2013). An assessment of the impact of behavioural cognitions on function in patients partaking in a trial of early home-based progressive resistance training after total hip replacement surgery. *Disabil Rehabil, 35*(23), 2000-2007. doi:10.3109/09638288.2013.770082

Okoro, T., Whitaker, R., Gardner, A., Maddison, P., Andrew, J. G., & Lemmey, A. (2016). Does an early home-based progressive resistance training program improve function following total hip replacement? Results of a randomized controlled study. *BMC Musculoskelet Disord, 17*, 173. doi:10.1186/s12891-016-1023-x

Oliver, D., Healey, F., & Haines, T. P. (2010). Preventing Falls and Fall-Related Injuries in Hospitals. *Clinics in Geriatric Medicine, 26*(4), 645-+. doi:10.1016/j.cger.2010.06.005

Oosting, E., Jans, M. P., Dronkers, J. J., Naber, R. H., Dronkers-Landman, C. M., Appelman-de Vries, S. M., & van Meeteren, N. L. (2012). Preoperative Home-Based Physical Therapy Versus Usual Care to Improve Functional Health of Frail Older Adults Scheduled for Elective Total Hip Arthroplasty: A Pilot Randomized Controlled Trial. *Archives of Physical Medicine and Rehabilitation, 93*(4), 610-616. doi:10.1016/j.apmr.2011.11.006

Oremus, K., Sostaric, S., Trkulja, V., & Haspl, M. (2014). Influence of tranexamic acid on postoperative autologous blood retransfusion in primary total hip and knee arthroplasty: a randomized controlled trial. *Transfusion, 54*(1), 31-41. doi:10.1111/trf.12224

Orwig, D., Mangione, K. K., Baumgarten, M., Terrin, M., Fortinsky, R., Kenny, A. M., . . . Magaziner, J. (2017). Improving community ambulation after hip fracture: protocol for a randomised, controlled trial. *Journal of physiotherapy, 63*(1), 45-46. doi:10.1016/j.jphys.2016.10.001

Osteras, B., Osteras, H., Torstensen, T. A., & Vasseljen, O. (2013). Dose-response effects of medical exercise therapy in patients with patellofemoral pain syndrome: a randomised controlled clinical trial. *Physiotherapy, 99*(2), 126-131. doi:10.1016/j.physio.2012.05.009

Osteras, N., Hagen, K. B., Grotle, M., Sand-Svartrud, A.-L., Mowinckel, P., Aas, E., & Kjeken, I. (2014). Exercise programme with telephone follow-up for people with hand osteoarthritis - protocol for a randomised controlled trial. *Bmc Musculoskeletal Disorders, 15*. doi:10.1186/1471-2474-15-82

Pakkala, I., Read, S., Sipila, S., Portegijs, E., Kallinen, M., Heinonen, A., . . . Rantanen, T. (2012). Effects of intensive strength-power training on sense of coherence among 60-85-year-old people

with hip fracture: a randomized controlled trial. *Aging Clinical and Experimental Research, 24*(3), 295-299. doi:10.1007/bf03325261

Palieri, G., Vetrano, M., Mangone, M., Cereti, M., Bemporad, J., Roselli, G., . . . Ferretti, A. (2011). Surgical access and damage extent after total hip arthroplasty influence early gait pattern and guide rehabilitation treatment. *Eur J Phys Rehabil Med, 47*(1), 9-17.

Palsson, T. S., & Graven-Nielsen, T. (2012). Experimental pelvic pain facilitates pain provocation tests and causes regional hyperalgesia. *Pain, 153*(11), 2233-2240. doi:10.1016/j.pain.2012.07.013

Pang, H. N., Lo, N. N., Yang, K. Y., Chong, H. C., & Yeo, S. J. (2008). Peri-articular steroid injection improves the outcome after unicondylar knee replacement - A prospective, randomised controlled trial with a two-year follow-up. *Journal of Bone and Joint Surgery-British Volume, 90B*(6), 738-744. doi:10.1302/0301-620x.90b6.20550

Pang, M. Y. C., Zhang, M., Li, L. S. W., & Jones, A. Y. M. (2013). Changes in bone density and geometry of the radius in chronic stroke and related factors: A one-year prospective study. *Journal of Musculoskeletal & Neuronal Interactions, 13*(1), 77-88.

Papadopoulos, G., Pouangare, M., Papathanakos, G., Arnaoutoglou, E., Petrou, A., & Tzimas, P. (2014). The effect of ondansetron on postoperative delirium and cognitive function in aged orthopedic patients. *Minerva Anestesiol, 80*(4), 444-451.

Park, S.-K., Kobsar, D., & Ferber, R. (2016). Relationship between lower limb Muscle strength, self-reported pain and function, and frontal plane gait kinematics in knee osteoarthritis. *Clinical Biomechanics, 38*, 68-74. doi:10.1016/j.clinbiomech.2016.08.009

Park, S. J., Ji, C., Kwon, J. Y., & Ha, K.-Y. (2007). The effect of radiofrequency neurotomy on chronic low back pain. *Asian spine journal, 1*(2), 88-90. doi:10.4184/asj.2007.1.2.88

Parmenter, B. J., Raymond, J., Dinnen, P., Lusby, R. J., & Singh, M. A. F. (2013). High-Intensity Progressive Resistance Training Improves Flat-Ground Walking in Older Adults with Symptomatic Peripheral Arterial Disease. *Journal of the American Geriatrics Society, 61*(11), 1964-1970. doi:10.1111/jgs.12500

Patel, N. K., Sarraf, K. M., Joseph, S., Lee, C., & Middleton, F. R. (2013). Implementing the National Hip Fracture Database: An audit of care. *Injury-International Journal of the Care of the Injured, 44*(12), 1934-1939. doi:10.1016/j.injury.2013.04.012

Pauley, T., Devlin, M., & Madan-Sharma, P. (2014). A single-blind, cross-over trial of hip abductor strength training to improve Timed Up & Go performance in patients with unilateral, transfemoral amputation. *J Rehabil Med, 46*(3), 264-270. doi:10.2340/16501977-1270

Pedersen, S. J., Borgbjerg, F. A., Schousboe, B., Pedersen, B. D., Jorgensen, H. L., Duus, B. R., . . . Hip Fracture Grp Bispebjerg, H. (2008). A comprehensive hip fracture program reduces complication rates and mortality. *Journal of the American Geriatrics Society, 56*(10), 1831-1838. doi:10.1111/j.1532-5415.2008.01945.x

Penny, J. O., Ovesen, O., Varmarken, J. E., & Overgaard, S. (2013). Similar range of motion and function after resurfacing large-head or standard total hip arthroplasty. *Acta Orthop, 84*(3), 246-253. doi:10.3109/17453674.2013.788435

Peoples, T., Bailey, T., Ronald, B., Zisser, H. C., Janowski, B., Huang, S., . . . Yang, Q. (2011). Accuracy performance of the Medtronic NexSensor for 6 days in an inpatient setting using abdomen and buttocks insertion sites. *J Diabetes Sci Technol, 5*(2), 358-364. doi:10.1177/193229681100500224

Pereira Avelar, N. C., Simao, A. P., Tossige-Gomes, R., Cunha Neves, C. D., Rocha-Vieira, E., Coimbra, C. C., & Rodrigues Lacerda, A. C. (2011). The Effect of Adding Whole-Body Vibration to Squat Training on the Functional Performance and Self-Report of Disease Status in Elderly Patients with Knee Osteoarthritis: A Randomized, Controlled Clinical Study. *Journal of Alternative and Complementary Medicine, 17*(12), 1149-1155. doi:10.1089/acm.2010.0782

Petersen, M. K., Andersen, N. T., & Soballe, K. (2008). Self-reported functional outcome after primary total hip replacement treated with two different perioperative regimes - A follow-up study involving 61 patients. *Acta Orthopaedica, 79*(2), 160-167. doi:10.1080/17453670710014932

Petersen, M. K., Anderseri, K. V., Andersen, N. T., & Soballe, K. (2007). "To whom do the results of this trial apply?" - External validity of a randomized controlled trial involving 130 patients scheduled for primary total hip replacement. *Acta Orthopaedica, 78*(1), 12-18. doi:10.1080/17453670610013367

Petis, S., Howard, J. L., Lanting, B. L., & Vasarhelyi, E. M. (2015). Surgical approach in primary total hip arthroplasty: anatomy, technique and clinical outcomes. *Can J Surg, 58*(2), 128-139.

Pimenta, L., Marchi, L., Oliveira, L., Coutinho, E., & Amaral, R. (2013). A Prospective, Randomized, Controlled Trial Comparing Radiographic and Clinical Outcomes between Stand-Alone Lateral Interbody Lumbar Fusion with either Silicate Calcium Phosphate or rh-BMP2. *Journal of Neurological Surgery Part a-Central European Neurosurgery, 74*(6), 343-350. doi:10.1055/s-0032-1333420

Pinsornsak, P., Rojanavijitkul, S., & Chumchuen, S. (2016). Peri-articular tranexamic acid injection in total knee arthroplasty: a randomized controlled trial. *Bmc Musculoskeletal Disorders, 17*. doi:10.1186/s12891-016-1176-7

Piva, S. R., Fitzgerald, G. K., Wisniewski, S., & Delitto, A. (2009). PREDICTORS OF PAIN AND FUNCTION OUTCOME AFTER REHABILITATION IN PATIENTS WITH PATELLOFEMORAL PAIN SYNDROME. *Journal of Rehabilitation Medicine, 41*(8), 604-612. doi:10.2340/16501977-0372

Piva, S. R., Moore, C. G., Schneider, M., Gil, A. B., Almeida, G. J., & Irrgang, J. J. (2015). A randomized trial to compare exercise treatment methods for patients after total knee replacement: protocol paper. *Bmc Musculoskeletal Disorders, 16*. doi:10.1186/s12891-015-0761-5

Poggie, R. A., Turgeon, T. R., & Coutts, R. D. (2007). Failure analysis of a ceramic bearing acetabular component. *Journal of Bone and Joint Surgery-American Volume, 89A*(2), 367-375. doi:10.2106/jbjs.f.00148

Polese, J. C., Pinheiro, M. B., Faria, C. D. C. M., Britto, R. R., Parreira, V. F., & Teixeira-Salmela, L. F. (2013). Strength of the respiratory and lower limb muscles and functional capacity in chronic stroke survivors with different physical activity levels. *Brazilian Journal of Physical Therapy, 17*(5), 487-493. doi:10.1590/s1413-35552012005000114

Pommergaard, H. C., Klein, M., Donatsky, A., Andresen, K., Andersen, L. P., & Burcharth, J. (2012). [Short sun exposure of the gluteal region is safe--a prospective, clinical, randomized trial]. *Ugeskr Laeger, 174*(49), 3071-3074.

Portegijs, E., Kallinen, M., Rantanen, T., Heinonen, A., Sihvonen, S., Alen, M., . . . Sipila, S. (2008). Effects of resistance training on lower-extremity impairments in older people with hip fracture. *Archives of Physical Medicine and Rehabilitation, 89*(9), 1667-1674. doi:10.1016/j.apmr.2008.01.026

Portegijs, E., Rantanen, T., Kallinen, M., Heinonen, A., Alen, M., Kiviranta, I., & Sipilae, S. (2009). Lower-Limb Pain, Disease, and Injury Burden as Determinants of Muscle Strength Deficit After Hip Fracture. *Journal of Bone and Joint Surgery-American Volume, 91A*(7), 1720-1728. doi:10.2106/jbjs.g.01675

Portegijs, E., Sipila, S., Rantanen, T., & Lamb, S. E. (2008). Leg extension power deficit and mobility limitation in women recovering from hip fracture. *American Journal of Physical Medicine & Rehabilitation, 87*(5), 363-370. doi:10.1097/PHM.0b013e318164a9e2

Poulsen, E., Christensen, H. W., Roos, E. M., Vach, W., Overgaard, S., & Hartvigsen, J. (2011). Non-surgical treatment of hip osteoarthritis. Hip school, with or without the addition of manual therapy, in comparison to a minimal control intervention: Protocol for a three-armed randomized clinical trial. *Bmc Musculoskeletal Disorders, 12*. doi:10.1186/1471-2474-12-88

Poulsen, E., Overgaard, S., Vestergaard, J. T., Christensen, H. W., & Hartvigsen, J. (2016). Pain distribution in primary care patients with hip osteoarthritis. *Family Practice, 33*(6), 601-606. doi:10.1093/fampra/cmw071

Pourahmadi, M. R., Takamjani, I. E., Jaberzadeh, S., Sarrafzadeh, J., Sanjari, M. A., Mohsenifar, H., . . . Taghipour, M. (2017). The Effect of Core Stabilization Exercise on the Kinematics and Joint Coordination of the Lumbar Spine and Hip During Sit-to-Stand and Stand-to-Sit in Patients

With Chronic Nonspecific Low Back Pain (COSCIOUS): Study Protocol for a Randomized Double-Blind Controlled Trial. *Jmir Research Protocols, 6*(6). doi:10.2196/resprot.7378

Prado Nunes, P. R., Barcelos, L. C., Oliveira, A. A., Furlanetto Junior, R., Martins, F. M., Orsatti, C. L., . . . Orsatti, F. L. (2016). Effect of resistance training on muscular strength and indicators of abdominal adiposity, metabolic risk, and inflammation in postmenopausal women: controlled and randomized clinical trial of efficacy of training volume. *Age, 38*(2). doi:10.1007/s11357-016-9901-6

Quintana Aparicio, E., Borrallo Quirante, L., Rodriguez Blanco, C., & Alburquerque Sendin, F. (2009). IMMEDIATE EFFECTS OF THE SUBOCCIPITAL MUSCLE INHIBITION TECHNIQUE IN SUBJECTS WITH SHORT HAMSTRING SYNDROME. *Journal of Manipulative and Physiological Therapeutics, 32*(4), 262-269. doi:10.1016/j.jmpt.2009.03.006

Rabago, D., Mundt, M., Zgierska, A., & Grettie, J. (2015). Hypertonic dextrose injection (prolotherapy) for knee osteoarthritis: Long term outcomes. *Complementary Therapies in Medicine, 23*(3), 388-395. doi:10.1016/j.ctim.2015.04.003

Rabago, D., Patterson, J. J., Mundt, M., Kijowski, R., Grettie, J., Segal, N. A., & Zgierska, A. (2013). Dextrose Prolotherapy for Knee Osteoarthritis: A Randomized Controlled Trial. *Annals of Family Medicine, 11*(3), 229-237. doi:10.1370/afm.1504

Rabago, D., Patterson, J. J., Mundt, M., Zgierska, A., Fortney, L., Grettie, J., & Kijowski, R. (2014). Dextrose and Morrhuate Sodium Injections (Prolotherapy) for Knee Osteoarthritis: A Prospective Open-Label Trial. *Journal of Alternative and Complementary Medicine, 20*(5), 383-391. doi:10.1089/acm.2013.0225

Rampersaud, Y. R., Ravi, B., Lewis, S. J., Stas, V., Barron, R., Davey, R., & Mahomed, N. (2008). Assessment of health-related quality of life after surgical treatment of focal symptomatic spinal stenosis compared with osteoarthritis of the hip or knee. *Spine Journal, 8*(2), 296-304. doi:10.1016/j.spinee.2007.05.003

Rampersaud, Y. R., Tso, P., Walker, K. R., Lewis, S. J., Davey, J. R., Mahomed, N. N., & Coyte, P. C. (2014). Comparative outcomes and cost-utility following surgical treatment of focal lumbar spinal stenosis compared with osteoarthritis of the hip or knee: part 2-estimated lifetime incremental cost-utility ratios. *Spine Journal, 14*(2), 244-254. doi:10.1016/j.spinee.2013.11.011

Rathleff, M. S., Roos, E. M., Olesen, J. L., & Rasmussen, S. (2012). Early intervention for adolescents with Patellofemoral Pain Syndrome - a pragmatic cluster randomised controlled trial. *Bmc Musculoskeletal Disorders, 13*. doi:10.1186/1471-2474-13-9

Rathleff, M. S., Roos, E. M., Olesen, J. L., Rasmussen, S., & Arendt-Nielsen, L. (2016). Self-reported Recovery is Associated With Improvement in Localized Hyperalgesia Among Adolescent Females With Patellofemoral Pain: Results From a Cluster Randomized Trial. *Clinical Journal of Pain, 32*(5), 428-434. doi:10.1097/ajp.0000000000000275

Razeghi, M., Etemadi, Y., Taghizadeh, S., & Ghaem, H. (2010). Could Hip and Knee Muscle Strengthening Alter the Pain Intensity in Patellofemoral Pain Syndrome? *Iranian Red Crescent Medical Journal, 12*(2), 104-110.

Reinhold, T., Witt, C. M., Jena, S., Brinkhaus, B., & Willich, S. N. (2008). Quality of life and cost-effectiveness of acupuncture treatment in patients with osteoarthritis pain. *European Journal of Health Economics, 9*(3), 209-219. doi:10.1007/s10198-007-0062-5

Remerand, F., Le Tendre, C., Baud, A., Couvret, C., Pourrat, X., Favard, L., . . . Fusciardi, J. (2009). The early and delayed analgesic effects of ketamine after total hip arthroplasty: a prospective, randomized, controlled, double-blind study. *Anesth Analg, 109*(6), 1963-1971. doi:10.1213/ANE.0b013e3181bdc8a0

Renken, F., Renken, S., Paech, A., Wenzl, M., Unger, A., & Schulz, A. P. (2012). Early functional results after hemiarthroplasty for femoral neck fracture: a randomized comparison between a minimal invasive and a conventional approach. *BMC Musculoskelet Disord, 13*, 141. doi:10.1186/1471-2474-13-141

Rizwan, M., Rodriguez-Blanco, I., Harbottle, A., Birch-Machin, M. A., Watson, R. E., & Rhodes, L. E. (2011a). Tomato paste rich in lycopene protects against cutaneous photodamage in humans in vivo: a randomized controlled trial. *Br J Dermatol, 164*(1), 154-162. doi:10.1111/j.1365-2133.2010.10057.x

Rizwan, M., Rodriguez-Blanco, I., Harbottle, A., Birch-Machin, M. A., Watson, R. E. B., & Rhodes, L. E. (2011b). Tomato paste rich in lycopene protects against cutaneous photodamage in humans in vivo: a randomized controlled trial. *British Journal of Dermatology, 164*(1), 154-162. doi:10.1111/j.1365-2133.2010.10057.x

Rizzo, C., Vetro, R., Vetro, A., Mantia, R., Iovane, A., Di Gesu, M., . . . Caruso, C. (2014). The role of platelet gel in osteoarticular injuries of young and old patients. *Immunity & Ageing, 11*. doi:10.1186/s12979-014-0021-9

Roach, S., Sorenson, E., Headley, B., & Juan, J. G. S. (2013). Prevalence of Myofascial Trigger Points in the Hip in Patellofemoral Pain. *Archives of Physical Medicine and Rehabilitation, 94*(3), 522-526. doi:10.1016/j.apmr.2012.10.022

Robinson, K. P., Wagstaff, K. J., Sanghera, S., & Kerry, R. M. (2014). Postoperative pain following primary lower limb arthroplasty and enhanced recovery pathway. *Annals of the Royal College of Surgeons of England, 96*(4), 302-306. doi:10.1308/003588414x13946184900525

Rompe, J. D., Segal, N. A., Cacchio, A., Furia, J. P., Morral, A., & Maffulli, N. (2009). Home Training, Local Corticosteroid Injection, or Radial Shock Wave Therapy for Greater Trochanter Pain Syndrome. *American Journal of Sports Medicine, 37*(10), 1981-1990. doi:10.1177/0363546509334374

Rompe, J. D., Segal, N. A., Cacchio, A., Furia, J. P., Morral, A., & Maffulli, N. (2009). Home training, local corticosteroid injection, or radial shock wave therapy for greater trochanter pain syndrome. *Am J Sports Med, 37*(10), 1981-1990. doi:10.1177/0363546509334374

Roper, J. L., Harding, E. M., Doerfler, D., Dexter, J. G., Kravitz, L., Dufek, J. S., & Mermier, C. M. (2016). The effects of gait retraining in runners with patellofemoral pain: A randomized trial. *Clinical Biomechanics, 35*, 14-22. doi:10.1016/j.clinbiomech.2016.03.010

Rosenlund, S., Broeng, L., Holsgaard-Larsen, A., Jensen, C., & Overgaard, S. (2017). Patient-reported outcome after total hip arthroplasty: comparison between lateral and posterior approach A randomized controlled trial in 80 patients with 12-month follow-up. *Acta Orthopaedica, 88*(3), 239-247. doi:10.1080/17453674.2017.1291100

Rosenlund, S., Broeng, L., Jensen, C., Holsgaard-Larsen, A., & Overgaard, S. (2014). The effect of posterior and lateral approach on patient-reported outcome measures and physical function in patients with osteoarthritis, undergoing total hip replacement: a randomised controlled trial protocol. *Bmc Musculoskeletal Disorders, 15*. doi:10.1186/1471-2474-15-354

Rosenlund, S., Holsgaard-Larsen, A., Overgaard, S., & Jensen, C. (2016). The Gait Deviation Index Is Associated with Hip Muscle Strength and Patient-Reported Outcome in Patients with Severe Hip Osteoarthritis-A Cross-Sectional Study. *Plos One, 11*(4). doi:10.1371/journal.pone.0153177

Rossenu, S., Cleton, A., Hough, D., Crauwels, H., Vandebosch, A., Berwaerts, J., . . . Francetic, I. (2015). Pharmacokinetic profile after multiple deltoid or gluteal intramuscular injections of paliperidone palmitate in patients with schizophrenia. *Clin Pharmacol Drug Dev, 4*(4), 270-278. doi:10.1002/cpdd.144

Roure, R., Oddos, T., Rossi, A., Vial, F., & Bertin, C. (2011). Evaluation of the efficacy of a topical cosmetic slimming product combining tetrahydroxypropyl ethylenediamine, caffeine, carnitine, forskolin and retinol, In vitro, ex vivo and in vivo studies. *International Journal of Cosmetic Science, 33*(6), 519-526. doi:10.1111/j.1468-2494.2011.00665.x

Ryan, R. a. H., S. (2016). How to GRADE the quality of the evidence. In: Consumers and Communication Group.

Sahota, O., Rowlands, M., Bradley, J., Van de Walt, G., Bedforth, N., Armstrong, S., & Moppett, I. (2014). Femoral nerve block Intervention in Neck of Femur fracture (FINOF): study protocol for a randomized controlled trial. *Trials, 15*, 189. doi:10.1186/1745-6215-15-189

Salpakoski, A., Tormakangas, T., Edgren, J., Kallinen, M., Sihvonen, S. E., Pesola, M., . . . Sipila, S. (2014). Effects of a multicomponent home-based physical rehabilitation program on mobility recovery after hip fracture: a randomized controlled trial. *J Am Med Dir Assoc, 15*(5), 361-368. doi:10.1016/j.jamda.2013.12.083

Saltvedt, I., Prestmo, A., Einarsen, E., Johnsen, L. G., Helbostad, J. L., & Sletvold, O. (2012). Development and delivery of patient treatment in the Trondheim Hip Fracture Trial. A new geriatric in-hospital pathway for elderly patients with hip fracture. *BMC Res Notes, 5*, 355. doi:10.1186/1756-0500-5-355

Sanchez, K., Eloumri, A., Rannou, F., & Poiraudeau, S. (2010). Nonpharmacologial and nonsurgical therapies for osteoarthritis: Orthosis, exercises. *Presse Medicale, 39*(11), 1172-1179. doi:10.1016/j.lpm.2009.11.022

Sanchez, M., Guadilla, J., Fiz, N., & Andia, I. (2012). Ultrasound-guided platelet-rich plasma injections for the treatment of osteoarthritis of the hip. *Rheumatology, 51*(1), 144-150. doi:10.1093/rheumatology/ker303

Sandal, L. F., Thorlund, J. B., Ulrich, R. S., Dieppe, P. A., & Roos, E. M. (2015). Exploring the effect of space and place on response to exercise therapy for knee and hip pain-a protocol for a double-blind randomised controlled clinical trial: the CONEX trial. *Bmj Open, 5*(3). doi:10.1136/bmjopen-2015-007701

Sandstedt, E., Fasth, A., Eek, M. N., & Beckung, E. (2013). Muscle strength, physical fitness and well-being in children and adolescents with juvenile idiopathic arthritis and the effect of an exercise programme: a randomized controlled trial. *Pediatric Rheumatology, 11*. doi:10.1186/1546-0096-11-7

Sardroodian, M., Madeleine, P., Voigt, M., & Hansen, E. A. (2014). Frequency and pattern of voluntary pedalling is influenced after one week of heavy strength training. *Hum Mov Sci, 36*, 58-69. doi:10.1016/j.humov.2014.05.003

Sattari, S., & Ashraf, A. R. (2011). Comparison the Effect of 3 Point Valgus Stress Knee Support and Lateral Wedge Insoles in Medial Compartment Knee Osteoarthritis. *Iranian Red Crescent Medical Journal, 13*(9), 624-628.

Schache, M. B., McClelland, J. A., & Webster, K. E. (2016). Does the addition of hip strengthening exercises improve outcomes following total knee arthroplasty? A study protocol for a randomized trial. *BMC Musculoskelet Disord, 17*, 259. doi:10.1186/s12891-016-1104-x

Schiller, J., Korallus, C., Bethge, M., Karst, M., Schmalhofer, M.-L., Gutenbrunner, C., & Fink, M. G. (2016). Effects of acupuncture on quality of life and pain in patients with osteoporosis-a pilot randomized controlled trial. *Archives of Osteoporosis, 11*(1). doi:10.1007/s11657-016-0288-x

Schnetzke, M., Swartman, B., Bonnen, I., Keil, H., Schueler, S., Gruetzner, P. A., & Franke, J. (2017). Vascular Impulse Technology versus elevation in the treatment of posttraumatic swelling of extremity fractures: study protocol for a randomized controlled trial. *Trials, 18*. doi:10.1186/s13063-017-1824-8

Segado Jimenez, M. I., Bayon Gago, M., Arias Delgado, J., Casas Garcia, M. L., Dominguez Hervella, F., Lopez Perez, A., & Izquierdo Gutierrez, C. (2009). [Efficacy of obturator and femoral cutaneous nerve blocks for postoperative analgesia in hip surgery]. *Rev Esp Anestesiol Reanim, 56*(10), 590-597.

Seitz, D. P., Gill, S. S., Austin, P. C., Bell, C. M., Anderson, G. M., Gruneir, A., & Rochon, P. A. (2016). Rehabilitation of Older Adults with Dementia After Hip Fracture. *Journal of the American Geriatrics Society, 64*(1), 47-54. doi:10.1111/jgs.13881

Seitz, D. P., Gill, S. S., Gruneir, A., Austin, P. C., Anderson, G. M., Bell, C. M., & Rochon, P. A. (2014). Effects of Dementia on Postoperative Outcomes of Older Adults With Hip Fractures: A Population-Based Study. *Journal of the American Medical Directors Association, 15*(5), 334-341. doi:10.1016/j.jamda.2013.12.011

Selfe, J., Callaghan, M., Witvrouw, E., Richards, J., Dey, M. P., Sutton, C., . . . Turner, D. (2013). Targeted interventions for patellofemoral pain syndrome (TIPPS) classification of clinical subgroups. *Bmj Open, 3*(9). doi:10.1136/bmjopen-2013-003795

Serner, A., Jakobsen, M. D., Andersen, L. L., Holmich, P., Sundstrup, E., & Thorborg, K. (2014). EMG evaluation of hip adduction exercises for soccer players: implications for exercise selection in prevention and treatment of groin injuries. *British Journal of Sports Medicine, 48*(14), 1108-U1149. doi:10.1136/bjsports-2012-091746

Shane, E., Cohen, A., Stein, E. M., McMahon, D. J., Zhang, C., Young, P., . . . Mancini, D. (2012). Zoledronic Acid Versus Alendronate for the Prevention of Bone Loss after Heart or Liver Transplantation. *Journal of Clinical Endocrinology & Metabolism, 97*(12), 4481-4490. doi:10.1210/jc.2012-2804

Sharia, A., Lam, E. T. C., Kargarfard, M., Tamrin, S. B. M., & Danaee, M. (2017). The application of a feasible exercise training program in the office setting. *Work-a Journal of Prevention Assessment & Rehabilitation, 56*(3), 421-428. doi:10.3233/wor-172508

Sharma, J., Weston, M., Batterham, A. M., & Spears, I. R. (2014). Gait Retraining and Incidence of Medial Tibial Stress Syndrome in Army Recruits. *Medicine and Science in Sports and Exercise, 46*(9), 1684-1692. doi:10.1249/mss.0000000000000290

Sheffler, L. R., Taylor, P. N., Bailey, S. N., Gunzler, D. D., Buurke, J. H., MJ, I. J., & Chae, J. (2015). Surface peroneal nerve stimulation in lower limb hemiparesis: effect on quantitative gait parameters. *Am J Phys Med Rehabil, 94*(5), 341-357. doi:10.1097/phm.0000000000000269

Sherrington, C., Fairhall, N., Kirkham, C., Clemson, L., Howard, K., Vogler, C., . . . Lord, S. R. (2016). Exercise and fall prevention self-management to reduce mobility-related disability and falls after fall-related lower limb fracture in older people: protocol for the RESTORE (Recovery Exercises and STepping On afteR fracturE) randomised controlled trial. *Bmc Geriatrics, 16*. doi:10.1186/s12877-016-0206-5

Shyu, Y. I., Liang, J., Tseng, M. Y., Li, H. J., Wu, C. C., Cheng, H. S., . . . Yang, C. T. (2013). Comprehensive and subacute care interventions improve health-related quality of life for older patients after surgery for hip fracture: a randomised controlled trial. *Int J Nurs Stud, 50*(8), 1013-1024. doi:10.1016/j.ijnurstu.2012.11.020

Shyu, Y. I., Liang, J., Tseng, M. Y., Li, H. J., Wu, C. C., Cheng, H. S., . . . Yang, C. T. (2016). Enhanced interdisciplinary care improves self-care ability and decreases emergency department visits for older Taiwanese patients over 2 years after hip-fracture surgery: A randomised controlled trial. *Int J Nurs Stud, 56*, 54-62. doi:10.1016/j.ijnurstu.2015.12.005

Siavash, M., Naseri, M., & Rahimi, M. (2016). Arnebia euchroma ointment can reduce abdominal fat thickness and abdominal circumference of overweight women: A randomized controlled study. *Journal of research in medical sciences : the official journal of Isfahan University of Medical Sciences, 21*, 63-63.

Simon, A. d. S., do Pinho, A. S., dos Santos, C. G., & Pagnussat, A. d. S. (2014). Facilitation handlings induce increase in electromyographic activity of muscles involved in head control of Cerebral Palsy children. *Research in Developmental Disabilities, 35*(10), 2547-2557. doi:10.1016/j.ridd.2014.06.018

Sipila, S., Salpakoski, A., Edgren, J., Heinonen, A., Kauppinen, M. A., Arkela-Kautiainen, M., . . . Kallinen, M. (2011). Promoting mobility after hip fracture (ProMo): study protocol and selected baseline results of a year-long randomized controlled trial among community-dwelling older people. *Bmc Musculoskeletal Disorders, 12*. doi:10.1186/1471-2474-12-277

Skou, S. T., Lind, M., Holmich, P., Jensen, H. P., Jensen, C., Afzal, M., . . . Thorlund, J. B. (2017). Study protocol for a randomised controlled trial of meniscal surgery compared with exercise and patient education for treatment of meniscal tears in young adults. *Bmj Open, 7*(8). doi:10.1136/bmjopen-2017-017436

Skou, S. T., Roos, E. M., Simonsen, O., Laursen, M. B., Rathleff, M. S., Arendt-Nielsen, L., & Rasmussen, S. (2016a). The effects of total knee replacement and non-surgical treatment on pain sensitization and clinical pain. *European Journal of Pain, 20*(10), 1612-1621. doi:10.1002/ejp.878

Skou, S. T., Roos, E. M., Simonsen, O., Laursen, M. B., Rathleff, M. S., Arendt-Nielsen, L., & Rasmussen, S. (2016b). The efficacy of non-surgical treatment on pain and sensitization in

patients with knee osteoarthritis: a pre-defined ancillary analysis from a randomized controlled trial. *Osteoarthritis and Cartilage, 24*(1), 108-116. doi:10.1016/j.joca.2015.07.013

Sletvold, O., Helbostad, J. L., Thingstad, P., Taraldsen, K., Prestmo, A., Lamb, S. E., . . . Saltvedt, I. (2011). Effect of in-hospital comprehensive geriatric assessment (CGA) in older people with hip fracture. The protocol of the Trondheim Hip Fracture trial. *BMC Geriatr, 11*, 18. doi:10.1186/1471-2318-11-18

Snijders, G. F., van den Ende, C. H. M., van Riel, P. L. C. M., van den Hoogen, F. H. J., den Broeder, A. A., & Grp, N. S. (2011). The effects of doxycycline on reducing symptoms in knee osteoarthritis: results from a triple-blinded randomised controlled trial. *Annals of the Rheumatic Diseases, 70*(7), 1191-1196. doi:10.1136/ard.2010.147967

Soares, J. L. M., Miot, H. A., Sanudo, A., & Bagatin, E. (2015). Cellulite: poor correlation between instrumental methods and photograph evaluation for severity classification. *International Journal of Cosmetic Science, 37*(1), 134-140. doi:10.1111/ics.12177

Somov, D. A., Makarova, M. R., & Makarova, I. N. (2015). [The importance of muscular disbalance in physical therapy of the patients presenting with pneumonia]. *Vopr Kurortol Fizioter Lech Fiz Kult, 92*(3), 7-10. doi:10.17116/kurort201537-10

Springer, S., Laufer, Y., Becher, M., & Vatine, J.-J. (2013). Dual-channel functional electrical stimulation improvements in speed-based gait classifications. *Clinical Interventions in Aging, 8*, 271-277. doi:10.2147/cia.s41141

Srbely, J. Z., Dickey, J. P., Bent, L. R., Lee, D., & Lowerison, M. (2010). Capsaicin-induced central sensitization evokes segmental increases in trigger point sensitivity in humans. *J Pain, 11*(7), 636-643. doi:10.1016/j.jpain.2009.10.005

Srbely, J. Z., Dickey, J. P., Lee, D., & Lowerison, M. (2010). DRY NEEDLE STIMULATION OF MYOFASCIAL TRIGGER POINTS EVOKES SEGMENTAL ANTI-NOCICEPTIVE EFFECTS. *Journal of Rehabilitation Medicine, 42*(5), 463-468. doi:10.2340/16501977-0535

Srbely, J. Z., Dickey, J. P., Lowerison, M., Edwards, A. M., Nolet, P. S., & Wong, L. L. (2008). Stimulation of myofascial trigger points with ultrasound induces segmental antinociceptive effects: a randomized controlled study. *Pain, 139*(2), 260-266. doi:10.1016/j.pain.2008.04.009

Srbely, J. Z., Vernon, H., Lee, D., & Polgar, M. (2013). IMMEDIATE EFFECTS OF SPINAL MANIPULATIVE THERAPY ON REGIONAL ANTINOCICEPTIVE EFFECTS IN MYOFASCIAL TISSUES IN HEALTHY YOUNG ADULTS. *Journal of Manipulative and Physiological Therapeutics, 36*(6), 333-341. doi:10.1016/j.jmpt.2013.01.005

Stanczyk, F. Z., Archer, D. F., Rubin, A., & Foegh, M. (2013). Therapeutically equivalent pharmacokinetic profile across three application sites for AG200-15, a novel low-estrogen dose contraceptive patch. *Contraception, 87*(6), 744-749. doi:10.1016/j.contraception.2012.10.038

Steffen, K., Nilstad, A., Kristianslund, E. K., Myklebust, G., Bahr, R., & Krosshaug, T. (2016). Association between Lower Extremity Muscle Strength and Noncontact ACL Injuries. *Medicine and Science in Sports and Exercise, 48*(11), 2082-2089. doi:10.1249/mss.0000000000001014

Stewart, D. M., & Gregory, D. E. (2016). The use of intermittent trunk flexion to alleviate low back pain during prolonged standing. *Journal of Electromyography and Kinesiology, 27*, 46-51. doi:10.1016/j.jelekin.2016.01.007

Stiles, V. H., Griew, P. J., & Rowlands, A. V. (2013). Use of Accelerometry to Classify Activity Beneficial to Bone in Premenopausal Women. *Medicine and Science in Sports and Exercise, 45*(12), 2353-2361. doi:10.1249/MSS.0b013e31829ba765

Straudi, S., Manfredini, F., Lamberti, N., Zamboni, P., Bernardi, F., Marchetti, G., . . . Basaglia, N. (2017). The effectiveness of Robot-Assisted Gait Training versus conventional therapy on mobility in severely disabled progressIve MultiplE sclerosis patients (RAGTIME): study protocol for a randomized controlled trial. *Trials, 18*. doi:10.1186/s13063-017-1838-2

Stubbs, D., Krebs, E., Bair, M., Damush, T., Wu, J., Sutherland, J., & Kroenke, K. (2010). Sex Differences in Pain and Pain-Related Disability among Primary Care Patients with Chronic Musculoskeletal Pain. *Pain Medicine, 11*(2), 232-239. doi:10.1111/j.1526-4637.2009.00760.x

Suetta, C., Andersen, J. L., Dalgas, U., Berget, J., Koskinen, S., Aagaard, P., . . . Kjaer, M. (2008). Resistance training induces qualitative changes in muscle morphology, muscle architecture, and muscle function in elderly postoperative patients. *J Appl Physiol (1985), 105*(1), 180-186. doi:10.1152/japplphysiol.01354.2007

Suhrabi, Z., Taghinejad, H., Direkvand-Moghadam, A., & Akbari, M. (2016). The Effect of Oxygen Inhalation Plus Oxytocin Compared with Oxytocin Only on Postpartum Haemorrhage: A Randomized Clinical Trial. *Journal of Clinical and Diagnostic Research, 10*(9), QC1-QC3. doi:10.7860/jcdr/2016/17981.8401

Sullivan, D., Olsson, A. G., Scott, R., Kim, J. B., Xue, A., Gebski, V., . . . Stein, E. A. (2012). Effect of a Monoclonal Antibody to PCSK9 on Low-Density Lipoprotein Cholesterol Levels in Statin-Intolerant Patients The GAUSS Randomized Trial. *Jama-Journal of the American Medical Association, 308*(23), 2497-2506. doi:10.1001/jama.2012.25790

Sumin, A. N., Bezdenezhnykh, A. V., Baidina, O. M., Popova, T. A., & Khairetdinova, O. P. (2011). The PATRIARCH Study: Effect of Passive Training on Long Term Treatment Results With Myocardial Infarction. *Kardiologiya, 51*(10), 26-32.

Sun, N., Shi, G.-X., Tu, J.-F., Li, Y.-T., Zhang, L.-W., Cao, Y., . . . Liu, C.-Z. (2016). Traditional Chinese acupuncture versus minimal acupuncture for mild-to-moderate knee osteoarthritis: a protocol for a randomised, controlled pilot trial. *Bmj Open, 6*(12). doi:10.1136/bmjopen-2016-013830

Svege, I., Fernandes, L., Nordsletten, L., Holm, I., & Risberg, M. A. (2016). Long-Term Effect of Exercise Therapy and Patient Education on Impairments and Activity Limitations in People With Hip Osteoarthritis: Secondary Outcome Analysis of a Randomized Clinical Trial. *Physical Therapy, 96*(6), 818-827. doi:10.2522/ptj.20140520

Svege, I., Nordsletten, L., Fernandes, L., & Risberg, M. A. (2015). Exercise therapy may postpone total hip replacement surgery in patients with hip osteoarthritis: a long-term follow-up of a randomised trial. *Ann Rheum Dis, 74*(1), 164-169. doi:10.1136/annrheumdis-2013-203628

Sylliaas, H., Brovold, T., Wyller, T. B., & Bergland, A. (2012). Prolonged strength training in older patients after hip fracture: a randomised controlled trial. *Age and Ageing, 41*(2), 206-212. doi:10.1093/ageing/afr164

Tal-Akabi, A., Steiger, U., & Villiger, P. M. (2007). Neuromuscular adaptation to early post-operative, highintensity, short resistance training of non-operated lower extremity in elderly patients: A randomized controlled trial. *Journal of Rehabilitation Medicine, 39*(9), 724-729. doi:10.2340/16501977-0116

Tammam, T. F. (2013). Ultrasound-guided infragluteal sciatic nerve block: a comparison between four different techniques. *Acta Anaesthesiol Scand, 57*(2), 243-248. doi:10.1111/aas.12036

Tammam, T. F. (2014). Ultrasound-guided sciatic nerve block: a comparison between four different infragluteal probe and needle alignment approaches. *J Anesth, 28*(4), 532-537. doi:10.1007/s00540-013-1753-y

Taraldsen, K., Vereijken, B., Thingstad, P., Sletvold, O., & Helbostad, J. L. (2014). Multiple Days of Monitoring Are Needed to Obtain a Reliable Estimate of Physical Activity in Hip-Fracture Patients. *Journal of Aging and Physical Activity, 22*(2), 173-177. doi:10.1123/japa.2012-0130

Telles, G., Cristovao, D. R., Belache, F. A., Santos, M. R., Almeida, R. S., & Nogueira, L. A. (2016). The effect of adding myofascial techniques to an exercise programme for patients with anterior knee pain. *J Bodyw Mov Ther, 20*(4), 844-850. doi:10.1016/j.jbmt.2016.02.007

Teut, M., Kaiser, S., Ortiz, M., Roll, S., Binting, S., Willich, S. N., & Brinkhaus, B. (2012). Pulsatile dry cupping in patients with osteoarthritis of the knee - a randomized controlled exploratory trial. *Bmc Complementary and Alternative Medicine, 12*. doi:10.1186/1472-6882-12-184

Thakur, C. P., Thakur, S., Narayan, S., & Sinha, A. (2008). Comparison of treatment regimens of kala-azar based on culture & sensitivity of amastigotes to sodium antimony gluconate. *Indian Journal of Medical Research, 127*(6), 582-588.

Thaysen-Petersen, D., Lin, J. Y., Nash, J. F., Beerwerth, F., Wulf, H. C., Philipsen, P. A., & Haedersdal, M. (2014). The Role of Natural and UV-Induced Skin Pigmentation on Low-Fluence IPL-Induced Side Effects: A Randomized Controlled Trial. *Lasers in Surgery and Medicine, 46*(2), 104-111. doi:10.1002/lsm.22167

Thingstad, P., Taraldsen, K., Hagen, G., Sand, S., Saltvedt, I., Sletvold, O., & Helbostad, J. L. (2015). Effectiveness of Task Specific Gait and Balance Exercise 4 Months After Hip Fracture: Protocol of a Randomized Controlled Trial - The Eva-Hip Study. *Physiotherapy Research International, 20*(2), 87-99. doi:10.1002/pri.1599

Thingstad, P., Taraldsen, K., Saltvedt, I., Sletvold, O., Vereijken, B., Lamb, S. E., & Helbostad, J. L. (2016). The long-term effect of comprehensive geriatric care on gait after hip fracture: the Trondheim Hip Fracture Trial-a randomised controlled trial. *Osteoporosis International, 27*(3), 933-942. doi:10.1007/s00198-015-3313-9

Thomsen, M. G., Husted, H., Otte, K. S., Holm, G., & Troelsen, A. (2013). Do patients care about higher flexion in total knee arthroplasty? A randomized, controlled, double-blinded trial. *Bmc Musculoskeletal Disorders, 14*. doi:10.1186/1471-2474-14-127

Thorborg, K., Bandholm, T., Petersen, J., Weeke, K. M. O., Weinold, C., Andersen, B., . . . Holmich, P. (2010). Hip abduction strength training in the clinical setting: With or without external loading? *Scandinavian Journal of Medicine & Science in Sports, 20*, 70-77. doi:10.1111/j.1600-0838.2010.01186.x

Thorborg, K., Bandholm, T., Zebis, M., Andersen, L. L., Jensen, J., & Holmich, P. (2016). Large strengthening effect of a hip-flexor training programme: a randomized controlled trial. *Knee Surg Sports Traumatol Arthrosc, 24*(7), 2346-2352. doi:10.1007/s00167-015-3583-y

Thorborg, K., Couppe, C., Petersen, J., Magnusson, S. P., & Holmich, P. (2011). Eccentric hip adduction and abduction strength in elite soccer players and matched controls: a cross-sectional study. *British Journal of Sports Medicine, 45*(1), 10-13. doi:10.1136/bjsm.2009.061762

Thybo, K. H., Hagi-Pedersen, D., Wetterslev, J., Dahl, J. B., Schroder, H. M., Bulow, H. H., . . . Mathiesen, O. (2017). PANSAID - PAracetamol and NSAID in combination: study protocol for a randomised trial. *Trials, 18*(1), 11. doi:10.1186/s13063-016-1749-7

Thybo, K. H., Mathiesen, O., Dahl, J. B., Schmidt, H., & Hagi-Pedersen, D. (2016). Lateral femoral cutaneous nerve block after total hip arthroplasty: a randomised trial. *Acta Anaesthesiologica Scandinavica, 60*(9), 1297-1305. doi:10.1111/aas.12764

Thybo, K. H., Schmidt, H., & Hagi-Pedersen, D. (2016). Effect of lateral femoral cutaneous nerve-block on pain after total hip arthroplasty: a randomised, blinded, placebo- controlled trial. *Bmc Anesthesiology, 16*. doi:10.1186/s12871-016-0183-4

Tijssen, M., van Cingel, R. E., Staal, J. B., Teerenstra, S., de Visser, E., & Nijhuis-van der Sanden, M. W. (2016a). Physical therapy aimed at self-management versus usual care physical therapy after hip arthroscopy for femoroacetabular impingement: study protocol for a randomized controlled trial. *Trials, 17*, 91. doi:10.1186/s13063-016-1222-7

Tijssen, M., van Cingel, R. E. H., Staal, J. B., Teerenstra, S., de Visser, E., & Nijhuis-van der Sanden, M. W. G. (2016b). Physical therapy aimed at self-management versus usual care physical therapy after hip arthroscopy for femoroacetabular impingement: study protocol for a randomized controlled trial. *Trials, 17*. doi:10.1186/s13063-016-1222-7

Tousignant, M., Moffet, H., Boissy, P., Corriveau, H., Cabana, F., & Marquis, F. (2011). A randomized controlled trial of home telerehabilitation for post-knee arthroplasty. *Journal of Telemedicine and Telecare, 17*(4), 195-198. doi:10.1258/jtt.2010.100602

Tseng, M. Y., Liang, J., Shyu, Y. I., Wu, C. C., Cheng, H. S., Chen, C. Y., & Yang, S. F. (2016). Effects of interventions on trajectories of health-related quality of life among older patients with hip fracture: a prospective randomized controlled trial. *BMC Musculoskelet Disord, 17*, 114. doi:10.1186/s12891-016-0958-2

Tseng, M. Y., Shyu, Y. I., & Liang, J. (2012). Functional recovery of older hip-fracture patients after interdisciplinary intervention follows three distinct trajectories. *Gerontologist, 52*(6), 833-842. doi:10.1093/geront/gns058

Tseng, M. Y., Shyu, Y. L., Liang, J., & Tsai, W. C. (2016). Interdisciplinary intervention reduced the risk of being persistently depressive among older patients with hip fracture. *Geriatr Gerontol Int, 16*(10), 1145-1152. doi:10.1111/ggi.12617

Tuakli-Wosornu, Y. A., Selzer, F., Losina, E., & Katz, J. N. (2016). Predictors of Exercise Adherence in Patients With Meniscal Tear and Osteoarthritis. *Archives of Physical Medicine and Rehabilitation, 97*(11), 1945-1952. doi:10.1016/j.apmr.2016.05.011

Turki-Belkhiria, L., Chaouachi, A., Turki, O., Chtourou, H., Chtara, M., Chamari, K., . . . Behm, D. G. (2014). Eight weeks of dynamic stretching during warm-ups improves jump power but not repeated or single sprint performance. *Eur J Sport Sci, 14*(1), 19-27. doi:10.1080/17461391.2012.726651

Turncliff, R., Hard, M., Du, Y., Risinger, R., & Ehrich, E. W. (2014). Relative bioavailability and safety of aripiprazole lauroxil, a novel once-monthly, long-acting injectable atypical antipsychotic, following deltoid and gluteal administration in adult subjects with schizophrenia. *Schizophr Res, 159*(2-3), 404-410. doi:10.1016/j.schres.2014.09.021

Turunen, K., Aaltonen, L., Kumpumaki, J., Portegijs, E., Keikkala, S., Kinnunen, M. L., . . . Nikander, R. (2017). A tailored counseling and home-based rehabilitation program to increase physical activity and improve mobility among community-dwelling older people after hospitalization: protocol of a randomized controlled trial. *Bmc Musculoskeletal Disorders, 18*. doi:10.1186/s12891-017-1825-5

Turunen, K., Salpakoski, A., Edgren, J., Tormakangas, T., Arkela, M., Kallinen, M., . . . Sipila, S. (2017). Physical Activity After a Hip Fracture: Effect of a Multicomponent Home-Based Rehabilitation Program-A Secondary Analysis of a Randomized Controlled Trial. *Arch Phys Med Rehabil, 98*(5), 981-988. doi:10.1016/j.apmr.2017.01.004

Ughreja, R. A., & Shukla, Y. U. (2017). MULLIGAN'S MOBILISATION WITH MOVEMENT (MWM) RELIEVES PAIN AND IMPROVES FUNCTIONAL STATUS IN OSTEOARTHRITIS KNEE. *International Journal of Physiotherapy, 4*(2), 132-138. doi:10.15621/ijphy/2017/v4i2/141954

Ulus, Y., Tander, B., Akyol, Y., Durmus, D., Buyukakincak, O., Gul, U., . . . Kuru, O. (2012). Therapeutic ultrasound versus sham ultrasound for the management of patients with knee osteoarthritis: a randomized double-blind controlled clinical study. *International Journal of Rheumatic Diseases, 15*(2), 197-206. doi:10.1111/j.1756-185X.2012.01709.x

Umpierres, C. S., Ribeiro, T. A., Marchisio, A. E., Galvao, L., Borges, I. N., Macedo, C. A., & Galia, C. R. (2014). Rehabilitation following total hip arthroplasty evaluation over short follow-up time: randomized clinical trial. *J Rehabil Res Dev, 51*(10), 1567-1578. doi:10.1682/JRRD.2014.05.0132

Unver, B., Bakirhan, S., & Karatosun, V. (2016). Does a weight-training exercise programme given to patients four or more years after total knee arthroplasty improve mobility: A randomized controlled trial. *Archives of Gerontology and Geriatrics, 64*, 45-50. doi:10.1016/j.archger.2016.01.003

Uy, C., Kurrle, S. E., & Cameron, I. D. (2008). Inpatient multidisciplinary rehabilitation after hip fracture for residents of nursing homes: A randomised trial. *Australasian Journal on Ageing, 27*(1), 43-44. doi:10.1111/j.1741-6612.2007.00277.x

van Beers, L. W., van Oldenrijk, J., Scholtes, V. A., Geerdink, C. H., Niers, B. B., Runne, W., . . . Poolman, R. W. (2016). Curved versus Straight Stem Uncemented Total Hip Arthroplasty Osteoarthritis Multicenter trial (CUSTOM): design of a prospective blinded randomised controlled multicentre trial. *BMJ Open, 6*(3), e010472. doi:10.1136/bmjopen-2015-010472

van Beers, L. W. A. H., van Oldenrijk, J., Scholtes, V. A. B., Geerdink, C. H., Niers, B. B. A. M., Runne, W., . . . Poolman, R. W. (2016). Curved versus Straight Stem Uncemented Total Hip Arthroplasty Osteoarthritis Multicenter trial (CUSTOM): design of a prospective blinded randomised controlled multicentre trial. *Bmj Open, 6*(3). doi:10.1136/bmjopen-2015-010472

van Buuren, F., Mellwig, K. P., Prinz, C., Koerber, B., Fruend, A., Fritzsche, D., . . . Horstkotte, D. (2013). Electrical myostimulation improves left ventricular function and peak oxygen consumption in patients with chronic heart failure: results from the exEMS study comparing different stimulation strategies. *Clinical Research in Cardiology, 102*(7), 523-534. doi:10.1007/s00392-013-0562-5

van den Driest, J. J., Schiphof, D., Luijsterburg, P. A. J., Koffeman, A. R., Koopmanschap, M. A., Bindels, P. J. E., & Bierma-Zeinstra, S. M. A. (2017). Effectiveness and cost-effectiveness of duloxetine added to usual care for patients with chronic pain due to hip or knee osteoarthritis: protocol of a pragmatic open-label cluster randomised trial (the DUO trial). *Bmj Open, 7*(9). doi:10.1136/bmjopen-2017-018661

van Doormaal, M. C. M., van der Horst, N., Backx, F. J. G., Smits, D.-W., & Huisstede, B. M. A. (2017). No Relationship Between Hamstring Flexibility and Hamstring Injuries in Male Amateur Soccer Players: A Prospective Study. *American Journal of Sports Medicine, 45*(1), 121-126. doi:10.1177/0363546516664162

Van Ginckel, A., & Witvrouw, E. (2013). Acute Cartilage Loading Responses After an In Vivo Squatting Exercise in People With Doubtful to Mild Knee Osteoarthritis: A Case-Control Study. *Physical Therapy, 93*(8), 1049-1060. doi:10.2522/ptj.20120491

van Middelkoop, M., Dziedzic, K. S., Doherty, M., Zhang, W., Bijlsma, J. W., McAlindon, T. E., . . . Bierma-Zeinstra, S. M. A. (2013). Individual patient data meta-analysis of trials investigating the effectiveness of intra-articular glucocorticoid injections in patients with knee or hip osteoarthritis: an OA Trial Bank protocol for a systematic review. *Systematic reviews, 2*, 54-54. doi:10.1186/2046-4053-2-54

Vas, J., Modesto, M., Aguilar, I., Goncalo, C. d. S., & Rivas-Ruiz, F. (2014). Efficacy and safety of auriculopressure for primary care patients with chronic non-specific spinal pain: a multicentre randomised controlled trial. *Acupuncture in Medicine, 32*(3), 227-235. doi:10.1136/acupmed-2013-010507

Vasilakis, I., Solomou, E., Vitsas, V., Fennema, P., Korovessis, P., & Siamblis, D. K. (2012). Correlative analysis of MRI-evident abductor hip muscle degeneration and power after minimally invasive versus conventional unilateral cementless THA. *Orthopedics, 35*(12), e1684-1691. doi:10.3928/01477447-20121120-10

Veenhof, C., Van den Ende, C. H. M., Dekker, J., Koke, A. J. A., Oostendorp, R. A., & Bijlsma, J. W. J. (2007). Which patients with osteoarthritis of hip and/or knee benefit most from behavioral graded activity? *International Journal of Behavioral Medicine, 14*(2), 86-91. doi:10.1007/bf03004173

Vibe Fersum, K., O'Sullivan, P., Skouen, J. S., Smith, A., & Kvale, A. (2013). Efficacy of classification-based cognitive functional therapy in patients with non-specific chronic low back pain: a randomized controlled trial. *European journal of pain (London, England), 17*(6), 916-928. doi:10.1002/j.1532-2149.2012.00252.x

Villadsen, A. (2016). Neuromuscular Exercise prior to Joint Arthroplasty in Patients with Osteoarthritis of the Hip or Knee. *Danish Medical Journal, 63*(4).

Villadsen, A., Overgaard, S., Holsgaard-Larsen, A., Christensen, R., & Roos, E. M. (2014). Postoperative effects of neuromuscular exercise prior to hip or knee arthroplasty: a randomised controlled trial. *Ann Rheum Dis, 73*(6), 1130-1137. doi:10.1136/annrheumdis-2012-203135

Villafane, J. H., Silva, G. B., & Chiarotto, A. (2012). EFFECTS OF PASSIVE UPPER EXTREMITY JOINT MOBILIZATION ON PAIN SENSITIVITY AND FUNCTION IN PARTICIPANTS WITH SECONDARY CARPOMETACARPAL OSTEOARTHRITIS: A CASE SERIES. *Journal of Manipulative and Physiological Therapeutics, 35*(9), 735-742. doi:10.1016/j.jmpt.2012.10.012

Villalon, K. L., Gozansky, W. S., Van Pelt, R. E., Wolfe, P., Jankowski, C. M., Schwartz, R. S., & Kohrt, W. M. (2011). A Losing Battle: Weight Regain Does Not Restore Weight Loss-Induced Bone Loss in Postmenopausal Women. *Obesity, 19*(12), 2345-2350. doi:10.1038/oby.2011.263

Vukomanovic, A., Popovic, Z., Durovic, A., & Krstic, L. (2008). The effects of short-term preoperative physical therapy and education on early functional recovery of patients younger than 70

undergoing total hip arthroplasty. *Vojnosanitetski Pregled, 65*(4), 291-297. doi:10.2298/vsp0804291v

Wada, T., Yamauchi, M., Oki, G., Sonoda, T., Yamakage, M., & Yamashita, T. (2014). Efficacy of axillary nerve block in elbow arthroscopic surgery: a randomized trial. *Journal of Shoulder and Elbow Surgery, 23*(3), 291-296. doi:10.1016/j.jse.2013.11.022

Wall, P. D., Dickenson, E. J., Robinson, D., Hughes, I., Realpe, A., Hobson, R., . . . Foster, N. E. (2016). Personalised Hip Therapy: development of a non-operative protocol to treat femoroacetabular impingement syndrome in the FASHIoN randomised controlled trial. *Br J Sports Med, 50*(19), 1217-1223. doi:10.1136/bjsports-2016-096368

Walsh, N., Cramp, F., Palmer, S., Pollock, J., Hampson, L., Gooberman-Hill, R., . . . Hurley, M. (2013). Exercise and self-management for people with chronic knee, hip or lower back pain: a cluster randomised controlled trial of clinical and cost-effectiveness. Study protocol. *Physiotherapy, 99*(4), 352-357. doi:10.1016/j.physio.2012.09.002

Walsh, R., & Kinsella, S. (2016). The effects of caudal mobilisation with movement (MWM) and caudal self-mobilisation with movement (SMWM) in relation to restricted internal rotation in the hip: A randomised control pilot study. *Man Ther, 22*, 9-15. doi:10.1016/j.math.2016.01.007

Wampler, D. A., Pineda, C., Polk, J., Kidd, E., Leboeuf, D., Flores, M., . . . Cooley, C. (2016). The long spine board does not reduce lateral motion during transport-a randomized healthy volunteer crossover trial. *American Journal of Emergency Medicine, 34*(4), 717-721. doi:10.1016/j.ajem.2015.12.078

Wang, D., Yang, Y., Li, Q., Tang, S.-L., Zeng, W.-N., Xu, J., . . . Zhou, Z.-K. (2017). Adductor canal block versus femoral nerve block for total knee arthroplasty: a meta-analysis of randomized controlled trials. *Scientific Reports, 7*. doi:10.1038/srep40721

Wang, L., Xu, X., Zhang, Y., Hao, H., Chen, L., Su, T., . . . Ma, Y. (2016). A model of health education and management for osteoporosis prevention. *Experimental and Therapeutic Medicine, 12*(6), 3797-3805. doi:10.3892/etm.2016.3822

Wang, M.-Y., Yu, S. S. Y., Hashish, R., Samarawickrame, S. D., Kazadi, L., Greendale, G. A., & Salem, G. (2013). The biomechanical demands of standing yoga poses in seniors: The Yoga empowers seniors study (YESS). *Bmc Complementary and Alternative Medicine, 13*. doi:10.1186/1472-6882-13-8

Wang, P.-C., Ritz, B. R., Janowitz, I., Harrison, R. J., Yu, F., Chan, J., & Rempel, D. M. (2008). A Randomized controlled trial of chair interventions on back and hip pain among sewing machine operators: The Los Angeles garment study. *Journal of Occupational and Environmental Medicine, 50*(3), 255-262. doi:10.1097/JOM.0b013e318163869a

Wang, T.-J., Belza, B., Thompson, F. E., Whitney, J. D., & Bennett, K. (2007). Effects of aquatic exercise on flexibility, strength and aerobic fitness in adults with osteoarthritis of the hip or knee. *Journal of Advanced Nursing, 57*(2), 141-152. doi:10.1111/j.1365-2648.2006.04102.x

Wang, T.-J., Lee, S.-C., Liang, S.-Y., Tung, H.-H., Wu, S.-F. V., & Lin, Y.-P. (2011). Comparing the efficacy of aquatic exercises and land-based exercises for patients with knee osteoarthritis. *Journal of Clinical Nursing, 20*(17-18), 2609-2622. doi:10.1111/j.1365-2702.2010.03675.x

Wang, X., You, T., Murphy, K., Lyles, M. F., & Nicklas, B. J. (2015). Addition of Exercise Increases Plasma Adiponectin and Release from Adipose Tissue. *Medicine and Science in Sports and Exercise, 47*(11), 2450-2455. doi:10.1249/mss.0000000000000670

Washer, J. D., Smith, D. E., Carman, M. E., & Blackhurst, D. W. (2010). Gluteal Fascial Advancement: An Innovative, Effective Method for Treating Pilonidal Disease. *American Surgeon, 76*(2), 154-156.

Watt, J. R., Jackson, K., Franz, J. R., Dicharry, J., Evans, J., & Kerrigan, D. C. (2011). Effect of a supervised hip flexor stretching program on gait in elderly individuals. *Pm r, 3*(4), 324-329. doi:10.1016/j.pmrj.2010.11.012

Watt, J. R., Jackson, K., Franz, J. R., Dicharry, J., Evans, J., & Kerrigan, D. C. (2011). Effect of a Supervised Hip Flexor Stretching Program on Gait in Frail Elderly Patients. *Pm&R, 3*(4), 330-335. doi:10.1016/j.pmrj.2011.01.006

Wayne, P. M., Buring, J. E., Davis, R. B., Connors, E. M., Bonato, P., Patritti, B., . . . Kiel, D. P. (2010). Tai Chi for osteopenic women: design and rationale of a pragmatic randomized controlled trial. *Bmc Musculoskeletal Disorders, 11*. doi:10.1186/1471-2474-11-40

Wegener, C., Wegener, K., Smith, R., Schott, K.-H., & Burns, J. (2016). Biomechanical effects of sensorimotor orthoses in adults with Charcot-Marie-Tooth disease. *Prosthetics and Orthotics International, 40*(4), 436-446. doi:10.1177/0309364615579318

Wenz, W., Hornung, C., Cramer, C., Schroeder, M., & Hoffmann, M. (2017). Effect of Glucosamine Sulfate on Osteoarthritis in the Cruciate-Deficient Canine Model of Osteoarthritis. *Cartilage, 8*(2), 173-179. doi:10.1177/1947603516638898

Westby, M. D. (2012). Rehabilitation and Total Joint Arthroplasty. *Clinics in Geriatric Medicine, 28*(3), 489-+. doi:10.1016/j.cger.2012.05.005

White, D. K., Zhang, Y., Niu, J., Keysor, J. J., Nevitt, M. C., Lewis, C. E., . . . Neogi, T. (2010). Do Worsening Knee Radiographs Mean Greater Chances of Severe Functional Limitation? *Arthritis Care & Research, 62*(10), 1433-1439. doi:10.1002/acr.20247

Whittaker, J. L., & Emery, C. A. (2015). Impact of the FIFA 11+on the structure of select muscles in adolescent female soccer players. *Physical Therapy in Sport, 16*(3), 228-235. doi:10.1016/j.ptsp.2014.10.007

Wiesmann, T., Piechowiak, K., Duderstadt, S., Haupt, D., Schmitt, J., Eschbach, D., . . . Steinfeldt, T. (2016). Continuous adductor canal block versus continuous femoral nerve block after total knee arthroplasty for mobilisation capability and pain treatment: a randomised and blinded clinical trial. *Archives of Orthopaedic and Trauma Surgery, 136*(3), 397-406. doi:10.1007/s00402-015-2403-7

Williams, G., Ada, L., Hassett, L., Morris, M. E., Clark, R., Bryant, A. L., & Olver, J. (2016). Ballistic strength training compared with usual care for improving mobility following traumatic brain injury: protocol for a randomised, controlled trial. *Journal of Physiotherapy, 62*(3), 164-164. doi:10.1016/j.jphys.2016.04.003

Williams, N. H., Amoakwa, E., Burton, K., Hendry, M., Belcher, J., Lewis, R., . . . Wilkinson, C. (2009). Activity Increase Despite Arthritis (AIDA): design of a Phase II randomised controlled trial evaluating an active management booklet for hip and knee osteoarthritis ISRCTN24554946. *Bmc Family Practice, 10*. doi:10.1186/1471-2296-10-62

Williams, N. H., Jenkins, A., Goulden, N., Hoare, Z., Hughes, D. A., Wood, E., . . . Wilkinson, C. (2017). Subcutaneous Injection of Adalimumab Trial compared with Control (SCIATiC): a randomised controlled trial of adalimumab injection compared with placebo for patients receiving physiotherapy treatment for sciatica. *Health Technology Assessment, 21*(60), 1-+. doi:10.3310/hta21600

Willy, R. W., & Davis, I. S. (2011). The effect of a hip-strengthening program on mechanics during running and during a single-leg squat. *J Orthop Sports Phys Ther, 41*(9), 625-632. doi:10.2519/jospt.2011.3470

Wilson, S. H., Auroux, A.-S. M., Eloy, J. D., Merman, R. B., & Chelly, J. E. (2014). Ropivacaine 0.1% Versus 0.2% for Continuous Lumbar Plexus Nerve Block Infusions Following Total Hip Arthroplasty: A Randomized, Double Blinded Study. *Pain Medicine, 15*(3), 465-472. doi:10.1111/pme.12309

Witjes, S., Hoorntje, A., Kuijer, P. P. F. M., Koenraadt, K. L. M., Blankevoort, L., Kerkhoffs, G. M. M. J., & van Geenen, R. C. I. (2016). Does Goal Attainment Scaling improve satisfaction regarding performance of activities of younger knee arthroplasty patients? Study protocol of the randomized controlled ACTION trial. *Bmc Musculoskeletal Disorders, 17*. doi:10.1186/s12891-016-0965-3

Witzleb, W. C., Stephan, L., Krummenauer, F., Neuke, A., & Guenther, K. P. (2009). SHORT-TERM OUTCOME AFTER POSTERIOR VERSUS LATERAL SURGICAL APPROACH FOR TOTAL HIP

ARTHROPLASTY - A RANDOMIZED CLINICAL TRIAL. *European Journal of Medical Research, 14*(6), 256-263. doi:10.1186/2047-783x-14-6-256

Wohlrab, D., Droege, J. W., Mendel, T., Brehme, K., Riedl, K., Leuchte, S., & Hein, W. (2008). [Minimally invasive vs. transgluteal total hip replacement. A 3-month follow-up of a prospective randomized clinical study]. *Orthopade, 37*(11), 1121-1126. doi:10.1007/s00132-008-1343-0

Wolf, O., Mattsson, P., Milbrink, J., Larsson, S., & Mallmin, H. (2010). Periprosthetic bone mineral density and fixation of the uncemented CLS stem related to different weight bearing regimes: A randomized study using DXA and RSA in 38 patients followed for 5 years. *Acta Orthop, 81*(3), 286-291. doi:10.3109/17453674.2010.487238

Wolf, O., Mattsson, P., Milbrink, J., Larsson, S., & Mallmin, H. (2013). EFFECTS OF POSTOPERATIVE WEIGHT-BEARING ON BODY COMPOSITION AND BONE MINERAL DENSITY AFTER UNCEMENTED TOTAL HIP ARTHROPLASTY. *Journal of Rehabilitation Medicine, 45*(5), 498-503. doi:10.2340/16501977-1140

Wong, M. L., Anderson, R. G., Garcia, K., Housmann, E. M., McHale, E., Goldberger, G. S., & Cahalin, L. P. (2017). The effect of inspiratory muscle training on respiratory variables in a patient with ankylosing spondylitis: A case report. *Physiotherapy Theory and Practice, 33*(10), 805-814. doi:10.1080/09593985.2017.1346023

Wood, L. R. J., Blagojevic-Bucknall, M., Stynes, S., D'Cruz, D., Mullis, R., Whittle, R., . . . Foster, N. E. (2016). Impairment-targeted exercises for older adults with knee pain: a proof-of-principle study (TargET-Knee-Pain). *Bmc Musculoskeletal Disorders, 17*. doi:10.1186/s12891-016-0899-9

Wood, L. R. J., Peat, G. M., Mullis, R., Thomas, E., & Foster, N. E. (2011). Impairment-targeted exercises for older adults with knee pain: protocol for a proof-of-principle study. *Bmc Musculoskeletal Disorders, 12*. doi:10.1186/1471-2474-12-2

Woolcott, J. C., Khan, K. M., Mitrovic, S., Anis, A. H., & Marra, C. A. (2012). The cost of fall related presentations to the ED: A prospective, in-person, patient-tracking analysis of health resource utilization. *Osteoporosis International, 23*(5), 1513-1519. doi:10.1007/s00198-011-1764-1

Woollard, J. D., Gil, A. B., Sparto, P., Kwoh, C. K., Piva, S. R., Farrokhi, S., . . . Fitzgerald, G. K. (2011). Change in Knee Cartilage Volume in Individuals Completing a Therapeutic Exercise Program for Knee Osteoarthritis. *Journal of Orthopaedic & Sports Physical Therapy, 41*(10), 708-722. doi:10.2519/jospt.2011.3633

Wu, J., Faux, S. G., Estell, J., Wilson, S., Harris, I., Poulos, C. J., & Klein, L. (2017). Early rehabilitation after hospital admission for road trauma using an in-reach multidisciplinary team: a randomised controlled trial. *Clinical Rehabilitation, 31*(9), 1189-1200. doi:10.1177/0269215517694462

Wyers, C. E., Breedveld-Peters, J. J., Reijven, P. L., van Helden, S., Guldemond, N. A., Severens, J. L., . . . Dagnelie, P. C. (2010). Efficacy and cost-effectiveness of nutritional intervention in elderly after hip fracture: design of a randomized controlled trial. *BMC Public Health, 10*, 212. doi:10.1186/1471-2458-10-212

Wyon, M. A., Smith, A., & Koutedakis, Y. (2013). A comparison of strength and stretch interventions on active and passive ranges of movement in dancers: a randomized controlled trial. *J Strength Cond Res, 27*(11), 3053-3059. doi:10.1519/JSC.0b013e31828a4842

Xu, H.-s., Zhuo, Z.-q., Chen, B.-c., Jing, J., Zhao, G.-r., Wu, J.-f., & Xiao, W. (2013). A randomized controlled clinical study on treatment of hand, foot and mouth disease in children with Reduning injection. *Chinese Medical Journal, 126*(13), 2585-2586. doi:10.3760/cma.j.issn.0366-6999.20123103

Yamashita, F., Iwamoto, J., Osugi, T., Yamazaki, M., & Takakuwa, M. (2012). Chair rising exercise is more effective than one-leg standing exercise in improving dynamic body balance: A randomized controlled trial. *Journal of Musculoskeletal & Neuronal Interactions, 12*(2), 74-79.

Yang, C., Zhu, Q., Han, Y., Zhu, J., Wang, H., Cong, R., & Zhang, D. (2010). Minimally-invasive total hip arthroplasty will improve early postoperative outcomes: a prospective, randomized, controlled trial. *Ir J Med Sci, 179*(2), 285-290. doi:10.1007/s11845-009-0437-y

Yasuda, S., Takechi, M., Ono, M., Miyatake, Y., Itoh, M., Kojima, T., . . . Kobayashi, K. (2012). The effect of glucagon on FDG uptake in skeletal muscle. *Tokai J Exp Clin Med, 37*(1), 11-13.

Yennan, P., Suputtitada, A., & Yuktanandana, P. (2010). Effects of aquatic exercise and land-based exercise on postural sway in elderly with knee osteoarthritis. *Asian Biomedicine, 4*(5), 739-745.

Yilmaz, D. K., Dikmen, Y., Kokturk, F., & Dedeoglu, Y. (2016). The effect of air-lock technique on pain at the site of intramuscular injection. *Saudi Medical Journal, 37*(3), 304-308. doi:10.15537/smj.2016.3.13113

Yip, Y. B., Sit, J. W., Fung, K. K. Y., Wong, D. Y. S., Chong, S. Y. C., Chung, L. H., & Ng, T. P. (2007). Impact of an arthritis self-management programme with an added exercise component for osteoarthritic knee sufferers on improving pain, functional outcomes, and use of health care services: An experimental study. *Patient Education and Counseling, 65*(1), 113-121. doi:10.1016/j.pec.2006.06.019

Yoon, Y. C., Wang, S., Kim, S.-H., Sung, M.-J., Hwang, J.-T., Kim, M. J., . . . Park, J.-H. (2013). INHIBITION OF ODORANT-INDUCED SIGNAL TRANSDUCTION BY DIINDOLYLMETHANE, A FOOD-DERIVED BIOACTIVE MOLECULE. *Current Topics in Nutraceutical Research, 11*(3), 91-96.

You, T., Disanzo, B. L., Wang, X., Yang, R., & Gong, D. (2011). Adipose tissue endocannabinoid system gene expression: depot differences and effects of diet and exercise. *Lipids Health Dis, 10*, 194. doi:10.1186/1476-511x-10-194

Young, Y., & Resnick, B. (2009). Don't Worry, Be Positive: Improving Functional Recovery 1 Year After Hip Fracture. *Rehabilitation Nursing, 34*(3), 110-117. doi:10.1002/j.2048-7940.2009.tb00265.x

Youssef, E. F., & Shanb, A. A. E. (2016). Supervised Versus Home Exercise Training Programs on Functional Balance in Older Subjects. *Malaysian Journal of Medical Science, 23*(6), 83-93. doi:10.21315/mjms2016.23.6.9

Yu, B., He, M., Cai, G.-Y., Zou, T.-X., & Zhang, N. (2016). Ultrasound-guided continuous femoral nerve block vs continuous fascia iliaca compartment block for hip replacement in the elderly A randomized controlled clinical trial (CONSORT). *Medicine, 95*(42). doi:10.1097/md.0000000000005056

Yuan, J., Chen, Y., Xuan, Y., Cao, L., Zhu, J., Wang, F., . . . Zhou, W. (2016). Can the upper inner side of the thigh become a new option for insulin injection? *Current Medical Research and Opinion, 32*(7), 1319-1324. doi:10.1185/03007995.2016.1174107

Yuan, X.-y., Liu, W., Hu, Y.-y., Zhang, P., Xin, X.-y., Tian, Y., . . . Fan, L.-y. (2009). Influence of grape seed proanthocyanidin extract on sunburn cell formation and p53 protein expression induced by acute ultraviolet injury. *Zhonghua Pifuke Zazhi, 42*(2), 94-96. doi:10.3760/cma.j.issn.0412-4030.2009.02.010

Zakir, A., Ahmed, S. I., Aziz, S., Yamin, F., Atiq ur, R., & Khanzada, S. (2016). EFFECTIVENESS OF MANUAL THERAPY VERSUS EXERCISE THERAPY FOR THE MANAGEMENT OF KNEE OSTEOARTHRITIS IN KARACHI PAKISTAN. *International Journal of Physiotherapy, 3*(1), 86-93. doi:10.15621/ijphy/2016/v3i1/88918

Zanfardino, A., Iafusco, D., Piscopo, A., Cocca, A., Villano, P., Confetto, S., . . . Scaramuzza, A. E. (2014). Continuous subcutaneous insulin infusion in preschool children: butt or tummy, which is the best infusion set site? *Diabetes Technol Ther, 16*(9), 563-566. doi:10.1089/dia.2013.0357

Zanoni, C. T., Galvao, F., Cliquet Junior, A., & Saad, S. T. O. (2015). Pilot randomized controlled trial to evaluate the effect of aquatic and land physical therapy on musculoskeletal dysfunction of sickle cell disease patients. *Revista brasileira de hematologia e hemoterapia, 37*(2), 82-89. doi:10.1016/j.bjhh.2014.11.010

Zebis, M. K., Skotte, J., Andersen, C. H., Mortensen, P., Petersen, H. H., Viskaer, T. C., . . . Andersen, L. L. (2013). Kettlebell swing targets semitendinosus and supine leg curl targets biceps femoris: an EMG study with rehabilitation implications. *British Journal of Sports Medicine, 47*(18), 1192-1198. doi:10.1136/bjsports-2011-090281

Zech, A., Hendrich, S., & Pfeifer, K. (2015). Association Between Exercise Therapy Dose and Functional Improvements in the Early Postoperative Phase After Hip and Knee Arthroplasty: An Observational Study. *Pm&R, 7*(10), 1064-1072. doi:10.1016/j.pmrj.2015.04.008

Zeman, P., Cibulkova, J., Kormunda, S., Koudela, K., Jr., Nepras, P., & Matejka, J. (2013). [Arthroscopic transcapsular iliopsoas tenotomy from the peripheral versus the central compartment in internal snapping hip syndrome. Short-term results of a prospective randomised study]. *Acta Chir Orthop Traumatol Cech, 80*(4), 263-272.

Zeng, R., Lin, J., Wu, S., Chen, L., Chen, S., Gao, H., . . . Ma, H. (2015). A randomized controlled trial: Preoperative home-based combined Tai Chi and Strength Training (TCST) to improve balance and aerobic capacity in patients with total hip arthroplasty (THA). *Archives of Gerontology and Geriatrics, 60*(2), 265-271. doi:10.1016/j.archger.2014.11.009

Zhang, Z. W., Deng, N., Zhou, X. B., Wang, Z., Shen, Y. H., Shang, G. D., . . . Yu, T. Y. (2011). [Treatment of lumbar disc herniation combine with buttock tender node with Pizhen]. *Zhongguo Gu Shang, 24*(10), 816-820.

Zhao, H. Y., Kang, P. D., Xia, Y. Y., Shi, X. J., Nie, Y., & Pei, F. X. (2017). Comparison of Early Functional Recovery After Total Hip Arthroplasty Using a Direct Anterior or Posterolateral Approach: A Randomized Controlled Trial. *J Arthroplasty, 32*(11), 3421-3428. doi:10.1016/j.arth.2017.05.056

Zhao, Q., Li, P., Jiang, J., & Hu, P. (2016). Pharmacokinetics of Single Ascending Doses and Multiple Doses of 20(S)-Ginsenoside Rg3 in Chinese Healthy Volunteers. *Eur J Drug Metab Pharmacokinet, 41*(6), 845-853. doi:10.1007/s13318-015-0304-3

Zhu, N.-N., Xu, P.-P., Lei, T.-T., Sun, T., & Chan, S. W.-C. (2017). Postoperative Pain Self-Management Behavior in Patients Who Underwent Total Knee or Hip Arthroplasty. *Aorn Journal, 105*(4), 355-364. doi:10.1016/j.aorn.2017.02.001

Zielinski, S. M., Bouwmans, C. A., Heetveld, M. J., Bhandari, M., Patka, P., & Van Lieshout, E. M. (2014). The societal costs of femoral neck fracture patients treated with internal fixation. *Osteoporos Int, 25*(3), 875-885. doi:10.1007/s00198-013-2487-2

Zoric, L., Cuvillon, P., Alonso, S., Demattei, C., Vialles, N., Asencio, G., . . . Nouvellon, E. (2014). Single-shot intraoperative local anaesthetic infiltration does not reduce morphine consumption after total hip arthroplasty: a double-blinded placebo-controlled randomized study. *Br J Anaesth, 112*(4), 722-728. doi:10.1093/bja/aet439

Zouboulis, C. C., Brunner, M., Lippert, U., Seele, P., & Trebing, D. (2015). Hidradenitis suppurativa / Acne inversa Current Aspects on Definition, Epidemiology, Pathogenesis, Classification and Evidence-based Treatment. *Aktuelle Dermatologie, 41*(5), 185-198. doi:10.1055/s-0034-1391994

조동찬, 이진현, 김창곤, 정우석, 문수정, 박태용, & 이정한. (2013). Narrative Review of Clinical Trial on Scolopendrid Pharmacopuncture in Korean Literature. [국내 데이터 베이스 검색을 통한 오공 약침 시술에 대한 임상 논문고찰]. *Journal of oriental rehabilitation medicine, 23*(4), 73-82.

8. Appendix: literature study

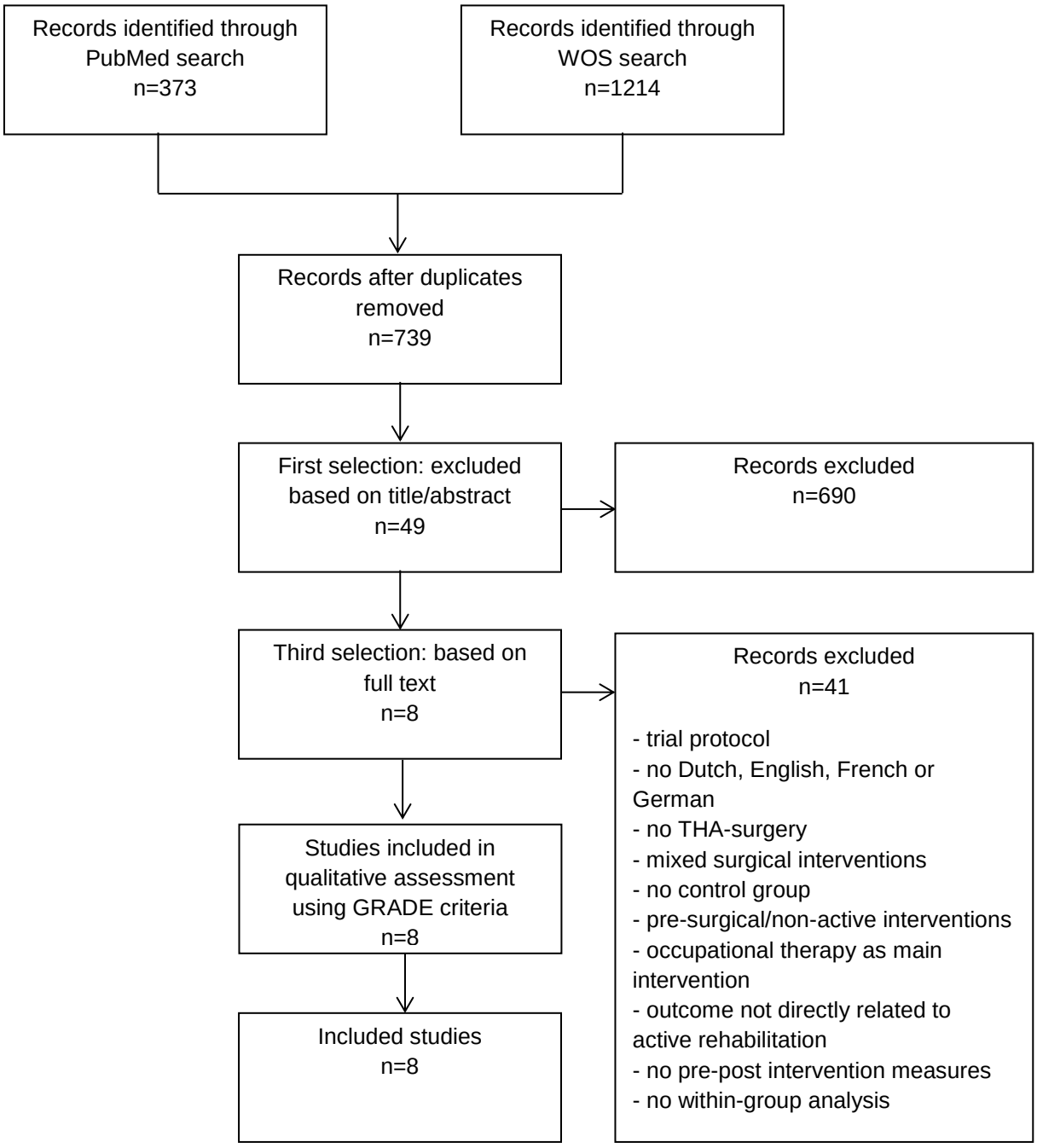

Figure 1. Flow chart in- and excluded articles PubMed and WOS

Table 2

Excluded studies and reason for exclusion (n=X)

Excluded based on title		
Reason for exclusion	**#studies**	**Auteur(s), year**
Trial protocols, designs of an RCT or designs other than RCT	n=88	(J. Haxby Abbott et al., 2009; Akazawa, Okawa, Tamura, & Moriyama, 2017; Ayanniyi, Ukpai, & Adeniyi, 2010) (Baker et al., 2007; Bastos de Oliveira et al., 2017; Benjaminse, Lemmink, Diercks, & Otten, 2010; Bhimani et al., 2017; J. A. Black, Herbison, Lyons, Polinder, & Derrett, 2011; Blandfort, Gregersen, Borris, & Damsgaard, 2017; Buhagiar et al., 2013; Chalidis et al., 2010; S.-T. Cheng et al., 2017; Clausen, Holsgaard-Larsen, & Roos, 2017; Coelho et al., 2014; Colon-Emeric et al., 2011; Cook et al., 2011; Coppack et al., 2016; dos Anjos Rabelo et al., 2014; Dos Santos et al., 2016; Dunkel et al., 2017; Fary, Carroll, Briffa, Gupta, & Briffa, 2008; Gofeld, Jitendra, & Faclier, 2007; Gordon et al., 2012; Harding, Weeks, Watson, & Beck, 2017; Heiberg, Bruun-Olsen, & Bergland, 2017; Hinman et al., 2017; Hinman et al., 2014; Holden et al., 2017; Hoogeboom et al., 2010; Hoskins & Pollard, 2010; Hulme, 2016; Judd, Winters, Stevens-Lapsley, & Christiansen, 2016; Kalliokoski, Bergqvist, & Lofvander, 2013; Karagulle, Kardes, & Karagulle, 2017; Kearns, Macfarlane, Anderson, & Kinsella, 2011; Kita et al., 2007; Knuepfer et al., 2014; E. E. Krebs et al., 2017; Kruse, 2008; Leegwater et al., 2016; Lewinson et al., 2014; Lin et al., 2009; J.-T. Liu et al., 2013; Mak, Klein, Finnegan, Mason, & Cameron, 2014; Mansell, Rhon, Marchant, Slevin, & Meyer, 2016; Marchand et al., 2015; Marques, Mota, & Carvalho, 2012; Mellor et al., 2016; Mens, 2017; Messier, Mihalko, Beavers, et al., 2013; Moreira-Silva, Santos, Abreu, & Mota, 2014; Moskal & Capps, 2013; Orwig et al., 2017; N. Osteras et al., 2014; Piva et al., 2015; Poulsen et al., 2011; Pourahmadi et al., 2017; Rosenlund, Broeng, Jensen, Holsgaard-Larsen, & Overgaard, 2014; Rosenlund, Holsgaard-Larsen, Overgaard, & Jensen, 2016; Sahota et al., 2014; Sandal, Thorlund, Ulrich, Dieppe, & Roos, 2015; Schache, McClelland, & Webster, 2016; Schnetzke et al., 2017; Sherrington et al., 2016; Sipila et al., 2011; Soren Thorgaard Skou et al., 2017; Sletvold et al., 2011; Sun et al., 2016; Pernille Thingstad et al., 2015; K. H. Thybo et al., 2017; Tijssen et al., 2016a; Tijssen et al., 2016b; Turunen, Aaltonen, et al., 2017; L. W. van Beers et al., 2016; L. W. A. H. van Beers et al., 2016; van Doormaal, van der Horst, Backx, Smits, & Huisstede, 2017; Van Ginckel & Witvrouw, 2013; van Middelkoop et al., 2013; N. Walsh et al., 2013; Wampler et al., 2016; D. Wang et al., 2017; Wayne et al., 2010; G. Williams et al., 2016; N. H. Williams et al., 2009; Witjes et al., 2016; Wong et al., 2017; 조동찬 et al., 2013)
Medical interventions	n=53	(Aggarwal, Shashikanth, & Marwaha, 2014; Awad, Cheung, Al-Allaq, Conroy, & McCartney, 2013; Banerjee & McLean, 2011; Becchi et al., 2008;

		Davenport et al., 2015; Dixon, Blom, Whitehouse, & Wylde, 2014; Dolan et al., 2007; Eslamian & Amouzandeh, 2015; Foss et al., 2009; Ghabach, Elmawieh, Matta, & Helou, 2016; Glennie, Korczak, Naudie, Bryant, & Howard, 2017; Huizinga, Brouwer, & van Raaij, 2014; Huterer, 2013; Ilfeld et al., 2012; Ilfeld, Mariano, et al., 2010; Ilizaliturri, Chaidez, Villegas, Briseno, & Camacho-Galindo, 2009; R. F. Jackson, Roche, & Shanks, 2013; Jerosch, Stobbe, Schmid, Schunck, & Filler, 2012; K. B. Jones et al., 2010; Katz, 2013; D.-H. Kim, Yoon, & Yoon, 2016; D. H. Kim et al., 2014; Klang et al., 2014; Krych, Thompson, Knutson, Scoon, & Coleman, 2013; Livesey et al., 2009; Lofgren, Engquist, Hoffmann, Sigstedt, & Vavruch, 2010; Lohmann-Jensen, Holsgaard-Larsen, Emmeluth, Overgaard, & Jensen, 2014; Lui, Cheng, Yung, Hung, & Chan, 2012; Luo et al., 2016; Marino et al., 2009; Mishra, Austin, Parvizi, Ramsey, & Showalter, 2011; Mouilhade et al., 2011; Muller et al., 2012; H. N. Pang, Lo, Yang, Chong, & Yeo, 2008; Pimenta, Marchi, Oliveira, Coutinho, & Amaral, 2013; Pinsornsak, Rojanavijitkul, & Chumchuen, 2016; Poggie, Turgeon, & Coutts, 2007; Rabago et al., 2013; Rabago et al., 2014; Renken et al., 2012; Segado Jimenez et al., 2009; Tammam, 2013, 2014; K. H. Thybo, Mathiesen, Dahl, Schmidt, & Hagi-Pedersen, 2016; Kasper H. Thybo, Schmidt, & Hagi-Pedersen, 2016; Vasilakis et al., 2012; Wada et al., 2014; Wiesmann et al., 2016; Wohlrab et al., 2008; Yu, He, Cai, Zou, & Zhang, 2016; Zeman et al., 2013)
Pharmacological interventions	n=35	(Antony & Ding, 2017; Arden et al., 2016; Arjmandi et al., 2014; Benson et al., 2009; Bern et al., 2007; Chlebowski et al., 2013; S. Cho et al., 2010; H. Clarke et al., 2015; Doria, Buonocore, Michelotti, Nobile, & Marzatico, 2013; Durmus, Alayli, Aliyazicioglu, Buyukakincak, & Canturk, 2013; Flodin et al., 2015; Heres et al., 2012; G. S. Jensen, Lenninger, Beaman, Taylor, & Benson, 2015; S.-P. Jung et al., 2013; Kadooka et al., 2013; Kelley, Adams, Mulliken, & Dalury, 2013; Lei, Guo, Wang, Zhang, & Hua, 2017; Lyles et al., 2007; Mak, Mason, Klein, & Cameron, 2016; Neves et al., 2011; Oremus, Sostaric, Trkulja, & Haspl, 2014; Rabago, Mundt, Zgierska, & Grettie, 2015; Remerand et al., 2009; Shane et al., 2012; Snijders et al., 2011; Stanczyk, Archer, Rubin, & Foegh, 2013; Sullivan et al., 2012; Thakur, Thakur, Narayan, & Sinha, 2008; Wenz, Hornung, Cramer, Schroeder, & Hoffmann, 2017; Wilson, Auroux, Eloy, Merman, & Chelly, 2014; Yasuda et al., 2012; Q. Zhao, Li, Jiang, & Hu, 2016; Zoric et al., 2014)
Passive interventions	n=19	(Araujo, de Souza Guerino Macedo, Ferreira, Shigaki, & da Silva, 2016; Ashraf et al., 2014; Braid et al., 2008; Broadbent et al., 2010; Cheatham, Stull, & Kolber, 2017; Goldberg et al., 2014; Hogler et al., 2017; Hsieh & Lee, 2016; Jamtvedt et al., 2010; Kelly, Racinais, Tanner, Grantham, & Chalabi, 2010; Kivlan, Carcia, Clemente, Phelps, & Martin, 2015; Lansdown, Howard, Brealey, & MacPherson, 2009; J. Liu, Li, Cao, & Wang, 2015; P. W. M. Marshall, Cashman, & Cheema, 2011; Schiller et al., 2016; Springer, Laufer, Becher, &

		Vatine, 2013; Srbely, Vernon, Lee, & Polgar, 2013; Teut et al., 2012)
Non-physical therapy related interventions	n=25	(Aaboud et al., 2016; Andersson, Hulander, Rothenberg, & Iversen, 2017; Bay et al., 2017; Benito-Ruiz et al., 2009; Blanc-Bisson, Dechamps, Gouspillou, Dehail, & Bourdel-Marchasson, 2008; Courteix et al., 2015; Hinman, Heywood, & Day, 2007; Hinman et al., 2016; A. F. Jacobson et al., 2016; Lechner et al., 2011; Messier, Mihalko, Legault, et al., 2013; Minns, Marsh, Chuck, & Todd, 2007; Myint et al., 2013; Nicol, Rowlands, Fazakerly, & Kellett, 2015; Rizwan et al., 2011a; Rizwan et al., 2011b; Rizzo et al., 2014; Roure, Oddos, Rossi, Vial, & Bertin, 2011; Sattari & Ashraf, 2011; Sharia, Lam, Kargarfard, Tamrin, & Danaee, 2017; Siavash, Naseri, & Rahimi, 2016; Srbely, Dickey, Bent, Lee, & Lowerison, 2010; Yilmaz, Dikmen, Kokturk, & Dedeoglu, 2016; Yoon et al., 2013)
Preventive, preoperative or non-surgical interventions	n=5	(Aerts et al., 2015; Oliver, Healey, & Haines, 2010; K. Sanchez, Eloumri, Rannou, & Poiraudeau, 2010; I. Svege, Nordsletten, Fernandes, & Risberg, 2015; Allan Villadsen, 2016)
No intervention, descriptive study	n=51	(Alfirevic, Milan, & Livio, 2012, 2013; Ambardekar, Shochet, Bracken, Coyaji, & Winikoff, 2014; Bai, 2009; Beyer-Westendorf, Bogorad, Tautenhahn, Marten, & Schellong, 2013; Buchecker, Lindinger, Pfusterschmied, & Mueller, 2013; Burgers et al., 2016; Curwin, Allt, Szpilfogel, & Makrides, 2013; Marco Di Monaco et al., 2014; Falvey, Mangione, & Stevens-Lapsley, 2015; A. M. Fearon et al., 2015; Gonzalez Montalvo et al., 2011; Grana et al., 2016; Hawker, 2017; Heikkinen, Vihriaelae, Vainionpaeae, Korpelainen, & Jaemsae, 2007; Holm, Kristensen, Husted, Kehlet, & Bandholm, 2011; Hunter, Thelen, & Dhaher, 2009; C. Jackson, Emck, Hunston, & Jarvis, 2009; Jansen, Mens, Backx, & Stam, 2009; Kemmler & von Stengel, 2013; Koh et al., 2017; Liebs, Kloos, Herzberg, Ruether, & Hassenpflug, 2013; Lyle, Valero-Cuevas, Gregor, & Powers, 2015; P. W. M. Marshall, Lovell, & Siegler, 2016; Mat et al., 2015; Merk, Winkler, Best, & Horstmann, 2008; Mudumbai et al., 2016; Nakase et al., 2013; Ni, Mooney, Harriell, Balachandran, & Signorile, 2014; P. R. Nielsen, Andreasen, Asmussen, & Tonnesen, 2008; Niemeyer et al., 2015; Palsson & Graven-Nielsen, 2012; Pommergaard et al., 2012; Rampersaud et al., 2014; Reinhold, Witt, Jena, Brinkhaus, & Willich, 2008; Serner et al., 2014; S. T. Skou et al., 2016b; Steffen et al., 2016; Stiles, Griew, & Rowlands, 2013; Stubbs et al., 2010; Tuakli-Wosornu, Selzer, Losina, & Katz, 2016; Uy, Kurrle, & Cameron, 2008; M.-Y. Wang et al., 2013; White et al., 2010; N. H. Williams et al., 2009; Woolcott, Khan, Mitrovic, Anis, & Marra, 2012; Wyers et al., 2010; Zielinski et al., 2014)
Other pathologies	n=102	(Aasvang et al., 2017; Aghazadeh et al., 2015; Agosti, Chandler, Anderton, & Clark, 2013; Akamatsu et al., 2017; Ang et al., 2010; Bade, Kittelson, Kohrt, & Stevens-Lapsley, 2014; Bagatin et al., 2013; Baldon, Piva, Silva, & Serrao, 2015; Bejek, Paroczai, Szendroi, & Kiss, 2011; Bentsen, Rustoen, Klopstad, &

		Miaskowski, 2008; Bergstrom, Landgren, Brinck, & Freyschuss, 2008; J. Black et al., 2015; Bonjour, Benoit, Rousseau, & Souberbielle, 2012; Borgwardt et al., 2009; Brennan, Allen, & Maldonado, 2017; Brown et al., 2016; Calvo et al., 2012; Carli et al., 2010; Adelaida M. Castro-Sanchez et al., 2014; Chaudhari, Jamison, McNally, Pan, & Schmitt, 2014; H. A. Clarke et al., 2014; de Campos, Rezende, Pasqualin, Frucchi, & Neto, 2015; de Castro, Teatin Juliato, Salao Piedemonte, & dos Santos Junior, 2016; de Putter et al., 2014; Dempsey et al., 2016; den Hertog, Gliesche, Timm, Muehlbauer, & Zebrowski, 2012; Dupont et al., 2014; Edinborough, P. Fisher, & Steele, 2016; Ekeberg et al., 2009; Ekele, Muhammed, Bello, & Namadina, 2009; Fatemi, Javid, & Najafabadi, 2015; Fersum, O'Sullivan, Skouen, Smith, & Kvale, 2013; Fey, Klute, & Neptune, 2011; Fu, Wang, Yang, Wu, & Hsiao, 2017; Grady, Mascha, Sessler, & Kurz, 2012; Gre & Millet, 2013; Grether-Beck, Marini, Jaenicke, Hoffmann, & Krutmann, 2017; Guney-Deniz, Kinikli, Caglar, Atilla, & Yuksel, 2017; Gupta, Rao, & Kumaran, 2011; Guren, Figved, Frihagen, Watne, & Westberg, 2017; Hagan & Lambert, 2008; Hagiwara et al., 2017; Hall et al., 2012; Ho et al., 2016; Hu et al., 2009; Hung et al., 2016; Hussey, Hussey, & Mighell, 2015; Ilfeld et al., 2009; Ilfeld et al., 2011; Ishoi, Sorensen, Kaae, Jorgensen, Hoelmich, et al., 2016; Ishoi, Sorensen, Kaae, Jorgensen, Holmich, et al., 2016; Iwamoto, Seki, Sato, & Matsumoto, 2012; Janier et al., 2012; J. Jensen et al., 2014; Jolles et al., 2012; P. Jones, Sorinola, & Strutton, 2014; Kamel et al., 2015; Kaunitz et al., 2015; Khan, Ghaffar, Choudhry, & Irshad, 2016; J. Kim, Ho, Wang, & Bogie, 2010; K. Knobloch, B. Joest, & P. M. Vogt, 2010; Karsten Knobloch, Beatrice Joest, & Peter M. Vogt, 2010; J. Knoop et al., 2013; Kon et al., 2017; Law et al., 2009; Levy, Frank, & Gefen, 2015; B. Li, Wen, Liu, & Tian, 2012; Lurie & Tomkins-Lane, 2016; Mendis & Hides, 2016; Moore, Mitchell, & Miklos, 2012; P. R. Nielsen, Jorgensen, Dahl, Pedersen, & Tonnesen, 2010; R. O. Nielsen et al., 2014; Noh et al., 2012; Nolan, 2012; Nussbaum et al., 2013; S. J. Park, Ji, Kwon, & Ha, 2007; Pauley, Devlin, & Madan-Sharma, 2014; Prado Nunes et al., 2016; Quintana Aparicio, Borrallo Quirante, Rodriguez Blanco, & Alburquerque Sendin, 2009; Rampersaud et al., 2008; Rathleff, Roos, Olesen, & Rasmussen, 2012; Sandstedt, Fasth, Eek, & Beckung, 2013; Sardroodian, Madeleine, Voigt, & Hansen, 2014; Soares, Miot, Sanudo, & Bagatin, 2015; Suhrabi, Taghinejad, Direkvand-Moghadam, & Akbari, 2016; Thaysen-Petersen et al., 2014; Vibe Fersum, O'Sullivan, Skouen, Smith, & Kvale, 2013; Villafane, Silva, & Chiarotto, 2012; Villalon et al., 2011; L. Wang et al., 2016; X. Wang, You, Murphy, Lyles, & Nicklas, 2015; Washer, Smith, Carman, & Blackhurst, 2010; Willy & Davis, 2011; Wu et al., 2017; You, Disanzo, Wang, Yang, & Gong, 2011; X.-y. Yuan et al., 2009; Zebis et al., 2013; Zhang et al., 2011; Zouboulis, Brunner, Lippert, Seele, & Trebing, 2015)
Neurological conditions	n=31	(Al-Abdulwahab & Al-Khatrawi, 2009; Auld & Johnston,

		2014; Carda et al., 2012; Ceca, Elvira, Guzman, & Pablos, 2017; M. K. Cho, Kim, Chung, & Hwang, 2015; Claerbout et al., 2012; Duval, Luttin, & Lam, 2011; Dyball, Taylor, & Dodd, 2011; Ferland, Lepage, Moffet, & Maltais, 2012; Ghedira et al., 2017; Groah, Lichy, Libin, & Ljungberg, 2010; Helayel, Bussman, da Conceicao, & de Oliveira Filho, 2008; Herrero et al., 2010; K. Jung et al., 2015; Kojovic, Djuric-Jovicic, Dosen, Popovic, & Popovic, 2009; Kumar, Chakrapani, & Kedambadi, 2016; Lau & Pang, 2009; Leech, Kinnaird, Holleran, Kahn, & Hornby, 2016; Lidbeck, Tedroff, & Bartonek, 2015; Maguire, Sieben, Frank, & Romkes, 2010; Maria Castro-Sanchez et al., 2011; Miyara et al., 2014; Ni & Signorile, 2017; Ni, Signorile, Balachandran, & Potiaumpai, 2016; M. Y. C. Pang, Zhang, Li, & Jones, 2013; Polese et al., 2013; Sheffler et al., 2015; Simon, do Pinho, dos Santos, & Pagnussat, 2014; Straudi et al., 2017; Wegener, Wegener, Smith, Schott, & Burns, 2016)
Cancer	n=6	(Bourke et al., 2011; Gamboa, Rehmus, & Haller, 2010; Greenlee et al., 2013; Ligibel et al., 2008; Nikander et al., 2012; Nuta et al., 2016)
Primary vascular and internal diseases	n=12	(Healy, Beasley, & Weatherall, 2010; Heyes, Tucker, Michael, & Wallace, 2015; O'Shea, Taylor, & Paratz, 2007; Parmenter, Raymond, Dinnen, Lusby, & Singh, 2013; Peoples et al., 2011; Somov, Makarova, & Makarova, 2015; Sumin, Bezdenezhnykh, Baidina, Popova, & Khairetdinova, 2011; van Buuren et al., 2013; J. Yuan et al., 2016; Zanfardino et al., 2014; Zanoni, Galvao, Cliquet Junior, & Saad, 2015)
Psychological/psychiatric disorders	n=11	(Cleton et al., 2014; Fleischhacker et al., 2012; Hough et al., 2009; Kroenke et al., 2009; Kroenke et al., 2012; Kroenke et al., 2011; Papadopoulos et al., 2014; Rossenu et al., 2015; Seitz et al., 2014; Turncliff, Hard, Du, Risinger, & Ehrich, 2014)
Children	n=6	(Bartels et al., 2014; Garcia Bartels et al., 2014; Garcia Bartels et al., 2012; Kanti et al., 2014; Lavender et al., 2012; Xu et al., 2013)
Animal study	n=3	(Clayton, Kaiser, Lavagnino, & Stubbs, 2012; Gallant et al., 2014; Mayer-Wagner et al., 2010)
Excluded based on abstract		
Reason for exclusion	**#studies**	**Auteur(s), year**
No active (exercise) therapy	n=86	(Alves Araujo, Guerino Macedo, Ferreira, Shigaki, & da Silva, 2016; Auffarth et al., 2011; Barlow, Donovan, Hart, & Hertel, 2015; Benjamin, Andersen, Herndon, & Suman, 2015; Bennell et al., 2011; Beselga, Neto, Alburquerque-Sendin, Hall, & Oliveira-Campelo, 2016; Bolgla, Earl-Boehm, Emery, Hamstra-Wright, & Ferber, 2015; A. M. Castro-Sanchez et al., 2011; C.-M. Cheng et al., 2012; Choi, Hoffer, & Robinovitch, 2010; Christiansen, 2008; Cipriani, Terry, Haines, Tabibnia, & Lyssanova, 2012; de Carvalho et al., 2016; Deyle, Gill, Allison, Hando, & Rochino, 2012; L. Donovan, Hart, & Hertel, 2015; Luke Donovan et al., 2016; Dowsey et al., 2014; Ericksen, Thomas, Gribble, Doebel, & Pietrosimone, 2015; Eschen, Kring, Brix, Ban, & Troelsen, 2012; Fasen et al., 2009; Foster, Voss, Hatch, & Frimodig, 2015; Foucher & Freels, 2015; John P. Furia, Jan D. Rompe, & Nicola Maffulli,

		2009; Genth et al., 2012; Glaviano & Saliba, 2016; Goosen, Kollen, Castelein, Kuipers, & Verheyen, 2011; Gremion, Gaillard, Leyvraz, & Jolles, 2009; Griffin et al., 2016; Hall, Stevermer, & Gillette, 2015; Hamel, Ross, Schultz, O'Neill, & Anderson, 2016; Haser et al., 2017; Housner, Jacobson, & Misko, 2009; S. Y. Huang et al., 2010; T.-T. Huang, Sung, Wang, & Wang, 2017; Hunt et al., 2009; Huurnink, Fransz, Kingma, Verhagen, & van Dieen, 2014; Ilfeld, Duke, & Donohue, 2010; Imoto et al., 2013; Iversen, Price, von Heideken, Harvey, & Wang, 2016; Izumi, Petersen, Arendt-Nielsen, & Graven-Nielsen, 2014; J. A. Jacobson et al., 2015; Judd et al., 2014; Kaneda, Sato, Wakabayashi, & Nomura, 2009; R. J. Khan, L. O. Lam, W. Breidahl, & W. G. Blakeney, 2012; R. J. K. Khan, L. O. Lam, W. Breidahl, & W. G. Blakeney, 2012; E. E. Krebs et al., 2010; LaRoche, Lussier, & Roy, 2008; Lauermann, Lienhard, Item-Glatthorn, Casartelli, & Maffiuletti, 2014; J. J. Lee, Harrison, Boachie-Adjei, Vargas, & Moley, 2016; K. J. Lee, Min, Bae, Cho, & Kwon, 2009; Levin et al., 2015; H.-Y. Liu et al., 2015; Y.-H. Liu, Wei, Wang, Lu, & Lin, 2017; Lluch et al., 2018; Martin, Clayson, Troussel, Fraser, & Docquier, 2011; Motealleh, Gheysari, Shokri, & Sobhani, 2016; Mueller, Tohtz, Springer, Dewey, & Perka, 2011; Muller, Tohtz, Dewey, Springer, & Perka, 2010; Muller, Tohtz, Springer, Dewey, & Perka, 2011; Muller, Tohtz, Winkler, et al., 2010; Nankaku et al., 2013; Nantel, Termoz, Vendittoli, Lavigne, & Prince, 2009; Nistor et al., 2017; Noehren, Abraham, Curry, Johnson, & Ireland, 2014; Okoro, Morrison, Maddison, Lemmey, & Andrew, 2013; Palieri et al., 2011; S.-K. Park, Kobsar, & Ferber, 2016; Penny, Ovesen, Varmarken, & Overgaard, 2013; Portegijs et al., 2009; Portegijs, Sipila, Rantanen, & Lamb, 2008; Poulsen, Overgaard, Vestergaard, Christensen, & Hartvigsen, 2016; Roach, Sorenson, Headley, & Juan, 2013; Rosenlund, Broeng, Holsgaard-Larsen, Jensen, & Overgaard, 2017; M. Sanchez, Guadilla, Fiz, & Andia, 2012; Srbely, Dickey, Lee, & Lowerison, 2010; Srbely et al., 2008; Taraldsen, Vereijken, Thingstad, Sletvold, & Helbostad, 2014; Ughreja & Shukla, 2017; Ulus et al., 2012; Vas, Modesto, Aguilar, Goncalo, & Rivas-Ruiz, 2014; R. Walsh & Kinsella, 2016; J. R. Watt et al., 2011; Jaclyn R. Watt et al., 2011; N. H. Williams et al., 2017; Witzleb, Stephan, Krummenauer, Neuke, & Guenther, 2009; Yang et al., 2010)
No GMe involvement in the intervention	n=37	(Ageberg, Link, & Roos, 2010; Aguilar et al., 2012; Bennell et al., 2012; Kim L. Bennell, Thorlene Egerton, et al., 2014; Kim L. Bennell, Mary Kyriakides, et al., 2014; Bourne, Williams, et al., 2017; Bruce-Brand et al., 2012; Chance-Larsen, Littlewood, & Garth, 2010; Crossley et al., 2015; Davis Hammonds, Laudner, McCaw, & McLoda, 2012; Deng, 2013; Elings et al., 2016; Foroughi et al., 2011; Ganderton, Semciw, Cook, & Pizzari, 2016; Gerber et al., 2009; Hall, Hinman, et al., 2015; Hoffman, Johnson, Zou, Harris-Hayes, & Van Dillen, 2011; Homma, Jigami, & Sato, 2016; P.-Y. Huang, W.-L. Chen, C.-F. Lin, & H.-J. Lee, 2014; P. Y. Huang, W. L. Chen, C. F. Lin, & H. J. Lee,

		2014; J. Knoop et al., 2013; J. Knoop et al., 2015; Jesper Knoop et al., 2014; Konishi et al., 2009; Kuenze et al., 2014; Lopez-Liria et al., 2015; Madsen, Larsen, Madsen, Soe, & Hansen, 2013; Marin, Chang, Cyhan, & Dinauer, 2008; Morishima et al., 2014; Nicholson, McKean, Slater, Kerr, & Burkett, 2015; B. Osteras, Osteras, Torstensen, & Vasseljen, 2013; Portegijs, Kallinen, et al., 2008; Rathleff, Roos, Olesen, Rasmussen, & Arendt-Nielsen, 2016; Roper et al., 2016; Stewart & Gregory, 2016; Thomsen, Husted, Otte, Holm, & Troelsen, 2013; Unver, Bakirhan, & Karatosun, 2016)
No THA	n=36	(Childs et al., 2010; S. P. Clarke, Poulis, Moreton, Walsh, & Lincoln, 2017; Cochrane, Harnett, & Pinfold, 2017; Cumps et al., 2008; Czyzewska et al., 2014; Duncan, Moeschler, Horlocker, Hanssen, & Hebl, 2013; French et al., 2009; French, Galvin, Cusack, & McCarthy, 2014; Gill, McBurney, & Schulz, 2009; Gyulai, Raba, Baranyai, Berkes, & Bender, 2015; Harris-Hayes et al., 2016; Hermann, Holsgaard-Larsen, Zerahn, Mejdahl, & Overgaard, 2016a, 2016b; Hinman et al., 2007; D. E. Krebs, Scarborough, & McGibbon, 2007; Kutzner et al., 2017; Lang et al., 2014; Leavey, Sandrey, & Dahmer, 2010; Y. Li, Cao, & Chen, 2013; H. Y. Liu et al., 2014; P. W. Marshall, Robbins, Wrightson, & Siegler, 2012; Mercer, Gross, Sharma, & Weeks, 2009; Nyland, Burden, Krupp, & Caborn, 2011; Nyland, Love, Burden, Krupp, & Caborn, 2014; Petersen, Anderseri, Andersen, & Soballe, 2007; Ida Svege, Fernandes, Nordsletten, Holm, & Risberg, 2016; Tal-Akabi, Steiger, & Villiger, 2007; Thorborg et al., 2010; Thorborg et al., 2016; Turki-Belkhiria et al., 2014; Wall et al., 2016; P.-C. Wang et al., 2008; T.-J. Wang, Belza, Thompson, Whitney, & Bennett, 2007; T.-J. Wang et al., 2011; Yamashita, Iwamoto, Osugi, Yamazaki, & Takakuwa, 2012; Youssef & Shanb, 2016)
Other study design	n=17	(Al-Khlaifat, Herrington, Tyson, Hammond, & Jones, 2016; Cibulka & Woehrle, 2013; Angela M. Fearon et al., 2014; Killington, Walker, & Crotty, 2016; Krommes et al., 2017; Kronborg, Bandholm, Palm, Kehlet, & Kristensen, 2014; Mistiaen et al., 2012; Moe et al., 2011; Patel, Sarraf, Joseph, Lee, & Middleton, 2013; Piva, Fitzgerald, Wisniewski, & Delitto, 2009; Thorborg, Couppe, Petersen, Magnusson, & Holmich, 2011; van den Driest et al., 2017; Wood et al., 2016; Wood, Peat, Mullis, Thomas, & Foster, 2011; Young & Resnick, 2009; Zech, Hendrich, & Pfeifer, 2015; Zhu, Xu, Lei, Sun, & Chan, 2017)
Active intervention combined with a passive intervention whereby a valid statement about the active intervention cannot be made	n=14	(J. Haxby Abbott et al., 2015; J. H. Abbott et al., 2013; Amiri-Khorasani, Abu Osman, & Yusof, 2011; Brantingham et al., 2012; Chen, Chen, Jan, & Lin, 2015; de Castro Lacaze, Sacco, Rocha, de Braganca Pereira, & Casarotto, 2010; Dwyer et al., 2015; Kostopoulos & Rizopoulos, 2008; Koybasi, Borman, Kocaoglu, & Ceceli, 2010; Niitsu et al., 2016; Pereira Avelar et al., 2011; Jan D. Rompe et al., 2009; Veenhof et al., 2007; Wyon, Smith, & Koutedakis, 2013)
Non-physical therapy related	n=11	(Bolton et al., 2012; Bourne, Duhig, et al., 2017;

outcomes		McKenzie et al., 2017; Mjaaland, Kivle, Svenningsen, Pripp, & Nordsletten, 2015; Nahm et al., 2012; Pedersen et al., 2008; Robinson, Wagstaff, Sanghera, & Kerry, 2014; O. Wolf, Mattsson, Milbrink, Larsson, & Mallmin, 2010; Olof Wolf, Mattsson, Milbrink, Larsson, & Mallmin, 2013; Woollard et al., 2011; Yip et al., 2007)
Preventive interventions	n=2	(Hance Clarke, Woodhouse, Kennedy, Stratford, & Katz, 2011; Zeng et al., 2015)
Psychological/psychiatric disorders	n=1	(Seitz et al., 2016)
Population <18 years	n=1	(Whittaker & Emery, 2015)
Excluded based on other pathologies in title and abstract		
Reason for exclusion	**#studies**	**Auteur(s), year**
Anterior cruciate ligament reconstruction	n=1	(Bell, Kulow, Stiffler, & Smith, 2014)
Hip osteoarthritis	n=1	(Fukumoto et al., 2014)
Knee osteoarthritis	n=4	(Lun, Marsh, Bray, Lindsay, & Wiley, 2015; Lund et al., 2008; Yennan, Suputtitada, & Yuktanandana, 2010; Zakir et al., 2016)
Total knee arthroplasty	n=5	(Liao et al., 2015; Loyd et al., 2017; Negus et al., 2015; S. T. Skou et al., 2016a; Tousignant et al., 2011)
Medial tibial stress syndrome	n= 1	(Sharma, Weston, Batterham, & Spears, 2014)
Anterior knee pain	n=1	(Telles et al., 2016)
Patellofemoral pain syndrome	n=20	(Avraham et al., 2007; Baldon Rde, Piva, Scattone Silva, & Serrao, 2015; Baldon Rde, Serrao, Scattone Silva, & Piva, 2014; Baldon et al., 2015; Baldon, Serrao, Scattone Silva, & Piva, 2014; Baldon, Serrao, Silva, & Piva, 2014; Bazett-Jones, Huddleston, Cobb, O'Connor, & Earl-Boehm, 2017; Dolak et al., 2011; dos Anjos Rabelo et al., 2017; Drew, Conaghan, Smith, Selfe, & Redmond, 2017; Ferber, Bolgla, Earl-Boehm, Emery, & Hamstra-Wright, 2015; Thiago Yukio Fukuda et al., 2012; T. Y. Fukuda et al., 2012; Fukuda et al., 2010; Glaviano & Saliba, 2016; Ismail, Gamaleldein, & Hassa, 2013; Khayambashi, Mohammadkhani, Ghaznavi, Lyle, & Powers, 2012; T. H. Nakagawa et al., 2008; Theresa Helissa Nakagawa et al., 2008; Razeghi, Etemadi, Taghizadeh, & Ghaem, 2010; Selfe et al., 2013)
General osteoarthritis	n=1	(Lange et al., 2009)
Plantar fasciitis	n=2	(D. H. Kamonseki, Goncalves, Yi, & Junior, 2016; Danilo H. Kamonseki, Goncalves, Yi, & Lombardi Junior, 2016)
Non-specific low back pain	n=1	(Kendall, Emery, Wiley, & Ferber, 2015)
Lumbar disc surgery	n=1	(Ogutluler Ozkara et al., 2015)
Excluded based on full text		
Reason for exclusion	**#studies**	**Auteur(s), year**
Text: no THA	n= 4	(Arumugam, Milosavljevic, Woodley, & Sole, 2015; K. L. Bennell et al., 2014; S. G. Kim & Lee, 2015; Pakkala et al., 2012)
Text: pre-surgical intervention	n=4	(Bitterli, Sieben, Hartmann, & de Bruin, 2011; Ferrara et al., 2008; Lyp et al., 2016; A. Villadsen, Overgaard, Holsgaard-Larsen, Christensen, & Roos, 2014)
Text: control group does not receive hip surgery	n=1	(Cavill et al., 2016)
Text: No within group analysis	n=3	(Coulter, Perriman, Neeman, Smith, & Scarvell, 2017; Salpakoski et al., 2014; P. Thingstad et al., 2016)

Text: mixed THA and internal fixation population	n=4	(Edgren et al., 2015{Kronborg, 2017 #3401)}(Shyu et al., 2016; Turunen, Salpakoski, et al., 2017)
Text: mixed THA and TKA population	n=3	(Gooch et al., 2009; Liebs, Herzberg, Ruther, Russlies, & Hassenpflug, 2016; Mahomed et al., 2008)
Text: no pre- and post-intervention measures	n=2	(Husby et al., 2010; Okamoto et al., 2016)
Text: no control group	n=3	(Host et al., 2007; Lone R. Mikkelsen et al., 2017; Westby, 2012)
Text: outcome is not directly related to active rehabilitation	n=5	(C. Jensen, Aagaard, & Overgaard, 2011; Meneghini & Smits, 2009; Petersen, Andersen, & Soballe, 2008; Suetta et al., 2008; Turunen, Salpakoski, et al., 2017)
Text: no active intervention	n=2	(Busato et al., 2016; Saltvedt et al., 2012)
Text: the specific intervention which is investigated is occupational therapy	n=1	(Martin-Martin et al., 2014)
Text: no implementation of gluteus medius in the intervention	n=8	(Jakovljevic & Vauhnik, 2011; Mendelsohn, Overend, Connelly, & Petrella, 2008; Oosting et al., 2012; Shyu et al., 2013; Sylliaas, Brovold, Wyller, & Bergland, 2012; Tseng, Liang, et al., 2016; Tseng, Shyu, & Liang, 2012; Tseng, Shyu, Liang, & Tsai, 2016)
Text: trail protocol, no outcomes	n=1	(Monaghan, Grant, Hing, & Cusack, 2012)
Text: other language than Dutch, English, French or German	n=1	(Vukomanovic, Popovic, Durovic, & Krstic, 2008)

Table 3

Risk of bias table

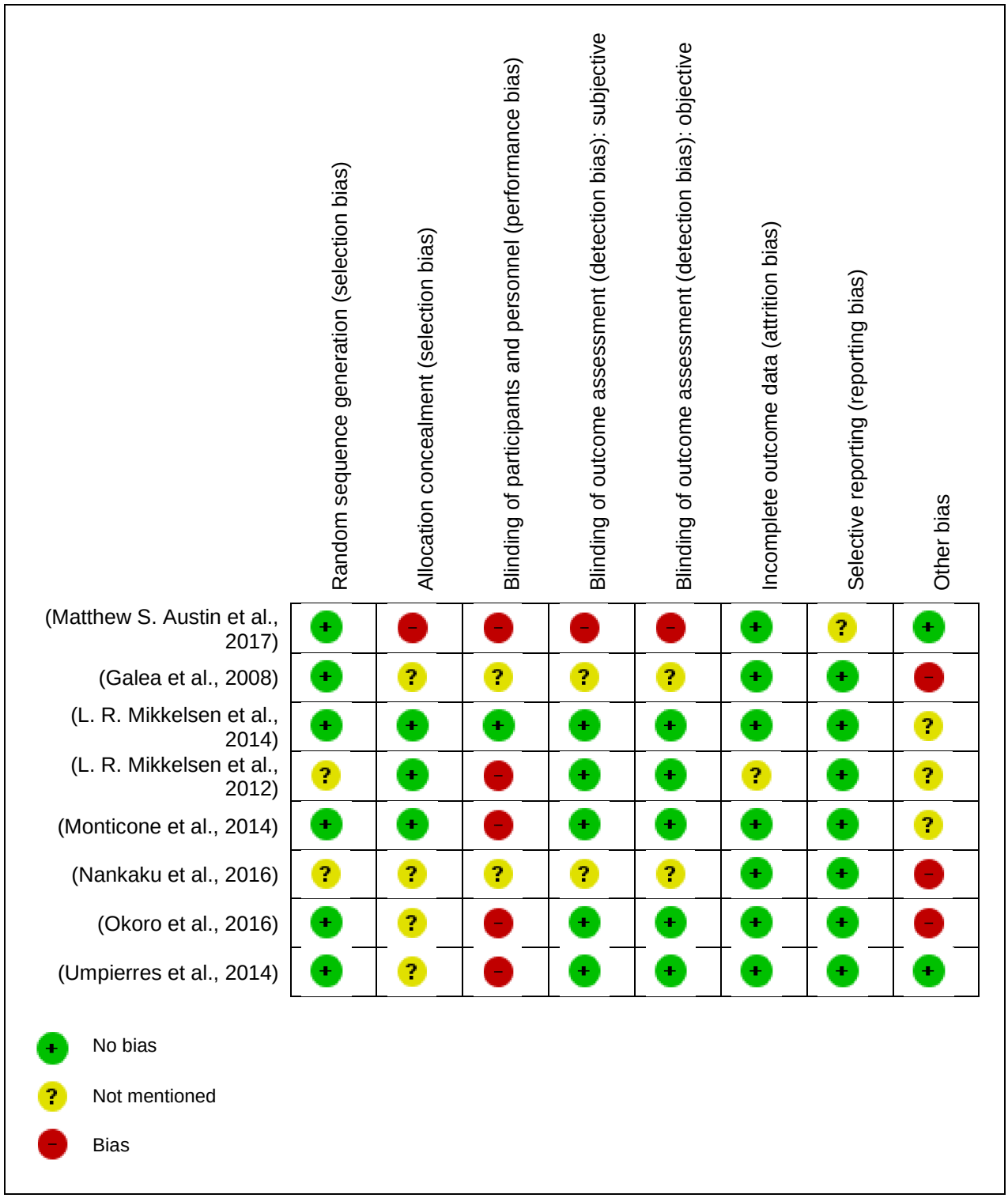

Table 4

GRADE for critical assessment of outcome measures

HHS (Matthew S. Austin et al., 2017)			
GRADE criteria	**Rating**	**Footnotes**	**Quality of the evidence**
Study design	RCT (starts as high quality)	Start with high quality (RCT)	⊕OOO Very low
Risk of Bias	Very serious (-2)	No allocation concealment. No blinding of patients, personnel or outcome.	
Inconsistency	No serious inconsistency	/	
Indirectness	No serious indirectness	/	
Imprecision	Serious (-1)	Continuous outcomes information is likely to be insufficient, if total number of participant is less than n=400. n=108, so the evidence was downgraded one level.	
Publication Bias	Undetected	Not strongly suspected	
Other	/	/	

WOMAC (Matthew S. Austin et al., 2017; Galea et al., 2008; L. R. Mikkelsen et al., 2012; Monticone et al., 2014)			
GRADE criteria	**Rating**	**Footnotes**	**Quality of the evidence**
Study design	RCT (starts as high quality)	Start with high quality (RCT)	⊕⊕OO Low
Risk of Bias	Serious (-1)	No blinding of participants and personnel or this was unknown for each text. In one study (Matthew S. Austin et al., 2017) there was no blinding of outcome assessment, in another study (Galea et al., 2008) this was unknown. Quality of evidence was downgraded one level.	
Inconsistency	No serious inconsistency	/	
Indirectness	No serious indirectness	/	
Imprecision	Serious (-1)	Continuous outcomes information is likely to be insufficient, if total number of participant is less than n=400. n=275, so the evidence was downgraded one level.	
Publication Bias	Undetected	Not strongly suspected	
Other	/	/	

AQoL, EQ-5D, SF 36 (Matthew S. Austin et al., 2017; Monticone et al., 2014; Umpierres et al., 2014) (Galea et al., 2008; L. R. Mikkelsen et al., 2012)			
GRADE criteria	**Rating**	**Footnotes**	**Quality of the evidence**
Study design	RCT (starts as high quality)	Start with high quality (RCT)	
Risk of Bias	No serious risk of bias	/	
Inconsistency	No serious inconsistency	/	

Indirectness	No serious indirectness	/	⊕⊕⊕O Moderate
Imprecision	Serious (-1)	Continuous outcomes information is likely to be insufficient, if total number of participant is less than n=400. n=358, so the evidence was downgraded one level.	
Publication Bias	Undetected	Not strongly suspected	
Other	/	/	

TUG (Galea et al., 2008; Nankaku et al., 2016; Okoro et al., 2016)			
GRADE criteria	**Rating**	**Footnotes**	**Quality of the evidence**
Study design	RCT (starts as high quality)	Start with high quality (RCT)	⊕⊕⊕O Moderate
Risk of Bias	No serious risk of bias	/	
Inconsistency	No serious inconsistency	/	
Indirectness	No serious indirectness	Outcomes in the studies were measured at different times, but this is not serious enough to downgrade one level.	
Imprecision	Serious (-1)	Continuous outcomes information is likely to be insufficient, if total number of participant is less than n=400. n=76, so the evidence was downgraded one level	
Publication Bias	Undetected	Not strongly suspected	
Other	/	/	

6MWT (Galea et al., 2008; Okoro et al., 2016)			
GRADE criteria	**Rating**	**Footnotes**	**Quality of the evidence**
Study design	RCT (starts as high quality)	Start with high quality (RCT)	⊕⊕⊕O Moderate
Risk of Bias	No serious risk of bias	/	
Inconsistency	No serious inconsistency	/	
Indirectness	No serious indirectness	Outcomes in both studies were measured at different times, but this is not serious enough to downgrade one level.	
Imprecision	Serious (-1)	Continuous outcomes information is likely to be insufficient, if total number of participant is less than n=400. n=48, so the evidence was downgraded one level.	
Publication Bias	Undetected	Not strongly suspected	
Other	/	/	

10MWT, 20MWT, walking speed, cadence, step length, step time, percentage in step time, single-support time, double-support time, symmetry index (step length, stem time, single- and double-support time) (L. R. Mikkelsen et al., 2012) (Galea et al., 2008; L. R. Mikkelsen et al., 2014)			
GRADE criteria	**Rating**	**Footnotes**	**Quality of the evidence**
Study design	RCT (starts as high quality)	Start with high quality (RCT)	⊕⊕⊕O Moderate
Risk of Bias	No serious risk of bias	/	
Inconsistency	No serious inconsistency	/	
Indirectness	No serious indirectness	Outcomes in both studies were measured at different times, but this is not serious enough to downgrade one level.	
Imprecision	Serious (-1)	Continuous outcomes information is likely to be insufficient, if total number of participant is less than n=400. n=140, so the evidence was downgraded one level.	
Publication Bias	Undetected	Not strongly suspected	
Other	/	/	

Negotiating stairs (Galea et al., 2008; L. R. Mikkelsen et al., 2014; Okoro et al., 2016)			
GRADE criteria	**Rating**	**Footnotes**	**Quality of the evidence**
Study design	RCT (starts as high quality)	Start with high quality (RCT)	⊕⊕⊕O Moderate
Risk of Bias	No serious risk of bias	/	
Inconsistency	No serious inconsistency	/	
Indirectness	No serious indirectness	/	
Imprecision	Serious (-1)	Continuous outcomes information is likely to be insufficient, if total number of participant is less than n=400. n=131, so the evidence was downgraded one level.	
Publication Bias	Undetected	Not strongly suspected	
Other	/	/	

HHD, Kedall's criteria (L. R. Mikkelsen et al., 2014; L. R. Mikkelsen et al., 2012; Nankaku et al., 2016; Umpierres et al., 2014)			
GRADE criteria	**Rating**	**Footnotes**	**Quality of the evidence**
Study design	RCT (starts as high quality)	Start with high quality (RCT)	⊕⊕⊕O Moderate
Risk of Bias	No serious risk of bias	/	
Inconsistency	No serious inconsistency	/	
Indirectness	No serious indirectness	/	
Imprecision	Serious (-1)	Continuous outcomes information is likely to be insufficient, if total number of participant is less than n=400. n=251, so the evidence was downgraded one level.	
Publication Bias	Undetected	Not strongly suspected	
Other	/	/	

30s sit-to-stand test (L. R. Mikkelsen et al., 2014; Okoro et al., 2016)			
GRADE criteria	**Rating**	**Footnotes**	**Quality of the evidence**
Study design	RCT (starts as high quality)	Start with high quality (RCT)	⊕⊕⊕O Moderate
Risk of Bias	No serious risk of bias	/	
Inconsistency	No serious inconsistency	/	
Indirectness	No serious indirectness	/	
Imprecision	Serious (-1)	Continuous outcomes information is likely to be insufficient, if total number of participant is less thean n=400. n=98, so the evidence was downgraded one level.	
Publication Bias	Undetected	Not strongly suspected	
Other	/	/	

HOOS (L. R. Mikkelsen et al., 2014)			
GRADE criteria	**Rating**	**Footnotes**	**Quality of the evidence**
Study design	RCT (starts as high quality)	Start with high quality (RCT)	⊕⊕⊕O Moderate
Risk of Bias	No serious risk of bias	/	
Inconsistency	No serious inconsistency	No	
Indirectness	No serious indirectness	No	
Imprecision	Serious (-1)	Continuous outcomes information is likely to be insufficient, if total number of participant is less than n=400. n=73, so the evidence was downgraded one level.	
Publication Bias	Undetected	Not strongly suspected	
Other	/	/	

One-legged stance (L. R. Mikkelsen et al., 2012)			
GRADE criteria	**Rating**	**Footnotes**	**Quality of the evidence**
Study design	RCT (starts as high quality)	Start with high quality (RCT)	⊕⊕OO Low
Risk of Bias	Serious (-1)	No blinding of participants and personnel. No random sequence generation, incomplete outcome date, other bias is unknown	
Inconsistency	No serious inconsistency	/	
Indirectness	No serious indirectness	/	
Imprecision	Serious (-1)	Continuous outcomes information is likely to be insufficient, if total number of participant is less than n=400. n=44, so the evidence was downgraded one level.	
Publication Bias	Undetected	Not strongly suspected	
Other	/	/	

Compliance, patient satisfaction, global perceived effect of treatment using a 5point-scale (L. R. Mikkelsen et al., 2012; Monticone et al., 2014)			
GRADE criteria	**Rating**	**Footnotes**	**Quality of the evidence**
Study design	RCT (starts as high quality)	Start with high quality (RCT)	⊕⊕⊕O Moderate
Risk of Bias	No serious risk of bias	/	
Inconsistency	No serious inconsistency	/	
Indirectness	No serious indirectness	/	
Imprecision	Serious (-1)	Continuous outcomes information is likely to be insufficient, if total number of participant is less than n=400. n=144, so the evidence was downgraded one level.	
Publication Bias	Undetected	Not strongly suspected	
Other	/	/	

PAS (L. R. Mikkelsen et al., 2012)			
GRADE criteria	**Rating**	**Footnotes**	**Quality of the evidence**
Study design	RCT (starts as high quality)	Start with high quality (RCT)	⊕⊕OO Low
Risk of Bias	Serious (-1)	No blinding of participants and personnel. No random sequence generation, incomplete outcome date, other bias is unknown	
Inconsistency	No serious inconsistency	/	
Indirectness	No serious indirectness	/	
Imprecision	Serious (-1)	Continuous outcomes information is likely to be insufficient, if total number of participant is less than n=400. n=44, so the evidence was downgraded one level.	
Publication Bias	Undetected	Not strongly suspected	
Other	/	/	

JOA (Nankaku et al., 2016)			
GRADE criteria	**Rating**	**Footnotes**	**Quality of the evidence**
Study design	RCT (starts as high quality)	Start with high quality (RCT)	⊕⊕OO Low
Risk of Bias	Serious (-1)	Major items in risk of bias table are unknown	
Inconsistency	No serious inconsistency	/	
Indirectness	No serious indirectness	/	
Imprecision	Serious (-1)	Continuous outcomes information is likely to be insufficient, if total number of participant is less than n=400. n=28, so the evidence was downgraded one level.	
Publication Bias	Undetected	Not strongly suspected	
Other	/	/	

Goniometry (Nankaku et al., 2016; Umpierres et al., 2014)			
GRADE criteria	**Rating**	**Footnotes**	**Quality of the evidence**
Study design	RCT (starts as high quality)	Start with high quality (RCT)	⊕⊕⊕O Moderate
Risk of Bias	No serious risk of bias	/	
Inconsistency	No serious inconsistency	/	
Indirectness	No serious indirectness	/	
Imprecision	Serious (-1)	Continuous outcomes information is likely to be insufficient, if total number of participant is less than n=400. n=134, so the evidence was downgraded one level.	
Publication Bias	Undetected	Not strongly suspected	
Other	/	/	

Merle d'Aubigné and Postel score (Umpierres et al., 2014)			
GRADE criteria	**Rating**	**Footnotes**	**Quality of the evidence**
Study design	RCT (starts as high quality)	Start with high quality (RCT)	⊕⊕⊕O Moderate
Risk of Bias	No serious risk of bias	/	
Inconsistency	No serious inconsistency	/	
Indirectness	No serious indirectness	/	
Imprecision	Serious (-1)	Continuous outcomes information is likely to be insufficient, if total number of participant is less than n=400. n=106, so the evidence was downgraded one level.	
Publication Bias	Undetected	Not strongly suspected	
Other	/	/	

Table 5

Strengths and weaknesses analysis

Author(s), Date	Strengths	Weaknesses
(M. S. Austin et al., 2017)	- Subjects analysed (n=108) - Patients were randomised using an Excel random number generator - Long-term follow up (6-12 months)	- No blinding of participants, personnel and outcome assessors - No concealed allocation - A substantial number of patients were noncompliant with the allocated intervention - Two different approaches were used to perform THA - Selection bias may have influenced the cohort - Subjects may grade themselves as having a maximal or minimal score on self-reported outcomes, therefore the HHS, WOMAC and SF-36 have been reported to have floor and ceiling effects
(Galea et al., 2008)	- Patients were randomly assigned to the intervention or control group	- Small sample size, subjects analysed (n=23) - No information was given about the randomisation sequence, the blinding and the allocation concealment - No real control group was used in the study, therefore the program's true effect is untested - Possible self-report bias in the recording of the exercise sessions in the intervention group - No information was given about the surgical approach
(L. R. Mikkelsen et al., 2014)	- Patients were randomly assigned to groups using a block randomisation - Subjects analysed (n=73) - Allocation was concealed using a simple shuffling envelope procedure - Patient, therapist and outcome assessors were blinded - Exclusion of the preoperative best functioning patients - Well-described intensity and execution of the exercises	- Potential selection bias and risk of attention bias
(L. R. Mikkelsen et al., 2012)	- Subjects are random assigned to groups - Allocation was concealed - Blinding of outcome assessors - Subjects analysed (n=44)	- No information was given about the randomisation sequence - No blinding of patients and therapists - Participants' additional training activities might have affected their outcomes

		- Follow-up time is relatively short (12 weeks) - Because it ended up as a pilot study, it is not possible to make conclusions about the efficacy of the intervention - Measurement errors - Limited test battery
(Monticone et al., 2014)	- Patients were randomised according to a random sequence generation and allocation was concealed - Blinding of outcome assessment - Subjects analysed (n=100) - Limited number of drop-outs - RCT was internally valid - Long term follow-up (12 months)	- No blinding of participants and personnel - Not generalizable to all patients undergoing a first THA or surgical revisions - Use of self-reported measures - Relationship between self-reported measures and physical measures/test was not investigated - No pre-surgical scores of disability, pain, ADL and quality of life - Surgical approach not mentioned or obtained by email
(Nankaku et al., 2016)	- 100% compliance of subjects	- Random sequence generation and type of blinding not mentioned - Allocation concealment not mentioned - Subjects analyse (n=28) - Investigated intervention only lasted 4 weeks - Not generalizable to all THA surgical approaches - No long-term follow-up (4 weeks)
(Okoro et al., 2016)	- Patients were randomised according to a random sequence generation - Blinding of outcome assessment - Long term follow-up (9-12 months)	- No blinding of participants and personnel - Allocation concealment not mentioned - Subjects analysed (n=26) - Compliance was a self-reported measure - Additional training activities to the intervention could not be controlled for - 25% loss-to follow up - Limited generalizability - Hip abduction exercises were included but the main focus were knee-extension exercises
(Umpierres et al., 2014)	- Patients were randomised according to a random sequence generation - Blinding of outcome assessment - Subjects analysed (n=106) - Merle d'Aubigné and Postel score is validated to measure fuctional capacity - Merle d'Aubigné and Postel	- No blinding of participants and personnel - Short-term follow-up (2 weeks) - Allocation concealment not mentioned - Kendall's criteria can (negatively) be influenced by pain - Measurements were obtained by different researchers and the

	score and SF-36 are effective and reliable		lack of a standard method to measure muscle strength - Patient comorbidities were not included - Gait evaluation was only reported as gait speed - Results not generalizable to other surgical approaches

Table 6

Used active rehabilitation contents including GMe exercises after THA

Intervention	Content
Standard rehabilitation (L. R. Mikkelsen et al., 2012; Nankaku et al., 2016; Okoro et al., 2016)	*Exercise type* - Gluteal muscle sets, leg sliding, straight leg raising, bridging, knee extension in sitting with low resistance, hip abduction in supine position without resistance, strengthening exercises for hip external rotators (supine, side lying with hip and knee flexed and prone with hip in neutral ab/adduction and knee 90° flexed) - Exercises without external resistance - Weight bearing performed against gravity (half squat, bilateral heel raises) - Balance: move bilateral to unilateral support - Functional without external loading - Postural exercises focusing on strengthening overstretched and weak muscles *Modality* - Isometric, concentric, eccentric *Stretching exercise* - Stretching of hip flexors *Supplementary exercises* - Biking - Walking
Inpatient rehabilitation (Monticone et al., 2014; Umpierres et al., 2014)	*Exercise type* - Strengthening of the gluteal and thigh muscles - Strength exercises: flexion, extension, abduction, external rotation, isotonic and isometric quadriceps strengthening, hamstring curls - Gait/walking training - Balance: turning, sudden start/stop, changing speed/direction - Functional training: sit-to stand, ascending/descending stairs, climbing obstacles, important ADL-strategies, recovering functional abilities *Modality* - Open and closed kinetic chain exercises - Isometric, concentric *Supplementary exercises* - Stationary cycling (strength and mobility) *Remark* - Supervised THA-protocol: supervised by a multidisciplinary hip group supported by a physical therapist - Unsupervised THA-protocol: supervised by a multidisciplinary hip group only

	- A booklet with ergonomic advice can be given in addition to the inpatient exercises
Outpatient rehabilitation (M. S. Austin et al., 2017; Galea et al., 2008; L. R. Mikkelsen et al., 2014)	*Exercise type* - Warming up on stationary bike - Strengthening and endurance: hip abduction - PRT: hip extension and abduction - Balance exercises: active single-leg stance - Functional exercises: sit-to-stand, figure-of-eight path walk, climbing steps, side stepping *Modality* - Isometric, concentric, eccentric - Open and closed kinetic chain exercises *Supplementary exercises* - Walking - Biking *Remark* - Patients can be given a list of suggested physical therapy home-exercises in addition to the outpatient rehabilitation
Home-based rehabilitation (M. S. Austin et al., 2017; Galea et al., 2008; L. R. Mikkelsen et al., 2014; L. R. Mikkelsen et al., 2012; Okoro et al., 2016)	*Exercise therapy* - Unloaded hip flexion, hip extension, hip abduction, knee flexion, knee extension - Exercises performed with a resistance band for the muscle groups most commonly affected by THA - Functional exercises: step exercises, sit-to-stand, block stepping, stair climbing, walking, lateral weight transfer exercises *Modality* - Isometric, concentric, eccentric - Open and closed kinetic chain exercises *Stretching exercise* - Stretching of hip flexors *Supplementary exercises* - Walking - Biking *Remark* - Patients can be given detailed physical therapy manual with written basic instructions and illustrations - A demonstration of exercises prior to discharge can be given to the patients

Table 7

Data extraction of included articles

Surgical approach: combination of direct lateral or direct anterior approach			
Author	**Patient**	**Content**	**Results**
(Matthew S. Austin et al., 2017)	Number of patients: n=120* IG (n=60) CG (n=60)	**IG: Unsupervised home exercise group** *Exercise type* - Patients received a detailed physical therapy manual with written explanations and images - Demonstration of exercises prior to discharge *Modality* - No information *Volume* - 3x/d for 10 w **CG: Formal outpatient therapy** *Exercise type* - In-home physical therapy - Formal outpatient therapy - Patients received a list of suggested physical therapy home-exercises *Modality* - No information *Volume* - 2w in-home therapy - 2-3x/w for 8w	**HHS** **(Activity level)** Significant within group differences were found for the IG ($p<0.001$) and CG ($p<0.001$) between baseline and 1 month. This significant difference was also found between baseline and the 6-12 month follow up for both groups with $p<0.001$. No significant difference between groups at 1 month, 6 and 12 months postoperatively when controlling for confounders ($p=0.82$). **WOMAC** **(Activity level)** Significant within group differences were found for the IG ($p<0.001$) and CG ($p<0.001$) between baseline and 1 month. This significant difference was also found between baseline and the 6-12 month follow up for both groups with $p<0.001$. No significant difference between groups at 1 month, 6 and 12 months postoperatively when controlling for confounders ($p=0.80$). **SF-36: Physical Health Component Summary** **(Activity level)** Significant within group differences were found for the IG ($p<0.001$) and CG ($p<0.001$) between baseline and 1 month. This significant difference was also found between baseline and the 6-12 month follow up for both groups with $p<0.001$. No significant difference between groups at 1 month, 6 and 12 months postoperatively when controlling for confounders ($p=0.90$). **SF-36: Mental Health Component Summary** **(Activity level)** Within group differences were not significant with $p=0.70$. No significant difference between groups at 1 month, 6 and 12 months postoperatively when controlling for confounders ($p=0.34$).

Surgical approach: Posterior approach			
Author	**Patient**	**Content**	**Results**
(L. R. Mikkelsen et al., 2014)	Number of patients: 73* IG (n=37) CG (n=36)	**IG + CG** Before discharge patients received physical therapy aiming at independency in gait, transfer, personal care and home-based exercise. **IG: home-based exercises with supervised progressive resistance training** *Exercise type* - Home-based exercises (unloaded hip flexion, hip extension, hip abduction, knee flexion, knee extension) - Warming-up on stationary bike - Supervised progressive resistance training (hip extension and hip abduction) - Encouraged to supplement exercises with aerobic training (walking, biking) *Modality* - 3s CON, 1s ISO, 3s EXC during full possible ROM *Volume* - Warming-up: 5 – 10 min - PRT: 2x/w for 10 weeks, 30-40 min (12 RM (week 1), 10 RM (week 2-5), 8 RM (week 6-10), 3 sets with 60s of rest between sets) - Unloaded exercises: 10 repetitions 2x/d for 5d/w - >48h rest between sessions	**20-MWT** **(Body function and structures)** Both groups improved significantly from baseline to 10 weeks (p<0.05) but not at 6 months follow-up (p>0,05). Significant difference between groups (p=0.008), in favour of the intervention group. **HHD isometric hip abduction** **(Body function and structures level)** Both groups improved significantly from baseline to 10 weeks (p<0.05). This was not found at 6 months follow-up (p>0.05)). No significant difference between groups (p=0.26). **HHD isometric hip flexion** **(Body function and structures level)** Hip flexion strength improved significantly from baseline to 10 weeks (p<0.05) in the intervention group. This was not found at 6 months follow-up (p>0.05)). The control group did not improve significantly (p>0.05) No between group differences were found (p=0.29). **30s sit-to-stand test** **(Activity level)** Both groups improved significantly from baseline to 10 weeks (p<0.05). This was not found at 6 months follow-up (p>0.05). No significant difference between groups (p=0.12). Remark: patients were not measured at 4 weeks follow-up. **Stair climb performance** **(Activity level)** Both groups improved significantly from baseline to 10 weeks (p<0.05) and at 6 months follow-up (>0.05). Remark: patients were not measured at 4 weeks follow-up. Significant difference between groups (p=0.04).

		CG: Home-based exercises without supervision *Exercise type* - Home-based exercises (unloaded hip flexion, hip extension, hip abduction, knee flexion, knee extension) - Encouraged to supplement exercises with aerobic training (walking, biking) *Modality* - No information *Volume* - 10 repetitions 2x/d for 7d/w	**HOOS** **(Activity level)** Both groups improved significantly at 10 weeks for the following subscales: symptoms, pain, ADL, sport/recreation and quality of life ($p<0.05$). These differences were not found at 12 months follow-up ($p>0.05$). Remark: sport/recreation was not measured at 2 and 4 weeks follow-up. No significant difference between groups ($p=0.31 – 0.90$).
(L. R. Mikkelsen et al., 2012)	Number of patients: n=46* IG (n=25) CG (n=21)	**IG + CG** During hospital stay, both groups received three supervised sessions in groups of 2-4 patients. The training was continued at home. **IG: Intensified home-based exercises** *Exercise type* - Step exercises - Exercises performed with a resistance band for the muscle groups most commonly affected by THA - Stretching of hip flexors - Walking and biking *Modality* - CON/EXC (resistance bands), ISO (gluteal sets), no information on stretching *Volume* - 10 repetitions 2x/d - Progression after 4 weeks by increasing speed and range of movement	**10-MWT** **(Body function and structures level)** Significant increase was found in the intervention group at 12 weeks ($p<0.05$). In the control group there was found a significant decrease at 12 weeks ($p<0.01$). There was no significant difference between groups 12 weeks postoperative ($p=0.50$). **HHD Isometric hip abduction strength of the operated and non-operated leg** **(Body function and structures level)** Significant increase for both groups at 12 weeks postoperatively for the operated and non-operated leg ($p<0.05$). No significant differences were found between groups at 12 weeks follow-up for the operated leg ($p=0.82$) and the non-operated leg ($p=0.50$). **One-legged stance on the operated and non-operated leg** **(Activity level)** There was a significant improvement for both groups at 12 weeks ($p<0.05$) compared to baseline in the operated and non-operated leg. No significant differences between groups 12 weeks postoperative for the operated leg ($p=0.88$) and the non-operated leg ($p=0.77$).

		CG: **Standard rehabilitation** *Exercise type* - Exercises without external resistance - Stretching of hip flexors - Biking and walking *Modality* CG: CON/EXC (gravity), ISO (gluteal sets), no information on stretching *Volume* - 10 repetitions 2x/d - No progression	**WOMAC** **(Activity level)** Significant decrease (p<0.001) in both groups at 4 weeks compared to baseline, for function, pain and stiffness. No significant difference between groups 12w postoperative for function (p=0.92), pain (p=0.61) and stiffness (p=0.79). **PAS** **(Activity level)** No significant difference between groups (p=0.07). **EQ-5D** **(Activity level)** Significant difference for both groups at 4 w compared to baseline for health status (p<0.001) and visual analogue scale (VAS) (p<0.05). No significant differences between groups 12 weeks postoperative in health status (p=0.89) and VAS (p=0.31). **Patient satisfaction** **(Person level)** Significant differences between groups in how strenuous the exercises were experienced (p=0.021), with the IG saying the exercises were too hard in the beginning and adequate later. The majority of the CG saying the exercises were adequate in the beginning and too easy later on. No significant difference between groups about satisfaction (p=0.095) and meaningfulness (p=0.747). **Training compliance** **(Person level)** There were no significant differences between groups for exercise program (performances/week) with p=0.37, walking/stationary biking (min/day) with p=0.19 and extra training with p=0.86.
(Okoro et al., 2016)	Number of patients: n=49* IG (n=25) CG (n=24)	**IG: home-based** PRT *Exercise type* - Functional exercises (sit-to-stand, block stepping, stair climbing, walking, lateral weight transfer exercises)	**TUG** **(Activity level)** Significant improvement in both groups (p=0.0001). No between group differences at 9 to 12 months (p=0.972).

	- Strengthening exercises (sitting knee extension) *Modality* - Mix of open and closed kinetic chain exercises - CON, ECC *Volume* - 5x/w for 6 weeks - To achieve progression overload number of repetitions increased according to the following scheme: 0-3, 4-6, 7-10 - Further progression by using ankle weights and foam blocks **CG: Standard rehabilitation** *Exercise type* - Weight bearing performed against gravity - Functional exercises without external loading - Bed-based exercises (buttock squeezes, leg sliding, straight leg raising, bridging) - Postural exercises focusing on strengthening overstretched and weak muscles *Modality* - CON, ECC *Volume* - 6 weeks - No further information	**30s sit-to-stand test** **(Activity level)** Significant improvement in both groups (p=0.0001). No between group differences (p=0.239). **6MWT** **(Activity level)** Significant improvement in both groups (p=0.0001). Significant difference between groups at 9-12m (p=0.004) in favour of the control group. **Stair climbing performance** **(Activity level)** Significant improvement in both groups (p=0.0001). Significant difference between groups (p=0.038) in favour of the control group.

Surgical approach: anterolateral approach			
Author	**Patient**	**Content**	**Results**
(Nankaku et al., 2016)	Number of patients: 28* IG (n=14) CG (n=14)	**IG: Hip external rotation exercise** *Exercise type* - Strengthening exercises for hip external rotators performed in three different body positions (supine, side lying with hip and knee flexed and prone with hip in neutral ab/adduction and knee 90° flexed) - Conventional rehabilitation: weight bearing exercises to achieve ambulation with a cane (move bilateral to unilateral support) - Gluteal muscle sets, bridging, heel slides, knee extension in sitting with low resistance, hip abduction in supine position without resistance, bilateral heel raises, half squat *Modality* - CON/EXC (elastic bands, gravity), ISO (gluteal sets, bridging) *Volume* - 8-12 repetitions, 3 sets, 5x/w - Resting time equivalent to one set - Progression: active assisted → active → low resistance (resistance bands) **CG: Conventional rehabilitation** - Conventional rehabilitation: weight bearing exercises to achieve ambulation with a cane (move bilateral to unilateral support) - Gluteal muscle sets, bridging, heel slides, knee extension in sitting with low resistance, hip abduction in supine position without resistance,	**JOA** **(Body function and structures level)** Significant differences for both groups (p<0.05) between pre- and post-intervention results. No between group information. **Goniometry passive hip flexion and abduction** **(Body function and structures level)** Significant improvement for hip flexion and abduction in both groups with p<0.05. No between group information. **HHD hip abduction operated leg** **(Body function and structures level)** Significant improvement for the intervention group (p<0.05). There was no significant difference in the control group (p=0.789). No between group information. **HHD external rotation operated leg** **(Body function and structures level)** There was no significant difference found in the intervention group (p=0.973). In the control group, there was a significant decrease (p<0.05). No between group information. **TUG** **(Activity level)** Significant improvement in the intervention group (p<0.05). No significant difference for the control group (p=0.352). No between group information.

		bilateral heel raises, half squat *Modality* - CON/EXC (gravity), ISO (gluteal sets, bridging) *Volume* - Intervention for 4 weeks, no further information - No progression	
Surgical approach: postero-lateral approach			
Author	**Patient**	**Content**	**Results**
(Umpierres et al., 2014)	Number of patients: n=106* IG (n=54) CG (n=52)	**IG: THA-protocol with supervision** *Exercise type* - Assistance by the multidisciplinary hip group (head nurse and medical hip staff) - Supported by a physiotherapy professional - Strengthening of the gluteal and thigh muscles - Gait training *Modality* - No information *Volume* - Strengthening exercises: 3x 12 repetitions - No further information **CG: THA-protocol** *Exercise type* - Assistance by the multidisciplinary hip group (head nurse and medical hip staff) - One time only verbal orientation and demonstration of strengthening exercises and gait training *Modality* - No information	**Goniometry (hip)** **(Body function and structures level)** For the intervention group there were significant improvements (p<0.001) between pre- and postoperative results for hip flexion, extension, adduction, abduction, internal and external rotation. In the control group significant differences were found for extension (p=0.001), adduction (p<0.001) and internal rotation (p<0.001). There were no significant differences for flexion (p=0.15), abduction (p=0.08) and external rotation (p=0.07). Significant differences between groups for adduction (p=0.002) and abduction (p=0.01) in favour of the intervention group. **Muscle strength (Kendall's criteria)** **(Body function and structures level)** There were significant differences in both groups for all values (p<0.05): flexion, extension, abduction, adduction, internal/external rotation and knee flexion/extension. Significant differences between groups for flexion (p<0.001), extension (p<0.001), adduction (p=0.003), abduction (p=0.002), internal rotation (p <0.001), external rotation (p<0.001) in favour of the intervention group. **Merle d'Aubigné and Postel scores** **(Body function and structures level)** Significant differences (p<0.05) in the intervention group pre- and postoperatively were found for motor performance evaluation, pain clinical evaluation, mobility clinical evaluation and global clinical evaluation. No significant differences for gait clinical evaluation (p=0.17).

		Volume - Strengthening exercises: 3x 12 repetitions - No further information	In the control group significant differences (p<0.05) for pain clinical evaluation and gait clinical evaluation. No significant differences for motor performance evaluation (p=0.16), mobility clinical evaluation (p=0.08) and global clinical evaluation (p=0.10). Significant between group difference for pain clinical evaluation (p=0.02), mobility clinical evaluation (p=0.01) and global clinical evaluation (p<0.001) in favour of IG. **SF-36** **(Activity level)** Significant differences (p<0.05) in the intervention group pre- and postoperatively were found for bodily pain, general health, vitality, social functioning and mental health. No significant differences were found for physical functioning (p>0.99), role physical (p>0.99) and role emotional (p>0.99). In the control group significant differences (p<0.05) were found for bodily pain, vitality, social functioning and mental health. In this group no significant differences were found for physical functioning (p>0.99), role physical (p>0.99), general health (p=0.09) and role emotional (p>0.99). Significant between group difference for bodily pain (p=0.01) in favour of the intervention group was found.
Surgical approach: unknown			
Author	**Patient**	**Content**	**Results**
(Galea et al., 2008)	Number of patients: 23* IG (n=11) CG (n=12)	**IG + CG** 5-6-day common program of functional tasks (gait stairs, transfers that address circulation/ROM/muscle strength) **IG: Supervised centre-based exercise group** *Exercise type* - Functional exercises (sit-to-stand, figure-of-eight path walk, climbing steps, side stepping) - Balance exercises (active single-leg stance) - Strengthening and endurance (hip	**Gait parameters** **(Body function and structures level)** Significant increase in the IG were fond for walking speed, cadence, step length (p<0.05). Significant reduced step time, percentage in stance time, single-support time (affected and unaffected limb) and double-support time (p<0.05). Significant improvement for symmetry index (step length) with p<0.05. No significant improvement for symmetry index (step time, single-support time and double-support time) with p>0.05. Significant increase in the CG were found for walking speed, cadence, step length (p<0.05). Unchanged step time, percentage in stance time and double-support time for the control group (p>0.05). Significantly reduced single-support time. Significant improvement for symmetry index (step length) with p<0.05. No significant improvement for symmetry index (step time, single-support time and double-support time) with p>0.05.

		abduction, heel raise) *Modality* - Mix of open and closed kinetic chain exercises - CON and ECC exercises executed against gravity *Volume* - Exercises executed for max. 5 min, stopping when feeling pain or tired - Progression was set by a physical therapist - Most exercises were progressed by increasing speed and therefore number of repetitions **CG: Home-based exercise group** *Exercise type* - Patients received an illustrated guide with the same exercises as IG, with basic instructions and illustrations *Modality* - Mix of open and closed kinetic chain exercises - Mix of concentric and eccentric exercises executed against gravity *Volume* - Exercises executed for max. 5 min, stopping when feeling pain or tired - No advice was given about progression	No significant differences between groups (p>0.05). **AQoL** **(Body function and structures level)** Both groups improved significantly on the AQOL (p=0.02). No significant difference between groups (p=0.121). **TUG** **(Activity level)** Significant within group improvements between pre and post results were found for the IG (p=0.003) and the CG (p=0.002). There was a significant difference between groups at 2 months (p=0.042) in favour of the CG. **6MWT** **(Activity level)** There was a significant increase in distance between pre and post results in the IG (p=0.02) and the CG (p=0.001). There was no significant between group difference (p=0.121). **Stair climbing** **(Activity level)** Both groups showed significant improvements in stair climbing (stair time and power) with p<0.05. No significant differences between groups (p=0.121). **WOMAC** **(Activity level)** There was a significant difference in the IG for pain (p=0.07) and function (p=0.0001). There was no significant difference in stiffness (p=0.26). There was a significant difference in the CG for function (p=0.002). There was no significant difference in pain (p=0.08) and stiffness (p=0.34). There was no significant difference between groups (p=0.121) for all 3 items.
(Monticone et al., 2014)	Number of patients: n=100* IG (n=50)	**IG: Task-oriented exercises** *Exercise type* - Functional training (sit-to stand, ascending/descending stairs,	**WOMAC** **(Activity level)** There was a significant difference in both groups (p<0.001) between pre- and post-training and follow-up in physical function, pain, stiffness, numeric

CG (n=50)	climbing obstacles, important ADL-strategies, recovering functional abilities and balance (turning, sudden start/stop, changing speed/direction)) - Strength and mobility: stationary cycling - Patients received a booklet with ergonomic advice *Modality* - Closed kinetic chain exercises *Volume* - increasing loads on the operated limb (walking in place, bilateral and unilateral knee flexion while standing) **CG: open kinetic chain exercises** *Exercise type* - Strength exercises (flexion, extension, abduction, external rotation, isotonic and isometric quadriceps strengthening, hamstring curls) - Walking training *Modality* - Open kinetic chain exercises - Concentric exercises - Isometric quadriceps settings *Volume* - No information	rating scale and functional independence measure. There was a significant between group difference (p<0.001) in favour of the intervention group. **SF-36** **(Activity level)** There was a significant difference in both groups (p<0.05) between pre- and post-training and follow-up in physical function, physical role, bodily pain, general health, vitality, social function, emotional role and mental health. Significant between group difference for physical function (p<0.001), physical role (p=0.002), bodily pain (p<0.001), general health (p<0.001), vitality (p=0.030) and mental health (p=0.015). No significant difference between groups for social function (p=0.264) and emotional role (p=0.075). **Global perceived effect of treatment using a 5-point scale (person level)** Between group differences were significant (p<0.001) with greater perceived effect in the IG.

** baseline characteristics were tested for differences between groups*

Table 8

List of abbreviations

ADL	Activities of Daily Living
AqoL	Assessment of Quality of Life
CG	Control group
CON	Concentric
ECC	Eccentric
EQ-5D	EuroQol 5-Dimensions
GMe	M. Gluteus Medius
GRADE	Grading of Recommendations Assessment, Development and Evaluation
HHD	Hand Held Dynamometry
HHS	Harris Hip Score
HOOS	Hip Disability and Osteoarthritis Outcome Score
ICF	International Classification of Functioning, Disability and Health
IG	Intervention group
ISO	Isometric
JOA	Japanese Orthopaedic Association Score
PAS	Physical Activity Scale
PICO	Patient, Intervention, Comparison, Outcome
PRT	Progressive resistance training
RCT	Randomised Controlled Trial
RoB	Risk of Bias
ROM	Range of Motion
SF-36	Short form-36 item health survey
THA	Total Hip Arthroplasty
TUG	Timed Up and Go Test
WOS	Web of Science
WOMAC	Western Ontario & McMaster Universities Osteoarthritis Index
6MWT	Six Minute Walking Test
10- or 20-MWT	10- or 20 Meter Walk Test

PART II: RESEARCH PROTOCOL

1. Introduction

The research protocol itself is designed by Dra. J. Emmerzaal as part of her PhD. We only had a part in this critical appraisal and not in the design of the protocol. All credits go to Dra. J. Emmerzaal for designing the protocol and A. Bruijnes (MSc) for obtaining the approval of the Medical Ethical Committee. We will try to contribute to this PhD by researching the feasibility of a mobile app to measure functional status in healthy persons and patients with degenerative knee or hip disorders.

This protocol is provided to us and can be found in the appendix (Study 2). The following text is our own critical appraisal about this research protocol.

2. Aim of the research

The aim of this research is to investigate the feasibility of a mobile application to monitor functional status in healthy persons and in persons with degenerative hip and knee disorders.

2.1. Research question

1. To what extent is the use of a smartphone with added sensors to register functional status (i.e. level of activity and load profile), plausible?
2. To what extent do persons with degenerative hip and knee disorders expect that a mobile application, combined with extra sensors, will positively influence their treatment outcome?
3. To what extent is the use of a smartphone application (added with sensors) user-friendly?
4. To what extent is the technology of a smartphone application accepted by the patients?
5. Which information can be added to the smartphone application to give meaningful feedback to healthy persons and persons with degenerative hip and knee disorders to support the rehabilitation process?
6. Which suggestions can be given in relation to the design of the application; what would facilitate its use?

2.1.1. Critical appraisal research question

1. A positive aspect of this study is that the accuracy of a smartphone, and a smartphone combined with in extra sensor is researched. Existing literature states that smartphones have a built in accelerometer (Adusumilli, Joseph et al. 2017). Compared to pedometers, accelerometers have a higher reliability for measuring physical activity. (Bartholdy, Gudbergsen et al. 2018) Accelerometers can measure: frequency, intensity and duration (Song, Semanik et al. 2010), time-on-body, total energy expenditure, sedentary time, active time and amount of steps/day (Holsgaard-Larsen and Roos 2012), spatiotemporal gait parameters (Kobsar, Osis et al. 2016), inclination of body segments, body displacement and activity level (Chen, Chen et al. 2015). It has a good validity for discriminating between ‘active’ and ‘sedentary’ in a standardised as well as a non-standardised setting. (Bartholdy, Gudbergsen et al. 2018) When an accelerometer is supplemented with a gyroscope and magnetometer the accuracy for estimating the gravity vector improves. (Chen, Chen et al. 2015). This could be a useful addition to our research and measurements, because gravity is an important influencer of the joint load.
2. It is positive that this aspect is investigated. It might be possible to develop an application that is valid and reliable, but when there are no positive effects on the rehabilitation, its usefulness is questionable.
3. A smartphone application has to be user friendly. If not patients will be reserved to use it. So it is positive that this is investigated as well.
4. Apart from usefulness, the acceptance must be researched as well. When you develop a valid, reliable and useful application but patients are hold back to use it, the aim of the application will not be reached.

5. It is positive that feedback from the patients is obtained about what they expect from a sort-like application. By doing this, computer scientists can fine tune the application to the specific needs and desires of this population.
6. The design of the application can also contribute to user-friendliness. Therefore it is positive that persons can give feedback on this aspect.

2.2. Hypothesis

We formed several hypothesis concerning the six research questions:

1. When placing the smartphone in a correct and standardised position we believe that functional activities can be recognised and measured. With the current technology of sensors present in smartphones, we believe that registration of functional status is possible. For measuring the load profile and performing certain activities, it might be necessary to use an extra sensor For example, the gravity vector can be more accurately estimated by adding a gyroscope and a magnetometer. So, we hypothesis that adding these two sensors to the built in accelerometer, will provide us with a more accurate estimation of the load profile.
2. We believe that a mobile application can have a positive influence on rehabilitation in the home-setting. Usefulness in a hospital-setting can be questioned. Patients must adhere to a fixed scheme and are often less independent. In this way, it could be possible that personal daily goals, set on the application, cannot be reached even though they complete all the treatments given in the hospital. This can possibly be solved by adding specific individual goals for inpatient persons.
3. The smartphone must be worn all day long. Therefore smartphones must be small and compact so they can fit in the patient's pocket. Besides, when adding more sensors, the set-up must still be quick and easy. For the application itself, clear and simple tabs will be needed. Furthermore, data expenditure or use of battery must be low.
4. We hypothesise that a mobile application will be more accepted by frequent smartphone users. An extra question about how often participants use their smartphone might therefore be a valuable addition.
5. We believe that patients are in need of simple, clear and meaningful information about their daily achievements and physical active status. Professionals will be needing more detailed information about the physiological and biomechanical parameters and the active status.
6. Since the lay-out and user-friendliness are strongly influenced by personal preference, we cannot form a hypothesis.

3. Methodology

3.1. Research design

A quantitative and qualitative descriptive study

3.2. Participants

According to the protocol 60 participants should be recruited (20 healthy persons, 10 knee osteoarthritis patients awaiting total knee arthroplasty, 10 knee osteoarthritis patients who underwent total knee arthroplasty at least 6 weeks ago, 10 hip osteoarthritis patients awaiting total hip arthroplasty and 10 hip osteoarthritis patients who underwent total hip arthroplasty at least 6 weeks ago). The power is not calculated. This would be a valuable addition to this research.

3.2.1. Inclusion criteria

- Healthy subjects (n=20):
    - Age ≥ 18 years
    - Able to comprehend, speak and read Dutch
    - Prepared to work with a smartphone application
    - No musculoskeletal complaints or other complaints limiting movement patterns during activities of daily living
- Diagnosed unilateral knee and hip disorders (pre-operative, n=20; postoperative, n=20)
    - Age ≥ 18 years
    - Diagnosed with unilateral knee or hip osteoarthritis (degree 4)
    - Intermittent or constant pijn (VAS ≥ 2/10)
    - No total knee (n=10) or hip (n=10) arthroplasty or ≥ 6 weeks to 3 months post total knee (n=10) or hip (n=10) arthroplasty
    - Able to walk for 10 minutes and to negotiate stairs
    - No other musculoskeletal complaints or complaints limiting movement patterns during activities of daily living
    - Able to comprehend, speak and read Dutch
    - Prepared to work with a smartphone application

3.2.1.1. Critical appraisal inclusion criteria

The age of 18 was set to not exclude certain participants. We hypothesise that the average age will be higher because of higher age in THA persons. Besides, be willing to work with a smartphone is necessary for participation. We consider this an important inclusion criteria. When someone is not willing to use a smartphone, or has never used one, it might be possible that the application will get a worse score for usability. Furthermore, one must be diagnosed with unilateral knee or hip osteoarthritis. When testing the accuracy of this application, it might be valuable to make a comparison between the affected and non-affected side. This raises two new questions: ‘Will the smartphone and the application be able to measure just one leg?’ and ‘When registering data from both legs, will it be possible to select the information of the affected leg only?’.

3.2.2. Exclusion criteria

Not mentioned in the original protocol.

3.2.2.1. Critical appraisal exclusion criteria

It might be interesting to set an exclusion criterion for persons with psychological or cognitive conditions. These conditions could possibly interfere with one's mental capacity and therefore the use of an application can be more complicated. Exclusion of neurological conditions should also be considered, because this condition might influence the movement patterns.

3.2.3. Recruitment

Healthy persons will be recruited from family and friends. Knee and hip osteoarthritis patients will be recruited from Jessa Ziekenhuis Hasselt and Ziekenhuis Oost-Limburg Genk. Besides, persons having interest in taking part in this research are provided with an informative flyer. Recruitment of patients will be performed by A. Bruijnes (MSc).

3.2.3.1. Critical appraisal recruitment

This study aims to assess the feasibility of a mobile application, used in a hospital- and home-setting. When recruiting persons from Jessa Ziekenhuis Hasselt and Ziekenhuis Oost-Limburg Genk, we need to make sure we include inpatient as well as outpatient persons. Otherwise, when only implementing inpatient persons, a conclusion of functionality in the home-based setting cannot be made. Perhaps recruitment of persons is also possible via independent physiotherapy practices.

3.3. Medical ethics

This protocol is successfully defended by A. Bruijnes (MSc) and thus approved by the Medical Ethical Committee.

3.4. Intervention

To answer the questions for our part of this research, we will conduct the following interventions. Patients will perform a predetermined movement protocol at Hasselt University. A context, in which participants will pretend they wore a mobile phone with sensors in a home environment, will be outlined. By showing a standardised video it will be explained to the participants why the information of the application could possibly be meaningful to them. Afterwards, the persons will be asked to speak aloud al (positive and negative) concerns about using the application. This will be recorded to use later in data-analysis. Questionnaires about credibility of therapy and expectancy of treatment, prestation- and exercise expectations, social influence and facilitating circumstances and usability will be completed by the participants. These questionnaires have been adjusted to match the research questions as closely as possible. Additional questions about the use of the application will be asked. They can be found in the protocol (Appendix research protocol, study 2).

3.5. Outcomes

3.5.1. Primary outcomes

- Credibility and Expectancy Questionnaire (devilly & borkovec, 2000): evaluation of credibility of a certain therapy and expectations of treatment effects.
- The unified theory of Technology Acceptance Questionnaire (Venkatesh,2003): evaluation of acceptance of technology through four domains (expectancy of prestation and effort, social influence and facilitation circumstances).
- The Usefulness, Satisfaction and Ease of use (USE) questionnaire (Lund, 2001): evaluation of utility.

3.5.2. Secondary outcomes

- Additional questions, which can be found in the appendix (study 2)
- Clustered information from the interviews

3.5.3. Critical appraisal outcomes

Primary and secondary outcomes were not defined. Outcomes mentioned above are classified according to our opinion.

3.6. Data analysis

To answer our questions the protocol states that a descriptive data-analysis will be performed.

3.6.1. Critical appraisal analysis

According to our opinion it may be possible to add a comparative data-analysis by using the Kruskall-Wallis test (non-parametric). This might be valuable to compare results between the groups.

Qualitative data-analysis will be used to process and cluster the information from the interviews.

Both a quantitative and qualitative assessment of the outcomes will be done. Assessing the ability of the smartphone and sensors to measure the amount and way of movement in combination with the assessment of usability and meaningfulness gives a broad perspective on the effectiveness of the application.

4. Time planning

Patients will be recruited until January 2019. Afterwards, data will be processed and conclusions will be written before May 2019.

5. Reference list: research protocol

Adusumilli, G., Joseph, S. E., Samaan, M. A., Schultz, B., Popovic, T., Souza, R. B., & Majumdar, S. (2017). iPhone Sensors in Tracking Outcome Variables of the 30-Second Chair Stand Test and Stair Climb Test to Evaluate Disability: Cross-Sectional Pilot Study. *Jmir Mhealth and Uhealth, 5*(10), 11. doi:10.2196/mhealth.8656

Bartholdy, C., Gudbergsen, H., Bliddal, H., Kjaergaard, M., Lykkegaard, K. L., & Henriksen, M. (2018). Reliability and Construct Validity of the SENS Motion(R) Activity Measurement System as a Tool to Detect Sedentary Behaviour in Patients with Knee Osteoarthritis. *Arthritis, 2018*, 6596278. doi:10.1155/2018/6596278

Chen, C. H., Chen, T. C., Jan, M. H., & Lin, J. J. (2015). Acute effects of static active or dynamic active stretching on eccentric-exercise-induced hamstring muscle damage. *Int J Sports Physiol Perform, 10*(3), 346-352. doi:10.1123/ijspp.2014-0206

Devilly, G. J., & Borkovec, T. D. (2000). Psychometric properties of the credibility/expectancy questionnaire. *J Behav Ther Exp Psychiatry, 31*(2), 73-86.

Holsgaard-Larsen, A., & Roos, E. M. (2012). Objectively measured physical activity in patients with end stage knee or hip osteoarthritis. *Eur J Phys Rehabil Med, 48*(4), 577-585.

Kobsar, D., Osis, S. T., Phinyomark, A., Boyd, J. E., & Ferber, R. (2016). Reliability of gait analysis using wearable sensors in patients with knee osteoarthritis. *J Biomech, 49*(16), 3977-3982. doi:10.1016/j.jbiomech.2016.11.047

Lund AM. Measuring usability with the USE questionnaire. Usability and User Experience. 2001. Available from: http://www.stcsig.org/usability/newsletter/0110_measuring_with_use.html.

Song, J., Semanik, P., Sharma, L., Chang, R. W., Hochberg, M. C., Mysiw, W. J., . . . Dunlop, D. D. (2010). Assessing physical activity in persons with knee osteoarthritis using accelerometers: data from the osteoarthritis initiative. *Arthritis Care Res (Hoboken), 62*(12), 1724-1732. doi:10.1002/acr.20305

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS quarterly, 425-478.

6. Appendix: research protocol

Protocol

Haalbaarheid van een mobiele applicatie voor monitoring van functionele status

Titel

Haalbaarheid van een applicatie voor mobiele monitoring van de functionele status bij gezonde personen en bij personen met degeneratieve heup- en knie- aandoeningen

Achtergrond

Osteoarthritis is een degeneratieve chronische gewrichtsaandoening die gekarakteriseerd wordt door progressieve kraakbeen- en botaantasting. Osteoarthritis wordt gekarakteriseerd door pijn en functionele beperkingen tijdens wandelen en andere activiteiten van het dagelijks leven (Heidari 2011). Naast pijnvermindering, zal de kinesitherapeutische behandeling van osteoarthritis zich richten op het verbeteren van de beperkingen op functie-, activiteiten-, en participatieniveau (Pisoni 2008, Dreinhofer 2004). Verschillende factoren spelen een rol in de ontwikkeling van osteoarthritis, waaronder malalignementen in het gewricht die kunnen leiden naar abnormale gewrichtsbelasting. Enerzijds is het voor een goede voedingstoestand van gewrichten belangrijk dat men voldoende beweegt. Anderzijds is het ook belangrijk dat aberrante bewegingspatronen en abnormale gewrichtsbelasting vermeden worden. Zowel het activiteitenniveau als de kwaliteit van de beweging bepalen de functionele status van de patiënt. Feedback over deze functionele status aan de kinesitherapeut en aan de patiënt kan het advies omtrent bewegingsgedrag aansturen. Daarom is het nuttig om een mobiele applicatie te ontwikkelen die functionele activiteiten herkent en deze kan koppelen aan het belastingsprofiel.

Doelstellingen en onderzoeksvragen

Doelstellingen

Het eerste doel is om data te verzamelen over bewegingsgedrag van gezonde personen, zodat deze data gebruikt kunnen worden om algoritmes te trainen voor het herkennen van functionele activiteiten. Tevens kunnen deze data gebruikt worden als normwaarden waarmee het bewegingsgedrag van patiënten kan worden vergeleken, hetgeen zinvol is voor het geven van feedback aan patiënten en zorgverleners.

Een tweede doel is om gebruikersvereisten in kaart te brengen van gezonde personen, personen met degeneratieve heup- en knieaandoeningen, en de zorgverleners die betrokken worden bij het revalidatieproces

Onderzoeksvragen

- In welke mate herkent een smartphone functionele activiteiten zoals uitgevoerd in gestandaardiseerde omstandigheden door gezonde deelnemers en door mensen met degeneratieve heup- en knie- aandoeningen?
- Wat is de haalbaarheid van het gebruik van een smartphone met extra sensoren voor registratie van de functionele status, i.e. activiteitenniveau en belasting profiel?

- Welke informatie moet een app bevatten om zinvolle feedback te geven aan gezonde personen, personen met degeneratieve heup- en knie- aandoeningen en kinesitherapeuten die betrokken zijn bij de revalidatie van personen met degeneratieve heup- en knie-aandoeningen?

Om deze onderzoeksvragen te beantwoorden zullen 3 studies opgezet worden

1 Haalbaarheid van de herkenning van functionele activiteiten tijdens monitoring in de thuissituatie.

2 Haalbaarheid van en gebruikersvereisten voor het gebruik van een app voor het monitoren van de functionele status van gezonde personen, mensen met degeneratieve knieaandoeningen, mensen met degeneratieve heupaandoeningen.

3 Bevraging van zorgverleners (kinesitherapeuten, orthopedisten, …) met betrekking tot gebruikersvereisten van een app voor het mobiel registreren van de functionele status van personen met degeneratieve heup- en knie- aandoeningen.

Studie 1: Haalbaarheid van de herkenning van functionele activiteiten tijdens monitoring in de thuissituatie

Onderzoeksvragen

- In welke mate herkent een smartphone met de speciaal ontwikkelde applicatie activiteiten in een gestandaardiseerde setting bij gezonde deelnemers en bij mensen met degeneratieve heup- en knieaandoeningen?
- In welke mate herkent een smartphone met de speciaal ontwikkelde applicatie functionele activiteiten in de thuissituatie op basis van activiteiten die werden gemeten in gestandaardiseerde omstandigheden door gezonde deelnemers en door mensen met degeneratieve heup- en knie- aandoeningen?
- Welke informatie moet de smartphone app nog bijkomend bevatten om zinvolle feedback te kunnen geven aan gezonde personen en personen met degeneratieve heup- en knie-aandoeningen om het revalidatieproces te ondersteunen?
- Welke suggesties zijn er nog naar vormgeving van de app; wat zou het gebruik nog makkelijker maken?

Proefpersonen

In deze studie zullen 100 personen worden gerekruteerd (60 gezonde personen, 10 personen met knie osteoarthritis die op de wachtlijst staan voor een totale knie prothese, 10 knie osteoarthritis patiënten minimaal 3 maanden en 6 weken na de totale knie prothese operatie, 10 personen met heup osteoarthrose die op de wachtlijst staan voor een totale heup prothese operatie, 10 heup osteoarthritis patiënten minimaal 3 maanden 6 weken na de totale heup prothese operatie). De gezonde populatie zal worden gerekruteerd via sociale netwerken van de onderzoekers en van studenten Universiteit Hasselt. De knie en heup osteoarthritis-patiënten zullen worden gerekruteerd via Prof. Dr. Corten (orthopedist ZOL) en via Mevr. Amber Bruijnes (onderzoek coördinator dienst orthopedie ZOL). De patiënten zullen worden benaderd door Mevr. Bruijnes. Als onderzoek coördinator heeft zij toegang tot

patiënten patiëntendossiers en kan zij op die manier de patiënten rekruteren die aan de inclusiecriteria voldoen. Daarnaast zullen er proefpersoon flyers beschikbaar zijn voor geïnteresseerde personen zodat ze al een beeld kunnen krijgen over wat de studie inhoudt.

Hieronder staan de inclusie criteria opgesomd:
Gezonde personen (N = 60)

- Leeftijd ≥ 18 jaar
- Begrijpen, spreken en lezen van de Nederlandse taal
- Bereid om met een smartphone app te werken
- Geen musculoskeletale klachten of andere klachten die het bewegingspatroon kunnen beïnvloeden tijdens activiteiten van het dagelijkse leven

Personen met degeneratieve heup of knieaandoeningen (peroperatief, N = 10; post-operatief, N = 10)

- Leeftijd ≥ 18 jaar
- Gediagnosticeerd met unilaterale knie of heup artrose (graad 4)
- Intermittente of constante pijnklachten (VAS ≥ 2/10)
- Geen totale knie/heup prothese operatie ondergaan (peroperatief, N = 10/10) of ≥ 6 weken en 3 maanden na de totale knie/heup prothese operatie (postoperatief, N = 10/10)
- In staat om 10 minuten meter te wandelen en de trap op en af te lopen
- Geen andere musculoskeletale klachten of andere klachten die het bewegingspatroon kunnen beïnvloeden tijdens activiteiten van het dagelijkse leven
- Begrijpen, spreken en lezen van de Nederlandse taal
- Bereid om met een smartphone te werken

Methodologie
Deze studie heeft twee luiken, luik één vindt plaats in een gestandaardiseerde setting, en luik twee vindt bij de mensen thuis plaats.

Aan de deelnemers van het eerste luik wordt gevraagd om eenmalig onderstaand protocol te doorlopen, terwijl men 3-5 smartphones (type Samsung J5) met de ontwikkelde applicatie draagt in hiervoor bestemde tasjes die rond de lende gedragen worden. Data van de volgende sensoren worden geregistreerd: 3D accelerometer (50 Hz or 50 samples per seconde), GPS (1hz), 3D gyroscoop (50 Hz) en magnetometer (50 Hz). Ook zullen de quaternion data geregistreerd worden. Deze metingen vinden plaats in Universiteit Hasselt, campus Diepenbeek voor gezonde personen en in Ziekenhuis Oost Limburg, dienst Orthopedie voor mensen met degeneratieve heup- en knie-aandoeningen. Na het doorlopen van de verschillende activiteiten wordt aan de deelnemers een smartphone meegegeven die de activiteit thuis registreert via de app die ontwikkeld werd door de Mobile Health Unit van Universiteit Hasselt

Het volgende activiteiten protocol zal worden doorlopen:

Activiteit	**Omschrijving**
Wandelen	Gedurende 10 minuten wandelen op zelfgekozen snelheid
Trappen afdalen	Trappen afdalen volgens gewoonlijke patroon (indien mogelijk zonder leuning vasthouden)
Trappen opstijgen	Trappen bestijgen volgens gewoonlijke patroon (indien mogelijk zonder leuning vasthouden)
Van zit naar stand	Zitten op een stoel voor ± 3 seconden, tot stand komen (± 3 seconden), terug gaan zitten (± 3 seconden). Dit wordt herhaald voor 3 verschillende stoelhoogtes.
Fietsen	Er wordt 10 minuten gefietst op een fietsergometer ZONDER weerstand aan zelf gekozen snelheid

Daarna wordt er aan de deelnemers gevraagd om deel te nemen aan luik twee in de niet gestandaardiseerde setting. Er wordt tevens aan de deelnemers gevraagd om gedurende 7 dagen, tijdens zoveel mogelijk van de wakkere uren een smartphone (type Samsung J5) met de ontwikkelde applicatie mee te dragen die bevestigd wordt ter hoogte van de heup door middel van een heuptasje. De smartphone wordt meegegeven door de onderzoekers. Alle data van de deelnemers wordt gecodeerd opgeslagen op de server van de Mobile Health Unit (UHasselt). Naast het opvolgen van de data van de accelerometer, de magnetometer, en gyroscoop wordt ook bijgehouden in welke mate mensen de instructie voor het smartphone gebruik hebben opgevolgd (aantal uren per dag dat de smartphone gedragen werd).
Deze studie is puur observationeel, de beweeg data wordt alleen gebruikt als validatie middel voor de smartphone met ontwikkelde applicatie. De deelnemers krijgen tijdens hun deelname geen inzicht of feedback op hun beweegpatronen.
Na deelname aan de studie wordt gevraagd aan de deelnemers om volgende vragen te beantwoorden. Deze vragen zijn opgesteld als inventarisatie van de behoeftes van de doelgroep met betrekking tot het gebruik van deze applicatie. De antwoorden op deze vragen zullen gebruikt worden om de applicatie verder te ontwikkelen:

- In welke mate zou u het haalbaar vinden om tijdens uw activiteiten van het dagelijks leven een smartphone mee te dragen zodat uw functionele status geregistreerd kan worden?
- In welke mate zou u het zinvol vinden om feedback te krijgen over hoeveel per dag u wandelt, trappen doet, fietst, opstaat uit uw stoel?
- Over welke activiteiten zou u nog graag informatie krijgen:
    - Met betrekking tot de hoeveelheid activiteit die u uitvoert:

      ……

    - Met betrekking tot de kwaliteit van de bewegingsuitvoering:
      ……
- In welke mate zou u bereid zijn om, naast het bijhouden van de smartphone, ook sensoren te dragen (er wordt als voorbeeld actigraph sensoren getoond; velcro strap bevestiging ledematen en heuptasje)
- Hoeveel sensoren zou u maximaal bereid zijn om te dragen, samen met de smartphone?
    - 1
    - 2
    - 3
    - Meer dan 3
- Hoeveel tijd bent u bereid om te spenderen aan het bekijken van de smartphone feedback?
    - … minuten
- Bent u bereid om eventueel persoonlijke data in te geven op dagelijkse basis, zoals een eventuele pijnscore?
    - Ja
    - Neen
- Bent u bereid om eventueel een kalibratiemeting te laten uitvoeren in het labo van universiteit Hasselt om de kwaliteit van uw bewegingen te laten evalueren om een meer accurate evaluatie van uw belastingsprofiel toe te laten?
- Bent u bereid om uw data rond functionele status te delen met uw behandelende arts/kinesitherapeut zodat hij/zij u advies kan geven m.b.t. het optimaliseren van uw functionele status?

Data-analyse

De data die verzameld worden tijdens de metingen van luik één in de gestandaardiseerde metingen setting in Universiteit Hasselt en Ziekenhuis Oost Limburg laten toe aan het Computer Science Departement van KU Leuven (Jesse Davis en Tim Op De Beeck) om algoritmes op te stellen en te trainen valideren die de uitgevoerde activiteiten herkennen op basis van de ruwe data zoals geregistreerd door een mobiele telefoon. Deze algoritmes kunnen nadien toegepast worden op de data die verzameld worden via het mobiele data-collectie platform van Mobile Health Unit (MHU) in de thuissituatie. In deze studie zal worden nagegaan in welke mate activiteiten in de thuissituatie kunnen herkend worden door de opgestelde algoritmes. Voorafgaand aan de metingen is de smartphone met applicatie nog niet in staat om de activiteiten te herkennen. Het eindproduct van deze studie is een smartphone met de ontwikkelde applicatie die gevalideerd is voor het meten en herkennen van activiteiten in de thuissituatie bij patiënten met degeneratieve heup- en knie- aandoeningen.
De antwoorden op de vragen worden verwerkt met descriptieve data-analyse technieken (weergave gemiddelde scores en standaarddeviatie).

Studie 2: Haalbaarheid van het gebruik van van een app voor het monitoren van de functionele status van gezonde personen, mensen met degeneratieve knie aandoeningen, mensen met degeneratieve heup aandoeningen

Onderzoeksvragen

- In welke mate is het gebruik van een smartphone met extra sensoren voor registratie van de functionele status, i.e. activiteitenniveau en belasting profiel, geloofwaardig?
- In welke mate verwachten mensen met degeneratieve heup-, en knie- aandoeningen dat de smartphone app, in combinatie met extra sensoren, hun behandeluitkomst positief zal kunnen beïnvloeden?
- In welke mate is de toepassing van de app (met sensoren) gebruiksvriendelijk?
- In welke mate wordt de technologie van de smartphone app met sensoren aanvaard door de patiënten?
- Welke informatie moet de smartphone app nog bijkomend bevatten om zinvolle feedback te kunnen geven aan gezonde personen en personen met degeneratieve heup en knieaandoeningen om het revalidatieproces te ondersteunen?
- Welke suggesties zijn er nog naar vormgeving van de app; wat zou het gebruik nog makkelijker maken?

Proefpersonen

In deze studie zullen 60 personen worden gerekruteerd (20 gezonde personen, 10 knie osteoarthritis patiënten die op de wachtlijst staan voor een totale knieprothese, 10 knie osteoarthritis patiënten minimaal 6 weken 3 maanden na de totale knie prothese operatie, 10 heup osteoarthritis patiënten die op de wachtlijst staan voor een totale heup prothese operatie, 10 heup osteoarthritis patiënten minimaal 3 maanden 6 weken na de totale heup prothese operatie). De gezonde populatie zal worden gerekruteerd via familie en bekenden. De knie en heup osteoarthritis patiënten zullen worden gerekruteerd via het Jessa Ziekenhuis Hasselt en Ziekenhuis Oost-Limburg Genk.

De inclusiecriteria zijn gelijk aan deze van studie 1. De rekrutering van de patiënten gaat wederom via Mevr. Amber Bruijnes. Wederom zijn er proefpersoon flyers beschikbaar voor de rekrutering van geïnteresseerde personen zodat ze al een beeld kunnen krijgen over wat de studie inhoudt.

Methode

Er wordt gevraagd aan de proefpersoon om eenmalig een bewegingsprotocol te doorlopen in Universiteit Hasselt (zie supra studie 1). Nadien zal de proefpersoon de feedback op zijn/haar bewegingen bekijken. Er wordt een context geschetst waarbij de proefpersoon zich probeert in te beelden dat de data afkomstig zijn van het dragen van een mobiele telefoon en sensoren in de thuissituatie. Er wordt ook uitgelegd aan de proefpersoon waarom deze informatie mogelijk zinvol kan zijn voor hem/haar. Hiervoor wordt een standaard video getoond zodat de uitleg dezelfde is voor al de proefpersonen. Vervolgens wordt aan de proefpersoon gevraagd om luidop alle (positieve en

negatieve) bedenkingen weer te geven tijdens het gebruik van de app (thinking aloud methode, Fonteyn et al 1993). Dit proces wordt op video opgenomen om data-analyse nadien toe te laten.

Na gebruik van de app worden volgende vragenlijsten ingevuld. De vragenlijsten zijn aangepast om zo goed mogelijk aan te sluiten bij onze onderzoeksvragen:

- Credibility and Expectancy Questionnaire (Devilly & Borkovec 2000): evalueert de geloofwaardigheid van een bepaalde therapievorm, evenals de verwachte behandeleffecten.
- The Unified Theory of Technology Acceptance Questionnaire (Venkatesh 2003): evalueert de acceptatie van technologie door vier domeinen (prestatieverwachtingen, inspanningsverwachtingen, sociale invloed en faciliterende omstandigheden) te ondervragen.
- The Usefulness, Satisfaction and Ease of use (USE) vragenlijst (Lund 2001): meet de bruikbaarheid voor gebruikers.

Naast het invullen van de vragenlijsten zullen de volgende vragen worden gesteld:

- In welke mate zou u het haalbaar vinden om tijdens uw activiteiten van het dagelijks leven een smartphone mee te dragen zodat uw functionele status geregistreerd kan worden?
- In welke mate zou u het zinvol vinden om feedback te krijgen over hoeveel per dag u wandelt, trappen doet, fietst, opstaat uit uw stoel?
- In welke mate zou u het zinvol vinden om feedback te krijgen over uw gewrichtsbelastingsprofiel tijdens het wandelen, trappen doen, fietsen, opstaan uit uw stoel?
- Over welke activiteiten zou u nog graag informatie krijgen:
    - Met betrekking tot de hoeveelheid activiteit die u uitvoert: …….
    - Met betrekking tot de kwaliteit van de bewegingsuitvoering: ……
- Welke van onderstaande feedback toepassing(en) zijn wenselijk voor u (u mag er meerdere aankruisen indien van toepassing)
    - Real time feedback: op elk moment feedback over functionele status
    - Elke dag feedback (op 1 gekozen tijdstip) is ok
    - Wekelijks een feedback update is ok
- Welk van onderstaande feedback mogelijkheden wenst u (u mag er 1 of meerdere aanduiden)
    - Een vergelijking van mijn functionele status met deze van gezonde personen is wenselijk
    - Een overzicht van mijn functionele status ten opzichte van de andere dagen deze week
    - Een overzicht van mijn functionele status ten opzichte van vorige weken
- In welke mate zou u bereid zijn om, naast het bijhouden van de smartphone ook sensoren te dragen (er wordt als voorbeeld actigraph sensoren getoond; velcro strap bevestiging ledematen en heuptasje)
- Hoeveel sensoren zou u maximaal bereid zijn om te dragen samen met de smartphone?

- Hoeveel tijd bent u bereid om te spenderen aan het bekijken van de smartphone feedback?
- Bent u bereid om eventueel persoonlijke data in te geven op dagelijkse basis, zoals een eventuele pijnscore?
  - Ja
  - Neen
- Bent u bereid om eventueel een calibratiemeting te laten uitvoeren in het labo van universiteit Hasselt om de kwaliteit van uw bewegingen te laten evalueren om een meer accurate evaluatie van uw belastingsprofiel toe te laten?
- Bent u bereid om uw data rond functionele status te delen met uw behandelende arts zodat hij/zij u advies kan geven m.b.t. het optimaliseren van uw functionele status?

Data Analyse

De video opname van de thinking aloud procedure zal uitgetypt worden. Een kwalitatieve data analyse techniek zal worden toegepast om informatie te clusteren. Voor de overige data wordt een descriptieve data analyse uitgevoerd.

Studie 3: Bevraging van kinesitherapeuten met betrekking tot gebruikersvereisten van een app voor het mobiel registreren van de functionele status van personen met degeneratieve heup- en knie- aandoeningen

Proefpersonen

- Kinesitherapeuten die betrokken zijn bij de revalidatie van mensen met degeneratieve heup- en knieaandoeningen (n=20)
- Orthopedisch specialisten (n=5)
- Andere zorgverleners, e.g. huisartsen (n=20)

De zorgverleners (n=45) zullen gerekruteerd worden via studenten 2de bach Revalidatiewetenschappen en Kinesitherapie (module 2.4. mini-onderzoek) en via contacten van collega's van Ziekenhuis Oost Limburg en UHasselt. De orthopedisch specialisten worden gerekruteerd in ZOL en via netwerken van de specialisten. Daarnaast zullen er proefpersoon flyers uitgedeeld worden aan geïnteresseerde personen zodat ze al een beeld kunnen krijgen over wat de studie inhoudt.

Methode

De smartphone applicatie wordt uitgelegd aan de zorgverlener via een video die via een link kan toegestuurd worden aan de betrokken deelnemers.

Na het bekijken van deze video link wordt gevraagd om volgende vragenlijsten in te vullen. Deze vragenlijsten zijn aangepast om zo goed mogelijk aan te sluiten bij onze onderzoeksvragen:

- Credibility and Expectancy Questionnaire (Devilly & Borkovec 2000): evalueert de geloofwaardigheid van een bepaalde therapievorm, evenals de verwachtte behandeleffecten.
- The Unified Theory of Technology Acceptance Questionnaire (Venkatesh 2003):): evalueert de acceptatie van technologie door vier domeinen (prestatieverwachtingen, inspanningsverwachtingen, sociale invloed en faciliterende omstandigheden) te ondervragen.

Ook wordt gevraagd om volgende vragen te beantwoorden:

- In welke mate zou u het zinvol vinden om feedback te krijgen over hoeveel per dag uw patient wandelt, trappen doet, fietst, opstaat uit uw stoel?
- In welke mate zou u het zinvol vinden om feedback te krijgen over het gewrichtsbelastingsprofiel van uw patiënt tijdens het wandelen, trappen doen, fietsen, opstaan uit uw stoel?
- Over welke activiteiten zou u nog graag informatie krijgen:
  - Met betrekking tot de hoeveelheid activiteit die uw patiënt uitvoert: …….
  - Met betrekking tot de kwaliteit van de bewegingsuitvoering van uw patiënt: ……
- Welke extra informatie over de patiënt kan nuttig zijn voor het optimaliseren van zijn revalidatietraject (bv. pijnbeleving, werkhervatting, slaappatroon,..). ……..
- Op welke manier zou u graag feedback geven aan uw patiënt (bv. telefonisch, semi-automatisch via gestandaardiseerde berichten op de smartphone, opstellen van gepersonaliseerde trainingsschema's/oefeningen, …)
- Hoeveel tijd wenst u per patiënt te besteden aan het ontvangen en reageren op de feedback?
- Kan het geven van feedback aan de patiënt mogelijks een deel van de behandelingen in de praktijk vervangen? Zo ja, hoe zou u dit dan getarifeerd zien?

Data-analyse

Beschrijvende statistiek en kwalitatieve data analyse technieken zullen worden toegepast om de gegevens te verwerken

Literatuur referenties

Devilly G. & Borkovec T. 2000. Psychometric properties of the credibility/expectancy questionnaire. Journal of Behavior Therapy and Experimental Psychiatry, 2000. 31: p. 73-86.

Dreinhofer K, Stucki G, Ewert T, Huber E, Ebenbichler G, Gutenbrunner C, et al. ICF Core Sets for osteoarthritis. Journal of Rehabilitation Medicine. 2004 (44 Suppl): 75-80

Foneyn M, Kuipers B, et al. 1993. A description of Think Aloud Method and Protocol Analysis. Qualitative Health.

Heidari B. Knee osteoarthritis prevalence, risk factors, pathogenesis and features: Part I. Caspian Journal of Internal Medicine. 2011;2(2):205-12.

Lund AM. Measuring usability with the USE questionnaire. Usability and User Experience. 2001. Available from: http://www.stcsig.org/usability/newsletter/0110_measuring_with_use.html.

Pisoni C, Giardini A, Majani G, Maini M. International Classificatie of Functioning, Disability and Health (ICF) core sets for osteoarthritis. A useful tool in the follow-up of patients after joint arthroplasty. Eur J Phys Rehabil Med. 2008;44(4):377-85.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS quarterly, 425-478.

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KNOWLEDGE IN ACTION

VOORTGANGSFORMULIER WETENSCHAPPELIJKE STAGE DEEL 1

DATUM	INHOUD OVERLEG	HANDTEKENINGEN
13/11/2017	Zoektermen.	Promotor: Copromotor: AB Student(e): Mertens Student(e): Vermeulen
16/1/2018	Inclusie - exclusie inleiding	Promotor: Copromotor: AB Student(e): Mertens Student(e): Vermeulen
5/3/2018	Data-extractie tabel. Bijstellen exclusiecriteria.	Promotor: Copromotor: Student(e): Mertens Student(e): Vermeulen
30/4/2018	Verbetering inleiding en methode Bespreking protocol volgend jaar	Promotor: Copromotor: Student(e): Mertens Student(e): Vermeulen
28/5/2018	verbetering inleiding, methode a resultaten en tabellen. Bespreking discussie.	Promotor: Copromotor: Student(e): Mertens Student(e): Vermeulen
4/6/2018	Bespreking protocol	Promotor: Copromotor: Student(e): Mertens Student(e): Vermeulen
		Promotor: Copromotor: Student(e): Student(e):
		Promotor: Copromotor: Student(e): Student(e):
		Promotor: Copromotor: Student(e): Student(e):
		Promotor: Copromotor: Student(e): Student(e):

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Agoralaan Gebouw A, Room 0.01
Tel. 011 29 21 28

BEOORDELING VAN DE WETENSCHAPPELIJKE STAGE-DEEL 1

Wetenschappelijke stage deel 1 (Masterproef deel 1- MP1) van de Master of Science in de revalidatiewetenschappen en de kinesitherapie bestaat uit **twee delen**:

1) De literatuurstudie volgens een welomschreven methodiek.
2) Het opstellen van het onderzoeksprotocol ter voorbereiding van masterproef deel 2.

Omschrijving van de **evaluatie**:

1) 80% van het eindcijfer wordt door de promotor in samenspraak met de copromotor gegeven op grond het product en van het proces dat de student doorliep om de MP1 te realiseren, met name het zelfstandig uitvoeren van de literatuurstudie en het zelfstandig opstellen van het onderzoeksprotocol, alsook de kwaliteit van academisch schrijven.
2) 20% van het eindcijfer wordt door de interne jury gegeven op grond van het ingeleverde product en de mondelinge presentatie waarin de student zijn/haar proces toelicht.

In de beoordeling dient onderscheid gemaakt te worden tussen studenten die, in samenspraak met de promotor, een nieuw onderzoek uitwerkten en studenten die instapten in een lopend onderzoek of zich baseren op voorgaande masterproeven of onderzoeksprojecten. Van deze laatste worden bijkomende inspanningen verwacht zoals bv. het bijsturen van de eerder geformuleerde onderzoeksvraag, de kritische reflectie over het onderzoeksdesign, het uitvoeren van een pilotexperiment.

Beoordelingskader:

Beoordelingskader: criteria op 20	
18-20	Excellente modelmasterproef
16-17	Uitmuntende masterproef
14-15	Zeer goede masterproef die zich onderscheidt van de andere masterproeven
12-13	Goede masterproef
10-11	Voldoende masterproef die op een aantal vlakken zwak scoort
8-9	Onvoldoende masterproef die niet aan de minimumnormen voldoet
6-7	Ernstig onvoldoende masterproef of een masterproef die slechts één van beide bevat
≤ 5	Ernstig onvoldoende en onvolledige masterproef

ZELFEVALUATIERAPPORT

Onderstaand zelfevaluatierapport is een hulpmiddel om je wetenschappelijke stage -deel 1 zelfstandig te organiseren. Bepaal zelf je deadlines, evalueer en reflecteer over je werkwijze en over de diepgang van je werk. Check de deadlines regelmatig. Toets ze eventueel af bij je (co)promotor. Succes!

Prof. M. Vanvuchelen, coördinerende verantwoordelijke wetenschappelijke stages

Naam & Voornaam STUDENT: Lotte Vermeulen
Naam & Voornaam (CO)PROMOTOR & PROMOTOR: Prof. Dr. Annick Timmermans, Prof. Dr. K. Corten, A. Bruijnes (MSc), Drs. J. Emmerzaal
TITEL masterproef (Nederlandstalig of Engels): 'Effects of Exercise Therapy after Total Hip Arthroplasty: A Systematic Review'

LITERATUURSTUDIE	**Gestelde deadline**	**Behaald op**	**Reflectie**
De belangrijkste concepten en conceptuele kaders van het onderzoekdomein uitdiepen en verwerken	Oktober 2017	Oktober 2017	
De belangrijkste informatie opzoeken als inleiding op de onderzoeksvraag van de literatuurstudie	Verspreid over de hele masterproef	Februari 2018	
De opzoekbare onderzoeksvraag identificeren en helder formuleren in functie van de literatuurstudie	Oktober 2017	Oktober 2017	Is hierna nog een aantal keer verder verfijnd.
De zoekstrategie op systematische wijze uitvoeren in relevante databanken	Januari 2018	Januari 2018	
De kwaliteitsbeoordeling van de artikels diepgaand uitvoeren	Januari 2018	Maart 2018	
De data-extractie grondig uitvoeren	Februari 2018	Maart 2018	
De bevindingen integreren tot een synthese	Maart 2018	Juni 2018	

ONDERZOEKSPROTOCOL	**Gestelde deadline**	**Behaald op**	**Reflectie**
De onderzoeksvraag in functie van het onderzoeksprotocol identificeren	/	/	/
Het onderzoeksdesign bepalen en/of kritisch reflecteren over bestaande onderzoeksdesign	Juni 2018	Juni 2018	We hebben een onderzoeksprotocol uitgewerkt gekregen. Er werd ons op 11/06/2018 definitief bekend gemaakt aan welk onderzoek wij zullen deelnemen.
De methodesectie (participanten, interventie, uitkomstmaten, data-analyse) uitwerken	/	/	/

ACADEMISCHE SCHRIJVEN	**Gestelde deadline**	**Behaald op**	**Reflectie**
Het abstract to the point schrijven	April 2018	Juni 2018	

De inleiding van de literatuurstudie logisch opbouwen	Verspreid over de hele masterproef	Februari 2018	
De methodesectie van de literatuurstudie transparant weergegeven	Februari 2018	Maart 2018	
De resultatensectie afstemmen op de onderzoeksvragen	Februari 2018	Maart 2018	
In de discussiesectie de bekomen resultaten in een wetenschappelijke tekst integreren en synthetiseren	Maart 2018	Juni 2018	
Het onderzoeksprotocol deskundig technisch uitschrijven	/	/	/
Referenties correct en volledig weergeven	Juni 2018	Juni 2018	

ZELFSTUREND EN WETENSCHAPPELIJK DENKEN EN HANDELEN	**Aanvangsfase**	**Tussentijdse fase**	**Eindfase**
Een realistische planning opmaken, deadlines stellen en opvolgen	Zeer goed	Goed	Voldoende
Initiatief en verantwoordelijkheid opnemen ten aanzien van de realisatie van de wetenschappelijke stage	Goed	Goed	Goed
Kritisch wetenschappelijk denken	Voldoende	Goed	Goed
De contacten met de promotor voorbereiden en efficiënt benutten	Zeer goed	Zeer goed	Zeer goed
De richtlijnen van de wetenschappelijke stage autonoom opvolgen en toepassen	Voldoende	Goed	Zeer goed
De communicatie met de medestudent helder en transparant voeren	Goed	Zeer goed	Zeer goed
De communicatie met de promotor/copromotor helder en transparant voeren	Goed	Goed	Goed
Andere verdiensten:			

Naam & Voornaam STUDENT: Vienna Mertens

Naam & Voornaam (CO)PROMOTOR & PROMOTOR: Prof. Dr. Annick Timmermans, Prof. Dr. K. Corten, A. Bruijnes (MSc), Drs. J. Emmerzaal

TITEL masterproef (Nederlandstalig of Engels): 'Effects of Exercise Therapy after Total Hip Arthroplasty: A Systematic Review'

LITERATUURSTUDIE	**Gestelde deadline**	**Behaald op**	**Reflectie**
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De belangrijkste informatie opzoeken als inleiding op de onderzoeksvraag van de literatuurstudie	Verspreid over de hele masterproef	Februari 2018	
De opzoekbare onderzoeksvraag identificeren en helder formuleren in functie van de literatuurstudie	Oktober 2017	Oktober 2017	Is hierna nog een aantal keer verder verfijnd.
De zoekstrategie op systematische wijze uitvoeren in relevante databanken	Januari 2018	Januari 2018	
De kwaliteitsbeoordeling van de artikels diepgaand uitvoeren	Januari 2018	Maart 2018	
De data-extractie grondig uitvoeren	Februari 2018	Maart 2018	
De bevindingen ïntegreren tot een synthese	Maart 2018	Juni 2018	

ONDERZOEKSPROTOCOL	**Gestelde deadline**	**Behaald op**	**Reflectie**
De onderzoeksvraag in functie van het onderzoeksprotocol identificeren	/	/	/
Het onderzoeksdesign bepalen en/of kritisch reflecteren over bestaande onderzoeksdesign	Juni 2018	Juni 2018	We hebben een onderzoeksprotocol uitgewerkt gekregen. Er werd ons op 11/06/2018 definitief bekend gemaakt aan welk onderzoek wij zullen deelnemen.
De methodesectie (participanten, interventie, uitkomstmaten, data-analyse) uitwerken	/	/	/

ACADEMISCHE SCHRIJVEN	**Gestelde deadline**	**Behaald op**	**Reflectie**
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Het onderzoeksprotocol deskundig technisch uitschrijven	/	/	/
Referenties correct en volledig weergeven	Juni 2018	Juni 2018	

ZELFSTUREND EN WETENSCHAPPELIJK DENKEN EN HANDELEN	**Aanvangsfase**	**Tussentijdse fase**	**Eindfase**
Een realistische planning opmaken, deadlines stellen en opvolgen	Zeer goed	Goed	Voldoende
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De contacten met de promotor voorbereiden en efficiënt benutten	Goed	Goed	Goed
De richtlijnen van de wetenschappelijke stage autonoom opvolgen en toepassen	Goed	Voldoende	Goed
De communicatie met de medestudent helder en transparant voeren	Goed	Goed	Goed
De communicatie met de promotor/copromotor helder en transparant voeren	Voldoende	Voldoende	Voldoende
Andere verdiensten:	/	/	/