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Resistance training interventions for lower limb tendinopathy: A scoping review of resistance training reporting content, quality, and scientific implementation

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ABSTRACT

OBJECTIVES: 1. To describe what exercises and intervention variables are used in resistance training interventions for lower limb tendinopathy 2. To assess completeness of reporting as assessed by the Consensus on Exercise Reporting Template (CERT) and the Toigo and Boutellier framework. 3. To assess the implementation of scientific resistance training principles.

DESIGN: Scoping review

LITERATURE SEARCH: We searched MEDLINE, CINAHL, AMED, EMBase, SPORTDiscus, and the Cochrane library databases.

STUDY SELECTION CRITERIA: Randomized controlled trials, cohort studies, case series, case reports and observational studies that reported using resistance exercises for lower limb tendinopathies.

DATA SYNTHESIS: Completeness of the reporting of exercise descriptors and programme variables was assessed by the CERT and the Toigo and Boutellier framework

RESULTS: 194 studies were included. Reporting of exercise descriptor items from the Toigo and Boutellier framework ranged from 0-13, with an average score of 9/13, and only 9 studies achieved a full 13/13. Reporting of items from the CERT ranged from 0-18, with an average score of 13/19. No study achieved a full 19/19, however 8 achieved 18/19. Scoring for resistance training principles ranged from 1-10, with only 14 studies achieving 10/10. Eccentric heel drops were the most common exercise (75 studies), followed by isotonic heel raises (38), and single leg eccentric decline squats (27).

CONCLUSION: The reporting of exercise descriptors and intervention content was high across studies, with most allowing exercise replication, particularly for Achilles and patellar tendinopathy. However, reporting for some tendinopathies and content items was poor, limiting optimal translation to clinical practice.

Keywords: Tendinopathy; Resistance training; Exercise; Physiotherapy; CERT

INTRODUCTION

Tendinopathy represents a spectrum of potential changes to healthy tendons, leading to tendon damage and disease, with changes characterised by abnormal tendon composition and cellularity, ultimately leading to altered tendon microstructure.[130] In tendinopathic tendons, the normal arrangement of collagen fibres and organisation of tenocytes become altered, typically by mechanical overuse, which lead to the main tendinopathy symptoms of pain, inflammation or swelling and impaired physical function and performance.[194] Despite all healthy tendons having the capability to progress to tendinopathy, tendons of the lower limb including the hip, knee and foot most commonly undergo tendinopathic changes, with their collagen matrix in states of disrepair, which may be due to the increased risk of mechanical overload in the lower limb.[117] Although the aetiology of tendinopathy has yet to be fully elucidated, it is considered the result of a disrupted tendon healing process, with the hallmarks of collagen derangement, neovascularisation, altered tendon structure and tissue calcification.[66] Tendinopathies account for up to 30% of all sports related injuries with a range of extrinsic and intrinsic risk factors identified, suggesting that each individual pathogenesis of tendinopathy is multifactorial.[189,204] The higher prevalence of patellar and Achilles tendinopathy found in athletes may be related to repetitive tendon microtrauma from repeated athletic movements such as running, jumping and landing.[241] Prevalence of Achilles and patellar tendinopathy have been reported to be as high as 23 and 45% in runners and jumping athletes, with plantar heel pain reported to be found in up to 18% of runners in one cohort.[84,199,12] Despite a recent proliferation in clinical research investigating effectiveness of a range of treatment options for tendinopathy, it remains unclear which treatments are most effective, with exercise-based treatments such as resistance training currently the most recommended.[31,119] Common adjunctive treatments to exercise used frequently in clinical practice include shockwave therapy, ultrasound, low-level laser therapy, manual therapy and corticosteroid injections.[34]

Isolated eccentric resistance training and heavy slow resistance training involving isotonic contractions, have been shown to have favourable outcomes for common lower limb tendinopathies including gluteal, Achilles, patellar, and plantar heel

pain.[42,103,21,161] The high loads encountered during resistance training may stimulate tendon healing by counteracting structural tendon alteration, leading to reorganization and remodelling of collagen fibres, therefore improving the mechanical properties of tendons.[25] Despite positive outcomes, a limitation of current resistance training interventions in tendinopathy research is that description, prescription and progression of exercises and program variables are often poorly defined and reported, making translation to clinical practice difficult.[165] If the exercise dosage and parameters prescribed clinically is insufficient, then the mechanobiological stimulus may not be adequate to initiate tendon healing and positive outcomes from intervention.[101] Despite the optimal dosage of resistance training for tendinopathy being unknown[120], research has shown an association between positive outcomes and higher exercise dosages in other musculoskeletal disorders.[145]

In recent years, several guidelines or frameworks have been developed for reporting exercise interventions and specific exercise details within research studies in order to enhance reproducibility of exercise interventions and their translation to and implementation in clinical practice.[79] The need to standardise reporting of components of exercise interventions has been highlighted in recent years, which lead to the development of The Consensus on Exercise Reporting Template (CERT), which advocates reporting detailed descriptions of exercises and their variables such as progression and tailoring, to allow clinical replication.[195] However, a limitation of the CERT is its omission of mechanobiological resistance training descriptors such as those included in the Toigo and Boutellier framework, such as rest intervals, time under tension and relative load.[213] Holden et al.[81] recently highlighted how the poor reporting of exercise interventions in patellofemoral pain limits the clinical translational of exercise research findings in this population, with the authors recommending that future studies should use both the CERT and Toigo and Boutellier framework in conjunction as they report different aspects of exercise prescription and would therefore be complementary. It is unclear if a similar issue exits within the interventional exercise literature in lower limb tendinopathies as no previous reviews have been conducted investigating the reporting of exercise descriptors using recommended frameworks. Although reporting of exercise interventions using the CERT has been

recommended in tendinopathy to improve transparency and clinical translation, it is unclear if this recommendation has been widely adopted in research studies.[13,180,136] Both the CERT and Toigo and Boutellier framework are recommended templates and have been used in several review studies evaluating exercise descriptions and variables in rehabilitation for musculoskeletal disorders other than tendinopathy.[72,118,40]

Although there has been a proliferation of clinical research examining resistance training treatment interventions for lower limb tendinopathies in recent years, it is unclear if these interventions have been sufficiently reported and described to allow clinical replication and implementation, with a comprehensive scoping review of the current literature an ideal way to investigate this question.[180] A search of MEDLINE, CINAHL, Cochrane Library and PEDro identified no reviews with the objective of evaluating the reporting of resistance exercises and variables within interventions using recommended frameworks such as the CERT or Toigo and Boutellier framework.[58] The aims of this scoping review were to evaluate the reporting of exercise descriptors and programme variables used within resistance training interventions for treating lower limb tendinopathies. The scoping review was guided by addressing the following review questions on specific aspects of exercise reporting within lower limb tendinopathy resistance training interventions: 1. What exercises and program variables are used in resistance training interventions for lower limb tendinopathy? 2. How complete is the reporting of the exercise descriptors and programme variables as assessed by the CERT and the Toigo and Boutellier framework? 3. Do studies implement scientific resistance training principles?

METHODS

Protocol

This scoping review was conducted in accordance with the Joanna Briggs Institute (JBI) methodology for scoping reviews.[214] The scoping review was reported in accordance with the Preferred Reporting Items for Systematic reviews and Meta-

analysis extension for Scoping reviews known as the PRISMA-ScR.[214] This scoping review evaluated current resistance training exercise descriptors and program variables in lower limb tendinopathy using recommended frameworks for the first time in the literature. The results allowed for dissemination of the parameters of research exercise interventions to clinical practitioners, allowing increased likelihood of implementation in clinical practice.[81] The review also outlined future research and exercise reporting needs within lower limb tendinopathy resistance training interventions.

Eligibility criteria

The inclusion criteria for this scoping review were guided by a modified PICO (PCoCo) as recommended for scoping reviews.[214] The review included adults aged eighteen years or older with a diagnosis of a lower limb tendinopathy for any time duration. All lower limb tendinopathies were included, such as gluteal, hamstring, patellar, Achilles, tibialis posterior and peroneal tendinopathy. Plantar fasciopathy, also referred to as Plantar heel pain was included as it is considered to have a similar pathophysiology to tendinopathy and should therefore be treated in accordance with other lower limb tendinopathies according to recent literature.[165] The concept of interest was resistance training for the treatment of lower limb tendinopathies, including any type or format such as exercise performed with bodyweight or external resistance. Therefore, any type of resistance training, including eccentric, concentric, isotonic, isometric, plyometric, heavy slow resistance training, general strength training or combinations of these exercise types was considered. The resistance training may be used as a first or second-line intervention for tendinopathy and may be delivered in isolation or combined with other treatments. Resistance training may be delivered across a range of settings, delivered by health or exercise professionals. Resistance training interventions may be delivered in a supervised or unsupervised manner, using any methods for training progression and monitoring. The context considered for inclusion included any healthcare or exercise setting in which resistance training interventions for lower limb tendinopathy have been provided. This scoping review considered both experimental and quasi-experimental study designs including randomized controlled trials and non-randomized controlled trials. In addition, prospective and retrospective cohort studies, case series and case reports were

considered for inclusion. Unpublished studies, reviews or reports were not considered.

Information Sources and Search

A 3-step search strategy was implemented in this scoping review. It incorporated the following: 1) a limited search of MEDLINE and CINAHL using initial keywords, followed by analysis of the text words in the title or abstract and those used to describe articles to develop a full search strategy; 2) The full search strategy was adapted to each database and applied to MEDLINE, CINAHL, AMED, EMBase, SPORTDiscus, Cochrane library (Controlled trials, Systematic reviews), and PEDro. The following trial registries were searched: ClinicalTrials.gov, ISRCTN, The Research Registry, EU-CTR (European Union Clinical Trials Registry), ANZCTR (Australia and New Zealand Clinical Trials Registry). Databases were searched from inception to December 2021. Although Stanish and Curwin[200] first published on the concept of eccentric resistance training in 1986, it was only following the publication of the Alfredson protocol in 1998[9] that resistance training became widespread in lower limb tendinopathy rehabilitation. Despite this, databases were searched from inception to ensure key articles and seminal studies on the topic published before 1998 were not omitted, which may influence overall findings. 3) For each article located in steps 1 and 2, a search of cited and citing articles using Scopus and hand-searching where necessary, was conducted. Studies published in a language other than English were only included if a translation was available as translation services were not available to the authors.

Study selection

Following the search, all identified citations were collated and uploaded into RefWorks and duplicates removed. Titles and abstracts were then screened by two independent reviewers for assessment against the inclusion criteria for the review. Potentially relevant studies were retrieved in full, and their citation details imported into Covidence (Veritas Health Innovation, Melbourne, Australia). Two independent reviewers then assessed the full text of selected citations in detail against the inclusion criteria. Any disagreements that arose between the reviewers at each stage of the study selection process were resolved through discussion or

by input from a third reviewer. The results of the search were reported in accordance with the PRISMA-ScR (FIGURE 1).[214]

Data extraction

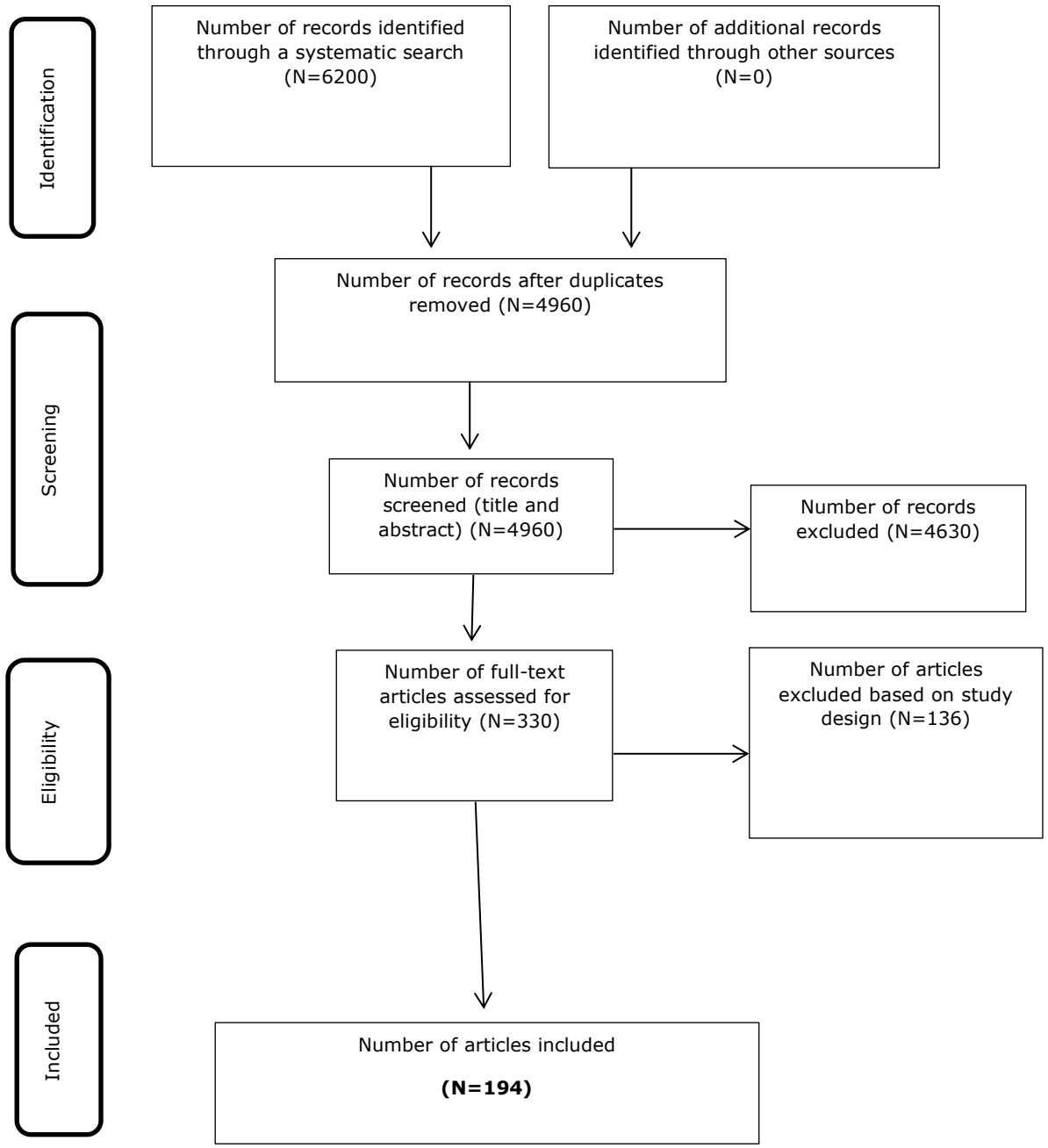
Data were extracted from sources included in the scoping review by one reviewer, with independent data extraction by a second reviewer for at least 10% of studies using data extraction tools developed specifically by the reviewers for each source type. The data extracted included specific details regarding the population, concept, context, study methods and key findings relevant to the review questions. Any disagreements that arose between the reviewers were resolved through discussion. The data extracted included dimensions such as authors, year of publication, study type, purpose, population & sample size, methods, details of resistance training intervention, specific exercises and outcome measures used. Details of the resistance training interventions included setting, mode of delivery, type, dosage, and methods used to progress and adjust the training stimulus. The contents and variables of the specific resistance training exercises were extracted using the 13-item Toigo and Boutellier framework for exercise mechanobiological description and included parameters such as repetitions, load magnitude and time under tension. General information from the resistance training interventions such as exercise supervision and delivery methods were extracted using the CERT tool. An evaluation of the implementation of scientific resistance training principles was also conducted, by extracting data on the principles of specificity, overload, progression, individualisation, and adherence. The definitions and criteria for these principles are provided in table 1. In accordance with guidance on conducting scoping reviews, critical appraisal was not conducted.[214]

Data Analysis

The extracted data are presented in tabular form as tables and figures, in a manner that aligns with the objective of this scoping review. A narrative summary accompanies the tabulated results and describes how the results relate to the review objective and questions. Completeness of information regarding the resistance training interventions is presented as the number of complete items of the CERT, Toigo and Boutellier framework and resistance training principles for

each study. Resistance training exercises were categorised as eccentric, concentric, isometric, isotonic, heavy slow resistance training (HSRT), low-load blood flow restricted training (BFRT), isoinertial, manually resisted, hip strength and general strength exercise.

FIGURE 1: PRISMA study flow diagram



RESULTS

Study Characteristics

A total of 194 studies were included (Table 3), of which 109 were randomised controlled trials (RCTs), 32 were cohort studies, 15 were case series, 26 were case reports, with 12 being other designs, quasi-experimental (4), before-after design (2), case control (4), and observational (2). The publication year ranged from 1989 to 2021, with 42 of the included studies being published since the year 2020, and 62 since 2019. The tendinopathy most frequently treated was Achilles (99), followed by Patellar (58), Plantar heel pain (16), Gluteal (8), Posterior tibial (6), Hamstring (5), Peroneal (1), Extensor hallucis longus (1), and Iliopsoas (1). The sample sizes of included studies ranged from 1 to 204. The duration of included resistance training interventions ranged from a single session to 32 weeks, with 12 being the most common, implemented in 122 of 194 studies (63%). All studies evaluated intervention outcomes for at least one of pain and function, with the vast majority evaluating both outcomes. Some studies also assessed tendon structure through ultrasonography and quality of life or general satisfaction outcome measures. Pain was assessed by a visual analogue scale (VAS) in 90 (46%) studies, and pain numeric rating scale (NRS-P) in 21 (11%) studies. Pain and function were assessed by the Victorian Institute of Sport Assessment – Achilles (VISA-A) in 66 (34%) studies, Victorian Institute of Sport Assessment – Patellar (VISA-P) in 45 (23%) studies, Victorian Institute of Sport Assessment – Gluteal (VISA-G) in 5 (3%) studies, Foot Function Index (FFI) in 10 (5%) studies, Lower Extremity Function Scale (LEFS) in 10 (5%) studies.

Content and Completeness of Exercise Description

Eccentric training was the most common type of resistance training, implemented in 130 (67%) studies, followed by general strength exercise in 35 (18%) studies, HSRT in 15 (8%) studies, isometric in 14 (7%) studies, isotonic in 11 (6%) studies, concentric in 6 (3%) studies, isoinertial in 4 (2%) studies, hip strength

exercises in 4 (2%) studies, BFRT in 2 (1%) studies and manually resisted exercise in 1 (0.5%) study. In terms of specific resistance training exercises implemented in the 194 studies, the Alfredson eccentric heel-drop was the most common exercise with 75 (39%) studies implementing it, followed by isotonic heel raises in 38 (20%) studies, single leg eccentric decline squats in 27 (14%) studies, knee extension in 16 (8%) studies, leg press in 13 (7%) studies, hip abduction in 10 (5%) studies, hip bridging in 9 (5%) studies, deadlifts in 8 (4%) studies, ankle inversion in 7 (4%) studies, plyometric jump exercises in 6 (3%) studies and lunges in 5 (3%) studies.

The number of items that described the Toigo and Boutellier framework exercise descriptors ranged from 0-13 out of a possible 13, with an average score across the 194 studies of 9/13. Only 9[165-167,207,182,76,198,6,197] (5%) studies achieved a full 13/13 for reporting items from the framework, with three of these from the same author.[165-167] Overall reporting across all studies for each item in the 194 studies (FIGURE 2) was as follows, load magnitude 167 (86%), repetitions 168 (87%), sets 165 (85%), rest between sets 47 (24%), sessions per day/week 161 (83%), duration period 173 (89%), contraction mode 188 (97%), rest between repetitions 169 (87%), time under tension 34 (18%), volitional muscular failure 15 (8%), range of motion 157 (81%), recovery time between sessions 165 (85%), anatomical exercise definition 159 (82%). Only 3 items were reported by less than 80% of studies, rest between sets (24%), time under tension (18%) and volitional muscular failure (8%). The item with the highest percentage of reporting at 97%, was the contraction mode of the exercise employed in the intervention.

Of the 19 items included in the CERT, reporting among included studies ranged from 0-18, with an average score across the 194 studies of 13/19. No study achieved a full score of 19, but 8[207,42,129,76,198,184,166,123] (4%) studies achieved a high score of 18/19, of these four[207,76,198,166] also achieved a full score of 13/13 for reporting exercise descriptors. Overall reporting for each item in the 194 studies (FIGURE 3) was as follows, exercise equipment 171 (88%), instructor qualification 169 (87%), individual or group 139 (72%), supervised or unsupervised 180 (93%), adherence measures 94 (49%), motivation strategies 4 (2%), progression

rules 133 (69%), how progressed 134 (69%), exercise replication 163 (84%), home program described 157 (81%), non-exercise components 189 (97%), adverse events 55 (28%), exercise setting 165 (85%), exercise intervention details 171 (88%), generic or tailored 184 (95%), tailored how 134 (69%), starting level 168 (87%), fidelity measured 11 (6%), exercise delivered as planned 70 (36%). Most items were well reported across studies, with only 5 items being reported less than 69%, adherence measures (49%), exercise delivered as planned (36%), adverse events (28%), fidelity measured (6%) and motivation strategies (2%), with the latter two items particularly poorly reported across the studies. Previous studies assessing the completeness of CERT items in musculoskeletal rehabilitation, determined that reporting completeness of items could be regarded as high (>75%), moderate (60 to 74%) or low (< 60%).[28,36] Based on this classification, 10 items can be rated as high, 4 as moderate and 5 as low.

Application of Resistance Training Principles

An evaluation of the implementation of scientific resistance training principles was conducted, by evaluating the design and reporting of the key principles of specificity, overload, progression, individualisation, and adherence (TABLE 1). One point each was given for the design and reporting of each of the 5 principles, with a maximum score of 10/10 available. The scoring system was based on scales used in previous reviews with the same objective.[31,63,131] Scoring for resistance training principles ranged from 1 to 10 across the 194 studies, with only 14 studies achieving a full score of 10/10.[107,108,205,129,206,238,155,135,75,6,157,174,124,110] Only one study did not implement and report the principle of specificity, whereas 193 (99%) studies implemented specificity by targeting the prescribed resistance training to the specific tendinopathy with the aim to improve pain and function. The principle of overload was not adequately implemented or reported in 45 studies, with 149 (77%) studies implementing overload by progressively increasing training resistance throughout the intervention. The principle of progression was not adequately implemented or reported in 57 studies, with 137 (71%) studies implementing progression, most commonly by increasing resistance though small

increases in external weight. However only 35 (18%) studies accurately reported the exact amount of weight implemented in progression increments. Incremental increases in resistance ranged from 0.9-5kg, with 5kg being the most common, implemented in 27 (14%) studies. The principle of individualisation was not adequately implemented or reported in 59 studies, with 135 (70%) studies implementing individualisation, most commonly by adjusting training resistance based on pain response as implemented in 118 (61%) studies. Other reported methods for individually tailoring training included exercise technique in 6 (3%) studies, as much volume as possible in 3 (2%) studies, increasing exercise difficulty in 8 (4%) studies, and level of fatigue in 7 (4%) studies, typically measured by rating of perceived exertion (RPE) scales. The principle of adherence was not adequately implemented or reported in 68 studies, with 126 (65%) studies implementing adherence, most commonly by using an individual exercise diary as reported in 72 (37%) studies. However, only 46 (24%) studies reported the percentage of participants who achieved an acceptable level of resistance training adherence, which ranged from 40 to 100%.

TABLE 1: Resistance training principles and training intervention criteria assessed

Principle	**Criteria for this review**
Specificity: Training and desired adaptations should be specific to the tendinopathy and relevant to desired outcomes	Appropriate population targeted and intervention designed to improve primary outcome
Progression: to allow for continuous adaptations, resistance or load must be increased providing a greater stress to the body	Training intervention was stated to be progressive with gradual increases in frequency, sets, repetitions, resistance or loading throughout intervention
Overload: for the intervention to improve strength, greater than normal stress and training volume must occur above current training levels	Interventions included baseline strength testing or rationale that intervention was of sufficient intensity and volume relative to baseline capacity
Individualisation: Training is tailored to the individual to allow for consideration of individual factors and training response	Training intervention considered methods to individually tailor exercises stimulus based on an individual's own factors or training response
Component of training	**Description**
Frequency	How many times per week or day
Intensity	Measurement method: RM, %RM, RPE, pain level
Time	Duration of session
Sets	How many sets of each exercise
Repetitions	How many repetitions of each exercise or target number of repetitions
Exercise selection	Outline and description of specific exercises used in intervention
Adherence	Was adherence to the training intervention monitored and reported?

TABLE 2: Application and reporting of key training principles

Principle/ criterion	Description		Score
Specificity	Design: have the authors designed the intervention to achieve desired outcomes? 1/10	Reporting: have the authors adequately described the intervention specificity? 1/10	2/10
Overload	Design: have the authors appropriately manipulated training variables to achieve desired outcomes? 1/10	Reporting: have the authors adequately described the intervention training variables? 1/10	2/10
Progression	Design: have the authors appropriately manipulated training variables to adequately progress the intervention? 1/10	Reporting: have the authors adequately described how intervention progression was achieved and assured? 1/10	2/10
Individualisation	Design: have the authors appropriately manipulated training variables to tailor the intervention adequately individually? 1/10	Reporting: have the authors adequately described how individually tailoring the intervention was achieved and assured? 1/10	2/10
Adherence	Design: have the authors appropriately designed and described methods for monitoring adherence? 1/10	Reporting: have the authors adequately reported individual adherence to training and training dose achieved? 1/10	2/10

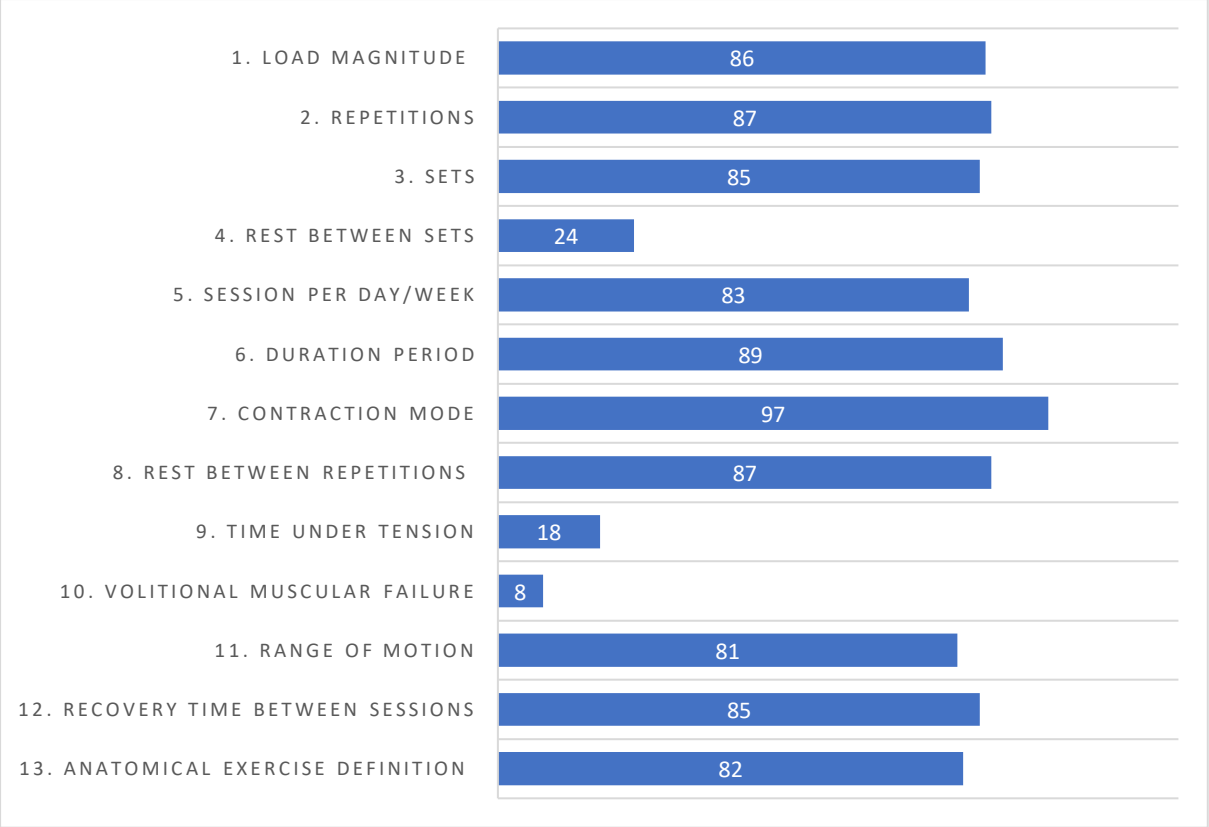


FIGURE 2: Percentage of studies (out of 194) with complete reporting for each item of the Toigo and Boutellier framework.

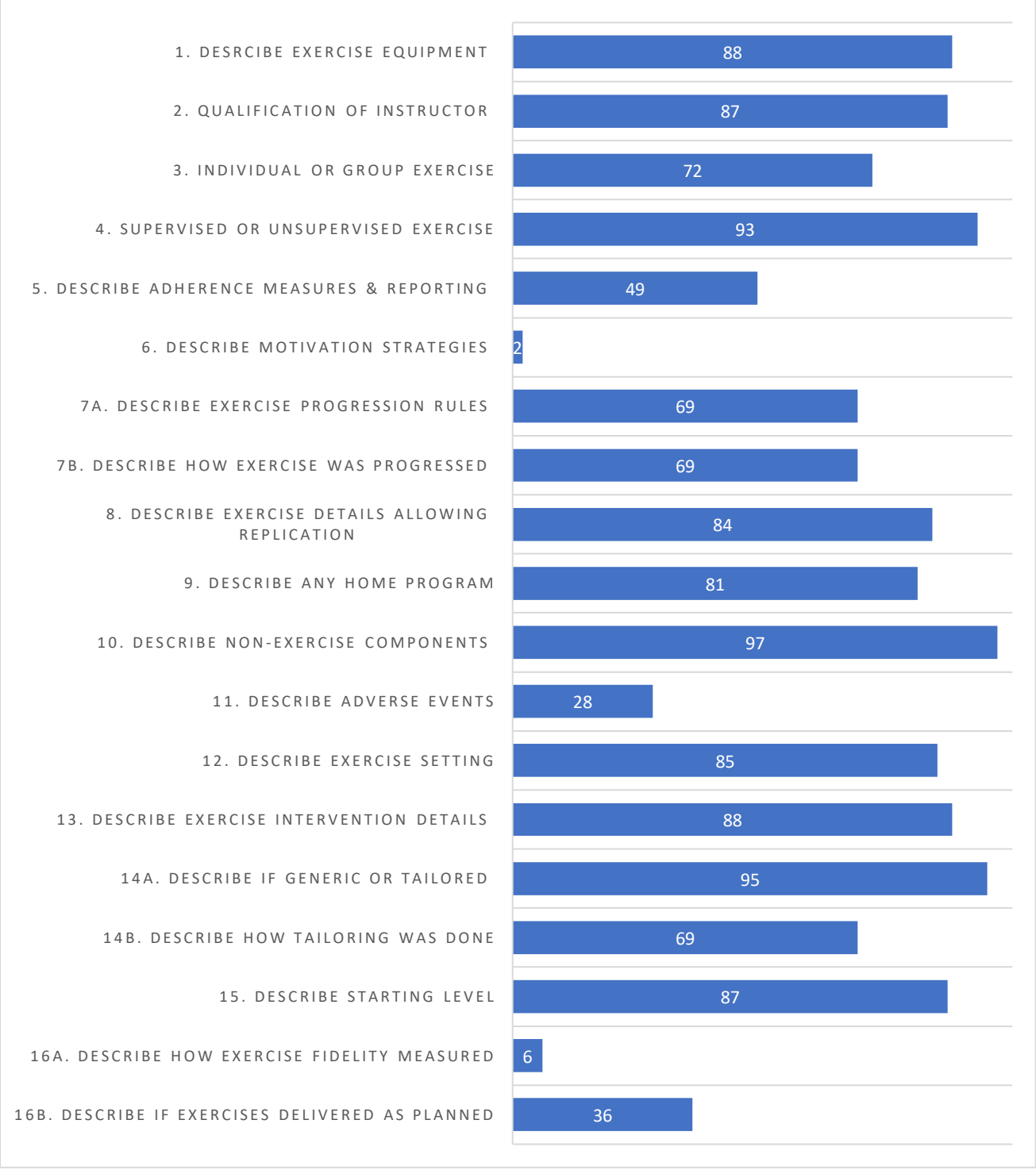


FIGURE 3: Percentage of studies (out of 194) with complete reporting for each item of the Consensus on Exercise Reporting Template (CERT).

TABLE 3: Characteristics and reporting scores of the 194 included studies

Author	Study design	Tendinopathy	Resistance training type	Resistance training exercise	TBF /13	CERT /19	RTP /10
Beyer et al.[21]	RCT	Achilles	HSRT, ECCT	Heel raises	12	17	9
Kongsgaard et al.[103]	RCT	Patellar	HSRT, ECCT	DSL squat, hack squat, leg press, squat	12	17	9
Riel et al.[165]	RCT	Plantar	HSRT	Heel raises	13	17	9
Stevens & Tan[207]	RCT	Achilles	ECCT	Alfredson heel-drop	13	18	9
Da Cunha et al.[47]	RCT	Patellar	ECCT	DSL squat	10	14	8
Kulig et al.[108]	RCT	P. tibial	Isokinetic ECCT, CONCT	Resisted adduction with plantarflexion	12	17	10
Bahr et al.[14]	RCT	Patellar	ECCT	DSL squat	11	14	8
Lee et al.[112]	RCT	Patellar	ECCT	DSL squat	11	14	9
Frohm et al.[67]	RCT	Patellar	ECCT	DSL squat	11	14	8
Silbernagel et al.[193]	RCT	Achilles	ECCT	Heel raises, plyometric heel raises	10	15	8
Balius et al.[15]	RCT	Achilles	ECCT	Alfredson heel-drop	8	10	4
Mafi et al.[116]	RCT	Achilles	ECCT, CONCT	Alfredson heel-drop	10	15	7
Norregaard et al.[138]	RCT	Achilles	ECCT	Alfredson heel-drop	10	15	9
Stasinopolous et al.[202]	RCT	Patellar	ECCT	DSL squat	10	14	7
De Vos et al.[55]	RCT	Achilles	ECCT	Alfredson heel-drop	10	16	9
Johannsen et al.[90]	RCT	Plantar	HSRT	Heel raises, inversion	3	5	2
MacDonald et al.[114]	RCT	Patellar	ECCT, ECCT + hip	DSL squat, isotonic hip exercises	10	16	8
Gatz et al.[70]	RCT	Achilles	ECCT, ECCT + Isom	Alfredson heel-drop	10	15	8
Ganderton et al.[68]	RCT	Gluteal	General strength EX	Isometric & isotonic hip exercises	10	17	9
Silbernagel et al.[192]	RCT	Achilles	General strength EX	Heel raises, plyometric heel raises	10	16	8
Clifford et al.[42]	RCT	Gluteal	ISOM, ISOT	Isometric & isotonic hip abduction exercises	12	18	9
Stergioulas et al.[205]	RCT	Achilles	ECCT	Heel raises	11	16	10
Rompe et al.[175]	RCT	Achilles	ECCT	Alfredson heel-drop	11	17	9
Mellor et al.[129]	RCT	Gluteal	General strength EX	Isometric & isotonic hip exercises	11	18	10
Van Ark et al.[217]	RCT	Patellar	ISOT, ISOM	Knee extension	12	16	8
Roos et al.[178]	RCT	Achilles	ECCT	Alfredson heel-drop	10	16	9
Chester et al.[37]	RCT	Achilles	ECCT	Alfredson heel-drop	10	15	7
Rompe et al.[177]	RCT	Achilles	ECCT	Alfredson heel-drop	10	16	8
Thijs et al.[209]	RCT	Patellar	ECCT	DSL squat	10	16	7
Horstmann et al.[82]	RCT	Achilles	ECCT	Alfredson heel-drop	11	15	7
Alfredson et al.[9]	RCT	Achilles	ECCT	Alfredson heel-drop	10	14	7
Alvarez et al.[10]	RCT	P. tibial	General strength EX	Heel raises, plantar-flexion, adduction, inversion	10	17	9
Kearney et al.[99]	RCT	Achilles	ECCT	Alfredson heel-drop	10	15	7
Tumilty et al.[216]	RCT	Achilles	ECCT	Alfredson heel-drop	10	17	9
Yelland et al.	RCT	Achilles	ECCT	Alfredson heel-drop	10	17	8
McCormack et al.[127]	RCT	Achilles	ECCT	Alfredson heel-drop	10	15	5
Tumilty et al.[215]	RCT	Achilles	ECCT	Alfredson heel-drop	10	17	9
Cannell et al.[33]	RCT	Patellar	ECCT, ISOT	Drop squat, knee extension & curl	11	14	8
Jonsson et al.[91]	RCT	Patellar	ECCT, CONCT	DSL squat	10	15	7
Kedia et al.[100]	RCT	Achilles	ECCT	Alfredson heel-drop	10	15	8
Herrington et al.[78]	RCT	Achilles	ECCT	Alfredson heel-drop	10	16	8
Houck et al.[83]	RCT	P. tibial	General strength EX	Heel raises, plantar-flexion, adduction, inversion	11	17	9
Dimitrios et al.[57]	RCT	Patellar	ECCT	DSL squat	11	17	8
Petersen et al.[152]	RCT	Achilles	ECCT	Alfredson heel-drop	10	16	8
Steunebrink et al.[206]	RCT	Patellar	ECCT	Alfredson heel-drop	10	15	10
Rompe et al.[176]	RCT	Achilles	ECCT	Alfredson heel-drop	11	17	8
Young et al.[238]	RCT	Patellar	ECCT	DSL squat	10	16	10
De Jonge et al.[50]	RCT	Achilles	ECCT	Alfredson heel-drop	10	14	8
Praet et al.[155]	RCT	Achilles	ECCT	Alfredson heel-drop	10	17	10

Rathleff et al.[161]	RCT	Plantar	HSRT	Heel raises	11	14	5
Knobloch et al.[102]	RCT	Achilles	ECCT	Alfredson heel-drop	10	11	2
Wheeler et al.[232]	RCT	Plantar	General strength EX	Heel raises, foot strength exercises	0	8	2
De Jonge et al.[51]	RCT	Achilles	ECCT	Alfredson heel-drop	6	11	5
De Vos et al.[54]	RCT	Achilles	ECCT	Alfredson heel-drop	6	11	5
Warden et al.[229]	RCT	Patellar	ECCT	DSL squat	10	17	9
Visnes et al.[225]	RCT	Patellar	ECCT	DSL squat	10	15	9
Van Ark et al.[218]	RCT	Patellar	Isom, Isot	Knee extension	12	14	8
Thompson et al.[210]	RCT	Gluteal	ECCT	Lunges, squats	6	10	5
Cacchio et al.[32]	RCT	Hamstring	General strength EX	Leg curls, lunge, squat, CM jumps, deadlift, hip strength exercises	8	7	4
Munteanu et al.[135]	RCT	Achilles	ECCT	Alfredson heel-drop	10	16	10
Van der Worp et al.[223]	RCT	Patellar	ECCT	DSL squat	9	16	8
Romero-morales[172]	RCT	Achilles	ECCT	Alfredson heel-drop	10	15	8
Romero-morales[173]	RCT	Achilles	ECCT	Alfredson heel-drop	10	15	8
Ryan et al.[183]	RCT	Plantar	General strength EX	Inversion & eversion	6	11	3
Riel et al.[167]	RCT	Plantar	Isom, Isot	Heel raises	13	14	7
Koszalinski et al.[105]	RCT	Achilles	ECCT	Alfredson heel-drop	7	10	2
Pearson et al.[151]	RCT	Achilles	ECCT	Alfredson heel-drop	1	5	7
Wang et al.[228]	RCT	Patellar	ECCT	Quadriceps & hams-tring strengthening	1	3	2
Notarnicola et al.[139]	RCT	Achilles	ECCT	NR	3	3	2
Dragoo et al.[59]	RCT	Patellar	ECCT	NR	1	5	2
Kaux et al.[98]	RCT	Patellar	ECCT	Wall squat	11	13	5
Abat et al.[3]	RCT	Patellar	ECCT	DSL squat	9	8	2
Biernat et al.[23]	RCT	Patellar	ECCT	DSL squat	10	14	7
Rio et al.[168]	RCT	Patellar	Isom, Isot	Knee extension	12	13	5
Rio et al.[169]	RCT	Patellar	Isom, Isot	Knee extension	12	16	9
Choudhary et al.[39]	RCT	Achilles	ECCT	NR	8	12	7
Cowan et al.[43]	RCT	Gluteal	General strength EX	Isometric & isotonic hip exercises	10	17	9
Habets et al.[75]	RCT	Achilles	ECCT, CONCT-ECCT	Alfredson heel-drop, heel raises	10	16	10
Ruffino et al.[182]	RCT	Patellar	HSRT, Isoinertial	Squat, leg press, knee extension, hack squat	13	17	9
Olesen et al.[141]	RCT	Patellar	HSRT	Squat, leg press, knee extension, hack squat	10	14	7
Hasani et al.[76]	RCT	Achilles	Isot	Heel raises	13	18	9
Mansur et al.[122]	RCT	Achilles	ECCT	Alfredson heel-drop	10	12	4
Sprague et al.[198]	RCT	Patellar	HSRT	Squat, leg press, knee extension, hack squat	13	18	9
Agergaard et al.[6]	RCT	Patellar	HSRT, .M-HSRT	Leg press & extension	13	17	10
Lopez-Royo et al.[113]	RCT	Patellar	ECCT	DSL squat	10	14	7
Abdelkader et al.[5]	RCT	Achilles	ECCT	Alfredson heel-drop	11	11	2
Van der Vlist et al.[221]	RCT	Achilles	ECCT	Heel raises, plyometric heel raises	12	17	9
Breda et al.[27]	RCT	Patellar	HSRT, ECCT	DSL squat, leg press, knee extension, hip strength exercises	10	17	9
Rabusin et al.[157]	RCT	Achilles	ECCT	Alfredson heel-drop	10	17	10
Solomons et al.[196]	RCT	Achilles	General strength EX	NR	1	11	6
Ramon et al.[159]	RCT	Gluteal	General strength EX	Bridging, hip abduction & extension	10	12	2
Scott et al.[188]	RCT	Patellar	HSRT	NR	1	5	2
Stefansson et al.[203]	RCT	Achilles	ECCT	Alfredson heel-drop	10	14	8
Boesen et al.[24]	RCT	Achilles	ECCT	Alfredson heel-drop	10	15	8
Chesterton et al.[38]	RCT	Plantar	General strength EX	Foot, calf & hip strength exercises	2	14	6
Rasenberg et al.[160]	RCT	Plantar	General strength EX	NR	1	0	3
Johannsen et al.[89]	RCT	Plantar	General strength EX	Heel raises, inversion	4	8	4
Thong-On et al.[212]	RCT	Plantar	General strength EX	Heel raises, inversion & eversion, toe curls	10	17	9
Cil et al.[41]	RCT	Plantar	General strength EX	Foot, ankle & hip exercises	9	10	5
Kamonseki et al.[93]	RCT	Plantar	Foot, hip Strength EX	Foot, ankle & hip exercises	10	13	5

Brown et al.[29]	RCT	Achilles	ECCT	Alfredson heel-drop	1	1	1
Niesen-Vertommen[137]	RCT	Achilles	ECCT, CONCT	Heel raises	10	17	9
Jensen et al.[87]	RCT	Patellar	Isokinetic ECCT	Dynamometer heel raise	11	16	8
Yu et al.[239]	RCT	Achilles	ECCT, CONCT	Heel raises, Alfredson heel-drop	10	15	8
Wheeler et al.[236]	RCT	Gluteal	General strength EX	Hip abduction, bridging, clams	7	13	7
Zhang et al.[240]	RCT	Achilles	ECCT	Alfredson heel-drop	10	14	8
Bell et al.[19]	RCT	Achilles	ECCT	Alfredson heel-drop	7	14	6
Pietrosimone et al.[153]	RCT	Patellar	Isom	Knee extension	12	12	4
Holden et al.[80]	RCT	Patellar	Isom, Dynamic EX	Knee extension	12	13	5
Sancho et al.[184]	Cohort	Achilles	General strength EX	Heel raises, hip abduction & extension, hops, jumps	10	18	9
Croisier et al.[44]	Cohort	Achilles, Patellar	Isokinetic ECCT	Dynamometer heel raise, knee extension	10	16	8
Ohberg et al.[140]	Cohort	Achilles	ECCT	Alfredson heel-drop	10	14	7
Sayana et al.[186]	Cohort	Achilles	ECCT	Alfredson heel-drop	11	16	9
Abat et al.[1]	Cohort	Patellar	Isoinertial ECCT	NR	10	12	5
Riel et al.[166]	Cohort	Plantar	HSRT	Heel raise	13	18	9
Kongsgaard et al.[104]	Cohort	Patellar	HSRT	Knee extension, leg press, hack squat, squat	12	15	7
Wetke et al.[231]	Cohort	Achilles	Isot	Heel raises	10	16	9
Maffulli et al.[115]	Cohort	Achilles	ECCT	Alfredson heel-drop	11	16	9
Shalabi et al.[190]	Cohort	Achilles	ECCT	Alfredson heel-drop	10	16	8
Mansur et al.[121]	Cohort	Achilles	ECCT	Alfredson heel-drop	10	14	8
Abat et al.[2]	Cohort	Patellar	Isoinertial ECCT	Leg press	10	10	4
Alfredson et al.[8]	Cohort	Achilles	ECCT	Alfredson heel-drop	10	14	7
O'Neill et al.	Cohort	Achilles	Isom	Dynamometer heel raise	10	11	4
Ooi et al.[144]	Cohort	Achilles	ECCT	Alfredson heel-drop	1	2	2
Kaux et al.[96]	Cohort	Patellar	ECCT	NR	3	4	2
Alfredson et al.[7]	Cohort	Achilles	ECCT	Alfredson heel-drop	10	14	8
De Jonge et al.[52]	Cohort	Achilles	ECCT	Alfredson heel-drop	3	2	2
Panni et al.[146]	Cohort	Patellar	General strength EX	NR	1	2	2
Angermann et al.	Cohort	Achilles	General strength EX	Heel raises	10	15	9
Von Wehren et al.	Cohort	Achilles	ECCT	Alfredson heel-drop	10	11	4
Kaux et al.[97]	Cohort	Patellar	ECCT, Isom	DSL squat	11	16	9
Wei et al.[230]	Cohort	Achilles	ECCT	Alfredson heel-drop	10	15	9
Basas et al.[18]	Cohort	Patellar	Isot	NR	8	14	7
Fahlstrom et al.[62]	Cohort	Achilles	ECCT	Alfredson heel-drop	10	14	7
Jonsson et al.[92]	Cohort	Achilles	ECCT	Alfredson heel-drop	10	14	8
Abate et al.[4]	Cohort	Achilles	ECCT	Alfredson heel-drop	10	16	9
Wheeler et al.[235]	Cohort	Achilles	ECCT	NR	1	3	2
Lagas et al.[109]	Cohort	Achilles	ECCT	NR	1	0	2
Robinson et al.[171]	Cohort	Achilles	ECCT	Heel raises	8	12	2
Wheeler et al.[234]	Cohort	Plantar	General strength EX	Heel raises, IFM strength	2	5	2
Mantovani et al.[123]	Cohort	Achilles	Isom	Heel raises	12	18	8
Kulig et al.[107]	C.Series	P. tibial	ECCT	Resisted adduction with plantarflexion	11	15	10
Deans et al.[56]	C.Series	Achilles	General strength EX	NR	1	4	2
Pavone et al.[150]	C.Series	Achilles	ECCT	NR	1	4	2
Romero-rodriguez et al.[174]	C.Series	Patellar	Isoinertial ECCT	Flywheel	12	15	10
Wheeler et al.[233]	C.Series	Achilles	General strength EX	NR	1	5	2
Syverston et al.[208]	C.Series	Achilles	ECCT	Alfredson heel-drop	10	11	4
Robinson et al.[170]	C.Series	P. tibial	General strength EX	Heel raises, short foot	8	11	2
Benito et al.[20]	C.Series	Achilles	ECCT	Alfredson heel-drop	10	13	6
Silbernagel et al.[191]	C.Series	Achilles	ECCT, plyometric EX	Heel raises, plyometric heel raises	10	14	7
Morton et al.[134]	C.Series	Patellar	ECCT	DSL squat	1	5	2
Van ark et al.[219]	C.Series	Patellar	General strength EX	Heel raises, squats, hip abduction, SL squat, lunges, step-downs, bridging, jumps	11	16	8
Munoz Fernandez[64]	C.Series	Patellar	General strength EX	Clams, bridging, DSL squat, squat, deadlift,	10	12	4

				short foot, hip abduction, pelvic drops			
Skovlund et al.[197]	C.Series	Patellar	LL-BFRT	Knee extension, leg press	13	17	9
Jayaseelan et al.[85]	C.Series	Achilles	ECCT	Alfredson heel-drop	10	12	3
Bianco et al.[22]	C.Series	Patellar	General strength EX	DSL squat, squat, drop squat, SL squat, jump downs, mini squat	8	14	5
Eckenrode et al.[61]	C.Report	Achilles	ECCT	Alfredson heel-drop, bridging, hip abduction, squat	12	14	7
Papa et al.[147]	C.Report	Achilles	ECCT	Alfredson heel-drop	10	13	5
Dos Santos et al.[185]	C.Report	Plantar	Hip strength EX	Hip abduction, extension, adduction & flexion	5	9	2
Lee et al.[111]	C.Report	Plantar	Hip strength EX	NR	1	4	2
Ross et al.[179]	C.Report	Achilles	General strength EX	Heel raises, plantarflexion, dorsiflexion, plyometric	10	16	8
Cuddeford et al.[45]	C.Report	Patellar	LL-BFRT	DSL squat, leg press	12	15	8
Krueger et al.[106]	C.Report	Hamstring	HSRT	Squat, deadlift, hip thrust, leg curl, reverse lunge	11	15	8
Borda et al.[26]	C.Report	Achilles	ECCT	Alfredson heel-drop	10	11	2
Rauseo et al.[163]	C.Report	Iliopsoas	ECCT	Hip flexion, bridging, squats, deadlift	10	15	8
McCormack et al.[126]	C.Report	Achilles	ECCT	Alfredson heel-drop	10	14	7
Patla et al.[149]	C.Report	P. tibial	General strength EX	Heel raises, pronation & supination	8	13	3
Pinkelman et al.[154]	C.Report	EHL	Manually resisted EX	Great toe extension	8	14	7
Francis et al.[65]	C.Report	Achilles	ECCT	Alfredson heel-drop	10	15	8
McCreesh et al.[128]	C.Report	Patellar	ECCT	DSL squat	10	13	5
Hensley et al.[77]	C.Report	Peroneal	General strength EX	Heel raises, inversion & eversion	10	13	5
Cushman et al.[48]	C.Report	Hamstring	ECCT	Hip extension	10	12	4
Thompson et al.[211]	C.Report	Achilles	General strength EX	Squats, pelvic thrust, deadlift, heel raises, band walks, lunges	11	14	7
Jayaseelan et al.[86]	C.Report	Hamstring	General strength EX	Leg curl, deadlift, bridging, hip abduction	10	14	7
Dumont et al.[60]	C.Report	Patellar	ECCT	Drop squats	10	16	9
Silva et al.[187]	C.Report	Patellar	Hip strength EX	Hip extension, birddog, deadlift, drop jumps	11	14	8
McCormack et al.[125]	C.Report	Hamstring	ECCT	Leg curl, hip extension, bridging, lunges Nordics, deadlift	10	13	4
Van Rooy et al.[224]	C.Report	Gluteal	ECCT	Hip abduction, lunges bridging	10	12	4
Greene et al.[74]	C.Report	Achilles	General strength EX	Heel raises, squats, leg pulls	8	14	7
Rowan et al.[181]	C.Report	Patellar	ECCT	DSL squats	8	10	2
Goldman et al.[73]	C.Report	Patellar	ECCT	DSL squats, leg press, knee extension, leg curls, step downs, heel taps	11	14	7
Cuddeford et al.[46]	C.Report	Achilles	ECCT	Heel drop on leg press	8	15	8
Masood et al.[124]	L-CC	Achilles	ECCT	Alfredson heel-drop	10	16	10
Gardin et al.[69]	BAD	Achilles	ECCT	Alfredson heel-drop	10	10	4
Langberg et al.[110]	CC	Achilles	ECCT	Alfredson heel-drop	10	15	10
Stasinopoulos et al.[201]	Quasi	Achilles	ECCT	Alfredson heel-drop, heel raises	11	17	8
Kanniappan et al.[94]	Quasi	Achilles	ECCT, Isom	Alfredson heel-drop, static plantarflexion	11	11	4
Purdam et al.[156]	Quasi	Patellar	ECCT	DSL squat, squat	10	14	7
Van der Vlist et al.[222]	Quasi	Achilles	Isom, Isot	Heel raises	12	17	8
Morgan et al.[133]	BAD	Patellar	General strength EX	NR	4	6	6
De Vos et al.[53]	OBS	Achilles	ECCT	Alfredson heel-drop	11	14	8

Park et al.[148]	CC	Achilles	ECCT	Alfredson heel-drop	11	14	8
Ram et al.[158]	CC	Achilles	ECCT	Alfredson heel-drop	10	13	8
Vander Doelen et al.[220]	R chart	Patellar	General strength EX	Knee Extension, leg press, squat, hack squat	11	14	5

Abbreviations: CERT: Consensus on Exercise Reporting Template, TBF: Toigo and Boutellier Framework, RTP: resistance training principles, ECCT: eccentric training, CONCT: concentric training, ISOM: Isometric: ISOT: Isotonic, EC: exercise, LL-BFRT: low-load blood flow restriction training, HSRT: heavy slow resistance training, C.Series: case series, C.Report: case report, CC: case control: BAD: before-after design, L-CC: longtitudinal case control, OBS: observational, QUASI: quasi-experimental, P.tibial: Posterior tibial, NR: not reported, DSL: decline single-leg

Discussion

The description and reporting of resistance training exercises used in the rehabilitation of lower limb tendinopathies was generally high overall, with some common areas of weakness. A broad range of resistance training types were implemented with eccentric training by far the most common at 67%, with Alfredson eccentric heel-drops (39%), isotonic heel raises (20%) and eccentric decline single-leg squats (14%) the most implemented exercises. Most studies included sufficient information on exercise dosage (load, repetitions, sets and frequency) to allow replication of the exercises in both research and clinical settings. However not all studies provided sufficient detail to allow replication, suggesting there is room for improvement in future research, with certain items on the scales employed being very poorly reported. Whereas the scientific resistance training principles of specificity and overload where well implemented and reported throughout the studies, the principals of progression, individualisation and adherence had poorer reporting, preventing complete clinical replication of these principles. Despite these issues, the overall moderate-high quality of reporting was better for lower limb tendinopathies than for other musculoskeletal conditions as assessed in other reviews applying the CERT. For example, the quality of exercise content reporting has been found to be low in exercise rehabilitation interventions for hamstring strains,[28] groin injury,[36] Achilles tendon ruptures,[40] rotator cuff disorders,[118] knee osteoarthritis,[17,142] patellofemoral pain,[81] knee injuries,[72] fibromyalgia,[88] juvenile arthritis,[95] hand osteoarthritis,[143] pelvic floor dysfunction,[35,71] low back pain,[49,16] ACL injury,[226] and femoral-acetabular impingement.[164] The only other review reporting an overall

moderate-high quality for CERT reporting like this review, was for hip osteoarthritis, which like this review reported an average CERT score of 13/19.[30] Item 8 of the CERT relates to describing exercises to a level that allows replication, which was met by 85% of studies included in this review. In comparison reporting of this item was much lower in the reviews for hamstring strains[28], (43%), knee osteoarthritis[142] (26%), rotator cuff disorders[118] (29%), groin injuries[36] (15%) and Achilles tendon ruptures[40] (26%), highlighting the comparative quality of exercise reporting for lower limb tendinopathies. The reasons for exercise reporting quality being higher for lower limb tendinopathies compared to other musculoskeletal conditions are unclear but could be related to the fact that resistance training has been considered the gold standard first-line intervention which has been recommended for many years.[31]

This review employed two common tools to describe resistance exercise implementation and reporting; the CERT which evaluates general information about the specific exercise intervention; and the Toigo and Boutellier framework which evaluates mechanobiological and exercise dosage descriptors, alongside an evaluation of five key scientific resistance training principles. The completeness of exercise reporting was high overall across the included studies, but the poor reporting of some items and key resistance training principles is concerning and limits the true translation of the findings regarding the resistance exercises to clinical practice. For example, the poor overall reporting on the specific loading employed during resistance exercise for progression, makes this principle difficult to replicate and translate to clinical practice. Although the Toigo and Boutellier framework is a well-accepted tool for reporting exercise descriptors in the literature, some of the items which were poorly reported in the included studies could theoretically be considered too detailed and impractical to properly implement both clinically and in research. The items, rest between sets, time under tension and volitional muscular failure were all poorly reported; however, it could be argued these items are the least relevant for exercise replication. Despite this, their inclusion would allow for a complete replication of the resistance training interventions implemented in the studies, which may be a more optimal scenario for prescribing resistance exercise to patients to ensure complete translation of the protocols. As a tool that was developed in the sports science literature it is not

rehabilitation specific, so key aspects of resistance exercises in the rehabilitation setting are not accounted for such as the patients psychological state, level of pain, and tolerance to exercise. Similarly, while most items on the CERT were well reported, several items were very poorly reported such as motivational strategies, fidelity measures, adherence, adverse events and if exercises were delivered as planned. Although the absence of these items does not prevent exercise replication, their inclusion would optimise replication in the clinical setting. It is well accepted that adherence to exercise during rehabilitation can be a significant barrier to progress, so it is therefore concerning that only 2% of studies reported using motivational strategies, and overall reporting of adherence was lacking, despite many studies stating they employed adherence tracking measures such as exercise diaries. The very poor reporting of fidelity and adherence highlighted in this review, highlights the need for future studies to focus on practical implementation issues to ensure translation to clinical practice. If fidelity and adherence of the interventions are not monitored and reported, then the quality of the exercise intervention reported in studies may be of less value. While the combination of both scales would allow exercise replication in a clinical setting, in isolation they would likely not be sufficient. Therefore, the development of a more rehabilitation specific scale for implementing and reporting resistance training interventions should be explored in future research to optimise clinical translation of research resistance exercise interventions.

Clinical implications

For many years, progressive resistance training has been considered the gold standard intervention for rehabilitating lower limb tendinopathies. Optimising rehabilitation outcomes for patients with lower limb tendinopathies requires implementing the most effective evidence-based resistance training interventions. However, interventions shown to be efficacious in high-quality research must also be replicable and translatable to the clinical setting. To achieve this, research interventions must follow scientific resistance training principles and include enough detail to be reproducible. Many of the studies included in this review which have shown good outcomes also score highly for replicability on the scales

employed, particularly those using eccentric heel raises for Achilles tendinopathy and eccentric decline squats for patellar tendinopathy. These protocols should remain the gold standard first-line intervention for clinicians as they have not only been found to be effective in the individual studies but can also be fully replicated clinically.

Implications for research

In comparison to reviews on other musculoskeletal pathologies in physical therapy, which have evaluated exercise reporting, this review has found that reporting of resistance exercise for lower limb tendinopathies is generally of high quality, despite several shortcomings. This is in stark contrast to reviews on other common musculoskeletal disorders where the reporting was considered poor overall. Indeed, the average scores found in this review for the CERT and Toigo and Boutellier framework are higher than for all the other pathologies previously listed. However, this review has highlighted some areas of weakness in reporting and implementation which must be addressed in future research to optimise clinical translation and outcomes for resistance training interventions in lower limb tendinopathies. Until a rehabilitation specific exercise reporting scale is validated, and available, future studies should continue to design and implement resistance training protocols using scales such as the CERT and Toigo and Boutellier framework, to ensure they are clinically reproducible.

Strengths and limitations

This scoping review has included a broad range of study designs from RCTs to individual case reports, with a broad range of interventions, so there is therefore vast heterogeneity in findings across all the studies, so findings should be interpreted with caution. However, determining effectiveness of interventions through meta-analysis techniques was not the objective of the review, with the aims focused on the description, reporting and implementation of resistance

training in interventions for lower limb tendinopathies. Only studies available in English language were included, which may introduce language bias. To provide a comprehensive analysis and state of the art review on reporting of resistance training interventions for lower limb tendinopathies, all primary study designs were considered. Despite all primary designs being included, this review did not consider review papers or clinical practice guidelines, which may have included detailed exercise reporting. Databases were search from inception and there was no limitation on sample size or intervention duration. Although many studies included were published before the publication of the CERT (2016) and Toigo and Boutellier framework (2006), there was no obvious reporting discrepancies from earlier to more recent studies, despite the culture of reporting becoming more widespread in recent years. Both scales are transparent and contain sufficient exercise details to allow 100% replication if fully followed, despite not being rehabilitation or tendinopathy specific. Most of the studies included in this review were for Achilles and patellar tendinopathies which also had the highest quality reporting, with other lower limb tendinopathies poorly represented and with comparatively poorer overall reporting quality. Therefore, the findings of this review can not be generalised to all lower limb tendinopathies, with future research required to address the dearth of resistance training interventions for non-Achilles and patellar lower limb tendinopathies.

CONCLUSION

Resistance training interventions and specific exercises are generally well reported across all primary study design for treating lower limb tendinopathies, particularly eccentric training for Achilles and patellar tendinopathy. However certain items were poorly reported and several key resistance training principles such as progression and adherence were poorly implemented and reported. While most studies provided sufficient details to allow clinical exercise replication, the weaknesses highlighted must be addressed in future research to allow resistance training interventions and exercises to be fully clinically reproducible to enhance rehabilitation outcomes.

KEY POINTS

FINDINGS: Eccentric heel raises for Achilles tendinopathy and eccentric decline squats for patellar tendinopathy were the most common resistance exercises used for lower limb tendinopathy, with a broad range of exercises used overall. Exercise descriptors and reporting was generally good across studies, with a few common weaknesses in reporting, such as details on progression and adherence.

IMPLICATIONS: Resistance training interventions and specific exercises generally have sufficient detail and reporting to allow replicability and clinical implementation, despite weaknesses which need addressed in future research.

CAUTION: This review did not investigate the effectiveness of the included resistance training interventions and exercises, just their reporting, implementation, and description.

STUDY DETAILS

AUTHOR CONTRIBUTIONS: IB conceptualised the work and developed the methods, search strategy and framework for the review. IB and AM contributed to the development of the research questions and the study design. All authors developed the first and subsequent drafts of the manuscript and reviewed and approved the manuscript.

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APPENDICES

APPENDIX 1: MEDLINE search strategy:

1. MH tendinopathy OR MH fasciitis, plantar KW tendin* OR KW tendon* OR KW tendinopath* OR KW plantar OR KW Achilles OR KW Patellar OR KW Gluteal OR KW Greater trochanter*)

2. MH resistance training OR MH exercise OR MH physical therapy modalities OR MH physical therapy specialty OR KW physiotherapy OR KW physical therapy OR KW exercis* OR KW strength training OR KW training

3. 1 AND 2

KW: Keyword, MH: MeSH heading

Dates inception-December 31st 2021

Planned limits: English language only

APPENDIX 2: Table 4: Study characteristics & reporting scores

Author	Tendinopathy	Intervention groups	Sample size	Intervention duration (wks)	Outcomes + measures	Follow-up length (weeks)	Outcomes/ results	TBF /13	CERT /19
RCT									
Beyer et al. 2015	Achilles	1. HSRT 2. ECCT	58	12	Pain (VAS), Function (VISA-A), Ultrasound	52	Both interventions were effective, with HSRT having greater patient satisfaction at 12 but not 52 weeks.	12	17
Kongsgaard et al. 2009	Patellar	1. CSI 2. HSRT 3. ECCT	37	12	Pain (VAS), Function (VISA-P), Ultrasound	26	All groups improved, with only exercise groups maintaining improvements at 6 months. HSRT has good short- and long-term clinical effects.	12	17
Riel et al. 2019	Plantar heel	1. fixed HSRT 2. Self-dosed HSRT	70	12	Function (FHSQ), Pain (self-efficacy), ultrasound	12	Both groups improved pain and function, with no significant differences between groups.	13	17
Stevens & Tan 2014	Achilles	1. fixed ECCT 2. Self-dosed ECCT	28	6	Pain (VAS), Function (VISA-A)	6	Both groups improved pain and function, with no significant differences between groups.	13	18
Da Cunha et al. 2012	Patellar	1. ECCT pain 2. ECCT no pain	17	12	Pain (VAS), Function (VISA-P)	12	No difference between groups, both groups improved pain and function.	10	14
Kulig et al. 2009	Posterior tibial	1. ECCT 2. CONCT 3. Orthoses	36	12	Pain (VAS), function (FFI)	12	Eccentric program was more effective than concentric or orthoses alone.	12	17
Bahr et al. 2006	Patellar	1. ECCT 2. surgery	35	12	Pain, function (VISA-P)	12	Both groups improved, no significant difference between groups. Trend favouring ECCT.	11	14
Lee et al. 2020	Patellar	1. ECCT 2. ECCT + ESWT	34	12	Pain (VAS), function (VISA-P), ultrasound	12	Combining exercise and ESWT could not been shown to be more effective than exercise alone	11	14

Frohm et al. 2007	Patellar	1. Standard ECCT 2. Overload ECCT	20	12	Pain (VAS), function (VISA-P)	12	Both treatment groups improved in the short term, with no significant difference between groups.	11	14
Silbernagel et al. 2001	Achilles	1. Overload ECCT 2. control	40	12	Pain (VAS), function, task performance	52	No significant difference between groups, at 1-year ECCT group more satisfied with outcomes.	10	15
Balius et al. 2016	Achilles	1. ECCT 2. ECCT + supplement 3. Supplement + stretching	59	12	Pain (VAS), function (VISA-A), ultrasound	12	Reduction in pain at rest was greater in the groups who took the supplement than in the ECCT alone group	8	10
Mafi et al. 2001	Achilles	1. ECCT 2. CONCT	44	12	Pain (VAS), function	12	The results after treatment with eccentric training was significantly better (P<0.002) than after concentric training.	10	15
Norregaard et al. 2007	Achilles	1. ECCT 2. Stretching	45	12	Manually tested Pain, function	52	Marked improvement in symptoms and findings could be gradually observed in both groups during the 1-year follow-up period.	10	15
Stasinopolous et al. 2004	Patellar	1. ECCT 2. Ultrasound 3. MT	30	4	Pain	4	ECCT was statistically significantly better than the other two treatments at the end of treatment.	10	14
De Vos et al. 2007	Achilles	1. ECCT 2. ECCT +night splint	70	12	Pain, function (VISA-A)	12	Both groups improved pain and function, with no significant difference between groups	10	16
Johannsen et al. 2019	Plantar Heel	1. HSRT 2. CSI 3. HSRT + CSI	90	12	Pain (VAS), function (FFI), ultrasound	26	Combined treatment is superior both in the short- and in the long-term.	3	5
MacDonald et al. 2019	Patellar	1. ECCT 2. ECCT + hip exercises	41	12	Pain, function (VISA-P, LEFS)	24	Favourable effects were demonstrated with combined treatment of eccentric squat and hip muscle strengthening or squat only	10	16
Gatz et al. 2020	Achilles	1. ECCT 2. ECCT + isometric	42	12	Pain, function (VISA-A),	12	Isometric exercises do not have additional benefit when combined with eccentric exercises, as assessed over a 3-month intervention period.	10	15

					shear wave elastography				
Ganderton et al. 2018	Gluteal	1. Ex 2. Sham Ex	94	12	Pain, function (VISA-G)	52	Lack of treatment effect was found with the addition of an exercise program to education	10	17
Silbernagel et al. 2007	Achilles	1. Rehab with continued sports 2. Control	38	12	Pain (VAS), function (VISA-A)	26	Significant improvement and no negative effects demonstrated from continuing Achilles tendon-loading activity, such as running and jumping, with the use of a pain-monitoring model, during treatment.	10	16
Clifford et al. 2019	Gluteal	1. isometric Ex 2. Isotonic Ex	30	12	Pain (NRS), function (VISA-G), QoL	12	Both groups effective in reducing pain and improving function, no difference between groups.	12	18
Stergioulas et al. 2008	Achilles	1. ECCT + LLLT 2. ECCT	52	8	Pain (VAS), function (VISA-A)	12	LLLT accelerates clinical recovery when added to ECCT	11	16
Rompe et al. 2008	Achilles	1. ECCT 2. ESWT	50	12	Pain, function (VISA-A)	16	ESWT superior to ECCT at 16 weeks.	11	17
Mellor et al. 2018	Gluteal	1. Ex, education 2. CSI 3. control	204	8	Pain (NRS), function (VISA-G), QoL (EQ5D), GROC	52	At 52-week follow-up, education plus exercise led to better global improvement than corticosteroid injection use, but no difference in pain intensity	11	18
Van Ark et al. 2016	Patellar	1. isotonic Ex 2. Isometric Ex	29	4	Pain (NRS), function (SLDS)	4	Both isometric and isotonic exercise programs improved pain and function	12	16
Roos et al. 2004	Achilles	1. ECCT 2. ECCT + night splint 3. Night splint	44	6	Pain, function (FAOS)	52	ECCT more effective than night splint for improving pain and function	10	16
Chester et al. 2008	Achilles	1. ECCT 2. Ultrasound	16	12	Pain (VAS), function (FILLA), QoL (EQ5D)	12	There were no significant differences between groups or clear trends over time. Both interventions proved acceptable with no adverse effects.	10	15
Rompe et al. 2007	Achilles	1. ECCT 2. ESWT 3. Control	75	12	Pain, function (VISA-A)	16	ECCT and ESWT showed comparable positive results. The wait-and-see strategy was ineffective.	10	16

Thijs et al. 2017	Patellar	1. ECCT + ESWT 2. ECCT	52	12	Pain, function (VISA-P)	12	No additional effect of ESWT to EECT for pain and function improvement.	10	16
Horstmann et al. 2013	Achilles	1. ECCT 2. Vibration training 3. control	58	12	Pain (VAS), function, tendon structure	24	Pain improvements were greatest in the eccentric group.	11	15
Alfredson et al. 1998	Achilles	1. ECCT 2. CT control	30	12	Pain (VAS)	12	Significant improvement with ECCT	10	14
Alvarez et al. 2006	Posterior tibial	1. Strength Ex + orthoses 2. Stretching + orthoses	39	12	Pain, function (FFI)	12	Both groups significantly improved in pain and function over the 12-week trial period. The self-report measures showed minimal differences between the treatment groups.	10	17
Kearney et al. 2013	Achilles	1. ECCT 2. PRP injection	20	12	Pain (VAS), function (VISA-A)	26	Both interventions effective, with PRP having better outcomes, however there was no significant difference.	10	15
Tumilty et al. 2012	Achilles	1. ECCT 2. ECCT + LLLT	40	12	Pain (VAS), function (VISA-A)	52	There was no statistically significant difference in VISA-A scores between groups.	10	17
Yelland et al. 2011	Achilles	1. ECCT 2. ECCT + prolotherapy 3. prolotherapy	43	12	Pain (VAS), function (VISA-A), costs	52	prolotherapy and particularly ECCT combined with prolotherapy give more rapid improvements in symptoms than ECT alone but long-term VISA-A scores are similar.	10	17
McCormack et al. 2016	Achilles	1. ECCT 2. ECCT + MT	16	12	Pain (NPRS), function (VISA-A)	52	ECCT + MT more effective than ECCT only at improving function during both short- and long-term follow-up	10	15
Tumilty et al. 2016	Achilles	1. ECCT 1 2. ECCT 1 + LLLT 3. ECCT 2 4. ECCT 2 +LLLT	80	12	Pain, function (VISA-A)	12	Twice-daily exercise sessions are not necessary as equivalent results can be obtained with two exercise sessions per week. The addition of LLLT can bring added benefit.	10	17
Cannell et al. 2001	Patellar	1. ECCT 2. Isotonic Ex	19	12	Pain (VAS), return to sport	12	Progressive drop squats and leg extension/curl exercises both reduced pain and enable return to sport	11	14

Jonsson et al. 2005	Patellar	1. ECCT 2, CONCT	19	12	Pain (VAS), function, (VISA-P)	12	eccentric, but not concentric, quadriceps training on a decline board, seems to reduce pain in PT	10	15
Kedia et al. 2014	Achilles	1. CT 2. ECCT + CT	36	12	Pain (VAS), function (SF36)	12	No significant differences between groups. CT and ECCT both effective.	10	15
Herrington et al. 2007	Achilles	1. ECCT + US + MT 2. US + MT	25	12	Pain, function (VISA-A)	12	ECCT + CT was more effective than CT alone for pain and function.	10	16
Houck et al. 2015	Posterior tibial	1. Orthosis + stretching 2. + strength Ex	39	12	Pain, function (FFI)	12	Both groups significantly improved in pain and function over the 12-week trial period. minimal differences between the treatment groups.	11	17
Dimitrios et al. 2012	Patellar	1. ECCT 2. ECCT + stretching	43	4	Pain, function (VISA-P)	24	ECCT and static stretching exercises is superior to ECCT alone to reduce pain and improve function	11	17
Petersen et al. 2007	Achilles	1. ECCT 2. Brace 3. ECCT + brace	100	12	Pain (VAS), function (AOFAS), QoL (SF-36)	54	The VAS score for pain, AOFAS score, and SF-36 improved significantly in all 3 groups at all 3 follow-ups, no significant difference between groups	10	16
Steunebrink et al. 2013	Patellar	1. ECCT + GTN 2. ECCT	33	12	Pain, function (VISA-P)	24	GTN + ECCT does not improve clinical outcome compared to placebo patches + ECCT	10	15
Rompe et al. 2009	Achilles	1. ECCT + ESWT 2. ECCT	68	12	Pain, function (VISA-A)	52	Combined ECCT + ESWT more effective at 4 months follow-up	11	17
Young et al. 2005	Patellar	1. ECCT step 2. ECCT decline	17	12	Pain (VAS), function (VISA-P)	52	Both groups improved pain and sporting function at 12 months. Decline squat more effective.	10	16
De Jonge et al. 2010	Achilles	1. ECCT 2. ECCT + night splint	58	12	Pain, function (VISA-A)	52	ECCT with or without a night splint improved functional outcome at 1-year. no significant difference in clinical outcome between groups.	10	14
Praet et al. 2019	Achilles	1. ECCT + collagen peptides	20	26	Pain, function (VISA-A)	26	Oral supplementation of collagen peptides may accelerate the clinical benefits of ECCT.	10	17
Rathleff et al. 2015	Plantar heel	1. HSRT 2. stretching	48	12	Pain, function (FFI)	52	HSRT superior to plantar fascia stretching for pain and function	11	14

Knobloch et al. 2008	Achilles	1. ECCT + brace 2. ECCT	116	12	Pain (VAS), function (FAOS)	12	No additional effect of heel brace to ECCT alone.	10	11
Wheeler et al. 2017	Plantar heel	1. General Ex 2. Ex + night splint	40	12	Pain (VAS), Function (FFI, FAAM)	12	Improvement in both groups, with no significant differences between groups.	0	8
DeJonge et al. 2011	Achilles	1. PRP + ECCT 2. Placebo injection + ECCT	54	12	Pain & Function (VISA-A)	52	Both groups improved with no additional benefit of PRP over ECCT	6	11
De Vos et al. 2010	Achilles	1. PRP + ECCT 2. Placebo injection + ECCT	54	12	Pain & Function (VISA-A)	24	Both groups improved with no additional benefit of PRP over ECCT	6	11
Warden et al. 2008	Patellar	1. US + ECCT 2. Placebo US + ECCT	37	12	Pain: VAS-usual, VAS-worst	12	US did not provide any additional benefit over placebo + ECCT.	10	17
Visnes et al. 2005	Patellar	1. ECCT 2. Normal volleyball training	29	12	Function (VISA-P)	26	No effect of ECCT compared with those who continued volleyball training	10	15
Van Ark et al. 2018	Patellar	1. Isometric EX 2. Isotonic EX	29	4	Tendon US, Pain (NRS), Function (VISA-P)	4	Tendon structural properties did not change in either group despite positive clinical outcomes.	12	14
Thompson et al. 2019	Gluteal	1. PRP injection + ECCT 2. Saline + ECCT	48	4	Pain (NRS)	52	No significant differences in improvements between groups.	6	10
Cacchio et al. 2011	Hamstring	1. ESWT 2. Strength Ex + stretching	40	3	Pain (VAS)	12	ESWT significantly superior to exercise for pain and function.	8	7
Munteanu et al. 2014	Achilles	1. ECCT + custom orthoses 2.	140	12	Pain (NRS), Function (VISA-A)	52	Custom orthoses no more effective than sham orthoses when combined with ECCT.	10	16

		ECCT + sham orthoses							
Van der Worp et al. 2014	Patellar	1. F-ESWT + ECCT 2. R-ESWT + ECCT	43	12	Pain (VAS), Function (VISA-P)	14	Both groups improved with no significant differences between groups.	9	16
Romero-morales et al. 2018	Achilles	1.ECCT + Vibration 2. ECCT + Cryotherapy	61	12	US Rectus anterior thickness & distance	12	ECCT + vibration superior to cryotherapy	10	15
Romero-morales et al. 2020	Achilles	1.ECCT + Vibration 2. ECCT + Cryotherapy	61	12	Pain & Function (VISA-A)	12	No significant differences between groups, both improved	10	15
Ryan et al. 2014	Plantar Heel	1. PT EX 2. CSI & stretching	56	12	Pain (VAS), Function (FADI)	12	Both groups improved, with no significant differences between groups.	6	11
Riel et al. 2018	Plantar heel	1. Isometric EX 2. Isotonic EX 3. Walking	20	3	Pain (VAS), PPI, US PF thickness	3	Isometric no better than isotonic or walking for reducing pain.	13	14
Koszalinski et al. 2020	Achilles	1. DN, MT, ECCT 2. MT, ECCT	22	4	Pain (NPRS), Function (FAAM), GROC	12	Both groups improved, with no significant difference between groups.	7	10
Pearson et al. 2012	Achilles	1. ABI + ECCT 2. ECCT	33	12	Function (VISA-A)	12	Small short-term improvement with addition of ABI to ECCT	1	5
Wang et al. 2007	Patellar	1. ESWT 2. ECCT	50	12	Function (VISA-P)	52	ESWT more effective than standard treatment including ECCT	1	3
Notarnicola et al. 2013	Achilles	1. CHELT + ECCT 2. ESWT + ECCT	60	8	Pain (VAS), Function (RMS)	26	CHELT group had quicker and better pain improvement and functional recovery.	3	3
Dragoo et al. 2014	Patellar	1. PRP, DN + ECCT 2. DN + ECCT	23	12	Pain (VAS), Function (VISA-P)	12	Addition of PRP improves short-term recovery, but no long-term difference	1	5
Kaux et al. 2019	Patellar	1. PRP +ECCT 2.HAI + ECCT	33	12	Pain (VAS), Function (VISA-P)	12	Both groups effective at medium-term, only PRP lead to pain decrease associated with strength increase	11	13
Abat et al. 2016	Patellar	1. Electro PT + ECCT 2. USGET + ECCT	60	8	Pain & Function (VISA-P)	8	USGET + ECCT had better outcomes for pain and function	9	8

Biernat et al. 2014	Patellar	1. ECCT 2. Normal training	28	12	Pain & Function (VISA-P)	24	ECCT group superior for pain and function improvement	10	14
Rio et al. 2015	Patellar	1. Isometric EX 2. Isotonic EX	6	Single session	Pain (SLD squat, VISA-P), MVIC	Single session	A single session of isometric EX significantly reduced pain & increased MVIC compared to isotonic EX.	12	13
Rio et al. 2017	Patellar	1. Isometric EX 2. Isotonic EX	20	4	Pain (SLD squat, VISA-P)	4	Both groups reduced pain, Isometric EX had significantly greater immediate analgesic effects	12	16
Choudhary et al. 2021	Achilles	1. Nutrition SUPP + ECCT 2. Diclofenac + ECCT	40	12	Pain (VAS), US	12	Both groups improved clinical outcomes, Nutrition SUPP + ECCT was superior.	8	12
Cowan et al. 2021	Gluteal	1.MHT + EX 2. EX + placebo 3. MHT + placebo 4. Placebo	132	12	Pain & function (VISA-G), GRoC	52	MHT or placebo combined with EX + education was effective for improving clinical outcomes.	10	17
Habets et al. 2021	Achilles	1. Alfredson ECCT 2. Silbernagel CONCT-ECCT	40	52	Pain (VAS), Function (VISA-A)	52	Both groups improved clinical outcomes, with no significant difference between groups.	10	16
Ruffino et al. 2021	Patellar	1. HSRT 2. Inertial Flywheel EX	42	12	Pain & function (VISA-P)	12	Both groups improved clinical outcomes, with no significant difference between groups.	13	17
Olesen et al. 2021	Patellar	1. HSRT + IGF-1 injection 2. HSRT + saline	40	12	Pain (VAS), Function (VISA-P)	52	Both groups improved clinical outcomes, with no significant difference between groups.	10	14
Hasani et al. 2021	Achilles	1. HI-LTUT EX 2. HI-HTUT EX 3. LI-HTUT EX 4. LI-LTUT EX	48	12	Trial measures, Pain & function (VISA-A)	12	A fully powered RCT would be feasible, with strategies to improve adherence & fidelity required.	13	18
Mansur et al. 2021	Achilles	1. ESWT + ECCT 2. ECCT	119	12	Pain (VAS), Function (VISA-A)	24	Both groups improved clinical outcomes, with no significant difference between groups.	10	12

Sprague et al. 2021	Patellar	1. HSRT + PGA 2. HSRT + PFA	15	12	Trial measures, Pain & function (VISA-P)	12	A fully powered RCT would be feasible, both groups improved clinical outcomes.	13	18
Agergaard et al. 2021	Patellar	1. HSRT 2.M-HSRT	44	12	Pain (NRS-P), Function (VISA-P)	52	Both groups improved clinical outcomes, with no significant difference between groups.	13	17
Lopez-Royo et al. 2021	Patellar	1, DN + ECCT 2. PNE + ECCT 3. ECCT	48	10	Pain (VAS), Function (VISA-P)	22	All groups improved clinical outcomes, with no significant difference between groups.	10	14
Abdelkader et al. 2021	Achilles	1. ESWT + ECCT 2. ECCT + SHAM	50	4	Pain (VAS), Function (VISA-A)	56	Both groups improved clinical outcomes, combined group had superior outcomes.	11	11
Van der Vlist et al. 2020	Achilles	1. HVIGI + ECCT 2. Placebo + ECCT	80	24	Pain & Function (VISA-A)	24	Both groups improved clinical outcomes, with no significant difference between groups.	12	17
Breda et al. 2020	Patellar	1. PTLE 2. ECCT	76	24	Pain & Function (VISA-P)	24	PTLE was superior for improving clinical outcomes compared to ECCT.	10	17
Rabusin et al. 2021	Achilles	1. Heel lifts 2. ECCT	100	12	Pain & Function (VISA-A)	12	Both groups improved clinical outcomes, heel lifts group had superior outcomes.	10	17
Solomons et al. 2020	Achilles	1. DN + EX 2. Sham DB + EX	52	12	Pain & Function (VISA-A)	52	Both groups improved clinical outcomes, with no significant difference between groups.	1	11
Ramon et al. 2020	Gluteal	1. F-ESWT + EX 2. Sham + EX	103	4	Pain (VAS), Function RMS), Harris hip score	26	F-ESWT combined with EX was superior for improving clinical outcomes, with a success rate of 87% at last follow-up.	10	12
Scott et al. 2019	Patellar	1. LR-PRP + HSRT 2. LP-PRP + HSRT 3. Saline + HSRT	57	6	Pain & Function (VISA-P), GRoC	52	PRP injections + HSRT no more effective than saline + HSRT for improving clinical outcomes.	1	5
Stefansson et al. 2019	Achilles	1. PM 2. ECCT 3. Both combined	60	4	Pain & Function (VISA-A)	24	All groups improved clinical outcomes, with no significant difference between groups.	10	14

Boesen et al. 2017	Achilles	1. HVIGI + ECCT 2. PRP + ECCT 3. Saline + ECCT	60	6	Pain (VAS), Function (VISA-A)	24	Treatment with HVIGI or PRP, with ECCT was more effective for improving clinical outcomes compared to saline + ECCT.	10	15
Chesterton et al. 2021	Plantar heel	1. Advice 2. Advice + EX 3. Advice + orthoses 4. Advice, EX & orthoses	82	12	Pain (NRS-P), Function (FFI), trial measures	12	A fully powered RCT would be feasible	2	14
Rasenberg et al. 2020	Plantar heel	1. Education + EX 2. Education, EX, insoles 3. Education, EX, sham insoles	185	12	Pain (NRS-P), Function (FFI),	12	All groups improved clinical outcomes, with no significant difference between groups.	1	0
Johannsen et al. 2020	Plantar heel	1. Surgery + strength EX 2. CSI + strength EX	30	12	Pain (VAS), Function (FFI)	104	Surgery + strength EX was superior for improving clinical outcomes.	4	8
Thong-On et al. 2019	Plantar heel	1. stretching 2. Strength EX	84	8	Pain (VAS)	8	Both groups improved clinical outcomes, with no significant difference between groups.	10	17
Cil et al. 2019	Plantar heel	1. Outpatient RX 2. Home EX	47	8	Pain (VAS), Function (FFI)	8	Both groups improved clinical outcomes, with the outpatient group having superior outcomes.	9	10
Kamonseki et al. 2016	Plantar heel	1. Foot EX 2. Foot & hip EX 3. Stretching	83	8	Pain (VAS), function (FAOS)	8	All groups improved clinical outcomes, with no significant difference between groups.	10	13
Brown et al. 2006	Achilles	1. Aprotinin + ECCT 2. Placebo + ECCT	26	12	Pain & Function (VISA-A)	52	Both groups improved clinical outcomes, with no significant difference between groups.	1	1
Niesen-Vertommen et al. 1992	Achilles	1. ECCT 2. CONCT	17	12	Pain (VAS)	12	ECCT was superior for improving clinical outcomes	10	17

Jensen et al. 1989	Patellar	1. Stretching 2. Stretching + Isokinetic ECCT	8	31	Pain (VAS), Quad strength	8	Quadriceps strength increased but knee pain increased with ECCT compared to healthy controls.	11	16
Yu et al. 2013	Achilles	1. ECCT 2. CONCT	32	8	Pain (VAS), muscle strength	8	ECCT was superior to CONCT for improving clinical outcomes	10	15
Wheeler et al. 2021	Gluteal	1. Max dose ESWT + Strength EX 2. Low dose ESWT + Strength EX	120	6	Pain & Function (VISA-G), Oxford hip score	26	Both groups improved clinical outcomes, with no significant difference between groups.	7	13
Zhang et al. 2013	Achilles	1. Accupunture 2. ECCT	64	8	Pain (VAS), Function (VISA-A)	24	Both groups improved clinical outcomes, with the acupuncture group being significantly superior.	10	14
Bell et al. 2013	Achilles	1. ABI + ECCT 2. Placebo + ECCT	53	12	Pain & function (VISA-A)	26	Both groups improved clinical outcomes, with no significant difference between groups.	7	14
Pietrosimone et al. 2020	Patellar	1. Isometric EX 2. Sham TENS	28	Single session	Pain & function (VISA-P), biomechanics	Single session	Single session isometric EX did not have acute effects on pai or landing biomechanics.	12	12
Holden et al. 2020	Patellar	1. Isometric EX 2. Dynamic EX	21	Single session	Pain (NRS, PPT)	Single session	Both groups immediately decreased pain but not after 45 mins, no difference between groups.	12	13
COHORT STUDIES									
Sancho et al. 2019	Achilles	1. Multimodal EX program	15	12	Pain & Function (VISA-A)	12	Larger-scale RCT feasible, pain and function improved, high satisfaction.	10	18
Croisier et al. 2001	Achilles & Patellar	1. Isokinetic ECCT	34	10	Pain (VAS)	10	Isokinetic ECCT had positive short-term effects on pain & function	10	16
Ohberg et al. 2004	Achilles	1. ECCT	25	12	Pain, US	12	Reduction in neovascularisation associated with reduced pain following ECCT	10	14
Sayana et al. 2007	Achilles	1.ECCT	34	12	Pain & function (VISA-A)	12	ECCT was effective for most patients, 15 (44%) did not improve.	11	16

Abat et al. 2014	Patellar	1. EPI + Isoinertial ECCT	33	12	Pain & function (VISA-P)	104	Significant improvement in pain & function	10	12
Riel et al. 2019	Plantar Heel	1. HSRT, CSI, insoles, education	20	8	Pain (NRS), Function (FHSQ).	8	Combined HSRT & CSI was feasible and acceptable, 75% compliance.	13	18
Kongsgaard et al 2010	Patellar	1. HSRT	8	12	Pain (VAS), Function (VISA-P)	12	HSRT improved clinical outcomes, associated with changes toward normal fibril morphology.	12	15
Wetke et al. 2015	Achilles	1. Isotonic EX + CSI	93	26	Pain (VAS)	26	Significant improvements in symptoms, with 94% improving.	10	16
Maffulli et al. 2008	Achilles	1. ECCT	45	12	Pain & function (VISA-A)	26	Significant improvement seen in 60% of athletic patients after ECCT.	11	16
Shalabi et al. 2004	Achilles	1. ECCT	25	12	MRI, Pain & Function (Rolf & Movin 6-point scale)	12	ECCT resulted in decreased tendon volume, intratendinous signal and improved clinical outcomes.	10	16
Mansur et al. 2019	Achilles	1. ECCT + ESWT	19	12	Pain (VAS), Function (VISA-A, AOFAS)	24	Combination was effective for improving clinical outcomes.	10	14
Abat et al. 2015	Patellar	1. EPI + Isoinertial ECCT	40	12	Pain & Function (VISA-P)	10 Years	Combination was effective for improving clinical outcomes.	10	10
Alfredson et al. 1999	Achilles	1. ECCT	14	12	Pain (VAS), BMD	56	ECCT led to clinical improvement but not significant BMD changes	10	14
O'Neill et al. 2019	Achilles	1. Isometric EX	16	Single session	Pain & Function (VISA-A), sensory response	Single session	No meaningful acute or sensory effect of intervention.	10	11
Ooi et al. 2019	Achilles	1. PRP + ECCT	45	12	Pain & Function (VISA-A), US	52	Achilles tendon stiffness correlated with improved clinical outcomes	1	2
Kaux et al. 2015	Patellar	1. PRP + ECCT	20	5	Pain (VAS), Function (VISA-P)	12	Combination was effective for improving clinical outcomes.	3	4

Alfredson et al. 2003	Achilles	1. ECCT	6	12	Pain (VAS), Function (VISA-A)	12	ECCT effective for improving clinical outcomes, no effect on intratendinous glutamate levels.	10	14
De Jonge et al. 2015	Achilles	1. PRP + ECCT 2. Saline + ECCT	54	12	Pain & Function (VISA-A), US	52	Restoration of tendon structure not required for effective symptom improvement	3	2
Panni et al. 2000	Patellar	1. Surgery 2. EX	42	26	Outcome rating	5 years	Clinical results were good or excellent in all patients.	1	2
Angermann et al. 1999	Achilles	1. EX program	22	26	Pain & Function	5 years	65%had improved or resolved symptoms, 35% failed or had poor long-term outcomes.	10	15
Von Wehren et al. 2019	Achilles	1. ECCT 2. Orthokine injections	50	12	Pain & Function (VISA-A), tendon thickness	26	Both groups had improved clinical outcomes, injection superior for long-term outcomes.	10	11
Kaux et al. 2014	Patellar	1. ECCT & isometric EX	30	12	Pain (VAS), Function (VISA-P, IKDC)	52	Intervention was effective for improving clinical outcomes.	11	16
Wei et al. 2017	Achilles	1. ECCT 2. ESWT 3. ERFA	78	12	Pain (VAS), Function (VISA-A, AOFAS)	5 years	All groups improved, ERFA led to superior clinical outcomes	10	15
Basas et al. 2018	Patellar	1. Isotonic EX + Electro stimulation	6	12	Pain (VAS)	3 years	Intervention was effective for improving clinical outcomes.	8	14
Fahlstrom et al. 2003	Achilles	1. ECCT	78	12	Pain (VAS)	12	Intervention was effective for improving clinical outcomes.	10	14
Jonsson et al. 2008	Achilles	1. ECCT	27	12	Pain (VAS)	16	Intervention was effective for improving clinical outcomes in 67% of patients.	10	14
Abate et al. 2020	Achilles	1. ECCT + PRP	84	12	Pain & Function (VISA-A)	26	Age, sex, and adherence associated with improved clinical outcomes from the intervention.	10	16
Wheeler et al. 2020	Achilles	1. HVIGI + ECCT 2. ESWT + ECCT	63	12	Pain (VAS), Function (VISA-A, MOXFQ)	12	Both interventions effective for improving clinical outcomes, no significant difference between groups.	1	3

Lagas et al. 2021	Achilles	1. ECCT + HVIGI	64	12	Pain & Function (VISA-A)	24	Intervention was effective for improving clinical outcomes.	1	0
Robinson et al. 2021	Achilles	1. Combined ESWT + ECCT 2. R-ESWT + ECCT	87	16	Pain & Function (VISA-A)	16	Both interventions effective for improving clinical outcomes, no significant difference between groups.	8	12
Wheeler et al. 2021	Plantar heel	1. R-ESWT + EX 2. ABI + EX	102	6	Pain (NRS-P), Function (FFI, MOXFQ)	26	Both interventions effective for improving clinical outcomes, no significant difference between groups.	2	5
Mantovani et al. 2020	Achilles	1. Isometric EX	22	Single session	Pain & function (VISA-A), leg stiffness	Single session	Intervention was feasible and led to immediate improvements in pain & leg stiffness	12	18
CASE SERIES									
Kulig et al. 2009	Posterior tibial	1. ECCT, orthoses	10	12	Pain (VAS), Function (FFI), GRS	26	Intervention was effective for improving clinical outcomes, without changes in tendon morphology.	11	15
Deans et al. 2012	Achilles	1. ACP, US, EX	26	6	Pain & Function (FAOS)	6	Intervention was effective for improving clinical outcomes.	1	4
Pavone et al. 2016	Achilles	1. ECCT + ESWT	40	12	Pain (VAS), Function (AOFAS)	52	Intervention was effective for improving clinical outcomes.	1	4
Romero-rodriguez et al. 2011	Patellar	1. Isoinertial flywheel ECCT	10	6	Pain (VAS), function (VISA-P)	6	Intervention was effective for improving clinical outcomes.	12	15
Wheeler et al. 2019	Achilles	1. ESWT + EX	39	6	Pain (VAS), Function (VISA-A, FAAM, RMS)	52	Intervention was more effective for improving clinical outcomes in insertional than non-insertional achilles tendinopathy.	1	5
Syverston et al. 2017	Achilles	1. ECCT, MT, taping	11	12	Pain (NRS), Function (VISA-A)	12	Intervention was effective for improving clinical outcomes.	10	11
Robinson et al. 2020	Posterior tibial	1. ESWT + EX	10	16	Pain & Function (FAAM)	16	Intervention was effective for improving clinical outcomes.	8	11

Benito et al. 2016	Achilles	1. ECCT, MT, electrotherapy	5	6	Pain & Function (VISA-A)	6	Intervention was effective for improving clinical outcomes BY 25%.	10	13
Silbernagel et al. 2011	Achilles	1. ECCT, plyometric EX	34	12	Pain & Function (VISA-A)	5 years	Most patients fully recovered in terms of pain and function	10	14
Morton et al. 2014	Patellar	1. HVIGI + ECCT	20	12	Pain & Function (VISA-A)	12	Intervention was effective for improving clinical outcomes.	1	5
Van ark et al. 2013	Patellar	1. PRP + EX program	5	12	Pain & Function (VISA-A)	26	Intervention was effective for improving clinical outcomes.	11	16
Munoz Fernandez et al. 2021	Patellar	2. UGPE + EX	3	8	Pain (NRS-P), Function (VISA-P)	8	Intervention was effective for improving clinical outcomes.	10	12
Skovlund et al. 2020	Patellar	1. low load BFRT	7	3	Pain (NRS-P), Function (VISA-P)	3	Intervention was effective for improving clinical outcomes.	13	17
Jayaseelan et al. 2017	Achilles	1. MT + ECCT	3	12	Pain & Function (VISA-A)	36	Intervention was effective for improving clinical outcomes.	10	12
Bianco et al. 2019	Patellar	1. MT + EX	3	12	Pain (VAS), Function (VISA-P)	12	Patients improved clinical outcomes and returned to sports activity	8	14
CASE REPORT									
Eckenrode et al. 2015	Achilles	1. E-STIM + ECCT	1	12	Pain & Function (VISA-A)	12	Patient improved clinical outcomes and returned to sports activity	12	14
Papa et al. 2012	Achilles	1. MT + ECCT	1	4	Pain (VAS), Function (LEFS)	52	Patient improved clinical outcomes and returned to normal activity	10	13
Dos Santos et al. 2016	Plantar heel	1. MT + Hip strength EX	1	10	Pain (NPR-S)	10	Patient improved clinical outcomes	5	9
Lee et al. 2019	Plantar heel	1. MT + Hip strength EX	1	12	Pain (VAS), Function	12	Patient improved clinical outcomes and returned to normal activity	1	4

					(AOFAS, FFI, FAAM)				
Ross et al. 2017	Achilles	1. Osteopathy + EX	1	12	Pain (VAS), Function (VISA-A)	12	Patient improved clinical outcomes and returned to sports activity	10	16
Cuddeford et al. 2020	Patellar	1. BFRT	2	12	Pain (VAS), Function (VISA-P)	12	Patients improved clinical outcomes and returned to sports activity	12	15
Krueger et al. 2020	Hamstring	1. HSRT	1	12	Pain (VAS), self-reported function	12	Patient improved clinical outcomes and returned to sports activity	11	15
Borda et al. 2017	Achilles	1. MT + ECCT	1	6	Pain & function (LEFS)	6	Patient improved clinical outcomes and returned to sports activity	10	11
Rauseo et al. 2017	Iliopsoas	1. ECCT	1	12	Pain (VAS), Function (CHGOS)	5 years	Patient improved clinical outcomes and returned to sports activity	10	15
McCormack et al. 2012	Achilles	1. MT + ECCT	1	12	Pain (NRS-P), Function (LEFS)	12	Patient improved clinical outcomes and returned to sports activity	10	14
Patla et al. 2015	Posterior tibial	1. MT + EX	1	6	Pain (NRS-P), Function (LEFS)	6	Patient improved clinical outcomes and returned to sports activity	8	13
Pinkelman et al. 2012	Extensor hallucis longus	1. Manually resisted EX, MT + US	1	6	Pain (VAS)	6	Patient improved clinical outcomes and returned to sports activity	8	14
Francis et al. 2020	Achilles	1. ESWT, ECCT, running program	1	12	Pain & Function (VISA-A, FADI)	12	Patient improved clinical outcomes and returned to sports activity	10	15
McCreesh et al. 2013	Patellar	1.ECCT	1	8	Pain & function (VISA-P), US	8	Patient improved clinical outcomes and tendon neovascularity.	10	13
Hensley et al. 2012	Peroneal	1. MT + EX	1	8	Pain (NRS-P), Function (LEFS)	8	Patient improved clinical outcomes and returned to normal activity	10	13
Cushman et al. 2015	Hamstring	1. ECCT	1	4	Pain & function (VISA-H)	12	Patient improved clinical outcomes and returned to sports activity	10	12

Thompson et al. 2017	Achilles & Plantar heel	1. EX program	1	12	Pain (VAS)	12	Patient improved clinical outcomes and returned to sports activity	11	14
Jayaseelan et al. 2014	Hamstring	1. EX + MT	2	10	Pain (NRS-P) Function (LEFS)	10	Patients improved clinical outcomes and returned to sports activity	10	14
Dumont et al. 2006	Patellar	1. ECCT	4	6	Pain (VAS)	6	Patients improved clinical outcomes but did not achieve full recovery.	10	16
Silva et al. 2015	Patellar	1. Hip strength EX	1	8	Pain (VAS), Function (VISA-P)	26	Patient improved clinical outcomes and returned to sports activity	11	14
McCormack et al. 2012	Hamstring	1. MT + ECCT	1	8	Pain (NRS-P) Function (LEFS)	8	Patient improved clinical outcomes by 95% and returned to sports activity	10	13
Van Rooy et al. 2009	Gluteal	1. MT + ECCT	1	12	Pain (VAS)	12	Patient improved clinical outcomes and was pain-free after intervention	10	12
Greene et al. 2002	Achilles	1. Ex program, orthosis	1	11	Pain (VAS) Function (LEFS)	11	Patient improved clinical outcomes	8	14
Rowan et al. 2013	Patellar	1. PRP + ECCT	1	4	Pain (VAS), Function (VISA-P)	26	Patient improved clinical outcomes and returned to sports activity	8	10
Goldman et al. 2010	Patellar	1.ECCT	1	6	Pain (VAS), Function (VISA-P, LEFS)	6	Patient improved clinical outcomes and returned to sports activity	11	14
Cuddeford et al. 2018	Achilles	1. ECCT	1	10	Pain & function (VISA-A)	10	Patient improved clinical outcomes	8	15
OTHER									
Longitudinal with control Masood et al. 2014	Achilles	1. ECCT	20	12	Pain (VAS), Function (VISA-A), EMG	12	Intervention was effective for improving clinical outcomes.	10	16
Before-after design	Achilles	1. ECCT	24	12	Pain & Function (Rolf & Movin), MRI	18	Intervention was effective for improving clinical outcomes & decreased intratendinous signal.	10	10

Gardin et al. 2010									
Case control Langberg et al. 2007	Achilles	1. ECCT	12	12	Pain (VAS)	12	Intervention was effective for improving clinical outcomes & Achilles collagen synthesis.	10	15
Quasi experimental (non-randomised) Stasinopoulos et al. 2013	Achilles	1. Alfredson ECCT 2. Stanish protocol	41	12	Pain & Function (VISA-A)	12	Alfredson ECCT protocol was superior for improving pain & function	11	17
Quasi experimental (non-randomised) Kanniappan et al. 2020	Achilles	1. ECCT 2. Isometric EX	40	4	Pain (VAS), Function (VISA-A)	4	Both groups improved clinical outcomes, with no significant differences between groups.	11	11
Quasi experimental (non-randomised) Purdam et al. 2004	Patellar	1. ECCT – flat squat 2. ECCT – DSL squat	17	12	Pain (VAS)	12	DSL squats more effective than standard flat squats for improving clinical outcomes.	10	14
Quasi experimental (non-randomised Van der Vlist et al. 2020	Achilles	1. Isometric EX (PF) 2. Isometric EX (DF) 3. Isotonic EX 4. rest	91	Single session	Pain (VAS)	Single session	Isometric EX did not result in immediate pain relief.	12	17
Before-after design	Patellar	1. EX program	16	12	Pain (VAS), Function	12	Intervention was effective for improving clinical outcomes.	4	6

Morgan et al. 2018					(VISA-P), EMG				
Observational prospective clinical trial De Vos et al. 2012	Achilles	1. ECCT	25	16	Pain & Function (VISA-A), US	24	Intervention was effective for improving clinical outcomes but did not change tendon structure.	11	14
Retrospective case control Park et al. 2021	Achilles	1. ECCT 2. Control	28	12	Pain (VAS)	12	ECCT was less effective for improving clinical outcomes in patients with metabolic syndrome.	11	14
Case control Ram et al. 2013	Achilles	1. ECCT 2. ECCT (healthy)	48	12	Pain & Function (VISA-A), satisfaction	12	Intervention was effective for improving clinical outcomes, but satisfaction was low.	10	13
Retrospective chart review Vander Doelen et al. 2020	Patellar	1. Multimodal rehabilitation INC EX, DN, ESWT. MT	9	18-32	Pain (NRS-P), Function (VISA-P)	18-32	Patients improved clinical outcomes and returned to sports activity	11	14

Abbreviations: ECCT: eccentric training, ESWT: extracorporeal shockwave therapy, DN: dry needling; MT: manual therapy, EX: exercise; VAS: visual analogue scale, NRS-P: pain numeric rating scale, VISA-A: Victorian Institute of Sport Assessment – Achilles, VISA-P: Victorian Institute of Sport Assessment – Patellar, VISA-G: Victorian Institute of Sport Assessment – Gluteal, VISA-H: Victorian Institute of Sport Assessment – Hamstring, FFI: Foot Function Index, LEFS: Lower Extremity Function Scale, WKS: weeks, US: ultrasound, PRP: platelet-rich plasma, HSRT: heavy slow resistance training: CONCT: concentric training, E-STIM: electrical stimulation, CSI: corticosteroid injection: LLLT: low-level laser therapy, BFRT: blood flow restriction training, FADI: Foot and ankle disability index, AOFAS: American orthopaedic foot and ankle score, UGPE: ultrasound guided percutaneous electrolysis, HVIGI: high-volume image guided injection: MRI: magnetic resonance imaging: RMS: Roles and Maudsley score, MHT: menopause hormone therapy, PPI: pain pressure intensity; FAAM: foot and ankle ability measure.

APPENDIX 3: Table 5: Application of resistance training principles

Author	Specificity	Over load	Progression + method	Individualised + method	Frequency (d/wk)	Intensity	Time (min)	Sets	Reps	Exercise mode/type	Adherence	RTP /8, Total /10
Beyer et al. 2015	Y	Y	Y, increase resistance/ load	Y, pain response 4-5/10	3	15RM – 6RM	107 x wk (HSRT) 308 x wk (ECCT)	3-4	15-6	Heel raises, with external weights	Y, diary (78-92%)	7, 9
Kongsgaard et al. 2009	Y	Y	Y, increase resistance	Y, pain response 3/10	3	15RM – 6RM	NR	3-4	15-6	DSL squats, squat, leg press, hack squat, with external weights	Y, diary (89-91%)	7, 9
Riel et al. 2019	Y	Y	Y, increase resistance or volume	Y, as many sets as possible	3	8RM – 12RM	tut	3-5, AMAP	8-12	Heel raises, loaded backpack	Y, diary, 29% not returned	7, 9
Stevens & Tan 2014	Y	Y	Y, increase resistance or volume	Y, as many reps as possible	7, 2xd	15RM	NR	2 x 6 (12)	15 (180 total)	Heel raises (straight leg & bent knee), loaded backpack	Y, diary, above 75%	7, 9
Da Cunha et al. 2012	Y	Y	Y, increase resistance (5kg inc)	Y, pain response	3	15RM	NR	3	15	Eccentric decline squat	NR	8, 8
Kulig et al. 2009	Y	Y	Y, increase resistance (0.9kg conforce spring)	Y, increase isokinetic resistance as able	7, 2xd	15RM	NR	2 x 3 (6)	15 (180)	Isokinetic resisted horizontal adduction with plantar flexion	Y, diary, 68% (39-98)	8, 10
Bahr et al. 2006	Y	Y	Y, increase resistance (5kg inc)	Y, pain response less 3/10, increase 5kg	7, 2xd	15RM	NR	2 X 3 (6)	15 (180)	DSL squat, loaded backpack	NR	8, 8

Lee et al. 2020	Y	Y	Y, increase resistance (5kg inc)	Y, pain response 4/10, increase 5kg	7, 2Xd	15RM	NR	2 X 3 (6)	15 (180)	DSL squat, loaded backpack	Y, diary	8, 9
Frohm et al. 2007	Y	Y	Y, increase resistance (5kg inc)	Y, pain response 5/10, increase 5kg	1.2 2. 7, 2xd	15-16RM	70 mins x session	3-4	15-16	1. The Bromsman eccentric overload training device 2. DSL squat, loaded backpack	NR	8,8
Silbernagel et al. 2001	Y	Y	Y, increase resistance, volume, speed & difficultly	Y, pain response 5/10	7	5-15RM	NR	3	5-15	Double and single leg Slow Heel raises, fast rebounding heel raises	Y, diary	7, 8
Balius et al. 2016	Y	NR	NR	NR	7, 2xd	15RM	NR	2 X 3 (6)	15 (180)	Alfredson heel raises, straight & bent knee	PT recorded; 70% minimum allowed	2, 4
Mafi et al. 2001	Y	Y	Y, increase resistance	Y, pain response	7, 2xd	15RM	NR	2 X 3 (6)	15 (180)	Alfredson heel raises, straight & bent knee, loaded with backpack or weight machines	NR	7, 7
Norregaard et al. 2007	Y	Y	Y, increase resistance (5kg inc)	Y, pain response, increase 5kg	7, 2xd	15RM	NR	2 X 3 (6)	15 (180)	Alfredson heel raises, straight & bent knee, loaded with backpack	Y. diary, results NR	8, 9
Stasinopolous et al. 2004	Y	Y	Y, increase resistance	Y, pain response	7, 2xd	15RM	NR	2 X 3 (6)	15 (180)	DSL squat, handheld external weights	NR	7, 7
De Vos et al. 2007	Y	Y	Y, increase resistance	Y, pain response	7, 2xd	15RM	NR	2 X 3 (6)	15 (180)	Alfredson heel raises, straight & bent knee, loaded with	Y, diary, (70-74%)	7, 9

										backpack or weight machines		
Johannsen et al. 2019	Y	UC	UC	NR	3	NR	NR	NR	NR	(1) heel-raises, (2) flexion of the first toe against elastic band. (3) Inversion of the foot against elastic band	NR	2, 2
MacDonald et al. 2019	Y	Y	Y, increase resistance (5kg inc)	Y, pain response 5/10, increase 5kg, correct technique	7, 2xd	15RM	NR	2 X 3 (6)	15 (180)	DSL squat eccentric protocol with addition of isotonic hip exercise, loaded backpack	Y, diary, 42.5% full	8, 10
Gatz et al. 2020	Y	Y	Y, increase resistance	Y, pain response	7, 2 X D	15RM	NR	2 X 3 (6)	15 (180)	Alfredson eccentric heel raise protocol + isometric exercise	Y, verbal, NR	7, 8
Ganderton et al. 2018	Y	Y	Y, increase difficulty	Y, individual ability determined progression	7, 2 x d	5-15RM	30MIN X D	2-4	5-15	isometric loading of gluteals, and kinetic chain strength exercises	Y, diary, 75%	7, 9
Silbernagel et al. 2007	Y	Y	Y, Increase resistance, volume, and speed of exercises	Y, Increased resistance, volume, and speed guided by Pain response	7	10-20RM	NR	3	10-20	2-legged, 1-legged, eccentric, and fast rebounding toe raises, plyometric exercise. Loaded with backpack or weight machine	Y, diary	7, 8
Clifford et al. 2019	Y	Y	Y, increase resistance band strength	Y, pain response 5/10	7	6-10RM	6min TUT x d	3-6	6-10	Isotonic & isometric hip abduction, loaded with bands	Y, diary, (58-70%)	7, 9

Stergioulas et al. 2008	Y	Y	Y, increase resistance (4kg inc)	Y, pain response 5/10	4	12RM	NR	12	12	Eccentric heel raise, knee straight & flexed, loaded backpack	Y, diary (85-100%)	8, 10
Rompe et al. 2008	Y	Y	Y, increase resistance (5kg inc)	Y, pain response, increase 5kg	7, 2 X D	10-15RM	NR	3 X 2 (6)	10-15 (180)	Alfredson eccentric heel raise, knee straight & flexed, loaded backpack	Y, verbal, NR	8, 9
Van Ark et al. 2016	Y	Y	Y, increase resistance 2.5% per week	Y, pain response, correct technique, 2.5% increase	4	isometric (80% 1RM) isotonic (80% 8RM)	NR	4-5	5-8	Leg extension machine, external weight. Audio used for speed tempo	NR	8, 8
Roos et al. 2004	Y	Y	Y, increase resistance	Y, pain response	7, 2 X D	15RM	NR	1-3	15 (180)	Modified Alfredson eccentric heel raise, knee straight & flexed, loaded backpack	Y, diary (50-75%)	7, 9
Chester et al. 2008	Y	Y	Y, increase resistance	Y, pain response	7	15RM	NR	3 X 2 (6)	15 (90)	Modified Alfredson eccentric heel raise, knee straight & flexed, loaded backpack	NR	7, 7
Rompe et al. 2007	Y	Y	Y, increase resistance (5kg inc)	Y, pain response, increase 5kg	7, 2 X D	10-15RM	NR	3 X 2 (6)	10-15 (180)	Modified Alfredson eccentric heel raise, knee straight & flexed, loaded backpack	NR	8, 8
Thijs et al. 2017	Y	Y	Y, increase resistance	Y, pain response, 4/10	7, 2 X D	15RM	NR	3 X 2 (6)	15 (180)	DSL eccentric squat, loaded backpack	NR	7, 7
Horstmann et al. 2013	Y	Y	Y, increase resistance + volume, based on fatigue	Y, increase resistance + volume,	7	15RM	NR	3-4	15	Modified Alfredson eccentric heel raise, knee	NR	7, 7

				based on fatigue						straight & flexed, loaded backpack		
Alfredson et al. 1998	Y	Y	Y, increase resistance	Y, pain response	7, 2 x d	15RM	NR	3 X 2 (6)	15 (180)	Modified Alfredson eccentric heel raise, knee straight & flexed, loaded backpack or weight machine	NR	7, 7
Alvarez et al. 2006	Y	Y	Y, increase resistance (elastic bands) and volume	Y, increase resistance based on pain response + correct technique	7, 2 X D	30RM	NR	3	30	Isotonic exercise with elastic bands, increased resistance (elastic bands strength) 1. Bilateral heel raises 2. Ankle plantar flexion with adduction and Inversion. 3. Unilateral heel raises (standing)	Y, diary (79%)	7, 9
Kearney et al. 2013	Y	Y	Y, progress from DL to SL with increased resistance	Y, pain response, progress from DL to SL with increased load	7, 2 x d	15RM	NR	3 X 2 (6)	15 (180)	Modified Alfredson eccentric heel raise, knee straight & flexed, loaded backpack, DL progressing to SL	NR	7, 7
Tumilty et al. 2012	Y	Y	Y, increase resistance	Y, pain response	7, 2 x d	15RM	NR	3 X 2 (6)	15 (180)	Modified Alfredson eccentric heel raise, knee straight & flexed, loaded backpack	Y, diary (70%)	7, 9

Yelland et al. 2011	Y	Y	Y, increase resistance	Y, pain response 4/10	7, 2 x d	15RM	NR	3 X 2 (6)	15 (180)	Modified Alfredson eccentric heel raise, knee straight & flexed, loaded backpack	Y, diary	7, 8
McCormack et al. 2016	Y	Y	Y, increase resistance	NR	7, 2 X D	15RM	NR	3 X 2 (6)	15 (180)	Modified Alfredson eccentric heel raise, knee straight & flexed, loaded backpack	NR	5, 5
Tumilty et al. 2016	Y	Y	Y, increase resistance	Y, pain response, 4/10	2	15RM	NR	3 X 2 (6)	15 (180)	Modified Alfredson eccentric heel raise, knee straight & flexed, loaded backpack. 2Xwk V D	Y, diary, 70-100%	7, 9
Cannell et al. 2001	Y	Y	Y, increase resistance with fixed loading protocol & external weight	Y, pain response	5	10-20RM	NR	3	10-20	Progressive drop squats and leg extension/curl exercises, fixed loading protocol, external weights	NR	8, 8
Jonsson et al. 2005	Y	Y	Y, increase resistance	Y, self-acceptable pain response	7, 2 X D	15RM	NR	3 X 2 (6)	15 (180)	Eccentric v concentric DSL squat, loaded backpack	NR	7, 7
Mellor et al. 2018	Y	Y	Y, increase diffciculty/ intensity (BORG)	Y, pain response 5/10, BORG scale (13-17 target)	7	BORG (13-17)	30 min x session	1-2	3-15	Comprehensive progressive exercise program targeting hip muscles, monitored by pain response and BORG scale. External load NR. Spring	Y, diary, 80%	8, 10

										resistance for hip abduction		
Kedia et al. 2014	Y	Y	Y, increase resistance	Y, exercise difficultly, increase resistance	7, 2 x d	15RM	NR	3 X 2 (6)	15 (180)	Modified Alfredson eccentric heel raise, knee straight & flexed, loaded backpack	Y, diary, NR	7, 8
Herrington et al. 2007	Y	Y	Y, increase speed and resistance	Y, increase speed and resistance based on pain response	7, 2 X D	15RM	NR	3 X 2 (6)	15 (180)	Modified Alfredson eccentric heel raise, knee straight & flexed, loaded backpack	Y, diary, NR	7, 8
Houck et al. 2015	Y	Y	Y, increase resistance – elastic bands strength	Y, increase resistance based on pain response & Ex technique	7, 2 X D	30RM	30 min x session	3 X 2 (6)	30 X 3 X 3 (180)	Bilateral & unilateral heel raises, ankle plantarflexion with adduction & inversion. Resistance bands	Y, diary (79%)	7, 9
Dimitrios et al. 2012	Y	Y	Y, increase resistance with handheld weights	Y, pain response	5	15RM	NR	3	15	Eccentric DSL squat, handheld weights	Y, diary, NR	7, 8
Petersen et al. 2007	Y	Y	Y, increase resistance	Y, pain response	7, 3 x D	15RM	NR	3 X 3 (9)	15 (270)	Modified Alfredson eccentric heel raise, knee straight & flexed, loaded backpack	Y, diary, NR	7, 8
Steunebrink et al. 2013	Y	Y	Y, increase resistance (5kg inc)	Y, pain response, 3/10 = increase load	7, 2 x d	15RM	NR	3 X 2 (6)	15 (180)	Modified Alfredson - Eccentric DSL squat	Y, diary (70%)	8, 10
Rompe et al. 2009	Y	Y	Y, increase resistance (5kg inc)	Y, pain response	7, 2 X D	15RM	NR	3 X 2 (6)	10-15 (180)	Modified Alfredson eccentric heel raise, knee	NR	8, 8

										straight & flexed, loaded backpack		
Young et al. 2005	Y	Y	Y, increase speed, then resistance (5kg inc)	Y, pain response	7. 2 x d	15RM	NR	3 X 2 (6)	15 (180)	Modified Alfredson DSL squat, loaded backpack	Y, diary (72%)	8, 10
De Jonge et al. 2010	Y	Y	Y, increase resistance	Y, pain response	7, 2 x d	15RM	NR	3 X 2 (6)	15 (180)	Modified Alfredson eccentric heel raise, knee straight & flexed, loaded backpack or weight machine	Y, diary	7, 8
Praet et al. 2019	Y	Y	Y, increase speed, then resistance (5kg inc until max 60kg)	Y, pain response	7, 2 X D	15RM	NR	3 X 2 (6)	15 (180)	Modified Alfredson eccentric heel raise, knee straight & flexed, loaded backpack	Y, diary (78-84%)	8, 10
Rathleff et al. 2015	Y	Y	Y, increase resistance	NR	3	12-8RM	NR	3-5	12-8	Heel raise on step with toes maximally dorsiflexed on towel	NR	5, 5
Knobloch et al. 2008	Y	NR	NR	NR	7, 2 X D	15RM	NR	3 X 2 (6)	15 (180)	Modified Alfredson eccentric heel drop, knee straight & flexed	NR	2, 2
Wheeler et al. 2017	Y	NR	NR	NR	NR	NR	NR	NR	NR	stretching, calf & foot muscle strengthening and balance exercises.	NR	2, 2
De Jonge et al. 2011	Y	NR	NR	Y, pain response	7	NR	NR	NR	180	Alfredson eccentric heel drop, knee straight & flexed,	Y, Verbal	4, 5

De Vos et al. 2010	Y	NR	NR	Y, pain response	7	NR	NR	NR	180	Alfredson eccentric heel drop, knee straight & flexed,	Y, Verbal	4, 5
Warden et al. 2008	Y	Y	Y, increase resistance with hand weights	Y, pain response	7	15RM	NR	3	15 (45)	Modified Alfredson DSL squat, hand weights	Y, diary, 65%	7, 9
Visnes et al. 2005	Y	Y	Y, increase resistance (5kg inc)	Y, pain response	7, 2 X D	15RM	NR	3 X 2 (6)	15 (90)	Modified Alfredson DSL squat, loaded backpack	Y, diary	8, 9
Van Ark et al. 2018	Y	Y	Y, increase resistance (2.5% per week)	Y, pain response	4	8RM	NR	4X2	8X2	Leg extension machine	NR	8, 8
Thompson et al. 2019	Y	NR	NR	Y, pain response	7, 2 X D	10-15RM	NR	1 X 2	10-15	leg lunges, single stance knee bends, and side lying eccentric flexion, side bending and extension	Y, NR	4, 5
Cacchio et al. 2011	Y	Y	NR	NR	3	6-10RM	NR	3-4	6-10	Loaded with weights: leg curls, hip flexion & extension, deadlift, lunge, half squat, countermovement jump	NR	4, 4
Munteanu et al. 2014	Y	Y	Y, increase resistance (5kg inc)	Y, pain response	7, 2 X D	15RM	NR	3 X 2	15	Alfredson eccentric heel-drop protocol	Y, diary (57%)	8, 10
Van der Worp et al. 2014	Y	Y	Y, increase resistance	Y, pain response	5	15RM	NR	3 X 2	15	DSL squat, loaded backpack (Visnes protocol)	Y, diary	7, 8
Romero-morales et al. 2018	Y	Y	Y, increase resistance	Y, pain response	7, 2 X D	15RM	NR	3 X 2 (6)	15 (90)	Modified Alfredson heel-drop protocol	Y, diary	7, 8

Romero-morales et al. 2020	Y	Y	Y, increase resistance	Y, pain response	7, 2 X D	15RM	NR	3 X 2 (6)	15 (90)	Modified Alfredson heel-drop protocol	Y, diary	7, 8
Ryan et al. 2014	Y	NR	NR	NR	7	15RM	NR	3-5	15	Forefoot extension, ankle inversion & eversion, SL standing, stretching.	Y, diary	2, 3
Riel et al. 2018	Y	Y	Y, increase resistance	Y, increase resistance individually	3	8RM	64/S set, 256/S total	4	8	Heel-raise with loaded backpack	NR	7, 7
Koszalinski et al. 2020	Y	NR	NR	NR	NR	15RM	NR	3	15	Alfredson eccentric heel-drop, Ankle adduction, Towel crunches	NR	2, 2
Pearson et al. 2012	Y	Y	Y, increase resistance	Y, pain response	NR	NR	NR	NR	NR	Alfredson eccentric heel-drop, no details given	NR	7, 7
Wang et al. 2007	Y	NR	NR	NR	NR	NR	NR	NR	NR	Eccentric strengthening of quadriceps and hamstrings	NR	2, 2
Notarnicola et al. 2013	Y	NR	NR	NR	NR	NR	NR	3	10	Eccentric exercise unspecified	NR	2, 2
Dragoo et al. 2014	Y	NR	NR	NR	NR	NR	NR	NR	NR	Eccentric exercise unspecified	NR	2, 2
Kaux et al. 2019	Y	Y	Y, increase volume	NR	3	15-20RM	NR	5-7	15	Bodyweight eccentric wall squat	NR	5, 5
Abat et al. 2016	Y	NR	NR	NR	NR	15RM	15min	3	15	Eccentric DSL squat	NR	2, 2
Biernat et al. 2014	Y	Y	Y, increase difficulty	Y, pain response	7	15RM	NR	3X2 (6)	15 (90)	Eccentric DSL squat	NR	7, 7

Rio et al. 2015	Y	Y	NR	NR	Single session	8RM	NR	4	8	Biodex (isometric) Leg extension machine (isotonic)	Y, supervised	4, 5
Rio et al. 2017	Y	Y	Y, increase resistance (2.5% weekly)	Y, fatigue	4	8RM	NR	4	8	Leg extension machine	Y, supervised	8, 9
Holden et al. 2020	Y	Y	NR	NR	Single session	8RM	NR	3	8	Biodex (isometric) Leg extension machine (isotonic)	Y, supervised	4, 5
Choudhary et al. 2021	Y	Y	Y, increase repetitions	Y, pain response	7, 3 X D	15RM	NR	3	15 (45)	ECCT – no details	NR	7, 7
Cowan et al. 2021	Y	Y	Y, individual ability determined progression	Y, increase difficultly	7, 2 x D	5-15RM	15min x 2 (30)	2-4	5-15	isometric loading of gluteals, and kinetic chain strength exercises	Y, diary (70-94%)	7, 9
Habets et al. 2021	Y	Y	Y, increase resistance (5kg inc in backpack - AG), + increase speed (SG)	Y, pain response	7, 2 x D (AG)	15RM (AG)	NR	6 (AG) 3 (SG)	180 (AG) 15 (SG)	Alfredson ECCT heel drop VS Silbernagel CONCT-ECCT heel raise	Y, diary, 74% (AG) 77% (SG)	8, 10
Ruffino et al. 2021	Y	Y	Y, increase resistance	Y, pain response	3	6-15RM	50MIN	4	6-15	HSRT (modified Kongsgaard protocol): squat, hack squat, leg press. Flywheel: squat, leg press, knee extension.	Y, diary, 88% (HSRT), 90% (Flywheel)	7, 9
Olesen et al. 2021	Y	Y	Y, increase resistance	Y, pain response	3	6-15RM	NR	4	6-15	HSRT (modified Kongsgaard protocol): squat, knee extension, leg press.	NR	7, 7

Hasani et al. 2021	Y	Y	Y, increase resistance	Y, pain response & difficultly	3	6-18RM	39-53MINS	4	6-18	Seated & standing calf raises on smith machine: high (6 RM) or low intensity (18 RM) exercise, performed with either high (6 s) or low (2) time-under-tension.	Y, diary, 49-68%	7, 9
Mansur et al. 2021	Y	Y	NR	NR	7, 2 X D	15RM	NR	3 x 2 x 2 (12)	15 x 3 x 2 x 2 (180)	Modified Alfredson heel drop protocol	NR	4, 4
Sprague et al. 2021	Y	Y	Y, increase resistance	Y, pain response	3	6-15RM	NR	4	6-15	HSRT (modified Kongsgaard protocol): squat, knee extension, leg press.	Y, diary (67-86%)	7, 9
Agergaard et al. 2021	Y	Y	Y, increase resistance (% of 1RM)	Y, pain response	3	55-90% 1RM	NR	3-5	4-15	HSRT: leg press, knee extension	Y, diary, 78-86%	8, 10
Lopez-Royo et al. 2021	Y	Y	Y, increase speed	Y, pain response	7, 2 X D	15RM	NR	3	15	Young ECCT Protocol: DSL squat	NR	7, 7
Abdelkader et al. 2021	Y	NR	NR	NR	7, 2 X D	15RM	NR	3	15	Modified Alfredson heel drop protocol, 4 weeks only	NR	2, 2
Van der Vlist et al. 2020	Y	Y	Y, increase resistance (backpack or weights)	Y, pain response	7	15RM	NR	3	15	Silbernagel protocol: isometric, CONCT, ECCT, plyometric, calf raises,	Y, diary, 76%	7, 9
Breda et al. 2020	Y	Y	Y, increase resistance & difficultly	Y, pain response	3-7	6-15RM, 70% MVIC	NR	4	6-15	ECCT: DSL squat, PTLE: isometric,	Y, diary, 40-49%	7, 9

						(isometric)				isotonic, plyometric EX, leg press, leg extension, sport specific, hip abduction & extension EX		
Rabusin et al. 2021	Y	Y	Y, increase resistance (5kg inc in backpack)	Y, pain response	7, 2 X D	15RM	NR	3 (12)	15 (180)	Alfredson ECCT heel drop protocol	Y, diary, 60-94%	8, 10
Solomons et al. 2020	Y	NR	NR	Y, pain response	NR	NR	NR	NR	NR	Isometric, CONCT, ECCT, no details	Y, diary, 83-100%	4, 6
Ramon et al. 2020	Y	NR	NR	NR	7	10RM	NR	1	10	Gluteal EX: Bridging, hip abduction & extension	NR	2, 2
Scott et al. 2019	Y	NR	NR	NR	3	NR	NR	NR	NR	HSRT (modified Kongsgaard protocol):no details	NR	2, 2
Stefansson et al. 2019	Y	Y	Y, increase resistance (5kg inc in backpack)	Y, pain response	7, 2 x D	10-15RM	NR	1-3	10-15	Alfredson ECCT heel drop protocol	NR	8, 8
Boesen et al. 2017	Y	Y	NR	Y, pain response	7, 2 x D	15RM	NR	6	180	Alfredson ECCT heel drop protocol	Y, diary, 70%	6, 8
Chesterton et al. 2021	Y	NR	Y, increase difficulty	Y, pain response	NR	NR	NR	NR	NR	Progressive foot, calf and hip strength EX, no details	Y, diary	5, 6
Rasenberg et al. 2020	Y	NR	NR	NR	NR	NR	NR	NR	NR	Rathleff heel-raise protocol, no details	Y, diary	2, 3
Johannsen et al. 2020	Y	NR	NR	NR	3	NR	NR	NR	NR	Ankle inversion, first toe flexion, heel raises	Y, diary, 100%	2, 4

										(performed slowly)		
Thong-On et al. 2019	Y	Y	Y, increase resistance	Y, increase difficulty	7	10-15RM	NR	3	10-15	Heel raises, toe curles, ankle inversion & eversion with resistance bands	Y, diary	7, 9
Cil et al. 2019	Y	Y	Y, increase repetitions	NR	7	10-15RM	NR	3	10-15	Strength EX; foot intrinsic, ankle & hip, TheraBand	NR	5, 5
Kamonseki et al. 2016	Y	Y	Y, increase resistance	NR	7	10-15RM	NR	3	10-15	Strength EX: Toe curl, short foot, inversion, eversion, PF, DF, hip External rotation & abduction	NR	5, 5
Brown et al. 2006	NR	NR	NR	NR	NR	NR	NR	NR	NR	Alfredson protocol, no details	Y, verbal	0, 1
Niesen-Vertommen et al. 1992	Y	Y	Y, increase resistance (10% of bodyweight)	Y, pain response	6	10RM	NR	5	10	ECCT (stanish protocol) vs CONCT heel raises on a step	Y, diary	8, 9
Jensen et al. 1989	Y	Y	Y, increase speed/velocity	Y, difficultly	3	Speed (30-70 degrees /s), 5RM	NR	6-4	5	ECCT: isokinetic dynamometer	Y, diary	7, 8
Yu et al. 2013	Y	Y	Y, increase resistance (5-10lbs)	Y, pain response	3	NR	50MIN	3	15	ECCT heel drop: modified Alfredson & Stanish protocols CONCT heel riase: Mafi protocol	NR	8, 8
Wheeler et al. 2021	Y	Y	Y, increase repetitions as able	Y, pain response	7	NR	NR	NR	NR	Isotonic hip strength EX: abduction, bridging clams	NR	7, 7

Zhang et al. 2013	Y	Y	Y, increase resistance (5kg inc in backpack)	Y, pain response	7	15RM	NR	3	15	Modified Alfredson heel drop protocol	NR	8, 8
Bell et al. 2013	Y	NR	NR	Y, pain response	7	NR	NR	NR	180	Alfredson heel drop protocol, no details	Y, diary, 62-65%	4, 6
Pietrosimone et al. 2020	Y	Y	NR	NR	Single session	70% MVIC	NR	5	45/s	Isometric knee extension	NR	4, 4
COHORT STUDIES												
Sancho et al. 2019	Y	Y	Y, increase resistance	Y, pain response	7 (isometric) 3 (isotonic)	8-25RM 80% OF 6RM for 8RM	NR	2-3	8-25	Seated & standing heel raises (isometric & isotonic), Hip abduction & extension, DL jumps, SL hops, running	Y, diary, 70%	7, 9
Croisier et al. 2001	Y	Y	Y, increase resistance & speed	Y, pain response	3	30-80% max intensity, 30-180 degrees/S velocity	NR	1-5	20-30	Isokinetic dynamometer: Heel raise (Achilles), knee extension (patellar)	Y, supervised	7, 8
Ohberg et al. 2004	Y	Y	Y, increase resistance (backpack or weights)	Y, pain response	7, 2 x D	15RM	NR	3 X 2 (6)	15 X 3 X 2 (90)	Alfredson eccentric heel-drop protocol	NR	7, 7
Sayana et al. 2007	Y	Y	Y, increase resistance (5kg inc in backpack)	Y, pain response	7, 2 x D	15RM	NR	3 X 2 (6)	15 X 3 X 2 (90)	Alfredson eccentric heel-drop protocol	Y, diary	8, 9
Abat et al. 2014	Y	Y	NR	NR	2	10RM	NR	3	10	Isoinertial eccentric training machine	Y, supervised	4, 5
Riel et al. 2019	Y	Y	Y, increase resistance	Y, as many sets as possible,	4	8RM	64 S/set	8	AMAP	HSRT heel-raise on a step, loaded backpack	Y, diary, 75%	7, 9

			(backpack) & volume (sets)	pain response								
Kongsgaard et al 2010	Y	Y	Y, increase resistance	Y, pain response	3	6-15RM	NR	4	6-15	Knee extension, squat, leg press, hack squat.	NR	7, 7
Wetke et al. 2015	Y	Y	Y, increase difficulty (no external load)	Y, pain response	7	20RM	NR	3	20	Bodyweight DL heel raises progressing to SL & higher height	Y, verbal, 65%	7, 9
Maffulli et al. 2008	Y	Y	Y, increase resistance & speed (5kg INC in backpack)	Y, pain response	7, 2 x D	10-15RM	NR	1-3	10-15	Modified Alfredson heel-drop protocol	Y, diary	8, 9
Shalabi et al. 2004	Y	Y	Y, increase resistance (backpack)	Y, pain response	7, 2 x D	15RM	NR	3 X 2 (6) X 2 (12)	15 X 3 X 2 (90) X 2 (180)	Modified Alfredson heel-drop protocol	Y, diary	7, 8
Mansur et al. 2019	Y	Y	Y, increase resistance (5kg INC in backpack)	Y, pain response	7, 2 X D	15RM	NR	3 X 2 (6) X 2 (12)	15 X 3 X 2 (90) X 2 (180)	Modified Alfredson heel-drop protocol	NR	8, 8
Abat et al. 2015	Y	Y	NR	NR	2	10RM	NR	3	10	Isoinertial ECCT, leg press machine	NR	4, 4
Alfredson et al. 1999	Y	Y	Y, increase resistance (backpack then weight machine)	Y, pain response	7, 2 X D	15RM	NR	3 X 2 (6) X 2 (12)	15 X 3 X 2 (90) X 2 (180)	Modified Alfredson heel-drop protocol	NR	7, 7
O'Neill et al. 2019	Y	Y	NR	NR	Single session	70% MVIC	45/S	1	1	Single session 45/s isometric contraction with	NR	4, 4

										isokinetic dynamometry		
Ooi et al. 2019	Y	NR	NR	NR	NR	NR	NR	NR	NR	Alfredson heel-drop protocol	NR	2, 2
Kaux et al. 2015	Y	NR	NR	NR	3	NR	NR	NR	NR	Sub-maximal ECCT, no details	NR	2, 2
Alfredson et al. 2003	Y	Y	Y, increase resistance (5kg INC in backpack)	Y, pain response	7, 2 X D	15RM	NR	3 X 2 (6) X 2 (12)	15 X 3 X 2 (90) X 2 (180)	Alfredson heel-drop protocol	NR	8, 8
De Jonge et al. 2015	Y	NR	NR	NR	7	NR	NR	NR	180	Alfredson heel-drop protocol, no details	NR	2, 2
Panni et al. 2000	Y	NR	NR	NR	NR	NR	NR	NR	NR	Eccentric and isometric exercises, no details.	NR	2, 2
Angermann et al. 1999	Y	Y	Y, increase resistance & speed (5kg INC)	Y, pain response	7, 2 X D	10RM	NR	3-8	10	Isotonic heel raises, no details	Y, verbal	8, 9
Von Wehren et al. 2019	Y	Y	NR	NR	7, 2 X D	15RM	NR	3 X 2 (6) X 2 (12)	15 X 3 X 2 (90) X 2 (180)	Alfredson heel-drop protocol	NR	4, 4
Kaux et al. 2014	Y	Y	Y, increase difficultly/incline angle (bodyweight)	Y, pain response	3	15-20RM	NR	3-5	15-20	Eccentric DSL squat, isometric EX	Y, diary, 75%	7, 9
Wei et al. 2017	Y	Y	Y, increase resistance & speed (5kg INC)	Y, pain response	7, 2 X D	15RM	NR	3 X 2 (6) X 2 (12)	15 X 3 X 2 (90) X 2	Alfredson heel-drop protocol	Y, verbal	8, 9

									(180)			
Basas et al. 2018	Y	Y	Y, increase resistance	Y, pain response	3	NR	NR	NR	NR	Eccentric + isometric exercises for quadriceps with ES.	NR	7, 7
Fahlstrom et al. 2003	Y	Y	Y, increase resistance	Y, pain response	7, 2 X D	15RM	NR	3 X 2 (6) X 2 (12)	15 X 3 X 2 (90) X 2 (180)	Alfredson heel-drop protocol	NR	7, 7
Jonsson et al. 2008	Y	Y	Y, increase resistance (backpack)	Y, pain response	7, 2 X D	15RM	NR	3 X 2 (6) X 2 (12)	15 X 3 X 2 (90) X 2 (180)	Modified Alfredson heel-drop protocol	Y, verbal	7, 8
Abate et al. 2020	Y	Y	Y, increase resistance	Y, pain response	7, 2 X D	15RM	NR	3 X 2 (6) X 2 (12)	15 X 3 X 2 (90) X 2 (180)	Alfredson heel-drop protocol	Y, diary, 70%	7, 9
Wheeler et al. 2020	Y	NR	NR	NR	NR	NR	NR	NR	NR	ECCT, no details	NR	2, 2
Lagas et al. 2021	Y	NR	NR	NR	NR	NR	NR	NR	NR	Calf strengthening EX, no details.	NR	2, 2
Robinson et al. 2021	Y	NR	NR	NR	7	NR	NR	3	30	Ecct: calf raises, no details	NR	2, 2
Wheeler et al. 2021	Y	NR	NR	NR	7	NR	NR	NR	NR	IFM EX, Isotonic calf raises, no details	NR	2, 2
Mantovani et al. 2020	Y	Y	Y, increase resistance	Y, RPE & pain response	Single session	RPE 6, 50% body weight load	NR	5	45/s	Isometric heel raise	Y, sup	7, 8

CASE SERIES												
Kulig et al. 2009	Y	Y	Y, increase resistance (modified by therapist)	Y, individual resistance	7, 2 x D	15RM	NR	3	15	Eccentric tibialis posterior EX with TibPost loader device	Y, diary, 77-100%	8, 10
Deans et al. 2012	Y	NR	NR	NR	NR	NR	NR	NR	NR	ECCT, no details	NR	2, 2
Pavone et al. 2016	Y	NR	NR	NR	4	NR	NR	NR	NR	ECCT, no details	NR	2, 2
Romero-rodriguez et al. 2011	Y	Y	Y, always maximal intensity	Y, always maximal intensity	2	10RM	NR	4	10	Isoinertial flywheel ECCT, maximal effort	NR	8, 10
Wheeler et al. 2019	Y	NR	NR	NR	NR	NR	NR	NR	NR	ECCT & isometric EX, no details	NR	2, 2
Syverston et al. 2017	Y	Y	NR	NR	7, 2 X D	15RM	NR	3 X 2 (6) X 2 (12)	15 X 3 X 2 (90) X 2 (180)	Alfredson heel-drop protocol	NR	4, 4
Robinson et al. 2020	Y	NR	NR	NR	NR	30RM	NR	3	30	Short foot EX, resisted tibialis posterior EX, Calf raises.	NR	2, 2
Benito et al. 2016	Y	Y	Y, increase resistance (2.5kg INC)	NR	7	8-15RM	NR	3	8-15	Modified Alfredson heel-drop protocol	NR	6, 6
Silbernagel et al. 2011	Y	Y	Y, increase resistance (external weights) & speed	Y, pain response	3	15M	NR	3	15	ECCT heel raises, Plyometric EX	NR	7, 7
Morton et al. 2014	Y	NR	NR	NR	NR	NR	NR	NR	NR	ECCT DSL squat, no details	NR	2, 2
Van ark et al. 2013	Y	Y	Y, increase resistance & difficultly	Y, pain response	7	8-10RM	NR	3	8-20	Isometric quadriceps, SLR, side-lying	Y, diary	7, 8

										abduction, squats, calf raises, SL squat, DSL squat, lunges, step-downs, bridging, jumping EX		
Munoz Fernandez et al. 2021	Y	Y	NR	Y, pain response	NR	NR	NR	3	15	Hip clams, single limb bridge, DSL squat, pelvic drop, hip abduction, squat, deadlift, short foot.	NR	4, 4
Skovlund et al. 2020	Y	Y	Y, increase volume	Y, pain response	3	10RM (30% OF 1RM)	NR	6	5-30	BFRT: SL leg press & knee extension	Y, diary, 98%	7, 9
Jayaseelan et al. 2017	Y	NR	NR	NR	7, 2 X D	15RM	NR	3	15	Modified Alfredson heel-drop protocol	Y, verbal	2, 3
Bianco et al. 2019	Y	NR	Y, increase speed	Y, pain response	NR	10-15RM	NR	2-3	10-15	Wall decline squat, SL mini squat, squat, DSL squat, drop squat, SL squat, jump downs	NR	5, 5
CASE REPORT												
Eckenrode et al. 2015	Y	Y	Y, increase resistance & difficultly	Y, pain response	7, 2 X D	15RM	NR	3	15	Alfredson heel-drop protocol. Other EX; bridging, lying hip abduction, SLR, wall squat	NR	7, 7
Papa et al. 2012	Y	Y	Y, increase resistance	NR	5	10-15RM	NR	3	10-15	Modified Alfredson heel-drop protocol	NR	5, 5

Dos Santos et al. 2016	Y	NR	NR	NR	NR	10RM, with 3kg weight	NR	3	10	Hip EX: flexion, abduction, adduction, extension	NR	2, 2
Lee et al. 2019	Y	NR	NR	NR	3	NR	30min	NR	NR	Calf and hip strength EX, no details	NR	2, 2
Ross et al. 2017	Y	Y	Y, increase resistance (backpack)	Y, pain response	NR	8-15RM	NR	3	8-15	Isotonic heel raises, TheraBand PF & DF, SL balance EX, plyometric EX	Y, diary	7, 8
Cuddeford et al. 2020	Y	Y	Y, increase resistance (10lbs INC)	Y, increase difficulty	2	1RM (load), 15-30RM	15MIN	4	15-30	BFRT: SL leg press, DSL squat	NR	8, 8
Krueger et al. 2020	Y	Y	Y, increase resistance	Y, RPE for load & pain response	3	RPE 7-9 (RIR 3-1), 1RM (load), 6-15RM	NR	3	6-15	HSRT: back squat, deadlift, hip thrust, hamstring curl, SL: deadlift, reverse lunge, hamstring curl	Y, verbal	7, 8
Borda et al. 2017	Y	NR	NR	NR	7	NR	NR	2-3	15-20	ECCT: heel drop: knee flexed and straight	NR	2, 2
Rauseo et al. 2017	Y	Y	Y, increase resistance	Y, pain response	7, 2 X D	15RM	NR	3	15	ECCT: resisted hip flexion Other EX: bridging, squats, SL deadlift	Y, verbal	7, 8
McCormack et al. 2012	Y	Y	Y, increase resistance	Y, pain response	7, 2 x D	10-20RM	NR	2	10-20	Modified Alfredson heel drop protocol	NR	7, 7
Patla et al. 2015	Y	NR	Y, increase volume	NR	NR	10-15RM	NR	2-3	10-15	Heel riase with ball squeeze, DL heel raise with SL lowering, pronation & supination	NR	3, 3

Pinkelman et al. 2012	Y	Y	Y, increase velocity	Y, pain response	14 sessions over 6 weeks	15-30RM	NR	3-5	15-30	ECCT: manually resisted great toe extension	NR	7, 7
Francis et al. 2020	Y	Y	Y, increase resistance (1.5kg INC in backpack)	NR	7, 2 X D	12RM	NR	3	12	Modified Alfredson heel-drop protocol, running program	Y, diary, 80%	6, 8
McCreesh et al. 2013	Y	Y	Y, increase resistance (backpack)	NR	7, 2 x D	10RM	NR	3	10	Purdam ECCT protocol: DSL squat	NR	5, 5
Hensley et al. 2012	Y	Y	Y, increase resistance (theraband)	NR	3	15RM	NR	3	15	Peroneal strength EX: theraband resisted inversion & eversion, heel raises	NR	5, 5
Cushman et al. 2015	Y	NR	NR	Y, pain response	7	12-15RM	NR	3	12-15	ECCT: hip extension performed slowly on moving treadmill	NR	4, 4
Thompson et al. 2017	Y	Y	Y, increase resistance (external load)	Y, load, RPE	3	% Of 6-8RM, 7-9/10 RPE	NR	2-6	6-12	DL squats, SL pelvic thrust, SL RDL, SL heel raises, band walks, SL lunge	NR	7, 7
Jayaseelan et al. 2014	Y	Y	Y, increase resistance or volume	Y, technique & pain response	7	10-15RM	NR	3	10-15	Leg curl machine, SL deadlift, bridge waslk-outs, side lying hip abduction	NR	7, 7
Dumont et al. 2006	Y	Y	Y, increase speed & resistance (5% bodyweight INC)	Y, pain response	7	10RM	NR	3	10	ECCT: drop squats	Y, diary	8, 9

Silva et al. 2015	Y	Y	Y, increase resistance (2kg INC)	Y, pain response & technique	3	50%1RM, 15RM	30MIN	3	15	Prone hip extension, birddog, SL deadlift, drop jumps	NR	8, 8
McCormack et al. 2012	Y	NR	NR	Y, increase difficulty	2	10RM	NR	2-3	10	Prone hamstring curl, resisted hip extension, seated hamstring curl, good mornings, unilateral bridging, lunges, Nordics	NR	4, 4
Van Rooy et al. 2009	Y	NR	NR	Y, pain response	7	10RM	NR	2	10	ECCT hip abduction, lunges, bridging,	NR	4, 4
Greene et al. 2002	Y	Y	Y, increase resistance (external weight)	NR	NR	10-20RM	NR	2-4	10-20	Squats, leg pulls, heel raises	Y, diary	6, 7
Rowan et al. 2013	Y	NR	NR	NR	7	10RM	NR	3	10	ECCT: DSL squats	NR	2, 2
Goldman et al. 2010	Y	Y	Y, increase resistance (external weight)	Y, pain response	3	10-15RM, 70-100% of 1RM	NR	3-5	10-15	ECCT: DSL squats, leg press, knee extension, hamstring curl, step downs, heel taps	NR	7, 7
Cuddeford et al. 2018	Y	Y	Y, increase resistance (external weight)	Y, difficultly	NR	6-8RM, 150% BW + 40% INC	NR	3	6-8	ECCT heel drop with leg press machine	Y, diary	7, 8
OTHER												
Longitudinal with control	Y	Y	Y, increase resistance (2.5kg INC)	Y, pain response	7, 2 x D	15RM	NR	3 X 2(6)	15 X 3 X 2 (90)	Modified Alfredson heel-drop protocol	Y, diary, 81%	8, 10

Masood et al. 2014												
Before-after design Gardin et al. 2010	Y	Y	NR	NR	7, 2 X D	15RM	NR	3 X 2(6) X 2 (12)	15 X 3 X 2 (90) X 2 (180)	Modified Alfredson heel-drop protocol	NR	4, 4
Case control Langberg et al. 2007	Y	Y	Y, increase resistance (BY 20% in backpack)	Y, pain response	7, 2 X D	15RM	NR	3 X 2(6) X 2 (12)	15 X 3 X 2 (90) X 2 (180)	Modified Alfredson heel-drop protocol	NR	8, 10
Quasi experimental (non-randomised) Stasinopoulos et al. 2013	Y	Y	Y, increase resistance & speed (backpack)	Y, pain response	7, 2 X D	15RM	NR	3 X 2(6) X 2 (12)	15 X 3 X 2 (90) X 2 (180)	Alfredson heel-drop protocol V Stanish protocol	Y, diary	7, 8
Quasi experimental (non-randomised) Kanniappan et al. 2020	Y	Y	NR	NR	7, 2 X D	15RM (ECCT) 45/s (iso)	NR	3	15 (ecct) 5 (iso)	Modified Alfredson heel-drop protocol V Isometric EX (static plantflexion max contraction)	NR	4, 4
Quasi experimental (non-randomised) Purdam et al. 2004	Y	Y	Y, increase resistance (backpack)	Y, pain response	7	15RM	NR	3	15	ECCT: DSL squat v standard flat squat	NR	7, 7

Quasi experimental (non-randomised Van der Vlist et al. 2020	Y	Y	Y, increase resistance (weight vest)	Y, RPE & pain response	Single session	Max intensity (30kg), RPE	13MIN	5	45/s	Isometric heel raises, seated & standing	Y, sup	7, 8
Before-after design Morgan et al. 2018	Y	Y	NR	Y, pain response & load tolerance	3	NR	30MIN	NR	NR	ECCT, isometric EX, Hip & core strength, no details	NR	6, 6
Observational prospective clinical trial De Vos et al. 2012	Y	Y	Y, increase resistance (2KG INC in backpack)	Y, pain response	7, 2 X D	15RM	NR	3 X 2(6) X 2 (12)	15 X 3 X 2 (90) X 2 (180)	Modified Alfredson heel-drop protocol	NR	8, 8
Retrospective case control Park et al. 2021	Y	Y	Y, increase resistance (2KG INC in backpack)	Y, pain response	7, 2 X D	15RM	NR	3 X 2	15 X 3 (45)	Modified Alfredson heel-drop protocol	NR	8, 8
Case control Ram et al. 2013	Y	Y	NR	Y, pain response	7, 2 X D	15RM	NR	3 X 2(6) X 2 (12)	15 X 3 X 2 (90) X 2 (180)	Alfredson heel-drop protocol	Y, diary, 17/20	6, 8
Retrospective chart review Vander Doelen et al. 2020	Y	Y	Y, increase resistance	NR	2-3	6-15RM (HSRT) 5 X 45/S @70% MVIC (ISO)	NR	4	6-15	Isometric (RIO protocol) HSRT: (kongsgaard protocol) leg press, squat, hack squat	NR	5, 5

Abbreviations: ECCT: eccentric training, Y: yes, NR: not reported, D: day, RM: repetition maximum, KG: kilogram, INC: increment, MVIC: maximum voluntary isometric contraction, HSRT: heavy slow resiatnce training, RPE: rating of perceived exertion, MIN: minutes, EX: exercise. RIR: repetitions in reserve, RTP: resistance training principles, WK: week, PF: plantarflexion, DF: dorsiflexion, CONCT: concentric training; DSL: decline single leg

APPENDIX 4: Table 6: Toigo and Boutellier framework exercise descriptors reporting for each study

Author	T1: load magnitude	T2: repetitions	T3: sets	T4: rest between sets	T5: sessions per d/wk.	T6: duration period	T7: contraction mode	T8: rest between reps	T9: tut	T10: muscular failure	T11:rom	T12: recovery between sessions	T13: anatomical exercise definition	TBF TOTAL/13
BEYER 2015	Y	Y	Y	Y	Y	Y	Y	Y, NIL	Y	N	Y	Y	Y	12
KONGSGAARD 2009	Y	Y	Y	Y	Y	Y	Y	Y, NIL	Y	N	Y	Y	Y	12
RIEL 2019	Y	Y	Y	Y	Y	Y	Y	Y, NIL	Y	Y	Y	Y	Y	13
STEVENS 2014	Y	Y	Y	Y	Y	Y	Y	Y, NIL	Y	Y	Y	Y	Y	13
CUNHA 2012	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
KULIG 2009	Y	Y	Y	Y	Y	Y	Y	Y, NIL	Y	N	Y	Y	Y	12
BAHR 2006	Y	Y	Y	N	Y	Y	Y	Y, NIL	Y	N	Y	Y	Y	11
LEE 2020	Y	Y	Y	N	Y	Y	Y	Y, NIL	Y	N	Y	Y	Y	11
FROHM 2007	Y	Y	Y	Y	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	11
SILBERNAGEL 2001	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
BALIUS 2016	N	Y	Y	N	Y	Y	Y	Y, NIL	N	N	N	Y	Y	8
MAFI 2001	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
NORREGAARD 2007	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
STASINOPOLOUS 2004	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10

DE VOS 2007	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
JOHANNSEN 2018	N	N	N	N	Y	Y	N	N	N	N	N	Y	N	3
MACDONALD 2019	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
GATZ 2020	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
GANDERTON 2018	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
SILBERNAGEL 2007	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
CLIFFORD 2019	Y	Y	Y	Y	Y	Y	Y	Y, NIL	Y	N	Y	Y	Y	12
STERGIOULAS 2008	Y	Y	Y	Y	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	11
ROMPE 2008	Y	Y	Y	Y	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	11
VAN ARK 2016	Y	Y	Y	Y	Y	Y	Y	Y, NIL	Y	N	Y	Y	Y	12
ROOS 2004	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
CHESTER 2008	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
ROMPE 2007	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
THIJS 2017	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
HORSTMANN 2013	Y	Y	Y	N	Y	Y	Y	Y, NIL	Y	N	Y	Y	Y	11
ALFREDSON 1998	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
ALVAREZ 2006	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
KEARNEY 2013	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10

TUMILTY 2012	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
YELLAND 2011	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
MCCORMACK 2016	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
TUMILTY 2016	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
CANNELL 2001	Y	Y	Y	N	Y	Y	Y	Y, NIL	Y	N	Y	Y	Y	11
JONSSON 2005	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
MELLOR 2018	Y	Y	Y	N	Y	Y	Y	Y, NIL	Y	N	Y	Y	Y	11
KEDIA 2014	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
HERRINGTON 2007	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
HOUCK 2015	Y	Y	Y	N	Y	Y	Y	Y, NIL	Y	N	Y	Y	Y	11
DIMITRIOS 2012	Y	Y	Y	Y	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	11
PETERSEN 2007	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
STEUNEBRINK 2013	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
ROMPE 2009	Y	Y	Y	Y	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	11
YOUNG 2005	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
DE JONGE 2010	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
PRAET 2019	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
RATHLEFF 2015	Y	Y	Y	N	Y	Y	Y	Y, NIL	Y	N	Y	Y	Y	11
KNOBLOCH 2008	Y	Y	Y	N	Y	Y	Y	Y, NIL	N	N	Y	Y	Y	10
WHEELER 2017	N	N	N	N	N	N	N	N	N	N	N	N	N	0

CHOUDHARY 2021	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	N	Y	N	8
COWAN 2021	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
HABETS 2021	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
RUFFINO 2021	Y	Y	Y	Y	Y	Y	Y	Y,NIL	Y	Y	Y	Y	Y	13
OLESEN 2021	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
HASANI 2021	Y	Y	Y	Y	Y	Y	Y	Y,NIL	Y	Y	Y	Y	Y	13
MANSUR 2021	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
SPRAGUE 2021	Y	Y	Y	Y	Y	Y	Y	Y,NIL	Y	Y	Y	Y	Y	13
AGERGAARD 2021	Y	Y	Y	Y	Y	Y	Y	Y,NIL	Y	Y	Y	Y	Y	13
LOPEZ-ROYO 2021	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
ABDELKADER 2021	Y	Y	Y	Y	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	11
VAN DER VLIST 2020	Y	Y	Y	Y	Y	Y	Y	Y,NIL	Y	N	Y	Y	Y	12
BREDA 2020	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
RABUSIN 2021	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
SOLOMONS 2020	N	N	N	N	N	N	Y	N	N	N	N	N	N	1
RAMON 2020	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
SCOTT 2019	N	N	N	N	N	N	Y	N	N	N	N	N	N	1
STEFANSSON 2019	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10

BOESEN 2017	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
CHESTERTON 2021	N	N	N	N	N	N	N	Y,NIL	N	N	N	N	Y	2
RASENBERG 2020	N	N	N	N	N	N	Y	N	N	N	N	N	N	1
JOHANNSEN 2020	N	N	N	N	Y	Y	Y	N	N	N	N	Y	N	4
THONG-ON 2019	Y	Y	Y	Y	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
CIL 2019	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	N	9
KAMONSEKI 2016	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
BROWN 2006	N	N	N	N	N	N	Y	N	N	N	N	N	N	1
NIESEN-VERTOMMEN	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
JENSEN 1989	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	Y	Y	Y	Y	11
YU 2013	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
WHEELER 2021	N	N	N	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	7
ZHANG 2013	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
BELL 2013	Y	Y	N	N	Y	Y	Y	Y,NIL	N	N	N	Y	N	7
PIETROSIMONE	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	12
DE JONGE 2011	Y	Y	N	N	N	Y	Y	Y,NIL	N	N	N	Y	N	6
DE VOS 2010	Y	Y	N	N	N	Y	Y	Y,NIL	N	N	N	Y	N	6
WARDEN 2008	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
VISNES 2005	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10

VAN ARK 2018	Y	Y	Y	Y	Y	Y	Y	Y,NIL	Y	N	Y	Y	Y	12
THOMPSON 2019	Y	Y	Y	N	Y	N	Y	Y,NIL	N	N	N	Y	N	6
CACCHIO 2011	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	N	Y	N	8
MUNTEANU 2014	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
VAN DER WORP 2014	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	N	9
ROMER-MORALES 2018	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
ROMERO-MORALES 2020	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
RYAN 2014	Y	Y	Y	N	Y	Y	N	Y,NIL	N	N	N	Y	N	6
RIEL 2018	Y	Y	Y	Y	Y	Y	Y	Y,NIL	Y	Y	Y	Y	Y	13
KOSZALINSKI 2020	Y	Y	Y	N	N	Y	Y	Y,NIL	N	N	N	N	Y	7
PEARSON 2012	N	N	N	N	N	Y	N	N	N	N	N	N	N	1
WANG 2007	N	N	N	N	N	N	Y	N	N	N	N	N	N	1
NOTARNICOLA 2013	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	3
DRAGOO 2014	N	N	N	N	N	N	Y	N	N	N	N	N	N	1
KAUX 2019	Y	Y	Y	Y	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	11
ABAT 2016	Y	Y	Y	Y	N	Y	Y	Y,NIL	N	N	Y	N	Y	9
BIERNAT 2014	Y	Y	Y	Y	N	Y	Y	Y,NIL	N	N	Y	Y	Y	10
RIO 2015	Y	Y	Y	Y	Y	Y	Y	Y,NIL	Y	N	Y	Y	Y	12

HOLDEN 2020	Y	Y	Y	Y	Y	Y	Y	Y,NIL	Y	N	Y	Y	Y	12
RIO 2017	Y	Y	Y	Y	Y	Y	Y	Y,NIL	Y	N	Y	Y	Y	12
SANCHO 2019	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
CROISIER 2001	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
OHBERG 2004	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
SAYANA 2007	Y	Y	Y	Y	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	11
ABAT 2014	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
RIEL 2019	Y	Y	Y	Y	Y	Y	Y	Y,NIL	Y	Y	Y	Y	Y	13
KONGSGAARD 2010	Y	Y	Y	Y	Y	Y	Y	Y,NIL	Y	N	Y	Y	Y	12
WETKE 2015	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
MAFFULLI 2008	Y	Y	Y	Y	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	11
SHALABI 2004	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
MANSUR 2019	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
ABAT 2015	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
ALFREDSON 1999	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
ALFREDSON 2003	Y	Y	Y	N	Y	Y	Y	Y,NIL	Y	Y	Y	Y	Y	10
O'NEILL 2019	Y	Y	Y	Y	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
OOI 2019	N	N	N	N	N	N	Y	N	N	N	N	N	N	1
KAUX 2015	N	N	N	N	N	Y	Y	N	N	N	N	Y	N	3
DE JONGE 2015	N	N	N	N	N	Y	Y	N	N	N	N	Y	N	3
PANNI 2000	N	N	N	N	N	N	Y	N	N	N	N	N	N	1

ANGERMANN 1999	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
VON WEHREN 2019	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
KAUX 2014	Y	Y	Y	Y	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	11
WEI 2017	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
BASAS 2018	Y	N	N	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	8
FAHLSTROM 2007	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
JONSSON 2008	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
ABATE 2020	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
WHEELER 2020	N	N	N	N	N	N	Y	N	N	N	N	N	N	1
LAGAS 2021	N	N	N	N	N	N	Y	N	N	N	N	N	N	1
ROBINSON 2021	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	N	Y	N	8
WHEELER 2021	N	N	N	N	N	N	Y	N	N	N	N	Y	N	2
MANTOVANI 2020	Y	Y	Y	Y	Y	Y	Y	Y,NIL	Y	N	Y	Y	Y	12
KULIG 2009	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	Y	Y	Y	Y	11
DEANS 2012	N	N	N	N	N	N	Y	N	N	N	N	N	N	1
PAVONE 2016	N	N	N	N	N	N	Y	N	N	N	N	N	N	1
ROMERO-RODRIGUEZ 2011	Y	Y	Y	Y	Y	Y	Y	Y,NIL	N	Y	Y	Y	Y	12
WHEELER 2019	N	N	N	N	N	N	Y	N	N	N	N	N	N	1

SYVERSTON 2017	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
ROBINSON 2020	Y	Y	Y	N	Y	N	Y	Y,NIL	N	N	Y	N	Y	8
BENITO 2016	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
SILBERNAGEL 2011	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
MORTON 2014	N	N	N	N	N	N	Y	N	N	N	N	N	N	1
MASOOD 2014	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
VAN ARK 2013	Y	Y	Y	Y	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	11
MUNOZ FERNANDEZ 2021	Y	Y	Y	Y	Y	Y	Y	Y,NIL	N	N	Y	N	Y	10
SKOVLUND 2020	Y	Y	Y	Y	Y	Y	Y	Y,NIL	Y	Y	Y	Y	Y	13
JAYASEELAN 2017	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
BIANCO 2019	Y	Y	Y	N	N	Y	Y	Y,NIL	N	N	Y	N	Y	8
ECKENRODE 2015	Y	Y	Y	Y	Y	Y	Y	Y,NIL	Y	N	Y	Y	Y	12
PAPA 2012	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
DOSS ANTOS 2016	Y	Y	Y	N	N	Y	N	N	N	N	N	N	Y	5
LEE 2019	N	N	N	N	N	N	Y	N	N	N	N	N	N	1
ROSS 2017	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
CUDDEFORD 2020	Y	Y	Y	Y	Y	Y	Y	Y,NIL	N	Y	Y	Y	Y	12
KRUEGER 2020	Y	Y	Y	N	Y	Y	Y	Y,NIL	Y	N	Y	Y	Y	11

BORDA 2017	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
RAUSEO 2017	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
MCCORMACK 2012	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
PATLA 2015	Y	Y	Y	N	N	Y	Y	Y,NIL	N	N	Y	N	Y	8
PINKELMAN 2012	Y	Y	Y	N	N	Y	Y	Y,NIL	N	N	Y	N	Y	8
FRANCIS 2020	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
MCCREESH 2013	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
HENSLEY 2012	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
CUSHMAN 2015	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
THOMPSON 2017	Y	Y	Y	Y	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	11
JAYASEELAN 2014	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
DUMONT 2006	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
SILVA 2015	Y	Y	Y	Y	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	11
MCCORMACK 2012	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
VAN ROOY 2009	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
GREENE 2002	Y	Y	Y	N	N	Y	Y	Y,NIL	N	N	Y	N	Y	8
ROWAN 2013	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	N	Y	N	8
GOLDMAN 2010	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	Y	Y	Y	Y	11
CUDDEFORD 2018	Y	Y	Y	N	N	Y	Y	Y,NIL	N	N	Y	N	Y	8

GARDIN 2010	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
LANGBERG 2007	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
STASINOPOULOS 2013	Y	Y	Y	Y	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	11
KANNIAPPAN 2020	Y	Y	Y	Y	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	11
PURDAM 2004	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
VAN DER VLIST 2020	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	12
MORGAN 2018	N	N	N	N	Y	Y	Y	N	N	N	N	Y	N	4
DE VOS 2012	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	11
PARK 2021	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	11
RAM 2013	Y	Y	Y	N	Y	Y	Y	Y,NIL	N	N	Y	Y	Y	10
VANDER DOELEN 2020	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	Y	Y	11

Abbreviations: Y: yes, N: no, TBF: Toigo and Boutellier framework.

APPENDIX 5: Table 7: Consensus on Exercise Reporting Template (CERT) items reporting for each study

C1: equipment	C2: instructor	C3: individual/group	C4: un/supervised	C5: adherence measure & reported	C6: motivation	C7a: progression rules	C7b: progressed how	C8: exercise details replication	C9: describe home program	C10: nonexercise components	C11: adverse events	C12: exercise setting	C13: exercise intervention details	C14a: generic or tailored	C14b: tailored how	C15: describe starting level	C16a: fidelity measured	C16b: exercise delivered as planned	CERT TOTAL/19	Author
Y	Y, PT	Y, I	Y, UN	Y	N	Y	Y	Y	Y	Y. EX ONLY	N	Y	Y	Y, I	PAIN	Y	Y	Y	17	BEYER 2015
Y	Y	Y, I	Y, both	Y	N	Y	Y	Y	Y, NA	Y, EX ONLY	Y	Y	Y	Y, G	N	Y	Y	Y	17	KONGSGAARD 2009
Y	Y	Y, I	Y, UN	Y	N	Y	Y	Y	Y	Y, EX ONLY	Y	Y	Y	Y, I	AMAP	Y	N	Y	17	RIEL 2019
Y	Y	Y, I	Y, UN	Y	N	Y	Y	Y	Y	Y, EX ONLY	Y	Y	Y	Y,I	AMAP	Y	Y	Y	18	STEVENS 2014
Y	Y, PT	Y, I	Y,SUP	N	N	Y	Y	Y	Y,NA	Y, EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	14	CUNHA 2012
Y	Y,PT	Y, I	Y,both	Y	N	Y	Y	Y	Y	Y, ORTHOSES	N	Y	Y	Y	IRAA	Y	Y	Y	17	KULIG 2009
Y	Y,PT	Y, I	Y,UN	N	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	14	BAHR 2006
Y	N	Y, I	Y,UN	Y	N	Y	Y	Y	Y	Y,ESWT	N	Y	Y	Y,I	PAIN	Y	N	N	14	LEE 2020
Y	Y	Y, I	Y,SUP	N	N	Y	Y	Y	Y,NA	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	14	FROHM 2007
Y	Y	Y, I	Y,SUP	Y	N	Y	Y	Y	Y,NA	Y	N	Y	Y	Y,I	PAIN	Y	N	N	15	SILBERNAGEL 2001
N	Y	Y, I	Y,SUP	Y	N	N	N	Y	Y,NA	Y,SUPP	N	N	Y	Y,G	N	N	N	Y	10	BALIUS 2016

Y	Y	Y, I	Y,UN	N	N	Y	Y	Y	Y	Y,NA	N	Y	Y	Y	PAIN	Y	N	Y	15	MAFI 2001
Y	Y	Y, I	Y,UN	Y	N	Y	Y	Y	Y	Y,NA	N	Y	Y	Y	PAIN	Y	N	N	15	NORREGAARD 2007
Y	Y	Y, I	Y,UN	N	N	Y	Y	Y	Y	Y,STRETCH	N	Y	Y	Y,I	PAIN	Y	N	N	14	STASINOPOLOUS 2004
Y	Y	Y, I	Y,UN	Y	N	Y	Y	Y	Y	Y,SPLINT	N	Y	Y	Y,I	PAIN	Y	N	Y	16	DE VOS 2007
N	Y	Y, I	Y,UN	Y	N	N	N	N	N	Y,CSI	N	N	N	N	N	N	N	N	5	JOHANNSEN 2018
Y	Y,PT	Y, I	Y,SUP	Y	N	Y	Y	Y	Y,NA	Y,HIP EX	N	Y	Y	Y,I	PAIN	Y	N	Y	16	MACDONALD 2019
Y	N	Y, I	Y,UN	Y	N	Y	Y	Y	Y,NA	Y,EX ONLY	Y	Y	Y	Y,I	PAIN	Y	N	N	15	GATZ 2020
Y	Y,PT	Y, I	Y,UN	Y	N	Y	Y	Y	Y	Y,EDUCATION	Y	Y	Y	Y,I	ABILITY	Y	N	Y	17	GANDERTON 2018
Y	Y,PT	Y, I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	Y	Y	Y	Y,I	PAIN	Y	N	N	16	SILBERNAGEL 2007
Y	Y,PT	Y, I	Y,both	Y	N	Y	Y	Y	Y	Y,EDUCATION	Y	Y	Y	Y,I	PAIN	Y	Y	Y	18	CLIFFORD 2019
Y	Y,PT	Y, I	Y,SUP	Y	N	Y	Y	Y	Y	Y,LLLT	N	Y	Y	Y,I	PAIN	Y	N	Y	16	STERGIOULAS 2008
Y	Y	Y, I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	Y	Y	Y	Y,I	PAIN	Y	N	Y	17	ROMPE 2008
Y	Y	Y, I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN,TECHNIQUE	Y	N	Y	16	VAN ARK 2016
Y	Y	Y, I	Y,UN	Y	N	Y	Y	Y	Y	Y,SPLINT	N	Y	Y	Y,I	PAIN	Y	N	Y	16	ROOS 2004
Y	Y	Y, I	Y,UN	N	N	Y	Y	Y	Y	Y,ULTRASOUND	Y	Y	Y	Y,I	PAIN	Y	N	N	15	CHESTER 2008

Y	Y	Y, I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	Y	Y	Y	Y,I	PAIN	Y	N	N	16	ROMPE 2007
Y	Y	Y, I	Y,UN	Y	N	Y	Y	Y	Y	Y,ESWT	Y	Y	Y	Y,I	PAIN	Y	N	N	16	THIJS 2017
Y	Y	Y, I	Y,SUP	Y	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	FATIGUE	Y	N	N	15	HORSTMANN 2013
Y	Y	Y, I	Y,UN	N	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	14	ALFREDSON 1998
Y	Y	Y, I	Y,UN	Y	N	Y	Y	Y	Y	Y,ORTHOSES	Y	Y	Y	Y,I	PAIN,TECHNIQUE	Y	N	Y	17	ALVAREZ 2006
Y	Y	Y, I	Y,UN	N	N	Y	Y	Y	Y	Y,EX ONLY	Y	Y	Y	Y,I	PAIN	Y	N	N	15	KEARNEY 2013
Y	Y	Y, I	Y,UN	Y	N	Y	Y	Y	Y	Y,LLLT	Y	Y	Y	Y,I	PAIN	Y	N	Y	17	TUMILTY 2012
Y	Y	Y, I	Y,UN	Y	N	Y	Y	Y	Y	Y,PROLOTHERAPY	Y	Y	Y	Y,I	PAIN	Y	N	Y	17	YELLAND 2011
Y	Y	Y, I	Y,both	N	N	Y	Y	Y	Y	Y,ASTYM	Y	Y	Y	Y,G	N	Y	N	Y	15	MCCORMACK 2016
Y	Y	Y, I	Y,UN	Y	N	Y	Y	Y	Y	Y,LLLT	Y	Y	Y	Y,I	PAIN	Y	N	Y	17	TUMILTY 2016
Y	Y	Y, I	Y,BOTH	N	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	14	CANNELL 2001
Y	Y	Y, I	Y,both	N	N	Y	Y	Y	Y	Y,EX ONLY	Y	Y	Y	Y,I	PAIN	Y	N	N	15	JONSSON 2005
Y	Y	Y, I	Y,both	Y	N	Y	Y	Y	Y	Y,EDUCATION	Y	Y	Y	Y,I	PAIN,BORG	Y	Y	Y	18	MELLOR 2018
Y	Y	Y, I	Y,UN	Y	N	Y	Y	Y	Y	Y,CON RX	N	Y	Y	Y,I	DIFFICULTY	Y	N	N	15	KEDIA 2014
Y	Y	Y, I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	Y	16	HERRINGTON 2007

Y	Y	Y, I	Y,UN	Y	N	Y	Y	Y	Y	Y,ORTHOSES	Y	Y	Y	Y,I	PAIN,TECHNIQUE	Y	N	Y	17	HOUCK 2015
Y	Y	Y, I	Y,SUP	Y	N	Y	Y	Y	Y	Y,STRETCH	Y	Y	Y	Y,I	PAIN	Y	N	Y	17	DIMITRIOS 2012
Y	Y	Y, I	Y,UN	Y	N	Y	Y	Y	Y	Y,BRACE	Y	Y	Y	Y,I	PAIN	Y	N	N	16	PETERSEN 2007
Y	Y	Y, I	Y,UN	Y	N	Y	Y	Y	Y	Y,GTN	N	Y	Y	Y,I	PAIN	Y	N	N	15	STEUNEBRINK 2013
Y	Y	Y, I	Y,UN	Y	N	Y	Y	Y	Y	Y,ESWT	Y	Y	Y	Y,I	PAIN	Y	N	Y	17	ROMPE 2009
Y	Y	Y, I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	Y	16	YOUNG 2005
Y	Y	Y, I	Y,UN	N	N	Y	Y	Y	Y	Y,SPLINT	N	Y	Y	Y,I	PAIN	Y	N	N	14	DE JONGE 2010
Y	Y	Y, I	Y,UN	Y	N	Y	Y	Y	Y	Y,SUPP	Y	Y	Y	Y,I	PAIN	Y	N	Y	17	PRAET 2019
Y	Y	Y, I	Y,UN	N	N	Y	Y	Y	Y	Y,ORTHOSES	Y	Y	Y	Y,G	N	Y	N	N	14	RATHLEFF 2015
Y	YY	Y, I	Y,UN	N	N	N	N	Y	Y	Y,BRACE	N	Y	Y	Y,G	N	Y	N	N	11	KNOBLOCH 2008
Y	Y	Y, I	Y,UN	N	N	N	N	N	Y	Y,SPLINT	N	Y	N	Y,G	N	N	N	N	8	WHEELER 2017
Y	Y	Y,I	Y,UN	N	N	N	N	Y	Y	Y,SUPP	N	Y	Y	Y,I	PAIN	Y	N	N	12	CHOUDHARY 2021
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,MHT	Y	Y	Y	Y,I	DIFFICULTY	Y	N	Y	17	COWAN 2021
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	Y	16	HABETS 2021
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	Y	Y	Y	Y,I	PAIN	Y	N	Y	17	RUFFINO 2021

Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,IGF-1	N	Y	Y	Y,I	PAIN	Y	N	N	14	OLESEN 2021
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	Y	Y	Y	Y,I	PAIN	Y	Y	Y	18	HASANI 2021
Y	Y	Y,I	Y,UN	N	N	N	N	Y	Y	Y,ESWT	Y	Y	Y	Y,G	N	Y	N	N	12	MANSUR 2021
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	Y	Y	Y	Y,I	PAIN	Y	Y	Y	18	SPRAGUE 2021
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	Y	17	AGERGAARD 2021
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,DN,PNE	N	Y	Y	Y,I	PAIN	Y	N	N	14	LOPEZ-ROYO 2021
Y	Y	Y,I	Y,UN	N	N	N	N	Y	Y	Y,ESWT	N	Y	Y	Y,G	N	Y	N	N	11	ABDELKADER 2021
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,HVIGI	Y	Y	Y	Y,I	PAIN	Y	N	Y	17	VAN DER VLIST 2020
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	Y	Y	Y	Y,I	PAIN	Y	N	Y	17	BREDA 2020
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,HEEL LIFTS	Y	Y	Y	Y,I	PAIN	Y	N	Y	17	RABUSIN 2021
Y	Y	Y,I	Y,UN	N	N	N	N	Y	Y	Y,DN	Y	N	N	Y,I	PAIN	N	N	Y	11	SOLOMONS 2020
Y	Y	Y,I	Y,UN	N	N	N	N	Y	Y	Y,ESWT	Y	Y	Y	Y,G	N	Y	N	N	12	RAMON 2020
N	Y	Y,I	Y,UN	N	N	N	N	N	N	Y,PRP	N	N	N	Y,G	N	N	N	N	5	SCOTT 2019
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,PM	N	Y	Y	Y,I	PAIN	Y	N	N	14	STEFANSSON 2019

Y	Y	Y,I	Y,UN	Y	N	N	N	Y	Y	Y,PRP,HVIGI	Y	Y	Y	Y,I	PAIN	Y	N	Y	15	BOESEN 2017
Y	Y	Y,I	Y,UN	Y	N	N	N	N	N	Y,ORTHOSES	Y	Y	Y	Y,I	PAIN	Y	Y	Y	14	CHESTERTON 2021
N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	0	RASENBERG 2020
N	Y	Y,I	Y,UN	Y	N	N	N	N	N	Y,SURGERY,CSI	Y	N	N	N	N	Y	N	Y	8	JOHANNSEN 2020
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	Y	Y	Y	Y,I	DIFFICULTY	Y	N	Y	17	THONG-ON 2019
N	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,MT	N	N	N	Y,G	N	Y	N	N	10	CIL 2019
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,EX	N	Y	Y	Y,G	N	Y	N	N	13	KAMONSEKI 2016
N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	1	BROWN 2006
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX	Y	Y	Y	Y,I	PAIN	Y	N	Y	17	NIESEN-VERTOMMEN
Y	Y	Y,I	Y,BOTH	Y	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	DIFFICULTY	Y	N	Y	16	JENSEN 1989
Y	Y	Y,I	Y,UN	N	Y	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	15	YU 2013
Y	Y	Y,I	Y,UN	N	N	Y	Y	N	Y	Y,ESWT	N	Y	Y	Y,I	PAIN	Y	N	N	13	WHEELER 2021
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	14	ZHANG 2013
Y	Y	Y,I	Y,UN	Y	N	N	N	N	Y	Y,EX ONLY	Y	Y	Y	Y,I	PAIN	Y	N	Y	14	BELL 2013
Y	Y	Y,I	Y,SUP	N	N	N	N	Y	Y	Y,EX ONLY	N	Y	Y	Y,G	N	Y	N	Y	12	PIETROSIMONE
Y	Y	Y,I	Y,UN	Y	N	N	N	N	Y	Y,PRP	N	N	Y	Y,I	PAIN	Y	N	N	11	DE JONGE 2011

Y	Y	Y,I	Y,UN	Y	N	N	N	N	Y	Y,PRP	N	N	Y	Y,I	PAIN	Y	N	N	11	DE VOS 2010
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,US	Y	Y	Y	Y,I	PAIN	Y	N	Y	17	WARDEN 2008
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX	N	Y	Y	Y,I	PAIN	Y	N	N	15	VISNES 2005
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	14	VAN ARK 2018
N	Y	Y,I	Y,UN	N	N	N	Y	N	Y	Y,PRP	N	Y	Y	Y,I	PAIN	N	N	N	10	THOMPSON 2019
Y	N	Y,I	Y,UN	N	N	N	N	Y	N	Y,CON RX	N	N	Y	N	N	Y	N	N	7	CACCHIO 2011
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,ORTHOSES	Y	Y	Y	Y,I	PAIN	Y	N	N	16	MUNTEANU 2014
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,ESWT	Y	Y	Y	Y,I	PAIN	Y	N	N	16	VAN DER WORP 2014
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y, VIB/CRY	N	Y	Y	Y,I	PAIN	Y	N	N	15	ROMER-MORALES 2018
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,VIB/CRY	N	Y	Y	Y,I	PAIN	Y	N	N	15	ROMERO-MORALES 2020
Y	Y	Y,I	Y,UN	Y	N	N	N	N	Y	Y,EX ONLY	N	Y	Y	Y,G	N	Y	N	N	11	RYAN 2014
Y	Y	Y,I	Y,SUP	N	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,G	RESISTANCE	Y	N	N	14	RIEL 2018
Y	Y	Y,I	Y,SUP	N	N	N	N	Y	N	Y,MT	N	Y	Y	Y,G	N	Y	N	N	10	KOSZALINSKI 2020
N	Y	Y,I	N	N	N	N	N	N	N	Y,ABI	N	N	N	Y,G	PAIN	N	N	N	5	PEARSON 2012

N	N	Y,I	N	N	N	N	N	N	N	Y,ESWT	N	N	N	Y,G	N	N	N	N	3	WANG 2007
N	N	Y,I	N	N	N	N	N	N	N	Y,CHELT	N	N	N	Y,G	N	N	N	N	3	NOTARNICOLA 2013
N	Y	Y,I	N	N	N	N	N	N	N	Y,PRP	Y	N	N	Y,G	N	N	N	N	5	DRAGOO 2014
Y	Y	Y,I	Y,SUP	N	N	Y	Y	Y	Y	Y,PRP,HAI	N	Y	Y	Y,G	Y	N	N	N	13	KAUX 2019
Y	Y	Y,I	N	N	N	N	N	Y	N	Y,USGET	N	N	Y	Y,G	N	Y	N	N	8	ABAT 2016
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	14	BIERNAT 2014
Y	Y	Y,I	Y,SUP	Y	N	N	N	Y	Y	Y,EX ONLY	N	Y	Y	Y,G	N	Y	N	Y	13	RIO 2015
Y	Y	Y,I	Y,SUP	Y	N	N	N	Y	Y	Y,EX ONLY	N	Y	Y	Y,G	N	Y	N	Y	13	HOLDEN 2020
Y	Y	Y,I	Y,SUP	Y	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	FATIGUE	Y	N	Y	16	RIO 2017
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,EDUCATION	Y	Y	Y	Y,I	PAIN	Y	Y	Y	18	SANCHO 2019
Y	Y	Y,I	Y,SUP	Y	N	Y	Y	Y	Y	Y,CON RX	N	Y	Y	Y,I	PAIN	Y	N	Y	16	CROISIER 2001
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	14	OHBERG 2004
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	Y	16	SAYANA 2007
Y	Y	Y,I	Y,SUP	Y	N	N	N	Y	N	Y, EPI	Y	Y	Y	Y,G	N	Y	N	N	12	ABAT 2014
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,CSI	Y	Y	Y	Y,I	RESISTANCE	Y	Y	Y	18	RIEL 2019

Y	Y	Y,I	Y,SUP	Y	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	15	KONGSGAARD 2010
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,CSI	N	Y	Y	Y,I	PAIN	Y	N	Y	16	WETKE 2015
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	Y	16	MAFFULLI 2008
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	Y	16	SHALABI 2004
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,ESWT	N	Y	Y	Y,I	PAIN	Y	N	N	14	MANSUR 2019
Y	Y	Y,I	Y,SUP	N	N	N	N	Y	N	Y, EPI	N	Y	Y	Y,G	N	Y	N	N	10	ABAT 2015
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	14	ALFREDSON 1999
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	14	ALFREDSON 2003
Y	Y	Y,I	Y,SUP	N	N	N	N	Y	Y	Y,EX ONLY	N	Y	Y	Y,G	N	Y	N	N	11	O'NEILL 2019
N	N	Y,I	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	2	OOI 2019
N	Y	Y,I	Y,SUP	N	N	N	N	N	N	Y,PRP	N	N	N	N	N	N	N	N	4	KAUX 2015
N	N	Y,I	N	N	N	N	N	N	N	Y,PRP	N	N	N	N	N	N	N	N	2	DE JONGE 2015
N	N	Y,I	N	N	N	N	N	N	N	N	N	N	N	Y,G	N	N	N	N	2	PANNI 2000
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,CON RX	N	Y	Y	Y,I	PAIN	Y	N	N	15	ANGERMANN 1999
Y	Y	Y,I	Y,UN	N	N	N	N	Y	Y	Y,EX ONLY	N	Y	Y	Y,G	N	Y	N	N	11	VON WEHREN 2019

Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,PRP	N	Y	Y	Y,I	PAIN	Y	N	Y	16	KAUX 2014
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	15	WEI 2017
Y	Y	Y,I	Y,SUP	N	N	Y	Y	Y	Y	Y,ES	N	Y	Y	Y,I	PAIN	Y	N	N	14	BASAS 2018
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	14	FAHLSTROM 2007
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,EX	N	Y	Y	Y,I	PAIN	Y	N	N	14	JONSSON 2008
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,PRP	Y	Y	Y	Y,I	PAIN	Y	N	N	16	ABATE 2020
N	N	Y,I	Y,UN	N	N	N	N	N	N	Y,ESWT,HVIGI	N	N	N	N	N	N	N	N	3	WHEELER 2020
N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	0	LAGAS 2021
Y	Y	Y,I	Y,UN	N	N	N	N	Y	Y	Y,ESWT	Y	Y	Y	Y,G	N	Y	N	N	12	ROBINSON 2021
N	Y	Y,I	N	N	N	N	N	Y	N	Y,ESWT	N	N	N	Y,G	N	N	N	N	5	WHEELER 2021
Y	Y	Y,I	Y,SUP	Y	Y	Y	Y	Y	Y	Y,EX ONLY	Y	Y	Y	Y,I	PAIN, RPE	Y	N	Y	18	MANTOVANI 2020
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	RESISTANCE	Y	N	N	15	KULIG 2009
Y	N	Y,I	N	N	N	N	N	N	N	Y,ACP	N	N	N	Y,G	N	N	N	N	4	DEANS 2012
Y	N	Y,I	N	N	N	N	N	N	N	Y,ESWT	N	N	N	Y,G	N	N	N	N	4	PAVONE 2016
Y	Y	Y,I	Y,SUP	N	Y	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	RESISTANCE	Y	N	N	15	ROMERO-RODRIGUEZ 2011

N	Y	Y,I	Y,UN	N	N	N	N	N	N	Y,ESWT	N	N	N	Y,I	N	N	N	N	WHEELER 2019
Y	Y	Y,I	Y,UN	N	N	N	N	Y	Y	Y,MT	N	Y	Y	Y,I	N	Y	N	N	SYVERSTON 2017
Y	Y	Y,I	Y,UN	N	N	N	N	Y	Y	Y,ESWT	N	Y	Y	Y,I	N	Y	N	N	ROBINSON 2020
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,MT	N	Y	Y	Y,I	N	Y	N	N	BENITO 2016
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	SILBERNAGEL 2011
N	Y	Y,I	Y,UN	N	N	N	N	N	N	Y,HVIGI	N	N	N	Y,I	N	N	N	N	MORTON 2014
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	Y	MASOOD 2014
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	Y	VAN ARK 2013
Y	Y	Y,I	Y,UN	N	N	N	N	Y	Y	Y,UGPE	N	Y	Y	Y,I	PAIN	Y	N	N	MUNOZ FERNANDEZ 2021
Y	Y	Y,I	Y,SUP	Y	N	Y	Y	Y	Y	Y,EX ONLY	Y	Y	Y	Y,I	PAIN	Y	N	Y	SKOVLUND 2020
Y	Y	Y,I	Y,UN	Y	N	N	N	Y	Y	Y,MT	N	Y	Y	Y,G	N	Y	N	N	JAYASEELAN 2017
Y	Y	Y,I	Y,SUP	N	N	Y	Y	Y	Y	Y,MT	N	Y	Y	Y,I	PAIN	Y	N	N	BIANCO 2019
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,E-STIM	N	Y	Y	Y,I	PAIN	Y	N	N	ECKENRODE 2015
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,MT	N	Y	Y	Y,G	N	Y	N	N	PAPA 2012

Y	Y	Y,I	Y,UN	N	N	N	N	N	N	Y,MT	N	Y	Y	Y,G	N	Y	N	N	9	DOSS ANTOS 2016
N	N	Y,I	Y,BOTH	N	N	N	N	N	N	Y,MT	N	N	N	Y,G	N	N	N	N	4	LEE 2019
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,MT	N	Y	Y	Y,I	PAIN	Y	N	Y	16	ROSS 2017
Y	Y	Y,I	Y,SUP	N	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	Y	15	CUDDEFORD 2020
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN,RPE	Y	N	N	15	KRUEGER 2020
Y	Y	Y,I	Y,UN	N	N	N	N	Y	Y	Y,MT	N	Y	Y	Y,G	N	Y	N	N	11	BORDA 2017
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	15	RAUSEO 2017
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,MT	N	Y	Y	Y,I	PAIN	Y	N	N	14	MCCORMACK 2012
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,MT	N	Y	Y	Y,G	N	Y	N	N	13	PATLA 2015
Y	Y	Y,I	Y,SUP	N	N	Y	Y	Y	Y	Y,MT	N	Y	Y	Y,I	PAIN	Y	N	N	14	PINKELMAN 2012
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,ESWT	N	Y	Y	Y,G	N	Y	N	Y	15	FRANCIS 2020
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,G	N	Y	N	N	13	MCCREESH 2013
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,MT	N	Y	Y	Y,G	N	Y	N	N	13	HENSLEY 2012
Y	Y	Y,I	Y,SUP	N	N	N	N	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	12	CUSHMAN 2015
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	LOAD	Y	N	N	14	THOMPSON 2017

Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,MT	N	Y	Y	Y,I	PAIN, DIFFICULTLY	Y	N	N	14	JAYASEELAN 2014
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	Y	16	DUMONT 2006
Y	Y	Y,I	Y,SUP	N	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	14	SILVA 2015
Y	Y	Y,I	Y,SUP	N	N	N	N	Y	Y	Y,MT	Y	Y	Y	Y,I	DIFFICULTLY	Y	N	N	13	MCCORMACK 2012
Y	Y	Y,I	Y,UN	N	N	N	N	Y	Y	Y,MT	N	Y	Y	Y,I	PAIN	Y	N	N	12	VAN ROOY 2009
Y	Y	Y,I	Y,BOTH	Y	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,G	N	Y	N	N	14	GREENE 2002
Y	Y	Y,I	Y,UN	N	N	N	N	Y	N	Y,PRP	N	Y	Y	Y,G	N	Y	N	N	10	ROWAN 2013
Y	Y	Y,I	Y,BOTH	N	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	14	GOLDMAN 2010
Y	Y	Y,I	Y,SUP	N	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	DIFFICULTLY	Y	N	Y	15	CUDDEFORD 2018
Y	N	Y,I	Y,UN	N	N	N	N	Y	Y	Y,EX ONLY	N	Y	Y	Y,G	N	Y	N	N	10	GARDIN 2010
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	Y	15	LANGBERG 2007
Y	Y	Y,I	Y,UN	Y	N	Y	Y	Y	Y	Y,EX ONLY	Y	Y	Y	Y,I	PAIN	Y	N	Y	17	STASINOPOULOS 2013
Y	Y	Y,I	Y,UN	N	N	N	N	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	N	Y	N	N	11	KANNIAPPAN 2020
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	14	PURDAM 2004

Y	Y	Y,I	Y,SUP	Y	Y	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN,RPE	Y	N	Y	17	VAN DER VLIST 2020
N	Y	Y,I	Y,UN	N	N	N	N	N	N	Y,EX ONLY	N	N	Y	Y,G	N	N	N	N	6	MORGAN 2018
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	14	DE VOS 2012
Y	Y	Y,I	Y,UN	N	N	Y	Y	Y	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	N	14	PARK 2021
Y	Y	Y,I	Y,UN	Y	N	N	N	N	Y	Y,EX ONLY	N	Y	Y	Y,I	PAIN	Y	N	Y	13	RAM 2013
Y	Y	Y,I	Y,BOTH	N	N	Y	Y	Y	Y	Y,EX ONLY	Y	Y	Y	Y,G	N	Y	N	N	14	VANDER DOELEN 2020

Abbreviations: Y: yes, N: no, UN: unsupervised,, SUP: supervised, G: general, I: individualised, CERT: consensus on exercise reporting template, EX: exercise, RPE: rating of perceived exertion, MT: manual therapy, ESWT: extracorporeal shockwave therapy, PRP: platelet-rich plasma, UGPE: ultrasound guided percutaneous electrolysis, LLLT: low-level laser therapy, ESTIM: electrical stimulation, CON RX: conventional rehabilitation, CSI: corticosteroid injection, ABI: autologous blood injection: ACP: autologous conditioned plasma