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Effect of resistance exercise dose components for tendinopathy management: a systematic review with meta-analysis

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ABSTRACT

Objective To investigate potential moderating effects of resistance exercise dose components including intensity, volume and frequency, for the management of common tendinopathies.

Design Systematic review with meta-analysis and meta-regressions.

Data sources Including but not limited to: MEDLINE, CINAHL, SPORTDiscus, ClinicalTrials.gov and ISRCTN Registry.

Eligibility criteria for selecting studies Randomised and non-randomised controlled trials investigating resistance exercise as the dominant treatment class, reporting sufficient information regarding ≥2 components of exercise dose.

Results A total of 110 studies were included in meta-analyses (148 treatment arms (TAs), 3953 participants), reporting on five tendinopathy locations (rotator cuff: 48 TAs; Achilles: 43 TAs; lateral elbow: 29 TAs; patellar: 24 TAs; gluteal: 4 TAs). Meta-regressions provided consistent evidence of greater pooled mean effect sizes for higher intensity therapies comprising additional external resistance compared with body mass only (large effect size domains: $\beta_{\text{BodyMass: External}} = 0.50$ (95% credible interval (CrI): 0.15 to 0.84; p=0.998); small effect size domains ($\beta_{\text{BodyMass: External}} = 0.04$ (95% CrI: −0.21 to 0.31; p=0.619)) when combined across tendinopathy locations or analysed separately. Greater pooled mean effect sizes were also identified for the lowest frequency (less than daily) compared with mid (daily) and high frequencies (more than once per day) for both effect size domains when combined or analysed separately (p≥0.976). Evidence for associations between training volume and pooled mean effect sizes was minimal and inconsistent.

Summary/conclusion Resistance exercise dose is poorly reported within tendinopathy management literature. However, this large meta-analysis identified some consistent patterns indicating greater efficacy on average with therapies prescribing higher intensities (through inclusion of additional loads) and lower frequencies, potentially creating stronger stimuli and facilitating adequate recovery.

INTRODUCTION

Tendinopathy is a prevalent condition involving degenerative changes within tendons of both children and adults, commonly in the Achilles, rotator cuff, lateral elbow, patellar and hip tendons.[1] It affects athletic and non-athletic populations[2] and can manifest in persistent pain,[3 4] swelling,[1] loss of function and diminished movement.[5] Exercise therapy is the mainstay of conservative management and has focused largely on resistance exercise, often eccentric actions,[6] to encourage load tolerance leading to structural adaptations at the musculotendinous unit and functional restoration.[7 8] Its effectiveness is likely to be influenced not only by the specific exercises but also the magnitude of the stimulus, quantified by the concept of exercise dose.[9] At the most basic level in clinical settings, exercise dose comprises three variables: intensity, volume and frequency, with overall exercise dose quantified as the product of all three.[10] As evidence has accumulated on the potential effectiveness of exercise therapies across a range of populations and tendinopathies, it has been recommended that primary studies and evidence syntheses attempt to better quantify dose-response relationships.[9 11 12] The potential to quantify dose-response relationships may be most feasible within resistance exercise due to the ability to appropriately quantify dose variables including intensity. Initial attempts to synthesise evidence and identify dose-response relationships for exercise therapy in tendinopathy management have been limited by setting restrictive inclusion criteria. Meyer *et al*[12] only included three studies when investigating the effect of eccentric exercise protocols for Achilles tendinopathy. A follow-up review included eight studies,[13] although the authors concluded that heterogenous outcomes and methodological limitations meant that data could not be pooled, nor recommendations made regarding dose-response. An alternative strategy is to increase the amount of data available by combining heterogenous sources and exploring the variability in results. Young *et al*[14] increased available data for their meta-analysis to 14 studies by including studies investigating multiple common disorders (Achilles tendinopathy, ankle sprains and plantar heel pain). Several trends were identified, including greater effects with increased frequency and progressive exercise compared with pre-prescribed sets and repetitions.[14] However, no formal statistical comparisons of exercise dose were made, limiting the conclusions that can be drawn. Given the limited attempts to explore dose-response relationships across the wider exercise therapy and

WHAT IS ALREADY KNOWN ON THIS TOPIC?

⇒ Tendinopathy is a prevalent condition in both athletic and non-athletic populations commonly affecting the Achilles, rotator cuff, lateral elbow, patellar and hip tendons.
⇒ Exercise therapy is the main mode of conservative treatment for tendinopathies with a focus on resistance exercise, which is shown to be effective in improving patient outcomes.
⇒ Little is known about the effect of different resistance exercise dose components, including intensity, volume and frequency, on patient improvement.
⇒ Previous systematic reviews and meta-analyses that have attempted to investigate exercise dose in tendinopathy have been limited to small numbers of studies.

WHAT THIS STUDY ADDS?

⇒ This extensive systematic review with meta-analysis included 91 studies (126 treatment arms), and identified common patterns despite large variations across interventions.
⇒ Interventions involving higher intensity resistance exercise, with the addition of external loads, showed greater efficacy compared with body mass only exercise.
⇒ Greater efficacy was seen with interventions performed less frequently, potentially allowing for adequate recovery, compared with higher frequencies of once or more per day.
⇒ There were no consistent results or patterns identified from analyses of resistance exercise volume.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Clinicians prescribing resistance exercise therapy for tendinopathy should consider including higher intensities of resistance exercise (through addition of external loads) and allowing adequate recovery between sessions.
⇒ We urge future research on exercise interventions to make use of reporting guidelines and to include full details of all components of exercise dose (intensity, volume, frequency).

tendinopathy literature, the present systematic review with meta-analysis combined data from studies investigating the effectiveness of resistance exercise across the most prevalent tendinopathies (rotator cuff related shoulder pain (RCRSP), lateral elbow, patellar, gluteal or Achilles). The aim was to investigate potential moderating effects of resistance exercise dose components, including intensity, volume and frequency, through contemporary meta-analysis and meta-regression approaches; allowing us to explore the heterogeneity and assess for general trends regarding dose-response relationships.

METHODS

This review was part of a project funded by the National Institute for Health Research (Health Technology Assessment 129388 Exercise therapy for the treatment of tendinopathies) and adhered to an a priori protocol (PROSPERO 2020 CRD42020168187).

Inclusion criteria

Inclusion criteria and methods were influenced by the project aims, the results of an initial scoping review[15] and two subsequent stakeholder workshops (n=13). The first included nine individuals who delivered exercise therapy for tendinopathy and had an academic interest. The second included four women with lived experience. Finally, an online survey (n=26) was conducted to gather the views of a more diverse international sample of purposefully selected clinicians and academics. A completed Preferred Reporting Items for Systematic review and Meta-Analysis checklist for reporting of systematic reviews can be found in online supplemental file 1. The inclusion criteria were framed according to a modified PICOS (participant, intervention, comparator, outcomes, study type) approach which also included context.

Participants

This meta-analysis included people of any age or gender with a diagnosis of RCRSP, lateral elbow, patellar, Achilles or gluteal tendinopathy of any severity or duration. Due to difficulty in diagnosing the patho-anatomical cause of shoulder pain[16 17] the term RCRSP is defined here as pain, impaired movement and function of the shoulder from one or more structures (encompassing subacromial pain/impingement syndrome (SIS), rotator cuff tendinopathy and subacromial bursitis).[17] We included studies that described participants as having tendinopathy, SIS or RCRSP, thereby acknowledging that participants may have tendinopathy+/−involvement of other structures. Full thickness or large tears were excluded, for all tendinopathies. Trial authors' diagnoses were accepted where a clearly verifiable group of clinical features was reported including: pathognomonic location of pain; a symptom altering response to applied load and/or stretch, with there being a specific test for most tendinopathies; strategies to rule out differential diagnoses; ultrasound or MRI confirmation of structural change. Typically, a minimum of two clinical features were acceptable, however often more were reported. Data from studies with mixed groups were included where there was clear reporting of the tendinopathic group, or they comprised >90% of the investigated cohort.

Intervention

The intervention being assessed was exercise therapy where resistance exercise represented the dominant class (see online supplemental file 2 for definitions). Intervention arms combining exercise with other non-exercise therapies were not included. We included resistance exercise delivered in a range of settings by a range of health and exercise professionals or support workers, as well as supervised or unsupervised (including home) exercise. Studies had to report sufficient information regarding exercise dose, including frequency (number of training sessions performed per week), volume (total number of repetitions) and intensity (limb/bodyweight vs additional external load expressed in absolute or relative terms). Where insufficient information was presented, the publishers' website was searched for supplementary files. Studies were included if a minimum of two of three dose components could be quantified.

Comparator

No head-to-head comparators were included, and analyses were conducted across levels of the dose moderator variables.

Outcomes

Based on initial review results[15 18] and stakeholder workshops we included outcomes that assessed six domains: (1) disability; (2) function; (3) pain (eg, pain on loading, pain over a specified time, pain without further specification); (4) range of motion for RCRSP; (5) physical function capacity; and (6) quality of life. Definitions of each domain and example tools are presented in online supplemental file 3.

Types of studies

We included randomised controlled trials and non-randomised controlled trials where at least one intervention arm comprised an exercise therapy where resistance exercise was judged to be the dominant treatment class based on the composition of the therapy.

Context

The context included primary care, secondary care or community locations in nations defined as very high or high on the Human Development Index (top 62 countries at the time of protocol development)[19] for the findings to be relevant to the UK context.

Search strategy

The search strategy used for this study was part of a larger search conducted to scope the entire exercise for tendinopathy research base. We employed a three-step search strategy. First, a limited search of MEDLINE and CINAHL using initial keywords (MH tendinopathy OR TX tendin* OR TX tendon*) AND (MH exercise OR TX exercis*) was conducted to develop a full search strategy. Second, the full search strategy was adapted to each database and applied systematically to: MEDLINE, CINAHL, AMED, Embase, SPORTDiscus, Cochrane library (Controlled trials, Systematic reviews), JBI Evidence Synthesis, PEDRo and Epistemonikos. The following trial registries were also searched: ClinicalTrials.gov, ISRCTN The Research Registry, EU-CTR (European Union Clinical Trials Registry), ANZCTR (Australia and New Zealand Clinical Trials Registry) (all search strategies are presented in online supplemental file 4). Finally, the third step involved a search of cited and citing articles using Scopus and hand-searching 130 systematic reviews that were identified to include information relevant to exercise therapy and tendinopathy. As a final check, the list of identified studies was sent to experts external to the research team to identify any potentially missing studies. Research studies published in languages other than English were translated via Google Translate or international collaborations of the review team. Searches were initiated from 1998 as (1) the heavy load eccentric calf-training protocol for Achilles tendinosis by Alfredson *et al*[20] was published in 1998 and may be considered seminal work in the field of tendinopathy, and (2) there has been a proliferation of research on exercise interventions for tendinopathies post 1998. The final search was conducted on 25 March 2022.

Study selection

Proquest Refworks was used to manage references and remove duplicates, before importing to Covidence (Melbourne, Australia) for screening and further de-duplication. Each title and abstract was independently reviewed by any two members of the review team (PAS/KC/LA/RM/LG/EP/JSCS/AVP). Full-texts of included studies were similarly screened independently by any two team members. Conflicts were resolved by discussion or by a third reviewer.

Data extraction

Following extraction training, data were extracted independently by eight members of the review team (PAS/KC/LA/RM/LG/EP/JSCS/AVP) into prepiloted excel spreadsheets and independently coded as described in the accompanying extraction codebook (online supplemental file 5). Each entry on the spreadsheet was double-checked by a different member of the team. Where pre-post intervention data were not presented in text but in figures, data were extracted using PlotDigitizer V.2.6.8 Windows (WebPlotDigitizer - Copyright 2010–2021 Ankit Rohatgi (automeris.io)).

Risk of bias assessment

Risk of bias was assessed using the earlier version of the Cochrane risk of bias (RoB) tool[21] since a recent review of RoB tools in tendinopathy management studies did not identify one tool as being superior to the others.[22] Furthermore, it allowed us to streamline the process by combining with RobotReviewer,[23] a machine learning software that semi-automates the Cochrane tool. A risk of bias judgement was made for each outcome and time point within studies for each of the seven domains[21] and reported as either 'low risk', 'high risk' or 'uncertain' when there was insufficient detail or the outcome was not addressed. RobotReviewer was used to make initial assessments on domains 1, 2 and 3 and validated manually using the extracted free text to agree on a final selection of risk of bias. This semi-automated process provided greater efficiency and consistency during the review process. Results are presented using an overall summary risk of bias assessment, obtained for each domain by selecting the mode risk category across all outcomes and time points. An assessment was made by any two members of the team (AVP, JSCS, RM, EP, LG] with comments made to justify scoring and regular consultation between team members where uncertainties arose.

Coding of resistance exercise therapies

Attempts were made to code exercise dose components (intensity, volume and frequency) for each study; however, sufficient information was not always available to code all three components. Coding of exercise intensity was initially achieved by identifying whether exercise load was prescribed in absolute (eg, kilogrammes when using dumbbells or isoinertial loads) or relative terms (as a percentage of the maximum load that can be lifted) and the magnitude of the load recorded. Additionally, a binary coding was used to identify whether exercise was performed with body mass only (eg, whole body mass or mass of a limb), or with the addition of external loads (such as a loaded backpack, dumbbell or elastic resistance). Exercise volume was coded by quantifying the number of sets and repetitions. Exercise frequency was recorded as the total number of resistance exercise sessions performed per week (including where there were multiple sessions a day). In cases where several resistance exercises were prescribed, intensity and volume were extracted for the primary resistance exercise only, which we defined as the exercise that was the focus of the paper or, if unclear, whichever had the greatest volume. In cases where exercise dose progressed, we took the average value for the primary exercise. Where progressions led from an initial mobility component to a resistance exercise focus, the latter was extracted.

Statistical analysis

The purpose of the meta-analysis was to investigate responses to exercise therapies where resistance exercise was the dominant treatment class. A broad modelling perspective was selected where outcomes across a range of tendinopathies and outcome domains were combined to investigate whether central estimates (eg, pooled mean) were associated with different levels of moderator variables representing exercise dose (frequency, intensity or volume). Due to the use of different outcome domains and different tests within the same outcome domain, pooling of data required standardisation. This was achieved

using the standardised mean difference (SMD_{pre}) effect size, dividing the mean group change by the pre-intervention SD. Where baseline SD values were not presented these were estimated using statistical information presented[24] (eg, CIs, SEs, t values, p values, F values) or imputed based on the simple linear regression quantifying the relationship between the log-transformed means (explanatory) and log-transformed SDs (response) from studies with complete data.[25] Where required, SMD_{pre} values were reflected by multiplying by –1 to ensure that positive values represented an improved clinical effect. Where multiple outcomes were reported from the same study (different outcomes and/or the same outcome at multiple time points), all possible SMD_{pre} values were calculated and included in the meta-analysis models. To account for covariances created, all meta-analyses were conducted using a nested four-level model[26] comprising the individual study (level 4), the outcome (level 3), the measurement occasion (level 2) and the sampling variance (level 1) levels. A comprehensive description of the model and further details of statistical analysis can be found in online supplemental file 6.

Confidence in cumulative evidence

Assessments were made using the Grading of Recommendations Assessment Development and Evaluation guidelines[27] in addition to recommendations on transparent reporting of evidence for tendinopathy management.[28] Confidence in evidence was assessed at the outcome level with: (1) overall risk of bias ranked as high, low or unclear risk, as identified by the mode rating across all data in the specific analysis; (2) inconsistency assessed based on meta-analysis results and comparisons of central and variance parameter estimates (downgraded where $\sigma_r > 0.9\ \gamma_0$); (3) imprecision judged by the number of available data points (studies, treatment arms, outcome measures) and the width of credible intervals for central estimates; (4) indirectness identified as low risk for all outcomes based on inclusion criteria from our previous scoping review and stakeholder recommendation; and (5) small study effects assessed by visual inspection of effect size distribution and sampling variance (downgraded when substantive number of points outside bounds). Overall confidence in evidence for each analysis was recorded as either high, moderate, low or very low. Categorisations began with high confidence in cumulative evidence and were downgraded to a level for each domain not judged as low risk.

Protocol deviations

A deviation from our PROSPERO registered protocol in relation to the included tendinopathies was made. We intended to include all tendinopathies but were guided by identification of studies reporting on resistance exercise following our scoping review. Our final inclusion criteria incorporated RCRSP, lateral elbow, patellar, Achilles and gluteal tendinopathies.

Equality, diversity and inclusion statement

The authors on this project were chosen on merit and came from a diverse range of backgrounds, occupations and levels of seniority. Although we excluded studies from countries not on the 'very high' Human Development Index (HDI) list, this was done to make findings more generalisable to the UK.

RESULTS

Study selection

The search strategy identified a total of 12 379 potential studies, with 6944 remaining following de-duplication (figure 1). After

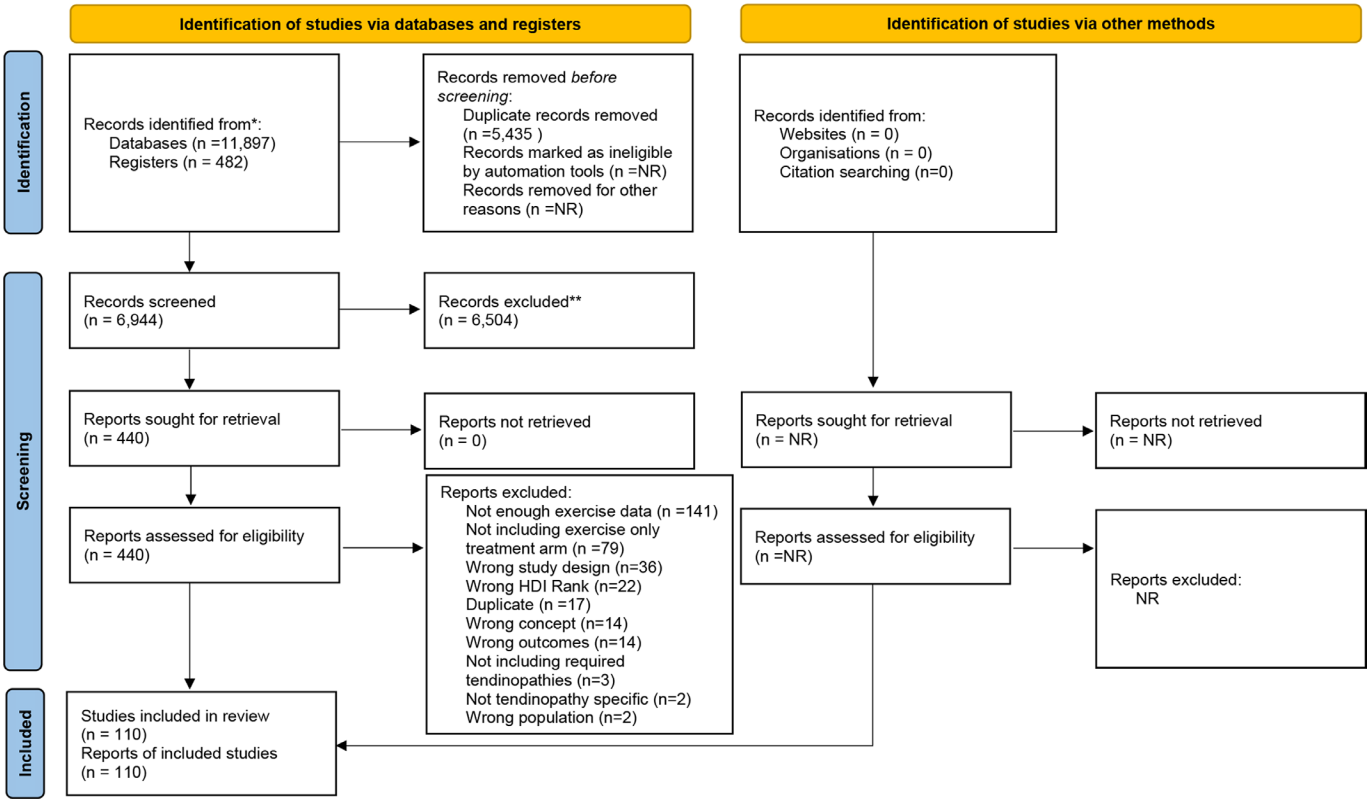

Figure 1 PRISMA flow chart of study selection process. From Page *et al*.[41] HDI, Human Development Index; PRISMA, Preferred Reporting Items for Systematic review and Meta-Analysis.

Table 1 Dominant resistance exercise treatments presented according to tendinopathy type

Tendinopathy type	Resistance exercise treatment	Number (%) of treatment arms
Achilles	Eccentric only	34 (79)
	Concentric and eccentric	6 (14)
	Concentric only	2 (5)
	Isometric	1 (2)
Gluteal (including greater trochanteric pain syndrome)	Concentric and eccentric	3 (75.0)
	Isokinetic	1 (25.0)
Lateral elbow	Eccentric only	18 (62)
	Isometric	6 (21)
	Concentric and eccentric	3 (10)
	Concentric only	2 (7)
Patellar	Eccentric only	9 (38)
	Concentric and eccentric	8 (33)
	Isometric	5 (21)
	Concentric only	1 (4)
	Isokinetic	1 (4)
Rotator cuff related shoulder pain	Concentric and eccentric	35 (73)
	Eccentric only	7 (15)
	Isometric	4 (8)
	Concentric only	1 (2)
	Isokinetic	1 (2)

title and abstract screening 440 studies were retained for full-text screening. Of these studies, a further 330 were excluded (online supplemental file 7A: Excluded studies with reasons reference list) based primarily on insufficient description of the exercise stimulus (141 studies) and not including exercise-only treatment arms (79 studies). In total, data from 110 studies comprising 148 treatment arms and 3953 participants were included in the meta-analyses (online supplemental file 7B, C: Table of included studies and reference list). Exercise therapies for the treatment of five different tendinopathies (RCRSP: 48 (32%) treatment arms; Achilles: 43 (29.0%) treatment arms; lateral elbow: 29 (20%) treatment arms; patellar: 24 (16%) treatment arms; and gluteal: 4 (3%) treatment arms) were identified (table 1). Over half of the treatment arms (82/55%) comprised resistance only therapies, with the remaining predominantly including additional flexibility exercises (table 1). The dominant resistance exercise treatments are presented in table 1, with eccentric only exercise the most common for Achilles (79% of relevant treatment arms), lateral elbow (62% of relevant treatment arms) and patellar (38% of relevant treatment arms) tendinopathies; and both concentric and eccentric resistance exercise most common for gluteal (75% of relevant treatment arms) and RCRSP (73% of relevant treatment arms). Overall, eccentric-only (68 treatment arms) was the most common dominant treatment, followed by concentric and eccentric (55 treatment arms) then isometric (16 treatment arms).

Risk of bias and confidence in cumulative evidence

RoB and confidence in evidence assessments are presented for the primary meta-analyses and more broadly in online supplemental file 8. Summarised according to studies, the most frequent risk of bias for randomised controlled trials was blinding of participants (40% studies high risk of bias) and 'other bias' (54% studies high risk of bias). Similarly, 'other bias' was also the most frequent risk of bias for non-randomised studies as assessed by the RoB tool. In general, confidence in evidence was frequently low based on imprecision due to wide credible intervals and inconsistency due to large between study variance estimates. Overall confidence in cumulative evidence varied from very low to moderate with low confidence most commonly identified.

Resistance exercise intensity

Of the 148 treatment arms included, 123 provided sufficient information to categorise the intensity as lower intensity in the form of body mass only (31 treatment arms; 25%), or higher intensity with the addition of external resistance (92 treatment arms; 75%) prescribed based on absolute loads (eg, addition of weights to a backpack, isoinertial loads, resistance band and dumbbells) or percentage of a maximum. Meta-regressions provided consistent evidence of greater pooled mean effect sizes for increased training intensity with the addition of external loads. Primary meta-analyses pooling data across all tendinopathy locations identified median increases of $\beta_{\text{BodyMass: External}} = 0.50$ (95% credible interval (CrI): 0.15 to 0.84; p=0.998) for outcomes generating large effect sizes, and an increase of $\beta_{\text{BodyMass: External}} = 0.04$ (95% CrI: −0.21 to 0.31; p=0.619) for outcomes generating small effect sizes (individual levels

Table 2 Moderator analysis comparing average pooled effect size for body weight interventions versus interventions including additional external load

Moderator	Pooled SMD_{pre} estimate (95% CrI)	Probability	Study VPC (75% CrI)	Outcome VPC (75% CrI)	Measurement occasion VPC (75% CrI)	Confidence in evidence
Large effect outcomes						
Body mass (169 outcomes 28 treatment arms)	0.9 (0.58 to 1.2)	*p* (body weight < additional) = 0.998	0.78 (0.74 to 0.84)	0.18 (0.14 to 0.23)	0.02 (0.00 to 0.06)	Low
Additional external (544 outcomes 90 treatment arms)	1.4 (1.2 to 1.6)					Moderate
Small effect outcomes						
Body weight (96 outcomes 11 treatment arms)	0.40 (0.21 to 0.53)	*p* (body weight < additional) = 0.619	0.70 (0.63 to 0.77)	0.27 (0.20 to 0.34)	0.02 (0.00 to 0.05)	Low
Additional external (331 outcomes 49 treatment arms)	0.44 (0.33 to 0.55)					Moderate

Results presented across all tendinopathies combined.
Large effect outcomes: Effect sizes obtained from outcomes measuring: (1) Disability; (2) Pain on loading/activity; (3) Pain without further specification; (4) Function; and (5) Pain over a specified time. Small effect outcomes: Effect sizes obtained from outcomes measuring: (1) Quality of Life and (2) Physical functional capacity.
CrI, credible interval; VPC, variance partition coefficient.

Table 3 Moderator analysis comparing average pooled effect size for different training frequencies

Moderator	Pooled SMD_{pre} estimate (95% CrI)	Probability	Study VPC (75% CrI)	Outcome VPC (75% CrI)	Measurement occasion VPC (75% CrI)	Confidence in evidence
Large effect outcomes						
Less than daily (270 outcomes 45 treatment arms)	1.5 (1.3 to 1.7)	*p* (less than daily > once per day) = 0.992	0.77 (0.71 to 0.82)	0.19 (0.15 to 0.24)	0.04 (0.00 to 0.08)	Low
Once per day (192 outcomes 33 treatment arms)	1.0 (0.69 to 1.3)	*p* (once per day < more than once per day) = 0.678				Moderate
More than once per day (305 outcomes 51 treatment arms)	1.2 (1.0 to 1.4)	*p* (less than daily > more than once per day) = 0.951				Moderate
Small effect outcomes						
Less than daily (174 outcomes 25 treatment arms)	0.60 (0.46 to 0.74)	*p* (less than daily > once per day) = 0.999	0.67 (0.58 to 0.74)	0.30 (0.23 to 0.39)	0.02 (0.00 to 0.06)	Moderate
Once per day (156 outcomes 20 treatment arms)	0.28 (0.10 to 0.45)	*p* (once per day < more than once per day) = 0.802				Moderate
More than once per day (107 outcomes 19 treatment arms)	0.39 (0.22 to 0.53)	*p* (less than daily > more than once per day) =0.976				Low

Results presented across all tendinopathies combined.
Large effects: Effect sizes obtained from outcomes measuring: (1) Disability; (2) Pain on loading/activity; (3) Pain without further specification; (4) Function; and (5) Pain over a specified time. Small effects: Effect sizes obtained from outcomes measuring: (1) Quality of Life and (2) Physical functional capacity.
CrI, credible interval; VPC, variance partition coefficient.

presented in table 2). Similarly, point estimates indicated greater pooled mean values for the addition of external resistance for all analyses separated by tendinopathy location for which there was sufficient data (online supplemental file 9A).

Frequency of resistance exercise

Of the 148 treatment arms included, 135 provided sufficient information to categorise the frequency as low frequency (less than daily: 48 treatment arms; 36%), moderate frequency (daily: 34 treatment arms; 25%) or high frequency (more than once per day: 53 treatment arms; 39%). Consistent evidence of a moderating effect was also identified for resistance exercise frequency with greater pooled mean effect sizes identified for the lowest frequency of less than once per day. Primary meta-analyses pooling data across all tendinopathy locations identified median increases of $\beta_{<Daily:\ Daily} = -0.50$ (95% CrI: −0.88 to −0.11; p=0.992) between less than once per day and once per day, and $\beta_{<Daily:\ >Daily} = -0.44$ (95% CrI: −0.829 to −0.05; p=0.951) between less than once per day and more than once per day for outcomes generating large effect sizes. Similarly, median increases of $\beta_{<Daily:\ Daily} = -0.32$ (95% CrI: −0.55 to −0.09; p=0.999) and $\beta_{<Daily:\ Daily} = -0.21$ (95% CrI: −0.42 to −0.00; p=0.976) were identified across the comparisons for outcomes generating small effect sizes (individual levels presented in table 3). Consistent evidence of increased pooled mean effect sizes for resistance exercise performed less than once per day was also obtained when analyses were separated by tendinopathy location (online supplemental file 9B). In contrast, effect size estimates tended to be similar for exercising once per day or more than once per day (table 3) with wide overlap of potential values also identified when analyses were separated by tendinopathy location (online supplemental file 9B).

Resistance exercise volume

Resistance exercise volume was categorised for 128 treatment arms as the product of the number of sets and repetitions for the primary resistance exercise. The most common number of total repetitions was 45 (eg, 3 sets of 15 repetitions) and this accounted for almost half of the training interventions (51 treatment arms; 40%). As a result, training volume was coded as a binary variable characterised as lower volume (<45 total repetitions: 67 treatment arms; 52%) and higher volume (≥45 total repetitions: 61 treatment arms; 48%). In general, considerable overlap was identified between pooled mean effect size estimates of lower and higher volume exercise including primary meta-analyses of outcomes generating large effect sizes ($\beta_{Lower:\ Higher} = -0.02$ (95% CrI: −0.40 to 0.37; p=0.553)) and outcomes generating small effect sizes ($\beta_{Lower:\ Higher} = -0.14$ (95% CrI: −0.35 to 0.09; p=0.782; individual levels presented in table 4)). While the median point estimates from the primary meta-analyses favoured lower volume exercise, this ordering was not consistently maintained when analyses were separated by tendinopathy location (online supplemental file 9C).

Combined analysis

As a final analysis, a meta-regression including the above intensity, frequency and volume variables were included to assess for differences in the pooled mean effect size while controlling for each other across all tendinopathy locations. A total of 76 studies (101 treatment arms) provided sufficient information for simultaneous coding of all three dose variables for outcomes generating large effect sizes, and 40 studies (53 treatment arms) provided sufficient information for outcomes generating small effect sizes. Results were consistent with analyses conducted individually on dosing variables, with evidence of increased pooled means with greater intensity for both outcomes generating large ($\beta_{BodyMass:\ External}$ =0.38 (95% CrI: 0.00 to 0.77; p=0.975)) and small ($\beta_{BodyMass:\ External} = 0.17$ (95% CrI: −0.11 to 0.46; p=0.888)) effect sizes. Similarly, evidence of increased pooled means was obtained for the lowest frequency therapies for both outcomes generating large ($\beta_{<Daily:\ Daily} = -0.60$ (95% CrI: −1.1 to −0.13; p=0.993); $\beta_{<Daily:\ >Daily} = -0.32$ [95% CrI:−0.76 to −0.02; p=0.977)) and small ($\beta_{<Daily:\ Daily} = -0.37$ (95% CrI:−0.63 to −0.08; p=0.995); $\beta_{<Daily:\ >Daily} = -0.26$ (95% CrI:−0.51 to −0.01; p=0.976)) effect sizes. Finally, minimal evidence was obtained for a moderating effect of training volume for outcomes generating either large ($\beta_{Lower:\ Higher} = -0.12$ (95% CrI: −0.43 to 0.17; p=0.614)) or small ($\beta_{Lower:\ Higher} = -0.08$ (95% CrI: −0.30 to 0.13; p=0.707)) effect sizes.

Table 4 Moderator analysis comparing average pooled effect size for binary resistance volume categorisation

Moderator	Pooled SMD_{pre} estimate (95% CrI)	Probability	Study VPC (75% CrI)	Outcome VPC (75% CrI)	Measurement occasion VPC (75% CrI)	Confidence in evidence
Large effect outcomes						
Lower volume (377 outcomes 63 treatment arms)	1.5 (1.3 to 1.7)	*p* (higher volume < lower vol) = 0.995	0.80 (0.74 to 0.85)	0.17 (0.13 to 0.21)	0.03 (0.00 to 0.07)	Moderate
Higher volume (355 outcomes 60 treatment arms)	1.2 (0.95 to 1.3)					Moderate
Small effect outcomes						
Lower volume (224 outcomes 34 treatment arms)	0.56 (0.37 to 0.74)	*p* (higher volume < lower vol) = 0.782	0.71 (0.63 to 0.78)	0.27 (0.20 to 0.35)	0.02 (0.00 to 0.05)	Moderate
Higher volume (183 outcomes 25 treatment arms)	0.42 (0.26 to 0.59)					Moderate

Results presented across all tendinopathies and individual tendinopathies.
Large effects: Effect sizes obtained from outcomes measuring: (1) Disability; (2) Pain on loading/activity; (3) Pain without further specification; (4) Function; and (5) Pain over a specified time. Small effects: Effect sizes obtained from outcomes measuring: (1) Quality of Life and (2) Physical functional capacity.
CrI, credible interval; VPC, variance partition coefficient.

DISCUSSION

Our review provides the largest synthesis of training dose in resistance exercise therapy for tendinopathy management to date. We included 110 studies across the five most common tendinopathy locations. Studies included diverse therapies with many comprising resistance exercise only, and others frequently combining resistance exercise with flexibility training. Despite the extensive variability in therapies, some general patterns were identified, indicating that increased loading with greater time for recovery may produce superior results. Meta-regressions consistently identified greater effect size estimates for therapies employing higher intensity exercise through the addition of external loads compared with body mass only. Similarly, meta-regressions consistently identified greater effect size estimates for therapies performed with a low frequency (less than once per day) compared with very high frequencies (once per day or more than once per day) that were also likely to comprise reduced loading to enable recovery. Less consistent results were obtained for moderator analyses investigating exercise volume.

One of the challenges in investigating resistance intensity was the lack of clear reporting of actual intensities used. Studies using resistance bands did not report the relative resistance provided or in general comment on intensity progression. Although some studies identified progression in intensity through additional loading using, for example, a dumbbell or loaded backpack, many did not state the actual loads recommended or used. Due to these limitations a cruder proxy of resistance intensity was investigated in this review based on the binary categorisation of lower intensity exercise involving just body mass, or higher intensity exercise involving additional external resistance. Evidence from our review indicating superior results with greater resistance training intensities is consistent with findings from previous studies that have also reported better adaptive responses in the mechanical properties of tendons.[29 30]

In our review, consistent evidence was obtained indicating that performing resistance exercises less frequently throughout the week (less than once per day) was more effective compared with once per day or greater. To achieve musculotendinous unit hypertrophy with resistance exercise requires high levels of activation.[31 32] Taking into consideration the microtrauma caused by resistance exercise in the tendon tissue this would be optimised with adequate rest periods between sessions.[31 32] Allowing greater recovery times between sessions may play a role in the effectiveness of interventions. This is in contrast to the results in a recent review by Young *et al*[14] who reported larger effect sizes with greater frequencies of exercise. However, these differences are likely due to the differences in the evidence-base (14 vs 110 studies) and inclusion of a wider range of protocols and tendinopathies in our review.

Comparisons of exercise volume, commonly reported as the product of sets and repetitions, did not produce consistent results in our review. However, it is worth noting that meta-regressions investigating volume for RCRSP tendinopathies provided some evidence of increased effectiveness of higher volume exercise for both outcome domains producing large and small effect sizes. The included RCRSP studies commonly prescribed lower intensities of resistance for the upper limb with a focus on range of motion and mobility.[33–35] A recent review by Malliaras[36] found low quality evidence suggesting that higher volume and intensity exercise (or higher volume alone) may have superior functional outcomes compared with lower doses, but not for pain outcomes, in RCRSP tendinopathies. However, they were limited to just three studies due to their inclusion criteria and lack of clear reporting in the literature.[36] Tendons of the shoulder facilitate repetitive movements of daily tasks with less overall load than larger weight bearing tendons like the Achilles and may require programmes that imitate that repetitive nature through higher volume of exercise.

Limitations

We did not search Web of Science, however, together with our information scientist we are confident that our search was comprehensive and rigorous. We may have missed some potentially relevant high-quality studies by excluding those that were not from countries ranked 'very high' on the HDI (eg, Brazil and South Africa). However, this number was small and allowed us to generalise the findings to the UK. One of the limitations of this study, and a challenge for future evidence syntheses, is the lack of clear reporting. We found that in general, exercise volume and frequency were better reported, with reporting of intensity often poor. Similarly, our review identified that although load progression was frequently stated, studies rarely reported the actual loads or intensity used. The use of reporting guidelines such as Consolidated Standards of Reporting Trials[37] or Consensus on Exercise Reporting Template[38] in primary research would greatly enhance future reviews. Understandably, progressions are matched to individuals, however, more detailed reporting of loads prescribed and ultimately used across participants would be useful for future evidence syntheses and to better

inform clinicians. Relative intensity measures such as per cent of maximum repetition are likely to provide the most useful information for future evidence syntheses and the most precise comparisons. Another limitation to note is that we extracted resistance dose data for the primary exercise, therefore other exercises prescribed as part of the wider intervention were not accounted for in analysis. This means that variables such as exercise volume may not be fully representative of the true volume of overall exercise performed, but rather specifically the dominant resistance exercise. Although most studies made clear which exercise was the focus of investigation, it was unclear in a small number and in these cases, we identified the exercise with the higher volume. The comparability of our RoB judgements with recent reviews using the updated RoB2 tool may be limited due to poor inter-tool reliability with the older version of Cochrane's RoB tool.[22] While we used RobotReviewer pragmatically for efficiency, we wish to point out that decisions were checked to improve accuracy and consistency.

An additional substantive limitation of this review includes the use of non-controlled effect sizes. This approach was adopted due to the ability to greatly increase the amount of data available and address limitations of previous reviews based largely on small sample sizes and subsequent decisions not to quantitatively synthesise results. The major limitation of this approach is the potential for unbalanced treatment moderators including a range of intervention and population characteristics to associate with different levels of the dose variables defined, thus biasing results. Given the likely interaction between intensity, volume and frequency, we attempted to control for these interactions by including a more complete meta-regression with all three variables included. While the results of the analysis supported those obtained with the individual meta-regressions, there are likely to be many other effect moderators including intervention duration, follow-up duration, adherence and baseline characteristics of patients[39 40] that may have been imbalanced and could not be controlled. Additionally, in clinical settings there is potential for extreme values to occur and if these errors are asymmetric then regression to the mean effects can create poor estimates further limiting non-controlled effect sizes. In a previous analysis conducted with similar data we showed that effect size values are greatly influenced by outcome domains and could be summarised by a binary classification.[18] As a result, we conducted analyses in the present review based on outcome domains that tended to generate large and small effects. However, it is possible that this binary classification represents too much of a simplification and imbalances in outcomes may also have biased results. Large increases in data were obtained by pooling results across the different tendinopathy locations. This approach was adopted based on our previous analysis indicating that the distribution of effect sizes following exercise therapy is likely to be similar.[18] However, where sufficient data were available to conduct meta-regressions for individual tendinopathy locations, results tended to be consistent. Finally, another limitation of the review included the confidence in cumulative evidence which was most frequently identified as low and in a number of cases very low. This was predominantly due to extensive heterogeneity in studies resulting in issues of inconsistency and imprecision in effect size estimates.

CONCLUSIONS AND CLINICAL IMPLICATIONS

The results of this large systematic review with meta-analysis suggest that where resistance exercise is being prescribed for tendinopathy management, clinicians should consider whether a sufficient stimulus with regards to exercise intensity is being adopted and whether there is appropriate time for recovery. For certain patients this may require a substantive period of progression before reaching higher intensities. However, when appropriate, clinicians should consider prescribing higher intensities of resistance exercise through the application of external loads rather than just body mass; and given the increased loading, prescribing lower frequencies of sessions (less than daily) to allow for adequate recovery. Further refinement of the interrelations between exercise dose parameters and patient characteristics are required, including better understanding of the influence of exercise volume.

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SF1: PRISMA 2020 Checklist for the reporting of systematic reviews

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	4-5
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	2, 4-5
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	5-7
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	7-8
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	7-8, SF3
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	8
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	8-9, SF1, 2 & 4
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	7
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	8-11,
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	9
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	10-11, SF6
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	10-11
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	10-11
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	10-11

Section and Topic	Item #	Checklist item	Location where item is reported
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	10-11, SF6
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	10-11, SF6
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	10-11, SF6
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	9
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	11
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	12, Figure 1
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	12 (SF7)
Study characteristics	17	Cite each included study and present its characteristics.	(SF7) 37-56,57-63
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	13, (SF8) 64-67, 68-70
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	13-19, SF8,SF9
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	13-19,SF9
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	15-19,SF9
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	15-19,SF9
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	68-70
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	68-70
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	20-21
	23b	Discuss any limitations of the evidence included in the review.	21-23
	23c	Discuss any limitations of the review processes used.	21-23

Section and Topic	Item #	Checklist item	Location where item is reported
	23d	Discuss implications of the results for practice, policy, and future research.	24
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	5
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	5
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	12
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	5, 24
Competing interests	26	Declare any competing interests of review authors.	24
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	Supplementary files

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

For more information, visit: http://www.prisma-statement.org/

SF2: Definitions used to define exercise treatments and treatment classes.

Treatment Class	**Definition**	**Treatment**	**Definition**
Resistance	Exercise designed primarily to increase strength of muscles by causing them to produce substantive force against an applied resistance which can take several forms including the mass of the body or its segments, isoinertial resistance, elastic resistance, or strength training equipment such as isokinetic devices.	Concentric Only	Includes movements where force produced overcomes the resistance such that muscle shortening occurs.
		Eccentric Only	Includes movements where force produced is less than the resistance such that controlled muscle lengthening occurs.
		Concentric and eccentric	Includes movements where force produced exceeds the resistance in one phase and is less than the resistance in another such that controlled muscle lengthening and shortening occurs.
		Isokinetic	Uses specialised exercise equipment such that the resistance is adjusted in real-time to ensure joint angular velocity remains constant.
		Isometric	Includes muscular actions against a resistance such that joint angle remains constant.

SF3: Outcome domains and example outcomes included in review.

Domain	ICON Definition	Example Tools
Disability	Composite scores of a mix of patient-rated pain & disability due to the pain, usually relating to tendon-specific activities/tasks	VISA scales; DASH; quick DASH; SPADI; Patient-rated tennis-elbow evaluation questionnaire; Constant Murley Score; WORC (Western Ontario Rotator Cuff Index); AOFAS (American Orthopaedic Foot & Ankle Society); Roles and Maudsley score; ASES (American Shoulder & Elbow Surgeons Index); Hip & Groin Outcome Score; Foot & Ankle outcome score (FAOS)/Questionnaire (FAOQ); Oxford hip score (OHS); Hip disability & outcome OA score (HOOS); Tegner activity score; Lysholm knee scale; Pain free function questionnaire; Ankle activity score; Subjective elbow Value (SEV); Placzek score; Shoulder disability questionnaire; Foot function index (FFI); International Knee Documentation Committee form (IKDC); Penn Shoulder score (university of Pennsylvania shoulder score) (PSS); Brief pain inventory (BPI); UCLA Shoulder Rating Scale; FILLA - functional index of leg and lower limb; Neer Shoulder Score; Nirschl phase rating scale; Manchester–Oxford Foot Questionnaire (MOXFQ); American Shoulder and Elbow Surgeon's (MASES) questionnaire; Mayo Elbow Performance Score (MEPS); Shoulder rating questionnaire (SRQ);
Function	Participant/patient rated level of function (and not referring to the intensity of their pain; eg, Patient Specific Function Scale on a VAS or NRS).	Patient-specific functional scale
Pain on loading/activity	Patient reported intensity of pain performing a task that loads the tendon	VAS; NRS; Pain experience scale
Pain over a specified time	Patient-reported pain intensity over period of time e.g. morning/night/24-hours/1-week	VAS; NRS Painful days in 3 months
Pain without further specification	Patient asked about pain levels without reference to activity or timeframe	VAS; NRS; Borg CR10 Scale; Pain status
Physical function capacity	Quantitative measures of physical tasks (e.g. hops, times walk, single leg squat) includes muscle strength	Counter movement jump; one-leg triple hop; single-leg decline squat; muscle strength measured by dynamometry (hand-held, isokinetic); manual muscle testing.
Quality of Life	General wellbeing	EQ5D; EQ3D; SF-36 or SF-12; Assessment of Quality of Life (AQoL); Nottingham Health Profile; Gothenburg QoL Instrument
Range of Motion (shoulder only)	Active or passive range of motion in specified plane, measured in degrees.	Hand-held goniometer; inclinometer

VISA= Victorian Institute of Sport Assessment; DASH =Disabilities of the Arm, Shoulder and Hand; OA= osteoarthritis; VAS= visual analogue scale; NRS= Numerical Rating Scale.

SF4: Search strategies for each source

Embase (Ovid)	(exercise OR exercise*.mp OR "isometric exercise" OR kinesiotherapy OR Eccentric.mp OR concentric.mp OR "heavy slow resistance".mp OR "isokinetic exercise" OR plyometrics OR "muscle stretching" OR "muscle training") AND (tendinitis OR Tendinopathy.mp OR "tendon injury" OR "shoulder injury" OR "rotator cuff injury" OR "tennis elbow" OR tendin.mp OR tendon.mp OR bursitis OR "shoulder impingement syndrome" OR 2posterior tibial tendon dysfunction" OR "Greater trochanteric pain syndrome".mp)
CINAHL (EBSCO-host)	(MH Exercise OR AB exercise* OR MH "muscle strengthening" OR MH "rehabilitation" OR MH "eccentric contraction" OR TX "heavy slow resistance exercis*" OR AB eccentric OR AB concentric OR AB isokinetic OR MH "therapeutic exercise") AND (MH tendinopathy OR MH "arm injuries" OR "tendon injuries" OR MH tendons OR TX tendin* OR TX tendon* OR AB bursitis OR MH Bursitis OR MH "Posterior tibial tendon dysfunction" OR MH "shoulder impingement syndrome" OR AB "Greater trochanteric pain syndrome")
Medline (EBSCO-host)	(MH exercise OR AB exercise* OR MH "isometric contraction" OR MH rehabilitation OR TX eccentric OR TX concentric OR TX "heavy slow resistance" OR TX isokinetic) AND (MH tendinopathy OR MH "shoulder injuries" OR MH tendons OR MH "tendon injuries OR TX tendin* OR tendon* OR MH bursitis OR AB bursitis OR MH "posterior tibial tendon dysfunction" OR MH "shoulder impingement syndrome" OR AB "greater trochanteric pain syndrome")
SPORTDiscus (EBSCO-host)	(DE exercise OR DE "exercise therapy" OR AB exercise* OR TX eccentric OR TX concentric OR TX "heavy slow resistance" OR DE "isokinetic exercise" OR DE plyometrics OR DE "strength training" OR DE "stretch (physiology)" OR DE "isometric exercise" OR DE rehabilitation) AND (DE tendinitis OR DE tendinosis OR AB tendinopathy OR DE "tendon injuries" OR "shoulder injuries" OR DE "tennis elbow" OR AB tendin* OR AB tendon* OR DE bursitis OR AB "shoulder impingement syndrome" OR AB "posterior tibial tendon dysfunction" OR AB "greater trochanteric pain syndrome")
Amed (EBSCO-host)	(ZU exercise OR ZU "exercise therapy" OR AB exercise OR ZU "muscle stretching exercises" OR ZU "isometric contraction" OR ZU rehabilitation OR TZ eccentric OR TZ concentric OR TX "heavy slow resistance" OR TX isokinetic OR AB plyometric) AND (ZU tendinopathy OR ZU "tendon injuries" OR ZU tendons OR ZU "shoulder injuries" OR ZU "tennis elbow" OR TX tendin* OR TX tendon* OR ZU bursitis OR AB bursitis OR ZU "shoulder impingement syndrome" OR ZU "posterior tibial tendon dysfunction" OR AB "greater trochanteric pain syndrome")
JBI Evidence Synthesis	Tendinopathy AND exercise
Cochrane Library	Tendinopathy AND exercise

	Tendin* AND exercise Tendon AND exercise
PEDro	Tendinopathy AND exercise Tendin* AND exercise Tendon AND exercise
Epistemonikos	(tendinopathy OR tendon* OR tendin*) AND exercise
Clinicialtrials.gov	Tendinopathy AND exercise Tendin* AND exercise Tendon AND exercise
ISRCTN	Tendinopathy AND exercise Tendin* AND exercise Tendon AND exercise
EU CTR	Tendinopathy AND exercise Tendin* AND exercise Tendon AND exercise
ANZCTR	Tendinopathy AND exercise Tendin* AND exercise Tendon AND exercise

ISRCTN – the Research Registry; EU CTN – European Clinical Trials Registry; ANZCTR – Australia and New Zealand Clinical Trials Registry.

SF5: Extraction codebook

Column		Heading	Description
Study Details	A	Initials Reviewer	Identification of individual extracting information
	B	Covidence Identifier	Reference number for Covidence
	C	Author	First author surname *et al.,*
	D	Year	Year of publication
	E	Title	Study title
	F	Country	Country where study was conducted
	G	Journal	Journal name
	H	Aims/Purpose	Study aims/purpose
	I	Tendinopathy type	1=Achilles; 2= Lateral elbow (tennis); 3 = Patellar; 4 = Rotator cuff related shoulder pain (RCRSP)
	J	Study Design	RCT = 1; Quasi-experimental = 2
	K	Age Mean	Mean age of study sample as a whole
	L	Age SD	Standard deviation age of study sample as a whole
	M	Baseline Total N	Total sample across all interventions measured at baseline
	N	Training Status Description	Brief description of training status of study sample as a whole
	O	Training Status Code	1 = Performance; 2 = Sporting; 3 = Other
	P	Sex	Percentage female of study sample as a whole
	Q	BMI Mean	Mean BMI of study sample as a whole
	R	BMI SD	Standard deviation of BMI of study sample as a whole
	S	Symptom Severity Mean	Mean severity measure at baseline of study sample as a whole
	T	Symptom Severity SD	Standard deviation of severity measure at baseline of study sample as a whole
	U	Symptom Duration Mean (Months)	Mean symptom duration reported in months
	V	Symptom Duration SD (Months)	Standard deviation symptom duration reported in months
	W	Population Comments	Any additional information relevant to the participants investigated including diagnostic criteria
Outcomes	X	Outcome Category	1 = Disability; 2 = Pain on loading/activity; 3 = Pain over a specified time; 4 = Pain without further specification; 5 = Physical function capacity; 6 = Participant/patient rating overall condition; 7) Participation; 8) Quality of life; 9) Range of motion
	Y	Outcome Tool	Description of outcome tool
	Z	Reflection	1 = Increase in outcome indicates positive treatment; -1 = Decrease in outcome indicates positive treatment
	AA	Measurement Time (Weeks)	Time of measurement in weeks
Intervention	AB	Dominant Treatment Class	**Only one dominant theme to be selected** 1 = Resistance; 2 = Plyometric; 3 = Vibration; 4 = Flexibility; 5 = Movement pattern retraining
	AC	Total Treatment class	**Multiple themes to be selected as required** 1 = Resistance; 2 = Plyometric; 3 = Vibration; 4 = Flexibility; 5 = Movement pattern retraining

	AD	Dose Comparison	1 = Lower dose intervention; 2 = Higher dose intervention
	AE	Intervention N	Intervention sample size at specified time
	AF	Intervention Total Duration	Total duration of exercise intervention in weeks
	AG	Intervention Adherence %	Reporting of adherence to exercise (reported as a percentage) if applicable
	AH	Intervention Location	Location exercise was performed 1 = Home; 2 = Clinic; 3 = Fitness facility; 4 = NR; 5 = NA
	AI	Intervention Volume	Numerical value describing volume
	AJ	Intervention Volume Category	1 = Duration of session (mins); 2 = sets * repetitions; 3 = number of repetitions; 4 = number of sets
	AK	Intervention Volume Comments	Any additional information relevant.
	AL	Intervention Intensity	Numerical value describing intensity
	AM	Intervention Intensity Category	1 = Absolute; 2 = Relative; 3=Bodyweight; 4=bodyweight+
	AN	Intervention Frequency	Number of sessions per week. Where there is progression, average value is to be entered.
	AO	Intervention Frequency Comments	Any additional information relevant.
	AP	Intervention Progression	**Multiple themes to be selected as required** 1 = No progression; 2 = NR; 3 = Progression volume; 4 = Progression intensity; 5 = Progression frequency; 6 = Progression specificity; 7 = Progression capacity; 8 = Other
	AQ	Intervention Progression Comments	Any additional information relevant.
Data	AR	Intervention Baseline Mean	Baseline mean for exercise therapy
	AS	Intervention Baseline SD	Baseline standard deviation for exercise therapy
	AT	Intervention Measurement Mean	Mean of outcome for exercise therapy at stated time point
	AU	Intervention Measurement SD	Standard deviation of outcome for exercise therapy at stated time point
	AV	Measurement Comments	State if a different value has been entered for means (e.g. median), a different value for standard deviations (e.g. standard error, IQR, percentiles, distance from mean to upper bound). Provide the relevant statistic (width of CI's, width of percentiles). Also state if data has extracted by digitization

* Outcome Specific. RCT=randomised controlled trial; SD=standard deviation; BMI= body mass index; NR= not reported; NA= not applicable; IQR=Inter Quartile Range; CI= confidence intervals.

SF6: Statistical Analysis

Note: This supplement should be read together with the 'Statistical Analysis' section in the main manuscript to ensure completeness of information.

The null model with no meta-regression terms was expressed as Level 1: $d_{ijk} = \beta_{0ijk} + e_{ijk}$; Level 2: $\beta_{0ijk} = \eta_{0jk} + r_{ijk}$; Level 3: $\eta_{0jk} = \theta_{0k} + u_{0jk}$; Level 4: $\theta_{0k} = \gamma_0 + v_{0k}$, where d_{ijk} is the observed effect size at measurement occasion $i\ (i = 1,2, \dots, I_{jk})$, from outcome $j\ (j = 1,2, \dots, J_k)$ and from study $k\ (k = 1,2, \dots, K)$. The random effects $e_{ijk} \sim N(0, \sigma_e^2), r_{ijk} \sim N(0, \sigma_r^2), u_{0jk} \sim N(0, \sigma_u^2)$ and $v_{0k} \sim N(0, \sigma_v^2)$ were assumed to be independent. The relative contributions of variance sources were described by variance partition coefficients (VPCs) calculated by dividing each estimated variance level by the total sum. Meta-analyses were conducted within a Bayesian framework providing additional flexibility in the handling of within study variances and enabled model estimates to be interpreted more intuitively through reporting of subjective probabilities.[1] Inferences in Bayesian analyses are generally made using credible intervals (CrI's) that provide more information than confidence intervals used in frequentist analyses that describe a uniform range of values that are plausible with the data.[1] In comparison CrI's can be interpreted probabilistically such that values at the centre are judged more probable than those at the tails. Similarly, inferences regarding the range of values a parameter may take (e.g., greater than zero) can be calculated and interpreted probabilistically within Bayesian analyses, compared to frequentist *p* values that do not provide information on the probability of parameter values.[1]

To assess the effects of dose variables, meta-regressions for d_{ijk} were performed with intensity (body mass vs. additional external) and volume (lower volume: <45 repetitions vs. ≥45 repetitions) comprising binary categorisations, and frequency (< once per day vs. once per day vs. > once per day) comprising a trinary categorisation. Meta-regressions were presented by selecting one level of the variable as a reference to make comparisons ($\beta_{\text{Reference:Comparison}}$ = Median [95% Credible Interval

(CrI): Lower Bound (LB) to Upper Bound (UB)], such that β>0 indicates an increased effect of the comparison relative to the reference). Based on previous analyses with a similar data set showing large differences in effect sizes across outcome types, separate meta-regressions were performed for outcomes typically generating large effect sizes (disability, function and pain), and small effect sizes (physical function capacity, range of motion and quality of life). Initially, meta-regressions were performed on data pooled across all tendinopathy locations. Sub-analyses were then performed with data from single tendinopathy locations where sufficient data were available. It was determined *a priori* that meta-regressions would only be performed when each level of the variable comprised a minimum of ten effect sizes from at least two studies. Inferences from all analyses were performed on posterior samples generated by Markov Chain Monte Carlo simulations and through use of credible intervals and probabilities calculated from the proportion of the posterior sample that met the given condition (e.g. β>0). Default weakly informative Student-t and Half-Student-t priors with 3 degrees of freedom and scale parameter equal to max{2.5, Median Absolute deviation(d_{ijk})} were used for location (γ_0, β) and variance parameters ($\sigma_r^2, \sigma_u^2, \sigma_v^2$), respectively.[2] Convergence of parameter estimates were obtained for all models with Gelman-Rubin R-hat values below 1.1.[3] Suitability of model assumptions were investigated by analysing standardised residuals by multiplying the difference in the observed value and median estimates of location parameters by the square root of the reciprocal of the total variance ($\sqrt{1/(\sigma_e^2 + \sigma_r^2 + \sigma_u^2 + \sigma_v^2)}\,(d_{ijk} - (\hat{\gamma}_0 + \hat{r}_{ijk} + \hat{u}_{0jk} + \hat{v}_{0k}))$). Analyses were performed using the R wrapper package brms interfaced with Stan to perform sampling.[4]

References:

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SF7: Included studies

SF7A: Excluded studies with reasons

Reference	Reason for Exclusion
Abat F, Gelber PE, Polidori F, et al. 1 Clinical Results After EPI ® and Eccentric Exercise in Patellar Tendinopathy at 10 Years Follow-Up. Br J Sports Med 2014;48:A1. https://bjsm.bmj.com/lookup/doi/10.1136/bjsports-2014-094114.1 (accessed 12 Jun 2021).	Duplicate
Balius R, Álvarez G, Baró F, et al. A 3-Arm Randomized Trial for Achilles Tendinopathy: Eccentric Training, Eccentric Training Plus a Dietary Supplement Containing Mucopolysaccharides, or Passive Stretching Plus a Dietary Supplement Containing Mucopolysaccharides. Curr Ther Res 2016;78:1–7.	Duplicate
Blume CL. Comparison of an eccentric exercise intervention to a concentric exercise intervention in adults with subacromial impingement syndrome (Doctoral dissertation, Texas Woman's University). 2014:1-218.	Duplicate
Cannell LJ, Taunton JE, Clement DB, et al. A randomised clinical trial of the efficacy of drop squats or leg extension/leg curl exercises to treat clinically diagnosed jumper's knee in athletes: pilot study. Br J Sports Med 2001;35:60-64.	Duplicate
de Vos RJ, Weir A, van Schie HT, et al. Platelet-rich plasma injection for chronic Achilles tendinopathy. J - Am Med Assoc 2010;303:144–9.	Duplicate
Frohm A, Saartok T, Halvorsen K, et al. Eccentric treatment for patellar tendinopathy: a prospective randomised short-term pilot study of two rehabilitation protocols. Br J Sports Med 2007;41:e7.	Duplicate
Ganderton C, Semciw A, Cook J, et al. Gluteal loading versus sham exercises to improve pain and dysfunction in postmenopausal women with greater trochanteric pain syndrome: a randomized controlled trial. J Women's Heal 2018;27:815–29.	Duplicate
Heron SR, Woby SR, Thompson DP. Comparison of three types of exercise in the treatment of rotator cuff tendinopathy/shoulder impingement syndrome: A randomized controlled trial. Physiotherapy 2017;103:167–73.	Duplicate
Jensen B, Bliddal H, Danneskiold-Samsøe B. Comparison of two different treatments of lateral humeral epicondylitis--" tennis elbow". A randomized controlled trial. Ugeskr Laeg 2001;1:1427-31.	Duplicate
Jonsson P, Alfredson H. Superior results with eccentric compared to concentric quadriceps training in patients with jumper's knee: a prospective randomised study. Br J Sports Med 2005;39:847–50	Duplicate
Manias P, Stasinopoulos D. A controlled clinical pilot trial to study the effectiveness of ice as a supplement to the exercise programme for the	Duplicate

management of lateral elbow tendinopathy. Br J Sports Med 2006;40:81-85.	
Senbursa G, Baltacı G, Atay A. Comparison of conservative treatment with and without manual physical therapy for patients with shoulder impingement syndrome: a prospective, randomized clinical trial. Knee Surg Sports Traumatol Arthrosc. 2007;15:915-921.	Duplicate
Stergioulas A, Stergioula M, Aarskog R, et al. Effects of low-level laser therapy and eccentric exercises in the treatment of recreational athletes with chronic achilles tendinopathy. Am J Sports Med 2008;36:881–7.	Duplicate
Tumilty S, Baxter GD. Heavy load eccentric exercise for Achilles tendinopathy; too much of a good thing?. Physiotherapy 2015;101:e1546-1547.	Duplicate
van Ark M. Patellar tendinopathy: Physical therapy and injection treatments (Doctoral dissertation, University of Groningen).2015:1-136.	Duplicate
Walther M, Werner A, Stahlschmidt T, et al. The subacromial impingement syndrome of the shoulder treated by conventional physiotherapy, self-training, and a shoulder brace: results of a prospective, randomized study. J Shoulder Elbow Surg 2004;1:417-23.	Duplicate
Wetke E, Johannsen F, Langberg H. A hilles tendinopathy: A prospective study on the effect of active rehabilitation and steroid injections in a clinical setting. Scan J Med Sci Sports 2015;25:e392-399.	Duplicate
Aceituno-Gómez J, Avendaño-Coy J, Gómez-Soriano J, et al. Efficacy of high-intensity laser therapy in subacromial impingement syndrome: a three-month follow-up controlled clinical trial. Clin Rehabil 2019;33:894-903.	Insufficient exercise data
Akgün K, Birtane M, Akarirmak U. Is local subacromial corticosteroid injection beneficial in subacromial impingement syndrome? Clin Rheumatol 2004;23:496–500.	Insufficient exercise data
Akkaya N, Akkaya S, Gungor HR, et al. Effects of weighted and un-weighted pendulum exercises on ultrasonographic acromiohumeral distance in patients with subacromial impingement syndrome. J Back Musculoskelet Rehabil 2017;30:221-228.	Insufficient exercise data
Akkurt HE, Kocabas H, Yilmaz H, et al. Comparison of an epicondylitis bandage with a wrist orthosis in patients with lateral epicondylitis. Prosthet Orthot Int 2018;42:599–605.	Insufficient exercise data
Al Dajah SB. Soft tissue mobilization and PNF improve range of motion and minimize pain level in shoulder impingement. J Phys Ther Sci 2014;26:1803–5.	Insufficient exercise data
Alfredson H, Lorentzon R. Intratendinous glutamate levels and eccentric training in chronic Achilles tendinosis: a prospective study using microdialysis technique. Knee Surg Sports Traumatol Arthrosc 2003;11(3):196-199.	Insufficient exercise data
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Aytar A, Baltaci G, Uhl TL, et al. The effects of scapular mobilization in patients with subacromial impingement syndrome: a randomized, double-blind, placebo-controlled clinical trial. J Sport Rehabil 2015;24:116–29.	Insufficient exercise data
Bae YH, Lee GC, Shin WS, et al. Effect of motor control and strengthening exercises on pain, function, strength and the range of motion of patients with shoulder impingement, syndrome. Journal of Physical Therapy Science 2011;23:687-92.	Insufficient exercise data
Bal A, Eksioglu E, Gurcay E, et al. Low-level laser therapy in subacromial impingement syndrome. Photomed Laser Surg 2009;27:31–6.	Insufficient exercise data
Bang MD, Deyle GD. Comparison of supervised exercise with and without manual physical therapy for patients with shoulder impingement syndrome. J Orthop Sports Phys Ther 2000;30:126-137.	Insufficient exercise data
Barra López ME, López de Celis C, Fernández Jentsch G, et al. Effectiveness of Diacutaneous Fibrolysis for the treatment of subacromial impingement syndrome: a randomised controlled trial. Man Ther 2013;18:418–24.	Insufficient exercise data
Başkurt F, Özcan A, Algun C. Comparison of effects of phonophoresis and iontophoresis of naproxen in the treatment of lateral epicondylitis. Clin Rehabil 2003;17:96–100.	Insufficient exercise data
Başkurt Z, Başkurt F, Gelecek N, et al. The effectiveness of scapular stabilization exercise in the patients with subacromial impingement syndrome. J Back Musculoskelet Rehabil 2011;24:173-179.	Insufficient exercise data
Baumer TG, Peltz CD, Drake A, et al. Effects of Rotator Cuff Pathology and Physical Therapy on In Vivo Shoulder Motion and Clinical Outcomes in Patients With a Symptomatic Full-Thickness Rotator Cuff Tear. Orthop J Sports Med 2016;4: 2325967116666506.	Insufficient exercise data
Bisset L, Beller E, Jull G, et al. Mobilisation with movement and exercise, corticosteroid injection, or wait and see for tennis elbow: Randomised trial. Br Med J 2006;333:939–41.	Insufficient exercise data
Bisset L, Yelland M, Ryan M, et al. Testing the effectiveness of emerging injection therapies compared to physiotherapy for tennis elbow: a randomised control trial. Physiotherapy 2015;101:e155.	Insufficient exercise data
Bisset LM, Coppieters MW, Vicenzino B. Sensorimotor deficits remain despite resolution of symptoms using conservative treatment in patients with tennis elbow: A randomized controlled trial. Arch Phys Med Rehabil 2009;90:1–8.	Insufficient exercise data
Bostrøm K, Mæhlum S, Småstuen MC, et al. Clinical comparative effectiveness of acupuncture versus manual therapy treatment of lateral epicondylitis: feasibility randomized clinical trial. Pilot feasibility Stud 2019;5:110.	Insufficient exercise data
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Brox JI, Gjengedal E, Uppheim G, et al. Arthroscopic surgery versus supervised exercises in patients with rotator cuff disease (stage II impingement syndrome): a prospective, randomized, controlled study in 125 patients with a 2 1/2-year follow-up. J Shoulder Elbow Surg 1999;8:102-111.	Insufficient exercise data
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González PP, Brahim MB. Treatment of Shoulder Impingement Syndrome in Adolescent Tennis Players. / Tractament de la síndrome subacromial en tennistes adolescents. Apunt Educ Física i Esports 2018;132:32–47.	Insufficient exercise data
Granviken F, Vasseljen O. Home exercises and supervised exercises are similarly effective for people with subacromial impingement: a randomised trial. Journal of Physiotherapy 2015;61:135-141.	Insufficient exercise data
Grävare Silbernagel K, Crossley KM. A proposed return-to-sport program for patients with midportion Achilles tendinopathy: rationale and implementation. journal of orthopaedic & sports physical therapy. 2015 Nov;45(11):876-86.	Insufficient exercise data
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Kaux JF, Forthomme B, Namurois MH, et al. Description of a standardized rehabilitation program based on sub-maximal eccentric following a platelet-rich plasma infiltration for jumper's knee. Muscles Ligaments Tendons J 2014;4:85-89.	Wrong study design
Keene DJ, Soutakbar H, Hopewell S, et al. Development and implementation of the physiotherapy-led exercise interventions for the treatment of rotator cuff disorders for the 'Getting it Right: Addressing Shoulder Pain'(GRASP) trial. Physiotherapy 2020;1:252-266.	Wrong study design
Knobloch K, Schreibmueller L, Longo UG, Vogt PM. Eccentric exercises for the management of tendinopathy of the main body of the Achilles tendon with or without the AirHeel™ Brace. A randomized controlled trial. A: effects on pain and microcirculation. Disabil. Rehabil. 2008;30:1685-91.	Wrong study design
Knobloch K. Eccentric training in Achilles tendinopathy: is it harmful to tendon microcirculation?. Br. J. Sports Med.2007;41:1-5.	Wrong study design
Langberg H, Ellingsgaard H, Madsen T, et al. Eccentric rehabilitation exercise increases peritendinous type I collagen synthesis in humans with Achilles tendinosis. Scand J Med Sci Sports 2007 17:61-66.	Wrong study design
Lee DR, Kim LJ. Internal-and External-Rotation Peak Torque in Little League Baseball Players with Subacromial Impingement Syndrome: Improved by Closed Kinetic Chain Shoulder Training. J Sport Rehabil 2016;25:263-265.	Wrong study design
Littlewood C, Malliaras P, Mawson S, et al. Development of a self-managed loaded exercise programme for rotator cuff tendinopathy. Physiotherapy 2013; 1;99:358-362.	Wrong study design

Lyftogt J. Prolotherapy and Achilles tendinopathy: a prospective pilot study of an old treatment. Australas Musculoskelet Med 2005;10:17-19	Wrong study design
Macías-Hernández SI, García-Morales JR, Hernández-Díaz C, et al. Tolerance and effectiveness of eccentric vs. concentric muscle strengthening in rotator cuff partial tears and moderate to severe shoulder pain. A randomized pilot study. J Clin Orthop Trauma 2021; 1:106-112.	Wrong study design
Maffulli N, Walley G, Sayana MK, Longo UG, Denaro V. Eccentric calf muscle training in athletic patients with Achilles tendinopathy. Disabil. Rehabil. 2008;30:1677-84.	Wrong study design
Malliaras P, Cridland K, Hopmans R, et al. Internet and telerehabilitation-delivered management of rotator cuff–Related shoulder pain (INTEL trial): Randomized controlled pilot and feasibility trial. JMIR mHealth uHealth 2020;8:e24311.	Wrong study design
Miller P, Osmotherly P. Does scapula taping facilitate recovery for shoulder impingement symptoms? A pilot randomized controlled trial. J Man Manip Ther 2009; 1:6E-13E.	Wrong study design
Payne C. Clinical applications of shear wave elastography to achilles tendon imaging and the monitoring of a rehabilitation protocol for achilles tendinopathy (Doctoral dissertation, University of Brighton). 2018.109-187.	Wrong study design
Pearson SJ, Stadler S, Menz H, Morrissey D, Scott I, Munteanu S, Malliaras P. Immediate and short-term effects of short-and long-duration isometric contractions in patellar tendinopathy. Clin J Sport Med. 2020;30:335-340.	Wrong study design
Roddy E, Ogollah RO, Oppong R, Zwierska I, Datta P, Hall A, Hay E, Jackson S, Jowett S, Lewis M, Shufflebotham J. Optimising outcomes of exercise and corticosteroid injection in patients with subacromial pain (impingement) syndrome: a factorial randomised trial. Br. J. Sports Med. 2021;55:262-271.	Wrong study design
Røe C, Brox JI, Bøhmer AS, et al. Muscle activation after supervised exercises in patients with rotator tendinosis. Arch Phys Med Rehabil 2000;8:67-72.	Wrong study design
Sandford FM, Sanders TA, Wilson H, et al. A randomised controlled trial of long-chain omega-3 polyunsaturated fatty acids in the management of rotator cuff related shoulder pain. BMJ Open Sport Exerc Med 2018;4:e000414.	Wrong study design
Savoie A, Mercier C, Desmeules F, Frémont P, Roy JS. Effects of a movement training oriented rehabilitation program on symptoms, functional limitations and acromiohumeral distance in individuals with subacromial pain syndrome. Man Ther. 2015;20:703-8.	Wrong study design
Silbernagel KG, Thomeé R, Eriksson BI, et al. Full symptomatic recovery does not ensure full recovery of muscle-tendon function in patients with Achilles tendinopathy. Br J Sports Med 2007;41:276-280.	Wrong study design
Sosa C, Lorenzo A, Jimenez SL, et al. Eccentric exercise in treatment of patellar tendinopathy in high level basketball players. A randomised clinical trial [Abstract]. J Strength Cond Res 2014;28:1	Wrong study design

Stasinopoulos D, Stasinopoulos I. Comparison of effects of exercise programme, pulsed ultrasound and transverse friction in the treatment of chronic patellar tendinopathy. Clin Rehabil 2004;18:347-352.	Wrong study design
Tyler TF, Nicholas SJ, Schmitt BM, et al. Clinical outcomes of the addition of eccentrics for rehabilitation of previously failed treatments of golfers elbow. Int J Sports Phys Ther 2014;9:365-370	Wrong study design
Valera-Garrido F, Minaya-Muñoz F, Medina-Mirapeix F. Ultrasound-guided percutaneous needle electrolysis in chronic lateral epicondylitis: short-term and long-term results. Acupunct Med 2014;32(6):446-454.	Wrong study design
van Ark M, Rio E, Cook J, et al. Clinical improvements are not explained by changes in tendon structure on UTC following an exercise program for patellar tendinopathy. Am J Phys Med 2018;97:708-714.	Wrong study design
van Rensburg KJ, Atkins E. Does thoracic manipulation increase shoulder range of movement in patients with subacromial impingement syndrome? A pilot study. Int Musculoskelet Med 2012; 1:101-107.	Wrong study design
Worsley P, Warner M, Mottram S, et al. Motor control retraining exercises for shoulder impingement: effects on function, muscle activation, and biomechanics in young adults. J Shoulder Elbow Surg 2013;22:e11-9.	Wrong study design

Supplementary table 7B. Table of included studies (n=110)

Study (first author, year, country)	Design	Tendinopathy Location	Participants (number (n); sex (%female); mean (sd) age; mean (sd) symptom duration in months)	Exercise-Only Treatment arms	Dominant resistance treatment	Original Author Findings
Agregaard 2021 Denmark[1]	RCT	Patellar	N= 44 0%female Age 28.8 (5.1) Symptoms 6.9 (2.4) Training status Recreational	2	2* Concentric and eccentric	There were no statistically superior effect of exercising with high (90%) compared to moderate (55%) load magnitude on the mechanical, material or morphological properties.
Agregaard 2021 Denmark[2]	RCT	Patellar	N= 44 0%female Age 28.8 (5.1) Symptoms 6.9 (2.4) Training status Recreational	2	2* Concentric and eccentric	There was no superior effect of exercising with a high load magnitude (HSR) compared with a moderate load magnitude (MSR) for the clinical outcome, tendon structure, or tendon function in the treatment of patellar tendinopathy in the short term. Both HSR and MSR showed equally good, continued improvements in outcomes in the long term but did not reach normal values for healthy tendons.
Alfredson 1998 Sweden[3]	Quasi-experimental	Achillies	N= 30 % female 20.0 Age 44.0 (7.0) Symptoms 25.9 (3-100)** Training status Recreational	1	Eccentric only	Our treatment model with heavy-load eccentric calf muscle training has a very good short-term effect on athletes in their early forties
Alfredson 1999	Quasi-experimental	Achilles	N= 24 % female 14.3	1	Eccentric only	Heavy-loaded, eccentric calf-muscle training seems to be a good

Sweden[4]			Age 42.6 (9.0) Symptoms 23.7 (3-100)** Training status Recreational			treatment mode for chronic Achilles tendinosis.
Arias-Buría 2017 Spain[5]	RCT	RCRSP	N= 50 % female 26.0 Age 48.5 (5.5) Symptoms 71.9 (21.6) Training status Other	1	Concentric and eccentric	This study found that the inclusion of 2 sessions of TrP-DN into an exercise program was effective for improving shoulder pain-related disability at short-, medium-, and long-term; however, no greater improvement in shoulder pain was observed.
Arias-Buría 2015 Spain[6]	RCT	RCRSP	N= 36 % female 75.0 Age 57.5 (6.4) Symptoms 10.9 (2.6) Training status Other	1	Concentric and eccentric	Ultrasound-guided percutaneous electrolysis combined with eccentric exercises resulted in better short-term outcomes compared to eccentric exercises alone.
Bagcier 2021 Turkey[7]	RCT	RCRSP	N= 65 NR%female Age 57.5 (5.2) Symptoms NR Training status Other	1	Concentric and eccentric	Kinesiotaping was superior to sham-KT in terms of all parameters except pain. KT was also found to be as effective as conventional exercise in all parameters. In addition, ultrasound objectively revealed that the supraspinatus tendinitis can be reduced and acromiohumeral distance can be increased.
Bahr 2006 Norway[8]	RCT	Patellar	N= 40 % female 12.5 Age 30.5 (7.9) Symptoms 34 (28.7) Training status Other	1	Eccentric only	No added benefit was observed for surgical treatment to eccentric strength training. Eccentric training should be offered for 12 weeks before tenotomy is considered for the treatment of patellar tendinopathy.

Balius 2016 Spain[9]	RCT	Achilles	N=37 % female 20.4 Age 41.4 (11.7) Symptoms NR Training status Other	6	3*Eccentric only	Findings confirmed the therapeutic potential of eccentric exercise at reactive and degenerative stages of tendinopathy. MCVC supplementation decreased pain more than eccentric exercise alone (reactive tendinopathy) Personalized stretching regime supplemented with MCVC may be appropriate for some patients
Berg 2021 Norway[10]	RCT	RCRSP	N= 21 47.6%female Age 48.5 (13) Symptoms 43 (57.5) Training status Other	1	Concentric and eccentric	HIIT rotator cuff exercise seems to be a feasible intervention in subacromial pain syndrome, increasing endurance performance more than usual care alone.
Beyer 2015 Denmark[11]	RCT	Achilles	N= 58 % female 31.9 Age 48.0 (2.0) Symptoms 18.1 (4.3) Training status Other	2	Eccentric only; Concentric and eccentric	Both traditional eccentric exercise and HSR yield positive, equally good and lasting clinical results in patients with Achilles tendinopathy. HSR is associated with greater patient satisfaction after 12 weeks but not after 52 weeks.
Blume 2015 United States[12]	RCT	RCRSP	N= 34 % female 58.0 Age 49.4 (15.6) Symptoms 22.7 (24.3) Training status Other	2	Concentric only; Eccentric only	Both eccentric and concentric PRE programs resulted in improved function, AROM, and strength in patients with SAIS. However, no difference was found between the two exercise modes, suggesting that therapists may use exercises that utilize either exercise mode in their treatment of SAIS.
Boudreau 2019 Canada[13]	RCT	RCRSP	N= 42 % female 52.4 Age 42.9 (12.0)	2	2*Concentric and eccentric	No additional benefit was found to adding coactivation to regular rotator cuff strengthening exercises at 6-weeks.

			Symptoms 43.0 (46.6) Training status Other			
Breda 2022 Netherlands[14]	RCT	Patellar	N= 76 23.7%female Age 26.5 (3.5) Symptoms NR Training status Recreational	2	Concentric and eccentric; Eccentric only	Patellar tendon stiffness, assessed with shear-wave elastography, is unsuitable to use as a single predictive measurement for clinical outcome. Decreasing stiffness during the course of exercise therapy is associated with improved clinical outcome in athletes recovering from patellar tendinopathy.
Breda 2020 Netherlands[15]	RCT	Patellar	N= 76 % female 23.7 Age 24 (3.9) Symptoms 98.5 (NR) Training status Performance	2	Isometric; Eccentric only	In patients with patellar tendinopathy, progressive tendon-loading exercises resulted in a significantly better clinical outcome after 24 weeks than eccentric exercise therapy. Progressive tendon-loading exercises are superior to eccentric exercise therapy and are therefore recommended as initial conservative treatment for patellar tendinopathy.
Chaconas 2017 United States[16]	RCT	RCRSP	N=46 % female 41.7 Age 45.9 (17.4) Symptoms 49.1 (80) Training status Other	2	Eccentric only	An eccentric program targeting the external rotators was superior to a general exercise program for strength, pain, and function after six months. The findings suggest eccentric training may be efficacious to improve self-report function and strength for those with SAPS.
Cheng 2007	RCT	RCRSP	N=94 % female Age 32.4 (10.2)	2	2*Concentric and eccentric	An eccentric program targeting the external rotators was superior to a general exercise program for

Hong Kong, China (SAR)[17]			Symptoms 23.4 Training status Other			strength, pain, and function after six months. The findings suggest eccentric training may be efficacious to improve self-report function and strength for those with subacromial pain syndrome.
Cho 2017 Korea (Republic of)[18]	Quasi-experimental	Patellar	N= 30 % female 46.7 Age 33.1 (29.1) Symptoms 15.1 (16.1) Training status Other	1	Eccentric only	A rehabilitation exercise programme was more effective at improving pain, strength and function in patellar tendinopathy that injection therapy alone.
Christiansen 2021 Denmark[19]	RCT	RCRSP	N= 208 54.3%female Age 52.3 (12) Symptoms 19 (6.3) Training status Other	3	Concentric and eccentric	In people with subacromial pain, group-based exercise, individually supervised exercise and home-based supervised exercise regimens have similar benefits. The home exercise intervention was associated with lowest costs.
Corum 2021 Turkey[20]	RCT	Lateral elbow/tennis elbow	N= 50 60%female Age 43 (7.6) Symptoms 12 (13.6) Training status Other	1	Eccentric only	The radial extracorporeal shock wave therapy seems to provide no significantly superior benefit than supervised exercises with neuromuscular inhibition at least until the three months in the treatment of LE.
de Jonge 2008 Netherlands[21]	RCT	Achilles	N= 70 % female NR Age 44.6 (26-59) ** Symptoms 30.7 (2-204) ** Training status Other	1	Eccentric only	Eccentric exercises with or without a night splint improved functional outcome at one year follow-up. At follow-up there was no significant difference in clinical outcome when a night splint was used in addition to an eccentric exercise.

de Vos 2007 Netherlands[22]	RCT	Achilles	N= 63 % female 41.3 Age 44.6 (8) Symptoms 30.6 (50.6) Training status Recreational	1	Eccentric only	A night splint has no added benefit to eccentric exercises in the treatment of chronic midportion Achilles tendinopathy. There was no significant difference between the two groups in VISA-A score and patient satisfaction.
Dejaco 2017 Netherlands[23]	RCT	RCRSP	N=36 % female 47.3 Age 49.5 (11.3) Symptoms 19.7 (20.1) Training status Other	2	Eccentric only; Concentric and eccentric	12-week-isolated eccentric training programme of the RC is beneficial for shoulder function and pain after 26 weeks in patients with RC tendinopathy. However, it is no more beneficial than a conventional exercise programme for the RC and scapular muscles.
Dimitrios 2012 Greece[24]	Quasi-experimental	Patellar	N= 60 % female 36.7 Age 47.6 (5.9) Symptoms 4.5 (NR) Training status Other	2	Eccentric only	Eccentric training and static stretching exercises is superior to eccentric training alone to reduce pain and improve function in patients with patellar tendinopathy at the end of the treatment and at follow-up.
Dimitrios 2013 Greece[25]	Quasi-experimental	Lateral elbow/tennis elbow	N= 60 36.7% female Age 47.5 (5.9) Symptoms NR Training status Other	2	Eccentric only, Isometric	Both supervised and home exercise programmes were found to be significantly effective in reducing pain and improving functional status. A specific supervised exercise programme was superior to a specific home exercise programme in reducing pain and improving function in patients with LET at the end of the treatment and at the 3 month follow-up.
Dogan 2021 Turkey[26]	RCT	RCRSP	N= 40 57.5%female Age 46 (7.9) Symptoms 10.25 (8.4)	1	Concentric and eccentric	Our results suggest that both PT and corticosteroid injection have beneficial effects on shoulder mobility and pain relief in SIS. PT should be an alternative and

			Training status Other			effective treatment method to corticosteroid injection in SIS.
Dupuis 2018 Canada[27]	RCT	RCRSP	N=43 % female 55.8 Age 33.3 (11.7) Symptoms 0.9 (0.3) Training status Other	2	Isometric	Both groups showed statistically significant improvements on symptoms and function at 2 weeks and 6 weeks but there was no difference between the short-term effect of cryotherapy and a gradual reloading exercise programme.
Eliason 2021 Sweden[28]	RCT	RCRSP	N= 120 50.8%female Age 44.9 (9.4) Symptoms 5.2 (3.6) Training status Other	1	Concentric and eccentric	In patients with subacromial pain syndrome guided exercises improved shoulder function compared with no treatment. Add-on joint mobilization decreased pain in the short-term compared with exercise alone or no treatment.
Ganderton 2018 Australia[29]	RCT	Gluteal	N=90 %female 100 Age 61.83 (7.81) Symptoms NR Training status Other	2	Concentric and eccentric	Lack of treatment effect was found with the addition of an exercise program to a comprehensive education on GTPS management. The improved outcomes of the responders in the GLoBE group indicate that there may be a subgroup of patients with a GTPS diagnosis that benefit from a GLoBE intervention program.
Gatz 2020 Germany[30]	RCT	Achilles	N= 42 % female 35.7 Age 50.0 (12.0) Symptoms 27.5 (23.8) Training status Other	2	Eccentric only; Isometric	No additional clinical benefits of adding ISOs to a basic EE program could be found in this preliminary randomized controlled trial study over a period of 3 months. SWE was able to differentiate between insertional and midportion tendon tissue and localize reported symptoms to sublocations but this did not correlate with better clinical scores

						(VISA-A) over a 3-month follow-up period.
Giray 2019 Turkey[31]	RCT	Lateral elbow/tennis elbow	N= 30 % female 86.7 Age 44.46 (9.92) Symptoms 1.69 (NR) Training status Other	1	Eccentric only	Kinesiotaping in addition to exercises is more effective than sham taping and exercises alone in improving pain in daily activities and arm disability due to lateral epicondylitis.
Habets 2021 Netherlands[32]	RCT	Achilles	N= 40 %female Age 44.9 (9) Symptoms 9.4 (8.2) Training status Recreational	2	Eccentric only; Concentric and eccentric	No differences in clinical effects were found between Alfredson and Silbernagel loading at up to 1-year follow-up. Both programs significantly improved clinical symptoms, and given their high adherence rates, offering either of them as a homebased program with limited supervision appears to be an effective treatment strategy for midportion AT.
Hallgren 2014 Sweden[33]	RCT	RCRSP	N= 50 % female 37.0 Age 52 (30-65)** Symptoms 18 (6-186)* Training status Other	2	Eccentric only	Specific exercises produced positive short-term improvements at 1-year follow-up and reduces the need for surgery. Full-thickness tear and a low CMS score appear to be predictors of poor outcome.
Hallgren 2017 Sweden[34]	RCT	RCRSP	N= 108 % female 34.1 Age 58 (NR) Symptoms NR Training status Other	2	Concentric and eccentric	More patients in the specific exercise group managed to avoid surgery compared to the unspecific exercise group at 5-year follow-up supporting it's prescription as an initial treatment for patients with subacromial pain.
Heron 2017	RCT	RCRSP	N= 120 % female 41.0 Age 49.9 (NR)	3	2*Concentric and eccentric	Open chain, closed chain, and range of movement exercises all seem to be effective in bringing

United Kingdom[35]			Symptoms NR Training status Other			about short-term changes in pain and disability in patients with rotator cuff tendinopathy.
Hopewell 2021 United Kingdom[36]	RCT	RCRSP	N= 708 49.3%female Age 55.5 (13.1) Symptoms 4.3 (0.5) Training status Other	2	Concentric and eccentric	Progressive exercise was not superior to a best-practice advice session with a physiotherapist. Subacromial corticosteroid injection improved shoulder pain and function, but provided only modest short-term benefit. Best-practice advice in combination with corticosteroid injection was expected to be most cost-effective, although there was substantial uncertainty
Hotta 2020 Brazil[37]	RCT	RCRSP	N=60 % female 70 Age 49 (9) Symptoms 28.5 (24) Training status Other	2	Concentric and eccentric	The inclusion of the isolated scapular stabilization exercises, emphasizing retraction and depression of the scapula, to a progressive general periscapular strengthening protocol did not add benefits to self-reported shoulder pain and disability, muscle strength, and ROM in patients with subacromial pain syndrome.
Johansson 2005 Sweden[38]	RCT	RCRSP	N=85 % female 69.4 Age 49 (7.5) Symptoms NR Training status Other	1	Isometric	Acupuncture was more effective than ultrasound when applied in addition to home exercises.
Jonsson 2005 Sweden[39]	RCT	Patellar	N= 15 % female 13.3 Age 24.9 (8.2) Symptoms 17.5 (13.2)	2	Eccentric only; Concentric only	Eccentric, but not concentric, quadriceps training on a decline board, seems to reduce pain in jumper's knee.

			Training status Performance			
Ketola 2009 Finland[40]	RCT	RCRSP	N=134 % female 62.9 Age 47.1(23.3-60.0)** Symptoms 2.6 (NR) Training status Other	1	Concentric and eccentric	Arthroscopic acromioplasty provides no clinically important effects over a structured and supervised exercise programme alone in terms of subjective outcome or cost-effectiveness when measured at 24 months.
Knobloch 2008 Italy[41]	RCT	Achilles	N= 92 % female 35.0 Age 47.5 (11.0) Symptoms NR Training status Recreational	1	Eccentric only	Patients with tendinopathy of the main body of the AT experienced improved clinical outcome with both management options. Although tendon microcirculation was optimized in the combined group of eccentric training and AirHeel Brace, these micro-vascular advantages do not translate into superior clinical performance when compared with eccentric training alone.
Knobloch 2007 Germany[42]	RCT	Achilles	N= 20 % female 45.0 Age 32.5 (11.0) Symptoms NR Training status	1	Eccentric only	An eccentric-training program performed daily over 12 weeks reduced the increased paratendinous capillary blood flow in Achilles tendinopathy by as much as 45% and decreased pain level based on a visual analog scale. Local paratendon oxygenation was preserved while paratendinous postcapillary venous filling pressures were reduced after 12 weeks of eccentric training, which appears to be beneficial from the perspective of microcirculation.
Knobloch 2007	RCT	Achilles	N= 118 % female 40	1	Eccentric only	Achilles tendon oxygen saturation is increased, and capillary venous

Germany[43]			Age 48.5 (12) Symptoms NR Training status Other			clearance facilitated using an Achilles wrap in addition to daily 12-week eccentric training
Kongsgaard 2009 Denmark[44]	RCT	Patellar	N= 37 % female 0 Age 32.4 (8.8) Symptoms 18.7 (12.3) Training status Recreational	2	Eccentric only; Concentric and eccentric	Corticosteroid injection has good short-term but poor long-term clinical effects, in patellar tendinopathy. Heavy-slow resistance exercise has good short- and long-term clinical effects accompanied by pathology improvement and increased collagen turnover.
Kromer 2014 Germany[45]	RCT	RCRSP	N= 90 % female 51.1 Age 51.8 (11.2) Symptoms 24.1 (35.1) Training status Other	1	Concentric and eccentric	The use of MT including Physiotherapy provides no additional benefits and is more expensive in comparison to exercise only interventions.
Kromer 2013 Germany[46]	RCT	RCRSP	N= 90 % female 51.1 Age 51.8 (11.2) Symptoms 7.8 (9.8) Training status Other	1	Concentric and eccentric	Individually adapted exercises were effective in the treatment of patients with shoulder impingement syndrome. Individualized manual Physiotherapy contributed only a minor amount to the improvement in pain intensity.
Littlewood 2016 United Kingdom[47]	RCT	RCRSP	N= 60 % female 50.3 Age 54.7 (NR) Symptoms 14.6 (NR) Training status Other	1	Concentric and eccentric	Self-management programme based on a single exercise were comparable to usual Physiotherapy in the short-, mid- and long-term.

Luginbuhl 2008 Switzerland[48]	RCT	Lateral elbow/tennis elbow	N= 30 % female 72.7 Age 47 (9) Symptoms 10 (11) Training status Other	1	Isometric	No beneficial effect of neither the forearm support band nor the strengthening exercises could be found.
Maenhout 2013 Belgium[49]	RCT	RCRSP	N= 61 % female 59.0 Age 39.8 (13.0) Symptoms NR Training status Other	2	Concentric and eccentric; Eccentric only	Adding heavy load eccentric training resulted in a higher gain in isometric strength at 90 degree of scapular abduction but was not superior for decreasing pain and improving shoulder function. The addition of a limited amount of Physiotherapy sessions combined with a daily home exercise programme is highly effective in patients with impingement.
Mafi 2001 Sweden[50]	RCT	Achilles	N= 44 % female 45.5 Age 48.3 (8.8) Symptoms 20.5 (3-120)** Training status Other	2	Eccentric only; Concentric only	Eccentric calf muscle training showed superior results to concentric training in the treatment of chronic Achilles tendinosis based on patient satisfaction and return to activity level.
Manias 2006 United Kingdom[51]	RCT	Lateral elbow/tennis elbow	N= 40 % female 67.5 Age 42.86 (6.23) Symptoms NR Training status Other	2	2*Eccentric only	An exercise programme consisting of eccentric and static stretching exercises had reduced the pain in patients with lateral epicondyle tendinopathy at the end of the treatment and at the follow up whether or not ice was included.
Martinez-Silvestrini 2005 United States[52]	Quasi-experimental	Lateral elbow/tennis elbow	N= 81 % female 46.8 Age 45.5 (7.7) Symptoms NR Training status Other	3	Concentric only; Eccentric only	Eccentric strengthening for the wrist extensors in subjects with lateral epicondylitis demonstrated improvement at six weeks but was not statistically different from that achieved with a conservative

						program with stretching or a concentric strengthening program.
Marzetti 2014 Italy[53]	RCT	RCRSP	N= 48 % female 61.4 Age 62.1 (12.5) Symptoms NR Training status Other	2	Concentric and eccentric	Neurocognitive rehabilitation is effective in reducing pain and improving function in patients with shoulder impingement syndrome, with benefits maintained for at least 24 weeks.
McCormack 2016 United States[54]	RCT	Achilles	N= 15 % female 68.8 Age 53.6 (38-69)** Symptoms 9.9 (NR) Training status Other	1	Eccentric only	Soft tissue treatment (Astym) plus eccentric exercise was more effective than eccentric exercise alone at improving function during both short- (26 weeks) and long-term (52 weeks) follow-up periods.
Mulligan 2016 United States[55]	RCT	RCRSP	N=50 % female 65 Age 50.1 (10.7) Symptoms 7.9 (7.4) Training status Other	1	Concentric and eccentric	Patients with SAIS demonstrate improvement in pain and function with a standardized program of physical therapy regardless of group exercise sequencing.
Nørregaard 2007 Denmark[56]	RCT	Achilles	N= 35 % female 49.0 Age 42.0 (2.0)*** Symptoms 28.4 (8.8)*** Training status Other	2	Eccentric only	Symptoms gradually improved during the 1-year follow-up period and were significantly better assessed by pain and symptoms after 3 weeks and all later visits. However, no significant differences could be observed between the two groups.
Nowotny 2018 Germany[57]	RCT	Lateral elbow/tennis elbow	N= 31 % female 57 Age 46 (NR) Symptoms NR Training status Other	1	Eccentric only	The use of an elbow orthosis appears to reduce pain and improve other subjective outcome measures. However, the long-term results do not appear to be any

						greater than those received through Physiotherapy alone.
Østerås 2010 Norway[58]	RCT	RCRSP	N=61 % female 20.5 Age 43.9 (13) Symptoms 40.2 (56.3) Training status Other	2	2*Concentric and eccentric	In long-term subacromial pain syndrome, high dosage medical exercise therapy is superior to a conventional low dosage exercise programme
Park 2010 Korea (Republic of)[59]	RCT	Lateral elbow/tennis elbow	N=31 % female 61.3 Age 50.2 (34-63)** Symptoms 6.3 (2-17)** Training status NR	1	Isometric	Isometric strengthening exercises done early in the course of LE (within 4 weeks) provides a clinically significant improvement.
Pearson 2012 New Zealand[60]	RCT	Patellar	N= 40 % female 62.5 Age 50.0 (8.2) Symptoms 11.0 (10.0) Training status Other	1	Eccentric only	There is some evidence for small short-term symptomatic improvements with the addition of autologous blood injection to standard treatment for Achilles tendinopathy.
Pearson 2018 Australia[61]	RCT	Achilles	N= 16 % female 0 Age 28 (4.25) Symptoms 34.17 (1.95) Training status Performance	2	2* Isometric	Pain was significantly reduced after isometric loading on both SLDS and hop tests. Pain and quadriceps function improved over the 4 weeks. Short-duration isometric contractions are found to be as effective as longer duration contractions for relieving patellar tendon pain when total time under tension is equalized.
Pekyavas 2016	RCT	RCRSP	N=70 % female NR	1	Concentric and eccentric	HILT and MT were found to be more effective in reducing pain and

Turkey[62]			Age 47.1 (13.8) Symptoms NR Training status Other			disability and improving ROM in patient with SAIS.
Petersen 2007 Germany[63]	RCT	Achilles	N= 86 % female 40.0 Age 42.5 (11.1) Symptoms 7.4 (2.3) Training status Recreational	1	Eccentric only	The AirHeel brace is as effective as eccentric training in the treatment of chronic Achilles tendinopathy. There is no added benefit to combining both treatments.
Peterson 2011 Sweden[64]	RCT	Lateral elbow/tennis elbow	N= 81 % female 42 Age 48.25 (8.35) Symptoms 23.3 (35.9) Training status Other	2	Concentric and eccentric	Exercise appears to be superior to the control group in reducing pain in chronic lateral epicondylosis.
Peterson 2014 Sweden[65]	RCT	Lateral elbow/tennis elbow	N= 120 % female 47.5 Age 47.9 (8.1) Symptoms NR Training status Other	1	Eccentric only; Concentric only	Eccentric graded exercise reduced pain and increased muscle strength in chronic tennis elbow more effectively than concentric graded exercise at follow-up. However, there were no significant differences in function or quality of life measures between the two groups.
Praet 2019 Australia[66]	RCT	Achilles	N= 20 % female 35.0 Age 43.7 (7.9) Symptoms 54 (90) Training status Recreational	1	Eccentric only	Oral supplementation of specific collagen peptides may accelerate the clinical benefits of a well-structured calf-strengthening and return-to-running programme in patients with chronic Achilles tendinopathy.
Rabusin 2020 Australia[67]	RCT	Achilles	N= 100 % female 52.0 Age 45.85 (9.4)	1	Eccentric only	In adults with mid-portion Achilles tendinopathy, heel lifts were more effective than calf muscle eccentric

			Symptoms 20.25 (NR) Training status Other			exercise in reducing pain and improving function at 12 weeks.
Rabusin 2021 Australia[68]	RCT	Achilles	N= 100 52%female Age 45.9 (9.4) Symptoms 20.9 (6.5) Training status Other	1	Eccentric only	In adults with mid-portion Achilles tendinopathy, heel lifts were more effective than calf muscle eccentric exercise in reducing pain and improving function at 12 weeks. However, there is uncertainty in the estimate of effect for this outcome and patients may not experience a clinically worthwhile difference between interventions.
Rio 2017 Australia[69]	RCT	Patellar	N= 20 % female 10.0 Age 22.5 (4.7) Symptoms NR Training status Performance	2	Concentric and eccentric; Isometric	Both isometric and isotonic contraction protocols appear efficacious for in-season athletes to reduce pain, however, isometric contractions demonstrated significantly greater immediate analgesia throughout the 4-week trial.
Romero-Morales 2020 Spain[70]	RCT	Achilles	N= 61 % female 26 Age 41.6 (8.7) Symptoms 4.25 (3.5) Training status Other	2	Eccentric only	Authors encourage the use of vibration with respect to cryotherapy added to eccentric exercise programs in order to enhance multifidus cross-sectional area in addition to lower limb functionality in individuals who suffer from chronic non-insertional AT.
Rompe 2007 Germany[71]	RCT	Achilles	N= 75 % female 61.3 Age 48.5 (10.6) Symptoms 10.8 (8.5) Training status Other	1	Eccentric only	At 4-month follow-up, eccentric loading and low-energy shock-wave therapy showed comparable results. The wait-and-see strategy was ineffective for the management of chronic recalcitrant Achilles tendinopathy.

Rompe 2009 Germany[72]	RCT	Achilles	N= 68 % female 55.9 Age 49.7 (9.9) Symptoms 14.5 (6.0) Training status Other	1	Concentric and eccentric	The likelihood of recovery after 4 months was higher after a combined approach of both eccentric loading and shock-wave therapy compared to eccentric loading alone.
Rompe 2009 Germany[73]	RCT	Gluteal (including GTPS)	N= 68 % female 55.9 Age 49.7 (9.9) Symptoms 14.5 (6) Training status Other	1	Eccentric only	Both corticosteroid injection and home training were significantly less successful than was shock wave therapy at 4-month follow-up. Corticosteroid injection was significantly less successful than was home training or shock wave therapy at 15-month follow-up.
Rompe 2008 Germany[74]	RCT	Achilles	N= 50 % female 60.0 Age 39.8 (11) Symptoms 25.55 (9.45) Training status Other	1	Eccentric only	Eccentric loading as applied in the present study showed inferior results to low-energy shock wave therapy as applied in patients with chronic recalcitrant tendinopathy of the insertion of the Achilles tendon at four months follow-up.
Roos 2004 Sweden[75]	RCT	Achilles	N= 44 % female 52.3 Age 45 (26-60)** Symptoms 5.5 (1-180)* Training status Recreational	1	Eccentric only	Eccentric exercises reduce pain and improve function in patients with Achilles tendinopathy.
Ruffino 2021 Argentina[76]	RCT	Patellar	N= 41 2.4%female Age 29.6 (7) Symptoms 13.4 (10.8) Training status	2	Concentric and eccentric; Isokinetic	Inertial flywheel resistance three times a week during 12 weeks resulted in similar pain and function benefit at 12 weeks compared with the heavy slow resistance training among people

			Recreational			with patellar tendinopathy. Flywheel training is another exercise option for managing people with patellar tendinopathy.
Sahbaz 2021 Turkey[77]	RCT	Lateral elbow/tennis elbow	N= 74 81%female Age 49.7 (7.6) Symptoms NR Training status Other	1	Eccentric only	In the treatment of chronic LE, platelet-rich plasma combined with exercise seems to be superior to exercise or extracorporeal shock wave therapy in terms of pain and functionality in chronic LE patients.
Schydlowsky 2022 Denmark[78]	RCT	RCRSP	N= 126 48.4%female Age 61 (13.2) Symptoms NR Training status Other	2	Concentric and eccentric	We found no significant difference between a comprehensive supervised training regimen including heavy training principles, and a home-based training program in patients with SIS.
Şenbursa 2011 Turkey[79]	RCT	RCRSP	N= 47 % female NR Age 49.0 (9.3) Symptoms NR Training status Other	2	2*Concentric and eccentric	Supervised exercise, supervised and MT, and home-based exercise are all effective and promising treatments for patients with subacromial impingement syndrome. The addition of an initial MT may improve outcomes with exercise.
Sevier 2015 United States[80]	RCT	Lateral elbow/tennis elbow	N= 90 % female 57.9 Age 46.95 (6.55) Symptoms NR Training status Other	1	Eccentric only	Astym therapy is an effective treatment option for patients with LE tendinopathy, as an initial treatment, and after an eccentric exercise program has failed.
Shim 2007 Korea[81]	RCT	Lateral elbow/tennis elbow	N= 63 %female Age 51.1 (8.5) Symptoms 12.5 (21.7) Training status	1	Isometric	Polydeoxyribonucleotide injections combined with EX exhibited a greater improvement in mean , Mayo elbow performance score and mean common extensor tendon depth compared to EX

			Other			only or EX combined with extracorporeal shockwave therapy for LE within the 12 weeks follow-up.
Silbernagel 2007 Sweden[82]	RCT	Achilles	N= 38 % female 47.4 Age 46.0 (8.0) Symptoms 36.2 (66.5) Training status Other	2	2*Concentric and eccentric	Our treatment protocol which gradually increases the load on the Achilles tendon and calf muscle, demonstrated significant improvements. Continuing tendon loading activity such as running and jumping with the use of a pain-monitoring model did not have any adverse effect.
Silbernagel 2001 Sweden[83]	RCT	Achilles	N= 47 % female 22.5 Age 44.0 (12.5) Symptoms 30.5 (40.7) Training status Recreational	2	2*Concentric and eccentric	The eccentric overload protocol used in the present study can be recommended for patients with chronic pain from the Achilles tendon. More patients achieved full recovery, improved pain and ROM in the Exp group compared to the control group.
Şimşek, 2013 Turkey[84]	RCT	RCRSP	N= 38 % female 65.8 Age 51.0 (18-69)** Symptoms NR Training status Other	1	Isokinetic	Findings were inconclusive and require further research.
Slider 2013 United States[85]	RCT		N=24 %female 79.2 Age 24.0 (9.0) Symptoms NR Training status Recreational	2	Isokinetic; Concentric and eccentric	In general, subjects with an acute hamstring strain injury treated with either the PATS or PRES rehabilitation program demonstrated a similar degree of muscle recovery at the time of return to sport. Despite this, there were no subjects who exhibited complete resolution of injury on MRI, and 2 of the 4 subjects who

						reinjured themselves did so within the first 2 weeks after return to sport.
Solomons 2020 Canada[86]	RCT	Achilles	N= 52 46%female Age 48 (7) Symptoms 18 (15) Training status Other	3	Eccentric only	The addition of intramuscular stimulation to standard rehabilitation for Achilles tendinopathy did not result in any improvement over the expected clinical benefit achieved with exercisebased rehabilitation alone.
Stasinopoulos 2017 Cyprus[87]	RCT	Lateral elbow/tennis elbow	N= 34 % female 55.8 Age 43.7 (4.6) Symptoms 6 (NR) Training status Recreational	3	Eccentric only; 2*Concentric and eccentric	Eccentric training, eccentric-concentric training, and eccentric-concentric training combined with isometric contraction reduced pain and improved function at the end of the treatment and follow-up. The eccentric-concentric training combined with isometric contraction produced the largest effect at the end of the treatment and follow-up.
Stasinopoulos 2006 Greece[88]	Quasi-experimental	Lateral elbow/tennis elbow	N= 75 % female 38.6% Age 40.3 (5.8) Symptoms 5 (NR) Training status Other	1	Eccentric only	Cyriax Physiotherapy, a supervised exercise programme, and polarized polychromatic non-coherent light reduced pain and improved function at the end of the treatment and at any of the follow-up time points. The supervised exercise programme produced the largest effect in the short, intermediate and long term.
Stasinopoulos 2010 Greece[89]	Quasi-experimental	Lateral elbow/tennis elbow	N= 70 % female 52.9 Age 45.1 (5.8) Symptoms 5 (NR) Training status NR	2	2*Eccentric only	Supervised exercise programme is superior to home exercise programme to reduce pain and improve function in patients with LET at the end of the treatment and at the follow-up.

Stasinopoulos 2013 Greece[90]	RCT	Lateral elbow/tennis elbow	N= 60 % female 36.7 Age 48.0 (5.9) Symptoms 4.5 (NR) Training status Other	2	Isometric; Eccentric only	A specific supervised exercise programme is superior to a specific home exercise programme in reducing pain and improving function in patients with lateral epicondyle tendinopathy at the end of the treatment and at the 3 month follow-up.
Stefansson 2019 Iceland[91]	RCT	Achilles	N= 58 % female 20.0 Age NR Symptoms NR Training status Other	1	Eccentric only	Similar results for pressure massage and eccentric exercise. Combining pressure massage and eccentric exercise did not improve outcomes
Steunebrink 2013 Netherlands[92]	RCT	Patellar	N= 33 % female 24.2 Age 32.9 (10) Symptoms 11 (8) Training status Recreational	1	Resistance	Continuous topical GTN treatment in addition to an eccentric exercise programme does not improve clinical outcome compared to placebo patches and an eccentric exercise programme in patients with chronic patellar tendinopathy.
Stevens 2014 United Kingdom[93]	RCT	Achilles	N= 28 % female 60.7 Age 48.7 (10.8) Symptoms 7.4 (4.0) Training status Other	2	2*Eccentric only	Performing a 6-week do-as-tolerated program of eccentric heel-drop exercises compared to the recommended 180 repetitions per day, did not lead to lesser improvement for individuals with midportion Achilles tendinopathy, based on VISA-A and VAS scores.
Svernlov 2001 Sweden[94]	Quasi-experimental	Lateral elbow/tennis elbow	N= 57 % female 61.3 Age 50.15 (NR) Symptoms 6.3 (NR) Training status Other	1	Eccentric only	Significant improvements observed for VAS and grip strength warrants clinical use of this regime.
Tonks 2007	RCT	Lateral elbow/tennis elbow	N= 34 % female NR Age 44.3 (7.1)	1	Isometric	Patients who received steroid injection were statistically significantly better for all outcome

United Kingdom[95]			Symptoms NR Training status Other			measures at follow up. No statistically significant effect of Physiotherapy nor interaction between Physiotherapy and injection was found.
Turgut 2017 Turkey[96]	RCT	RCRSP	N= 30 % female 46.7 Age 36.45 (17.5) Symptoms 6.28 (5.4) Training status Other	2	2*Concentric and eccentric	Progressive exercise training independent from specific scapular stabilization exercises provides decreased disability and pain severity in impingement syndrome. All groups showed improvement, however, there were no significant differences between the groups.
Vallés-Carrascosa 2018 Spain[97]	RCT	RCRSP	N= 22 % female 54 Age 59.0 (58.5-70.0)* Symptoms Training status Other	2	2*Eccentric only	Both rotator cuff eccentric exercise protocols with scapular stabilising and stretching of upper trapezius were equally effective in improving pain, function, and active ROM in the short-term in patients with subacromial syndrome.
vanArk 2016 Australia[98]	RCT	Patellar	N= 19 % female 6.9 Age 23 (4.7) Symptoms 35.8 (33.8) Training status Recreational	2	Isometric; Concentric and eccentric	This study found favourable results for athletes with patellar tendinopathy without modification of the training. Both isometric and isotonic exercise programs reduced pain and improve function in athletes with patellar tendinopathy during a season.
Vinuesa-Montoya 2017 Spain[99]	RCT	RCRSP	N= 40 % female 26.8 Age 47.0 (9.0) Symptoms 6.2 (3.8) Training status Other	1	Concentric and eccentric	Cervicothoracic manipulative treatment with mobilisation plus exercise therapy may improve intensity of pain and ROM compared with home exercise alone.
Visnes 2005 Norway[100]	RCT	Patellar	N= 29 % female 38.5 Age 26.58 (NR)	1	Eccentric only	There was no effect on knee function (VISA) from a 12-week program with eccentric training

			Symptoms 73.6 (62.3) Training status Performance			among a group of volleyball players with patellar tendinopathy who continued to train and compete during the treatment period. Whether the training would be effective if the patients did not participate in sports activity is not known.
Vuvan 2019 Australia[101]	RCT	Lateral elbow/tennis elbow	N= 39 % female 28 Age 48.5 (9) Symptoms 4 (NR) Training status Other	2	Isometric	Unsupervised isometric exercise was effective in improving pain and disability, but not perceived rating of change and pain-free grip strength when compared with wait-and-see at 8 wk. With only one of the three primary outcomes being significantly improved, it is doubtful if isometric exercises can be an efficacious standalone treatment.
Walther 2004 Germany[102]	RCT	RCRSP	N= 60 % female 43.3 Age 50.7 (NR) Symptoms 27.3 (NR) Training status Other	2	Isometric	There were no statistically significant differences among the groups. Guided self-training can lead to results similar to those of conventional Physiotherapy.
Wegener 2016 Australia[103]	RCT	Lateral elbow/tennis elbow	N= 40 % female 70 Age 49.52 (8.09) Symptoms NR Training status NR	1	Eccentric only	Whilst all groups improved on key outcomes, it is possible that exercise alone and/or natural recovery were responsible for improvements.
Wen 2011 United States[104]	RCT	Lateral elbow/tennis elbow	N= 28 % female 46.4 Age 46 (7.3) Symptoms 3.3 (2.2)	1	Eccentric only	The authors were unable to show any statistical advantage to eccentric exercises for lateral epicondylosis compared with local modalities and stretching exercises.

			Training status Other			
Werner 2002 Germany[105]	RCT	RCRSP	N=20 % female 50 Age 51.75 (NR) Symptoms 27.5 Training status Other	2	Isometric	Strengthening of the centering muscles around the humeral head lead to positive outcomes for subacromial impingement. Self-training after instruction showed no difference to physiotherapist-supervised exercises.
Wiedmann 2017 Germany[106]	RCT	Achilles	N= 20 % female 65.0 Age 43.0 (6.0) Symptoms NR Training status Other	1	Eccentric only	Eccentric training improved the VISA-A and VAS scores after 12 weeks more than Physiotherapy treatment.
Yelland 2011 Australia[107]	RCT	Achilles	N= 43 % female NR Age 46.7 (NR) Symptoms 17 (NR) Training status Other	1	Eccentric only	Prolotherapy and particularly eccentric loading exercises combined with prolotherapy gave more rapid improvements in Achilles tendinosis symptoms than eccentric loading exercises alone. Long term VISA-A scores were similar.
Yilmaz 2022 Turkey[108]	RCT	Lateral elbow/tennis elbow	N= 40 65%female Age 42.8 (8.9) Symptoms 29.9 (33.7) Training status Other	1	Eccentric only	Radial nerve mobilization techniques are more effective on pain than conservative rehabilitation therapy in LE patients, and this effect continues after treatment.
Young 2005 Australia[109]	RCT	Patellar	N= 17 % female 23.5 Age 27.3 (1.8) Symptoms NR Training status Performance	2	Eccentric only; Concentric and eccentric	Both exercise protocols improved pain and sporting function in volleyball players over 12 months. The decline squat protocol offers greater clinical gains during a rehabilitation programme for

						patellar tendinopathy in athletes who continue to train and play with pain.
Yu 2013 Korea (Republic of) [110]	Quasi-experimental	Achilles	N= 32 % female 0.0 Age 30.3 (1.6) Symptoms 11.7 (2.1) Training status Other	2	Eccentric only; Concentric only	Eccentric strengthening was more effective than concentric strengthening in reducing pain and improving function in patients with Achilles tendinopathy.

Key: * = median (interquartile range); ** = mean (range); *** = mean (standard error of the mean); MVCV = mean dietary supplement containing mucopolysaccharides, type I collages & vitamin C; AT = Achilles Tendinopathy; GTPS = Greater trochanteric pain syndrome; F-ESWT=electromagnetic focused extracorporeal shockwave treatment; PATS = progressive agility and trunk stabilization; PRES = progressive running and eccentric strengthening; HVI = high-volume injection; PRP = platelet-rich plasma; VISA-A=Victorian Institute of Sports Assessment self-administered Achilles questionnaire; VAS = visual analogue scale; HSR = heavy slow resistance training; ROM = range of motion; SAIS = Subacromial impingement syndrome; SIS = Shoulder impingement syndrome; RCT=randomised controlled trial; RSP = Round shoulder posture; DASH = Disabilities of the Arm, Shoulder and Hand; SF-36 = The 36-Item Short Form Survey; RC = rotator cuff; TrP-DN = trigger point dry needling; CMS = Constant-Murley score; HILT = high-intensity laser therapy; MT = manual therapy; NSAID = a nonsteroidal anti-inflammatory drug; IFC = interferential current; SAPS = Subacromial pain syndrome; LET=lateral epicondylitis tendinopathy; LLLT = low-level laser therapy; PHLE = Progressive high-load exercise; LLE = low-load exercise; AROM = active range of motion; PRE = progressive resistance exercise

Supplementary 7C – Included Studies References (n=110)

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SF8: Risk of Bias and confidence in cumulative evidence assessments

Supplementary table 8A. Risk of Bias assessments per study. Assessments were made for each outcome in a study with the mode value selected and presented here. In the case of non-randomised studies, the first two domains (randomisation, allocation concealment) were judged as high risk as there was no control over allocation; the remaining domains were judged as for randomised studies.

Author, Year (reference) *	**Random sequence generation**	**Allocation concealment**	**Blinding of participants/personnel**	**Blinding of outcome assessment**	**Incomplete outcome bias**	**Selective reporting**	**Other bias****
Agregaard et al 2021[1]	Low risk	Low risk	High risk	Low risk	Low risk	Low risk	High risk
Agregaard et al 2021[2]	Low risk	Low risk	High risk	Low risk	Low risk	Low risk	Unclear
Alfredson et al 1998[3]	High risk	Unclear	High risk	Unclear	Low risk	Unclear	High risk
Alfredson et al 1999[4]	High risk	High risk	Unclear	Unclear	Low risk	Unclear	High risk
Arias-Buría et al 2015[5]	Low risk	Low risk	High risk	Low risk	Low risk	Unclear	Low risk
Arias-Buría et al 2017[6]	Low risk	Low risk	Unclear	Low risk	Unclear	Low risk	High risk
Bagcier et al 2021[7]	Low risk	Unclear	Low risk	Low risk	Low risk	Low risk	Low risk
Bahr et al 2006[8]	Low risk	Low risk	High risk	Low risk	Low risk	Unclear	Low risk
Balius et al 2016[9]	Low risk	Low risk	Unclear	Low risk	Low risk	Unclear	Low risk
Berg et al 2021[10]	Low risk	Unclear	Unclear	Unclear	Low risk	Low risk	High risk
Beyer et al 2015[11]	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	High risk
Blume et al 2015[12]	Unclear	Low risk	Low risk	Low risk	Low risk	Unclear	Low risk
Boudreau et al 2019[13]	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Breda et al 2020[14]	Low risk	Low risk	High risk	Low risk	Low risk	High risk	High risk
Breda et al 2022[15]	Low risk	Low risk	High risk	Low risk	Low risk	Low risk	High risk
Chaconas et al 2017[16]	Low risk	Unclear	Unclear	Low risk	High risk	Unclear	High risk
Cheng et al 2007[17]	High risk	High risk	Unclear	Unclear	Unclear	Unclear	High risk
Cho et al 2017[18]	High risk	High risk	Unclear	Unclear	Low risk	Low risk	Unclear

Author, Year (reference) *	**Random sequence generation**	**Allocation concealment**	**Blinding of participants/personnel**	**Blinding of outcome assessment**	**Incomplete outcome bias**	**Selective reporting**	**Other bias****
Christiansen et al 2021[19]	Low risk	Low risk	Unclear	Unclear	Low risk	Low risk	High risk
Corum et al 2021[20]	Low risk	Low risk	High risk	Low risk	High risk	Low risk	High risk
de Jonge et al 2008[21]	Unclear	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
de Vos et al 2007[22]	Low risk	Unclear	Low risk	Low risk	Unclear	Low risk	High risk
Dejaco et al 2017[23]	Low risk	Low risk	Low risk	Low risk	Low risk	High risk	Low risk
Dimitrios et al 2012[24]	High risk	High risk	Low risk	Low risk	Low risk	Unclear	High risk
Dimitrios et al 2012[25]	High risk	High risk	Low risk	Low risk	Low risk	Unclear	High risk
Dogan et al 2021[26]	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear	High risk
Dupuis et al 2018[27]	Low risk	Low risk	High risk	Low risk	Low risk	Low risk	High risk
Eliason et al 2021[28]	High risk	Low risk	Low risk	Low risk	Low risk	Low risk	High risk
Ganderton et al 2018[29]	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	High risk
Gatz et al 2020[30]	Low risk	Low risk	Low risk	Low risk	Unclear	Unclear	High risk
Giray et al 2019[31]	Low risk	Low risk	High risk	Low risk	Low risk	Low risk	High risk
Habets et al 2021[32]	Low risk	Low risk	Unclear	Low risk	Low risk	Low risk	Low risk
Hallgren et al 2014[33]	High risk	Low risk	High risk	Low risk	Unclear	Low risk	Low risk
Hallgren et al 2017[34]	Unclear	Unclear	Low risk	Low risk	Low risk	Low risk	Low risk
Heron et al 2017[35]	Low risk	Low risk	Low risk	Low risk	High risk	High risk	Low risk
Hopewell et al 2021[36]	Low risk	Low risk	High risk	Low risk	Low risk	Low risk	Low risk
Hotta et al 2020[37]	Low risk	Low risk	High risk	Low risk	Low risk	Low risk	High risk
Johansson et al 2005[38]	Low risk	Unclear	Unclear	Low risk	Low risk	Unclear	High risk

Author, Year (reference) *	**Random sequence generation**	**Allocation concealment**	**Blinding of participants/personnel**	**Blinding of outcome assessment**	**Incomplete outcome bias**	**Selective reporting**	**Other bias****
Jonsson 2009[39]	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear
Ketola et al 2009[40]	Low risk	Low risk	Unclear	Low risk	Low risk	Unclear	High risk
Knobloch et al 2007[41]	Low risk	Low risk	Unclear	Unclear	High risk	Unclear	High risk
Knobloch et al 2007[42]	Unclear	Unclear	High risk	Low risk	Unclear	Unclear	High risk
Knobloch et al 2008[43]	Unclear	Low risk	Unclear	Unclear	Unclear	Unclear	High risk
Kongsgaard et al[44]	Low risk	Low risk	High risk	Low risk	Low risk	Unclear	Low risk
Kromer et al 2013[45]	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Kromer et al 2014[46]	Low risk	Low risk	High risk	High risk	Low risk	Low risk	Low risk
Littlewood et al 2016[47]	Low risk	Low risk	High risk	High risk	Unclear	Unclear	High risk
Luginbuhl et al 2008[48]	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear	High risk
Maenhout et al 2013[49]	Unclear	High risk	High risk	High risk	Low risk	Unclear	Low risk
Mafi et al 2001[50]	Low risk	Unclear	Unclear	Unclear	Unclear	Unclear	High risk
Manias et al 2006[51]	High risk	High risk	High risk	High risk	Low risk	Unclear	Unclear
Martinez-Silvestrini et al 2005[52]	Unclear	Unclear	Unclear	Unclear	Low risk	Unclear	High risk
Marzetti et al 2014[53]	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
McCormack et al 2016[54]	Low risk	Low risk	Unclear	Unclear	Low risk	Low risk	Low risk
Mulligan et al 2016[55]	Low risk	Low risk	Low risk	Low risk	Low risk	Unclear	High risk
Nørregaard et al 2007[56]	Low risk	Low risk	Unclear	Unclear	Unclear	Unclear	High risk

Author, Year (reference) *	**Random sequence generation**	**Allocation concealment**	**Blinding of participants/personnel**	**Blinding of outcome assessment**	**Incomplete outcome bias**	**Selective reporting**	**Other bias****
Nowotny et al 2018[57]	Low risk	Unclear	Low risk	Low risk	High risk	Unclear	High risk
Østerås et al 2010[58]	Low risk	Low risk	High risk	High risk	Low risk	Unclear	High risk
Park et al 2010[59]	Low risk	Unclear	Unclear	Unclear	Unclear	Unclear	High risk
Pearson et al 2012[60]	Unclear	Unclear	High risk	Unclear	Low risk	Unclear	High risk
Pearson et al 2018[61]	Low risk	Low risk	High risk	Low risk	Low risk	Low risk	High risk
Pekyavas et al 2016[62]	Low risk	Low risk	High risk	Low risk	Unclear	Unclear	Low risk
Petersen et al 2007[63]	Low risk	Unclear	Unclear	Unclear	Unclear	Unclear	High risk
Peterson et al 2011[64]	Low risk	Low risk	Unclear	High risk	Low risk	Low risk	Low risk
Peterson et al 2014[65]	Low risk	Unclear	Low risk	High risk	Low risk	Low risk	Low risk
Praet et al 2019[66]	Low risk	Low risk	Low risk	Low risk	Low risk	Unclear	Low risk
Rabusin et al 2020[67]	Low risk	Low risk	High risk	High risk	Low risk	Low risk	High risk
Rabusin et al 2021[68]	Low risk	Low risk	High risk	High risk	Low risk	Low risk	High risk
Rio et al 2017[69]	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	High risk
Romero-Morales et al 2020[70]	Unclear	Unclear	Unclear	Unclear	Low risk	Low risk	High risk
Rompe et al 2007[71]	Low risk	Low risk	Unclear	Low risk	Low risk	Unclear	Low risk
Rompe et al 2008[72]	Low risk	Low risk	Unclear	Low risk	Low risk	Unclear	Unclear
Rompe et al 2009[73]	Unclear	Low risk	High risk	High risk	Low risk	Unclear	Low risk
Rompe et al 2009[74]	Low risk	Low risk	High risk	Low risk	Low risk	Unclear	Low risk
Roos et al 2004[75]	Low risk	Unclear	Unclear	Low risk	Low risk	Unclear	Low risk
Ruffino et al 2021[76]	Low risk	Low risk	High risk	Low risk	Low risk	Unclear	High risk
Sahbaz et al 2021[77]	Low risk	Unclear	Unclear	Unclear	Low risk	Low risk	Unclear
Schydlowsky 2022[78]	Unclear	Low risk	High risk	Low risk	Low risk	Low risk	High risk

Author, Year (reference) *	**Random sequence generation**	**Allocation concealment**	**Blinding of participants/personnel**	**Blinding of outcome assessment**	**Incomplete outcome bias**	**Selective reporting**	**Other bias****
Şenbursa et al 2011[79]	Low risk	Unclear	Unclear	Unclear	Low risk	Unclear	Low risk
Sevier et al 2015[80]	Low risk	Unclear	High risk	High risk	High risk	Unclear	High risk
Shim et al 2021[81]	Low risk	Low risk	High risk	Low risk	Low risk	Unclear	High risk
Silbernagel et al 2001[82]	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear	High risk
Silbernagel et al 2007[83]	Low risk	Low risk	High risk	High risk	Low risk	Unclear	Low risk
Simşek et al 2013[84]	Unclear	Unclear	Unclear	Low risk	Unclear	Unclear	Unclear
Slider et al 2013[85]	Low risk	Unclear	Low risk	Low risk	Low risk	Unclear	Unclear
Solomons et al 2020[86]	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Stasinopoulos 2013[87]	High risk	High risk	High risk	Low risk	Low risk	Unclear	High risk
Stasinopoulos et al 2006[88]	High risk	High risk	Unclear	Low risk	Low risk	Unclear	High risk
Stasinopoulos et al 2010[89]	High risk	High risk	Low risk	Low risk	Low risk	Unclear	High risk
Stasinopoulos et al 2017[90]	Low risk	Unclear	Low risk	Low risk	Low risk	Unclear	High risk
Stefansson et al 2019[91]	Low risk	Unclear	High risk	Low risk	High risk	Unclear	Low risk
Steunebrink et al 2013[92]	Low risk	Low risk	Low risk	Low risk	Low risk	Unclear	Low risk
Stevens et al 2014[93]	Unclear	Unclear	High risk	High risk	Unclear	Unclear	High risk
Svernlov et al 2001[94]	High risk	High risk	Unclear	Unclear	Unclear	Unclear	High risk
Tonks et al 2007[95]	Low risk	Low risk	Low risk	High risk	High risk	Low risk	Low risk
Turgut et al 2017[96]	Low risk	Unclear	Unclear	Unclear	High risk	Unclear	Low risk
Vallés-Carrascosa	Low risk	Low risk	Low risk	High risk	Low risk	Low risk	High risk

Author, Year (reference) *	**Random sequence generation**	**Allocation concealment**	**Blinding of participants/personnel**	**Blinding of outcome assessment**	**Incomplete outcome bias**	**Selective reporting**	**Other bias****
et al 2018[97]							
vanArk et al 2016[98]	Low risk	Low risk	Low risk	Unclear	Unclear	Low risk	Low risk
Vinuesa-Montoya et al 2017[99]	Low risk	Low risk	High risk	Low risk	Low risk	Low risk	Low risk
Visnes et al 2005[100]	Low risk	Low risk	High risk	Low risk	Unclear	Unclear	Unclear
Vuvan et al 2019[101]	Low risk	Low risk	High risk	High risk	Low risk	Low risk	Low risk
Walther et al 2004[102]	Unclear	Unclear	Unclear	Unclear	Low risk	Unclear	Unclear
Wegener et al 2016[103]	Low risk	Low risk	High risk	Low risk	Low risk	Unclear	High risk
Wen et al 2011[104]	Unclear	Unclear	Low risk	Unclear	High risk	Unclear	High risk
Werner et al 2002[105]	Low risk	Unclear	Unclear	Unclear	Unclear	Unclear	High risk
Wiedmann et al 2017[106]	Low risk	Low risk	Unclear	Unclear	Unclear	Unclear	High risk
Yelland et al 2011[107]	Low risk	Low risk	High risk	Low risk	Low risk	Unclear	Low risk
Yilmaz et al 2022[108]	Unclear	Low risk	Unclear	Low risk	Low risk	Unclear	High risk
Young et al 2005[109]	Unclear	Unclear	High risk	Low risk	High risk	Unclear	High risk
Yu et al 2013[110]	Low risk	Low risk	Low risk	Unclear	Low risk	Unclear	Unclear

*Included studies reference list in supplementary SF7-B.

**Note: The "other bias" category captures any bias not covered in the other domains. Specifically in this review we used the examples below to help with judging "other bias". Criteria for 'High risk' on assessing "other bias" include:

- Measurement of the outcome differed between intervention groups. Outcomes would usually be comparable across intervention groups in studies with pre-specific outcomes. For example: does one treatment group result in more frequent clinic visits (e.g., home exercise program vs. physiotherapy-led treatment)?
- Inappropriate outcome measurement tools used and/or uncertainty in their validity and reliability e.g., self-reported measures may have higher risk of bias than clinically observed outcomes.
- Design-specific bias:
    - Duration of follow-up that is different across comparison groups within a study, this difference could be a source of bias.

    - The issue of study populations that are systematically different between comparison groups within a study (e.g., important baseline imbalances) may be a source of bias; the population selected for the focus of the study (e.g., inclusion and exclusion criteria) would need to be considered.
- Failure of study to maintain fidelity to the intervention protocol resulting in performance bias.
- Conflict of Interest from Sponsor Bias resulting in:
    - The selection of designs and hypotheses; choosing non-inferiority rather than superiority approaches, picking comparison drugs and doses, choosing outcomes, or using composite endpoints (e.g., quality of life) without presenting data on individual endpoints.
    - Selective outcome reporting e.g., "cherry-picking" from multiple endpoints.
    - Biased presentation of results.
    - Publication bias.

Supplementary table 8B. Overall RoB and confidence in cumulative evidence assessment for moderator levels in meta-regression investigating resistance exercise intensity.

Moderator	Model	Overall RoB	Inconsistency	Imprecision	Indirectness	Small study-effects	Confidence in Evidence
Intensity: Body mass	All tendinopathies/ Large-effects	Low risk	Low risk	High risk	Low risk	High risk	Low
Intensity: Additional	All tendinopathies/ Large-effects	Low risk	Low risk	Low risk	Low risk	High risk	Moderate
Intensity: Body mass	Achilles/ Large-effects	Low risk	Low risk	High risk	Low risk	High risk	Low
Intensity: Additional	Achilles / Large-effects	Low risk	Low risk	High risk	Low risk	High risk	Low
Intensity: Body mass	RCRSP/ Large-effects	Low risk	Low risk	High risk	Low risk	High risk	Low
Intensity: Additional	RCRSP/ Large-effects	Low risk	Low risk	Low risk	Low risk	High risk	Moderate
Intensity: Body mass	Patellar/ Large-effects	Low risk	High risk	High risk	Low risk	High risk	Very low
Intensity: Additional	Patellar/ Large-effects	Low risk	Low risk	High risk	Low risk	High risk	Low
Intensity: Body mass	All tendinopathies/ Small-effects	Low risk	Low risk	High risk	Low risk	High risk	Low
Intensity: Additional	All tendinopathies/ Small -effects	Low risk	Low risk	Low risk	Low risk	High risk	Moderate
Intensity: Body mass	Achilles/ Small-effects	Low risk	High risk	High risk	Low risk	High risk	Very low
Intensity: Additional	Achilles / Small-effects	Low risk	High risk	High risk	Low risk	High risk	Very low
Intensity: Body mass	RCRSP / Small-effects	Low risk	High risk	High risk	Low risk	High risk	Very low
Intensity: Additional	RCRSP / Small-effects	Low risk	Low risk	Low risk	Low risk	High risk	Moderate

Supplementary table 8C. Overall RoB and confidence in cumulative evidence assessment for moderator levels in meta-regression investigating resistance exercise frequency.

Moderator	Model	Overall RoB	Inconsistency	Imprecision	Indirectness	Small study-effects	Confidence in evidence
Frequency: Less than daily	All tendinopathies/ Large-effects	Low risk	High risk	High risk	Low risk	High risk	Low
Frequency: Daily	All tendinopathies/ Large-effects	Low risk	Low risk	Low risk	Low risk	High risk	Moderate
Frequency: More than once per day	All tendinopathies/ Large-effects	Low risk	Low risk	Low risk	Low risk	High risk	Moderate
Frequency: Less than daily	Achilles/ Large-effects	Low risk	High risk	High risk	Low risk	High risk	Very low
Frequency: Daily	Achilles/ Large-effects	Low risk	Low risk	High risk	Low risk	High risk	Low
Frequency: More than once per day	Achilles/ Large-effects	Low risk	Low risk	Low risk	Low risk	High risk	Moderate
Frequency: Less than daily	RCRSP/ Large-effects	Low risk	Low risk	Low risk	Low risk	High risk	Moderate
Frequency: Daily	RCRSP/ Large-effects	Low risk	Low risk	Low risk	Low risk	High risk	Moderate
Frequency: More than once per day	RCRSP/ Large-effects	Low risk	Low risk	High risk	Low risk	High risk	Low
Frequency: Less than daily	All tendinopathies/ Small-effects	Low risk	High risk	High risk	Low risk	High risk	Very low
Frequency: Daily	All tendinopathies/ Small-effects	Low risk	Low risk	High risk	Low risk	High risk	Low
Frequency: More than once per day	All tendinopathies/ Small-effects	Low risk	Low risk	Low risk	Low risk	High risk	Moderate
Frequency: Less than daily	Achilles/ Small-effects	Low risk	High risk	High risk	Low risk	High risk	Very low
Frequency: Daily	Achilles/ Small-effects	Low risk	Low risk	High risk	Low risk	High risk	Low
Frequency: More than once per day	Achilles/ Small-effects	High risk	High risk	Low risk	Low risk	High risk	Very low
Frequency: Less than daily	RCRSP/ Small-effects	Low risk	Low risk	Low risk	Low risk	High risk	Moderate
Frequency: Daily	RCRSP/ Small-effects	Low risk	High risk	High risk	Low risk	High risk	Very low

Frequency: More than once per day	RCRSP/ Small-effects	Low risk	Low risk	High risk	Low risk	High risk	Low

Supplementary table 8D. Overall RoB and confidence in cumulative evidence assessment for moderator levels in meta-regression investigating resistance exercise volume.

Moderator	Model	Overall RoB	Inconsistency	Imprecision	Indirectness	Small study-effects	Confidence in evidence
Volume: Low	All tendinopathies/ Large-effects	Low risk	Low risk	Low risk	Low risk	High risk	Moderate
Volume: High	All tendinopathies/ Large-effects	Low risk	Low risk	Low risk	Low risk	High risk	Moderate
Volume: Low	Achilles/ Large-effects	Low risk	High risk	High risk	Low risk	Low risk	Low
Volume: High	Achilles / Large-effects	Low risk	Low risk	Low risk	Low risk	High risk	Moderate
Volume: Low	RCRSP/ Large-effects	Low risk	Low risk	Low risk	Low risk	High risk	Moderate
Volume: High	RCRSP/ Large-effects	Low risk	Low risk	Low risk	Low risk	High risk	Moderate
Volume: Low	Patellar/ Large-effects	Low risk	Low risk	High risk	Low risk	High risk	Low
Volume: High	Patellar/ Large-effects	Low risk	Low risk	High risk	Low risk	High risk	Low
Volume: Low	Elbow/ Large-effects	Low risk	Low risk	High risk	Low risk	High risk	Low
Volume: High	Elbow/ Large-effects	Low risk	Low risk	High risk	Low risk	High risk	Low
Volume: Low	All tendinopathies/ Small-effects	Low risk	Low risk	Low risk	Low risk	High risk	Moderate
Volume: High	All tendinopathies/ Small-effects	Low risk	Low risk	Low risk	Low risk	High risk	Moderate
Volume: Low	RCRSP/ Small-effects	Low risk	Low risk	Low risk	Low risk	High risk	Moderate
Volume: High	RCRSP/ Small-effects	Low risk	Low risk	High risk	Low risk	High risk	Low
Volume: Low	Patellar/ Small-effects	Low risk	Low risk	High risk	Low risk	High risk	Low
Volume: High	Patellar/ Small-effects	Low risk	Low risk	High risk	Low risk	High risk	Low

SF9: Moderator analyses comparing averaged pooled effect sizes

Supplementary table 9A. Moderator analysis comparing average pooled effect size for body weight interventions versus interventions including additional external load. Results presented across all tendinopathies and individual tendinopathies.

Moderator		Pooled SMD_{pre} estimate [95% CrI]	Probability	Study VPC [75% CrI]	Outcome VPC [75% CrI]	Measurement occasion VPC [75% CrI]	Confidence in evidence
Large Effects (All tendinopathies)	Body mass (169 outcomes 28 treatment arms)	0.91 [0.58 to 1.2]	*p*(Body weight < Additional) = 0.998	0.78 [0.74 to 0.84]	0.18 [0.14 to 0.23]	0.02 [0.00 to 0.06]	Low
	Additional external (544 outcomes 90 treatment arms)	1.4 [1.2 to 1.6]					Moderate
Large Effects (Achilles)	Body weight (91 outcomes 14 treatment arms)	0.87 [0.43 to 1.2]	*p*(Body weight < Additional) = 0.979	0.85 [0.75 to 0.92]	0.10 [0.04 to 0.19]	0.05 [0.00 to 0.10]	Low
	Additional external (84 outcomes 21 treatment arms)	1.4 [1.1 to 1.8]					Low
Large Effects (RCRSP)	Body weight (60 outcomes 7 treatment arms)	0.60 [0.22 to 0.89]	*p*(Body weight < Additional) = 0.990	0.35 [0.22 to 0.50]	0.57 [0.44 to 0.71]	0.05 [0.01 to 0.11]	Low
	Additional external (216 outcomes 32 treatment arms)	1.0 [0.84 to 1.2]					Moderate
Large Effects (Patellar)	Body weight (10 outcomes 3 treatment arms)	0.76 [0.40 to 0.97]	*p*(Body weight < Additional) = 0.903	0.48 [0.21 to 0.68]	0.45 [0.26 to 0.72]	0.06 [0.00 to 0.14]	Very Low
	Additional external (93 outcomes 18 treatment arms)	1.1 [0.88 to 1.4]					Low
Small Effects (All tendinopathies)	Body weight (96 outcomes 11 treatment arms)	0.40 [0.21 to 0.53]	*p*(Body weight < Additional) = 0.619	0.70 [0.63 to 0.77]	0.27 [0.20 to 0.34]	0.02 [0.00 to 0.05]	Low

	Additional external (331 outcomes 49 treatment arms)	0.44 [0.33 to 0.55]					Moderate
Small Effects (Achilles)	Body weight (71 outcomes 6 treatment arms)	0.36 [-0.17 to 0.92]	*p*(Body weight < Additional) = 0.721	0.53 [0.34 to 0.71]	0.47 [0.29 to 0.65]	0.00 [0.00 to 0.02]	Very Low
	Additional external (51 outcomes 8 treatment arms)	0.56 [0.07 to 1.0]					Very Low
Small Effects (RCRSP)	Body weight (12 outcomes 2 treatment arms)	0.48 [0.13 to 0.84]	*p*(Body weight < Additional) = 0.520	0.76 [0.63 to 0.86]	0.22 [0.13 to 0.35]	0.00 [0.00 to 0.01]	Very Low
	Additional external (181 outcomes 21 treatment arms)	0.48 [0.36 to 0.60]					Moderate

Large Effects: Effect sizes obtained from outcomes measuring: 1) Disability; 2) Pain on loading/activity; 3) Pain without further specification; 4) Function; and 5) Pain over a specified time. Small Effects: Effect sizes obtained from outcomes measuring: 1) Quality of Life; 2) Physical Functional Capacity. CrI= credible interval. VPC= variance partition coefficient. RCRSP= rotator cuff related shoulder pain.

Supplementary table 9B. Moderator analysis comparing average pooled effect size for different training frequencies. Results presented across all tendinopathies and individual tendinopathies.

Moderator		**Pooled** SMD_{pre} **estimate [95% CrI]**	**Probability**	**Study VPC [75% CrI]**	**Outcome VPC [75% CrI]**	**Measurement occasion VPC [75% CrI]**	**Confidence in evidence**
Large Effects (All tendinopathies)	Less than daily (270 outcomes 45 treatment arms)	1.5 [1.3 to 1.7]	*p*(Less than daily > Once per day) = 0.992	0.77 [0.71 to 0.82]	0.19 [0.15 to 0.24]	0.04 [0.00 to 0.08]	Low
	Once per day (192 outcomes 33 treatment arms)	1.0 [0.69 to 1.3]	*p*(Once per day < More than once per day) = 0.693				Moderate
	More than once per day (305 outcomes 51 treatment arms)	1.2 [1.0 to 1.4]	*p*(Less than daily > More than once per day) = 0.951				Moderate
Large Effects (Achilles)	Less than daily 10 outcomes 3 treatment arms)	2.2 [1.2 to 3.4]	*p*(Less than daily > Once per day) = 0.989	0.85 [0.75 to 0.92]	0.10 [0.05 to 0.18]	0.04 [0.00 to 0.11]	Very low
	Once per day (40 outcomes 10 treatment arms)	1.0 [0.51 to 1.5]	*p*(Once per day < More than once per day) = 0.712				Low
	More than once per day (133 outcomes 24 treatment arms)	1.2 [0.86 to 1.5]	*p*(Less than daily > More than once per day) = 0.976				Moderate
Large Effects (RCRSP)	Less than daily (121 outcomes 18 treatment arms)	1.0 [0.72 to 1.4]	*p*(Less than daily > Once per day) = 0.815	0.42 [0.28 to 0.56]	0.49 [0.36 to 0.63]	0.09 [0.01 to 0.17]	Moderate
	Once per day (76 outcomes 11 treatment arms)	0.78 [0.42 to 1.1]	*p*(Once per day < More than once per day) = 0.986				Moderate
	More than once per day (104 outcomes 13 treatment arms)	1.4 [0.97 to 1.7]	*p*(Less than daily < More than once per day) > 0.896				Low
Small Effects (All tendinopathies)	Less than daily (174 outcomes 21 treatment arms)	0.60 [0.46 to 0.74]	*p*(Less than daily > Once per day) = 0.999	0.67 [0.58 to 0.74]	0.30 [0.23 to 0.39]	0.02 [0.00 to 0.06]	Moderate
	Once per day (156 outcomes	0.28 [0.10 to 0.45]	*p*(Once per day < More than once per day) = 0.802				Moderate

	20 treatment arms)						
	More than once per day (107 outcomes 19 treatment arms)	0.39 [0.22 to 0.53]	*p*(Less than daily > More than once per day) =0.976				Low
Small Effects (Achilles)	Less than daily (26 outcomes 2 treatment arms)	0.79 [0.20 to 1.4]	*p*(Less than daily > Once per day) = 0.997	0.28 [0.12 to 0.48]	0.71 [0.51 to 0.87]	0.00 [0.00 to 0.03]	Very low
	Once per day (51 outcomes 5 treatment arms)	0.28 [-0.07 to 0.63]	*p*(Once per day > More than once per day) = 0.533				Low
	More than once per day (46 outcomes 8 treatment arms)	0.28 [0.01 to 0.60]	*p*(Less than daily > More than once per day) = 0.998				Moderate
Small Effects (RCRSP)	Less than daily (105 outcomes 14 treatment arms)	0.53 [0.37 to 0.68]	*p*(Less than daily > Once per day) = 0.948	0.62 [0.47 to 0.75]	0.30 [0.18 to 0.43]	0.07 [0.00 to 0.17]	Moderate
	Once per day (46 outcomes 5 treatment arms)	0.27 [0.04 to 0.51]	*p*(Once per day > More than once per day) = 0.602				Very low
	More than once per day (44 outcomes 6 treatment arms)	0.29 [0.03 to 0.55]	*p*(Less than daily > More than once per day) = 0.902				Low

Large Effects: Effect sizes obtained from outcomes measuring: 1) Disability; 2) Pain on loading/activity; 3) Pain without further specification; 4) Function; and 5) Pain over a specified time. Small Effects: Effect sizes obtained from outcomes measuring: 1) Quality of Life; 2) Physical Functional Capacity. CrI= credible interval. VPC= variance partition coefficient. RCRSP= rotator cuff related shoulder pain.

Supplementary table 9C. Moderator analysis comparing average pooled effect size for binary resistance volume categorisation. Results presented across all tendinopathies and individual tendinopathies.

Moderator		Pooled SMD_{pre} estimate [95% CrI]	Probability	Study VPC [75% CrI]	Outcome VPC [75% CrI]	Measurement occasion VPC [75% CrI]	Confidence in evidence
Large Effects (All tendinopathies)	Lower Volume (377 outcomes 63 treatment arms)	1.2 [0.95 to 1.3]	*p*(Higher volume < Lower volume) = 0.553	0.80 [0. 74 to 0.85]	0.17 [0.13 to 0.21]	0.03 [0.00 to 0.07]	Moderate
	Higher Volume (355 outcomes 60 treatment arms)	1.2 [0.95 to 1.3]					Moderate
Large Effects (Achilles)	Lower Volume (29 outcomes 3 treatment arms)	1.1 [0.15 to 2.1]	*p*(Higher volume > Lower volume) = 0.601	0.85 [0.73 to 0.92]	0.10 [0.04 to 0.20]	0.04 [0.00 to 0.11]	Low
	Higher Volume (142 outcomes 32 treatment arms)	1.2 [0.93 to 1.6]					Moderate
Large Effects (RCRSP)	Lower Volume (220 outcomes 33 treatment arms)	0.97 [0.76 to 1.2]	*p*(Higher volume > Lower volume) = 0.989	0.44 [0.32 to 0.57]	0.45 [0.34 to 0.58]	0.10 [0.01 to 0.18]	Moderate
	Higher Volume (75 outcomes 7 treatment arms)	1.5 [1.1 to 1.9]					Moderate
Large Effects (Patellar)	Lower Volume (62 outcomes 11 treatment arms)	1.0 [0.62 to 1.4]	*p*(Higher volume > Lower volume) = 0.54	0.68 [0.46 to 0.82]	0.29 [0.14 to 0.49]	0.03 [0.00 to 0.09]	Low
	Higher Volume (47 outcomes 12 treatment arms)	1.0 [0.66 to 1.4]					Low
Large Effects (Lateral elbow)	Lower Volume (63 outcomes 13 treatment arms)	1.7 [0.70 to 2.5]	*p*(Higher volume < Lower volume) = 0.612	0.73 [0.57 to 0.84]	0.24 [0.14 to 0.39]	0.02 [0.00 to 0.04]	Low
	Higher Volume (91 outcomes 10 treatment arms)	1.6 [0.62 to 2.5]					Low
	Lower Volume	0.56 [0.37 to 0.74]		0.71 [0.63 to 0.78]	0.27 [0.20 to 0.35]	0.02 [0.00 to 0.05]	Moderate

Small Effects (All tendinopathies)	(224 outcomes 34 treatment arms)		*p*(Higher volume < Lower volume) = 0.782				
	Higher Volume (183 outcomes 25 treatment arms)	0.42 [0.26 to 0.59]					Moderate
Small Effects (RCRSP)	Lower Volume (165 outcomes 19 treatment arms)	0.47 [0.33 to 0.61]	*p*(Higher volume > Lower volume) = 0.792	0.75 [0.60 to 0.86]	0.23 [0.13 to 0.37]	0.01 [0.00 to 0.03]	Moderate
	Higher Volume (20 outcomes 3 treatment arms)	0.61 [0.28 to 0.96]					Low
Small Effects (Lateral elbow)	Lower Volume (18 outcomes 8 treatment arms)	0.45 [0.05 to 0.82]	*p*(Higher volume < Lower volume) = 0.633	0.53 [0.08 to 0.84]	0.46 [0.15 to 0.90]	0.00 [0.00 to 0.02]	Low
	Higher Volume (41 outcomes 6 treatment arms)	0.38 [0.02 to 0.78]					Low

Large Effects: Effect sizes obtained from outcomes measuring: 1) Disability; 2) Pain on loading/activity; 3) Pain without further specification; 4) Function; and 5) Pain over a specified time. Small Effects: Effect sizes obtained from outcomes measuring: 1) Quality of Life; 2) Physical Functional Capacity. CrI= credible interval. VPC= variance partition coefficient. RCRSP= rotator cuff related shoulder pain.