# **Supplementary information for:**

**TITLE:** Mechanical, morphological and material adaptations of healthy lower limb tendons to mechanical loading: A systematic review and meta-analysis

JOURNAL: Sports Medicine

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# S1. Search strategy and limits

1. Location	2. Tendon	3. Trg Intervention	4. Tendon	5. NOT
	Tissue	-	Properties	
OR	OR	OR	OR	OR
Lower limb	Tend*	Strength*	Adapt*	ACL
Hamstring*	Aponeuros*	Resistance	Modulus	Anterior cruciate
Vastus lateralis		Run*	Stiffness	ligament
Quadricep*		Sprint*	Cross-sectional	Tendinopath*
Achilles		Power	area	Tendinitis
Patella*		Endurance	CSA	Tendinosis
Adductor*		jump*	Morphology	Rupture
Gastrocnemius		plyometric	Geometry	Reconstruction
Soleus		ballistic	Material prop*	Graft
		bound*	Mechanical prop*	Injur*
		land*	Complian*	
		stretch short*	Stress	
		SSC	Strain	
			Deformation	
		AND	Elongation	
			Plasticity	
		(Load* OR		
		Exercis* OR		
		Training OR		
		Intervention)		

**Strategy:** The terms in each column were searched using the Boolean operator above them. These searches were combined using the following strategy for titles, abstracts: (1 AND 2 AND 3 AND 4) NOT 5

The following database keywords were also searched in addition to the title and abstract search above: PubMed = MeSH Terms; Scopus = Keywords; CINAHL = Subject Terms; SportDISCUS = Subject Terms; EMBASE = Author key terms

#### **Limits applied**: Human(s), English

A manual check of reference lists of included studies and similar reviews was also conducted.

<u>S2.</u> Funnel plot for all studies reporting stiffness, demonstrating the standardised mean differences versus standard error, with result for Egger's test and adjusted SMDs based on the methods in Vevea & Woods (2005).



Standardised Mean Difference

Egger's: intercept = 4.90, t = 4.89, p < 0.001

Original SMD: 0.74, 95% CI 0.62 – 0.86

Adjusted SMD – moderate bias: 0.63, 95% CI 0.50 – 0.76

Reference: Vevea JL, Woods CM. Publication bias in research synthesis: Sensitivity analysis using a priori weight functions. Psychol Methods. 2005;10(4):428–43.

**S3.** Funnel plot for all studies reporting modulus, demonstrating the standardised mean differences versus standard error, with result for Egger's test and adjusted SMDs based on the methods in Vevea & Woods (2005).



Standardised Mean Difference

Eggers: intercept = 6.39, t = 5.99, p < 0.001

Original SMD: 0.82, 95%CI 0.58 - 1.07

Adjusted SMD – moderate bias: 0.65, 95% CI 0.39 – 0.92

Reference: Vevea JL, Woods CM. Publication bias in research synthesis: Sensitivity analysis using a priori weight functions. Psychol Methods. 2005;10(4):428–43.

<u>S4.</u> Funnel plot for all studies reporting cross-sectional area, demonstrating the standardised mean differences versus standard error, with result for Egger's test and adjusted SMDs based on the methods in Vevea & Woods (2005).



Standardised Mean Difference

Eggers: intercept = -1.56, t = -2.27, p = 0.026

Original SMD: 0.22, 95%CI 0.12 - 0.33

Adjusted SMD – moderate: 0.14, 95% CI 0.04 - 0.24

Reference: Vevea JL, Woods CM. Publication bias in research synthesis: Sensitivity analysis using a priori weight functions. Psychol Methods. 2005;10(4):428–43.

# **<u>S5.</u>** Study characteristics (extended).

Source	Participants	Intervention		Tendon	
Author	Group	Duration (weeks), Frequency per week	Exercise Parameters/Activity Descriptor	Outcome measures - method	Tissue
Albracht et al., 2013 [5]	Exercise	14, 4	Unilat iso PF @ 5° DF (knee extended) 5 x 4 @ 90% MVC 3s contract, 3s rest	Stiffness: ramped iso PF MVC on isokinetic dynamometer with 2D US to assess elongation of distal GaM fascicles and apon Modulus: not assessed CSA: not assessed	AT
	Control (rec active)		Continued own endurance training (running, $\ge$ 3 x p/wk)		
Arampatzis et al., 2007 [19]	Low strain limb	14, 4	Unilat iso PF @ 85° DF (knee extended) Low strain: 5 x 7 @ 55% MVC = 2.85 ± 0.99% strain	Stiffness: ramped iso PF MVC on isokinetic dynamometer with 2D US to assess elongation of distal GaM fascicles and apon	AT
u., 2007 [13]	High strain limb		High strain: 5 x 4 @ 90% MVC = 4.55 ± 1.38% strain 3s contract, 3s rest	Modulus: calculated from linear regression of the tendon stress-tendon/aponeurosis strain relationship between 50-100% of maximum tendon stress CSA: T1 MRI; 10% intervals along length	
	Control *		No exercise intervention		
Arampatzis et al., 2010 [20]	Low strain limb	14, 4	Unilat iso PF @ 85° DF (knee extended) Low strain: 5 x 20 @ 55% MVC @ 2.97 ± 0.47% strain High strain: 5 x 12 @ 90% MVC @ 4.72 ± 1.08% strain 1s contract. 1s rest	Stiffness: ramped iso PF MVC on isokinetic dynamometer with 2D US to assess elongation of distal GaM fascicles and apon Modulus: calculated from linear regression of the tendon stress-tendon/aponeurosis strain relationship between 50-100% of maximum tendon stress	AT
	High strain limb			CSA: T1 MRI; 10% intervals along length	
Baptista et	Concentric limb	12, 2	Unilat con or ecc knee extension	Stiffness: not assessed	РТ
ai., 2010 [95]	Eccentric limb		Ecc: 2 x 10 @ ~80% 5RM 0.5 s load acceptance + 3 s con or ecc	CSA: 2D US; 50% of distance between patella apex and tibial insertion	
Bohm et al., 2014 [21]	High strain rate limb & Reference protocol limb	14, 4	Unilat hops High strain rate: 5 x 72 @ 90% MVC = 6.63 ± 1.24% maximum strain	Stiffness: iso PF MVC on isokinetic dynamometer with 2D US to assess elongation at GaM MTJ, calculated from linear regression of the tendon force-tendon elongation ratio between 50-100% maximum tendon force Modulus: calculated from linear regression of the tendon stress-tendon strain	AT
	Long strain duration limb &		Unilat iso PF Long strain duration: $E = 12c = 0.00\%$ MVC = $6.04 \pm 1.54\%$	relationship between 50-100% maximum stress CSA: MRI, 10% intervals along length	
	protocol limb		maximum strain		
	Control *		Reference protocol (completed on non-intervention limb): Unilat iso PF @ 5° DF (knee extended): 5 x 4 (3s contract, 3s rest) @ 90% MVC No exercise intervention		

Bohm et al., 2021 [17]	Intervention	14, 3-4	Unilat iso PF 5 x 4 @ 90% MVC 3 s contract, 3 s rest	Stiffness: ramped iso PF MVC on isokinetic dynamometer with 2D US to assess elongation at GaM MTJ, calculated between 50-100% max tend force and strain Modulus: not assessed CSA: not assessed	AT
	Control (rec active)		Continued own endurance training (running, $\ge 2 \times p/wk$ )		
Carroll et al., 2011 [62]	Placebo (control = extracted group)	12, 3	Bilat con:ecc knee extension 3 x 10 @ 74 ± 1% 1RM (mean) 120s inter-set rest	Stiffness: ramped iso MVC in seated, force recorded via strain-gauge, with 2D US used to assess displacement of patella and tibial insertions, calculated from final 10% of force-elongation curve Modulus: calculated from final 10% of stress-strain curve	РТ
	Acetaminophen		Resistance training + 4000 mg acetaminophen (daily)	CSA: MRI; proximal, middle and distal regions	
	Ibuprofen		Resistance training + 1200 mg ibuprofen (daily)		
Centner et al., 2019 [71]	Heavy load (extracted group)	14, 3	Standing and seated con:ecc PF 3 x 6-12 each exercise @ 70-85% 1RM 60 s inter-set rest 180 s inter-exercise rest	Stiffness: ramped iso PF on isokinetic dynamometer with 2D US to assess elongation at GaM MTJ, calculated as the slope of the force-elongation curve between 50-80% MVC Modulus: slope of the stress-strain curve between 50-80% MVC	AT
	Low load + BFR		Exercises above @ 20% $\rightarrow$ 35% 1RM First set: 1 x 30 Subsequent sets: 3 x 15 @ 50% limb occlusive pressure	aspect Gastrocnemius)	
	Control (rec active)		No exercise intervention		
Dalgaard et al., 2019 [104]	Non- contraceptive (extracted group)	10, 3	Con:ecc Knee extension and incline leg press Wk 1: 3x12 @ 15RM → Wk 6-10: 4x10 @10RM.	Stiffness: not assessed Modulus: not assessed CSA: T1 MRI; proximal, middle and distal regions	РТ
	Contraceptive				
Duclay et al., 2009 [105]	Eccentric training	7, 3	Exercises as above + oral contraceptives Unilat ecc calf raise 6 x 6 @ 120% concentric 1RM 180s inter-set rest 1 x session per week seated (calf machine) @ 90 knee° flexion, other sessions supine (sled) 18 sessions total	Stiffness: ramped iso PF MVC on isokinetic dynamometer in prone lying, with 2D US to assess elongation at GaM at distal myotendinous junction; assessed at 10% intervals of MVC torque Modulus: not assessed CSA: not assessed	AT
	Control (rec active)		No exercise intevention		

Eriksen et al., 2018 [63]	Old heavy resistance Very old heavy resistance	12, 3	Knee con:ecc extension, leg press & leg curls Wk 1: 3 x 12 @ 12RM (~70% 1RM) $\rightarrow$ Wk 10: 5 x 6 @ 6RM (~90% 1RM) $\rightarrow$ Wk 11: 3 x 6 @ 6RM $\rightarrow$ Wk 12: 2 x 6 @6RM	Stiffness: iso knee extension MVC in seated, force recorded via strain-gauge, with 2D US to assess elongation of PT between patella and tibial tendon insertions, calculated from the final 10% of force-elongation curve. Modulus: calculated from final 10% of stress-strain curve (inferred from citations) CSA: T1 MRI; proximal, middle and distal regions	РТ
	Control (sedentary)		No exercise intervention		
Eriksen et al., 2019 [64]	Heavy resistance (extracted group)	52, 3	Knee con:ecc extension & leg press 6-8 wk of 3 x 15 @ $\sim$ 50-60 %1RM. 8 wk blocks (1 wk inter-block break). 3 x 12 @ 70% $\rightarrow$ 3 x 6 @ 85% 1RM	Stiffness: iso knee extension in seated, force recorded via dynamometer, with 2D US to assess elongation of PT between patella and tibial tendon insertions, calculated from the final 10% of the force-elongation curve Modulus: calculated from the final 10% of the stress-strain curve CSA: T1 MBI: provinal middle and distal regions	PT
	Moderate resistance		Unsupervised, home-based circuit + elastic band activity		
	Control (habitual activity)		No exercise intervention		
Farup et al., 2014 [106]	Placebo Concentric limb Placebo Eccentric limb	12, 3	Unilat con:ecc knee extension $6 \times 10-15 \text{RM} \rightarrow 8 \times 6-10 \text{RM}$ Eccentric = 120% concentric load Concentric = 2s, Eccentric = 2s 120s inter-set rest 33 sessions total	Stiffness: not assessed Modulus: not assessed CSA: T1 MRI; proximal, middle and distal regions	PT
	Whey hydrolysate (not extracted)		Exercise above + high-leucine whey protein hydrolysate + carbohydrate supplementation		
Fletcher et al., 2010 [60]	Isometric	8, 3	Unilat iso PF 4 x 20s @ 80% MVC	Stiffness: ramped iso PF MVC on isokinetic dynamometer in prone lying, with 2D US to assess elongation at GaM deep apon; assessed between 25-45%, 30-70% and 50-100% of MVC force	AT
	Control (activo)		K: $70-170$ km/wk	CSA: not assessed	
	control (active)				
Fouré et al., 2009 [107]	Training/Jump	8, 2	SJ, CMJ, DJ, hurdles (DL to SL combos) 150-280 jumps per session Progressive increase in number of jumps and heights over first 5 wk (detail n/s)	Stiffness: iso PF MVC on isokinetic dynamometer in prone lying, with 2D US to assess elongation at Ga MTJ, calculated as the slope of force-elongation values Modulus: not assessed CSA: not assessed	AT
	Control (rec active)		No exercise intervention – habitual exercise		

Fouré et al., 2010 [49]	Training/Jump	14, n/s	SJ, CMJ, DJ (@ 40cm, 60cm, or 80cm), hurdle hops/jumps. 200-600 jumps/session ≈ 6800 jumps total in programme 34 sessions total	Stiffness: iso PF MVC on isokinetic dynamometer in prone lying, with 2D US to assess elongation at GaM MTJ, calculated as the slope of the force-elongation curve between 50-90% maximum force Modulus: not assessed	AT
	Control (rec active)		No exercise intervention – habitual exercise	CSA: 2D US, level with medial malleolus	
Fouré et al., 2011 [50]	Training/Jump	14, n/s	SJ, CMJ, DJ (@ 35cm, 50cm, 65cm), hurdle hops/jumps (40cm hurdle) 200-600 jumps/session Progressive increase in number of exercises, jumps, and/or height (detail n/s) 34 sessions total	Stiffness: not assessed Modulus: not assessed CSA: 2D US, level with medial malleolus	AT
	Control (rec active)		No exercise intervention – habitual exercise		
Fouré et al., 2012 [51]	Jump	14, n/s	SJ, CMJ, DJ (@ 40cm, 60cm, or 80cm), hurdle hops/jumps. 200-600 jumps/session ≈ 6800 jumps total in programme 34 sessions total	Stiffness: not assessed Modulus: not assessed CSA: 2D US, level with medial malleolus	AT
	Control (rec active)		No exercise intervention – habitual exercise		
Fouré et al., 2013 [108]	Eccentric	14, n/s	Unilat ecc heel drops + jump/landings from 35/50/65cm box (landing: unilateral or bilateral). Progressive increase in number of PF actions or height of jump (increments n/s) 200-600 ecc actions/session ≈ 6800 contractions total in programme 34 sessions total	Stiffness: iso PF MVC on isokinetic dynamometer in prone lying, with 2D US to assess elongation at GaM MTJ, calculated as the slope of the force-elongation curve between 50-90% maximum force Modulus: not assessed CSA: 2D US, level with medial malleolus	AT
	Control (rec active)		No exercise intervention – habitual exercise		
Geremia et al., 2018 [72]	Eccentric	12, 2	Unilat ecc calf raises 3-5 x 10 @ 100% MVC 60 s inter-set rest 23 sessions total	Stiffness: ramped iso PF MVC on isokinetic dynamometer, with 2D US to assess elongation at GaM MTJ, calculated as the slope of the force-elongation curve from 50-100% MVC Modulus: calculated as the slope of the stress-strain curve from 50-100% MVC CSA: 2D US at 2, 4 and 6 cm from calcaneal insertion	AT
Hirayama et al., 2017 [109]	Training	12, 3	Unilat sled depth jumps 10 x 10 @ 100% 30 s inter-rep rest	Stiffness: iso PF MVC on myometer in prone lying, with 2D US to assess displacement of GaM fascicle intersection at deep apon, calculated as the slop of the force- elongation curve from 50-100% peak torque Modulus: not assessed	AT
	Control (rec active)		No exercise intervention	CSA: not assessed	

Houghton et al., 2013 [73]	Plyometric Control (rec active)	8, 2	Various unilat/bilat horizontal and lateral jump exercises. Varying intensity. 15 sessions total No exercise intervention – habitual exercise	Stiffness: ramped iso PF MVC on isokinetic dynamometer in prone lying, with 2D US to assess elongation at GaM MTJ, calculated as the gradient of linear regressions against the force-elongation curve between 0-40% and 50-90% MVC Modulus: calculated as the gradient of linear regression against the stress-strain curve between 50-90% peak stress CSA: 2D US, 2cm superior to line between medial and lateral malleoli	AT
Kay et al., 2016 [110]	Training	6, 2	Unilat PF @ 20° PF, sustained contraction with passive DF to 10° (i.e., 30° ROM) = induced ecc 5 x 12 @ 100% 1 s inter-rep rest 60 s inter-set rest	Stiffness: ramped iso PF MVC on isokinetic dynamometer, with 2D US to assess elongation at GaM MTJ, calculated as change in PF moment from 50-90% MVC divided by elongation Modulus: not assessed CSA: not assessed	AT
Kongsgaard et al., 2007 [65]	Heavy Resistance limb Light Resistance limb	12, 3	Unilat con:ecc knee extension Heavy: 10 x 8 @ 70% 1RM 180 s inter-set rest Light: 10 x 36 @ equivalent load (not reported) 30 s inter-set rest	Stiffness: ramped iso knee extension MVC using strain gauge, with 2D US to assess elongation of PT between patella and tibial insertions, calculated in final 10% of force-elongation curve Modulus: calculated in the final 10% of stress-strain curve CSA: T1 MRI; proximal, middle and distal regions	PT
Kubo et al., 2001 [51]	Short duration limb	12, 4	Unilat iso knee extension @ 80° knee flexion Short duration: 3 x 50 rapid contraction @ 70% MVC 2 s inter-rep rest 60 s inter-set rest	Stiffness: ramped iso knee extension MVC on isokinetic dynamometer, with 2D US to assess elongation of VL apon at 50% length of thigh visualising fascicle insertion into apon, calculated as the slope of linear regression over 50-100% MVC Modulus: not assessed CSA: T1 MRI, prone lying, immediate superior to patella and 10mm from patella	QT VL apon
	Long duration limb		Long duration: 4 x 20s @ 70% MVC 60 s inter-rep rest.		
Kubo et al., 2001 [52]	Isometric	12, 4	Unilat iso knee extension @ 80° knee flexion 4 x 20s @ 70% MVC 60 s inter-rep rest	Stiffness: ramped iso knee extension MVC on isokinetic dynamometer, with 2D US to assess elongation of VL apon at 50% length of thigh visualising fascicle insertion into apon, calculated as the slope of linear regression over 50-100% MVC Modulus: not assessed CSA: T1 MRL propervises immediate superior to patella and 10mm from patella	QT VL Apon
Kubo et al., 2002 [111]	Resistance Training (extracted group)	8, 4	Unilat con:ecc PF on leg press 5 x 10 @ 70% 1RM	Stiffness: ramped iso PF MVC on isokinetic dynamometer, with 2D US 30% length of lower leg (proximal to distal) to assess displacement of GaM fascicle intersection with deep apon, calculated as the slope of linear regression over 50-100% MVC	AT
	Resistance training + static stretching		Exercises above + 5 x 45 s stretches for PF group	CSA: T1 MRI, immediately superior to calcaneus and 10mm from calcaneus	
Kubo et al., 2006 [112]	Isometric	12, 4	Bilat iso leg press 10 x 15s @ 70% MVC 60 s inter-set rest	Stiffness: ramped iso knee extension MVC on isokinetic dynamometer, with 2D US to assess elongation of VL apon at 50% length of thigh visualising fascicle insertion into apon and PT at apex of patella, calculated as the slope of linear regression over 50-100% MVC	PT VL Apon
	Control (rec active)		No exercise intervention	Modulus: not assessed CSA: T1 MRI; assessed 10, 20 and 30 mm inferior to patella	

Kubo et al., 2006 [113]	Short length limb	12, 4	Unilat iso knee extension Short: 6 x 15s @ 50-70% MVC @ 50° knee flexion 30 s inter-rep rest	Stiffness: ramped iso knee extension MVC on isokinetic dynamometer, with 2D US to assess elongation of VL apon at 50% length of thigh visualising fascicle insertion into apon, calculated as the slope of linear regression over 50-100% MVC Modulus: not assessed	QT VL Apon
	Long length limb		Long: 6 x 15s @ 50-70% MVC @ 100° knee flexion 30 s inter-rep rest.	CSA: T1 MRI, prone lying, immediate superior to patella and 10mm from patella	
Kubo et al., 2006 [96]	High load (extracted group)	12, 3	Unilat con:ecc knee extension 0 - 90° knee flexion 4 x 10 @ 80% 1RM Con = 1 s, Ecc = 3 s Inter-set rest = 60 s	Stiffness: ramped iso knee extension MVC on isokinetic dynamometer, with 2D US to assess elongation of VL apon at 50% length of thigh visualising fascicle insertion into apon and PT at apex of patella, calculated as the slope of linear regression over 50- 100% MVC Modulus: not assessed CSA: 2D US; assessed at 25, 50 and 75% length of the PT	PT VL Apon
	BEK		Exercise above @ 20% 1RM 4 sets: 25/18/15/12 reps		
Kubo et al., 2007 [85]	Plyometric/ Jump limb	12, 4	Unilat Hop and DJ from 20cm; Each exercise: 5 x 10 @ 40% 1RM PF 30 s inter-set rest	Stiffness: ramped iso PF MVC on isokinetic dynamometer, with 2D US to assess elongation at GaM MTJ, calculated as the slope of linear regression over 50-100% MVC Modulus: not assessed	AT
	Weight training limb		Unilat con:ecc 5 x 10 PF @ 80% 1RM Con = 1 s, Ecc = 3s 60 s inter-set rest	CSA: T1 MRI, immediately superior to calcaneus and 10mm from calcaneus	
Kubo et al., 2009 [114]	Isometric	12, 4	Unilat iso knee extension @ 90° knee flexion 10 x 15s @ 70% MVC 30 s inter-rep rest	Stiffness: ramped iso knee extension MVC on isokinetic dynamometer, with 2D US to assess elongation of VL apon at 50% length of thigh visualising fascicle insertion into apon and PT at apex of patella, calculated as the slope of linear regression over 50-100% MVC	PT VL Apon
	Con:Ecc		Unilat con:ecc knee extension between 0-90° 5 x 10 @ 80% 1RM Con = ~1s, Ecc = ~3s 60 s inter-set rest	Modulus: not assessed CSA: 2D US; assessed at 25, 50 and 75% length of the PT	
Kubo et al., 2010 [115]	PF	12, 4	Unilat con:ecc PF 5 x 10 @ 80% 1RM 60 s inter-set rest Con = 1 s, Ecc = 3 s	Stiffness: ramped iso knee extension and PF MVC on isokinetic dynamometer, with 2D US to assess elongation at the patella apex and GaM MTJ Modulus: not assessed CSA: T1 MRI; assessed immediately inferior to the patella and 20mm distal to patella, and immediately superior to calcaneus and 10mm superior to calcaneus	PT AT
	Knee extension		Unilat con:ecc knee extension between 0-90° 5 x 10 @ 80% 1RM Concentric = ~1 s, Eccentric: ~3 s 60 s inter-set rest	,	

Kubo et al. <i>,</i> 2010 [88]	Isometric	12, 4	Unilat iso knee extension @ 90° knee flexion 10 x 15 s @ 70% MVC 30 s inter-rep rest	Stiffness: ramped iso knee extension MVC on isokinetic dynamometer, with 2D US to assess elongation of VL apon at 50% length of thigh visualising fascicle insertion into apon, calculated as the slope of linear regression over 50-100% MVC Modulus: not assessed	PT VL Apon
	Control (rec active)		No exercise intervention	CSA: T1 MRI;10, 20 and 30 mm inferior to patella	
Kubo et al., 2012 [89]	Isometric	12, 4	Unilat iso PF @ 0° DF (knee extended) 15 x 15 s @ 80% MVC 30 s inter-rep rest.	Stiffness: ramped iso PF MVC on isokinetic dynamometer, with 2D US to assess elongation at GaM MTJ, calculated as the slope of linear regression over 50-100% MVC Modulus: not assessed	AT
	Control (rec active)		No exercise intervention	CSA: T1 MRI; assessed every three images	
Kubo et al., 2017 [86]	Isometric	12, 3	Unilat iso PF (prone lying) @ 0° DF (knee extended) 10 x 15 s @ 80% MVC 30 s inter-rep rest	Stiffness: ramped iso PF MVC on isokinetic dynamometer, with 2D US to assess elongation at GaM visualising fascicle intersection at deep apon at 30% lower leg length (proximal to distal), calculated as the slope of linear regression over 50-100% MVC	AT
	Plyometric		Unilat hops/drop jumps on sled 5 x 10 @ 40% 30 s inter-set rest	Modulus: not assessed CSA: 2D US; level with lateral malleolus	
Kubo et al., 2017 [116]	Concentric	12, 3	Unilat con or ecc knee extn between 0-90° flexion 5 x 10 @ 80% 1RM	Stiffness: ramped iso knee extension MVC on isokinetic dynamometer, with 2D US to assess elongation between patella and tibial insertions, calculated as the slope of	РТ
	Eccentric		Con = 1 s (unloaded ecc = 3 s) Ecc = 3 s (unloaded con = 1 s) 60 s inter-set rest	linear regression over 50-100% MVC Modulus: not assessed CSA: 2D US; assessed at 50% PT length	
	Control (rec active)		No exercise intervention		
Laurent et al., 2020 [117]	Knee extended	10, 2	Bilat vertical hop and DJ variations (30-40cm) 6-8 exercises per session x 10 repetitions per exercise ~90 s inter-set rest	Stiffness: iso PF MVC using ankle ergometer with force transducer, with 2D US to assess elongation at GaM MTJ, calculated as slope of torque-elongation curve between 20-80% MVC	AT
	Knee flexed		~180 s inter-exercise rest 200 $\rightarrow$ 400 foot contacts p/wk in either knee extended or flexed position	Modulus: not assessed CSA: 2D US; 4cm superior to AT calcaneal insertion	
	Control (rec active)		No exercise intervention		

Malliaras et al., 2013 [61]	Concentric	12, 3	4 x 7-8 @ 80% con:ecc 1RM knee extension Con phase = unilat, Ecc phase = bilat	Stiffness: iso knee extension MVC on isokinetic dynamometer, with 2D US to assess elongation at patella apex, calculated between 50-75% and 75-100% maximum torque	РТ
	Eccentric		4 x 12-15 @ 80% con:ecc 1RM knee extension Con phase = bilat, Ecc phase = unilat 5 s ecc through 0-90° knee flexion	Modulus: calculated by multiplying stiffness between 50-75% and 75-100% MVC by ratio of tendon length to CSA CSA: 2D US; 50% length of PT	
	High load eccentric		4 x 7-8 @ 80% ecc 1RM knee extension Con phase = bilat, Ecc phase = unilat 5 s ecc through 0-90° knee flexion		
	Control *		No exercise intervention		
Massey et al., 2018 [66]	Explosive contraction	12, 3	Unilat iso knee extension Explosive: 4 x 10 @ >80% maximal torque 5 s inter-rep rest 120 s inter-set rest	Stiffness: ramped iso knee extension MVC using strain gauge, with 2D US to assess elongation of VL apon at 50% length of the thigh by visualising fascicle intersection with deep apon and of PT via displacement of patella and tibial insertions, calculated as slope of force-elongation curve over 70-80% MVT Modulus: calculated as slope of stress-strain curve over stress range corresponding	PT VL apon
	Sustained contraction		Sustained: 4 x 10 @ 75% maximal torque Contraction: 1 s ramp, 3 s plateau 2 s inter-rep rest 120 s inter-set rest	to 70-80% MVT CSA: T1 MRI; contiguous images from 2cm superior to patella apex to 2cm inferior to tibial insertion	
	Control *		No exercise intervention – habitual exercise		
McMahon et al., 2013 [67]	Short range	8, 3	4 x con:ecc exercises p/session (2 x squat variations, 1 x machine, 1 x Sampson chair), from: exercises = barbell back squat, Bulgarian split squat, leg press, leg extension,	Stiffness: ramped iso knee extension on isokinetic dynamometer, with 2D US to assess elongation at the patella apex, calculated as slope of force-elongation curve of 10% MVC intervals	РТ
	Long range		dumbbell lunge, static Sampson chair 3 x 10 $\rightarrow$ 4 x 8 Short = 0-50° knee flexion @ 80% 1RM	Modulus: calculated as stiffness multiplied by the ratio of tendon length to CSA CSA: 2D US; assessed at 25, 50 and 75% PT length	
	Full range		Long range = 40-90° knee flexion @ 55% 1RM Full range = 0-90° knee flexion @ 80% 1RM		
	Control (rec active)		No exercise intervention – habitual exercise		
McMahon et al., 2018 [68]	Trained males	8, 3	4 x con:ecc exercises p/session (barbell back squat, Bulgarian split squat, leg press, leg extension, dumbbell	Stiffness: ramped iso knee extension on isokinetic dynamometer, with 2D US to assess elongation at the patella apex, calculated as the average stiffness value from	РТ
	i raineu iemaies		$3 \times 10 \rightarrow 4 \times 8 @ 80\% 1 \text{RM}$	Modulus: calculated as stiffness multiplied by the ratio of tendon length to CSA CSA: 2D US; assessed at 25, 50 and 75% PT length	
	Control (males, females; rec active)		No exercise intervention		

Mouraux et al., 2000 [118]	Eccentric Control limb	6, 3	Unilat ecc DF on isokinetic dynamometer 3-6 x 10 @ 30-80% peak torque Untrained contralateral limb	Stiffness: not assessed Modulus: not assessed CSA: T2 MRI; assessed 2 cm proximally to calcaneal insertion	AT
Ogiso et al., 2020 [119]	Non-muscle stimulation (extracted group)	3, 3	3 x 10 reactive jump + 20 maximum effort reactive jumps	Stiffness: iso PF MVC on isokinetic dynamometer, with 2D US to assess elongation at GaM MTJ Modulus: not assessed	AT
	Electrical muscle stimulation		Exercises above + electrical muscle stimulation	C3A. HUT dssesseu	
	Control (rec		No exercise intervention		
Onambélé et al., 2008 [120]	Resistance training	12, 3	Bilat con:ecc knee extension and ankle rotator Resistance: 1-4 x 8-12 @ 80% 1RM	Stiffness: ramped iso PF MVC on isokinetic dynamometer, with 2D US to assess elongation (location n/s)	AT
	Inertial flywheel training		Bilat con:ecc YOYO leg extension flywheel and ankle rotator Flywheel: 1-4 x 8-12 @ 100% power output	CSA: not assessed	
			5 min inter-set rest		
Quinlan et al., 2021 [121]	Young con Young ecc	8, 3	Bilat → unilat con or ecc leg press Con: 4 x 15 @ 60% Con 1RM Ecc: 4 x 15 @ 60% Ecc 1RM	Stiffness: ramped iso knee extension MVC on isokinetic dynamometer, with 2D US to assess elongation of PT between patella and tibial insertions, calculated as the gradient of force-elongation curve between 90-100% maximal force	РТ
	Old con		3 s contraction 120 s inter-set rest	Modulus: calculated as tendon stiffness multiplied by the ratio of tendon length to tend CSA	
	Old ecc			CSA: 31 Miki, every 1cm along length of P1	
Reeves et al., 2003 [69]	Training	14, 3	Bilat con:ecc leg press + leg extension (+ five other non-PT loading/general strength exercises) 2 x ~10 @ ~60-80% 5RM Con = ~2s Ecc = ~3s ~180 s inter-set rest	Stiffness: ramped iso knee extension MVC on isokinetic dynamometer, with 2D US to assess elongation of the PT, calculated as the gradient over 10% intervals of tendon force Modulus: calculated as stiffness multiplied the ratio of tendon length to CSA CSA: 2D US; 25, 50 and 75% of patella tendon length	PT
	Control *		No exercise intervention – habitual activity		

Reeves et al., 2003 [122]	Training	14, 3	Bilat con:ecc leg extension + leg press (+ five non-PT loading/general strength exercises) 2 x 10 @ ~60-80% 5RM Con = ~2s Ecc = ~3s. ~180 s inter-set rest	Stiffness: iso knee extension MVC on isokinetic dynamometer, with 2D US to assess elongation at patella apex, calculated as gradient of force-elongation curve between 60-100% MVC Modulus: not assessed CSA: not assessed	РТ
	Control *		No exercise intervention – habitual activity		
Sanz-López et al., 2016 [123]	Eccentric overload	6, 2	Bilat con:ecc YoYo flywheel squats to parallel 4 x 7 @ 80% 1RM 120 s inter-set rest	Stiffness: not assessed Modulus: not assessed CSA: 2D US; 3cm proximal to calcaneal insertion	AT
	Control (rec active)		No resistance training intervention		
Seynnes et al., 2009 [70]	Training	9, 3	Unilat con:ecc knee extension (Technogym) 4 x 10 @ 80% 1RM 120 s inter-set rest	Stiffness: ramped iso knee extension on isokinetic dynamometer, with 2D US to assess elongation at patella apex Modulus: calculated as tendon stiffness multiplied by ratio of tendon length to mean CSA CSA: T1 MRI; assessed at 10% intervals	РТ
Standley et al., 2013 [124]	Aerobic cycling	12, 3-4	20-45 min cyc @ 60-80% heart rate reserve @ 70-90 rpm 42 sessions total	Stiffness: not assessed Modulus: not assessed CSA: MRI; average of all slices	ΡΤ
Tillin et al., 2012 [125]	Trained limb	4, 4	Unilat iso explosive knee extension 4 x 10 @ ≥90% MVC 5 s inter-rep rest 120 s inter-set rest	Stiffness: ramped iso knee extension MVC via strain gauge, with 2D US to assess displacement of fascicle intersection at VL apon, calculated as slope of force- elongation curve between 10-50% and 50-90% MVC Modulus: not assessed CSA: not assessed	VL Apon
	Control limb		No exercise intervention		

Vikmoen et al., 2016 [59]	Cc Endurance + strength (extracted group)	11, 2	Strength: Smith machine half squat, unilat leg press, unilat cable hip flexion, calf raises 3 x 10RM $\rightarrow$ 4RM (each exercise) Con = ~1 s Ecc = 2-3 s	Stiffness: ramped iso knee extension MVC via force cell, with 2D US to assess displacement of patellar apex relative to tibial plateau; calculated the slope of force- elongation curves between 90-100% MVC Modulus: calculated as stiffness multiplied by ratio of patella length and mean CSA CSA: 2D US; assessed at proximal, middle and distal regions	РТ
	Endurance (habitual)		Endurance training (cyc/R, not prescribed): completed on separate day ~ 4 x sessions/wk 60-100% heart rate		
Wakahara et al., 2015 [75]	Training	12, 3	Unilat con:ecc knee extension @ 20-100° knee flexion 5 x 8 @ 80% 1RM Con = 2s Ecc = 2s 90 s inter-set rest	Stiffness: not assessed Modulus: not assessed CSA: T1 MRI; mean value from all slices with visible apon	VL apon
	Control (sedentary/rec active)		No exercise intervention – habitual activity		
Walker et al. <i>,</i> 2020 [58]	Traditional training	10, 2	Bilat con:ecc leg press, unilat knee extension, bilat knee flexion Each wk: Session 1 = 3 x 6RM, session 2 = 3 x 10RM	Stiffness: ramped iso knee extension on custom dynamometer, with 2D US to assess elongation between patellar apex and tibial insertion, calculated as the slope of force-elongation curve from 50-100% MVC	PT
	Accentuated eccentric training		Accentuated ecc = con load + 40%	Modulus: not assessed CSA: not assessed	
			Concentric = 2s, Eccentric = 2s		
	Control (active)		No exercise intervention – own resistance training		
Waugh et al., 2014 [74]	Training	10, 2	Circuit of team-based activity + 1 x station with 45° con:ecc incline calf raise. 2 x 8-15 RM $\rightarrow$ 3 x 8-15RM	Stiffness: iso PF on isokinetic dynamometer, with 2D US to assess displacement of GaM MTJ, calculated as the slope of linear force-elongation curve between 10-90% MVC Modulus: calculated as slope of stress-strain relationship between 10-90% peak	AT
	Control *		No exercise intervention	stress CSA: 2D US; assessed ~25 mm from proximal calcaneus	
Waugh et al., 2018 [54]	Long rest	12, 3	Unilat iso PF 5 x 10 x 3 s @ 90% MVC	Stiffness: ramped iso PF on isokinetic dynamometer, with 2D US to assess displacement of GaM MTJ, calculated as the slope of the linear force-alongation	AT
	Short rest		Long: 10 s inter-rep rest Short: 3 s inter-rep rest 90 s inter-set rest	curve between 25-90% MVC Modulus: calculated as the slope of the stress-strain curve between 25-90% peak stress CSA: 3D UTC transverse images at 1, 2, 3 and 4 cm proximal to tendon insertion	

Waugh et al., 2021 [55]	Long rest Short rest	12, 3	Unilat iso PF 5 x 10 x 3 s @ 90% MVC Long: 10 s inter-rep rest Short: 3 s inter-rep rest 90 s inter-set rest	Stiffness: ramped iso PF on isokinetic dynamometer, with 2D US to assess displacement of GaM MTJ, calculated as the slope of the linear force-alongation curve between 25-90% MVC Modulus: calculated as the slope of the stress-strain curve between 25-90% peak stress CSA: 3D UTC transverse images at 1, 2, 3 and 4 cm proximal to tendon insertion	AT
Werkhausen et al., 2018 [56]	Isometric Control (rec	10, 3	Unilat iso PF in standing 4 x 10 explosive (~1 s) @ 80% MVC 5 s inter-rep rest No exercise intervention – habitual exercise	Stiffness: ramped iso PF on isokinetic dynamometer, with 2D US to assess displacement at GaM MTJ, calculated as the slope of the force-elongation curve between 50-80% MVC Modulus: not assessed CSA: not assessed	AT
Werkhausen et al., 2019 [57]	active) Training	10, 3	Unilat iso PF in standing 4 x 10 explosive (~1 s) @ 80% MVC 5 s inter-rep rest	Stiffness: ramped iso PF on isokinetic dynamometer, with 2D US to assess displacement at GaM MTJ, calculated as the slope of the force-elongation curve between 50-80% MVC Modulus: not assessed	AT
	Control (rec active)		Control (rec active)	CSA: not assessed	
Wu et al., 2010 [126]	Training/Jump	8, 2	Wk 1-2 (low intensity): SJ (10x2); split SJ (10x2); cycled split SJ (10x2) Wk 3-4 (low/med): Split SJ (10x2); pike jump (10x2); double leg tuck jump (10x2) Wk 5-6 (med): Pike jump (10x3); double leg tuck jump (10x3); double leg zigzag hop (10x3); double leg hop (10x3) Wk 7-8 (med/high): Double leg zigzag hop (10x3); double leg hop (10x3); depth jump (10x3); box jump (10x3) 30s inter-set rest 120s inter-exercise rest Box height = 45cm	Stiffness: ramped iso PF MVC via load cell, with 2D US to assess displacement of GaM MTJ, calculated as slope of ascending phase of muscle contraction between 60-100% MVC (on stress-displacement loop) Modulus: not assessed CSA: not assessed	AT
	Control *		General stretch activity for upper limb and back, 2 x p/wk		

Notes/abbreviations: AT = Achilles tendon; Bilat = bilateral; Cc = concurrent training; Con = concentric; Con:Ecc = concentric: cccentric; Cyc = cycling; DF = dorsiflexion; Ecc = eccentric; CMJ = countermovement jump; DJ = drop jump; F = female; GaM Apon = Gastronemius medialis aponeurosis; GRF = ground reaction force; Iso = isometric; M = Male; min = minute; MRI = magnetic resonance imaging; MTJ = myo/musculotendinous junction; MVC = maximal voluntary contraction; MVT = maximal voluntary torque; n/s = not specified; PF = plantarflexion; PT = patellar tendon; QT = Quadriceps tendon; R = running; rec active = recreationally active; rpm = revolutions per minute; SJ = squat jump; SSC = stretch shortening cycle; Unilat = unilateral; UTC = ultrasound tissue characterisation; VL Apon = Vastus lateralis aponeurosis; Wk = week(s); 2D US = two-dimensional ultrasound; nRM = repetition maximum of n; n x p/wk = number of sessions per week; \* = healthy control participants, no activity status (i.e., not active, recreationally active, trained athlete) not specified;  $\rightarrow = progressing$  to

						Criter	ia						
Author	1	2	3	4	5	6	7	8	9	10	11	Total	Relative score %
Albracht et al., 2013 [5]	1	0	0	0	-	-	0	1	1	0	1	3	38
Arampatzis et al. 2007 [19]	0	1	0	1	-	-	0	1	1	1	1	6	75
Arampatzis et al. 2010 [20]	0	1	0	1	-	-	0	1	1	1	1	6	75
Baptista et al. 2016 [95]	0	1	0	1	-	-	1	1	0	1	1	6	75
Bohm et al. 2014 [21]	0	1	0	1	-	-	0	1	1	1	1	6	75
Bohm et al., 2021 [17]	1	1	0	1	-	-	0	0	1	1	1	5	62.5
Carroll et al. 2011 [62]	1	1	0	0	-	-	1	1	0	1	1	5	63
Centner et al., 2019 [71]	1	1	1	1	-	-	1	0	1	1	1	7	88
Dalgaard et al. 2019 [104]	1	0	0	1	-	-	1	1	1	0	1	5	63
Duclay et al., 2009 [105]	1	0	0	1	-	-	0	1	1	0	1	4	50
Eriksen et al. 2018 [63]	1	1	0	0	-	-	1	0	1	1	1	5	63
Eriksen et al. 2019 [64]	1	1	1	1	-	-	0	1	1	1	1	7	88
Farup et al., 2014 [106]	1	0	0	1	-	-	1	0	1	1	1	5	63
Fletcher et al., 2010 [60]	1	1	0	1	-	-	0	1	1	1	1	6	75
Fouré et al. 2009 [107]	0	1	0	1	-	-	0	0	0	0	1	3	38
Fouré et al. 2010 [49]	0	1	0	1	-	-	0	1	1	0	1	5	63
Fouré et al. 2011 [50]	0	1	0	1	-	-	0	0	0	0	1	3	38
Fouré et al. 2012 [51]	0	0	0	1	-	-	0	1	1	0	1	4	50
Fouré et al. 2013 [108]	0	1	0	1	-	-	0	0	0	0	1	3	38

**<u>S6</u>**. Quality analysis using the PEDro scale, showing individual criteria scores, total score and adjusted relative score (i.e., using number of criteria applicable to study design as the denominator).

Geremia et al., 2018 [72] *	1	-	-	-	-	-	0	0	1	-	1	2	50
Hirayama et al. 2017 [109]	0	1	0	1	-	-	0	0	0	0	1	3	38
Houghton et al., 2013 [73]	1	0	0	0	-	-	0	0	0	1	1	2	25
Kay et al. 2016 [110] *	0	-	-	-	-	-	0	0	0	-	1	1	25
Kongsgaard et al. 2007 [65]	0	1	0	1	-	-	1	0	0	1	1	5	63
Kubo et al. 2001 [51]	0	1	0	1	-	-	0	0	0	1	1	4	50
Kubo et al. 2001 [52] *	0	-	-	-	-	-	0	0	0	-	1	1	25
Kubo et al. 2002 [111]	0	1	0	1	-	-	0	0	0	1	1	4	50
Kubo et al. 2006 [112]	0	0	0	1	-	-	0	1	1	1	1	5	63
Kubo et al. 2006 [113]	0	1	0	1	-	-	0	0	0	1	1	4	50
Kubo et al., 2006 [96]	0	1	0	1	-	-	0	0	0	1	1	4	50
Kubo et al. 2007 [85]	0	1	0	0	-	-	0	0	0	0	1	2	25
Kubo et al. 2009 [114]	0	1	0	1	-	-	0	0	0	0	1	3	38
Kubo et al., 2010 [115]	0	1	0	1	-	-	0	0	0	1	1	4	50
Kubo et al. 2010 [88]	0	1	0	0	-	-	0	1	1	0	1	4	50
Kubo et al. 2012 [89]	0	1	0	0	-	-	0	0	0	0	1	2	25
Kubo et al., 2017 [86]	0	1	0	1	-	-	0	0	0	1	1	4	50
Kubo et al., 2017 [116]	0	1	0	0	-	-	0	0	0	0	1	2	25
Laurent et al. 2020 [117]	0	1	0	1	-	-	0	1	1	1	1	6	75
Malliaras et al. 2013 [61]	1	1	1	1	-	-	1	1	1	1	1	8	100
Massey et al. 2018 [66]	0	1	0	1	-	-	0	1	1	1	1	6	75
McMahon et al. 2013 [67]	1	1	0	0	-	-	0	0	0	1	1	3	38
McMahon et al. 2018 [68]	1	1	0	1	-	-	0	1	1	1	1	6	75

	43	79	7	82	-	-	18	41	48	64	100		
Wu et al. 2010 [126]	1	1	0	1	-	-	0	1	1	0	1	5	63
Werkhausen et al., 2019 [57]	1	0	0	1	-	-	0	0	0	1	1	3	38
Werkhausen et al. 2018 [56]	0	0	0	1	-	-	0	0	0	1	1	3	38
Waugh et al., 2021 [55]	1	1	0	1	-	-	0	0	0	1	1	4	50
Waugh et al. 2018 [54]	0	1	1	1	-	-	1	0	1	1	1	7	88
Waugh et al. 2014 [74]	0	1	0	1	-	-	0	1	1	1	1	6	75
Walker et al., 2020 [58]	1	0	0	0	-	-	0	0	0	1	1	2	25
Wakahara et al., 2015 [75]	0	1	0	1	-	-	0	0	0	0	1	3	38
Vikmoen et al., 2016 [59]	1	1	0	1	-	-	0	0	0	1	1	4	50
Tillin et al., 2012 [125]	1	1	0	1	-	-	0	1	0	1	1	5	63
Standley et al., 2013 [124] *	0	-	-	-	-	-	1	0	1	-	1	3	75
Seynnes et al. 2009 [70] *	1	-	-	-	-	-	0	0	0	-	1	1	25
Sanz-López et al. 2016 [123]	1	0	0	1	-	-	1	1	1	0	1	4	50
Reeves et al. 2003 [122]	0	1	0	1	-	-	0	1	1	0	1	5	63
Reeves et al. 2003 [69]	0	1	0	1	-	-	0	0	0	0	1	3	38
Quinlan et al., 2021 [121]	1	1	0	1	-	-	0	1	1	1	1	6	75
Onambélé et al., 2008 [120]	0	1	0	1	-	-	0	1	1	1	1	6	75
Ogiso et al., 2020 [119]	1	1	0	1	-	-	0	0	0	0	1	3	38
al., 2000 [118]	1	0	0	1	-	-	0	0	0	1	1	3	38

Note: Relative score = total score/maximum possible score for the study design (Multiple group, experimental = 8, Single group = 4). Dash/hyphen denotes criterion is not applicable for study design. PEDro score does not use Criterion 1 for calculating total and subsequently is also not included in the calculation of the relative score. Studies with a single group (\*) cannot achieve criteria 2-4 or 10 which have also been removed from

calculation of the relative score for those papers and the percentage of papers meeting the criteria. ITT = Intention to treat; Criteria: 1) Eligibility criteria specified; 2) Random allocation to groups; 3) Allocation concealment; 4) Groups are similar at baseline; 5) Blinding of subjects to allocation/condition; 6) Blinding of therapist delivering condition; 7) Blinding of assessor of key outcome; 8) Key outcome recorded for >85% of participants; 9) All subjects received the condition, or an intention to treat analysis was used; 10) Betweengroups statistics documented; 11) Point measures and variability provided for outcomes.

Study	n	Mean	Post SD	n	Mean	Pre SD		SMD	[95% CI]	Weight
Concurrent training Fletcher et al. 2010 [60] Vikmoen et al. 2016 [59] Random effects model Heterogeneity: $I^2 = 55\%$ , $p < 0.01$	6 11 17	434 2483	122 733	6 11 17	366 2752	56 402		0.66 -0.44 0.03	[-0.52; 1.84] [-1.29; 0.41] [-1.03; 1.10]	0.9% 1.4% 2.2%
Jump-based training Bohm et al. 2014 [21] Foure et al. 2009 [107] Foure et al. 2010 [49] Hirayama et al. 2017 [109] Houghton et al. 2013 [73] Kubo et al. 2007 [85] Kubo et al. 2007 [86] Laurent et al. 2020 [117] Digiso et al. 2020 [117] Ogiso et al. 2020 [119] Wu et al. 2010 [126] Random effects model Heterogeneity: $I^2 = 0\%$ , $p = 0.90$	14 6 9 8 7 10 11 11 11 9 11 107	475 43 283 260 856 154 23 7 6 17 80	254 18 137 67 564 55 5 2 2 5 35	14 6 9 8 7 10 11 11 11 9 11 107	339 41 223 193 940 129 23 5 5 5 5 5 5 5 5 6	114 3 87 52 473 36 6 1 2 3 32		0.67 0.12 0.50 1.06 -0.15 0.51 0.12 0.89 0.41 0.43 0.68 0.49	$      \begin{bmatrix} -0.10; 1.43 \\ -1.01; 1.26 \\ -0.44; 1.44 \\ -0.01; 2.12 \\ -1.20; 0.90 \\ -0.38; 1.41 \\ -0.71; 0.96 \\ -0.36; 1.47 \\ -0.43; 1.26 \\ -0.50; 1.37 \\ -0.19; 1.54 \\ -0.22; 0.77 \\ -0.22; 0.75 \\ -0.22; 0.75 \\ -0.22; 0.75 \\ -0.22; 0.75 \\ -0.22; 0.75 \\ -0.22; 0.75 \\ -0.22; 0.75 \\ -0.22; 0.75 \\ -0.22; 0.75 \\ -0.22; 0.75 \\ -0.22; 0.75 \\ -0.22;$	1.6% 0.9% 1.2% 1.0% 1.3% 1.4% 1.3% 1.4% 1.2% 1.3% 1.3% 1.3%
Resistance training Albracht et al. 2013 [5] Arampatzis et al. 2007 [19] Arampatzis et al. 2007 [19] Arampatzis et al. 2010 [20] Bohm et al. 2014 [21] Bohm et al. 2019 [71] Duclay et al. 2009 [105] Eriksen et al. 2018 [63] Eriksen et al. 2018 [72] Kay et al. 2016 [110] Kongsgaard et al. 2007 [65] Kongsgaard et al. 2007 [65] Kubo et al. 2002 [111] Kubo et al. 2006 [112] Kubo et al. 2006 [113] Kubo et al. 2006 [113] Kubo et al. 2006 [113] Kubo et al. 2006 [113] Kubo et al. 2006 [114] Kubo et al. 2009 [114] Kubo et al. 2009 [114] Kubo et al. 2009 [114] Kubo et al. 2009 [114] Kubo et al. 2010 [15] Kubo et al. 2017 [85] Kubo et al. 2010 [15] Kubo et al. 2017 [16] Kubo et al. 2017 [16] Kubo et al. 2017 [16] Kubo et al. 2013 [61] Malliaras et al. 2013 [61] McMahon et al. 2013 [67] McMahon et al. 2013 [68] Maskey et al. 2014 [74] Waugh et al. 2014 [75]	13 1 1 1 1 1 1 2 1 2 1 2 1 1 1 1 1 1 1 1	$\begin{array}{c} 315\\ 201\\ 228\\ 261\\ 302\\ 457\\ 539\\ 579\\ 111\\ 3335\\ 565\\ 2911\\ 3335\\ 565\\ 2911\\ 3335\\ 1900\\ 4220\\ 251\\ 350\\ 122\\ 1819\\ 596\\ 122\\ 1819\\ 596\\ 122\\ 1819\\ 596\\ 166\\ 1833\\ 1253\\ 106\\ 1833\\ 1253\\ 106\\ 1833\\ 1253\\ 106\\ 1833\\ 1253\\ 1221\\ 110\\ 96\\ 411\\ 96\\ 104\\ 277\\ 2512\\ 2336\\ 2508\\ 3122\\ 3239\\ 595\\ 687\\ 1221\\ 1124\\ 1167\\ 1517\\ 887\\ 409\\ 2314\\ 2376\\ 2236\\ 2256\\ 3610\\ 2288\\ 697\\ 1893\\ 1582\\ 178\\ 456\\ 461\\ 459\\ \end{array}$	$\begin{array}{c} 53\\ 41\\ 40\\ 56\\ 57\\ 122\\ 40\\ 172\\ 9\\ 1334\\ 158\\ 2430\\ 693\\ 1079\\ 59\\ 30\\ 1251\\ 330\\ 660\\ 24\\ 40\\ 710\\ 233\\ 106\\ 624\\ 40\\ 710\\ 233\\ 106\\ 632\\ 40\\ 106\\ 632\\ 575\\ 101\\ 2854\\ 471\\ 353\\ 306\\ 232\\ 466\\ 635\\ 575\\ 101\\ 2854\\ 471\\ 3530\\ 305\\ 232\\ 466\\ 635\\ 769\\ 1476\\ 1215\\ 103\\ 676\\ 40\\ 147\\ 147\\ 147\\ 147\\ 147\\ 147\\ 147\\ 147$	13 11 11 11 12 14 12 13 12 14 10 9 12 10 11 15 13 12 12 8 8 8 8 9 9 9 9 9 10 10 10 10 10 10 8 9 9 9 11 9 10 10 14 15 14 15 10 11 11 8 8 12 12 8 10 9 8 7 9 15 10 10 10 14 14 11 12 14 12 14 14 14 14 14 14 14 14 14 14 14 14 14	272 187 168 276 258 370 336 3775 2928 402 249 100 3676 192 107 3676 192 107 3676 192 107 3676 192 107 3676 108 1071 997 81 1676 406 128 1071 997 72 322 69 1803 1087 1087 1087 1087 1087 1087 1099 107 1099 107 1076 1087 1099 1077 1099 1077 2025 1090 1077 2025 1090 1077 2025 1090 1077 2025 1090 1077 2025 1090 1077 2025 1090 1087 1087 1087 1087 1087 1099 1077 2025 2025 1090 1087 1099 1077 2025 2091 1087 1087 1087 1087 1087 1099 1077 2025 1090 1087 1099 1077 2025 1090 1077 2025 1090 1077 2025 1090 1087 10	$\begin{array}{c} 48\\ 38\\ 37\\ 53\\ 51\\ 132\\ 89\\ 106\\ 1320\\ 103\\ 9\\ 1530\\ 1530\\ 1530\\ 1530\\ 1530\\ 22\\ 21\\ 662\\ 19\\ 559\\ 22\\ 22\\ 1306\\ 662\\ 19\\ 559\\ 22\\ 22\\ 662\\ 19\\ 559\\ 22\\ 26\\ 662\\ 19\\ 559\\ 22\\ 26\\ 662\\ 19\\ 559\\ 22\\ 26\\ 662\\ 19\\ 559\\ 22\\ 21\\ 662\\ 19\\ 559\\ 22\\ 21\\ 662\\ 19\\ 559\\ 22\\ 21\\ 662\\ 19\\ 559\\ 22\\ 22\\ 136\\ 662\\ 19\\ 20\\ 579\\ 388\\ 360\\ 444\\ 118\\ 773\\ 898\\ 360\\ 444\\ 118\\ 773\\ 898\\ 360\\ 444\\ 118\\ 773\\ 53\\ 146\\ 597\\ 425\\ 428\\ 113\\ 1813\\ 867\\ 353\\ 146\\ 37\\ 353\\ 353\\ 146\\ 37\\ 353\\ 353\\ 353\\ 353\\ 353\\ 353\\ 353\\$		0.82 0.362 1.52 -0.25 0.79 0.64 1.04 1.37 0.52 0.30 1.19 0.30 1.19 0.32 1.17 0.20 0.25 1.17 0.20 0.25 1.17 0.20 0.25 1.17 0.20 0.41 0.38 -0.23 1.31 0.38 -0.23 1.37 0.20 0.41 0.38 -0.23 1.17 0.20 0.41 0.38 -0.25 1.17 0.20 0.62 1.17 0.20 0.62 1.17 0.20 0.62 1.17 0.20 0.62 1.17 0.20 0.62 1.17 0.20 0.62 1.17 0.20 0.62 1.17 0.20 0.62 1.17 0.20 0.62 1.17 0.20 0.62 1.17 0.20 0.65 1.12 1.06 0.32 1.17 0.03 0.75 0.65 1.22 1.06 0.56 0.56 0.56 0.98 0.72 0.56 0.65 1.24 0.65 1.44 0.69 0.56 0.65 1.25 0.98 0.72 0.56 0.65 1.25 0.98 0.72 0.56 0.65 1.24 0.65 1.25 0.98 0.72 0.56 0.65 1.25 0.98 0.72 0.65 1.17 0.03 0.62 0.65 1.25 0.98 0.72 0.56 0.65 1.24 0.65 1.24 0.65 1.25 0.98 0.72 0.56 0.65 1.25 0.98 0.72 0.56 0.65 1.24 0.65 1.24 0.75 0.98 0.72 0.56 0.65 1.24 0.75 0.98 0.72 0.56 0.65 1.24 0.75 0.98 0.72 0.56 0.65 1.24 0.71 0.31 1.10 1.51 0.31 0.31 0.31 0.31 0.41 0.80 0.51 0.31 0.31 0.31 0.31 0.41 0.80 0.51 0.31	$ \begin{bmatrix} 0.02; 1.63 \\ [-0.49; 1.20] \\ [-0.9; 0.59] \\ [-0.09; 1.66] \\ [-0.18; 1.47] \\ [-0.27; 1.30] \\ [-0.27; 1.30] \\ [-0.51; 1.10] \\ [-0.33; 1.58] \\ [-0.65; 0.95] \\ [-0.60; 1.16] \\ [-0.45; 1.24] \\ [-0.33; 1.58] \\ [-0.65; 0.95] \\ [-0.60; 1.16] \\ [-0.45; 1.24] \\ [-0.33; 1.57] \\ [-0.27; 1.94] \\ [-0.43; 1.19] \\ [-1.04; 0.57] \\ [-0.27; 1.94] \\ [-0.43; 1.19] \\ [-1.04; 0.57] \\ [-0.20; 2.42] \\ [-0.33; 1.57] \\ [-0.23; 1.83] \\ [-0.33; 1.57] \\ [-0.33; 1.57] \\ [-0.33; 1.57] \\ [-0.33; 1.57] \\ [-0.33; 1.57] \\ [-0.69; 1.28] \\ [-0.69; 1.28] \\ [-0.69; 1.28] \\ [-0.69; 1.28] \\ [-0.69; 1.28] \\ [-0.69; 1.28] \\ [-0.69; 1.28] \\ [-0.69; 1.28] \\ [-0.69; 1.28] \\ [-0.69; 1.28] \\ [-0.69; 1.28] \\ [-0.69; 2.42] \\ [-0.69; 1.28] \\ [-0.73; 1.13] \\ [-0.33; 1.57] \\ [-0.73; 1.13] \\ [-0.33; 1.57] \\ [-0.73; 1.13] \\ [-0.33; 1.57] \\ [-0.60; 1.170] \\ [-0.61; 1.26] \\ [-0.61; 1.26] \\ [-0.61; 1.26] \\ [-0.61; 1.26] \\ [-0.61; 2.20] \\ [-0.61; 2.20] \\ [-0.61; 2.20] \\ [-0.61; 2.20] \\ [-0.5; 2.09] \\ [-0.34; 2.21] \\ [-0.34; 2.21] \\ [-0.34; 2.24] \\ [-0.34; 2.21]$	1.5% 1.4% 1.3% 1.4% 1.3% 1.5% 1.5% 1.5% 1.4% 1.5% 1.4% 1.5% 1.4% 1.5% 1.4% 1.5% 1.4% 1.5% 1.4% 1.5% 1.4% 1.2% 1.2% 1.2% 1.2% 1.2% 1.2% 1.2% 1.2
Heterogeneity: $l^2 = 33\%$ , $p < 0.01$ Residual heterogeneity: $l^2 = 29\%$ , $p$	o < 0.01					-	4 -2 0 2 4 Decrease Increase		,	

<u>S7.</u> Forest plot for the meta-analysis of stiffness subdivided by training intervention type showing standardised mean differences (SMD) and 95% confidence intervals (CI).

<u>S8.</u>	Forest plot for	r the meta-and	alysis of modul	us subdivided b	by training	intervention t	type showing
stan	dardised mear	differences	(SMD) and 95%	6 confidence in	tervals (CI	).	

			Post			Pre				
Study	n	Mean	SD	n	Mean	SD		SMD	[95% CI]	Weight
0							13			
Concurrent training	44	005	100	44	1000	104		0.01	[ 1 47: 0 25]	0.00/
Vikmoen et al. 2016 [59]	11	925	162	11	1038	194		-0.61	[-1.47; 0.25]	2.8%
Hotorogonoity: not applicable	11			11			<u> </u>	-0.01	[-1.47, 0.25]	2.070
Heterogeneity, not applicable										
Jump-based training										
Bohm et al 2014 [21]	14	1140	486	14	920	299		0.53	[-0 23·1 28]	3.0%
Houghton et al. 2013 [73]	7	2000	1300	7	2500	1300		-0.36	[-1 42: 0 70]	2 4%
Random effects model	21	2000	1000	21	2000	1000		0.17	[-0.69: 1.02]	5.4%
Heterogeneity: $l^2 = 44\%$ , $p = 0.18$									L	
Resistance training										
Arampatzis et al. 2007 [19]	11	400	293	11	420	401		-0.05	[-0.89; 0.78]	2.9%
Arampatzis et al. 2007 [19]	11	680	355	11	440	278		0.72	[-0.14; 1.59]	2.8%
Arampatzis et al. 2010 [20]	11	970	265	11	1010	199		-0.16	[-1.00; 0.67]	2.9%
Arampatzis et al. 2010 [20]	11	1130	332	11	970	232		0.54	[-0.32; 1.39]	2.8%
Bohm et al. 2014 [21]	12	1050	277	12	890	277		0.56	[-0.26; 1.38]	2.9%
Bohm et al. 2014 [21]	14	1430	636	14	910	262		1.04	[ 0.24; 1.83]	2.9%
Bohm et al. 2014 [21]	12	1410	381	12	970	277		1.28	[ 0.38; 2.17]	2.7%
Carroll et al. 2011 [62]	12	1220	450	12	1030	416		0.42	[-0.39; 1.23]	2.9%
Centner et al. 2019 [71]	14	1848	481	14	1540	492		0.61	[-0.15; 1.38]	3.0%
Eriksen et al. 2018 [63]	9	1330	690	9	1230	390		0.17	[-0.76; 1.10]	2.7%
Eriksen et al. 2018 [63]	12	735	263	12	703	253		0.12	[-0.68; 0.92]	2.9%
Eriksen et al. 2019 [64]	10	1560	443	10	1510	474	- <b></b>	0.10	[-0.77; 0.98]	2.8%
Geremia et al. 2018 [/2]	15	1292	436	15	695	160		1.//	[ 0.91; 2.63]	2.8%
Kongsgaard et al. 2007 [65]	12	1650	554	12	1470	589		0.30	[-0.50; 1.11]	2.9%
Kongsgaard et al. 2007 [65]	12	1360	658	12	1420	121		-0.08	[-0.88; 0.72]	2.9%
Kubo et al. 2001 [52]	8	433	35	8	288	26		- 4.45	[2.42; 6.47]	1.1%
Malliaras et al. 2013 [61]	9	942	279	9	620	223		1.22	[0.19; 2.24]	2.4%
Malliaras et al. 2013 [61]	10	1022	339	10	131	390		0.75	[-0.17; 1.66]	2.7%
	10	1400	436	10	570	191		1.25	[0.28; 2.23]	2.5%
Massey et al. 2018 [66]	14	1490	270	14	1230	180		1.10	[0.30; 1.90]	2.9%
McMabon et al. 2013 [67]	10	1100	120	10	820	270		2.44	[-0.15, 1.51]	0.1%
McMahon et al. 2013 [67]	11	990	110	11	740	90		2.44	[1.22, 3.03]	2.1/0
McMahon et al. 2013 [67]	11	1150	110	11	780	100		2.00	[2.00:4.77]	1.8%
McMahon et al. 2018 [68]	8	990	255	8	780	170		0.92	[_0 13: 1 96]	2.4%
McMahon et al. 2018 [68]	8	600	226	8	420	113		0.95	[-0.10; 2.00]	2.4%
Quinlan et al 2021 [121]	8	1280	230	8	710	130	T	2 88	[137:440]	1.6%
Quinlan et al. 2021 [121]	10	1510	440	10	1160	290		0.90	[-0.03: 1.83]	2.6%
Quinlan et al. 2021 [121]	9	1460	350	9	1050	270		1.25	[ 0.22: 2.28]	2.4%
Quinlan et al. 2021 [121]	8	1430	570	8	800	250		1.35	[ 0.23; 2.47]	2.3%
Reeves et al. 2003 [69]	9	2200	800	9	1300	300		1.42	[ 0.36; 2.48]	2.4%
Seynnes et al. 2009 [70]	15	1160	1201	15	980	1162		0.15	[-0.57; 0.87]	3.1%
Waugh et al. 2014 [74]	10	799	150	10	642	171	-	0.94	[ 0.00; 1.87]	2.6%
Waugh et al. 2018 [54]	14	1586	611	14	1261	459	+	0.58	[-0.18; 1.34]	3.0%
Waugh et al. 2018 [54]	14	1529	459	14	1242	420		0.63	[-0.13; 1.39]	3.0%
Random effects model	389			389			\$	0.90	[ 0.65; 1.15]	91.8%
Heterogeneity: $I^2 = 61\%$ , $p = NA$										
Random effects model	421			421			•	0.82	[ 0.58; 1.07]	100.0%
Heterogeneity: $I^2 = 63\%$ , $p < 0.01$	13 40							1		
Residual heterogeneity: I <sup>2</sup> = 61%,	p < 0.0	1					-6 -4 -2 0 2 4	6		
							Decrease Increase			

**<u>S9.</u>** Forest plot for the meta-analysis of cross-sectional area subdivided by training type showing standardised mean differences (SMD) and 95% confidence intervals (CI).

Study	n	Mean	Post SD	n	Mean	Pre SD		SMD	[95% CI]	Weight
Aerobic training Standley et al. 2013 [124] Random effects model Heterogeneity: not applicable	9 9	92	18	9 9	90	15		0.11 0.11	[-0.81; 1.04] [-0.81; 1.04]	1.2% 1.2%
Concurrent training Vikmoen et al. 2016 [59] Random effects model Heterogeneity: not applicable	<b>11</b> 11	69	7	<mark>11</mark> 11	66	7		0.45 0.45	[-0.40; 1.30] [-0.40; 1.30]	1.4% 1.4%
Jump-based training Bohm et al. 2014 [21] Foure et al. 2010 [49] Houghton et al. 2013 [73] Kubo et al. 2007 [85] Kubo et al. 2017 [86] Laurent et al. 2020 [117] Random effects model Heterogeneity: $J^2 = 0\%$ , $p = NA$	14 9 7 10 11 11 73	82 57 79 59 65 62 56	13 13 9 7 11 10	14 9 7 10 11 11 73	80 56 70 57 66 62 56	15 12 7 9 8 11 10		0.14 0.13 - 1.12 0.20 -0.13 0.00 0.00 0.14	[-0.60; 0.88] [-0.80; 1.05] [-0.04; 2.28] [-0.67; 1.08] [-0.97; 0.71] [-0.84; 0.84] [-0.84; 0.84] [-0.19; 0.47]	1.9% 1.2% 0.8% 1.3% 1.5% 1.5% 9.7%
Resistance training Arampatzis et al. 2007 [19] Arampatzis et al. 2010 [20] Arampatzis et al. 2010 [20] Baptista et al. 2016 [95] Bohm et al. 2014 [21] Bohm et al. 2014 [21] Carnoll et al. 2014 [21] Fixsen et al. 2018 [63] Eriksen et al. 2018 [63] Eriksen et al. 2018 [63] Eriksen et al. 2014 [106] Foure et al. 2015 [72] Kongsgaard et al. 2007 [65] Kubo et al. 2000 [51] Kubo et al. 2000 [51] Kubo et al. 2000 [51] Kubo et al. 2000 [113] Kubo et al. 2000 [113] Kubo et al. 2000 [114] Kubo et al. 2000 [114] Kubo et al. 2010 [115] Kubo et al. 2017 [116] Kubo et al. 2013 [61] Malliaras et al. 2013 [61] MorMahon et al. 2013 [67] McMahon et al. 2013 [67] McMahon et al. 2013 [67] McMahon et al. 2013 [67] McMahon et al. 2014 [121] Quinlan et al. 2021 [12	11 11 11 12 23 22 14 12 14 14 9 11 01 11 11 11 12 12 8 8 8 8 9 9 9 9 10 010 10 8 9 9 9 9 11 9 10 11 11 11 11 12 12 8 8 8 8 8 9 9 9 9 10 10 10 11 11 11 11 12 12 14 12 12 14 10 11 11 11 11 11 11 11 11 11 11 11 11	$\begin{array}{c} 53\\ 53\\ 60\\ 56\\ 10\\ 10\\ 82\\ 83\\ 79\\ 115\\ 74\\ 97\\ 129\\ 123\\ 124\\ 149\\ 67\\ 722\\ 121\\ 118\\ 213\\ 215\\ 59\\ 73\\ 205\\ 78\\ 68\\ 68\\ 81\\ 74\\ 66\\ 118\\ 120\\ 98\\ 73\\ 77\\ 76\\ 81\\ 70\\ 257\\ 90\\ 85\\ 87\\ 89\\ 84\\ 82\\ 107\\ 37\\ 76\\ 61\\ 60\\ \end{array}$	$\begin{array}{c}15\\14\\35\\6\\1\\2\\22\\19\\10\\11\\4\\33\\22\\2\\29\\10\\11\\4\\33\\22\\29\\10\\11\\4\\33\\22\\29\\10\\11\\4\\33\\22\\29\\10\\10\\8\\8\\8\\8\\8\\8\\8\\22\\10\\9\\8\\9\\19\\19\\8\\13\\14\\9\\16\\13\\22\\6\\9\\5\\11\\22\\23\\4\\6\\17\\14\end{array}$	11 11 11 12 23 22 14 12 14 14 19 12 10 11 11 11 11 12 12 8 8 8 8 9 9 9 9 10 10 10 10 8 9 9 9 9 11 9 10 10 14 11 11 11 12 23 12 4 12 14 14 19 12 10 11 11 11 11 11 12 12 12 14 14 19 12 10 11 11 11 11 11 12 12 12 14 14 11 11 11 11 11 11 11 11 11 11 11	$\begin{array}{c} 50\\ 48\\ 58\\ 69\\ 9\\ 9\\ 78\\ 0\\ 75\\ 117\\ 700\\ 86\\ 2102\\ 211\\ 117\\ 140\\ 138\\ 68\\ 2117\\ 116\\ 2102\\ 261\\ 73\\ 204\\ 202\\ 78\\ 59\\ 66\\ 0\\ 72\\ 74\\ 559\\ 66\\ 0\\ 72\\ 74\\ 59\\ 66\\ 0\\ 72\\ 74\\ 59\\ 66\\ 0\\ 72\\ 74\\ 59\\ 66\\ 0\\ 84\\ 87\\ 89\\ 84\\ 64\\ 103\\ 62\\ 58\\ 84\\ 64\\ 103\\ 62\\ 58\\ 84\\ 64\\ 103\\ 62\\ 58\\ 84\\ 64\\ 103\\ 62\\ 58\\ 84\\ 64\\ 103\\ 62\\ 58\\ 84\\ 64\\ 103\\ 62\\ 58\\ 84\\ 64\\ 103\\ 62\\ 58\\ 84\\ 64\\ 103\\ 62\\ 58\\ 84\\ 64\\ 103\\ 62\\ 58\\ 84\\ 64\\ 103\\ 62\\ 58\\ 84\\ 64\\ 103\\ 62\\ 58\\ 84\\ 64\\ 103\\ 62\\ 58\\ 84\\ 64\\ 103\\ 62\\ 58\\ 84\\ 64\\ 103\\ 62\\ 58\\ 84\\ 86\\ 84\\ 87\\ 88\\ 84\\ 86\\ 84\\ 86\\ 86\\ 86\\ 86\\ 86\\ 86\\ 86\\ 86\\ 86\\ 86$	$\begin{array}{c} 15 \\ 13 \\ 34 \\ 38 \\ 1 \\ 3 \\ 1 \\ 1 \\ 3 \\ 1 \\ 1 \\ 3 \\ 1 \\ 1$		0.14 0.30 0.02 0.82 0.21 0.34 -0.06 0.33 0.34 -0.06 0.34 -0.07 0.06 0.34 -0.07 0.06 0.34 -0.07 0.44 0.56 -0.11 1.011 0.28 0.10 0.15 -0.22 0.01 0.15 -0.22 0.01 0.15 -0.22 0.01 0.15 -0.22 0.01 0.15 -0.22 0.01 0.15 -0.22 0.01 0.15 -0.22 0.01 0.15 -0.22 0.01 0.15 -0.22 0.01 0.15 -0.22 0.01 0.15 -0.22 0.01 0.15 -0.22 0.01 0.15 -0.22 0.01 0.15 -0.22 0.01 0.15 -0.22 0.01 0.16 0.08 0.21 0.06 0.08 0.21 0.06 0.03 0.21 0.06 0.33 0.21 0.06 0.33 0.21 0.22 0.00 0.08 0.21 0.00 0.08 0.21 0.00 0.08 0.21 0.00 0.08 0.21 0.00 0.08 0.21 0.00 0.08 0.21 0.00 0.08 0.21 0.00 0.03 0.21 0.22 0.00 0.03 0.21 0.22 0.00 0.03 0.21 0.22 0.00 0.03 0.21 0.22 0.01 0.22 0.01 0.06 0.03 0.21 0.22 0.03 0.03 0.21 0.22 0.03 0.21 0.22 0.03 0.21 0.22 0.03 0.21 0.22 0.03 0.21 0.22 0.03 0.21 0.22 0.03 0.21 0.22 0.03 0.21 0.22 0.03 0.21 0.22 0.03 0.21 0.22 0.03 0.21 0.22 0.03 0.21 0.22 0.00 0.22 0.03 0.21 0.22 0.03 0.21 0.22 0.08 0.10 0.22 0.03 0.21 0.22 0.08 0.10 0.22 0.08 0.10 0.22 0.08 0.10 0.22 0.08 0.10 0.22 0.08 0.10 0.22 0.08 0.14 0.22 0.08 0.10 0.21 0.22 0.08 0.104 0.01 0.02 0.08 0.01 0.00 1.04 1.04 0.23 0.21 0.22 0.08 0.10 0.21 0.02 0.08 0.10 0.21 0.02 0.08 0.01 0.02 0.03 0.03 0.01 0.02 0.03 0.03 0.03 0.03 0.01 0.00 0.04 0.14 0.23 0.21 0.22 0.08 0.14 0.22 0.08 0.14 0.22 0.08 0.14 0.22 0.08 0.14 0.23 0.21 0.22 0.20 0.21 0.22 0.22 0.22 0.23 0.24 0.24 0.25 0	$ \begin{bmatrix} -0.70; 0.98] \\ [-0.55; 1.14] \\ [-0.79; 0.88] \\ [-0.82; 0.85] \\ [0.22; 1.42] \\ [-0.37; 0.79] \\ [-0.45; 1.16] \\ [-0.52; 0.97] \\ [-0.45; 1.16] \\ [-0.52; 0.97] \\ [-0.47; 1.14] \\ [-0.86; 0.74] \\ [-0.56; 0.92] \\ [-0.22; 1.29] \\ [-0.22; 1.29] \\ [-0.22; 1.29] \\ [-0.22; 1.29] \\ [-0.23; 1.29] \\ [-0.30; 1.42] \\ [-0.30; 1.42] \\ [-0.30; 1.42] \\ [-0.30; 1.42] \\ [-0.30; 1.42] \\ [-0.30; 1.42] \\ [-0.30; 1.42] \\ [-0.30; 1.42] \\ [-0.30; 1.42] \\ [-0.30; 1.42] \\ [-0.30; 1.42] \\ [-0.30; 1.42] \\ [-0.30; 1.42] \\ [-0.30; 1.42] \\ [-0.30; 1.42] \\ [-0.30; 1.42] \\ [-0.30; 1.42] \\ [-0.70; 0.91] \\ [-0.70; 0.91] \\ [-0.73; 1.08] \\ [-0.77; 0.99] \\ [-0.77; 0.99] \\ [-0.76; 0.99] \\ [-0.76; 0.99] \\ [-0.76; 0.99] \\ [-0.76; 0.99] \\ [-0.76; 0.97] \\ [-0.67; 1.09] \\ [-0.76; 1.09] \\ [-0.76; 1.09] \\ [-0.76; 1.16] \\ [-0.65; 1.22] \\ [-1.04; 0.45] \\ [-0.67; 1.30] \\ [-0.72; 1.04] \\ [-0.95; 0.99] \\ [-0.72; 1.04] \\ [-0.95; 0.99] \\ [-0.72; 1.04] \\ [-0.95; 0.99] \\ [-0.72; 1.04] \\ [-0.92; 0.93] \\ [0.38; 1.71] \\ [0.24; 1.77] \\ [-0.84; 0.67] \\ [-0.60; 0.88] \\ [0.12; 0.34] \\ \end{bmatrix}$	1.5% 1.5% 1.5% 1.5% 2.9% 3.1% 1.6% 1.9% 1.6% 1.9% 1.6% 1.5% 1.4% 1.5% 1.4% 1.5% 1.4% 1.5% 1.4% 1.5% 1.4% 1.5% 1.4% 1.1% 1.9% 1.2% 1.2% 1.2% 1.2% 1.2% 1.2% 1.4% 1.3% 1.4% 1.3% 1.4% 1.5% 1.4% 1.2% 1.4% 1.5% 1.4% 1.2% 1.2% 1.2% 1.2% 1.2% 1.2% 1.2% 1.2% 1.2% 1.2% 1.2% 1.2% 1.5% 1.5% 1.5% 1.5% 1.5% 1.5% 1.5% 1.5% 1.9% 1.5% 1.5% 1.5% 1.5% 1.5% 1.5% 1.5% 1.5% 1.5% 1.5% 1.5% 1.5% 1.5% 1.5% 1.5% 1.5% 1.9% 1.5%
Random effects model Heterogeneity: $l^2 = 0\%$ , $p = 1.00$ Residual heterogeneity: $l^2 = 0\%$ , $p$	7 <b>51</b> = 1.00			752			-2 -1 0 1 2 Decrease Increase	0.22	[ U.12; 0.33]	100.0%

**<u>S10.</u>** Descriptive statistics for sub-group analyses in Figure 6, showing mean, 95% confidence intervals and range of quantitative grouping variables.

Variable	Sub-group	Ν	Mean	95%CI	Range
Intensity (%)	Low	7	57.86	55.88 - 59.84	55 - 60
	High	54	82.02	79.54 - 84.50	70 - 120
Strain (%)	Low	2	2.99	2.96 - 3.01	2.97 - 3.00
	High	6	6.12	5.33 - 6.91	4.72 - 6.90
Volume (au)	Low	23	1715.87	1332.73 - 2099.01	280 - 3060
	High	33	5692.73	3936.78 - 7448.68	3200 - 32400
Duration (weeks)	<12	12	7.33	6.42 - 8.25	4 - 10
	≥12	40	13.40	11.44 - 15.36	12 - 52

<u>S11.</u> Forest plot for the meta-analysis of stiffness subdivided by protocol intensity (high versus low) showing standardised mean differences (SMD) and 95% confidence intervals (CI) of resistance training studies.

High Intervalip Arampatize et al. 2010 [2]         13         315         53         13         272         48           Arampatize et al. 2010 [2]         11         228         40         11         168         37         152         1052 [249]         157           Bohm et al. 2014 [21]         14         339         254         14         336         158         14         136         158         14         136         144 <td< th=""><th>Study</th><th>n</th><th>Mean</th><th>Post SD</th><th>n</th><th>Mean</th><th>Pre SD</th><th></th><th>SMD</th><th>[95% CI]</th><th>Weight</th></td<>	Study	n	Mean	Post SD	n	Mean	Pre SD		SMD	[95% CI]	Weight
Abracht erial 2013 [5]       13       315       53       13       272       48       0.82       0.022       163       187         Arampatzie erial 2007 [19]       11       228       40       11       168       37       0.79       169       166       1.77       166       1.77       166       1.77       166       1.77       166       1.77       166       1.77       166       2.77       170       170       170       171       183       187       2.82       1.02       1.77       166       1.77       167       2.77       170       171       183       187       171       183       187       123       2.82       1.20       0.30       1.51       1.81       1.77       166       1.77       176       171       16       1.81       1.91       1.92       1.92       1.93 </td <td>High Intensity</td> <td></td>	High Intensity										
Arampatis et al. 2007 [19]         11         238         40         11         168         37         -         152         1625 [249]         157           Bohm ettal. 2014 [21]         12         457         132         12         2370         132         17         12         158         17         141         158         157         168         177         168         177         168         177         168         177         168         177         168         177         168         177         168         177         168         177         168         177         168         177         168         177         168         177         168         177         168         177         168         177         168         177         168         168         177         168         178         168         178	Albracht et al. 2013 [5]	13	315	53	13	272	48		0.82	[ 0.02; 1.63]	1.9%
Adampaize etal. 2010 [c2]         11         302         52         11         258         32         0.78         10.88         100         11.43         11.44 <t< td=""><td>Arampatzis et al. 2007 [19]</td><td>11</td><td>228</td><td>40</td><td>11</td><td>168</td><td>37</td><td></td><td>1.52</td><td>[ 0.55; 2.49]</td><td>1.5%</td></t<>	Arampatzis et al. 2007 [19]	11	228	40	11	168	37		1.52	[ 0.55; 2.49]	1.5%
Dotm         etal.         Dots         Etal.         District         Total.         Total. <thtotal.< th=""></thtotal.<>	Arampatzis et al. 2010 [20] Rohm et al. 2014 [21]	11	302	57	11	258	51 132		0.79	[-0.09; 1.66]	1.7%
Dorb         Caroli et al. 2014 [21]         12         579         772         12         377         106           Caroli et al. 2011 [62]         12         333         133         112         2228         1320         0.30         0.52         [0.57]         1.10         119           Caroli et al. 2011 [63]         10         291         125         10         240         90         0.33         0.28         [0.37]         1.19         [0.38]         1.19         [0.38]         1.19         [0.38]         1.19         [0.38]         1.19         [0.38]         1.19         [0.38]         1.19         [0.38]         1.19         [0.38]         1.19         [0.38]         1.19         [0.38]         1.19         [0.38]         1.19         [0.38]         1.19         [0.38]         1.19         [0.38]         1.11         [0.38]         1.11         [0.38]         1.11         [0.38]         1.11         [0.38]         1.11         [0.48]         1.11         [0.48]         1.11         [0.48]         1.11         [0.48]         1.11         [0.48]         1.11         [0.48]         1.11         [0.48]         1.11         [0.48]         1.11         [0.48]         1.11         [0.48] <td< td=""><td>Bohm et al. 2014 [21]</td><td>14</td><td>539</td><td>254</td><td>14</td><td>336</td><td>89</td><td></td><td>1.04</td><td>[-0.10, 1.47]</td><td>1.0%</td></td<>	Bohm et al. 2014 [21]	14	539	254	14	336	89		1.04	[-0.10, 1.47]	1.0%
Behm etal. 2021 [17] Carnoli etal. 2021 [17] Carnoli etal. 2021 [17] Carnoli etal. 2021 [17] Enksen etal. 2016 [17] Enksen etal. 2018 [16] Duday etal. 2021 [16] Enksen etal. 2018 [16] Enksen etal. 2018 [16] 10 420 1075 11 406 130 Enksen etal. 2018 [16] 10 422 112 Enksen etal. 2018 [16] 10 422 112 11 10 422 112 Enksen etal. 2018 [16] 10 422 112 Enksen etal. 2008 [16] 10 423 148 10 42 10 42	Bohm et al. 2014 [21]	12	579	172	12	377	106		1.37	[ 0.46; 2.27]	1.7%
Carroll et al. 2011 [62] 12 3333 1334 12 2928 1320 Carroll et al. 2016 [71] 14 666 158 14 402 103 Ducky et al. 2006 [16] 10 291 125 10 249 99 Carroll et al. 2016 [63] 19 240 103 9 260 1530 Enksen et al. 2016 [63] 12 12 1800 633 11 160 656 1 Carroll et al. 2016 [72] 15 350 15 15 12 03 4 16 12 356 1 Carroll et al. 2016 [72] 15 350 15 15 12 03 4 16 12 356 1 Carroll et al. 2016 [73] 18 106 12 356 1 Carroll et al. 2007 [16] 18 106 13 3 8 66 21 1 Carroll et al. 2007 [16] 18 106 13 3 8 66 21 1 Carroll et al. 2007 [17] 18 106 13 38 66 21 1 Carroll et al. 2007 [17] 18 106 13 8 66 2 1 Carroll et al. 2007 [17] 18 106 13 8 66 2 1 Carroll et al. 2007 [17] 18 106 13 8 66 2 1 Carroll et al. 2007 [17] 18 106 13 8 66 2 1 Carroll et al. 2007 [17] 18 106 13 8 66 2 1 Carroll et al. 2007 [17] 18 106 13 8 66 2 1 Carroll et al. 2007 [17] 18 106 13 8 66 2 1 Carroll et al. 2007 [17] 18 106 13 8 66 2 1 Carroll et al. 2007 [17] 18 106 13 8 66 2 1 Carroll et al. 2007 [17] 18 106 13 8 66 2 1 Carroll et al. 2007 [17] 18 106 13 8 67 12 2 Carroll et al. 2007 [17] 18 106 13 8 67 10 22 Carroll et al. 2008 [12] 28 178 66 8 179 559 Carroll et al. 2008 [12] 18 178 66 8 179 559 Carroll et al. 2008 [13] 9 86 36 9 79 2 21 Carroll et al. 2008 [14] 10 166 44 10 128 26 Carroll et al. 2008 [14] 10 166 64 10 128 26 Carroll et al. 2008 [14] 10 166 67 19 Carroll et al. 2008 [14] 10 16 66 10 67 19 Carroll et al. 2008 [14] 10 18 36 892 10 1071 639 Carroll et al. 2008 [14] 10 18 36 892 10 1071 639 Carroll et al. 2008 [14] 10 183 892 10 1071 639 Carroll et al. 2008 [14] 10 183 892 10 1071 639 Carroll et al. 2008 [14] 10 183 892 110 1071 639 Carroll et al. 2017 [16] 9 1447 440 9 1289 544 Carroll et al. 2018 [17] 10 241 77 115 9 183 45 Carroll et al. 2018 [18] 10 250 860 10 1327 5 Carroll et al. 2018 [18] 11 273 11 1277 117 12 12 10 34 14 13 10 32 5 Carroll et al. 2018 [17] 10 251 12 271 15 12 271 15 12 271 17 15 10 177 Carroll et al. 2018 [17] 10 250 166 10 1367 360 Carroll et al. 2018 [17] 10 250 166 10 1367 360 Carroll	Bohm et al. 2021 [17]	13	111	59	13	85	36		0.52	[-0.27; 1.30]	1.9%
Centron et al. 2001 [17] 14 955 158 14 402 103 151 10 231 125 10 249 350 103 126 128 127 128 17 25 10 249 350 1052 103 128 100 1051 128 17 26 128 17 26 17 10 102 14 102 015 11 10 102 14 102 015 11 10 102 14 10 102 15 14 10 102 14 10 102 15 14 10 102 14 11 11 15 12 14 11 15 12 14 11 15 12 14 11 15 12 14 11 15 12 14 11 15 12 14 14 10 102 14 11 11 15 12 14 14 10 102 14 11 11 15 12 14 14 10 102 14 11 11 15 12 14 14 10 102 14 11 11 15 12 14 14 10 102 14 11 11 15 12 14 14 10 102 14 11 11 15 12 14 14 10 102 14 11 11 15 12 14 14 10 102 14 11 11 15 12 14 14 11 15 12 14 14 11 15 12 14 14 11 15	Carroll et al. 2011 [62]	12	3335	1334	12	2928	1320		0.30	[-0.51; 1.10]	1.9%
Draws         Hat         Dotation         Dist	Centner et al. 2019 [71]	14	565	158	14	402	103		1.19	[0.38; 2.01]	1.9%
Eriksen et al. 2018 [63]       12       1900       693       12       1800       624         Eriksen et al. 2018 [64]       10       420       975       10       460       1360         Kongsgaard et al. 2007 [65]       12       4213       1406       12       3676       1306       0.38       [0.43; 119]       137         Kubo et al. 2002 [111]       8       196       24       8       51       22       0.29       [0.66; 112]       1.31       [0.42; 119]       1.65         Kubo et al. 2006 [112]       8       196       6.66       8       1730       559       -0.02       [0.68; 112]       1.65         Kubo et al. 2006 [113]       9       22       40       9       81       22       -0.29       [0.66; 117]       1.65         Kubo et al. 2006 [13]       9       122       40       9       81       26       -1.17       [0.15; 2.18]       1.55         Kubo et al. 2006 [13]       9       199       7.67       6.62       -0.02       [-0.37; 1.13]       1.65       Kubo et al. 2006 [14]       10       1.65       Kubo et al. 2006 [14]       10       1.65       Kubo et al. 2006 [14]       10       1.65       Kubo et al. 2007 [16]       1.6	Friksen et al. 2009 [103]	9	3890	2430	9	249	1530		0.30	[-0.33: 1.58]	1.7%
Enksen et al. 2019 [rd] Enksen et al. 2018 [rd] Enksen et al. 2018 [rd] Enksen et al. 2018 [rd] Enksen et al. 2018 [rd] Enksen et al. 2001 [sf] Kube et al. 2002 [sf] B 106 33 8 66 21 Enksen et al. 2002 [sf] B 106 33 8 66 21 Enksen et al. 2002 [sf] B 106 33 8 66 21 Enksen et al. 2002 [sf] B 106 33 8 66 21 Enksen et al. 2002 [sf] B 106 61 8 18 Enksen et al. 2006 [sf] B 106 61 8 18 Enksen et al. 2006 [sf] B 106 61 8 18 Enksen et al. 2006 [sf] B 122 423 8 144 Enksen et al. 2007 [sf] B 122 423 8 14 Enksen et al. 2008 [sf] B 122 42 8 8 51 Enksen et al. 2008 [sf] B 122 42 8 8 51 Enksen et al. 2008 [sf] B 122 42 8 8 51 Enksen et al. 2008 [sf] B 122 42 8 8 51 Enksen et al. 2008 [sf] B 122 42 8 8 51 Enksen et al. 2008 [sf] B 122 42 8 8 51 Enksen et al. 2008 [sf] B 122 42 8 8 51 Enksen et al. 2008 [sf] B 122 42 8 8 51 Enksen et al. 2008 [sf] B 122 42 8 8 51 Enksen et al. 2008 [sf] B 122 42 8 8 51 Enksen et al. 2008 [sf] B 122 42 8 8 51 Enksen et al. 2008 [sf] B 122 42 8 8 51 Enksen et al. 2008 [sf] B 122 42 8 9 44 Enksen et al. 2009 [sf] H 10 10 36 10 67 19 467 Enksen et al. 2009 [sf] H 10 10 36 10 67 19 467 Enksen et al. 2009 [sf] H 10 110 36 10 67 19 467 Enksen et al. 2009 [sf] H 10 125 20 H 11 10 255 Enksen et al. 2009 [sf] B 104 37 10 72 20 H 128 54 Enksen et al. 2018 [sf] B 104 37 10 72 20 H 128 54 Enksen et al. 2018 [sf] H 11 32 9 11 24 S 20 H 11 32 9 11 24 S 20 H 11 32 9 11 24 S 20 H 20	Eriksen et al. 2018 [63]	12	1900	693	12	1800	624	-	0.15	[-0.65; 0.95]	1.9%
Geremia et al. 2018 [72] 15 350 59 15 192 36 Kay et al. 2016 [51] 13 13 3 13 10 2 Kubo et al. 2002 [51] 8 106 12 3676 1306 Kubo et al. 2002 [51] 8 106 33 8 66 21 1.31 [0.20, 242] 1.33 Kubo et al. 2002 [11] 8 34 10 8 26 9 Kubo et al. 2006 [112] 8 159 24 8 51 22 0.29 [0.68; 1.29] 1.55 Kubo et al. 2006 [113] 9 86 660 8 1790 559 4 8 51 22 0.29 [0.68; 1.29] 1.55 Kubo et al. 2006 [113] 9 162 40 8 61 29 0.050 [113] 9 164 660 8 1790 559 0.050 [113] 9 164 71 0 9 46 12 0.050 [113] 9 164 71 0 9 46 12 0.050 [114] 10 116 38 100 67 19 0.050 [114] 10 116 38 100 67 19 0.051 [0.050 [114] 10 168 100 67 19 0.052 [0.075 [0.161 67] 177 Kubo et al. 2009 [114] 10 116 38 100 1071 639 0.058 [0.40; 1.41 10, 1.41 11 18 Kubo et al. 2009 [114] 10 1253 410 10 999 426 Kubo et al. 2009 [114] 10 11253 410 10 999 426 Kubo et al. 2009 [114] 10 11253 410 10 999 426 Kubo et al. 2009 [114] 10 1253 410 10 999 426 Kubo et al. 2010 [115] 10 41 13 10 32 5 0.68 [0.42; 1.44] 177 Kubo et al. 2010 [115] 10 41 37 8 69 19 1.12 [0.42; 2.04 1.43 Kubo et al. 2017 [116] 9 144 4355 9 104 4384 1.06 [0.05; 2.06 1.55 Kubo et al. 2017 [116] 9 144 4355 9 104 4384 1.06 [0.05; 2.06 1.55 Kubo et al. 2017 [161] 9 2438 635 10 1642 898 0.78 [0.31; 7.7] 1.66 Mailaras et al. 2017 [161] 9 2438 635 10 1642 898 0.78 [0.31; 7.7] 1.66 Mailaras et al. 2017 [161] 10 2508 1066 10 1387 360 0.74 [0.13; 1.70] 1.67 Mailaras et al. 2017 [161] 10 2508 1066 10 1387 360 0.74 [0.31; 1.70] 1.67 Mailaras et al. 2017 [161] 10 2508 1066 10 1387 360 0.74 [0.31; 1.70] 1.67 Mailaras et al. 2018 [66] 15 667 265 15 560 177 0.77 [0.22; 1.51] 2.23 Mailaras et al. 2018 [66] 15 667 265 15 560 177 0.36 [0.49; 1.20] 1.67 Mailaras et al. 2018 [66] 15 667 265 15 560 177 0.36 [0.49; 1.20] 1.67 Mailaras et al. 2018 [66] 15 667 265 15 560 177 0.66 [0.70; 1.22] 1.75 Mailaras et al. 2018 [66] 15 6	Eriksen et al. 2019 [64]	10	4420	1075	10	4060	1360		0.28	[-0.60; 1.16]	1.7%
Kay et al. 2001 [110]       13       3       13       10 <th10< th="">       10       10       <th1< td=""><td>Geremia et al. 2018 [72]</td><td>15</td><td>350</td><td>59</td><td>15</td><td>192</td><td>36</td><td></td><td>3.15</td><td>[ 2.03; 4.26]</td><td>1.3%</td></th1<></th10<>	Geremia et al. 2018 [72]	15	350	59	15	192	36		3.15	[ 2.03; 4.26]	1.3%
Nubspace         Part of the second seco	Kay et al. 2016 [110]	13	13	1406	13	10	1206		1.10	[0.27; 1.94]	1.8%
kub et al.         2002 [111]         B         34         10         B         28         9         0         0         [0.32] (1.3]         1.4           Kub et al.         2006 [112]         B         579         24         66         1.790         559           Kub et al.         2006 [113]         9         186         36         9         79         21         -0.20         [.0.33, 17.3]         166           Kub et al.         2006 [163]         9         122         40         9         81         26         -0.21         [.0.33, 17.3]         166           Kub et al.         2006 [96]         9         159         23         9         46         19         -0.62         [.0.33, 17.3]         166           Kub et al.         2009 [141]         10         110         36         10         67         19         -1.43         [.0.43, 2.44]         155           Kub et al.         2009 [141]         10         1133         10         32         5         -0.66         [.0.02, 17.7]         166         10.72         20         -0.75         [.0.61, 17.7]         16.8         16.0         10.72         20         -0.75         [.0.61, 17.7]	Kubo et al. 2001 [51]	8	106	33	8	68	21		1.31	[-0.43, 1.13]	1.3%
kubo et al.         2006 [112]         8         59         24         8         51         22	Kubo et al. 2002 [111]	8	34	10	8	26	9		0.80	[-0.23; 1.83]	1.4%
Kubo et al.         2006 [112]         8         1786         660         8         1790         559          -0.01         [-0.09, 0.37]         1.5.           Kubo et al.         2006 [113]         9         122         40         9         81         26          0.25         [-0.09, 0.37]         1.6.           Kubo et al.         2006 [96]         9         1819         710         9         1676         6622          0.20         [-0.33, 1.31]         166           Kubo et al.         2009 [141]         10         100         36         10         67         19           0.75         [-0.06, 16.77]         17.7         I60         17.7         I60         17.7         I60         16.71         17.7         I60         17.7         I60         16.71         17.7         I60         17.7         I60         17.7         I60         17.7         I60         17.7         I60         17.8         I60         17.7         I60         I60.71         17.7         I60         I60         I60.75         I60         I60.75         I60         I60.75         I60         I60.75         I60         I60         I60.	Kubo et al. 2006 [112]	8	59	24	8	51	22		0.29	[-0.69; 1.28]	1.5%
Kubo et al.         Zobe [113]         9         8b         3b         9         7         21         7         0.25         [208]         1.11         1.5           Kubo et al.         Zobe [96]         9         59         23         9         46         19         662         0.25         [208]         1.11         1.65           Kubo et al.         Zobe [96]         9         59         23         9         46         19         676         662         0.26         [-0.073]         1.13         1.66           Kubo et al.         Zobe [141]         10         10         36         67         19         -1.43         10.43         10.43         10.43         10.43         10.43         10.43         10.43         10.43         10.44         10.65         10.66         10.71         17.6         10.66         10.71         17.6         10.66         10.44         10.66         10.71         17.6         10.66         10.71         17.6         10.65         10.66         10.71         17.6         10.65         10.66         10.71         17.6         10.66         10.05         10.66         10.71         10.76         10.71         10.76         10.71 <t< td=""><td>Kubo et al. 2006 [112]</td><td>8</td><td>1786</td><td>660</td><td>8</td><td>1790</td><td>559</td><td></td><td>-0.01</td><td>[-0.99; 0.97]</td><td>1.5%</td></t<>	Kubo et al. 2006 [112]	8	1786	660	8	1790	559		-0.01	[-0.99; 0.97]	1.5%
Nube et al. 2006 [16]912910201.11[10, 13, 2.16]1.23Kubo et al. 2006 [86]91819710916766620.20[0, 73, 1.13]168Kubo et al. 2007 [85]101664410128260.20[0, 73, 1.13]168Kubo et al. 2008 [114]1011036106719143[0, 43, 2.44]1.75Kubo et al. 2008 [114]1018338921010716390.94[0, 01, 1.88]1.66Kubo et al. 2010 [115]104113103250.85[0, 08, 1.77]1.66Kubo et al. 2010 [115]104113103250.85[0, 08, 1.77]1.67Kubo et al. 2010 [115]10414355910043841.66[0.05, 2.06]1.56Kubo et al. 2017 [116]9147744012895440.32[0, 61, 1.76]1.77Kubo et al. 2017 [166]1132911245-1.77[0, 25, 2.09]Maliaras et al. 2013 [61]102536850101822898-0.78[0, 31, 1.70]1.67Maliaras et al. 2013 [66]14595101145921180.31[0, 31, 1.70]1.67Massey et al. 2018 [66]14312263214260446-0.771.0021.67Massey et al. 201	Kubo et al. 2006 [113]	9	122	36	9	79	21		0.25	[-0.68; 1.17]	1.6%
Kubo etal. 2006 [66]91819710916766620.200.2010.7311318Kubo etal. 2007 [14]10166441012826-1.0110.07, 186]1.85Kubo etal. 2008 [114]1010361077200.75[-0.16, 167]1.75Kubo etal. 2008 [114]101283892101076390.75[-0.16, 167]1.75Kubo etal. 2009 [114]101283410109994260.88[-0.32, 148]1.77Kubo etal. 2010 [115]1096371072200.75[-0.16, 167]1.77Kubo etal. 2010 [115]1096371072200.75[-0.16, 167]1.77Kubo etal. 2017 [116]9144744091289544-0.32[-0.61, 126]1.55Kubo etal. 2017 [16]9145744091289544-0.32[-0.61, 126]1.55Kubo etal. 2017 [16]9145744091289544-0.32[-0.61, 126]1.56Maliaras etal. 2013 [61]1025081066101387360-1.35[-0.36, 2.34]1.55Maliaras etal. 2013 [66]1455210114552186-0.32[-0.71, 0.77]2.05Massey etal. 2018 [66]1431226324740.36 <td>Kubo et al. 2006 [113]</td> <td>9</td> <td>59</td> <td>23</td> <td>9</td> <td>46</td> <td>19</td> <td></td> <td>0.62</td> <td>[-0.33: 1.57]</td> <td>1.5%</td>	Kubo et al. 2006 [113]	9	59	23	9	46	19		0.62	[-0.33: 1.57]	1.5%
kubo etal. 2007 [85]10166441012826Kubo etal. 2009 [114]109637107220Kubo etal. 2009 [114]1018389210107639Kubo etal. 2009 [114]101253410109994260.75 $0.011$ : 1.88Kubo etal. 2010 [115]10411310325 $0.86$ $0.021$ : 1.481.77Kubo etal. 2010 [115]104137869191.12 $0.06$ ; 2.061.55Kubo etal. 2017 [116]91447355910043841.06 $0.065$ ; 2.061.55Kubo etal. 2017 [116]91447355910043841.06 $0.065$ ; 2.061.55Kubo etal. 2017 [116]9144744012829887.8 $0.03$ ; 2.031.55Maliaras etal. 2013 [61]1025368501018229887.8 $0.03$ ; 2.031.55Maliaras etal. 2013 [61]10253615550177 $0.52$ $0.21$ ; 1.252.17Massey etal. 2018 [66]15552118 $0.03$ $0.67$ ; 1.0772.00Massey etal. 2018 [66]15329575152.88444 $0.03$ $0.071$ ; 0.7712.00Massey etal. 2018 [66]16322544 $0.03$ $0.71$ ; 0.7712.00 $0.98$ $0.08$ $0.03$ ; 2.03 $1.771$ Massey etal	Kubo et al. 2006 [96]	9	1819	710	9	1676	662		0.20	[-0.73; 1.13]	1.6%
Kubo etal. 2009 [114]1011036106719111010133802107220Kubo etal. 2009 [114]1018338921010716390.94(0.01; 1.88]167Kubo etal. 2010 [115]104113103250.94(0.01; 1.88]167Kubo etal. 2010 [115]104113103250.98(0.01; 1.88]167Kubo etal. 2010 [115]109637107220-0.75(-0.6; 1.67]177Kubo etal. 2010 [115]914435591004384-0.85(-0.08; 1.77]178Kubo etal. 2017 [116]9144744091289544-0.82(-0.6; 1.67]177Kubo etal. 2017 [16]9145744091289544-0.32(-0.6; 1.67]Maliaras etal. 2013 [61]1025.081066101387360-0.78(-0.13; 1.70]Massey etal. 2013 [61]1025.081066101387360-0.78(-0.13; 1.70]Massey etal. 2018 [66]1453255560177-0.52(-0.21; 1.52]2.10Massey etal. 2018 [66]15323575152835444-0.77(-0.22; 1.61]2.00Mohahon etal. 2018 [66]15323575152835444-0.77(-0.21; 1.51]2.00 <td>Kubo et al. 2007 [85]</td> <td>10</td> <td>166</td> <td>44</td> <td>10</td> <td>128</td> <td>26</td> <td></td> <td>1.01</td> <td>[ 0.07; 1.96]</td> <td>1.6%</td>	Kubo et al. 2007 [85]	10	166	44	10	128	26		1.01	[ 0.07; 1.96]	1.6%
Kubo et al. 2009 [114]109637107220Kubo et al. 2009 [114]10125341010999426Kubo et al. 2010 [115]10411310325Kubo et al. 2010 [115]109637107220Kubo et al. 2010 [115]109637107220Kubo et al. 2010 [88]81043786919Kubo et al. 2012 [89]9277111918345Kubo et al. 2017 [116]9144135591004384Kubo et al. 2017 [116]914474401288544Kubo et al. 2017 [86]1132911245Maliaras et al. 2013 [61]102536850101822888Maliaras et al. 2013 [61]10253610114592117Massey et al. 2018 [66]1459510114592118Massey et al. 2018 [66]1431226371552605146Massey et al. 2018 [66]14312263716283Massey et al. 2018 [66]14312263716283Massey et al. 2018 [66]14312263716283Massey et al. 2018 [66]14312263716283Massey et al. 2018 [66]14312637305641Mokhon et al. 2018	Kubo et al. 2009 [114]	10	110	36	10	67	19		1.43	[ 0.43; 2.44]	1.5%
Nubbe etal. 2009 [114]1016336521010106336531010633Kubbe etal. 2010 [115]104113103250.65 $[-0.02, 14.8]$ 17.7Kubb etal. 2010 [115]1096371072200.75 $[-0.61, 16.7]$ Kubb etal. 2012 [89]9927.7111913345-10.6 $[0.05, 22.6]$ 1.5Kubb etal. 2017 [116]9144435591004384-10.6 $[0.05, 22.6]$ 1.6Kubb etal. 2017 [16]9144744091289544-00.3 $[-0.61, 16.7]$ Kubb etal. 2017 [16]9123363891560793-11.3 $[0.03, 22.03]$ 1.5Mallaras etal. 2013 [61]1025081066101387360-71.35 $[0.36, 2.34]$ 1.5Mallaras etal. 2013 [66]143122625155601770.52 $[-0.21, 1.12]$ 2.1Massey etal. 2018 [66]1431226254440.77 $[0.22, 1.51]$ 2.0Massey etal. 2018 [66]1431226254440.77 $[0.22, 1.51]$ 2.0Moklahon etal. 2013 [67]10122159410916441-0.56 $[-0.34, 1.46]$ 1.77Moklahon etal. 2018 [66]88673058619204-0.77 $[0.22, 1.51]$ <	Kubo et al. 2009 [114]	10	96	37	10	72	20		0.75	[-0.16; 1.67]	1.7%
Lubo et al. 2010 [115]101012.33103252Kubo et al. 2010 [115]109637107220 $0.75$ $[-0.16; 1.67]$ 17.7Kubo et al. 2012 [189]9277111918345 $-1.06$ $[0.05; 2.06]$ 1.55Kubo et al. 2017 [116]9141435591004384 $$ $1.06$ $[0.05; 2.06]$ 1.55Kubo et al. 2017 [16]9145744091289544 $$ $0.32$ $[-0.61; 1.26]$ 166Malliaras et al. 2013 [61]102536850101822888 $$ $1.03$ $[0.03; 2.03]$ 159Malliaras et al. 2013 [61]102536850101822888 $$ $1.35$ $[-0.71; 0.77]$ $2.02$ Massey et al. 2018 [66]1459510114592118 $$ $0.36$ $[-0.21; 1.25]$ $2.17$ Massey et al. 2018 [66]155239575152825444 $-0.77$ $0.52$ $[-0.21; 1.25]$ $2.17$ Mokahon et al. 2018 [66]143122632142605446 $0.77$ $0.52$ $[-0.21; 1.25]$ $2.17$ Mokahon et al. 2018 [66]8151739081132294 $-0.56$ $[-0.34; 1.46]$ $1.79$ Mokahon et al. 2018 [68]887058619204 $0.72$ $[-0.51; 0.93]$ $2.11$ Mokahon et al. 2018 [	Kubo et al. 2009 [114]	10	1253	410	10	999	426		0.94	[ 0.01, 1.00] [-0.32:1.48]	1.0%
kubo et al. 2010 [115]109637107220 $  0.75$ $[-0.16; 1.67]$ $1.75$ Kubo et al. 2010 [88]81043786919 $ 1.12$ $[0.04; 2.00]$ $1.43$ Kubo et al. 2017 [116]9144135591004384 $ 1.06$ $[1.05; 2.06]$ $1.55$ Kubo et al. 2017 [16]9144744091289544 $ 0.32$ $[-0.6; 1.67]$ $1.75$ Malliaras et al. 2013 [61]102536850101822898 $ 0.78$ $[-0.13; 1.70]$ $1.66$ Malliaras et al. 2013 [61]102536850101822898 $ 0.78$ $[-0.13; 1.70]$ $1.66$ Malliaras et al. 2013 [66]14355101822898 $ 0.78$ $[-0.13; 1.70]$ $1.66$ Malliaras et al. 2018 [66]14312262515560 $1.77$ $0.52$ $[-0.21; 1.25]$ $2.17$ Massey et al. 2018 [66]14312262514 $2.254$ 444 $ 0.52$ $[-0.21; 1.25]$ $2.17$ McMahon et al. 2018 [66]143122525152.835444 $ 0.56$ $[-0.34; 1.46]$ $1.79$ McMahon et al. 2018 [67]10122159410916441 $ 0.56$ $[-0.23; 1.16]$ $1.42$ $0.26$ $[-0.34; 1.46]$ McMahon et al. 2018 [54]14<	Kubo et al. 2010 [115]	10	41	13	10	32			0.85	[-0.08; 1.77]	1.6%
Kubo et al. 2010 [88]81043786919Kubo et al. 2017 [86]92771119183451.02 $[0.05, 2.06]$ 1.55Kubo et al. 2017 [116]91447355910043840.05 $[0.05, 2.06]$ 1.55Kubo et al. 2017 [61]1025368501018228981.03 $[0.05, 2.06]$ 1.55Malliaras et al. 2013 [61]1025368501018228981.03 $[0.05, 2.03]$ 1.56Maliaras et al. 2013 [61]1025368501018228981.35 $[0.36, 2.34]$ 1.56Massey et al. 2018 [66]14455101145921180.52 $[-0.21; 1.25]$ 2.15Massey et al. 2018 [66]1431226321426054460.92 $[1.03, 1.70]$ 1.96Massey et al. 2018 [66]15687285155601770.52 $[-0.21; 1.25]$ 2.15Massey et al. 2018 [66]143122633111167353117652421.28McMahon et al. 2018 [67]101221594109164410.76 $[-0.01; 2.12]$ 1.44McMahon et al. 2018 [68]88730081132294	Kubo et al. 2010 [115]	10	96	37	10	72	20		0.75	[-0.16; 1.67]	1.7%
Kubo et al. 2017 [116]9141435591004384Kubo et al. 2017 [116]9141435591004384Kubo et al. 2017 [16]9141435591004384Kubo et al. 2017 [16]9143744091289544Kubo et al. 2017 [16]1132911245Malliaras et al. 2013 [61]10253863691560793Malliaras et al. 2013 [61]102538666101822898Malliaras et al. 2018 [66]1459510114592118Massey et al. 2018 [66]145871066101387360Massey et al. 2018 [66]1431226321426054460.92[0.13, 1.70]1.97Massey et al. 2018 [66]1532395751528354440.77[0.02, 1.51]2.01McMahon et al. 2013 [67]10122159410916441-0.56[-0.34; 1.46]1.77McMahon et al. 2018 [68]888730586192040.98[-0.08, 2.03]1.49Onambélé et al. 2008 [120]124023122613-0.72[-0.11; 1.55]1.65Vaugh et al. 2018 [64]14523531435953-0.28[-0.44; 1.22]1.83Kordsogaard et al. 2018 [67]11 <td< td=""><td>Kubo et al. 2010 [88]</td><td>8</td><td>104</td><td>37</td><td>8</td><td>69</td><td>19</td><td></td><td>1.12</td><td>[ 0.04; 2.20]</td><td><mark>1.4%</mark></td></td<>	Kubo et al. 2010 [88]	8	104	37	8	69	19		1.12	[ 0.04; 2.20]	<mark>1.4%</mark>
Nubb et al. 2017 [116]9144733591004364Kubb et al. 2017 [16]9145744091289544-1.05[0.05, 2.06]1.65Malliaras et al. 2013 [61]102536850101822898-1.07[0.05, 2.06]1.65Malliaras et al. 2013 [61]102536850101822898-0.78[-0.13; 1.70]1.65Malliaras et al. 2013 [66]1459510114592118-0.33[-0.71; 0.77]2.00Massey et al. 2018 [66]143122632142605446-0.92[0.13; 1.70]1.97Massey et al. 2018 [66]15687285155601770.52[-0.31; 1.70]1.97Massey et al. 2018 [66]15323957152835444-0.77[0.02; 1.51]2.00McMahon et al. 2013 [67]10122159410916441-0.56[-0.34; 1.46]1.77McMahon et al. 2018 [68]8151739081132294-1.05[-0.11; 1.55]1.48Seymes et al. 2008 [102]124023122613-0.27[-0.11; 1.55]1.48Seymes et al. 2008 [54]14523531435953-0.28[-0.49; 1.20]1.44Waugh et al. 2018 [54]1454149<	Kubo et al. 2012 [89]	9	277	111	9	183	45		1.06	[ 0.05; 2.06]	1.5%
Nubbe et al. 2017 [66]11321631701231245Malliaras et al. 2013 [61]1025366501018228981.03 $[.0.03, 2.03]$ 1.55Malliaras et al. 2013 [61]1025368501018228980.78 $[.0.13, 1.70]$ 1.66Malliaras et al. 2018 [66]14595101145921180.03 $[.0.32, 2.34]$ 1.55Massey et al. 2018 [66]1431226321426054460.92 $[.0.13, 1.70]$ 1.99Massey et al. 2018 [66]15687285155601770.52 $[.0.21, 1.25]$ 2.17Massey et al. 2018 [66]1431226321426054440.660.021, 1.122.09MeMahon et al. 2013 [67]101221594109164410.66 $[-0.34, 1.46]$ 1.77McMahon et al. 2018 [68]88730586192040.38 $[-0.08, 2.03]$ 1.46Onambélé et al. 2008 [70]152288211515186418130.72 $[-0.11, 1.55]$ 1.65Seynnes et al. 2018 [54]14541491439035 $[-0.22, 1.51]$ 1.42Waugh et al. 2018 [54]14541491439035 $[-0.44, 1.22]$ 1.48Mallaras et al. 2017 [15]11201411118738 $-0.23$ $[-1.04, 0.57]$ 1.98 <td>Kubo et al. 2017 [116]</td> <td>9</td> <td>1414</td> <td>300</td> <td>9</td> <td>1004</td> <td>544</td> <td></td> <td>0.32</td> <td>[0.05; 2.06]</td> <td>1.5%</td>	Kubo et al. 2017 [116]	9	1414	300	9	1004	544		0.32	[0.05; 2.06]	1.5%
Mailiaras et al. 2013 [61]       9       2338       638       9       1560       793       -       1.03       [0.03; 2.03]       1.53         Mailiaras et al. 2013 [61]       10       2536       850       10       1822       898       -       1.03       [0.03; 2.03]       1.53         Massey et al. 2018 [66]       14       595       101       14       592       118       0.33       [-0.13; 1.70]       1.63         Massey et al. 2018 [66]       14       3122       632       14       2605       446       0.32       [-0.21; 1.25]       2.13         Massey et al. 2018 [66]       15       3239       575       15       2835       444       0.77       [0.02; 1.51]       2.01         McMahon et al. 2013 [67]       11       1167       353       11       765       242       1.28       [0.34; 2.21]       1.66         McMahon et al. 2018 [68]       8       157       390       8       1132       294       -       0.56       [-0.01; 2.12]       1.44         Onambélé et al. 2008 [70]       15       2288       2115       15       1864       1813       0.21       [-0.71; 2.86]       1.44       90       3.43       2.21; [-0.51; 0.	Kubo et al. 2017 [86]	11	32	9	11	24	5		1.17	[0.25: 2.09]	1.6%
Maliaras et al. 2013 [61]       10       2536       850       10       1822       898	Malliaras et al. 2013 [61]	9	2338	638	9	1560	793	- <b>-</b>	1.03	[ 0.03; 2.03]	1.5%
Malliaras et al. 2013 [61]       10       2508       1066       10       1387       360	Malliaras et al. 2013 [61]	10	2536	850	10	1822	898	+	0.78	[-0.13; 1.70]	1.6%
Massey et al. 2016 [66]14393101143921180.03 $[-0.7], 0.7/1$ 2.00Massey et al. 2018 [66]1431226321426054460.92 $[0.13; 1.70]$ 1.99Massey et al. 2018 [66]1532395751528354440.77 $[0.02; 1.51]$ 2.01McMahon et al. 2013 [67]111167353117652421.86 $[0.34; 2.21]$ 1.69McMahon et al. 2018 [68]8877300811322940.38 $[0.04; 2.03]$ 1.46McMahon et al. 2018 [68]888730586192040.88 $[0.04; 2.03]$ 1.46Onambélé et al. 2008 [120]1240231226130.72 $[-0.11; 1.55]$ 1.89Seynnes et al. 2018 [68]14523531439035 $[-0.47; 4.12]$ 1.38Waugh et al. 2018 [54]14523531435953 $-2.99$ $[1.87; 4.12]$ 1.38Warkhause et al. 2018 [56]1145914711397146 $-0.25$ $[-0.49; 1.20]$ 1.88Arampatzis et al. 2007 [19]11201411118738 $-0.23$ $[-0.49; 0.57]$ 1.88Kongsgaard et al. 2013 [67]1111244711187779 $-0.25$ $[-1.09; 0.59]$ 1.88Kongsgaard et al. 2021 [121]9251263591769	Malliaras et al. 2013 [61]	10	2508	1066	10	1387	360		1.35	[0.36; 2.34]	1.5%
Massey et al. 2018 [66]153239575152835444Massey et al. 2018 [66]153239575152835444McMahon et al. 2013 [67]10122159410916441McMahon et al. 2018 [68]8151739081132294McMahon et al. 2018 [68]8151739081132294McMahon et al. 2018 [68]88673058619204Onambélé et al. 2008 [120]124023122613Onambélé et al. 2018 [68]145211518641813Onambélé et al. 2018 [54]14541491439035Waugh et al. 2018 [54]14523531435953Wardh et al. 2018 [54]14523531435953Wardh et al. 2018 [56]1145914711397146Arampatzis et al. 2007 [19]11201411118738Arampatzis et al. 2007 [65]12337512511237161569Quinlan et al. 2021 [121]0237608101769462Quinlan et al. 2021 [121]9251263591782570Quinlan et al. 2021 [121]8231446681267260Quinlan et al. 2021 [121]8231446681267260Quinlan et al. 2021 [1	Massey et al. 2016 [66]	14	595	285	14	592	177		0.03	[-0.71; 0.77]	2.0%
Massey et al. 2018 [66]15 $3239$ $575$ 15 $2835$ $444$ McMahon et al. 2013 [67]101221 $594$ 10916 $441$ McMahon et al. 2018 [67]111167 $353$ 11 $765$ $242$ McMahon et al. 2018 [68]81517 $390$ 8 $1132$ $294$ McMahon et al. 2018 [68]8887 $305$ 8 $619$ $204$ Onambélé et al. 2008 [120]12 $40$ $23$ $12$ $26$ $13$ Seynnes et al. 2009 [70]15 $2288$ $2115$ $15$ $1864$ $1813$ Tillin et al. 2018 [54]14 $523$ $53$ $14$ $359$ $53$ Waugh et al. 2018 [54]14 $523$ $53$ $14$ $359$ $53$ Werkhausen et al. 2018 [56]11 $459$ $147$ $11$ $397$ $146$ Random effects model $577$ $577$ $577$ $-0.25$ $[-0.49; 1.20]$ $1.87$ Heterogeneity: $I^2 = 42\%$ , $p < 0.01$ $11$ $201$ $41$ $11$ $187$ $38$ Arampatzis et al. 2007 [19] $11$ $201$ $41$ $11$ $877$ $379$ Quinlan et al. 2021 [121] $0271$ $635$ $9$ $776$ $657$ Quinlan et al. 2021 [121] $82326$ $769$ $8$ $1376$ $428$ Quinlan et al. 2021 [121] $82326$ $769$ $8$ $1376$ $428$ Quinlan et al. 2021 [121] $80$ $80$ $80$ $80$ <t< td=""><td>Massey et al. 2018 [66]</td><td>14</td><td>3122</td><td>632</td><td>14</td><td>2605</td><td>446</td><td></td><td>0.92</td><td>[ 0.13; 1.70]</td><td>1.9%</td></t<>	Massey et al. 2018 [66]	14	3122	632	14	2605	446		0.92	[ 0.13; 1.70]	1.9%
McMahon et al. 2013 [67]       10       1221       594       10       916       441         McMahon et al. 2013 [67]       11       1167       353       11       765       242         McMahon et al. 2018 [68]       8       1517       390       8       1132       294         McMahon et al. 2018 [68]       8       867       305       8       619       204         Onambélé et al. 2008 [120]       12       40       23       12       26       13         Seynnes et al. 2009 [70]       15       2288       2115       15       1864       1813         Tillin et al. 2012 [125]       10       697       103       10       520       86         Waugh et al. 2018 [54]       14       523       53       14       359       53         Warkhausen et al. 2018 [56]       11       459       147       11       397       146         Random effects model       577       577       577       577       0.36       [-0.49; 1.20]       1.83         Arampatzis et al. 2007 [19]       11       201       41       1276       53       -0.25       [-1.09; 0.59]       1.83         Kongsgaard et al. 2021 [65]       12	Massey et al. 2018 [66]	15	3239	575	15	2835	444		0.77	[ 0.02; 1.51]	2.0%
McMahon et al. 2013 [67]       11       1167       353       11       765       242        1.28 $[0.34; 2.21]$ 1.65         McMahon et al. 2018 [68]       8       1517       390       8       1132       294        1.05 $[-0.01; 2.12]$ 1.46         McMahon et al. 2018 [68]       8       887       305       8       619       204       0.98 $[-0.01; 2.12]$ 1.46         McMahon et al. 2018 [70]       15       2288       2115       15       1864       1813       0.72 $[-0.11; 1.55]$ 1.88         Seynnes et al. 2018 [54]       14       541       49       14       390       35        3.43 $[2.21; 4.65]$ 1.29         Waugh et al. 2018 [54]       14       523       53       14       359       53        3.43 $[2.21; 4.65]$ 1.29         Warkhausen et al. 2018 [56]       11       459       147       11       397       146        0.41 $[-0.44; 1.25]$ 1.88         Arampatzis et al. 2007 [19]       11       201       41       11       187       38        0.25 $[-1.09; 0.59]$ 1.88 </td <td>McMahon et al. 2013 [67]</td> <td>10</td> <td>1221</td> <td>594</td> <td>10</td> <td>916</td> <td>441</td> <td></td> <td>0.56</td> <td>[-0.34; 1.46]</td> <td>1.7%</td>	McMahon et al. 2013 [67]	10	1221	594	10	916	441		0.56	[-0.34; 1.46]	1.7%
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	McMahon et al. 2013 [67]	11	1167	353	11	765	242		1.28	[0.34; 2.21]	1.6%
$\begin{array}{c} \text{Normation of et al. 2008 [120]}{\text{Commbolis et al. 2008 [120]}} 12 & 40 & 23 & 12 & 26 & 13 \\ \text{Seynnes et al. 2008 [70]} & 15 & 2288 & 2115 & 15 & 1864 & 1813 \\ \text{Tillin et al. 2012 [125]} & 10 & 697 & 103 & 10 & 520 & 86 \\ \text{Waugh et al. 2018 [54]} & 14 & 541 & 49 & 14 & 390 & 35 \\ \text{Waugh et al. 2018 [54]} & 14 & 523 & 53 & 14 & 359 & 53 \\ \text{Werkhausen et al. 2018 [56]} & 11 & 459 & 147 & 11 & 397 & 146 \\ \text{Random effects model} & 577 & 577 \\ \text{Heterogeneity: } l^2 = 42\%, p < 0.01 \\ \text{Low Intensity} \\ \text{Arampatzis et al. 2007 [19]} & 11 & 201 & 41 & 11 & 187 & 38 \\ \text{Arampatzis et al. 2007 [55]} & 12 & 3375 & 1251 & 12 & 3716 & 1569 \\ \text{Mulahon et al. 2013 [67]} & 11 & 1124 & 471 & 11 & 837 & 379 \\ \text{Quinlan et al. 2021 [121]} & 2512 & 635 & 9 & 1782 & 570 \\ \text{Quinlan et al. 2021 [121]} & 2326 & 769 & 8 & 1376 & 428 \\ \text{Quinlan et al. 2021 [121]} & 8 & 2314 & 466 & 8 & 1267 & 260 \\ \text{Random effects model} & 80 \\ \text{Heterogeneity: } l^2 = 66\%, p < 0.01 \\ \end{array}$	McMahon et al. 2018 [68]	8	887	305	0	619	294		0.98	[-0.01, 2.12]	1.4%
Seynnes et al. 2009 [70]       15       2288       2115       15       1864       1813         Tillin et al. 2012 [125]       10       697       103       10       520       86         Waugh et al. 2018 [54]       14       541       49       14       390       35         Werkhausen et al. 2018 [56]       11       459       147       11       397       146         Random effects model       577       577       577       577       0.41       [-0.44; 1.25]       1.89         Arampatzis et al. 2007 [19]       11       201       41       11       187       38       -0.25       [-1.09; 0.59]       1.89         Kongsgaard et al. 2007 [65]       12       3375       1251       12       3716       1569       -0.23       [-1.04; 0.57]       1.99         McMahon et al. 2021 [121]       10       2377       608       10       1769       462       -0.23       [-1.04; 0.57]       1.99         Quinlan et al. 2021 [121]       9       2512       635       9       1782       570       1.15       [0.13; 2.23]       1.65         Quinlan et al. 2021 [121]       8       2314       466       8       1267       260       2	Onambélé et al. 2008 [120]	12	40	23	12	26	13		0.72	[-0.11: 1.55]	1.8%
Tillin et al. 2012 [125]       10       697       103       10       520       86         Waugh et al. 2018 [54]       14       541       49       14       390       35         Waugh et al. 2018 [54]       14       523       53       14       359       53         Werkhausen et al. 2018 [56]       11       459       147       11       397       146         Random effects model       577       577       577       0.41       [-0.44; 1.25]       1.89         Arampatzis et al. 2007 [19]       11       201       41       11       187       38       -0.36       [-0.49; 1.20]       1.88         Kongsgaard et al. 2007 [55]       12       3375       1251       12       3716       1569       -0.25       [-1.09; 0.59]       1.89         Kongsgaard et al. 2021 [121]       10       2375       1251       12       3716       1569       -0.25       [-1.09; 0.59]       1.89         Quinlan et al. 2021 [121]       10       2375       1256       9       1769       462       -0.86       [-0.43; 1.2.6]       1.66         Quinlan et al. 2021 [121]       8       2326       769       8       1376       428       -1.44       <	Seynnes et al. 2009 [70]	15	2288	2115	15	1864	1813		0.21	[-0.51; 0.93]	2.1%
Waugh et al. 2018 [54]       14       541       49       14       390       35         Waugh et al. 2018 [54]       14       523       53       14       359       53         Werkhausen et al. 2018 [56]       11       459       11       397       146       0.36 $[-0.44; 1.25]$ 1.88         Random effects model       577       577       577       0.86 $[0.70; 1.02]$ 87.59         Heterogeneity: $l^2 = 42\%$ , $p < 0.01$ 11       201       41       10.41       187       38         Arampatzis et al. 2007 [19]       11       201       41       1265       53       -0.25 $[-1.04; 0.57]$ 1.88         Kongsgaard et al. 2007 [65]       12       3375       1251       12       3716       1569       -0.25 $[-0.49; 0.57]$ 1.99         McMahon et al. 2021 [121]       10       2377       608       10       1769       462       -0.65 $[-0.22; 1.51]$ 1.88         Quinlan et al. 2021 [121]       9       2512       635       9       1782       570       1.15 $[0.13; 2.58]$ 1.33         Quinlan et al. 2021 [121]       8       2314       466       8       1267 </td <td>Tillin et al. 2012 [125]</td> <td>10</td> <td>697</td> <td>103</td> <td>10</td> <td>520</td> <td>86</td> <td></td> <td>1.79</td> <td>[ 0.71; 2.86]</td> <td>1.4%</td>	Tillin et al. 2012 [125]	10	697	103	10	520	86		1.79	[ 0.71; 2.86]	1.4%
Warkhausen et al. 2018 [56]       11       459       147       11       339       53	Waugh et al. 2018 [54]	14	541	49	14	390	35		- 3.43	[ 2.21; 4.65]	1.2%
Kandom effects model       577       577       577       577         Heterogeneity: $l^2 = 42\%$ , $p < 0.01$ 577       577       577         Low Intensity       Arampatzis et al. 2007 [19]       11       201       41       11       187       38         Arampatzis et al. 2010 [20]       11       261       56       11       276       53       -0.25       [-1.09; 0.59]       1.89         Kongsgaard et al. 2007 [65]       12       3375       1251       12       3716       1569       -0.23       [-1.04; 0.57]       1.99         McMahon et al. 2021 [67]       11       1124       471       11       837       379       0.65       [-0.22; 1.51]       1.89         Quinlan et al. 2021 [121]       0       2377       608       10       1769       462       1.08       [0.13; 2.03]       1.69         Quinlan et al. 2021 [121]       8       2326       769       8       1376       428       1.44       [0.31; 2.58]       1.33         Quinlan et al. 2021 [121]       8       2314       466       8       1267       260       2.62       [1.19; 4.06]       0.99         Random effects model       80       80       80       80	Werkhausen et al. 2018 [56]	14	523 459	147	14	397	146		0.41	[ 1.07, 4.12] [-0.44: 1.25]	1.3%
Heterogeneily: $l^2 = 42\%$ , $p < 0.01$ Low Intensity         Arampatzis et al. 2007 [19]       11       201       41       11       187       38         Arampatzis et al. 2010 [20]       11       261       56       11       276       53         Kongsgaard et al. 2007 [65]       12       3375       1251       12       3716       1569         McMahon et al. 2013 [67]       11       1124       471       11       837       379       0.65       [-0.22; 1.51]       1.88         Quinlan et al. 2021 [121]       0       2377       608       10       1769       462       1.08       [0.13; 2.03]       1.69         Quinlan et al. 2021 [121]       8       2326       769       8       1376       428       1.44       [0.31; 2.58]       1.39         Quinlan et al. 2021 [121]       8       2314       466       8       1267       260       2.62       [1.19; 4.06]       0.99         Random effects model       80       80       80       80       0.74       [0.68; 1.00]       100.09	Random effects model	577	400	141	577	001	140	•	0.86	[ 0.70; 1.02]	87.5%
Low Intensity         Arampatzis et al. 2007 [19]       11       201       41       11       187       38         Arampatzis et al. 2007 [19]       11       201       41       11       187       38         Arampatzis et al. 2007 [19]       11       201       56       11       276       53       -0.25       [-1.04; 0.57]       1.99         Kongsgaard et al. 2007 [65]       12       3375       1251       12       3716       1569       -0.25       [-1.04; 0.57]       1.99         McMahon et al. 2013 [67]       11       1124       471       11       837       379       0.65       [-0.22; 1.51]       1.89         Quinlan et al. 2021 [121]       9       2512       635       9       1782       570       1.15       [0.13; 2.33]       1.66         Quinlan et al. 2021 [121]       8       2326       769       8       1376       428       1.44       [0.31; 2.58]       1.33         Quinlan et al. 2021 [121]       8       2314       466       8       1267       260       7.44       [0.16; 1.31]       12.55         Random effects model       80       80       80       80       0.74       [0.16; 1.31]       12.55	Heterogeneity: $I^2 = 42\%$ , $p < 0.01$									L , 3	
Arampatzis et al. 2007 [19]       11       201       41       11       187       38         Arampatzis et al. 2010 [20]       11       261       56       11       276       53       -0.25 $[-0.49; 1.20]$ 1.89         Kongsgaard et al. 2007 [65]       12       3375       1251       12       3716       1569       -0.23 $[-0.49; 0.57]$ 1.99         McMahon et al. 2013 [67]       11       1124       471       11       837       379       0.65 $[-0.22; 1.51]$ 1.89         Quinlan et al. 2021 [121]       10       2377       608       10       1769       462       -0.81 $[0.13; 2.03]$ 1.66         Quinlan et al. 2021 [121]       8       2326       769       8       1376       428       -1.44       [0.31; 2.58]       1.33         Quinlan et al. 2021 [121]       8       2314       466       8       1267       260       -0.74       [0.16; 1.31]       12.55         Random effects model       80       80       -0.74       [0.68; 1.00]       100.99         Random effects model       657       657       -0.84       [0.68; 1.00]       100.99	Low Intensity										
Arampatzis et al. 2010 [20]       11       261       56       11       276       53 $-0.25$ [-1.09; 0.59]       1.88         Kongsgaard et al. 2007 [65]       12       3375       1251       12       3716       1569 $-0.23$ [-1.04; 0.57]       1.99         McMahon et al. 2013 [67]       11       1124       471       11       837       379 $0.65$ [-0.22; 1.51]       1.89         Quinlan et al. 2021 [121]       9       2512       635       9       1782       570       1.15       [0.13; 2.03]       1.69         Quinlan et al. 2021 [121]       8       2326       769       8       1376       428 $-1.44$ [0.31; 2.58]       1.39         Quinlan et al. 2021 [121]       8       2314       466       8       1267       260 $-0.74$ [0.16; 1.31]       12.59         Random effects model       80       80       80 $0.74$ [0.68; 1.00]       100.09         Heterogeneity: $l^2 = 66\%, p < 0.01$ 657       657 $0.84$ [0.68; 1.00]       100.09	Arampatzis et al. 2007 [19]	11	201	41	11	187	38		0.36	[-0.49; 1.20]	1.8%
Kongsgaard et al. 2007 [65]       12       3375       1251       12       3776       1569       -0.23       [-1.04; 0.57]       1.99         McMahon et al. 2013 [67]       11       1124       471       11       837       379       -0.65       [-0.22; 1.51]       1.89         Quinlan et al. 2021 [121]       10       2377       608       10       1769       462       -0.65       [-0.22; 1.51]       1.89         Quinlan et al. 2021 [121]       9       2512       635       9       1782       570       -1.15       [0.13; 2.17]       1.59         Quinlan et al. 2021 [121]       8       2326       769       8       1376       428       -1.44       [0.31; 2.58]       1.39         Quinlan et al. 2021 [121]       8       2314       466       8       1267       260       -0.74       [0.16; 1.31]       12.59         Random effects model       80       80       80       80       -0.74       [0.68; 1.00]       100.09         Heterogeneity: $l^2 = 66\%, p < 0.01$ 657       657       9       0.84       [0.68; 1.00]       100.09	Arampatzis et al. 2010 [20]	11	261	56	11	276	53		-0.25	[-1.09; 0.59]	1.8%
Midmandir et al. 2013 [07]       11       1124       471       11       637       575       0.83 $[-0.22, 1.3]$ 1.03         Quinlan et al. 2021 [121]       10       2377       608       10       1769       462       1.08 $[-0.13; 2.03]$ 1.66         Quinlan et al. 2021 [121]       9       2512       635       9       1782       570       1.15 $[0.13; 2.03]$ 1.67         Quinlan et al. 2021 [121]       8       2326       769       8       1376       428       1.44 $[0.31; 2.58]$ 1.39         Quinlan et al. 2021 [121]       8       2314       466       8       1267       260       2.62 $[1.19; 4.06]$ 0.99         Random effects model       80       80       80       80       0.74 $[0.16; 1.31]$ 12.59         Heterogeneity: $l^2 = 66\%, p < 0.01$ 657       657       9       0.84 $[0.68; 1.00]$ 100.09	Kongsgaard et al. 2007 [65]	12	3375	1251	12	3/16	1569		-0.23	[-1.04; 0.57]	1.9%
Quinlan et al. 2021 [121]       9       2512       635       9       1782       570         Quinlan et al. 2021 [121]       8       2326       769       8       1376       428         Quinlan et al. 2021 [121]       8       2314       466       8       1267       260         Random effects model       80       80       80       80       0.74       [0.16; 1.31]       12.59         Heterogeneity: $l^2 = 66\%, p < 0.01$ 657       657       0.84       [0.68; 1.00]       100.09	Quinlan et al. 2013 [07]	10	2377	608	10	1769	462		1.08	[0.13:2.03]	1.6%
Quinlan et al. 2021 [121]       8       2326       769       8       1376       428         Quinlan et al. 2021 [121]       8       2314       466       8       1267       260         Random effects model       80       80       80       80       0.74       [0.16; 1.31]       12.59         Random effects model       657       657       0.84       [0.68; 1.00]       100.09	Quinlan et al. 2021 [121]	9	2512	635	9	1782	570		1.15	[ 0.13; 2.17]	1.5%
Quinlan et al. 2021 [121]       8       2314       466       8       1267       260 $\blacksquare$ 2.62       [1.19; 4.06]       0.99         Random effects model       80       80       80 $0.74$ [0.16; 1.31]       12.59         Heterogeneity: $l^2 = 66\%, p < 0.01$ 657       657 $0.84$ [0.68; 1.00]       100.09	Quinlan et al. 2021 [121]	8	2326	769	8	1376	428		1.44	[ 0.31; 2.58]	1.3%
Random errects model         SU         SU         SU         U./4         [0.16; 1.31]         12.55           Heterogeneity: l <sup>2</sup> = 66%, p < 0.01	Quinlan et al. 2021 [121]	8	2314	466	8	1267	260		2.62	[ 1.19; 4.06]	0.9%
Random effects model 657 657 0.84 [0.68; 1.00] 100.09	Heterogeneity: $I^2 = 66\%$ , $p < 0.01$	80			80			$\diamond$	U.74	[ 0.16; 1.31]	12.5%
2	Random effects model	657			657			\$	0.84	[ 0.68; 1.00]	100.0%
Heterogeneity: $l^2 = 46\%$ , $p < 0.01$ Residual heterogeneity: $l^2 = 46\%$ , $p < 0.01$ -4 -2 0 2 4	Heterogeneity: $I^2 = 46\%$ , $p < 0.01$ Residual heterogeneity: $I^2 = 46\%$ , $p$	p < 0.01						-4 -2 0 2 4		1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 -	

Decrease Increase

<u>S12.</u> Forest plot for the meta-analysis of modulus subdivided by protocol intensity (high versus low) showing standardised mean differences (SMD) and 95% confidence intervals (CI) of resistance training studies.

Study	n	Mean	Post SD	n	Mean	Pre SD				SMD	[95% CI]	Weight
High Intensity									13		-	•
Aramostzia at al. 2007 [10]	11	680	255	11	440	279				0.72	[0 14: 1 50]	2 20/
Arampatzis et al. 2007 [19]	11	1130	333	11	970	210				0.72	[-0.14, 1.39]	3 3 2 /0
Rohm et al. 2014 [21]	12	1050	277	12	800	232				0.54	[-0.32, 1.33]	3.4%
Bohm et al. 2014 [21]	14	1430	636	14	030	262				1.04	[-0.20, 1.30]	3.4%
Bohm et al. 2014 [21]	14	1430	281	12	910	202				1.04	[0.24, 1.03]	3.4%
	12	1220	450	12	1020	416				0.42	[0.30, 2.17]	3.4%
Control et al. 2011 [02]	14	1848	430	14	1540	410				0.42	[-0.39, 1.23]	3.470
Erikson et al. 2019 [71]	14	1220	401	0	1040	200				0.01	[-0.15, 1.56]	3.5%
Erikson et al. 2010 [03]	10	725	262	12	702	350				0.17	[-0.70, 1.10]	3.170
Eriksen et al. 2010 [63]	12	1560	203	12	1510	253				0.12	[-0.66, 0.92]	3.4%
	10	1000	443	10	1510	474				0.10	[-0.77; 0.98]	3.2%
Geremia et al. 2018 [72]	15	1292	436	15	695	160				1.77	[0.91; 2.63]	3.2%
Kongsgaard et al. 2007 [65]	12	1650	554	12	1470	569				0.30	[-0.50, 1.11]	3.4%
Kubo et al. 2001 [52]	8	433	35	8	288	26				- 4.45	[2.42; 6.47]	1.2%
Malliaras et al. 2013 [61]	9	942	279	9	620	223				1.22	[0.19; 2.24]	2.8%
Malliaras et al. 2013 [61]	10	1022	339	10	737	390				0.75	[-0.17; 1.66]	3.1%
Malliaras et al. 2013 [61]	10	1011	436	10	570	191				1.25	[ 0.28; 2.23]	2.9%
Massey et al. 2018 [66]	14	1490	270	14	1230	180				1.10	[ 0.30; 1.90]	3.4%
Massey et al. 2018 [66]	15	1510	360	15	1320	270				0.58	[-0.15; 1.31]	3.6%
McMahon et al. 2013 [67]	10	1100	120	10	830	90				2.44	[ 1.22; 3.65]	2.4%
McMahon et al. 2013 [67]	11	1150	110	11	780	100				3.39	[ 2.00; 4.77]	2.1%
McMahon et al. 2018 [68]	8	990	255	8	780	170				0.92	[-0.13; 1.96]	2.8%
McMahon et al. 2018 [68]	8	600	226	8	420	113				0.95	[-0.10; 2.00]	2.8%
Seynnes et al. 2009 [70]	15	1160	1201	15	980	1162				0.15	[-0.57; 0.87]	3.6%
Waugh et al. 2018 [54]	14	1892	803	14	1261	459				0.94	[ 0.15; 1.72]	3.4%
Waugh et al. 2018 [54]	14	1720	535	14	1242	420				0.96	[ 0.17; 1.75]	3.4%
Random effects model	290			290					•	0.91	[ 0.63; 1.18]	77.1%
Heterogeneity: $I^2 = 57\%$ , $p < 0.01$												
Low Intensity												
Arampatzis et al. 2007 [19]	11	400	293	11	420	401				-0.05	[-0.89; 0.78]	3.3%
Arampatzis et al. 2010 [20]	11	970	265	11	1010	199				-0.16	[-1.00; 0.67]	3.3%
Kongsgaard et al. 2007 [65]	12	1360	658	12	1420	727				-0.08	[-0.88; 0.72]	3.4%
McMahon et al. 2013 [67]	11	990	110	11	740	90				2.39	[ 1.25; 3.54]	2.5%
Quinlan et al. 2021 [121]	10	1510	440	10	1160	290			-	0.90	[-0.03; 1.83]	3.1%
Quinlan et al. 2021 [121]	9	1460	350	9	1050	270				1.25	0.22: 2.281	2.8%
Quinlan et al. 2021 [121]	8	1430	570	8	800	250				1.35	0.23: 2.471	2.6%
Quinlan et al. 2021 [121]	8	1280	230	8	710	130				2.88	[ 1.37; 4.40]	1.9%
Random effects model	80			80					$\diamond$	0.95	[ 0.23: 1.68]	22.9%
Heterogeneity: $l^2 = 77\%$ , $p < 0.01$										2	,,	
Random effects model	370			370					\$	0.91	[ 0.65: 1.17]	100.0%
Heterogeneity: $l^2 = 63\%$ $n < 0.01$										1		
Residual beterogeneity: $I^2 = 64\%$	n < 0.0	1					-6 -	4 -2	0 2 4	6		
	- 0.0						De	ecreas	e Increase	-		

<u>S13.</u> Forest plot for the meta-analysis of cross-sectional area subdivided by protocol intensity (high versus low) showing standardised mean differences (SMD) and 95% confidence intervals (CI) of resistance training studies.

		-	Post		7 1-12100F	Pre				
Study	n	Mean	SD	n	Mean	SD		SMD	[95% CI]	Weight
High Intensity Arampatzis et al. 2007 [10]	11	52	14	11	19	12		0.30	L0 55: 1 141	2 0%
Arampatzis et al. 2007 [19]	11	56	36	11	40	38		0.30	[-0.33, 1.14]	2.0%
Rohm et al. 2014 [21]	12	82	12	12	78	11		0.02	[-0.02, 0.05]	2.1/0
Bohm et al. 2014 [21]	14	83	14	14	80	13		0.30	[-0.52: 0.97]	2.270
Bohm et al. 2014 [21]	12	79	10	12	75	9		0.34	$[-0.47 \cdot 1.14]$	2.0%
Carroll et al. 2011 [62]	12	115	33	12	117	35		-0.06	[-0.86: 0.74]	2.2%
Centner et al. 2019 [71]	14	74	17	14	70	18		0.18	[-0.56; 0.92]	2.6%
Eriksen et al. 2018 [63]	9	129	24	9	131	27		-0.07	[-1.00; 0.85]	1.7%
Eriksen et al. 2018 [63]	11	123	33	12	121	28		0.06	[-0.76; 0.88]	2.1%
Eriksen et al. 2019 [64]	10	124	22	10	117	21		0.31	[-0.57; 1.20]	1.8%
Geremia et al. 2018 [72]	15	72	11	15	62	8		1.01	[ 0.24; 1.77]	2.4%
Kongsgaard et al. 2007 [65]	12	121	14	12	117	14		0.28	[-0.53; 1.08]	2.2%
Kubo et al. 2001 [51]	8	213	19	8	210	16		0.16	[-0.82; 1.14]	1.5%
Kubo et al. 2001 [51]	8	215	21	8	212	18		0.15	[-0.84; 1.13]	1.5%
Kubo et al. 2002 [111]	8	59	8	8	61	9	<b>_</b>	-0.22	[-1.21; 0.76]	1.5%
Kubo et al. 2006 [112]	8	73	18	8	73	20		0.01	[-0.97; 0.99]	1.5%
Kubo et al. 2006 [113]	9	207	22	9	204	19		0.14	[-0.79; 1.06]	1.7%
Kubo et al. 2006 [113]	9	205	17	9	202	13		0.19	[-0.74; 1.12]	1.7%
Kubo et al. 2006 [96]	10	10	20	10	10	19		-0.02	[-0.95, 0.90]	1.7%
Kubo et al. 2007 [65]	10	63	8	10	60	7		-0.08	[-0.96, 0.79]	1.9%
Kubo et al. 2009 [114]	10	62	8	10	61	7		0.32	[-0.37, 1.20]	1.0%
Kubo et al. 2009 [114]	10	58	8	10	59	8		-0.08	[-0.76, 0.36]	1.9%
Kubo et al. 2010 [115]	10	68	8	10	66	8		0.21	[-0.67:1.09]	1.9%
Kubo et al. 2010 [88]	8	81	20	8	80	19		0.04	[-0.94 1.02]	1.5%
Kubo et al. 2012 [89]	9	74	28	9	72	33		0.06	[-0.86: 0.99]	1.7%
Kubo et al. 2017 [116]	9	73	10	9	72	11		0.08	[-0.84: 1.01]	1.7%
Kubo et al. 2017 [116]	9	74	9	9	74	8	· · · · · · · · · · · · · · · · · · ·	0.03	[-0.89; 0.96]	1.7%
Kubo et al. 2017 [86]	11	66	8	11	65	8		0.14	[-0.70; 0.97]	2.0%
Malliaras et al. 2013 [61]	9	118	9	9	112	6		0.73	[-0.23; 1.70]	1.5%
Malliaras et al. 2013 [61]	10	120	19	10	116	8		0.27	[-0.61; 1.15]	1.8%
Malliaras et al. 2013 [61]	10	120	19	10	114	19		0.33	[-0.55; 1.22]	1.8%
Massey et al. 2018 [66]	14	96	8	14	99	10		-0.30	[-1.04; 0.45]	2.6%
Massey et al. 2018 [66]	15	98	13	15	97	13		0.03	[-0.69; 0.75]	2.8%
McMahon et al. 2013 [67]	10	73	14	10	70	13		0.21	[-0.67; 1.09]	1.9%
McMahon et al. 2013 [67]	11	76	16	11	71	13		0.31	[-0.53; 1.16]	2.0%
McMahon et al. 2018 [68]	8	81	13	8	11	13		0.32	[-0.67; 1.30]	1.5%
McManon et al. 2018 [68]	8	70	22	8	66	11		0.20	[-0.78; 1.18]	1.5%
	10	257	01	10	240	49		0.29	[-0.59; 1.18]	1.8%
Sanz-Lopez et al. 2016 [123]	20	107	23	20	102	11		1.04	[0.36; 1.71]	3.2%
Wauch et al. 2009 [70]	14	61	17	14	62	15		-0.08	[0.24, 1.77]	2.4%
Waugh et al. 2010 [54]	14	60	14	14	58	13		0.14	[-0.60; 0.88]	2.6%
Random effects model	466	00	14	467	00	10	\$	0.22	[ 0.09; 0.35]	85.1%
Heterogeneity: $I^2 = 0\%$ , $p = 1.00$	400			401				U. Anda	[ 0.00, 0.00]	00.170
Low Intensity										
Arampatzis et al. 2007 [19]	11	53	15	11	50	15		0.14	[-0.70; 0.98]	2.0%
Arampatzis et al. 2010 [20]	11	60	35	11	58	34		0.05	[-0.79; 0.88]	2.0%
Kongsgaard et al. 2007 [65]	12	118	13	12	116	18		0.10	[-0.70; 0.91]	2.2%
McMahon et al. 2013 [67]	11	77	19	11	72	14		0.26	[-0.58; 1.10]	2.0%
Quinlan et al. 2021 [121]	10	85	5	10	84	6		0.16	[-0.72; 1.04]	1.9%
Quinlan et al. 2021 [121]	9	87	11	9	87	10		-0.03	[-0.95; 0.90]	1.7%
Quinlan et al. 2021 [121]	8	89	12	8	89	11		0.01	[-0.97; 0.99]	1.5%
Quinlan et al. 2021 [121]	8	90	9	8	90	10		0.08	[-0.90; 1.06]	1.5%
Random effects model	80			80			$\Diamond$	0.10	[-0.21; 0.41]	14.9%
meterogeneity: $r^2 = 0\%$ , $p = 0.99$										
Random effects model Heterogeneity: $l^2 = 0\%$ , $p = 1.00$	546			547				0.20	[ 0.08; 0.32]	100.0%
Residual heterogeneity: $I^2 = 0\%$ , $p$	= 1.00						-1.5 -1 -0.5 0 0.5 1 1.5			

Decrease Increase

<u>S14.</u> Forest plot for the meta-analysis of stiffness subdivided by protocol strain (high versus low) showing standardised mean differences (SMD) and 95% confidence intervals (CI) of resistance training studies.

			Post			Pre				
Study	n	Mean	SD	n	Mean	SD		SMD	[95% CI]	Weight
High										
Arampatzis et al. 2007 [19]	11	228	40	11	168	37		1.52	[ 0.55; 2.49]	12.5%
Arampatzis et al. 2010 [20]	11	302	57	11	258	51		0.79	[-0.09; 1.66]	14.1%
Bohm et al. 2014 [21]	12	457	132	12	370	132		0.64	[-0.18: 1.47]	15.0%
Bohm et al. 2014 [21]	14	539	254	14	336	89		- 1.04	[ 0.24: 1.84]	15.5%
Bohm et al. 2014 [21]	12	579	172	12	377	106		1.37	[0.46: 2.27]	13.6%
Random effects model	60		0.00	60				1.04	[0.65: 1.43]	70.7%
Heterogeneity: $l^2 = 0\%$ , $p = 0.32$									[ 0100] 1110]	
Low										
Arampatzis et al. 2007 [19]	11	201	41	11	187	38		0.36	[-0.49; 1.20]	14.6%
Arampatzis et al. 2010 [20]	11	261	56	11	276	53		-0.25	[-1.09; 0.59]	14.7%
Random effects model Heterogeneity: $l^2 = 1\%$ , $p = 0.62$	22			22			$\diamond$	0.05	[-0.55; 0.65]	29.3%
Random effects model	82			82				0.76	[ 0.31; 1.20]	100.0%
Period and hotorogonality: $l^2 = 0.05$	n = 0.6	20					2 1 0 1	2		
Residual neterogeneity: / = 0%,	p = 0.0	00					-2 -1 U I	2		
							Decrease Inclease	5		

<u>S15.</u> Forest plot for the meta-analysis of modulus subdivided by protocol strain (high versus low) showing standardised mean differences (SMD) and 95% confidence intervals (CI) of resistance training studies.

			Post			Pre				
Study	n	Mean	SD	n	Mean	SD		SMD	[95% CI]	Weight
High Arampatzis et al. 2007 [19] Arampatzis et al. 2010 [20] Bohm et al. 2014 [21] Bohm et al. 2014 [21] Bohm et al. 2014 [21] Random effects model Heterogeneity: $l^2 = 0\%$ , $p = 0.86$	11 11 12 14 12 60	680 1130 1050 1430 1410	355 332 277 636 381	11 11 12 14 12 60	440 970 890 910 970	278 232 277 262 277		0.72 0.54 0.56 1.04 - 1.28 0.82	[-0.14; 1.59] [-0.32; 1.39] [-0.26; 1.38] [ 0.24; 1.83] [ 0.38; 2.17] [ 0.44; 1.20]	13.7% 14.0% 14.8% 15.4% 13.2% 71.2%
Low Arampatzis et al. 2007 [19] Arampatzis et al. 2010 [20] Random effects model Heterogeneity: $l^2 = 0\%$ , $p = 0.71$	11 11 22	400 970	293 265	11 11 22	420 1010	401 199		-0.05 -0.16 -0.11	[-0.89; 0.78] [-1.00; 0.67] [-0.70; 0.48]	14.4% 14.4% 28.8%
Random effects model Heterogeneity: $I^2 = 33\%$ , $p = 0.18$ Residual heterogeneity: $I^2 = 0\%$ ,	<b>82</b> 3 p = 0.8	32		82			-2 -1 0 1 2 Decrease Increase	<b>0.55</b>	[ 0.17; 0.94]	100.0%

<u>S16.</u> Forest plot for the meta-analysis of cross-sectional area subdivided by protocol strain (high versus low) showing standardised mean differences (SMD) and 95% confidence intervals (CI) of resistance training studies.

		Post			Pre				
n	Mean	SD	n	Mean	SD		SMD	[95% CI]	Weight
11	53	14	11	48	13		- 0.30	[-0.55; 1.14]	13.4%
11	56	36	11	56	38		0.02	[-0.82; 0.85]	13.5%
12	82	12	12	78	11		- 0.36	[-0.45; 1.16]	14.5%
14	83	14	14	80	13		0.23	[-0.52; 0.97]	17.1%
12	79	10	12	75	9		- 0.34	[-0.47: 1.14]	14.5%
60			60				0.25	[-0.11; 0.61]	73.0%
11	53	15	11	50	15		0.14	[-0.70; 0.98]	13.5%
11	60	35	11	58	34		0.05	[-0.79; 0.88]	13.5%
22			22				0.09	[-0.50; 0.69]	27.0%
00			07				0.24	L 0 40, 0 541	100 0%
02			02				0.21	[-0.10; 0.51]	100.0%
0 = 0.9	99					-1 -0.5 0 0.5 1			
						Decrease Increase			
	n 11 12 14 12 60 11 11 22 82 p = 0.8	n Mean 11 53 12 82 14 83 12 79 60 11 53 12 60 82 0 = 0.99	Post Mean         Post SD           11         53         14           11         56         36           12         82         12           14         3         14           12         79         10           60         35         35           22         60         35           82         0         0.99	Post n         Post Mean         SD         n           11         53         14         11           15         636         11           12         82         12         12           14         83         14         14           12         79         10         12           60         60         11         12           11         53         15         11           12         60         35         11           22         22         82         82           a = 0.99         5         5         11	Nean         SD         n         Mean           11         53         14         11         48           11         56         36         11         56           12         82         12         12         78           14         83         14         14         80           12         79         10         12         75           60         60         35         11         50           11         53         15         11         58           22         2         22         82         82           9         0.99         9         9         10         12	Post         Pre           n         Mean         SD         n         Mean         SD           11         53         14         11         48         13           11         56         36         11         56         38           12         82         12         12         78         11           14         83         14         14         80         13           12         79         10         12         75         9           60         60         75         9         60         15           11         53         15         11         50         15           12         60         35         11         58         34           22         2         82         82         22         2           60         35         11         58         34           20         0.99         9         9         11         15	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Post         Pre           n         Mean         SD         n         Mean         SD         SMD           11         53         14         11         48         13         0.30           11         56         36         11         56         38         0.02           12         82         12         78         11         0.23           14         83         14         14         80         13           60         60         75         9         0.34           60         60         0.25         0.34           11         53         15         11         50         15           22         22         22         0.09         0.24           82         82         82         0.05         0.05           0         0.05         0.05         1         0.21           0         -1         -0.5         0         0.5         1           0         0         0         0         0.5         1	Post         Pre           n         Mean         SD         n         Mean         SD         SMD         [95% CI]           11         53         14         11         48         13         0.30         [-0.55; 1.14]           11         56         36         11         56         38         0.02         [-0.82; 0.85]           12         82         12         12         78         11         0.36         [-0.45; 1.16]           14         83         14         14         80         13         0.23         [-0.52; 0.97]           12         79         10         12         75         9         0.34         [-0.47; 1.14]           60         60         15         [-0.79; 0.98]         [-0.79; 0.98]         [-0.79; 0.88]           22         22         22         22         0.09         [-0.50; 0.69]         0.99         [-0.50; 0.69]           82         82         82         -1         -0.5         0.0.5         1         0.21         [-0.10; 0.51]           0= 0.99         -1         -0.5         0.0.5         1         -1         -1         -1         -1         -1         -1

<u>S17.</u> Forest plot for the meta-analysis of stiffness subdivided by training volume (high versus low) showing standardised mean differences (SMD) and 95% confidence intervals (CI) of resistance training studies.

Study	n	Mean	Post SD	n	Mean	Pre SD		SMD	[95% CI]	Weight
High volume							- [ ]			
Arampatzis et al 2010 [20]	11	261	56	11	276	53		-0.25	[-1 09: 0 59]	2.0%
Arampatzis et al 2010 [20]	11	302	57	11	258	51		0.79	[-0.09: 1.66]	1.9%
Bohm et al. 2014 [21]	14	539	254	14	336	89		1.04	[ 0.24; 1.84]	2.1%
Duclay et al. 2009 [105]	10	291	125	10	249	90		0.38	[-0.51; 1.26]	1.9%
Geremia et al. 2018 [72]	15	350	59	15	192	36		3.15	[ 2.03; 4.26]	1.3%
Kongsgaard et al. 2007 [65]	12	4213	1406	12	3676	1306	-	0.38	[-0.43; 1.19]	2.1%
Kubo et al. 2006 [113]	9	86	36	9	79	21		0.25	[-0.68; 1.17]	1.7%
Kubo et al. 2006 [113]	9	122	40	9	81	26		1.17	[ 0.15; 2.18]	1.5%
Kubo et al. 2006 [96]	9	59	23	9	46	19		0.62	[-0.33; 1.57]	1.7%
Kubo et al. 2006 [96]	10	1819	710	10	10/0	200		0.20	[-0.73; 1.13]	1.7%
Kubo et al. 2009 [114]	10	1253	410	10	999	426		0.75	[-0.10, 1.07]	1.0%
Kubo et al. 2000 [114]	10	41	13	10	32	-20		0.85	[-0.02, 1.40]	1.8%
Kubo et al. 2010 [115]	10	96	37	10	72	20		0.75	[-0.16: 1.67]	1.8%
Kubo et al. 2017 [116]	9	1414	355	9	1004	384		1.06	[ 0.05; 2.06]	1.6%
Kubo et al. 2017 [116]	9	1457	440	9	1289	544		0.32	[-0.61; 1.26]	1.7%
Malliaras et al. 2013 [61]	10	2536	850	10	1822	898		0.78	[-0.13; 1.70]	1.8%
Massey et al. 2018 [66]	14	595	101	14	592	118		0.03	[-0.71; 0.77]	2.3%
Massey et al. 2018 [66]	14	3122	632	14	2605	446		0.92	[0.13; 1.70]	2.2%
McMahon et al. 2013 [67]	10	1221	594	10	916	441		0.56	[-0.34; 1.46]	1.8%
McMahon et al. 2013 [67]	11	1124	4/1	11	837	3/9		0.65	[-0.22; 1.51]	1.9%
Onambélé et al. 2013 [07]	12	40	22	12	26	13		0.72	[0.34, 2.21]	2.0%
Quinlan et al. 2021 [121]	10	2377	608	10	1769	462		1.08	[0.13:2.03]	1.7%
Quinlan et al. 2021 [121]	9	2512	635	9	1782	570		1.15	[0.13; 2.17]	1.5%
Quinlan et al. 2021 [121]	8	2326	769	8	1376	428		1.44	0.31; 2.58]	1.3%
Quinlan et al. 2021 [121]	8	2314	466	8	1267	260		2.62	[ 1.19; 4.06]	0.9%
Seynnes et al. 2009 [70]	15	2288	2115	15	1864	1813	-	0.21	[-0.51; 0.93]	2.4%
Tillin et al. 2012 [125]	10	697	103	10	520	86		1.79	[ 0.71; 2.86]	1.4%
Waugh et al. 2018 [54]	14	456	49	14	390	35		1.51	[ 0.66; 2.37]	1.9%
Waugh et al. 2018 [54]	14	461	40	14	359	53		2.11	[ 1.16; 3.06]	1.7%
Random effects model	3/18	459	147	3/18	397	140		0.41	[-0.44, 1.25]	57.0%
Heterogeneity: $I^2 = 49\%$ , $p = 0.65$	040			040				0.00	[0.02, 1.07]	07.070
Low volume										
Albracht et al. 2013[5]	13	315	53	13	272	48		0.82	[ 0.02; 1.63]	2.1%
Arampatzis et al. 2007 [19]	11	201	41	11	187	38		0.36	[-0.49; 1.20]	2.0%
Arampatzis et al. 2007 [19]	11	228	40	11	168	122		1.52	[0.55; 2.49]	1.6%
Bohm et al. 2014 [21]	12	579	172	12	370	106		1 37	[-0.16, 1.47]	1.8%
Bohm et al. 2021 [17]	13	111	59	13	85	36		0.52	[-0.27:1.30]	2.2%
Carroll et al. 2011 [62]	12	3335	1334	12	2928	1320		0.30	[-0.51; 1.10]	2.1%
Centner et al. 2019 [71]	14	565	158	14	402	103		1.19	[ 0.38; 2.01]	2.1%
Eriksen et al. 2018 [63]	9	3890	2430	9	2560	1530	+=-	0.62	[-0.33; 1.58]	1.7%
Eriksen et al. 2018 [63]	12	1900	693	12	1800	624		0.15	[-0.65; 0.95]	2.1%
Kubo et al. 2001 [51]	8	106	33	8	68	21		1.31	[ 0.20; 2.42]	1.3%
Kubo et al. 2006 [112]	8	59	24	8	51	22		0.29	[-0.69; 1.28]	1.6%
Kubo et al. 2006 [112]	8	1/86	660	8	1790	559		-0.01	[-0.99; 0.97]	1.6%
Kubo et al. 2009 [114]	10	1833	802	10	1071	630		0.94	[0.43, 2.44]	1.0%
Kubo et al. 2010 [88]	8	104	37	8	69	19		1 12	[ 0.04 2.20]	1.4%
Kubo et al. 2012 [89]	9	277	111	9	183	45		1.06	[ 0.05: 2.06]	1.6%
Kubo et al. 2017 [86]	11	32	9	11	24	5		1.17	[ 0.25; 2.09]	1.8%
Malliaras et al. 2013 [61]	9	2338	638	9	1560	793		1.03	[ 0.03; 2.03]	1.6%
Malliaras et al. 2013 [61]	10	2508	1066	10	1387	360		1.35	[ 0.36; 2.34]	1.6%
Massey et al. 2018 [66]	15	687	285	15	560	177		0.52	[-0.21; 1.25]	2.4%
Massey et al. 2018 [66]	15	3239	575	15	2835	444		0.77	[0.02; 1.51]	2.3%
wicivianon et al. 2018 [68]	8	151/	390	8	1132	294		1.05	[-0.01; 2.12]	1.4%
Random effects model	256	991	305	256	019	204		0.98	[-0.06; 2.03]	1.5%
Heterogeneity: $J^2 = 0\%$ $p < 0.01$	200			200				0.01	[ 0.02, 0.33]	40.0 /0
necerogenery, r = 070, p < 0.01										
Random effects model	604			604			0	0.83	[ 0.68; 0.97]	100.0%
Heterogeneity: $I^2 = 32\%$ , $p = 0.01$									53. St. St.	
Residual heterogeneity: $I^2 = 33\%$ ,	p = 0.01						-4 -2 0 2 4			
							Decrease Increase			

**<u>S18.</u>** Forest plot for the meta-analysis of modulus subdivided by training volume (high versus low) showing standardised mean differences (SMD) and 95% confidence intervals (CI) of resistance training studies.

Study	n	Mean	Post SD	n	Mean	Pre SD				SMD	[95% CI]	Weight
High volume												
Arampatzis et al. 2010 [20]	11	970	265	11	1010	199		-		-0.16	[-1.00; 0.67]	3.7%
Arampatzis et al. 2010 [20]	11	1130	332	11	970	232		-		0.54	[-0.32; 1.39]	3.6%
Bohm et al. 2014 [21]	14	1430	636	14	910	262		-		1.04	[ 0.24; 1.83]	3.8%
Geremia et al. 2018 [72]	15	1292	436	15	695	160				1.77	[ 0.91; 2.63]	3.6%
Kongsgaard et al. 2007 [65]	12	1650	554	12	1470	589		+		0.30	[-0.50; 1.11]	3.8%
Malliaras et al. 2013 [61]	10	1022	339	10	737	390		1	•	0.75	[-0.17; 1.66]	3.4%
Massey et al. 2018 [66]	14	1490	270	14	1230	180		3	+	1.10	[ 0.30; 1.90]	3.8%
McMahon et al. 2013 [67]	10	1100	120	10	830	90				2.44	[ 1.22; 3.65]	2.7%
McMahon et al. 2013 [67]	11	990	110	11	740	90				2.39	[ 1.25; 3.54]	2.8%
McMahon et al. 2013 [67]	11	1150	110	11	780	100				3.39	[2.00; 4.77]	2.3%
Quinlan et al. 2021 [121]	10	1510	440	10	1160	290			<u> </u>	0.90	[-0.03; 1.83]	3.4%
Quinlan et al. 2021 [121]	9	1460	350	9	1050	270		-	E	1.25	[ 0.22; 2.28]	3.1%
Quinlan et al. 2021 [121]	8	1430	570	8	800	250				1.35	[ 0.23; 2.47]	2.9%
Quinlan et al. 2021 [121]	8	1280	230	8	/10	130				2.88	[1.37; 4.40]	2.1%
Seynnes et al. 2009 [70]	15	1160	1201	15	980	1162		-		0.15	[-0.57; 0.87]	4.0%
Waugh et al. 2018 [54]	14	1586	611	14	1261	459				0.58	[-0.18; 1.34]	3.9%
Waugh et al. 2018 [54]	14	1529	459	14	1242	420				0.63	[-0.13; 1.39]	3.9%
Random effects model	197			197						1.13	[0.73; 1.53]	56.6%
Heterogeneity: $T = 69\%$ , $p = 0.02$												
Louvielume												
Arampetzia et al. 2007 [10]	11	400	202	11	400	101				0.05	10 00.0 701	2 70/
Arampatzis et al. 2007 [19]	11	400	293	11	420	279				-0.05	[-0.09, 0.78]	3.770
Rohm et al. 2014 [21]	12	1050	277	10	900	270				0.72	[-0.14, 1.39]	3.0%
Bohm et al. 2014 [21]	12	1410	211	12	970	277				1.28	[-0.20, 1.30]	3.5%
Centrer et al. 2014 [21]	14	18/18	481	14	1540	102				0.61	[0.30, 2.17]	3.0%
Erikson et al. 2018 [63]	9	1330	690	9	1230	300		-	1	0.01	[-0.76:1.10]	3.1%
Eriksen et al. 2018 [63]	12	735	263	12	703	253		-		0.17	[-0.68: 0.92]	3.8%
Kubo et al. 2001 [52]	8	433	35	8	288	26				- 445	[242.647]	1.4%
Malliaras et al. 2013 [61]	9	942	279	g	620	223				1 22	[0.19, 2.24]	3.1%
Malliaras et al. 2013 [61]	10	1011	436	10	570	191		_		1.25	[ 0 28 2 23]	3.3%
Massev et al. 2018 [66]	15	1510	360	15	1320	270				0.58	[-0.15: 1.31]	4.0%
McMahon et al. 2018 [68]	8	990	255	8	780	170			-	0.92	[-0.13: 1.96]	3.1%
McMahon et al. 2018 [68]	8	600	226	8	420	113		- 4	÷	0.95	[-0.10:2.00]	3.1%
Random effects model	139	000	220	139	120	110			o l	0.77	[0.40:1.13]	43.4%
Heterogeneity: $l^2 = 50\%$ p < 0.01	100			100						Sec. 1	[ strot trio]	101170
Random effects model	336			336					\$	0.97	[ 0.70; 1.25]	100.0%
Heterogeneity: $l^2 = 63\%$ , $p < 0.01$												second SUSCE FL
Residual heterogeneity: $I^2 = 63\%$ .	p < 0.0	1					-6 -4	-2 0	2 4	6		
							Deci	rease	Increase			

<u>S19.</u> Forest plot for the meta-analysis of cross-sectional area subdivided by training volume (high versus low) showing standardised mean differences (SMD) and 95% confidence intervals (CI) of resistance training studies.

			Post		NO PROVIDE	Pre		7-10000000		
Study	n	Mean	SD	n	Mean	SD		SMD	[95% CI]	Weight
							T T			
High volume	4.4	<b>CO</b>	25	4.4	50	24		0.05	[0.70,0.00]	0 10/
Arampatzis et al. 2010 [20]	11	50	30	11	50	29		0.05	[-0.79, 0.00]	2.1%
Rohm at al 2014 [21]	14	00	14	14	00	12		0.02	[-0.62, 0.65]	2.170
Coromia at al. 2014 [21]	14	72	14	14	60	13		1.01	[-0.32, 0.97]	2.170
Kengegoord et al. 2016 [72]	10	121	14	10	117	14		0.29	[0.24, 1.77]	2.3%
Kuba at al. 2001 [51]	12	121	14	12	210	14		0.20	[-0.33, 1.00]	2.3%
Kubo et al. 2007 [51]	0	213	19	0	210	10		0.10	[-0.02, 1.14]	1.5%
Kubo et al. 2002 [111]	0	207	22	0	204	10		0.14	[-1.21, 0.70]	1.5%
Kubo et al. 2000 [113]	9	207	17	9	204	13		0.14	[-0.73, 1.00]	1.7%
Kubo et al. 2000 [113]	a	205	20	a	78	19		-0.02	[-0.95: 0.90]	1.7%
Kubo et al. 2000 [50]	10	58	20	10	59	8		-0.02	[-0.00; 0.00]	1 9%
Kubo et al. 2007 [05]	10	62	8	10	61	7		0.10	[-0.78: 0.98]	1.9%
Kubo et al. 2000 [114]	10	58	8	10	59	8		-0.08	[-0.96: 0.79]	1.9%
Kubo et al 2010 [115]	10	68	Ř	10	66	8		0.00	[-0.67:1.09]	1.9%
Kubo et al. 2017 [116]	9	73	10	9	72	11		0.08	[-0.84: 1.01]	1.3%
Kubo et al. 2017 [116]	ğ	74	9	9	74	8		0.03	[-0.89: 0.96]	1.7%
Malliaras et al 2013 [61]	10	120	19	10	116	8		0.27	[-0.61:1.15]	1.9%
Massev et al 2018 [66]	14	96	8	14	99	10		-0.30	[-1.04: 0.45]	2.7%
McMahon et al 2013 [67]	10	73	14	10	70	13		0.21	[-0.67:1.09]	1.9%
McMahon et al 2013 [67]	11	77	19	11	72	14		0.26	[-0.58: 1.10]	2.1%
McMahon et al 2013 [67]	11	76	16	11	71	13		0.31	[-0.53: 1.16]	2.1%
Mouraux et al 2000 [118]	10	257	61	10	240	49		0.29	[-0 59 1 18]	1.9%
Quinlan et al. 2021 [121]	10	85	5	10	84	6		0.16	[-0.72: 1.04]	1.9%
Quinlan et al. 2021 [121]	9	87	11	9	87	10		-0.03	[-0.95: 0.90]	1.7%
Quinlan et al. 2021 [121]	8	89	12	8	89	11		0.01	[-0.97: 0.99]	1.6%
Quinlan et al. 2021 [121]	8	90	9	8	90	10		0.08	[-0.90: 1.06]	1.6%
Sevnnes et al. 2009 [70]	15	107	4	15	103	4		1.01	[ 0.24: 1.77]	2.5%
Waugh et al. 2018 [54]	14	61	17	14	62	15		-0.08	[-0.82: 0.67]	2.7%
Waugh et al. 2018 [54]	14	60	14	14	58	13		0.14	[-0.60: 0.88]	2.7%
Random effects model	308			308			<b></b>	0.17	[0.01; 0.33]	58.8%
Heterogeneity: $I^2 = 0\%$ , $p = 0.97$										
Low volume										
Arampatzis et al. 2007 [19]	11	53	15	11	50	15		0.14	[-0.70; 0.98]	2.1%
Arampatzis et al. 2007 [19]	11	53	14	11	48	13		0.30	[-0.55; 1.14]	2.1%
Bohm et al. 2014 [21]	12	82	12	12	78	11		0.36	[-0.45; 1.16]	2.3%
Bohm et al. 2014 [21]	12	79	10	12	75	9		0.34	[-0.47; 1.14]	2.3%
Carroll et al. 2011 [62]	12	115	33	12	117	35		-0.06	[-0.86; 0.74]	2.3%
Centner et al. 2019 [71]	14	74	17	14	70	18		0.18	[-0.56; 0.92]	2.7%
Eriksen et al. 2018 [63]	9	129	24	9	131	27		-0.07	[-1.00; 0.85]	1.7%
Eriksen et al. 2018 [63]	11	123	33	12	121	28		0.06	[-0.76; 0.88]	2.2%
Kubo et al. 2001 [51]	8	215	21	8	212	18		0.15	[-0.84; 1.13]	1.5%
Kubo et al. 2006 [112]	8	73	18	8	73	20		0.01	[-0.97; 0.99]	1.6%
Kubo et al. 2009 [114]	10	63	8	10	60	7		0.32	[-0.57; 1.20]	1.9%
Kubo et al. 2010 [88]	8	81	20	8	80	19		0.04	[-0.94; 1.02]	1.6%
Kubo et al. 2012 [89]	9	74	28	9	72	33		0.06	[-0.86; 0.99]	1.7%
Kubo et al. 2017 [86]	11	66	8	11	65	8		0.14	[-0.70; 0.97]	2.1%
Malliaras et al. 2013 [61]	9	118	9	9	112	6		0.73	[-0.23; 1.70]	1.6%
Maillaras et al. 2013 [61]	10	120	19	10	114	19		0.33	[-0.55; 1.22]	1.9%
wassey et al. 2018 [66]	15	98	13	15	97	13		0.03	[-0.69; 0.75]	2.9%
McMahon et al. 2018 [68]	8	81	13	8	//	13		0.32	[-0.67; 1.30]	1.5%
Micivianon et al. 2018 [68]	8	/0	22	8	66	11		0.20	[-0.78; 1.18]	1.5%
Sanz-Lopez et al. 2016 [123]	20	82	23	20	64	11		1.04	[ 0.38; 1.71]	3.4%
Random effects model	216			217				0.25	[ 0.06; 0.44]	41.2%
Heterogeneity: $I^{-} = 0\%$ , $p = 0.99$										
Random effects model	524			525				0.20	10.08.0.221	100 09/
Heterogeneity: $J^2 = 0\%$ $p = 1.00$	524			525				0.20	[ 0.00; 0.33]	100.0%
Residual heterogeneity: $I^2 = 0\%$ , p	= 1.00						-1.5 -1 -0.5 0 0.5 1 1.5			

Decrease Increase

<u>S20.</u> Forest plot for the meta-analysis of stiffness subdivided by protocol duration showing standardised mean differences (SMD) and 95% confidence intervals (CI) of high intensity, resistance training studies.

			Post			Pre					
Study	n	Mean	SD	n	Mean	SD			SMD	[95% CI]	Weight
								E 3			
<12 weeks	10	004	405	10	0.40	00			0.00	0.54 4.001	0.00/
Duclay et al. 2009 [105]	10	291	125	10	249	90	-		0.38	[-0.51; 1.26]	2.0%
Kay et al. 2016 [110]	13	13	3	13	10	2			1.10	[0.27; 1.94]	2.1%
Kubo et al. 2002 [111]	10	1001	504	10	20	9			0.80	[-0.23; 1.83]	1.0%
McMahan et al. 2013 [67]	10	1221	594	10	916	441			0.56	[-0.34; 1.46]	1.9%
McMahan et al. 2013 [67]	11	1107	353	11	1100	242			1.28	[0.34; 2.21]	1.8%
McMahan et al. 2016 [66]	0	1517	390	0	1132	294			1.05	[-0.01; 2.12]	1.6%
Nicivianon et al. 2018 [68]	8	0000	305	8	1004	204			0.98	[-0.08; 2.03]	1.6%
Seynnes et al. 2009 [70]	15	2200	2115	15	1864	1013			0.21	[-0.51; 0.93]	2.4%
Tillin et al. 2012 [125]	10	697	103	10	520	86			1.79	[0.71; 2.86]	1.5%
Werkhausen et al. 2018 [56]	11	459	147	11	397	146			0.41	[-0.44; 1.25]	2.1%
Random effects model	104			104				<b>\$</b>	0.78	[ 0.48; 1.08]	18.6%
Heterogeneity: $I^{-} = 7\%$ , $p < 0.01$											
10											
12 Weeks+	40	045	50	40	070	40			0.00	[0.00.4.00]	0.00/
Albracht et al. 2013 [5]	13	315	53	13	212	48			0.82	[0.02; 1.63]	2.2%
Arampatzis et al. 2007 [19]	11	220	40	11	100	3/			1.52	[0.55; 2.49]	1.0%
Arampaizis et al. 2010 [20]	10	302	100	10	200	100			0.79	[-0.09, 1.66]	2.0%
Bonm et al. 2014 [21]	12	457	132	12	370	132			0.64	[-0.18; 1.47]	2.1%
Bohm et al. 2014 [21]	14	539	254	14	336	89			1.04	[0.24; 1.84]	2.2%
Bonm et al. 2014 [21]	12	579	172	12	3//	106			1.37	[0.46; 2.27]	1.9%
Bohm et al. 2021 [17]	13	111	59	13	85	36			0.52	[-0.27; 1.30]	2.2%
Carroll et al. 2011 [62]	12	3335	1334	12	2928	1320			0.30	[-0.51; 1.10]	2.2%
Centher et al. 2019 [71]	14	565	158	14	402	103			1.19	[ 0.38; 2.01]	2.1%
Eriksen et al. 2018 [63]	9	3890	2430	9	2560	1530			0.62	[-0.33; 1.58]	1.8%
Eriksen et al. 2018 [63]	12	1900	693	12	1800	624	-		0.15	[-0.65; 0.95]	2.2%
Eriksen et al. 2019 [64]	10	4420	1075	10	4060	1360			0.28	[-0.60; 1.16]	2.0%
Geremia et al. 2018 [72]	15	350	59	15	192	36			3.15	[2.03; 4.26]	1.5%
Kongsgaard et al. 2007 [65]	12	4213	1406	12	3676	1306	1. <del>.</del>		0.38	[-0.43; 1.19]	2.2%
Kubo et al. 2001 [51]	8	106	33	8	68	21			1.31	[0.20; 2.42]	1.5%
Kubo et al. 2006 [112]	8	59	24	8	51	22			0.29	[-0.69; 1.28]	1.7%
Kubo et al. 2006 [112]	8	1786	660	8	1790	559			-0.01	[-0.99; 0.97]	1.7%
Kubo et al. 2006 [113]	9	86	36	9	79	21	1		0.25	[-0.68; 1.17]	1.9%
Kubo et al. 2006 [113]	9	122	40	9	81	26			1.17	[0.15; 2.18]	1.7%
Kubo et al. 2006 [96]	9	59	_23	9	46	19			0.62	[-0.33; 1.57]	1.8%
Kubo et al. 2006 [96]	9	1819	710	9	1676	662	-		0.20	[-0.73; 1.13]	1.9%
Kubo et al. 2007 [85]	10	166	44	10	128	26			1.01	[ 0.07; 1.96]	1.8%
Kubo et al. 2009 [114]	10	96	37	10	72	20			0.75	[-0.16; 1.67]	1.9%
Kubo et al. 2009 [114]	10	1253	410	10	999	426			0.58	[-0.32; 1.48]	1.9%
Kubo et al. 2009 [114]	10	110	36	10	67	19			1.43	[0.43; 2.44]	1.7%
Kubo et al. 2009 [114]	10	1833	892	10	1071	639			0.94	[ 0.01; 1.88]	1.8%
Kubo et al. 2010 [115]	10	96	37	10	72	20			0.75	[-0.16; 1.67]	1.9%
Kubo et al. 2010 [115]	10	41	13	10	32	5			0.85	[-0.08; 1.77]	1.9%
Kubo et al. 2010 [88]	8	104	37	8	69	19			1.12	[ 0.04; 2.20]	1.5%
Kubo et al. 2012 [89]	9	277	111	9	183	45		- <u></u>	1.06	[ 0.05; 2.06]	1.7%
Kubo et al. 2017 [116]	9	1414	355	9	1004	384			1.06	[ 0.05; 2.06]	1.7%
Kubo et al. 2017 [116]	9	1457	440	9	1289	544	-		0.32	[-0.61; 1.26]	1.8%
Kubo et al. 2017 [86]	11	32	9	11	24	5			1.17	[ 0.25; 2.09]	1.9%
Malliaras et al. 2013 [61]	9	2338	638	9	1560	793			1.03	[ 0.03; 2.03]	1.7%
Malliaras et al. 2013 [61]	10	2536	850	10	1822	898			0.78	[-0.13; 1.70]	1.9%
Malliaras et al. 2013 [61]	10	2508	1066	10	1387	360			1.35	[ 0.36; 2.34]	1.7%
Massey et al. 2018 [66]	15	687	285	15	560	177			0.52	[-0.21; 1.25]	2.4%
Massey et al. 2018 [66]	15	3239	575	15	2835	444			0.77	[ 0.02; 1.51]	2.3%
Massey et al. 2018 [66]	14	595	101	14	592	118	-		0.03	[-0.71; 0.77]	2.4%
Massey et al. 2018 [66]	14	3122	632	14	2605	446			0.92	[ 0.13; 1.70]	2.2%
Onambélé et al. 2008 [120]	12	40	23	12	26	13		<b>†</b>	0.72	[-0.11; 1.55]	2.1%
Waugh et al. 2018 [54]	14	541	49	14	390	35		-	3.43	[ 2.21; 4.65]	1.3%
Waugh et al. 2018 [54]	14	523	53	14	359	53			2.99	[ 1.87; 4.12]	1.5%
Random effects model	473			473				\$	0.88	[ 0.69; 1.07]	81.4%
Heterogeneity: $I^2 = 48\%, p = 0.38$											
Random effects model	577			577				<b></b>	0.86	[ 0.70; 1.02]	100.0%
Residual beteroconsity: $I^2 = 42\%$ , $p < 0.01$	0 < 0.01						-1 2	0 2 4			
Nosidual neterogeneity. 1 – 43%,	μ ~ 0.01						T -2	Increase			
							Deciease	11010030			

<u>S21.</u> Forest plot for the meta-analysis of modulus subdivided by protocol duration showing standardised mean differences (SMD) and 95% confidence intervals (CI) of high intensity, resistance training studies.

			Post			Pre					
Study	n	Mean	SD	n	Mean	SD			SMD	[95% CI]	Weight
410								13			
<12 weeks	10	4400	100	10	000	00			0.44	14.00.0.051	0.00/
McMahan et al. 2013 [67]	10	1100	120	10	830	90			2.44	[ 1.22; 3.65]	3.0%
McMahon et al. 2013 [67]	11	1150	110	11	780	100			3.39	[2.00; 4.77]	2.5%
McManon et al. 2018 [68]	8	990	255	8	780	170			0.92	[-0.13; 1.96]	3.5%
McMahon et al. 2018 [68]	8	600	226	8	420	113			0.95	[-0.10; 2.00]	3.5%
Seynnes et al. 2009 [70]	15	1160	1201	15	980	1162	1		0.15	[-0.57; 0.87]	4.8%
Random effects model	52			52				$\sim$	1.48	[0.38; 2.58]	17.3%
Heterogeneity: $I^2 = 82\%$ , $p = 0.04$											
12 weeks+											
Arampatzis et al. 2007 [19]	11	680	355	11	440	278		<u> </u>	0.72	[-0.14: 1.59]	4.2%
Arampatzis et al. 2010 [20]	11	1130	332	11	970	232		-	0.54	[-0.32: 1.39]	4.2%
Bohm et al. 2014 [21]	12	1050	277	12	890	277			0.56	[-0.26: 1.38]	4.4%
Bohm et al 2014 [21]	14	1430	636	14	910	262			1.04	[0.24.1.83]	4 5%
Bohm et al 2014 [21]	12	1410	381	12	970	277			1.28	[0.38:2.17]	4 1%
Carroll et al. 2011 [62]	12	1220	450	12	1030	416	-	-	0.42	[-0.39: 1.23]	4.4%
Centner et al. 2019 [71]	14	1848	481	14	1540	492		-	0.61	[-0.15: 1.38]	4.6%
Eriksen et al. 2018 [63]	9	1330	690	9	1230	390	-		0.17	[-0.76: 1.10]	3.9%
Eriksen et al. 2018 [63]	12	735	263	12	703	253			0.12	[-0.68: 0.92]	4.5%
Eriksen et al. 2019 [64]	10	1560	443	10	1510	474	_		0.10	[-0.77: 0.98]	4.1%
Geremia et al. 2018 [72]	15	1292	436	15	695	160			1.77	[0.91:2.63]	4.2%
Kongsgaard et al. 2007 [65]	12	1650	554	12	1470	589	-		0.30	[-0.50: 1.11]	4.4%
Kubo et al. 2001 [52]	8	433	35	8	288	26		□	4.45	[2.42:6.47]	1.4%
Malliaras et al. 2013 [61]	9	942	279	9	620	223			1.22	[0.19: 2.24]	3.6%
Malliaras et al. 2013 [61]	10	1022	339	10	737	390		<b>F</b>	0.75	[-0.17, 1.66]	4.0%
Malliaras et al. 2013 [61]	10	1011	436	10	570	191		<b>—</b>	1.25	[0.28:2.23]	3.8%
Massev et al. 2018 [66]	15	1510	360	15	1320	270			0.58	[-0.15: 1.31]	4.8%
Massey et al 2018 [66]	14	1490	270	14	1230	180			1 10	[0 30 1 90]	4 5%
Waugh et al. 2018 [54]	14	1892	803	14	1261	459		<b>—</b>	0.94	[ 0.15; 1.72]	4.5%
Waugh et al. 2018 [54]	14	1720	535	14	1242	420		<b>—</b>	0.96	[0.17:1.75]	4.5%
Random effects model	238			238				\$	0.80	[ 0.55: 1.05]	82.7%
Heterogeneity: $l^2 = 40\% p < 0.01$										F	
Random effects model	290			290				\$	0.91	[ 0.63; 1.18]	100.0%
Heterogeneity: $I^2 = 57\%$ , $p < 0.01$											
Residual heterogeneity: $I^2 = 57\%$ ,	p < 0.0	1				-	-6 -4 -2	0246			
							Decrease	Increase			

<u>S22.</u> Forest plot for the meta-analysis of cross-sectional area subdivided by protocol duration showing standardised mean differences (SMD) and 95% confidence intervals (CI) of high intensity, resistance training studies.

			Post			Pre				
Study	n	Mean	SD	n	Mean	SD		SMD	[95% CI]	Weight
							1.5			
<12 weeks	0	50	•	•	0.4	0	_	0.00	1 4 0 4 0 701	4 70/
Kubo et al. 2002 [111]	8	59	8	8	01	9		-0.22	[-1.21; 0.76]	1.7%
McMahon et al. 2013[67]	10	73	14	10	70	13		0.21	[-0.67; 1.09]	2.2%
McMahon et al. 2013[67]	11	76	16	11	/1	13		0.31	[-0.53; 1.16]	2.4%
McMahon et al. 2018 [68]	8	81	13	8	77	13		0.32	[-0.67; 1.30]	1.7%
McMahon et al. 2018 [68]	8	70	22	8	66	11		0.20	[-0.78; 1.18]	1.7%
Mouraux et al. 2000 [118]	10	257	61	10	240	49		0.29	[-0.59; 1.18]	2.2%
Sanz-Lopez et al. 2016 [123]	20	82	23	20	64	11		1.04	[ 0.38; 1.71]	3.8%
Seynnes et al. 2009 [70]	15	107	4	15	103	4		1.01	[ 0.24; 1.77]	2.9%
Random effects model	90			90			$\diamond$	0.49	[0.17; 0.80]	18.6%
Heterogeneity: $I^2 = 8\%$ , $p = 1.00$										
10										
12 weeks+		50			40	40		0.00		0.40/
Arampatzis et al. 2007 [19]	11	53	14	11	48	13		0.30	[-0.55; 1.14]	2.4%
Arampatzis et al. 2010 [20]	11	56	36	11	56	38		0.02	[-0.82; 0.85]	2.4%
Bohm et al. 2014 [21]	12	82	12	12	78	11		0.36	[-0.45; 1.16]	2.6%
Bohm et al. 2014 [21]	14	83	14	14	80	13		0.23	[-0.52; 0.97]	3.0%
Bohm et al. 2014 [21]	12	79	10	12	75	9		0.34	[-0.47; 1.14]	2.6%
Carroll et al. 2011 [62]	12	115	33	12	117	35		-0.06	[-0.86; 0.74]	2.6%
Centner et al. 2019 [71]	14	74	17	14	70	18		0.18	[-0.56; 0.92]	3.1%
Eriksen et al. 2018 [63]	9	129	24	9	131	27		-0.07	[-1.00; 0.85]	2.0%
Eriksen et al. 2018 [63]	11	123	33	12	121	28		0.06	[-0.76; 0.88]	2.5%
Eriksen et al. 2019 [64]	10	124	22	10	117	21		0.31	[-0.57; 1.20]	2.2%
Geremia et al. 2018 [72]	15	72	11	15	62	8		1.01	[ 0.24; 1.77]	2.9%
Kongsgaard et al. 2007 [65]	12	121	14	12	117	14		0.28	[-0.53; 1.08]	2.6%
Kubo et al. 2001 [51]	8	213	19	8	210	16		0.16	[-0.82; 1.14]	1.7%
Kubo et al. 2001 [51]	8	215	21	8	212	18		0.15	[-0.84; 1.13]	1.7%
Kubo et al. 2006 [112]	8	73	18	8	73	20		0.01	[-0.97; 0.99]	1.8%
Kubo et al. 2006 [113]	9	207	22	9	204	19		0.14	[-0.79; 1.06]	2.0%
Kubo et al. 2006 [113]	9	205	17	9	202	13		0.19	[-0.74; 1.12]	2.0%
Kubo et al. 2006 [96]	9	78	20	9	78	19		-0.02	[-0.95; 0.90]	2.0%
Kubo et al. 2007 [85]	10	58	8	10	59	8		-0.08	[-0.96; 0.79]	2.2%
Kubo et al. 2009 [114]	10	62	8	10	61	7		0.10	[-0.78; 0.98]	2.2%
Kubo et al. 2009 [114]	10	63	8	10	60	7		0.32	[-0.57; 1.20]	2.2%
Kubo et al. 2010 [115]	10	58	8	10	59	8		-0.08	[-0.96; 0.79]	2.2%
Kubo et al. 2010 [115]	10	68	8	10	66	8		0.21	[-0.67; 1.09]	2.2%
Kubo et al. 2010 [88]	8	81	20	8	80	19		0.04	[-0.94; 1.02]	1.8%
Kubo et al. 2012 [89]	9	74	28	9	72	33		0.06	[-0.86; 0.99]	2.0%
Kubo et al. 2017 [116]	9	73	10	9	72	11		0.08	[-0.84; 1.01]	2.0%
Kubo et al. 2017 [116]	9	74	9	9	74	8		0.03	[-0.89; 0.96]	2.0%
Kubo et al. 2017 [86]	11	66	8	11	65	8		0.14	[-0.70; 0.97]	2.4%
Malliaras et al. 2013 [61]	9	118	9	9	112	6		0.73	[-0.23; 1.70]	1.8%
Malliaras et al. 2013 [61]	10	120	19	10	116	8		0.27	[-0.61; 1.15]	2.2%
Malliaras et al. 2013 [61]	10	120	19	10	114	19		0.33	[-0.55; 1.22]	2.2%
Massey et al. 2018 [66]	14	96	8	14	99	10		-0.30	[-1.04; 0.45]	3.0%
Massey et al. 2018 [66]	15	98	13	15	97	13		0.03	[-0.69; 0.75]	3.3%
Waugh et al. 2018 [54]		61	17	14	62	15	· · · · · · · · · · · · · · · · · · ·	-0.08	[-0.82: 0.67]	3.1%
Waugh et al. 2018 [54]	14	01								
Random effects model	14 14	60	14	14	58	13		0.14	[-0.60: 0.88]	3.1%
Heterogeneity: $l^2 = 0\%$ , $p = 0.37$	14 14 376	60	14	14 377	58	13		0.14 0.16	[-0.60; 0.88] [ 0.01: 0.30]	3.1% 81.4%
rioteregenery. r	14 14 376	60	14	14 377	58	13		0.14 0.16	[-0.60; 0.88] [ 0.01; 0.30]	3.1% 81.4%
Random effects model	14 14 376	60	14	14 377 467	58	13		0.14 0.16	[-0.60; 0.88] [ 0.01; 0.30]	3.1% 81.4%
<b>Random effects model</b> Heterogeneity: $l^2 = 0\%$ , $p = 0.99$	14 14 376 466	60	14	14 377 <b>467</b>	58	13		0.14 0.16 0.22	[-0.60; 0.88] [ 0.01; 0.30] [ 0.09; 0.35]	3.1% 81.4% 100.0%
<b>Random effects model</b> Heterogeneity: $l^2 = 0\%$ , $p = 0.99$ Residual beterogeneity: $l^2 = 0\%$ , $p$	14 14 376 <b>466</b> = 1.00	60	14	14 377 <b>467</b>	58	13	-15.1.05.0.05.1.15	0.14 0.16 0.22	[-0.60; 0.88] [ 0.01; 0.30] [ 0.09; 0.35]	3.1% 81.4% 100.0%

<u>S23.</u> Forest plot for the meta-analysis of stiffness subdivided by contraction mode showing standardised mean differences (SMD) and 95% confidence intervals (CI) of high intensity, resistance training studies.

Study	n	Mean	Post SD	n	Mean	Pre SD		SMD	[95% CI]	Weight
Con:Ecc										
Carroll et al. 2011 [62] Centner et al. 2019 [71]	12 14	3335 565	1334 158	12 14	2928 402	1320 103		0.30 1.19	[-0.51; 1.10] [ 0.38; 2.01]	2.2% 2.1%
Eriksen et al. 2018 [63]	9	3890	2430	9	2560	1530	<u>+</u>	0.62	[-0.33; 1.58]	1.8%
Eriksen et al. 2018 [63]	12	1900	693	12	1800	624		0.15	[-0.65; 0.95]	2.2%
Eriksen et al. 2019 [64] Kongsgaard et al. 2007 [65]	10	4420	1075	10	4060	1360		0.28	[-0.60; 1.16]	2.0%
Kubo et al. 2002 [111]	8	34	1400	8	26	9		0.80	[-0.23: 1.83]	1.6%
Kubo et al. 2006 [96]	9	59	23	9	46	19		0.62	[-0.33; 1.57]	1.8%
Kubo et al. 2006 [96]	9	1819	710	9	1676	662	- <b>H</b>	0.20	[-0.73; 1.13]	1.9%
Kubo et al. 2007 [85]	10	166	44	10	128	26		1.01	[0.07; 1.96]	1.8%
Kubo et al. 2009 [114] Kubo et al. 2009 [114]	10	1253	37	10	999	20		0.75	[-0.16; 1.67]	1.9%
Kubo et al. 2010 [115]	10	96	37	10	72	20		0.75	[-0.16; 1.67]	1.9%
McMahon et al. 2013 [67]	10	1221	594	10	916	441		0.56	[-0.34; 1.46]	1.9%
McMahon et al. 2013 [67]	11	1167	353	11	765	242		1.28	[0.34; 2.21]	1.8%
McMahon et al. 2018 [68]	8	1517	390	8	1132	294		1.05	[-0.01; 2.12]	1.6%
Onambélé et al. 2008 [120]	12	40	23	12	26	204		0.90	[-0.11:1.55]	2.1%
Seynnes et al. 2009 [70]	15	2288	2115	15	1864	1813		0.21	[-0.51; 0.93]	2.4%
Random effects model	199			199			•	0.62	[0.41; 0.82]	36.7%
Heterogeneity: $l^2 = 0\%$ , $p < 0.01$										
Concentric										
Kubo et al. 2017 [116]	9	1414	355	9	1004	384		1.06	[ 0.05; 2.06]	1.7%
Malliaras et al. 2013 [61]	9	2338	638	9	1560	793		1.03	[ 0.03; 2.03]	1.7%
Random effects model	18			18			$\diamond$	1.04	[ 0.34; 1.75]	3.4%
Heterogeneity: $I^* = 0\%$ , $p = 0.90$										
Eccentric										
Duclay et al. 2009 [105]	10	291	125	10	249	90		0.38	[-0.51; 1.26]	2.0%
Geremia et al. 2018 [72]	15	350	59	15	192	36		3.15	[2.03; 4.26]	1.5%
Kubo et al 2017 [116]	9	1457	440	9	1289	544		0.32	[-0.61:1.94]	2.1%
Malliaras et al. 2013 [61]	10	2536	850	10	1822	898		0.78	[-0.13; 1.70]	1.9%
Malliaras et al. 2013 [61]	10	2508	1066	10	1387	360		1.35	[ 0.36; 2.34]	1.7%
Random effects model	67			67				1.14	[ 0.40; 1.89]	11.0%
Heterogeneity: $I^2 = 73\%$ , $p < 0.01$										
Isometric		5.75	10101							0.000
Albracht et al. 2013 [5]	13	315	53	13	272	48		0.82	[ 0.02; 1.63]	2.2%
Arampatzis et al. 2007 [19]	11	302	40	11	258	51		0.79	[0.55, 2.49]	2.0%
Bohm et al. 2014 [21]	12	457	132	12	370	132	<b></b>	0.64	[-0.18; 1.47]	2.1%
Bohm et al. 2014 [21]	14	539	254	14	336	89		1.04	[ 0.24; 1.84]	2.2%
Bohm et al. 2014 [21]	12	579	172	12	377	106		1.37	[ 0.46; 2.27]	1.9%
Bohm et al. 2021 [17]	13	111	59	13	85	36		0.52	[-0.27; 1.30]	2.2%
Kubo et al. 2001 [51]	8	106	33	8	68 51	21		1.31	[0.20; 2.42]	1.5%
Kubo et al. 2006 [112]	8	1786	660	8	1790	559		-0.01	[-0.99: 0.97]	1.7%
Kubo et al. 2006 [113]	9	86	36	9	79	21		0.25	[-0.68; 1.17]	1.9%
Kubo et al. 2006 [113]	9	122	40	9	81	26		1.17	[ 0.15; 2.18]	1.7%
Kubo et al. 2009 [114]	10	110	36	10	67	19		1.43	[0.43; 2.44]	1.7%
Kubo et al. 2009 [114]	10	1833	892	10	10/1	639		0.94	[0.01; 1.88]	1.8%
Kubo et al. 2010 [113]	8	104	37	8	69	19		1.12	[0.04: 2.20]	1.5%
Kubo et al. 2012 [89]	9	277	111	9	183	45	- <u>-</u>	1.06	[ 0.05; 2.06]	1.7%
Kubo et al. 2017 [86]	11	32	9	11	24	5		1.17	[ 0.25; 2.09]	1.9%
Massey et al. 2018 [66]	15	687	285	15	560	177		0.52	[-0.21; 1.25]	2.4%
Massey et al. 2018 [66]	15	595	5/5	15	2835	444		0.77	[ 0.02; 1.51] [-0.71: 0.77]	2.3%
Massey et al. 2018 [66]	14	3122	632	14	2605	446		0.92	[ 0.13: 1.70]	2.2%
Tillin et al. 2012 [125]	10	697	103	10	520	86		1.79	[ 0.71, 2.86]	1.5%
Waugh et al. 2018 [54]	14	541	49	14	390	35		- 3.43	[2.21; 4.65]	1.3%
Warkbausen et al. 2018 [54]	14	523	53	14	359	53		2.99	[ 1.87; 4.12]	1.5%
Random effects model	293	409	147	293	391	140	•	0.41	[ 0.72: 1.24]	49.0%
Heterogeneity: $I^2 = 53\%$ , $p = 0.97$										
Random effects model	577			577				<u>a</u> 8 0	[0 70.1 02]	100 0%
Heterogeneity: $l^2 = 42\% p < 0.01$	911			5/1				0.00	[ 0.70, 1.02]	100.0 /0

Heterogeneity:  $I^2 = 42\%$ , p < 0.01Residual heterogeneity:  $I^2 = 41\%$ , p < 0.01 -4 -2 0 2 4 Decrease Increase <u>S24.</u> Forest plot for the meta-analysis of modulus subdivided by contraction mode showing standardised mean differences (SMD) and 95% confidence intervals (CI) of high intensity, resistance training studies.

			Post			Pre				
Study	n	Mean	SD	n	Mean	SD		SMD	[95% CI]	Weight
ContEco							14			
Corroll et al. 2011 [62]	10	1000	450	10	1020	416		0 42	10 20: 1 221	4 4 9/
Canton et al. 2010 [71]	14	1010	400	14	1540	410		0.42	[-0.39, 1.23]	4.4%
Centrier et al. 2019 [71]	14	1040	401	14	1020	492		0.017	[-0.15, 1.36]	4.0%
Eriksen et al. 2018 [63]	10	1330	690	9	1230	390		0.17	[-0.76; 1.10]	3.9%
Eriksen et al. 2016 [63]	12	130	203	12	103	253		0.12	[-0.66, 0.92]	4.5%
Eriksen et al. 2019 [64]	10	1050	443	10	1510	4/4		0.10	[-0.77; 0.98]	4.1%
Kongsgaard et al. 2007 [65]	12	1650	554	12	1470	589		0.30	[-0.50; 1.11]	4.4%
McMahon et al. 2013 [67]	10	1100	120	10	830	90		2.44	[ 1.22; 3.65]	3.0%
McMahon et al. 2013 [67]	11	1150	110	11	780	100		3.39	[2.00; 4.77]	2.5%
McMahon et al. 2018 [68]	8	990	255	8	780	170		0.92	[-0.13; 1.96]	3.5%
McMahon et al. 2018 [68]	8	600	226	8	420	113		0.95	[-0.10; 2.00]	3.5%
Seynnes et al. 2009 [70]	15	1160	1201	15	980	1162		0.15	[-0.57; 0.87]	4.8%
Random effects model	121			121			\$	0.74	[ 0.26; 1.23]	43.4%
Heterogeneity: $I^2 = 67\%$ , $p = 0.09$										
Concentric	10	1000000	10000000	52	100000000	1377783		a (1933)	2000 2000 C 0. 0.	12010-0000
Malliaras et al. 2013 [61]	9	942	279	9	620	223	-	1.22	[ 0.19; 2.24]	3.6%
Random effects model	9			9			$\diamond$	1.22	[ 0.19; 2.24]	3.6%
Heterogeneity: not applicable										
Eccentric										
Geremia et al. 2018 [72]	15	1292	436	15	695	160		1.77	[ 0.91; 2.63]	4.2%
Malliaras et al. 2013 [61]	10	1022	339	10	737	390	+	0.75	[-0.17; 1.66]	4.0%
Malliaras et al. 2013 [61]	10	1011	436	10	570	191		1.25	[ 0.28; 2.23]	3.8%
Random effects model	35			35			•	1.27	[ 0.67; 1.87]	12.0%
Heterogeneity: $I^2 = 22\%, p = 0.28$										
Isometric										
Arampatzis et al. 2007 [19]	11	680	355	11	440	278		0.72	[-0.14; 1.59]	4.2%
Arampatzis et al. 2010 [20]	11	1130	332	11	970	232		0.54	[-0.32; 1.39]	4.2%
Bohm et al. 2014 [21]	12	1050	277	12	890	277		0.56	[-0.26; 1.38]	4.4%
Bohm et al. 2014 [21]	14	1430	636	14	910	262		1.04	[ 0.24; 1.83]	4.5%
Bohm et al. 2014 [21]	12	1410	381	12	970	277		1.28	[ 0.38; 2.17]	4.1%
Kubo et al. 2001 [52]	8	433	35	8	288	26		- 4.45	[ 2.42: 6.47]	1.4%
Massey et al. 2018 [66]	15	1510	360	15	1320	270		0.58	[-0.15: 1.31]	4.8%
Massey et al. 2018 [66]	14	1490	270	14	1230	180		1.10	[0.30: 1.90]	4.5%
Waugh et al. 2018 [54]	14	1892	803	14	1261	459	-	0.94	[0.15:1.72]	4 5%
Waugh et al 2018 [54]	14	1720	535	14	1242	420		0.96	[0 17 1 75]	4 5%
Random effects model	125			125			\$	0.95	[0.60: 1.30]	41.1%
Heterogeneity: $l^2 = 40\%$ $p = NA$	1.00.00			1000				0100	, stoo, 1100]	-1117U
interesting and the state of the state										
Random effects model	290			290			\$	0.91	[ 0.63: 1.18]	100.0%
Heterogeneity: $l^2 = 57\%$ , $p < 0.01$	200			200				1 0.07	[ 5.00, 1.10]	10010/0
Residual beterogeneity: $l^2 = 57\%$	n < 0 0	1					-6 -4 -2 0 2 4 4	5		
	p - 0.0	80.					Decrease Increase	5		

<u>S25.</u> Forest plot for the meta-analysis of cross-sectional area subdivided by contraction mode showing standardised mean differences (SMD) and 95% confidence intervals (CI) of high intensity, resistance training studies.

Study	n	Mean	Post	n	Mean	Pre		SMD	[95% CI]	Weight
olddy		mean	00		mean	00	Ê		[00/0 01]	Weight
Con:Ecc Carroll et al. 2011 [62] Centner et al. 2019 [71] Eriksen et al. 2018 [63] Eriksen et al. 2018 [63] Eriksen et al. 2019 [64] Kongsgaard et al. 2007 [65] Kubo et al. 2002 [111] Kubo et al. 2007 [85] Kubo et al. 2007 [85] Kubo et al. 2009 [114] Kubo et al. 2010 [115] McMahon et al. 2013 [67] McMahon et al. 2013 [67] McMahon et al. 2018 [68] McMahon et al. 2018 [68] Seynnes et al. 2009 [70] Random effects model Heterogeneity: $I^2 = 0\%$ , $\rho = 1.00$	12 14 9 11 10 12 8 9 10 10 10 10 10 10 10 11 8 8 15 177	115 74 129 123 124 121 59 78 62 58 62 58 68 73 76 81 70 107	33 17 24 33 22 14 8 20 8 8 8 8 14 16 13 22 4	12 14 9 12 10 12 8 9 10 10 10 10 10 10 11 8 8 15 178	117 70 131 121 117 61 59 66 70 71 77 66 103	35 18 27 28 21 14 9 19 8 7 8 8 13 13 13 13 11 4		-0.06 0.18 -0.07 0.06 0.31 0.22 -0.02 -0.08 0.10 -0.08 0.21 0.21 0.21 0.21 0.21 0.21 0.21 0.21	$\begin{bmatrix} -0.86; 0.74 \\ -0.56; 0.92 \\ -1.00; 0.85 \\ -0.76; 0.88 \\ -0.57; 1.20 \\ -0.53; 1.08 \\ -1.21; 0.76 \\ -0.95; 0.90 \\ -0.96; 0.79 \\ -0.96; 0.79 \\ -0.96; 0.79 \\ -0.67; 1.09 \\ -0.67; 1.09 \\ -0.67; 1.09 \\ -0.67; 1.16 \\ -0.67; 1.30 \\ -0.78; 1.18 \\ -0.24; 1.77 \\ -0.04; 0.38 \\ \end{bmatrix}$	2.6% 3.1% 2.5% 2.5% 2.6% 2.2% 2.2% 2.2% 2.2% 2.2% 2.2% 2.2
Concentric Kubo et al. 2017 [116] Malliaras et al. 2013 [61] Random effects model Heterogeneity: $l^2 = 0\%$ , $\rho = 0.97$	9 9 18	73 118	10 9	9 9 18	72 112	11 6		0.08 0.73 0.40	[-0.84; 1.01] [-0.23; 1.70] [-0.27; 1.06]	2.0% 1.8% 3.8%
Eccentric Geremia et al. 2018 [72] Kubo et al. 2017 [116] Malliaras et al. 2013 [61] Malliaras et al. 2013 [61] Mouraux et al. 2000 [118] Sanz-Lopez et al. 2016 [123] Random effects model Heterogeneity: $I^2 = 10\%$ , $p = 0.35$	15 9 10 10 10 20 74	72 74 120 120 257 82	11 9 19 19 61 23	15 9 10 10 10 20 74	62 74 116 114 240 64	8 8 19 49 11		- 1.01 0.03 0.27 0.33 0.29 1.04 0.58	[ 0.24; 1.77] [-0.89; 0.96] [-0.61; 1.15] [-0.55; 1.22] [-0.59; 1.18] [ 0.38; 1.71] [ 0.22; 0.93]	2.9% 2.0% 2.2% 2.2% 3.8% 15.1%
Isometric Arampatzis et al. 2007 [19] Arampatzis et al. 2010 [20] Bohm et al. 2014 [21] Bohm et al. 2014 [21] Bohm et al. 2014 [21] Kubo et al. 2001 [51] Kubo et al. 2006 [112] Kubo et al. 2006 [113] Kubo et al. 2006 [113] Kubo et al. 2006 [113] Kubo et al. 2009 [114] Kubo et al. 2010 [88] Kubo et al. 2011 [86] Massey et al. 2018 [66] Massey et al. 2018 [54] Waugh et al. 2018 [54] Random effects model Heterogeneity: $I^2 = 0\%$ , $p = 0.34$	11 12 14 12 8 8 9 9 10 8 9 11 15 14 15 14 197	53 56 82 83 79 213 215 73 207 205 63 81 74 66 96 96 98 61 60	14 36 12 14 10 19 21 8 22 17 8 20 28 8 8 13 17 14	11 11 12 14 12 8 8 9 9 10 8 9 11 14 15 14 197	48 56 78 210 212 73 204 202 60 80 72 65 99 97 62 58	13 38 11 13 9 16 8 20 19 13 7 19 33 8 10 13 15 13		0.30 0.02 0.34 0.16 0.15 0.01 0.14 0.19 0.32 0.04 0.06 0.14 -0.30 0.03 -0.08 0.14 0.12	$\begin{bmatrix} -0.55; 1.14 \\ [-0.82; 0.85] \\ [-0.45; 1.16] \\ [-0.52; 0.97] \\ [-0.47; 1.14] \\ [-0.82; 1.14] \\ [-0.82; 1.14] \\ [-0.84; 1.13] \\ [-0.97; 0.99] \\ [-0.79; 1.06] \\ [-0.74; 1.12] \\ [-0.57; 1.20] \\ [-0.94; 1.02] \\ [-0.94; 1.02] \\ [-0.96; 0.99] \\ [-0.70; 0.97] \\ [-1.04; 0.45] \\ [-0.69; 0.75] \\ [-0.82; 0.67] \\ [-0.82; 0.67] \\ [-0.08; 0.32] \\ \end{bmatrix}$	2.4% 2.6% 3.0% 2.6% 1.7% 1.8% 2.0% 2.2% 1.8% 2.0% 2.4% 3.0% 3.3% 3.1% 42.9%
<b>Random effects model</b> Heterogeneity: $l^2 = 0\%$ , $p = 0.99$	466			467			► ► ► ► ► ► ► ► ► ► ► ► ► ► ► ► ► ► ►	0.22	[ 0.09; 0.35]	100.0%

Residual heterogeneity:  $I^2 = 0\%$ , p = 1.00

-1.5 -1 -0.5 0 0.5 1 1.5 Decrease Increase <u>S26.</u> Forest plot for the meta-analysis of stiffness subdivided by contraction mode showing standardised mean differences (SMD) and 95% confidence intervals (CI) of matched high intensity, resistance training studies.

			Post			Pre				
Study	n	Mean	SD	n	Mean	SD		SMD	[95% CI]	Weight
Con:Ecc Kubo et al. 2009 [114] Kubo et al. 2009 [114] Random effects model Heterogeneity: $l^2 = 0\%$ , $p = 0.8$	10 10 20	96 1253	37 410	10 10 20	72 999	20 426		0.75 0.58 0.67	[-0.16; 1.67] [-0.32; 1.48] [ 0.02; 1.31]	12.1% 12.5% 24.5%
Concentric Kubo et al. 2017 [116] Malliaras et al. 2013 [61] Random effects model Heterogeneity: $I^2 = 0\%$ , $p = 0.4$	9 9 18 8	1414 2338	355 638	9 9 18	1004 1560	384 793		1.06 1.03 1.04	[ 0.05; 2.06] [ 0.03; 2.03] [ 0.34; 1.75]	10.0% 10.1% 20.1%
Eccentric Kubo et al. 2017 [116] Malliaras et al. 2013 [61] Malliaras et al. 2013 [61] Random effects model Heterogeneity: $I^2 = 8\%$ , $p = 0.9$	9 10 10 29	1457 2536 2508	440 850 1066	9 10 10 29	1289 1822 1387	544 898 360		0.32 0.78 - 1.35 0.80	[-0.61; 1.26] [-0.13; 1.70] [ 0.36; 2.34] [ 0.23; 1.37]	11.6% 12.0% 10.2% 33.8%
Isometric Kubo et al. 2009 [114] Kubo et al. 2009 [114] Random effects model Heterogeneity: $l^2 = 0\%$ , $p = 0.3$	10 10 20	110 1833	36 892	10 10 20	67 1071	19 639		- 1.43 0.94 1.17	[ 0.43; 2.44] [ 0.01; 1.88] [ 0.48; 1.85]	9.9% 11.5% 21.5%
<b>Random effects model</b> Heterogeneity: $I^2 = 0\%$ , $\rho = 0.8$ Residual heterogeneity: $I^2 = 0\%$	<b>87</b> 4 6, p = 1	0.74		87			-2 -1 0 1 2 Decrease Increase	0.89	[ 0.58; 1.21]	100. <mark>0</mark> %

<u>S27.</u> Forest plot for the meta-analysis of modulus subdivided by contraction mode showing standardised mean differences (SMD) and 95% confidence intervals (CI) of matched high intensity, resistance training studies.

Study	n	Mean	Post SD	n	Mean	Pre SD			SMD	[95% CI]	Weight
Concentric											
Malliaras et al. 2013 [61]	9	942	279	9	620	223		-	- 1.22	[ 0.19; 2.24]	29.7%
Random effects model	9			9					1.22	[ 0.19; 2.24]	29.7%
Heterogeneity: not applicable											
Eccentric											
Malliaras et al. 2013 [61]	10	1022	339	10	737	390			0.75	[-0.17; 1.66]	37.5%
Malliaras et al. 2013 [61]	10	1011	436	10	570	191			1.25	[ 0.28; 2.23]	32.8%
Random effects model	20			20				$\langle \rangle$	0.98	[ 0.32; 1.65]	70.3%
Heterogeneity: $I^2 = 0\%$ , $p = 0.4$	46										
Random effects model	29			29					1.05	[ 0.49; 1.61]	100.0%
Heterogeneity: $I^2 = 0\%$ , $p = 0$ .	71						1 1	1 1 1			
Residual heterogeneity: $I^2 = 0^{\circ}$	%, p =	0.46					-2 -1	0 1 2			
							Decreas	e Increase			

<u>S28.</u> Forest plot for the meta-analysis of cross-sectional area subdivided by contraction mode showing standardised mean differences (SMD) and 95% confidence intervals (CI) of matched high intensity, resistance training studies.

0, 1	222		Post			Pre			10.5% OR	
Study	n	Mean	SD	n	Mean	50		SMD	[95% CI]	weight
Con:Ecc Kubo et al. 2009 [114] Random effects model Heterogeneity: not applicable	10 10	62	8	10 10	61	7		0.10 0.10	[-0.78; 0.98] [-0.78; 0.98]	15.2% 15.2%
Concentric Kubo et al. 2017 [116] Malliaras et al. 2013 [61] Random effects model Heterogeneity: $l^2 = 0\%$ , $p = NA$	9 9 18	73 118	10 9	9 9 18	72 112	11 6		0.08 0.73 0.40	[-0.84; 1.01] [-0.23; 1.70] [-0.27; 1.06]	13.7% 12.6% 26.2%
Eccentric Kubo et al. 2017 [116] Malliaras et al. 2013 [61] Malliaras et al. 2013 [61] Random effects model Heterogeneity: $I^2 = 0\%, \rho = 0.3$	9 10 10 29 34	74 120 120	9 19 19	9 10 10 29	74 116 114	8 8 19		0.03 0.27 0.33 0.22	[-0.89; 0.96] [-0.61; 1.15] [-0.55; 1.22] [-0.30; 0.73]	13.7% 15.0% 14.9% 43.6%
Isometric Kubo et al. 2009 [114] Random effects model Heterogeneity: not applicable	10 10	63	8	10 10	60	7		0.32 0.32	[-0.57; 1.20] [-0.57; 1.20]	15.0% 15.0%
<b>Random effects model</b> Heterogeneity: $I^2 = 0\%$ , $p = 0.5$ Residual heterogeneity: $I^2 = 0\%$	<b>67</b> 96 %, p = 0	0.77		67		-	1.5 -1 -0.5 0 0.5 1 1.5 Decrease Increase	0.26	[-0.08; 0.60]	100.0%

<u>S29.</u> Forest plot for the meta-analysis of stiffness subdivided by age group showing standardised mean differences (SMD) and 95% confidence intervals (CI) of high intensity resistance training studies.

Study	n	Mean	Post SD	n	Mean	Pre SD			SMD	[95% CI]	Weight
Adult								1 3			
Albracht et al. 2013 [5]	13	315	53	13	272	48			0.82	[0.02: 1.63]	2.2%
Arampatzis et al. 2007 [19]	11	228	40	11	168	37			1.52	0.55; 2.49]	1.8%
Arampatzis et al. 2010 [20]	11	302	57	11	258	51		-	0.79	[-0.09; 1.66]	2.0%
Bohm et al. 2014 [21]	12	457	132	12	370	132		+	0.64	[-0.18; 1.47]	2.1%
Bohm et al. 2014 [21]	14	539	254	14	336	89			1.04	[ 0.24; 1.84]	2.2%
Bohm et al. 2014 [21]	12	579	172	12	377	106			1.37	[0.46; 2.27]	1.9%
Bonm et al. 2021 [17]	13	111	159	13	85	36			0.52	[-0.27; 1.30]	2.2%
Duclay et al. 2009 [105]	14	201	125	14	2/9	90			0.38	[0.30, 2.01]	2.1%
Geremia et al 2018 [72]	15	350	59	15	192	36			3 15	[2.03: 4.26]	1.5%
Kay et al. 2016 [110]	13	13	3	13	10	2			1.10	[ 0.27; 1.94]	2.1%
Kongsgaard et al. 2007 [65]	12	4213	1406	12	3676	1306			0.38	[-0.43; 1.19]	2.2%
Kubo et al. 2001 [51]	8	106	33	8	68	21			1.31	[ 0.20; 2.42]	1.5%
Kubo et al. 2002 [111]	8	34	10	8	26	9			0.80	[-0.23; 1.83]	1.6%
Kubo et al. 2006 [112]	8	59	24	8	51	22			0.29	[-0.69; 1.28]	1.7%
Kubo et al. 2006 [112]	8	1786	660	8	1/90	559	-		-0.01	[-0.99; 0.97]	1.7%
Kubo et al. 2006 [113]	9	122	40	9	81	21			1 17	[-0.06, 1.17]	1.9%
Kubo et al. 2006 [96]	9	59	23	9	46	19			0.62	[-0.33: 1.57]	1.8%
Kubo et al. 2006 [96]	9	1819	710	9	1676	662		_ <b>_</b>	0.20	[-0.73; 1.13]	1.9%
Kubo et al. 2007 [85]	10	166	44	10	128	26			1.01	[ 0.07; 1.96]	1.8%
Kubo et al. 2009 [114]	10	96	37	10	72	20		-	0.75	[-0.16; 1.67]	1.9%
Kubo et al. 2009 [114]	10	1253	410	10	999	426			0.58	[-0.32; 1.48]	1.9%
Kubo et al. 2009 [114]	10	110	36	10	67	19			1.43	[0.43; 2.44]	1.7%
Kubo et al. 2009 [114]	10	1833	892	10	1071	639			0.94	[0.01; 1.88]	1.8%
Kubo et al. 2010 [115]	10	90	13	10	32	20			0.75	[-0.16, 1.67]	1.9%
Kubo et al. 2010 [88]	8	104	37	8	69	19			1 12	[0.04 2.20]	1.5%
Kubo et al. 2012 [89]	9	277	111	9	183	45			1.06	[ 0.05; 2.06]	1.7%
Kubo et al. 2017 [116]	9	1414	355	9	1004	384		- <u>-</u>	1.06	[ 0.05; 2.06]	1.7%
Kubo et al. 2017 [116]	9	1457	440	9	1289	544		-	0.32	[-0.61; 1.26]	1.8%
Kubo et al. 2017 [86]	11	32	9	11	24	5			1.17	[ 0.25; 2.09]	1.9%
Malliaras et al. 2013 [61]	9	2338	638	9	1560	793			1.03	[0.03; 2.03]	1.7%
Malliaras et al. 2013 [61]	10	2536	1066	10	1822	898			0.78	[-0.13; 1.70]	1.9%
Massev et al. 2018 [66]	15	687	285	15	560	177			0.52	[-0.21:1.25]	2 4%
Massey et al. 2018 [66]	15	3239	575	15	2835	444			0.77	[ 0.02; 1.51]	2.3%
Massey et al. 2018 [66]	14	595	101	14	592	118			0.03	[-0.71; 0.77]	2.4%
Massey et al. 2018 [66]	14	3122	632	14	2605	446			0.92	[0.13; 1.70]	2.2%
McMahon et al. 2013 [67]	10	1221	594	10	916	441			0.56	[-0.34; 1.46]	1.9%
McMahon et al. 2013 [67]	11	1167	353	11	765	242			1.28	[0.34; 2.21]	1.8%
McMahon et al. 2018 [68]	8	1517	390	8	1132	294			1.05	[-0.01; 2.12]	1.6%
Sevenes et al. 2016 [66]	15	2288	2115	15	1864	1813			0.98	[-0.06; 2.03]	2.4%
Tillin et al. 2012 [125]	10	697	103	10	520	86			1 79	[0.71 2.86]	1.5%
Waugh et al. 2018 [54]	14	541	49	14	390	35			- 3.43	[ 2.21; 4.65]	1.3%
Waugh et al. 2018 [54]	14	523	53	14	359	53			2.99	[ 1.87; 4.12]	1.5%
Werkhausen et al. 2018 [56]	11	459	147	11	397	146			0.41	[-0.44; 1.25]	2.1%
Random effects model Heterogeneity: $I^2 = 44\%$ , $p < 0.01$	522			522				\$	0.91	[ 0.74; 1.09]	89.8%
Flderly											
Carroll et al. 2011 [62]	12	3335	1334	12	2928	1320			0.30	[-0.51: 1.10]	2.2%
Eriksen et al. 2018 [63]	9	3890	2430	9	2560	1530		- <b>F</b>	0.62	[-0.33; 1.58]	1.8%
Eriksen et al. 2018 [63]	12	1900	693	12	1800	624		- <b></b>	0.15	[-0.65; 0.95]	2.2%
Eriksen et al. 2019 [64]	10	4420	1075	10	4060	1360			0.28	[-0.60; 1.16]	2.0%
Onambélé et al. 2008 [120]	12	40	23	12	26	13			0.72	[-0.11; 1.55]	2.1%
Random effects model Heterogeneity: $I^2 = 0\%$ , $p = 0.86$	55			55					0.40	[ 0.02; 0.78]	10.2%
Random effects model	577			577				\$	0.86	[ 0.70; 1.02]	100.0%
Heterogeneity: $I^2 = 42\%, p < 0.01$											
Residual heterogeneity: $I^2 = 40\%$ ,	p < 0.01						-4 -2	0 2 4			
							Decreas	e Increase			

**<u>S30.</u>** Forest plot for the meta-analysis of modulus subdivided by age group showing standardised mean differences (SMD) and 95% confidence intervals (CI) of high intensity resistance training studies.

			Post			Pre				
Study	n	Mean	SD	n	Mean	SD		SMD	[95% CI]	Weight
Adult							1			
Arampatzis et al. 2007 [19]	11	680	355	11	440	278	<b></b>	0.72	[-0.14: 1.59]	4.2%
Arampatzis et al. 2010 [20]	11	1130	332	11	970	232		0.54	[-0.32; 1.39]	4.2%
Bohm et al. 2014 [21]	12	1050	277	12	890	277		0.56	[-0.26; 1.38]	4.4%
Bohm et al. 2014 [21]	14	1430	636	14	910	262		1.04	[0.24; 1.83]	4.5%
Bohm et al. 2014 [21]	12	1410	381	12	970	277		1.28	[0.38; 2.17]	4.1%
Centner et al. 2019 [71]	14	1848	481	14	1540	492		0.61	[-0.15; 1.38]	4.6%
Geremia et al. 2018 [72]	15	1292	436	15	695	160		1.77	[ 0.91; 2.63]	4.2%
Kongsgaard et al. 2007 [65]	12	1650	554	12	1470	589		0.30	[-0.50; 1.11]	4.4%
Kubo et al. 2001 [52]	8	433	35	8	288	26		- 4.45	[ 2.42; 6.47]	1.4%
Malliaras et al. 2013 [61]	9	942	279	9	620	223		1.22	[ 0.19; 2.24]	3.6%
Malliaras et al. 2013 [61]	10	1022	339	10	737	390		0.75	[-0.17; 1.66]	4.0%
Malliaras et al. 2013 [61]	10	1011	436	10	570	191		1.25	[ 0.28; 2.23]	3.8%
Massey et al. 2018 [66]	15	1510	360	15	1320	270		0.58	[-0.15; 1.31]	4.8%
Massey et al. 2018 [66]	14	1490	270	14	1230	180	-	1.10	[ 0.30; 1.90]	4.5%
McMahon et al. 2013 [67]	10	1100	120	10	830	90		2.44	[ 1.22; 3.65]	3.0%
McMahon et al. 2013 [67]	11	1150	110	11	780	100		3.39	[2.00; 4.77]	2.5%
McMahon et al. 2018 [68]	8	990	255	8	780	170		0.92	[-0.13; 1.96]	3.5%
McManon et al. 2018 [68]	8	600	226	8	420	113		0.95	[-0.10; 2.00]	3.5%
Seynnes et al. 2009 [70]	15	1160	1201	15	980	1162		0.15	[-0.57; 0.87]	4.8%
Waugh et al. 2018 [54]	14	1892	803	14	1201	459		0.94	[0.15; 1.72]	4.5%
Waugh et al. 2016 [54]	247	1720	535	14	1242	420	<b>—</b>	1.05	[0.17, 1.75]	4.5%
Random effects model	247			247			×	1.05	[ 0.75; 1.34]	83.0%
Heterogeneity: $I = 56\%$ , $p < 0.01$										
Elderly										
Carroll et al. 2011 [62]	12	1220	450	12	1030	416		0.42	[-0.39: 1.23]	4.4%
Eriksen et al. 2018 [63]	9	1330	690	9	1230	390		0.17	[-0.76: 1.10]	3.9%
Eriksen et al. 2018 [63]	12	735	263	12	703	253		0.12	[-0.68; 0.92]	4.5%
Eriksen et al. 2019 [64]	10	1560	443	10	1510	474		0.10	[-0.77; 0.98]	4.1%
Random effects model	43			43			\$	0.21	[-0.21; 0.63]	17.0%
Heterogeneity: $I^2 = 0\%$ , $p = 0.94$										
Random effects model	290			290			\$	0.91	[0.63.1.18]	100 0%
Heterogeneity: $l^2 = 57\%$ , $p < 0.01$								0.01	[ 0.00, 1.10]	
Residual heterogeneity: $I^2 = 49\%$ ,	p < 0.0	1					-6 -4 -2 0 2 4 6			
							Decrease Increase			

**<u>S31.</u>** Forest plot for the meta-analysis of cross-sectional area subdivided by age group showing standardised mean differences (SMD) and 95% confidence intervals (CI) of high intensity resistance training studies.

			Post			Pre				
Study	n	Mean	SD	n	Mean	SD		SMD	[95% CI]	Weight
Adult										
Arampatzis et al. 2007 [19]	11	53	14	11	48	13		0.30	[-0.55: 1.14]	2.4%
Arampatzis et al. 2010 [20]	11	56	36	11	56	38		0.02	[-0.82: 0.85]	2.4%
Bohm et al. 2014 [21]	12	82	12	12	78	11		0.36	[-0.45: 1.16]	2.6%
Bohm et al. 2014 [21]	14	83	14	14	80	13		0.23	[-0.52: 0.97]	3.0%
Bohm et al. 2014 [21]	12	79	10	12	75	9		0.34	[-0.47: 1.14]	2.6%
Centner et al. 2019 [71]	14	74	17	14	70	18		0.18	[-0.56: 0.92]	3.1%
Geremia et al. 2018 [72]	15	72	11	15	62	8		1.01	0.24: 1.77	2.9%
Kongsgaard et al. 2007 [65]	12	121	14	12	117	14		0.28	[-0.53; 1.08]	2.6%
Kubo et al. 2001 [51]	8	213	19	8	210	16		0.16	[-0.82; 1.14]	1.7%
Kubo et al. 2001 [51]	8	215	21	8	212	18		0.15	[-0.84; 1.13]	1.7%
Kubo et al. 2002 [111]	8	59	8	8	61	9		-0.22	[-1.21; 0.76]	1.7%
Kubo et al. 2006 [112]	8	73	18	8	73	20		0.01	[-0.97; 0.99]	1.8%
Kubo et al. 2006 [113]	9	207	22	9	204	19		0.14	[-0.79; 1.06]	2.0%
Kubo et al. 2006 [113]	9	205	17	9	202	13		0.19	[-0.74; 1.12]	2.0%
Kubo et al. 2006 [96]	9	78	20	9	78	19		-0.02	[-0.95; 0.90]	2.0%
Kubo et al. 2007 [85]	10	58	8	10	59	8		-0.08	[-0.96; 0.79]	2.2%
Kubo et al. 2009 [114]	10	62	8	10	61	7		0.10	[-0.78; 0.98]	2.2%
Kubo et al. 2009 [114]	10	63	8	10	60	7		0.32	[-0.57; 1.20]	2.2%
Kubo et al. 2010 [115]	10	58	8	10	59	8		-0.08	[-0.96; 0.79]	2.2%
Kubo et al. 2010 [115]	10	68	8	10	66	8		0.21	[-0.67; 1.09]	2.2%
Kubo et al. 2010 [88]	8	81	20	8	80	19		0.04	[-0.94; 1.02]	1.8%
Kubo et al. 2012 [89]	9	74	28	9	72	33		0.06	[-0.86; 0.99]	2.0%
Kubo et al. 2017 [116]	9	73	10	9	72	11		0.08	[-0.84; 1.01]	2.0%
Kubo et al. 2017 [116]	9	/4	9	9	74	8		0.03	[-0.89; 0.96]	2.0%
Kubo et al. 2017 [86]	11	66	8	11	65	8		0.14	[-0.70; 0.97]	2.4%
Malliaras et al. 2013 [61]	9	118	9	9	112	6		0.73	[-0.23; 1.70]	1.8%
Malliaras et al. 2013 [61]	10	120	19	10	110	10		0.27	[-0.61, 1.15]	2.2%
Managay et al. 2019 [61]	14	120	19	14	00	19		0.33	[-0.55, 1.22]	2.270
Massey et al. 2018 [66]	15	08	13	15	07	13		0.03	[-1.04, 0.45]	3 30%
McMahon et al 2013 [67]	10	73	14	10	70	13		0.00	[-0.67: 1.09]	2 2%
McMahon et al. 2013 [67]	11	76	16	11	70	13		0.21	[-0.53: 1.16]	2.270
McMahon et al. 2018 [68]	8	81	13	8	77	13		0.32	[-0.67: 1.30]	1 7%
McMahon et al 2018 [68]	8	70	22	8	66	11		0.20	[-0.78: 1.18]	1.7%
Mouraux et al 2000 [118]	10	257	61	10	240	49		0.29	[-0.59: 1.18]	2.2%
Sanz-Lopez et al. 2016 [123]	20	82	23	20	64	11	<b>-</b>	1.04	[ 0.38: 1.71]	3.8%
Sevnnes et al. 2009 [70]	15	107	4	15	103	4		1.01	0.24: 1.77	2.9%
Waugh et al. 2018 [54]	14	61	17	14	62	15		-0.08	[-0.82: 0.67]	3.1%
Waugh et al. 2018 [54]	14	60	14	14	58	13		0.14	[-0.60; 0.88]	3.1%
Random effects model	424			424			$\diamond$	0.24	[ 0.10; 0.37]	90.7%
Heterogeneity: $I^2 = 0\%$ , $p = 0.99$										
Elderly										
Carroll et al. 2011 [62]	12	115	33	12	117	35		-0.06	[-0.86; 0.74]	2.6%
Eriksen et al. 2018 [63]	9	129	24	9	131	27		-0.07	[-1.00; 0.85]	2.0%
Eriksen et al. 2018 [63]	11	123	33	12	121	28		0.06	[-0.76; 0.88]	2.5%
Eriksen et al. 2019 [64]	10	124	22	10	117	21		0.31	[-0.57; 1.20]	2.2%
Random effects model	42			43			$\sim$	0.06	[-0.37; 0.48]	9.3%
Heterogeneity: $I^{-} = 0\%$ , $p = 0.92$										
Random effects model	466			467			\$	0.22	[ 0.09: 0.35]	100.0%
Heterogeneity: $l^2 = 0\% p = 0.99$									[ 1.00, 0.00]	
Residual heterogeneity: $I^2 = 0\%$ . p	= 0.99					8	-1.5 -1 -0.5 0 0.5 1 1.5			
							Decrease Increase			