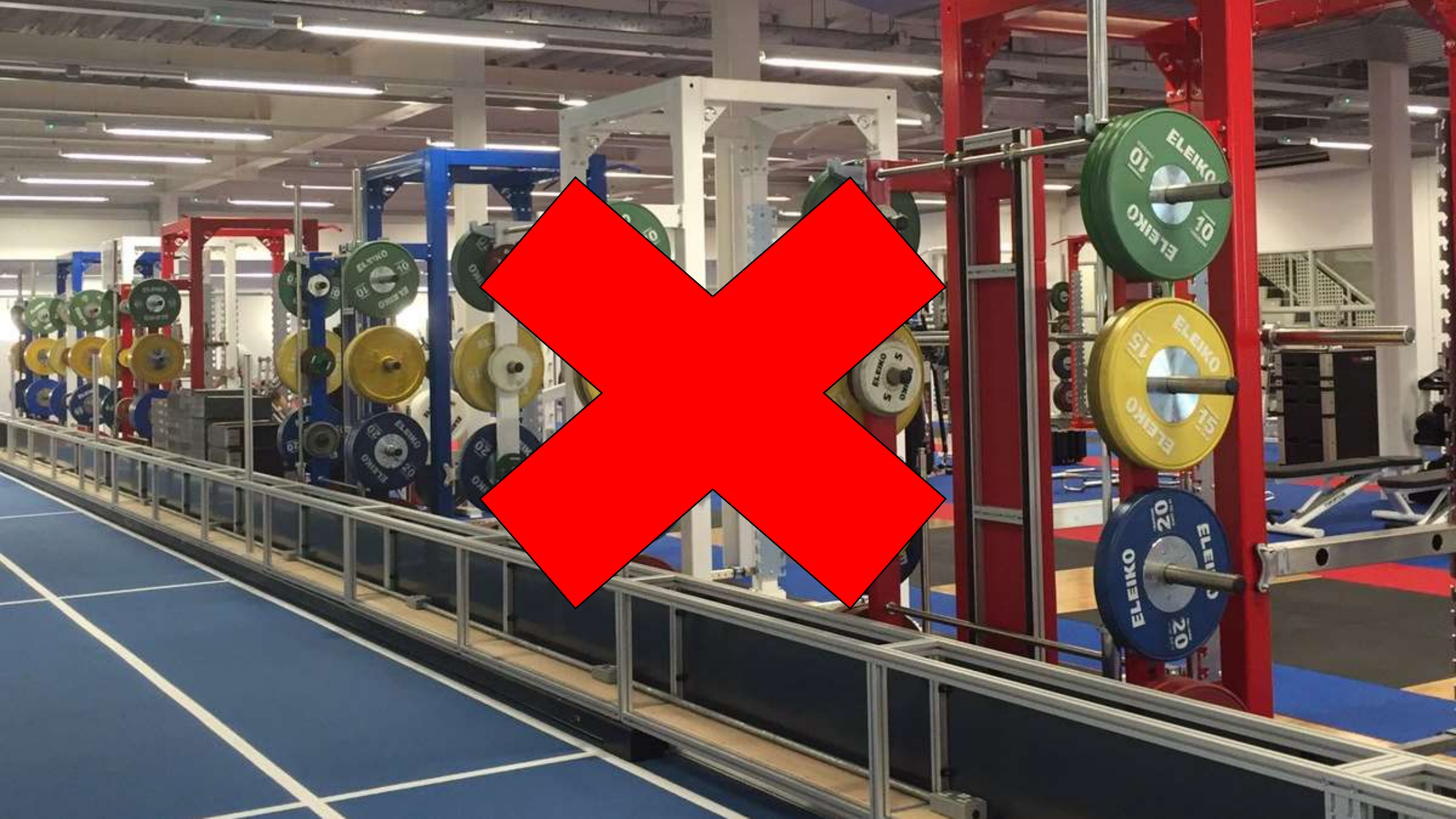
BRITISH ROWING

Creative Strength Training

Ben Sheath

BRITISH ROWING


ELEIKO
10
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15
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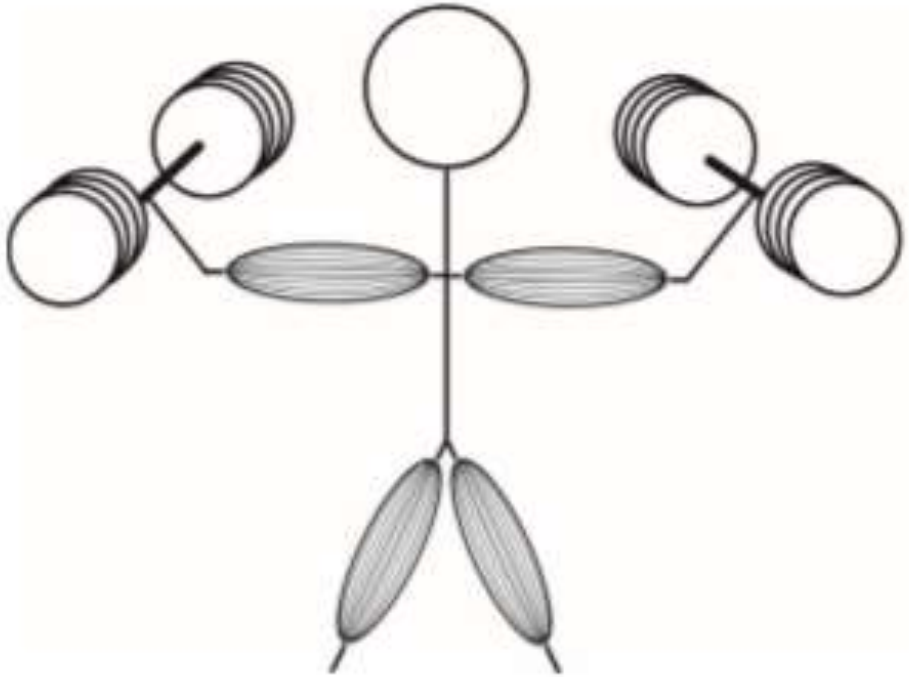
Strength in Rowing

Determinant of Erg performance

Glue!

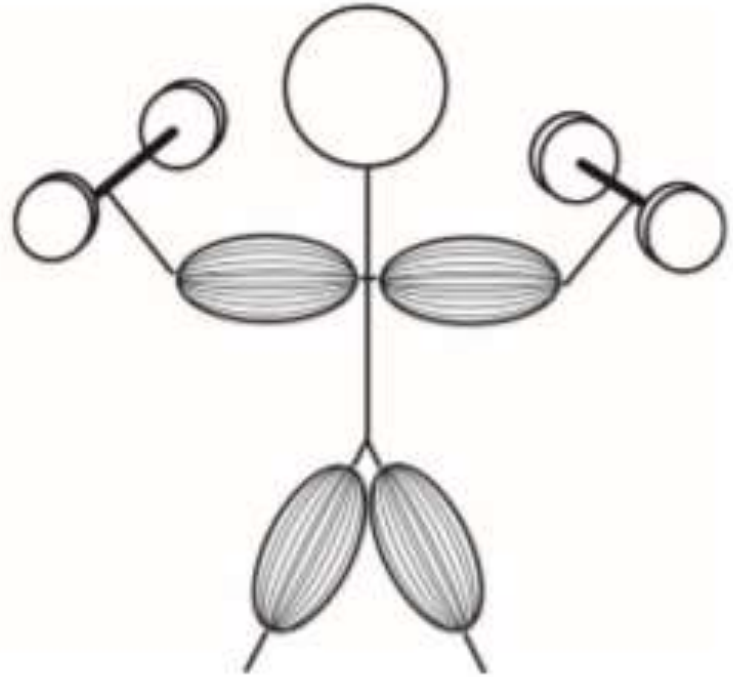

sas

Strength



1. Specificity
   training for the test (e.g., 1RM vs. dynamometry)
2. Load
   >85 %1RM
3. Volume
   <15 sets/muscle/wk
4. Daily protein intake
   ≥1.6 g/kg of body mass/day
5. Inter-set rest
   2-5 minutes

Hypertrophy



1. Intensity of Effort
   volitional fatigue and internal focus
2. Volume
   >10 repititions/muscle/wk but <15 sets/muscle/wk
3. Training Frequency
   ≥ 3 sessions/wk
4. Daily protein intake
   ≥1.6 g/kg of body mass/day
5. Inter-set rest
   >60 seconds

Current Opinion in Physiology

Morten et al., 2019

USE IT OR LOSE IT!

Fitness Component	Residual Effect (days)	Characteristics
Speed (maximal)	5 ±3	Neuromuscular and motor control, creatine phosphate recovery
Strength Endurance	15 ±5	Slow twitch fiber hypertrophy, aerobic/anaerobic enzyme activity, local blood circulation, lactate tolerance
Anaerobic Glycolytic Endurance	18 ±4	Anaerobic enzyme activity, lactate accumulation rate, buffering capacity, glycogen storage
Aerobic endurance	30 ±5	Aerobic enzymes activity, mitochondria number, glycogen storage, muscle capillaries, fat oxidation rate
Strength (maximal)	30 ±5	Neural control, muscular hypertrophy

Issurin, 2008

Bosquet et al.

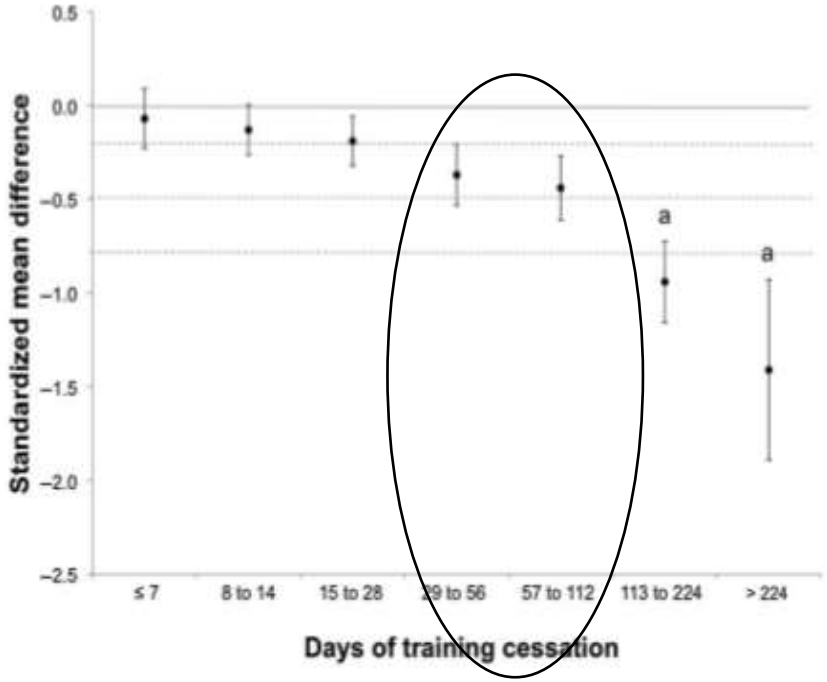
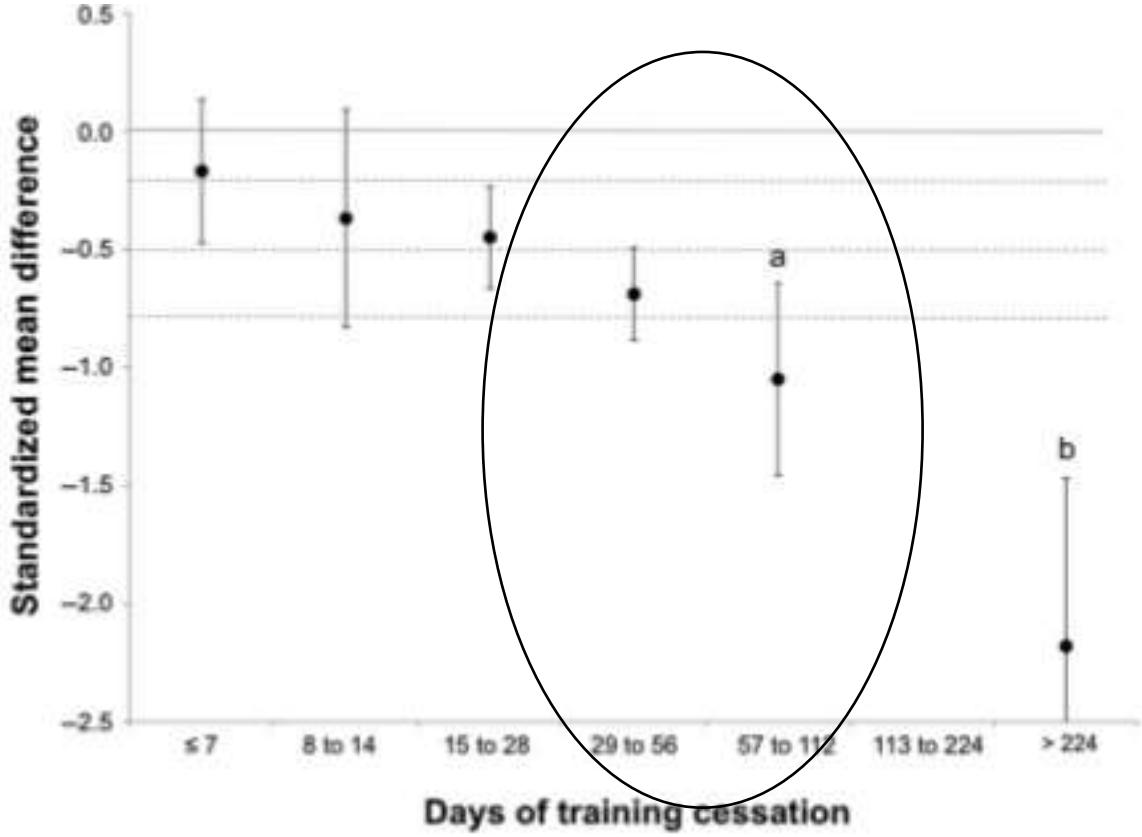
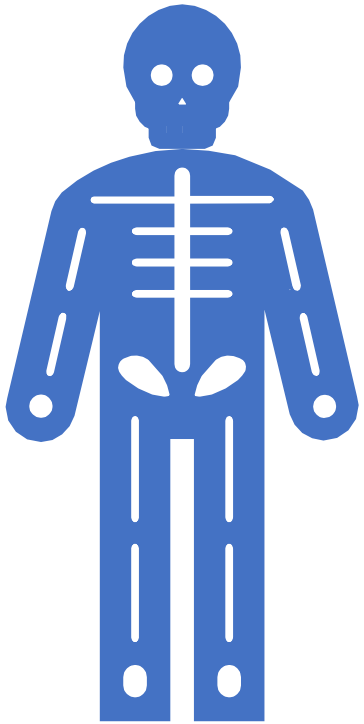


Fig. 2. Dose–response curve for the effect of the duration of training cessation on maximal force. (a) Different from standardized differences computed for ≤ 112 days of training cessation.



Bosquet et al., 2013



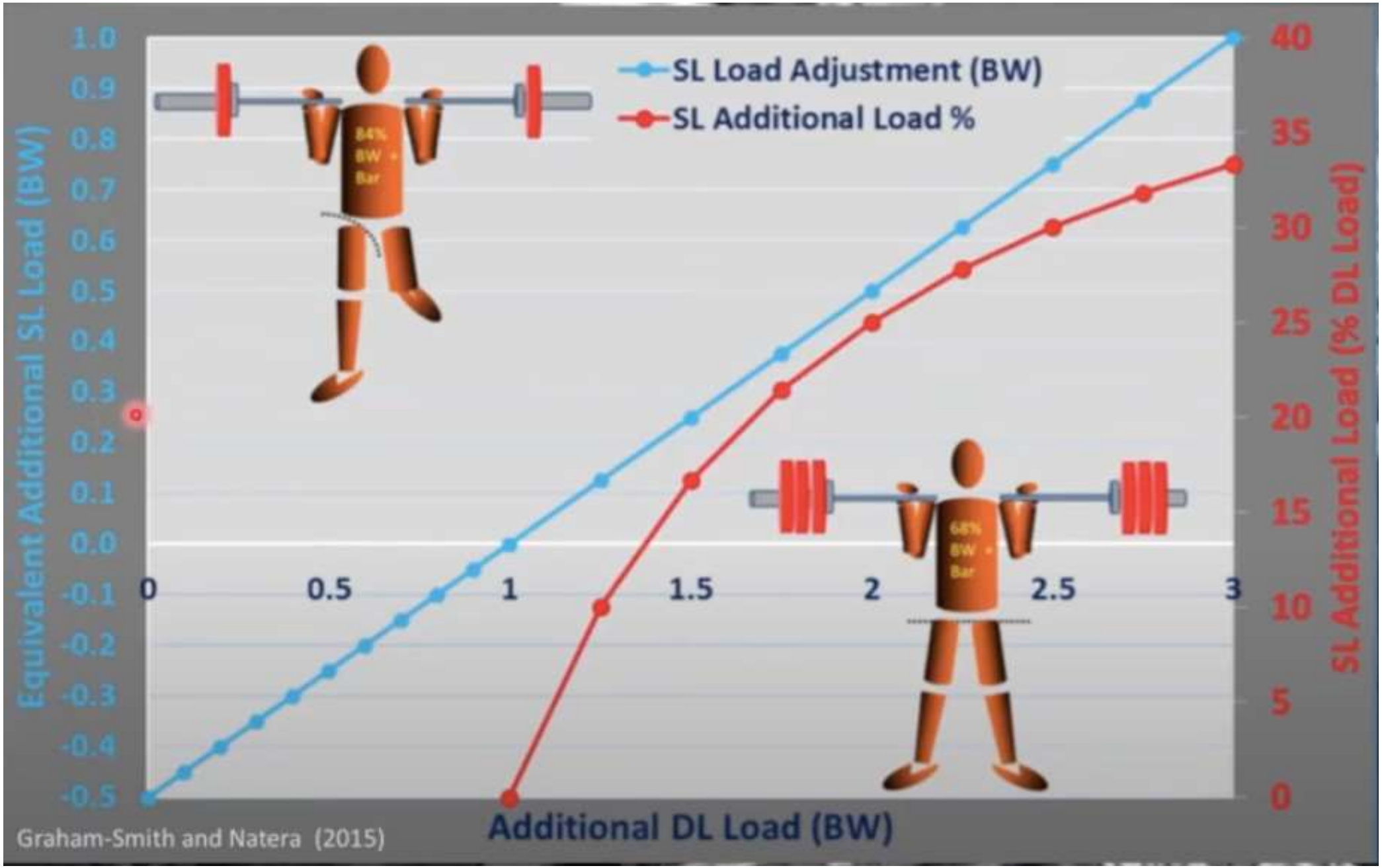
‘8-13% loss in EMG activation after 2 weeks of cessation’

(Mujika & Padilla, 2003)


52


KEEP CALM
AND
STAY
SAFE

APPLYING THE SCIENCE


SL Load Adjustment (BW)
SL Additional Load %
Equivalent Additional SL Load (BW)
SL Additional Load (% DL Load)
Additional DL Load (BW)
1.0
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-0.2
-0.3
-0.4
-0.5
40
35
30
25
20
15
10
5
0
0
0.5
1
1.5
2
2.5
3
84% BW + Bar
68% BW + Bar
Graham-Smith and Natera (2015)

Minimal Dose

Garcia-Palleres et al., 2009

- 5WK Training Cessation vs Reduced Training in World-Class Kayak

- 1xPW @ >85% (BP -3.9% vs -8.9%; PBP -3.4% vs -7.8%)
- Still require specific power training ★

Ronnestad et al., 2010

- 1 x PW for 13 weeks preserved Strength and CSA
- Highly specific sporting action ★

Androulakis-Korakakis et al., 2019

- Meta-Analysis
- Single set possible if intensity is high → Frequency through week important
- 'Effort' is key

TABLE 3. Percent change in group means (±*SD*) and differences in performance outcomes adjusted for pretest scores (log-transformed data).*

	Body mass	LP5	IP
Rowing and weight training (%)	0.5 ± 2.8	9.1 ± 8.5†	12.3 ± 8.6
Rowing only (%)	−0.6 ± 4.8	−1.0 ± 5.3	5.3 ± 13.4
% Adjusted difference in performance outcomes	−1.1	−9.3	−6.2
90% CL	−5.2 to 3.0	−15.1 to −3.0	−22.9 to 14.1
p value	0.61	0.03	0.52

*LP5 = 5-repetition leg press; IP = isometric pull; CL = confidence limit.
†$p = 0.01$.

Lawton et al., 2013

Intended rather than actual movement velocity determines velocity-specific training response

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Department of Physical Education, McMaster University, Hamilton, Ontario L8S 4K1, Canada

Ullrich et al. [69]	36 athletes (9 females and 27 males) Isometric vs. Dynamic vs. Combine	See Ullrich et al. [68]	Isometric: Increase in knee extension peak power at 40% (20%) & 60% (20.3%) of 1RM and knee flexion peak power at 40% (47.8%) & 60% (25.4%). Dynamic: Increase in knee extension peak power at 40% (26.7%), 60% (21.2%) & 80% (19.4%) of 1RM and knee flexion peak power at 40% (53.3%), 60% (35%) & 80% (19%). Combined: Increase in knee extension peak power at 40% (28.1%) & 60% (10.3%) of 1RM and knee flexion peak power at 40% (29.9%) & 60% (13.2%).
Weir et al. [70]	13 adults (7 females & 6 males) Training vs. Control leg (Intra-individual comparison)	Training: 3 sessions/week for 6 weeks 2 × 10 × 6 s single leg isometric knee extension at 80% MVC.	Training: Increase in isometric torque at 2 knee angles (22.3–23.3%).
Weir et al. [71]	17 female [illegible] students Control vs. T[illegible]		
Young et al. [72]	4 male adult[illegible] Sustained co[illegible] leg vs. Rhyth[illegible] contraction (I[illegible] (Intra-individ[illegible] comparison)		
Znladz et al. [73]	7 male adult[illegible] underwent i[illegible] training)		

CMJ = Countermovement j[illegible]

Garfinkel & Cafarelli [20]	15 sedentary female university students Control vs. Experimental	Exp[illegible] 3 ×	
Goldmann et al. [21]	27 healthy male adults Control vs. Experimental	Exp[illegible] 4 ×	
Hagberg et al. [22]	69 female adults with shoulder and neck injuries. Endurance vs. Strength	3 s[illegible] End[illegible] con[illegible] Strength: 10 × 5 s 90° isometric shoulder flexion at maximal contraction.	(10.2–18.6%). Endurance: Increased in shoulder abduction (9.8–13.9%), flexion (11.5–15.1%) and outward rotation strength (7.5–9.0%) and grip strength (4.3–5.1%).
Ikai & Fukunaga [25]	6 male adults Trained vs. Untrained arm	6 sessions/week for 100 days Trained: 3 × 10 s MVC isometric arm flexion.	Trained: Increased in maximum strength (91.7%) and muscle CSA (23%).
Jones & Rutherford [26]	1 female and 11 male adults Control vs. Isometric vs. Concentric vs. Eccentric leg	3 sessions/week for 12 weeks Isometric: 4 × 6 × 4 s single leg isometric leg extension at 80% MVC. Concentric: 4 × 6 single leg concentric only leg extension at 80% maximum load. Eccentric: 4 × 6 single leg eccentric only leg extension at 80% maximum load.	Isometric: Increase in isometric force (34.2%) and muscle CSA (4.8%). Concentric: Increase in isometric force (15.4%) and muscle CSA (5.7%). Eccentric: Increase in isometric force (10.8%) and muscle CSA (3.5%).
Kanehisa & Miyashita [27]	20 male adults Isometric Fast (FG) vs. Isometric Slow (SG)	Same isometric training for 5 sessions/week for 8 weeks. Isokinetic training for 5 sessions/week for subsequent 6 weeks Isometric: 3 × 5 s maximal isometric elbow flexion at multiple elbow angles. FG: 29 × maximal isokinetic elbow flexion at 157°/s. SG: 13 × maximal isokinetic elbow flexion at 73°/s	Isometric: Increased isometric strength at 4 joint angles (27–36%), power at 4 intensity levels (34–46%), and arm circumference (1.8%). FG: Increase in power while lifting light loads (9.4–15.5%). SG: Increase in power while lifting heaviest load (13.1%).
Kanehisa et al. [28]	12 male adults 100% vs. 60% group	3 sessions/week for 10 weeks 100%: 12 × 6 s MVC single arm isometric elbow extension at 1.57 rad elbow angle. 60%: 4 × 30 s 60% MVC single arm isometric elbow extension at 1.57 rad elbow angle.	100%: Increase in muscle volume (12.4%), fascicle angle (16%), isometric torque (53.2%) and concentric & eccentric torque (14–49%). 60%: Increase in muscle volume (5.3%), fascicle angle (15%), isometric torque (60.2%) and concentric & eccentric torque (19–40%).
Khouw & Herbert [29]	51 university students (33 females & 18 males) [illegible]	3 sessions/week for 6 weeks 6 × 10 s isometric elbow flexion at 140° elbow angle. Each	Subjects who trained near 0% MVC: Increase MVC (~5.3%)

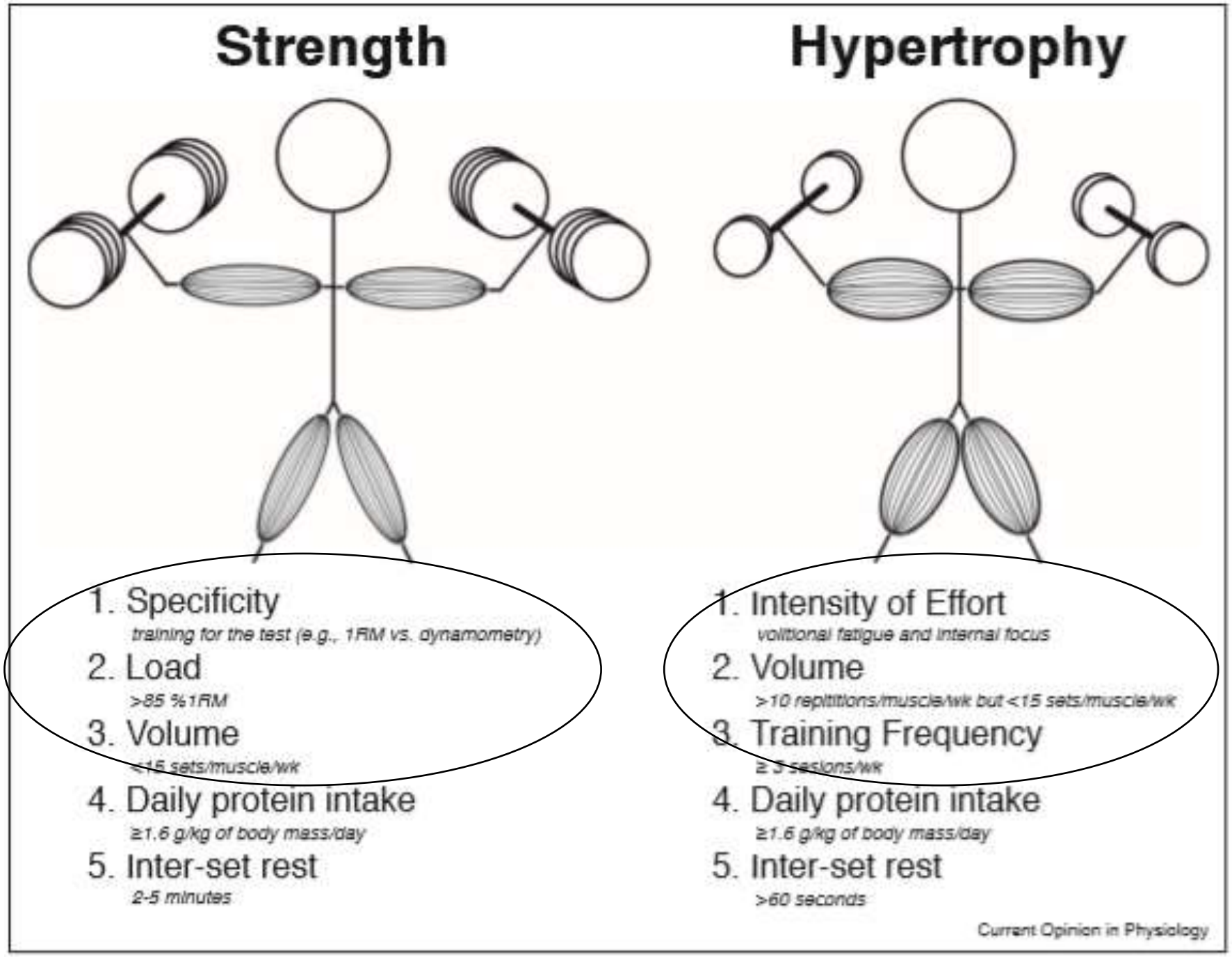
Symons et al. [63]	37 old adults (19 females & 18 males) Isometric vs. Concentric vs. Eccentric training group	3 sessions/week for 12 weeks Isometric: 3 × 10 × 5 s MVC isometric knee extension at 90° knee angle. Concentric: 3 × 10 × 5 s MVC concentric only isokinetic knee extension at 90°/s. Eccentric: 3 × 10 × 5 s MVC eccentric only isokinetic knee extension at 90°/s.	Isometric: Increase in concentric torque (15.1%), isometric torque (27.7%), eccentric torque (16.5%), peak concentric work (14.9%) and power (20.8%) and improved step test time (~7%). Concentric: Increase in concentric torque (22.1%), isometric torque (17.3%), eccentric torque (17.9%), peak concentric work (45.2%) and power (51.8%) and improved step test time (~7%). Eccentric: Increase in concentric torque (10%), isometric torque (25.5%), eccentric torque (26%), peak concentric work (12.7%) and power (23.3%) and improved step test time (~6%).
Tanaka et al. [64]	16 female adults Control vs. Intervention	Intervention: 3 sessions/ week for 4 weeks 3 × 20 × 3 s 20° isometric plantarflexion at 30% MVC.	Intervention: Increase in MVC at 0° (29.3%) and 10° (29%) plantarflexion.
Tillin & Folland [65]	19 male adults Explosive strength training (EST) vs. Maximal strength training (MST)	4 sessions/week for 4 weeks EST: 4 × 10 explosive isometric leg extension. MST: 4 × 10 × 3 s isometric leg extension at 75% MVT.	EST: Increase in MVF (10.6%), force at 50 ms (53.7%), 100 ms (15%) & 150 ms (13%) and EMG activity (~20%). MVT: Increase in MVF (20.5%) and EMG activity (~28%).
Tillin et al. [66]	9 male adults Trained vs. Untrained Leg	4 sessions/week for 4 weeks Trained Leg: 4 × 10 × 3 s single leg isometric leg extension at 75% MVF.	Trained: Increase in MVF (20%) and EMG activity (26%). Untrained: Increase in MVF (8%).

Behm & Sale [8]	16 adults (8 females and 8 males) Isometric vs. Isokinetic foot (Intra-individual comparison)	3 sessions/week for 16 weeks Isometric: 3–5 × 1 s 10 MVC isometric dorsiflexion at 30° plantar flexion angle. Isokinetic: 3–5 × 10 isokinetic dorsi flexion at 5.23 rad/s.	Isometric: Increase in isokinetic torque (~35%). Isokinetic: Increase in isokinetic torque (~25%).
Bimson et al. [10]	16 female amateur soccer players Control vs. Experimental	Experimental: Once per week IST for 6 weeks. 1 × 3 s maximal isometric leg extension at multiple knee angles.	Experimental: Increase in CMJ height (2.24%) and kicking distance (8.8%).
Bogdanis et al. [11]	15 male university students 85° vs. 145° knee angle	3 sessions/week for 6 weeks 85°: 5–7 × 3 s MVC isometric leg press at 85° knee angle 145°: 5–7 × 3 s MVC isometric leg press at 145° knee angle Both groups performed countermovement jumps during rest interval.	85°: Increased in maximal isometric force (13.4%) and vertical jump height (8.1%). 145°: Increased vertical jump height (7.4%).
Burgess et al. [12]	13 male adults Plyometric vs. Isometric	2–3 sessions/week for 6 weeks Plyometric: 3–4 × 15–20 one-legged straight leg drop jump. Isometric: 3–4 × 1 s 15–20 one-legged explosive isometric plantar flexion.	Plyometric: Increase in tendon stiffness (29.4%), jump height (58.6%) and RFD (18.9%). Isometric: Increase tendon stiffness (61.6%) and RFD (16.7%). Non-significant increase in jump height (64.3%).
Chui [13]	96 male university students Control vs. Isometric vs. Rapid Contraction vs. Slow Contraction	3 sessions/week for 9 weeks All groups performed the following 6 exercises: 2-hand military press, stiff-leg deadlift, 2-hand curl, squat, supine press & sit up. Isometric: 3 × 6 s mid-range isometric contraction at 10 RM load. Rapid Contraction: 3 × 10 rapid dynamic contractions at 10 RM. Slow Contraction: 3 × 10 slow dynamic contraction at 10 RM.	Significant increase in strength for elbow flexion & extension, shoulder vertical & horizontal flexion, hip & knee extension, trunk flexion & extension, in all training groups. Significant improvements in speed of movement with and without resistance for press, curl, supine press, stiff-leg deadlift, squat and sit up in all

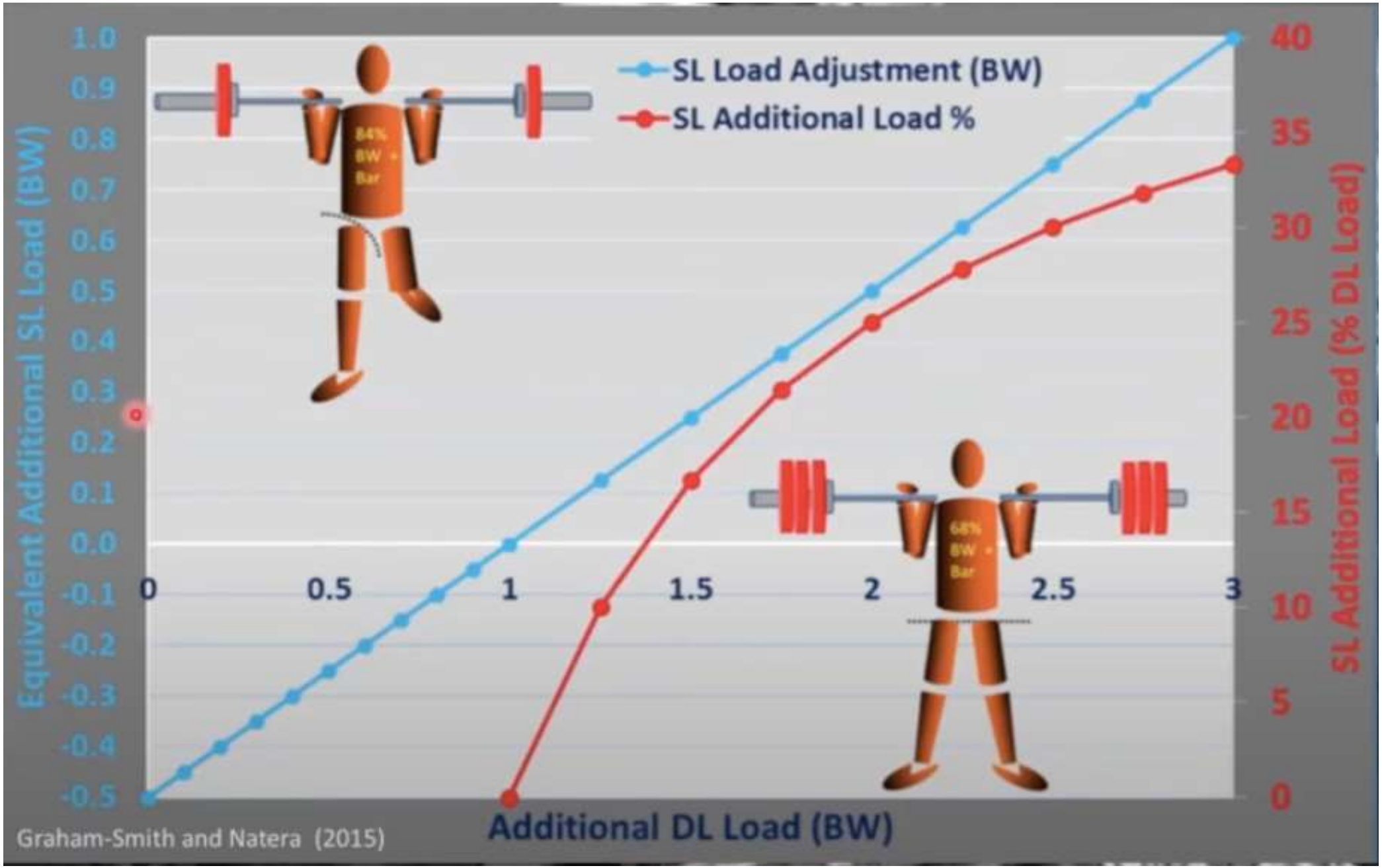
Kubo et al. [35]	9 male adults Short muscle length (ST) vs. Long muscle length (LT) training leg (Intra-individual comparison)	4 sessions/week for 12 weeks ST: 6 × 15 s 50%–70% MVC isometric knee extension at 50° knee flexion. LT: 6 × 15 s 50%–70% MVC isometric knee extension at 100° knee flexion.	ST: Increase in MVC at trained angle (49%) and 40°–80° knee angles and EMG activity (~3–8%). LT: Increase in MVC at trained angle (44%) and 40°–120° knee angles, EMG activity (~7–10%) and stiffness (50.9%).
Kubo et al. [36]	14 male adults Control vs. Training	Training: 4 sessions/week for 12 weeks 10 × 15 s 70% MVC isometric leg press	Training: Increase in MVC (12.4%), stiffness of tendon-aponeurosis (14%), EMG activity (~3–8%), 5] height (5%), duration of push off phase during CMJ (9.4%) and decrease in knee angular velocity during CMJ (8.6%)
Lee et al. [37]	31 male adults Isometric (IM) vs. Isotonic (IT) vs. Isokinetic (IK)	3 sessions/week for 8 weeks IM: 10 × 1 s single leg isometric leg extension at multiple knee angles and 75% maximal voluntary torque. IT: 4 × 10 single leg isotonic leg extension at 75% of 1 repetition max. IM: 4 × 10 single leg isokinetic leg extension.	IM: Increase in isometric force at 4 knee angles (26.6–34.2%), 1RM knee extension (19%), isokinetic torque at 3 angular velocities (11.2–14.2%) and muscle mass (3.1%). IT: Increase in isometric force at 4 knee angles (13.4–20%), 1RM knee extension (36.3%),

Towel Isometrics


LOAD



Morten et al., 2019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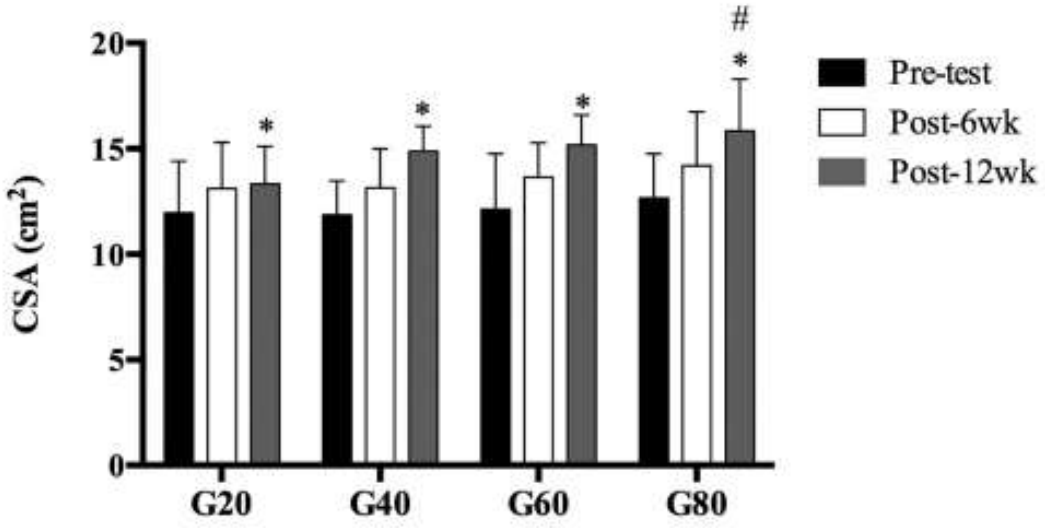
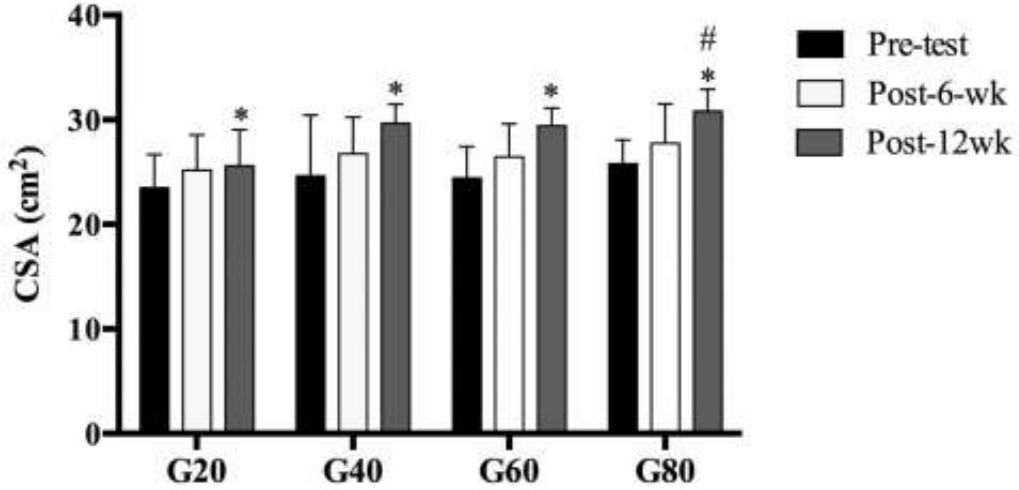
3
84% BW + Bar
68% BW + Bar
Graham-Smith and Natera (2015)

Ullrich et al. [69]	36 athletes (9 females and 27 males) Isometric vs. Dynamic vs. Combine	See Ullrich et al. [68]	Isometric: Increase in knee extension peak power at 40 % (20 %) & 60 % (20.3 %) of 1RM and knee flexion peak power at 40 % (47.8 %) & 60 % (25.4 %). Dynamic: Increase in knee extension peak power at 40 % (26.7 %), 60 % (21.2 %) & 80 % (19.4 %) of 1RM and knee flexion peak power at 40 % (53.3 %), 60 % (35 %) & 80 % (19 %). Combined: Increase in knee extension peak power at 40 % (28.1 %) & 60 % (10.3 %) of 1RM and knee flexion peak power at 40 % (29.9 %) & 60 % (13.2 %).
Weir et al. [70]	13 adults (7 females & 6 males) Training vs. Control leg (Intra-individual comparison)		ase in isometric torque at 2 knee 3.3 %).
Weir et al. [71]	17 female college students Control vs. Training		ase in isometric torque at 2 knee 27.4 %).
Young et al. [72]	4 male adults Sustained contraction (ST) leg vs. Rhythmic contraction (RT) leg (Intra-individual comparison)		MVC (3.3 % per week), and .4 %). MVC (5.5 % per week).
Zoladz et al. [73]	7 male adults (All underwent intervention training)		

CMJ = Countermovement jump; CSA = Cr

Kubo et al. [35]	9 male adults Short muscle length (ST) vs. Long muscle length (LT) training leg (Intra-individual comparison)	4 sessions/week for 12 weeks ST: 6 × 15 s 50 %–70 % MVC isometric knee extension at 50° knee flexion. LT: 6 × 15 s 50 %–70 % MVC isometric knee extension at 100° knee flexion.	ST: Increase in MVC at trained angle (49 %) and 40°–80° knee angles and EMG activity (~3–8 %). LT: Increase in MVC at trained angle (44 %) and 40°–120° knee angles, EMG activity (~7–10 %) and stiffness (50.9 %).
Kubo et al. [36]	14 male adults Control vs. Training	Training: 4 sessions/week for 12 weeks 10 × 15 s 70 % MVC isometric leg press	Training: Increase in MVC (12.4 %), stiffness of tendon-aponeurosis (14 %), EMG activity (~3–8 %), 5] height (5 %), duration of push off phase during CMJ (9.4 %) and decrease in knee angular velocity during CMJ (8.6 %)
Lee et al. [37]	31 male ad… Isometric ((IT) vs. Isok	3 sessions/week for 8 weeks	…force at 4 knee angles …extension (19 %), …ular velocities … mass (3.1 %). …rce at 4 knee angles …tension (36.3 %), …ular velocities … mass (3.9 %). …rce at 4 knee angles …extension (17.9 %), …ular velocities …op distance (4.8 %).
Lee & McGill [38]	12 male M… athletes Control vs.		…elocity (13.2–45.5 %) …elocity (5.2–23.9 %)
		load. Isometric: 3 × 10 × 6 s isometric knee extension at 60° knee angle with 50–100 % 10RM load.	
		3 sessions/week for 3 weeks Experimental: 3 × 10 × 3 s MVC isometric knee extension at 90° knee angle.	Experim… maximal
		5 sessions/week for 5 weeks Single: 3 × 15 s elbow flexion at 90° elbow angle. Multiple: 1 × 15 s elbow flexion at 60°, 90° and 120° elbow angles.	Single: i… angles. Multiple: angles.
		3 sessions/week for 14 weeks Intermittent: 4 × 10 × 3 s single leg isometric knee extension at 70 % MVC. Continuous: 4 × 30 s single leg isometric knee extension at 70 % MVC.	Intermitt… isokineti… (11.3–1… CSA (4.3… Continuo… CSA (10…
		3 sessions/week for 12 weeks Isometric: 3 × 10 × 5 s MVC isometric knee extension at 90° knee angle. Concentric: 3 × 10 × 5 s MVC concentric only isokinetic knee extension at 90°/s. Eccentric: 3 × 10 × 5 s MVC eccentric only isokinetic knee extension at 90°/s.	Isometric… isometric… (16.5 %), (20.8 %) … Concentri… isometric… (17.9 %), … (51.8 %) and improved step test time (~7 %). Eccentric: Increase in concentric torque (10 %), isometric torque (25.5 %), eccentric torque (26 %), peak concentric work (12.7 %) and power (23.3 %) and improved step test time (~6 %).
Tanaka et al. [64]	16 female adults Control vs. Intervention	Intervention: 3 sessions/ week for 4 weeks 3 × 20 × 3 s 20° isometric plantarflexion at 30 % MVC.	Intervention: Increase in MVC at 0° (29.3 %) and 10° (29 %) plantarflexion.
Tillin & Folland [65]	19 male adults Explosive strength training (EST) vs. Maximal strength training (MST)	4 sessions/week for 4 weeks EST: 4 × 10 explosive isometric leg extension. MST: 4 × 10 × 3 s isometric leg extension at 75 % MVT.	EST: Increase in MVF (10.6 %), force at 50 ms (53.7 %), 100 ms (15 %) & 150 ms (13 %) and EMG activity (~20 %). MVT: Increase in MVF (20.5 %) and EMG activity (~28 %).
Tillin et al. [66]	9 male adults Trained vs. Untrained Leg	4 sessions/week for 4 weeks Trained Leg: 4 × 10 × 3 s single leg isometric leg extension at 75 % MVF.	Trained: Increase in MVF (20 %) and EMG activity (26 %). Untrained: Increase in MVF (8 %).
Garfinkel & Cafarelli [20]	15 sedentary female university students Control vs. Experimental	Experimental: 3 sessions/wee… 3 × 10 × 3–5 s single leg isom…	
Goldmann et al. [21]	27 healthy male adults Control vs. Experimental	Experimental: 4 sessions/wee… 4 × 5 × 3 s isometric toe flexi…	
Hagberg et al. [22]	69 female adults with shoulder and neck injuries. Endurance vs. Strength	3 sessions/week for 12 week… Endurance: 4 × 2 min 90° isor… corresponded to 20–30 % ma… Strength: 10 × 5 s 90° isomet… contraction.	
Ikai & Fukunaga [25]	6 male adults Trained vs. Untrained arm	6 sessions/week for 100 days Trained: 3 × 10 s MVC isomet…	
Jones & Rutherford [26]	1 female and 11 male adults Control vs. Isometric vs. Concentric vs. Eccentric leg	3 sessions/week for 12 week… Isometric: 4 × 6 × 4 s single leg isometric leg extension at 80 % MVC. Concentric: 4 × 6 single leg concentric only leg extension at 80 % maximum load. Eccentric: 4 × 6 single leg eccentric only leg extension at 80 % maximum load.	muscle CSA (4.8 %). Concentric: Increase in isometric force (15.4 %) and muscle CSA (5.7 %). Eccentric: Increase in isometric force (10.8 %) and muscle CSA (3.5 %).
Kanehisa & Miyashita [27]	20 male adults Isometric Fast (FG) vs. Isometric Slow (SG)	Same isometric training for 5 sessions/week for 8 weeks. Isokinetic training for 5 sessions/week for subsequent 6 weeks Isometric: 3 × 5 s maximal isometric elbow flexion at multiple elbow angles. FG: 29 × maximal isokinetic elbow flexion at 157°/s. SG: 13 × maximal isokinetic elbow flexion at 73°/s	Isometric: Increased isometric strength at 4 joint angles (27–36 %), power at 4 intensity levels (34–46 %), and arm circumference (1.8 %). FG: Increase in power while lifting light loads (9.4–15.5 %). SG: Increase in power while lifting heaviest load (13.1 %).
Kanehisa et al. [28]	12 male adults 100 % vs. 60 % group	3 sessions/week for 10 weeks 100 %: 12 × 6 s MVC single arm isometric elbow extension at 1.57 rad elbow angle. 60 %: 4 × 30 s 60 % MVC single arm isometric elbow extension at 1.57 rad elbow angle.	100 %: Increase in muscle volume (12.4 %), fascicle angle (16 %), isometric torque (53.2 %) and concentric & eccentric torque (14–49 %). 60 %: Increase in muscle volume (5.3 %), fascicle angle (15 %), isometric torque (60.2 %) and concentric & eccentric torque (19–40 %).
Khouw & Herbert [29]	51 university students (33 females & 18 males)	3 sessions/week for 6 weeks 6 × 10 s isometric elbow flexion at 140° elbow angle. Each	Subjects who trained near 0 % MVC: Increase MVC (~5.3 %)
Bimson et al. [10]	16 female amateur soccer players Control vs. Experimental	Experimental: Once per week IST for 6 weeks. 1 × 3 s maximal isometric leg extension at multiple knee angles.	Experimental: Increase in CMJ height (2.24 %) and kicking distance (8.8 %).
Bogdanis et al. [11]	15 male university students 85° vs. 145° knee angle	3 sessions/week for 6 weeks 85°: 5–7 × 3 s MVC isometric leg press at 85° knee angle 145°: 5–7 × 3 s MVC isometric leg press at 145° knee angle Both groups performed countermovement jumps during rest interval.	85°: Increased in maximal isometric force (13.4 %) and vertical jump height (8.1 %). 145°: Increased vertical jump height (7.4 %).
Burgess et al. [12]	13 male adults Plyometric vs. Isometric	2–3 sessions/week for 6 weeks Plyometric: 3–4 × 15–20 one-legged straight leg drop jump. Isometric: 3–4 × 1 s 15–20 one-legged explosive isometric plantar flexion.	Plyometric: Increase in tendon stiffness (29.4 %), jump height (58.6 %) and RFD (18.9 %). Isometric: Increase tendon stiffness (61.6 %) and RFD (16.7 %). Non-significant increase in jump height (64.3 %).
Chui [13]	96 male university students Control vs. Isometric vs. Rapid Contraction vs. Slow Contraction	3 sessions/week for 9 weeks All groups performed the following 6 exercises: 2-hand military press, stiff-leg deadlift, 2-hand curl, squat, supine press & sit up. Isometric: 3 × 6 s mid-range isometric contraction at 10 RM load. Rapid Contraction: 3 × 10 rapid dynamic contractions at 10 RM. Slow Contraction: 3 × 10 slow dynamic contraction at 10 RM.	Significant increase in strength for elbow flexion & extension, shoulder vertical & horizontal flexion, hip & knee extension, trunk flexion & extension, in all training groups. Significant improvements in speed of movement with and without resistance for press, curl, supine press, stiff-leg deadlift, squat and sit up in all



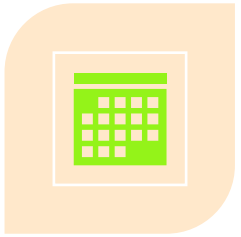


Lasvicius et al., 2018

Elevator Isometrics

Myo Reps

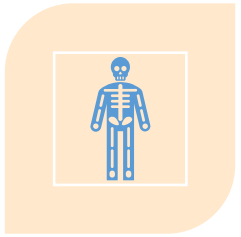
VOLUME



FREQUENCY

TIME/DURATION

TEMPO



LOAD

(& MECHANISM)

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Interference Effect

Recap

- Unilateral Loading
- Isometrics
- Intent
- Specificity
- Low Load, High Volume
- Manipulation of training programme

Worst Case Scenario

	Vo_2peak ($L.min^{-1}$)	pVo_2peak (watts)	Vo_2 at LT ($L.min^{-1}$)	LT % Vo_2 peak	Vo_2 at 330 watts ($L.min^{-1}$)	p2mM (watts)	p4mM (watts)
(Pre OG)	6.76	546	5.34	79	4.95	399	441
(Post IA)	6.19	435	5.26	81	5.26	290	343
(Post 8)	6.42	501	4.98	77	4.98	375	408
(Post 20)	6.46	552	4.82	79	4.82	385	452

Key: peak -peak oxygen uptake, ppeak -power at peak, LT % peak - lactate threshold as a percentage of peak, at 330 watts is a measure of oxygen economy, p2mM -power at 2mM [BLa], p4mM -power at 4 mM [BLa]. Pre OG is the test point before the Olympic Games. Post IA is the test point after 8 weeks of inactivity. Post 8 is the test point after 8 weeks of retraining. Post 20 is the test point after 20 weeks of retraining.

Table 1: Physiologic data across time.

Godfrey, 2005


KEEP CALM
AND
STAY
SAFE

Q&A

Thank you!!

@bensheath

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