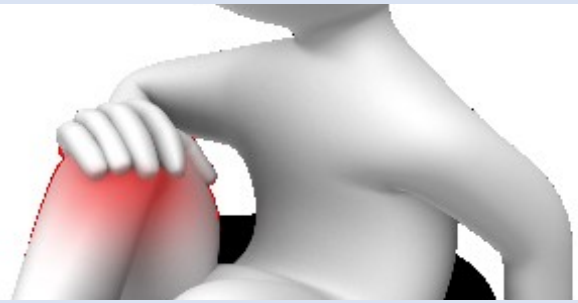
A proximal progressive resistance training program targeting strength and power is feasible in people with patellofemoral pain



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La Trobe Sport and Exercise Medicine Research Centre, Melbourne, Australia
Department of Surgery, University of Melbourne, St.Vincent's Hospital, Melbourne, Victoria, Australia
Clinical Director and Physiotherapist, Complete Sports Care, Melbourne, Australia

Co-authors: Danilo de Oliveira Silva, Brooke Patterson, Prof Kay Crossley, Tania Pizzari, Guilherme Nunes

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BJSM The Journal of Sport & Exercise Medicine BMJ Journals

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Original article

The 'Best Practice Guide to Conservative Management of Patellofemoral Pain': incorporating level 1 evidence

Christian John Barton,[1,2,] Dylan Morrissey[1,5]

Consensus statement

2016 Patellofemoral pain consensus statement from the 4th International Patel Retreat, Manchester. Part 2 interventions (exercise, tap orthoses and combined int

Kay M Crossley,[1] Marienke van Middelkoo Natalie J Collins,[5] Michael Skovdal Rathleff

Consensus statement

2018 Consensus statement on exercise therapy and physical interventions (orthoses, taping and manual therapy) to treat patellofemoral pain: recommendations from the 5th International Patellofemoral Pain Research Retreat, Gold Coast, Australia, 2017

Natalie J Collins,[1,2] Christian J Barton,[2,3] Marienke van Middelkoop,[4] Michael J Callaghan,[5] Michael Skovdal Rathleff,[6] Bill T Vicenzino,[1] Irene S Davis,[7] Christopher M Powers,[8] Erin M Macri,[9,10] Harvi F Hart,[2,11] Danilo de Oliveira Silva,[2,12] Kay M Crossley[2]

CLINICAL PRACTICE GUIDELINES

RICHARD W. WILLY, PT, PhD • LISA T. HOGLUND, PT, PhD • CHRISTIAN J. BARTON, PT, PhD
LORI A. BOLGLA, PT, PhD • DAVID A. SCALZITTI, PT, PhD • DAVID S. LOGERSTEDT, PT, PhD
ANDREW D. LYNCH, PT, PhD • LYNN SNYDER-MACKLER, PT, ScD, FAPTA • CHRISTINE M. MCDONOUGH, PT, PhD

Patellofemoral Pain

Clinical Practice Guidelines Linked to the International Classification of Functioning, Disability and Health From the Academy of Orthopaedic Physical Therapy of the American Physical Therapy Association

J Orthop Sports Phys Ther. 2019;49(9):CPG1-CPG95. doi:10.2519/jospt.2019.0302

Exercise is the cornerstone of treatment

Successful outcome at 1 year = 41 – 67% (Collins 2008; van Linschoten, 2009)

Favorable outcomes at 5-8 years = 43% (Lankhorst 2016)

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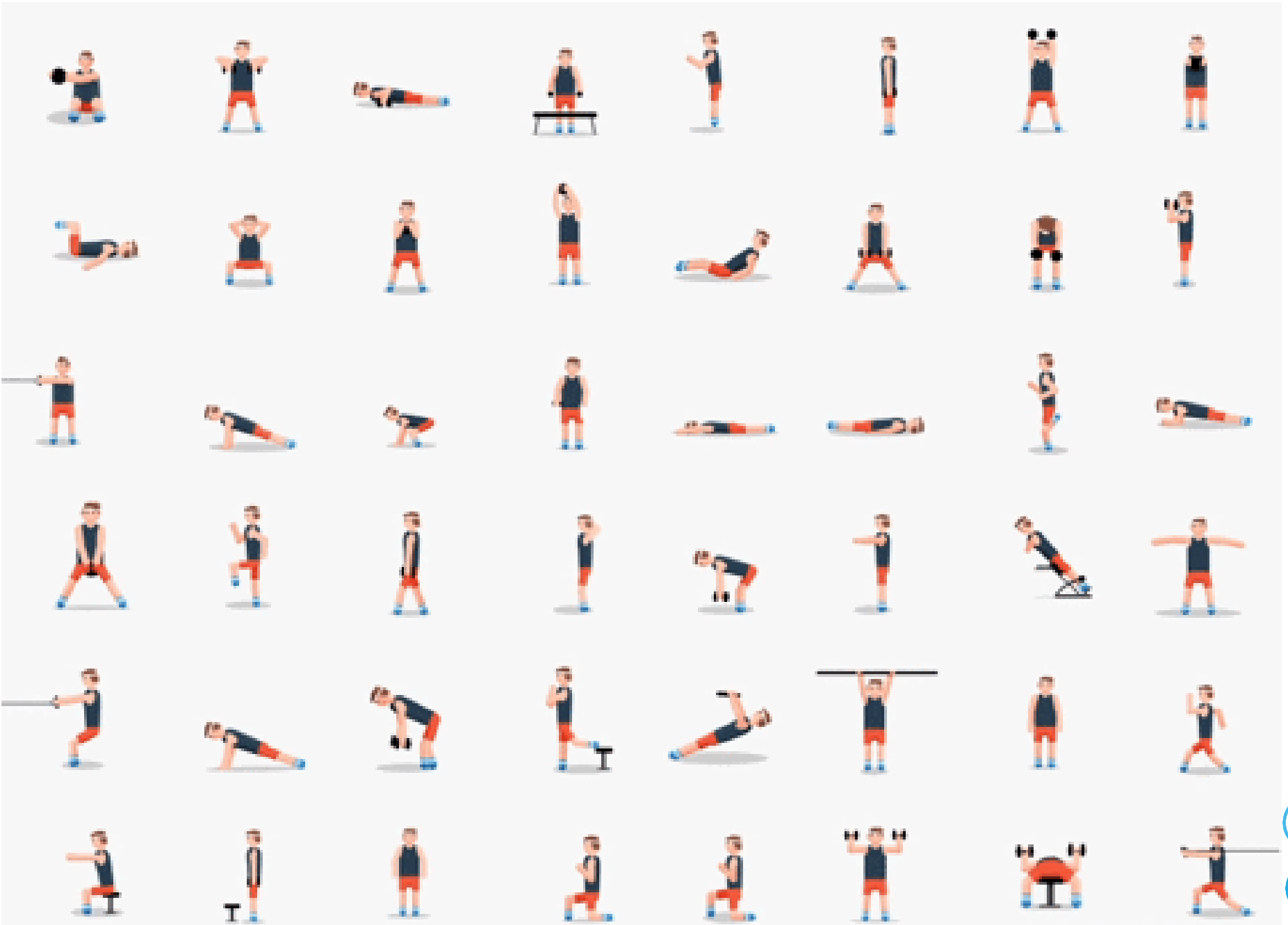

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Proximal muscle rehabilitation is effective for patellofemoral pain: a systematic review with meta-analysis

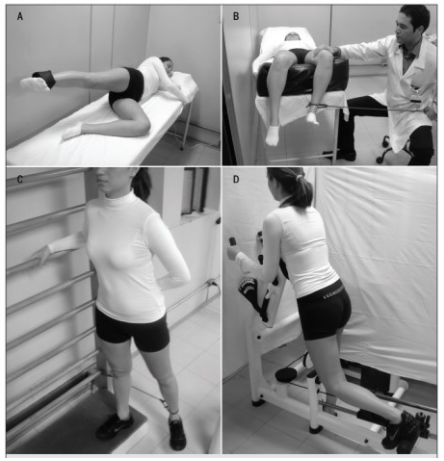
Simon Lack,[1] Christian Barton,[1,2,3,4] Oliver Sohan,[1] Kay Crossley,[5] Dylan Morrissey[1,6]

How can we implement exercise therapy for patellofemoral pain if we don't know what was prescribed? A systematic review

Sinead Holden,[1,2] Michael Skovdal Rathleff,[1,3] Martin Bach Jensen,[1] Christian J Barton[4]

Hip and knee focused exercise seems to help

Hip targeted more beneficial in short term



What prescription principles?

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OPEN ACCESS

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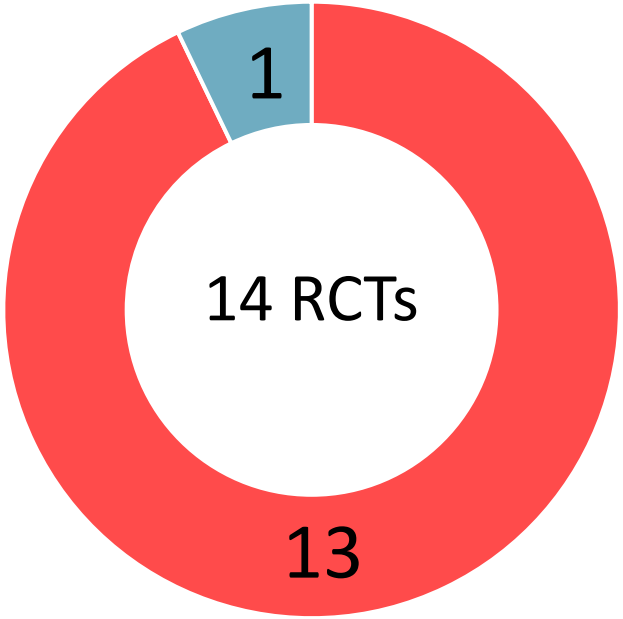
Type of exercise reported according to studies' titles



Neuromuscular Strength Endurance Power Undetermined

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Journal of Science and Medicine in Sport 21 (2018) 123–128

Contents lists available at ScienceDirect

Journal of Science and Medicine in Sport

journal homepage: www.elsevier.com/locate/jsams

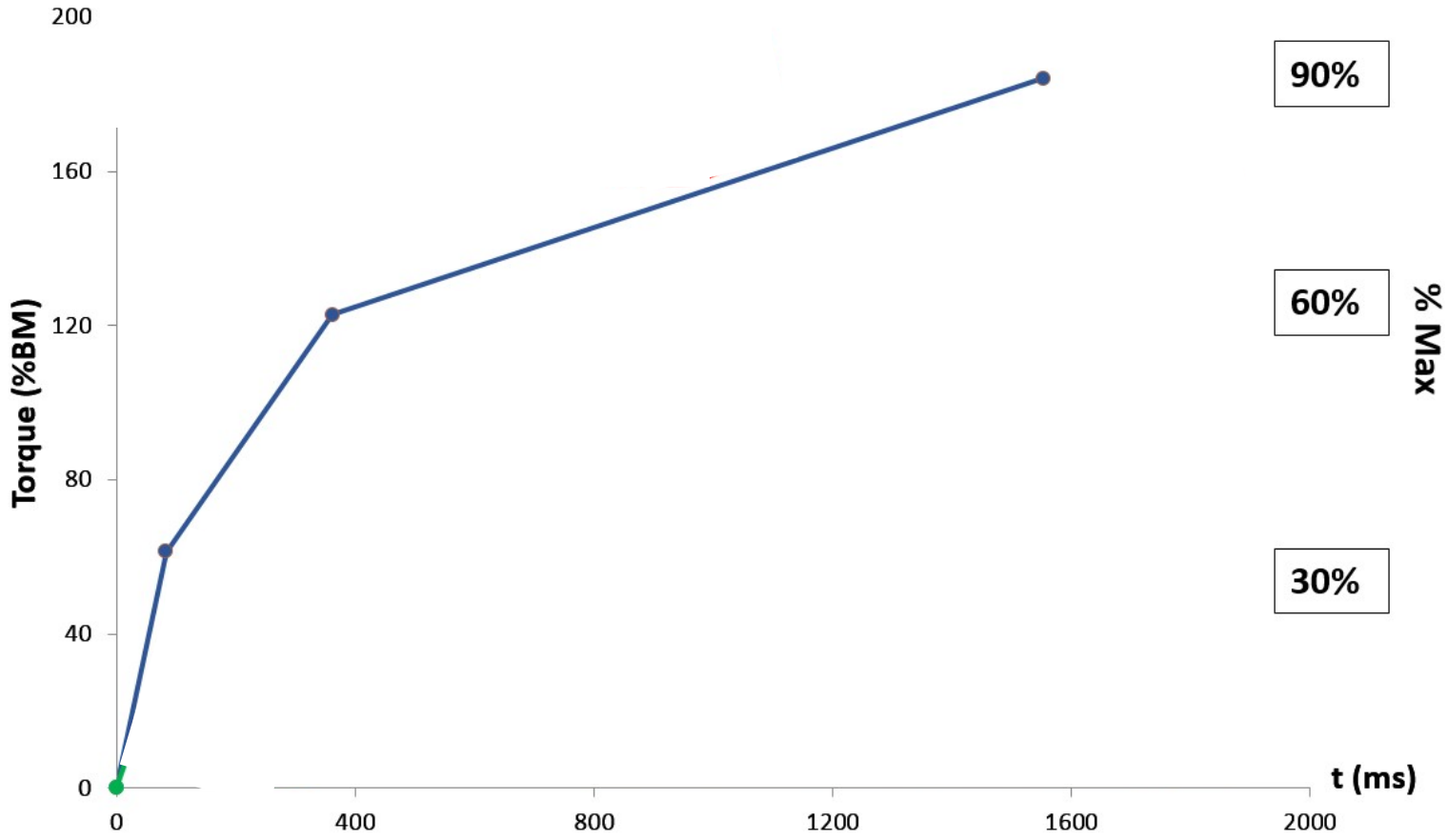
Original research

Hip rate of force development and strength are impaired in females with patellofemoral pain without signs of altered gluteus medius and maximus morphology

Guilherme S. Nunes[a,b,*], Christian John Barton[b], Fábio Viadanna Serrão[a]

[a] Department of Physiotherapy, São Carlos Federal University, Brazil
[b] Sport and Exercise Medicine Research Centre, School of Allied Health, La Trobe University, Australia

Hip extensor rate of force development



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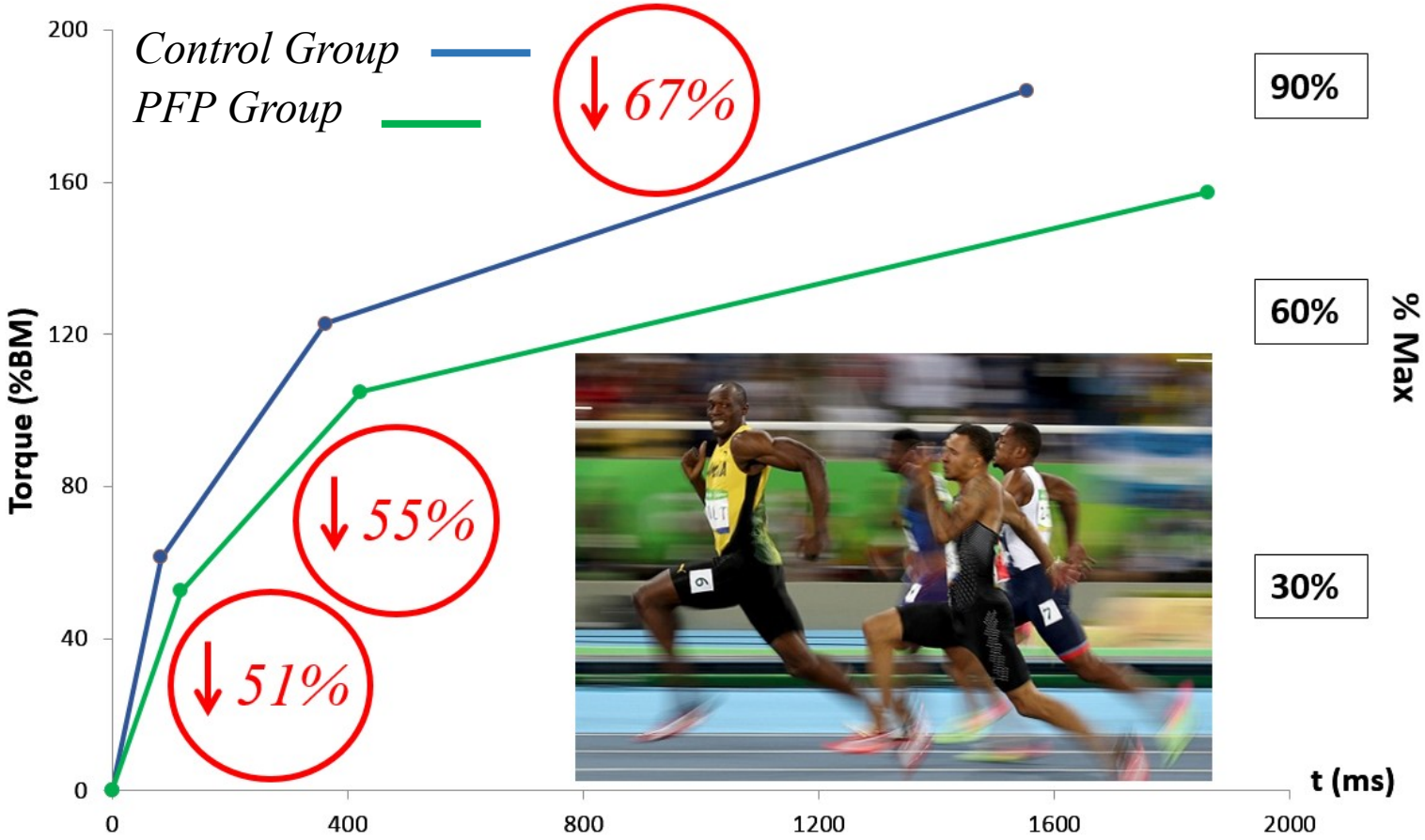

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Clinically measured hip muscle capacity deficits in people with patellofemoral pain

Guilherme S. Nunes [a, b, *], Danilo de Oliveira Silva [a, c], Tania Pizzari [a], Fábio Viadanna Serrão [b], Kay M. Crossley [a], Christian John Barton [a, d]

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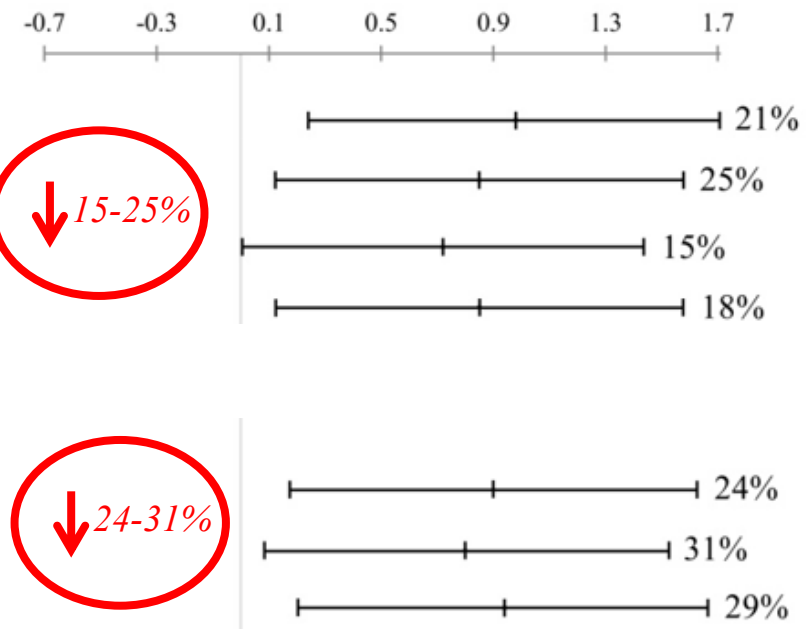
	PFP group (n=16)	Control group (n=16)	Mean difference (95% CI)	p value
Strength (%BM)				
Isometric – hip abductors	117.9 (23.4)	149.9 (38.7)	32.0 (8.9 to 55.1)	**<0.01**
Isometric – hip extensors	82.3 (33.1)	110.3 (31.0)	28.0 (4.9 to 51.1)	**0.02**
10 RM – hip abductors	53.1 (13.9)	62.1 (10.3)	9.0 (0.2 to 17.9)	**0.05**
10 RM – hip extensors	58.2 (14.7)	70.8 (14.1)	12.6 (2.2 to 23.0)	**0.02**
Power (W/kg)				
Squat	14.2 (4.0)	18.6 (5.4)	4.4 (1.0 to 7.8)	**0.01**
Hip abduction	1.9 (0.8)	2.6 (0.9)	0.8 (0.2 to 1.4)	**0.02**
Hip extensors	2.9 (1.2)	4.1 (1.3)	1.2 (0.3 to 2.1)	**0.01**



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A proximal progressive resistance training program targeting strength and power is feasible in people with patellofemoral pain

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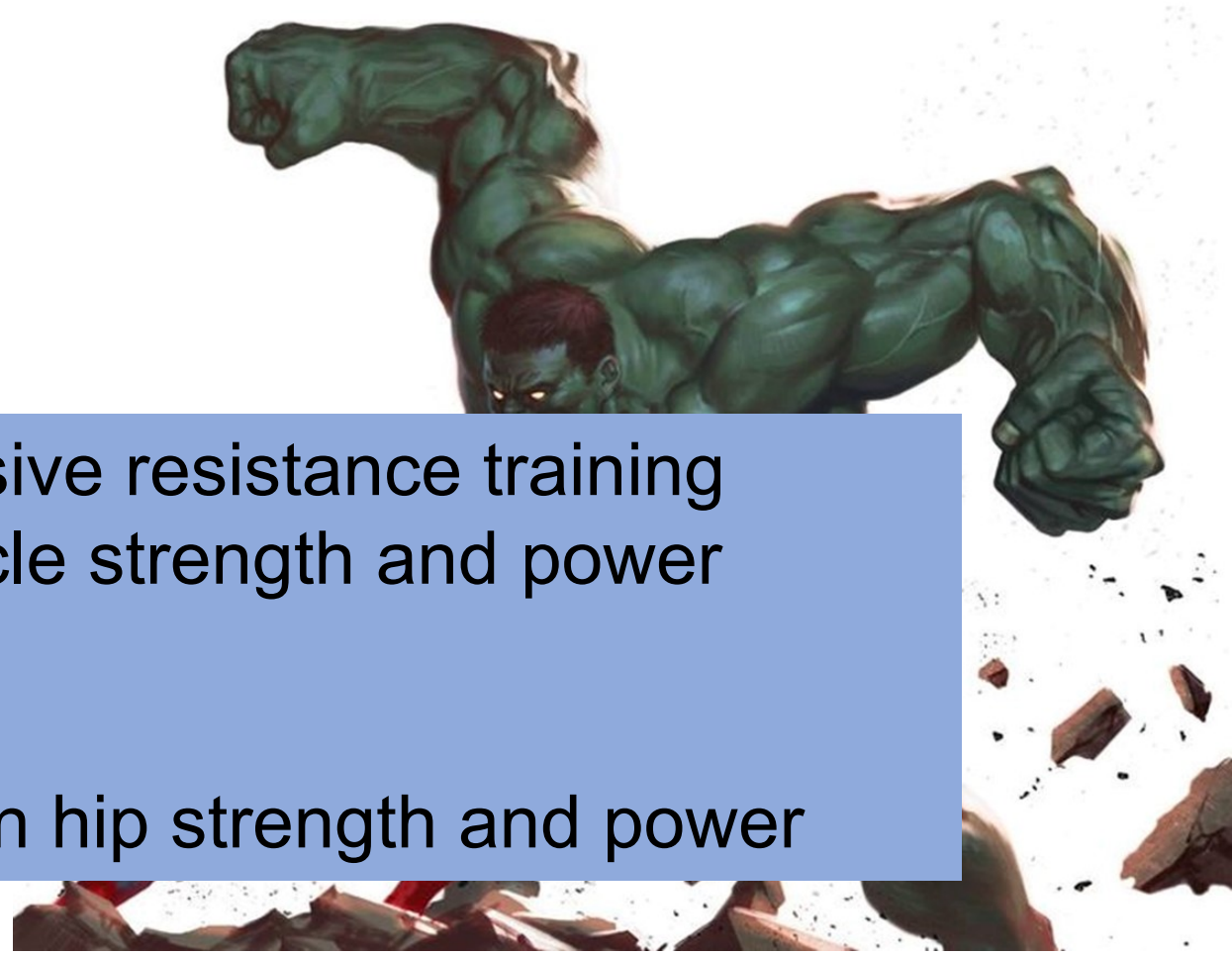

Study aims

1. Feasibility of a 12-week progressive resistance training program targeting proximal muscle strength and power
2. Clinical outcomes and changes in hip strength and power

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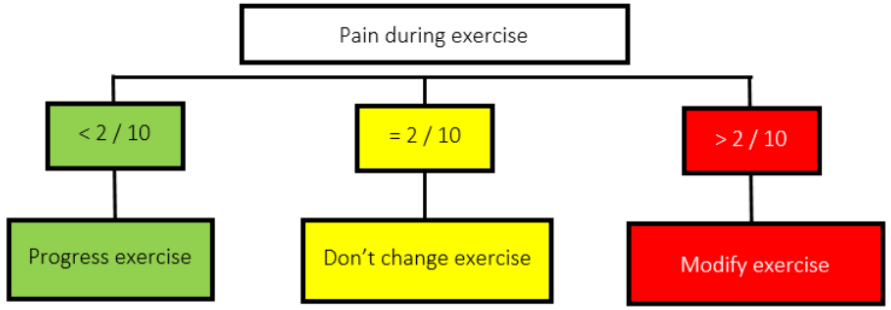
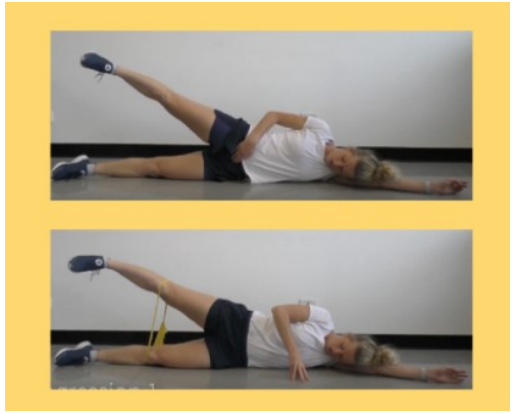
Exercise program



- 12-week (3 x per week)
- 3-5 exercises targeting hip and trunk and tailored to individual
- 5-8 physiotherapy consultations (exercise only)



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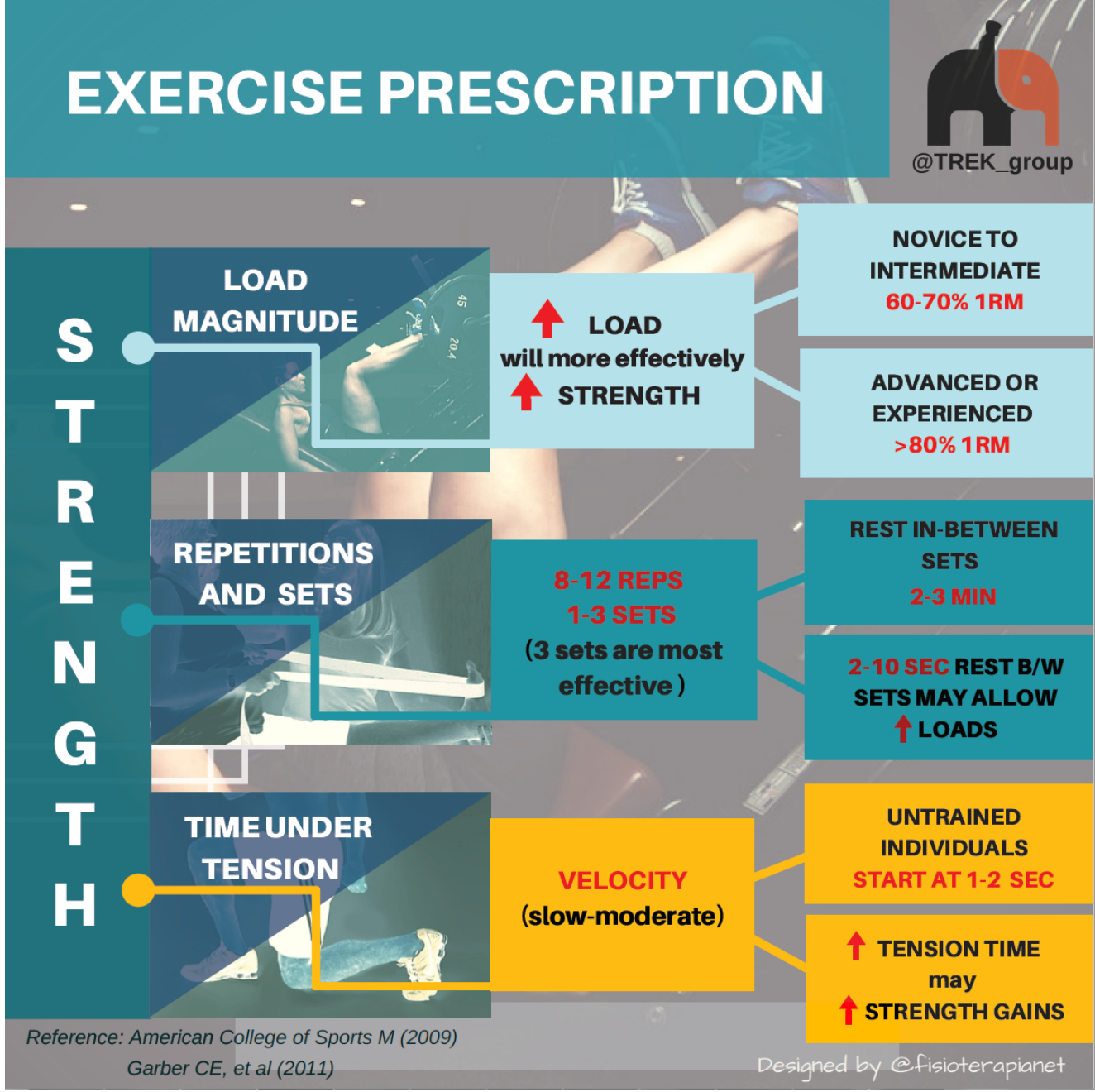
The muscles ability to move against resistance

Greater resistance is needed for about 8-12 repetitions in a slower controlled manner

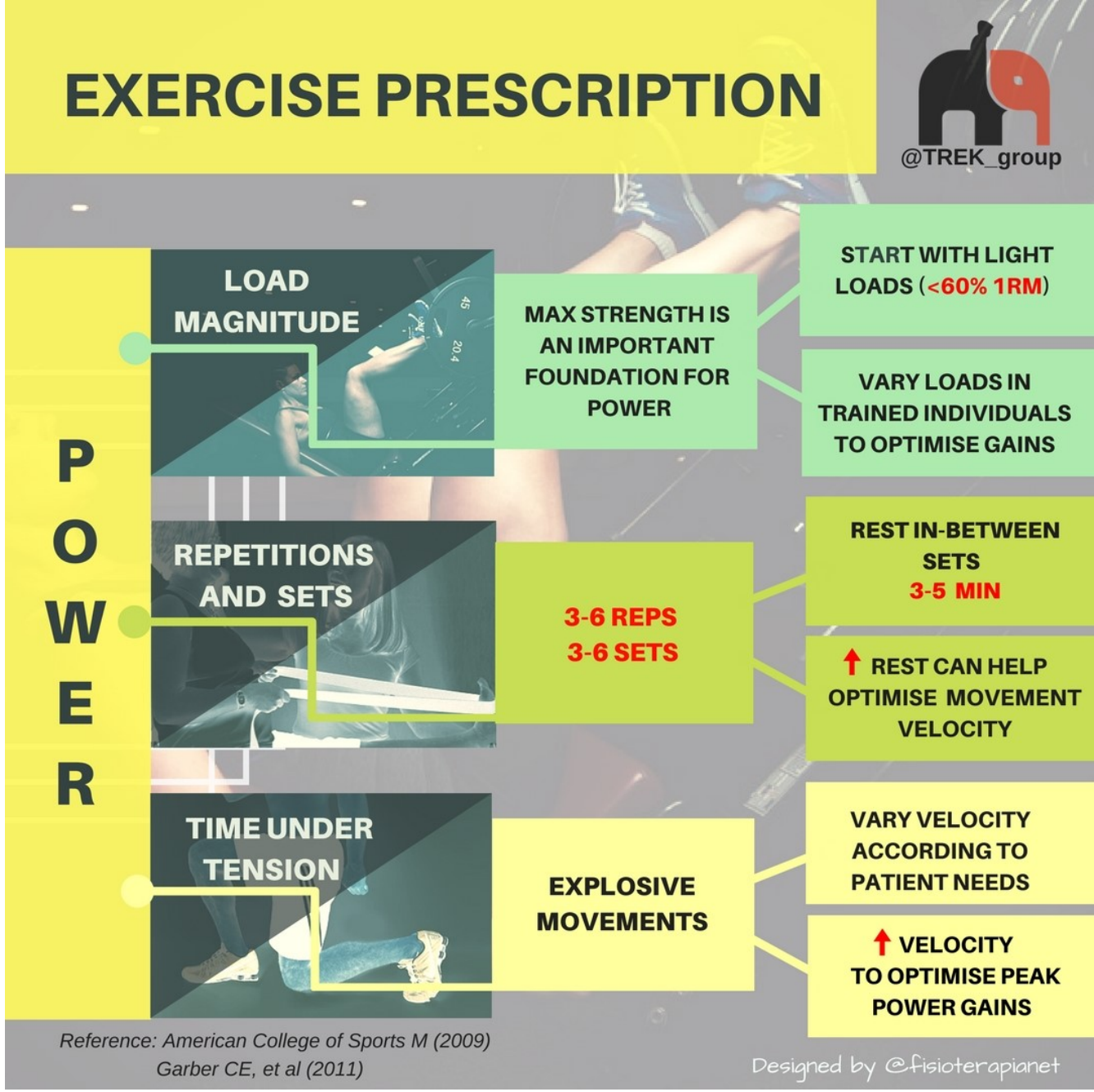
Generally the rest time is about 2-3 minutes between sets



How quickly a given load can be moved or force generated

Exercise against heavy resistance in an explosive manner for a low number of repetitions and 3-6 sets

An extended rest (3-5 minutes) is often needed to fully recover



Feasibility Outcomes

→ Proportion of eligible participants willing to participate

→ Recruitment rate

→ Proportion of prescribed exercise tasks, including all sets, completed each week

→ Drop outs

→ Adverse events

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Clinical Outcomes

→ Global rating of change

→ Worst pain in previous week

→ Anterior knee pain scale

→ KOOS – Patellofemoral

→ Hip muscle capacity
(isometric strength; 10 repetition maximum; Power)

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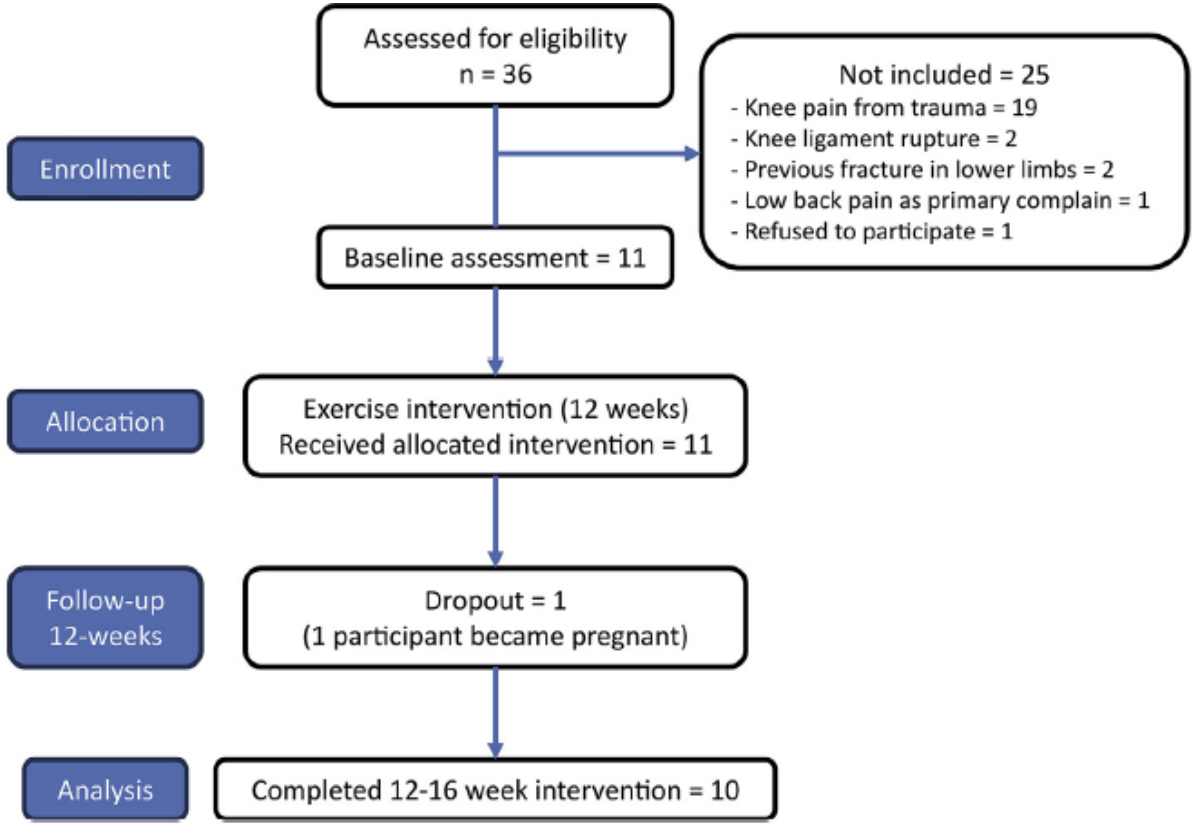
	All sample (n = 11)	Men (n = 5)	Women (n = 6)
Age (y)	33 (10)	35 (9)	32 (11)
Height (m)	1.69 (0.13)	1.80 (0.05)	1.59 (0.09)
Body Mass (kg)	66 (16)	79 (9)	56 (12)
BMI (kg/m^2)	23.0 (3.0)	24.3 (1.5)	21.9 (3.6)

1 Adverse outcome (pain flare)

Typically progressed well
(strength 3-5 weeks; power 4-8 weeks)

Very poor exercise adherence **data** after first 3-4 weeks (Physitrack)



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	Pre Mean (SD)	Post Mean (SD)	Mean difference (95%CI)
Isometric strength			
Hip abduction	123 (20)	136 (31)	-13 (-26; -1)*
Hip extension	83 (34)	96 (34)	-13 (-28; 1)
10 Repetition Maximum			
Hip abduction	54 (14)	72 (12)	-19 (-25; -12)*
Hip extension	55 (15)	74 (7)	-19 (-28; -10)*
Power			
Hip abduction	2.0 (0.9)	2.5 (1.2)	-0.6 (-1.1; -0.1)*
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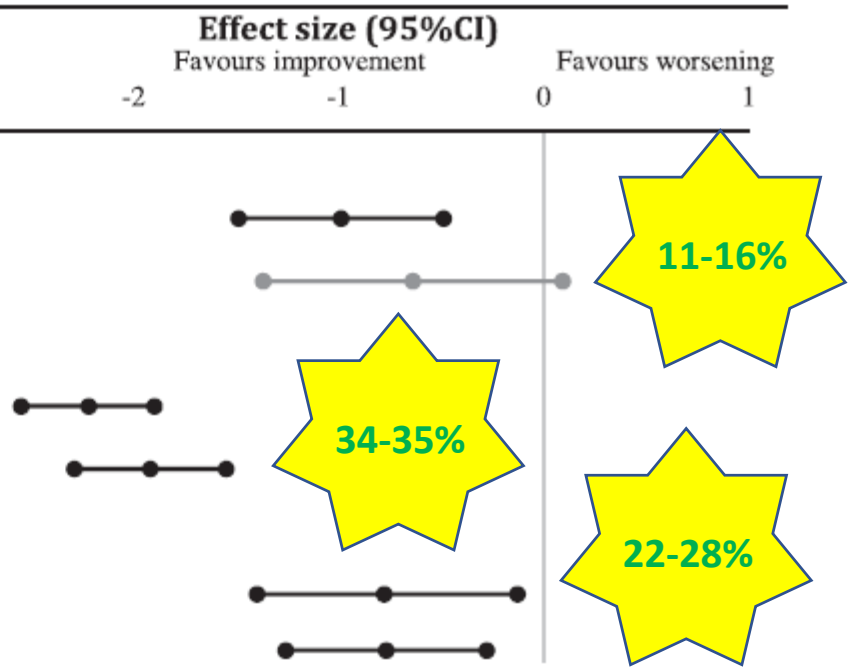

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Exercise is the cornerstone of treatment

Successful outcome at 1 year = 41 – 67% (Collins 2008; van Linschoten, 2009)

Favorable outcomes at 5-8 years = 43% (Lankhorst 2016)

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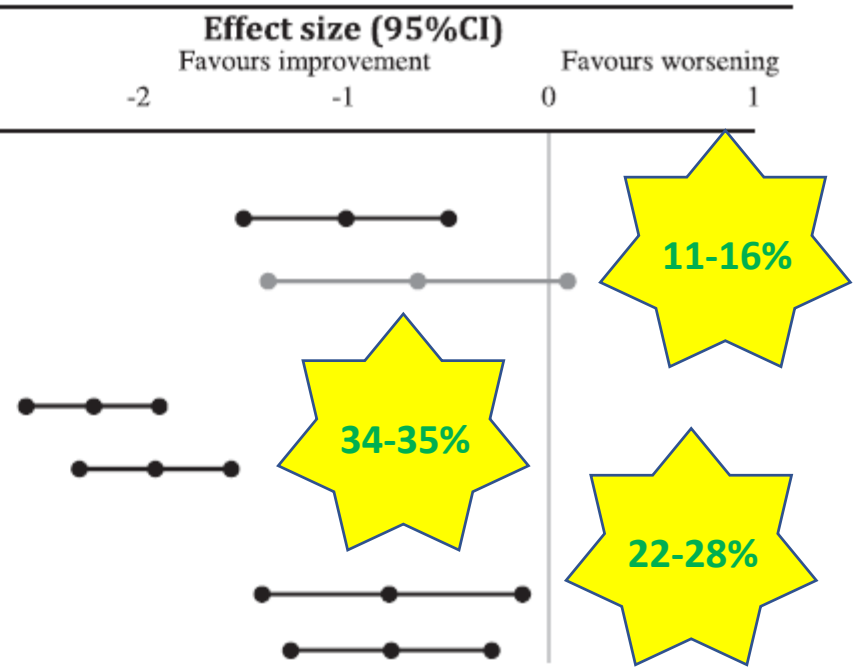
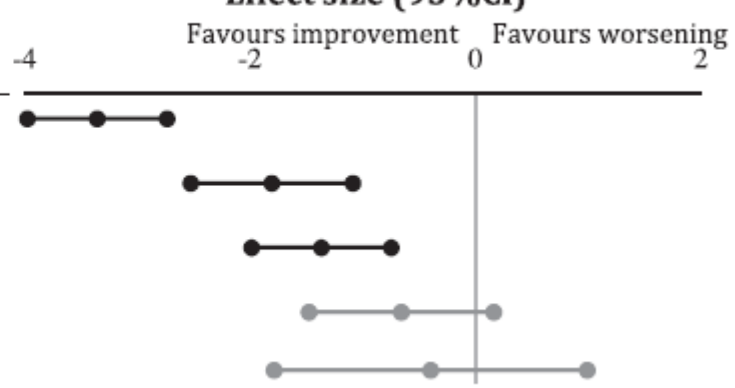


	Pre Mean (SD)	Post Mean (SD)	Mean difference (95%CI)
Worst pain last week	5.7 (1.57)	1.0 (1.3)	4.7 (3.7; 5.7)*
AKPS	76 (12)	90 (9)	-14 (-20; -8)*
KOOS-PF	74 (18)	89 (10)	-15 (-24; -5)*
Kinesiophobia	34 (8)	29 (6)	5 (-1; 10)
Physical activity level	3,567 (5,092)	5,944 (5,955)	-2,376 (-6,606; 1,853)



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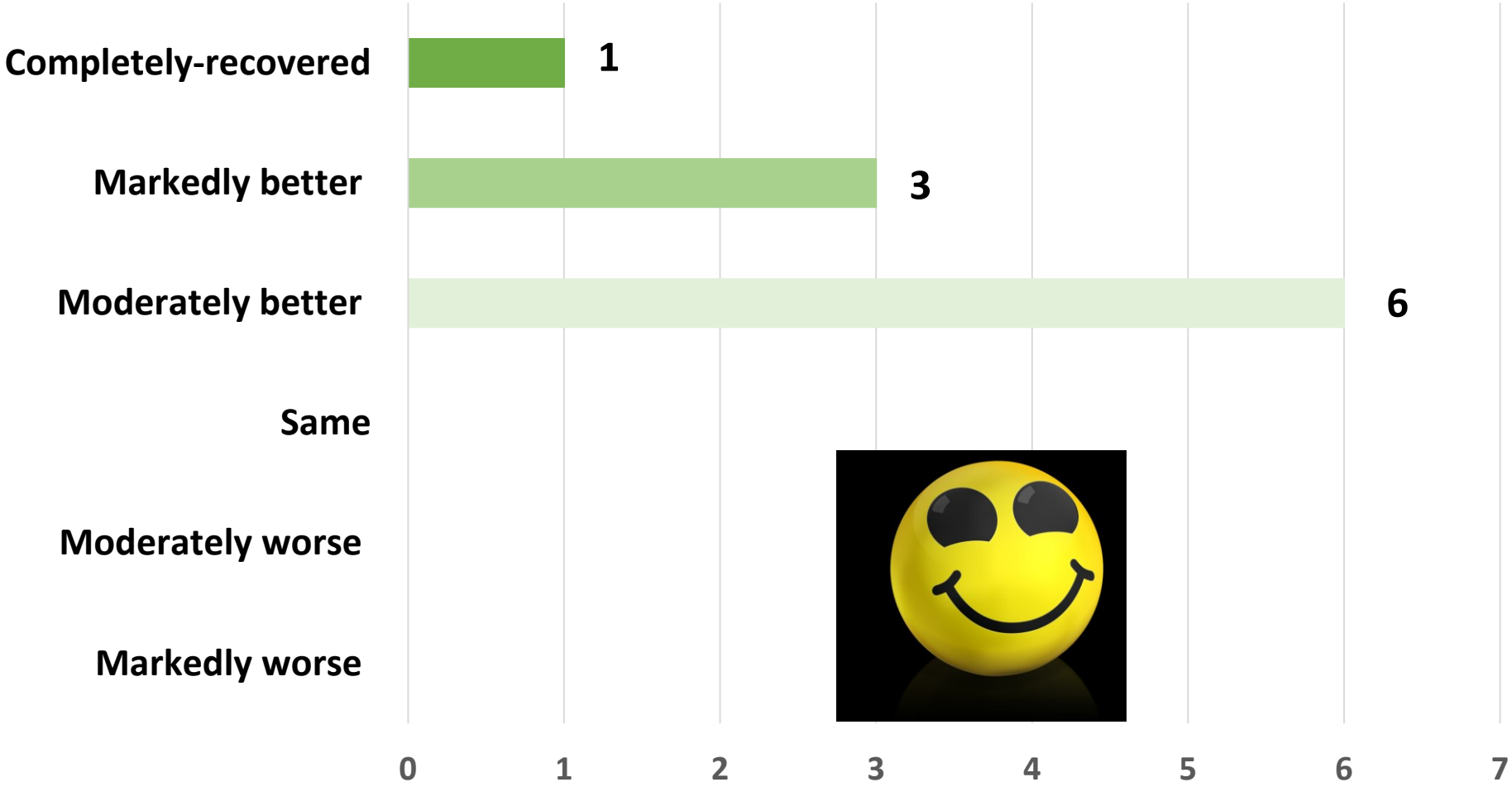
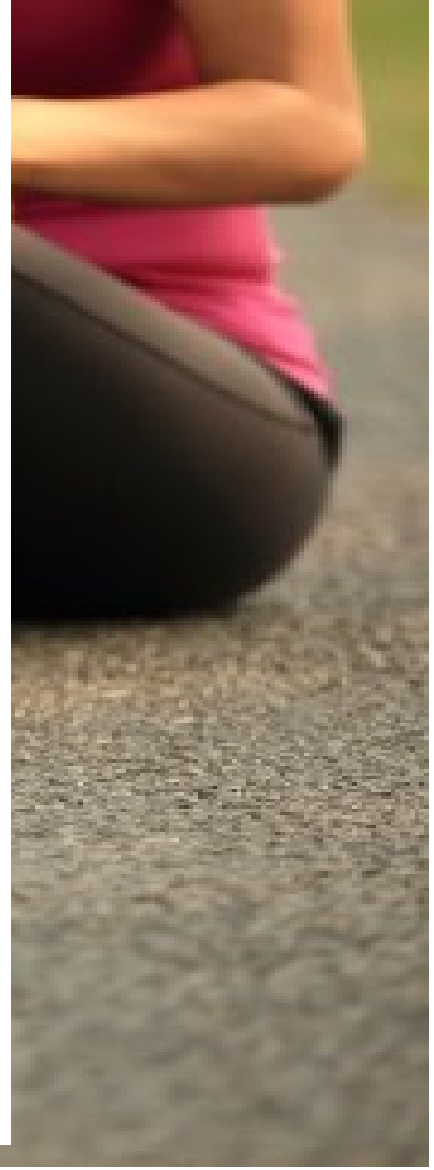
Global scale of perceived recovery





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Limitations

- Small group
- No control or comparison group
- Young adults (18-47 y/o)
- Mixed-sex cohort

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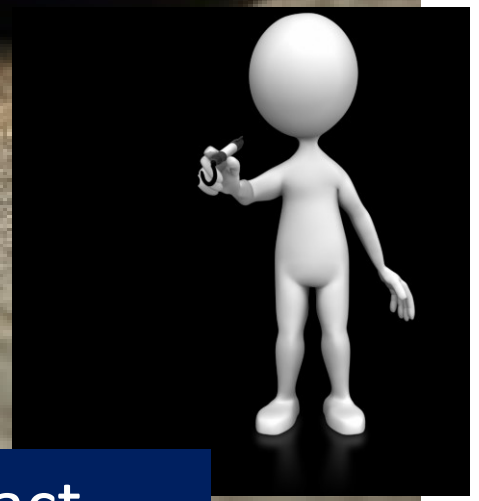
TAKE HOMES

1. Prescribing strength and power is feasible
2. Moderate-large improvements in strength + power
3. Associated with large improvements in pain + function
4. Does better exercise prescription improve long term outcomes?



Todays slides: http://bit.ly/barton-act

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