

香港中文大學
The Chinese University of Hong Kong

Test your Calf

There is an app for that



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Calf raise



PLAN

1

Calf raise test (*heel rise test*)

2

Calf Raise application

3

Give it a go

4

A few considerations

5

Q&A



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Calf raise



**A LONG TIME AGO
IN A GALAXY FAR,
FAR AWAY...**

**...PhD ON THE
CALF MUSCLES...**

CALF MUSCLE

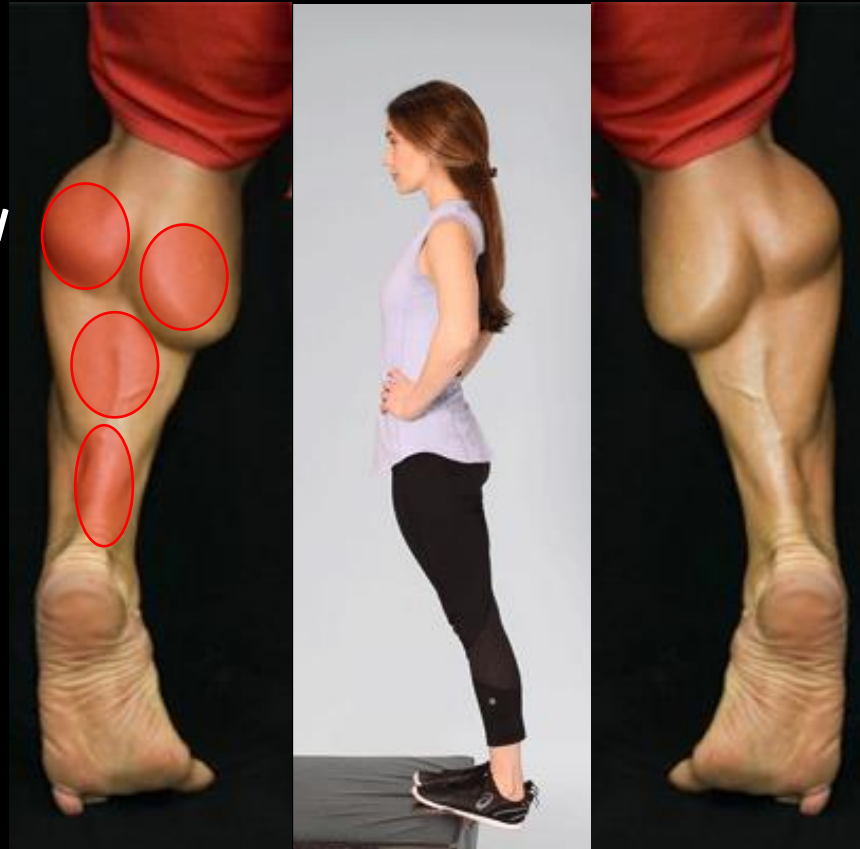
Lateral Medial

Soleus

Achilles

Concentric

Eccentric



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Calf raise



CALF MUSCLE



¹ Pandy et al. *Scand J Med Sci Sports*. 2021;31:1882-1896

² Möck et al. *Res Sports Med*. 2018;26:474-481

³ Hébert-Losier et al. *Phys Ther Sport*. 2023;64:117-122



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Calf raise



CALF RAISE TEST

Calf Raise Test (heel rise test for strength endurance)

Most common **clinical test** to assess the plantar flexors

Up and down **as many times** as possible on one leg¹

Up 1 s – down 1 s (**60 bpm** metronome = 30 reps per minute)



¹ Hebert-Losier et al. *Phys Ther Sport*. 2009;10(4):142-9

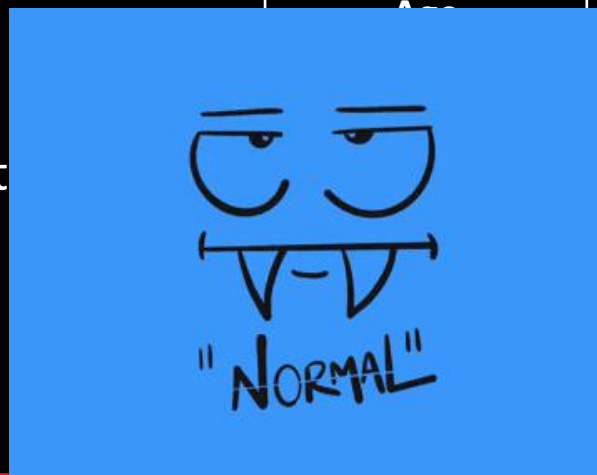


CALF RAISE TEST

Number of repetitions used in clinics as outcome

25 repetitions considered “normal”

- ❌ Age
- ❌ Sex
- ❌ Physical activity
- ❌ BMI
- ❌ Side



		Repetitions ($n = 566$) ¹	
		Males	Females
Right = Left	Age	38	31
	Sex	33	28
	Physical activity	29	25
	BMI	24	23
	Side	20	20
		15	17
		10	15
	80 y		

BMI: 24.2 kg/m²

Activity: Moderate

¹Hebert-Losier et al. *Physiotherapy*. 2017;103(4):446-52



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CALF RAISE TEST

Number of repetitions used in clinics as outcome

25 repetitions considered “normal”



Right = Left

Age	Repetitions ($n = 165$) ¹	
	Males	Females
10-17 y	26	26

BMI: 50th centile

¹Hebert-Losier et al. *Phys Occup Ther Pediatr*. 2024:*online first*



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Take home messages

25 repetitions is normal based on median, but it depends

More repetitions in younger and more active adults (25 in children)

More repetitions in adult males up to 60 years (F = M in children)

Using **matched norm** data is important in interpreting outcomes

Contralateral side adequate reference in absence of norms



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CALF RAISE TEST

Repetitions is not a sensitive outcome to deficits in calf function¹

- ✓ Peak height
- ✓ Total work



Specialised equipment not often accessible or practical for clinicians^{2,3}



¹Silbernagel et al. *Knee Surg Sports Traumatol Arthrosc.* 2010;18:258-64

²Hebert-Losier et al. *J Strength Cond Res.* 2012; 26(11):3134-47

³Fernandez Hebert-Losier. *Physiother Res Int.* 2023; 28(4):e2039

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CALF RAISE APP

High use of **mobile applications** in health & sport

Over 60% practitioners use apps to collect data¹

Practical – Affordable – Valuable when valid and reliable²



¹ Shaw et al. *JMIR mHealth and uHealth*. 2021;9:e21763

² Peart et al. *J Strength Cond Res*. 2019; 33(4):1167-1177



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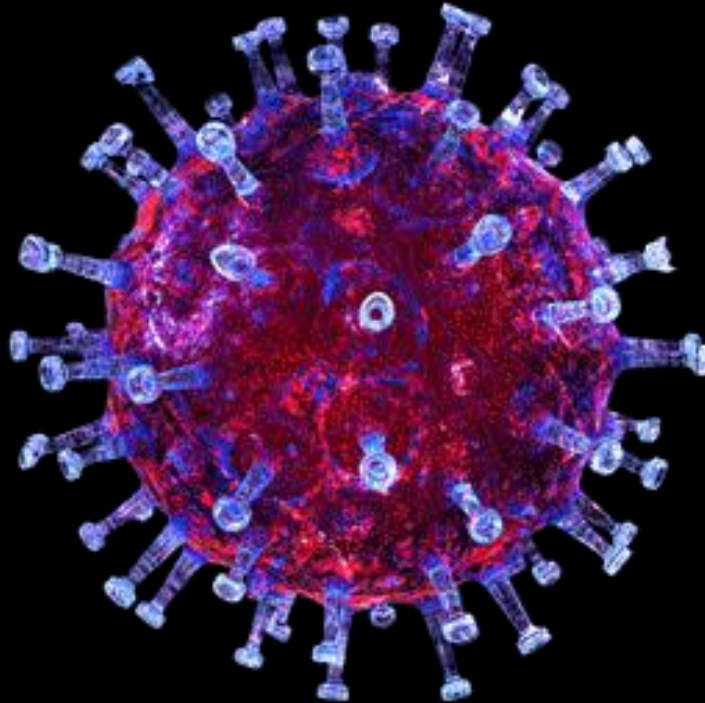
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CALF RAISE APP



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CALF RAISE APP



Dr Carlos Balsalobre-Fernández



My Lift

<https://www.youtube.com/watch?v=WGU4VR8efzQ>

¹ Balsalobre-Fernández et al. *J Sports Sci.* 2020;38(6):710-716



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CALF RAISE APP

Calf Raise facilitates testing in clinics and on the field

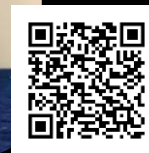
Computer vision tracks a marker placed on the foot



CALF RAISE



SCAN ME



*Also on Google Play
(Jaime Fernández Recio)*



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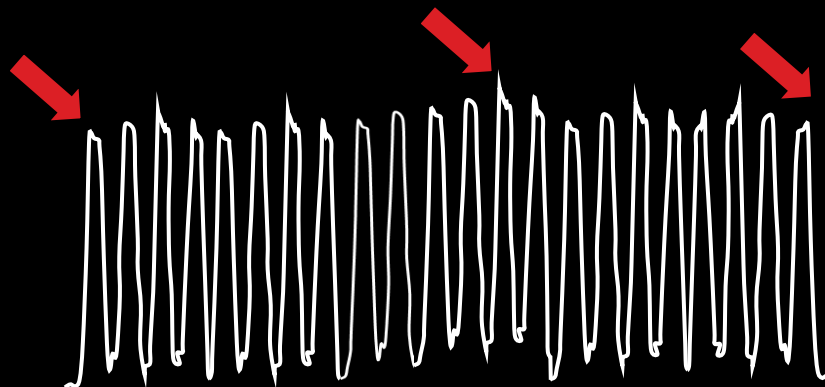


CALF RAISE APP

Number of repetitions

Peak height (cm)

Fatigue index (%)



Height Power Work

Left foot Right foot

TOTAL REPS: 22

Total: 226.03 cm

Peak: 10.76 cm

Fatigue index: 1.2%



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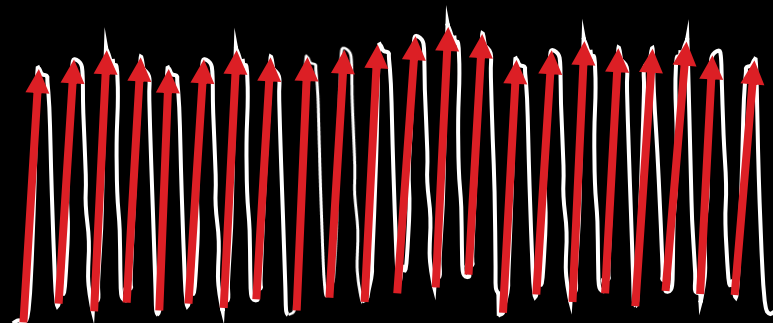
CALF RAISE APP

Number of repetitions

Peak height (cm)

Fatigue index (%)

Total positive displacement (cm)



Height

Power

Work

Left foot

Right foot

TOTAL REPS: 22

Total: 226.03 cm

Peak: 10.76 cm

Fatigue index: 1.2%



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CALF RAISE APP

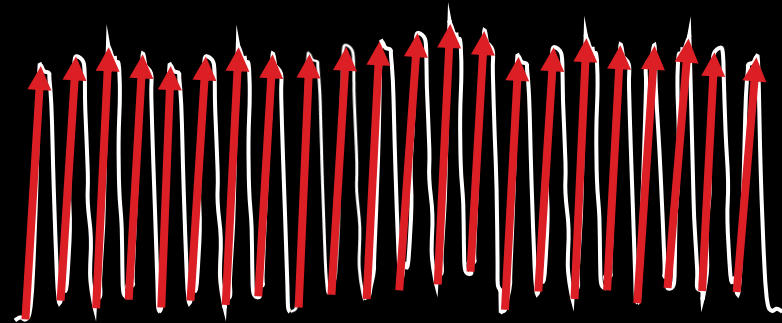
Number of repetitions

Peak height (cm)

Fatigue index (%)

Total positive displacement (cm)

Total positive work (J)



Height	Power	Work
Left foot		Right foot

Work (Joules)

Force x displacement

$F_g = \text{mass} \times \text{gravity}$

TOTAL REPS: 22

Total positive: 1,903.43 J

Total negative: -1,894.61 J



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CALF RAISE APP

Number of repetitions

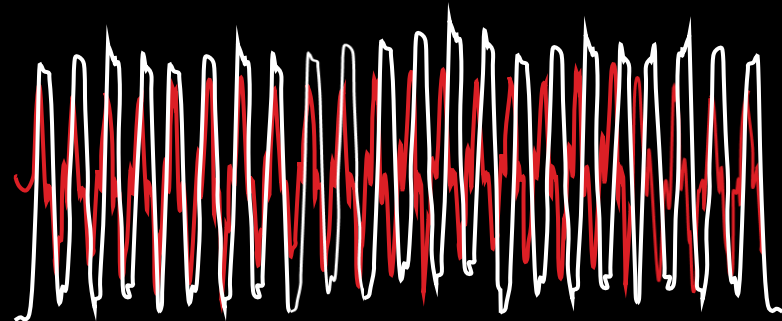
Peak height (cm)

Fatigue index (%)

Total positive displacement (cm)

Total positive work (J)

Peak positive power (W)



Height	Power	Work
Left foot	Right foot	

Peak power (watts)

Force x velocity

$F_g = \text{mass} \times \text{gravity}$

TOTAL REPS: 22

Peak positive: 286.32 W

Peak negative: -306.38 W



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CALF RAISE APP

Validated in healthy adults ($n = 13$)¹ and athletes ($n = 20$)²

✓ App vs lab – excellent agreement and low errors (5-10%)

⊘ *Exception* – fatigue index (15.3%)

Lateral marker better than posterior¹

Higher agreement and lower errors (5% vs 10%)

Lower perspective and parallax errors



✓
Lateral

⊘
Post

¹Fernandez, Hébert-Losier. *Musculoskelet Sci Pract.* 2023;63:102711

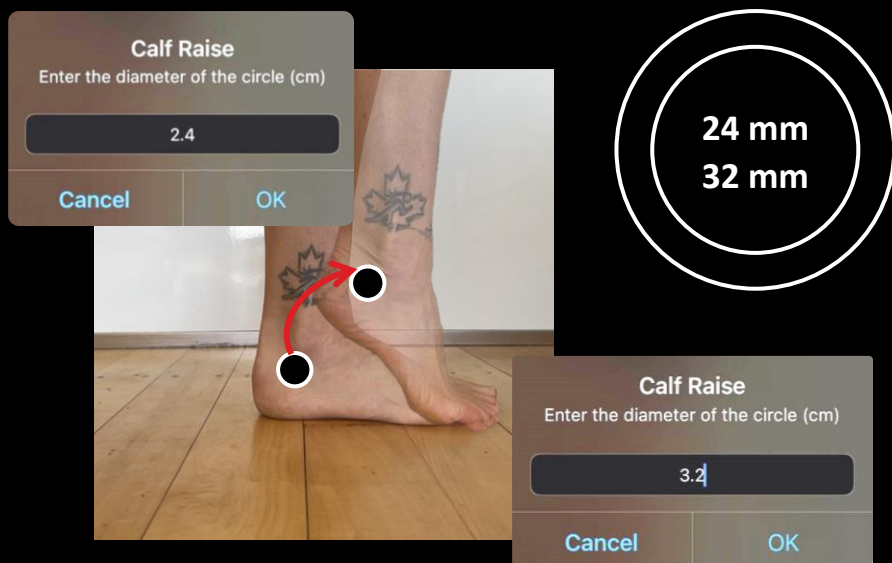
²Hébert-Losier al. *Sports Biomech.* 2022; doi: 10.1080/14763141.2022.2118158



CALF RAISE APP

Using good 2D motion capture practices is important¹

✓ **Calibration** – Key first step to calculating distances



Total displacement 30 repetitions

24 mm = 365 cm

32 mm = 376 cm (+3%)

24 on 32 mm = 280 cm (-33%)

32 on 24 mm = 494 cm (+35%)

¹Hébert-Losier. *Knee Surg Sports Traumatol Arthosc.* 2024 (in press); doi: 10.1002/ksa.12515



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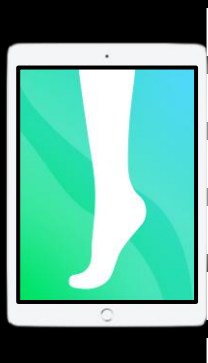
Calf raise



CALF RAISE APP

Using good 2D motion capture practices is important¹

- ✓ **Calibration** – Key first step to calculating distances
- ✓ **Set-up** – Appropriate and fixed distance from motion



Device perpendicular
Large calibration target
Good representation of motion



¹Hébert-Losier. *Knee Surg Sports Traumatol Arthrosc.* 2024 (in press); doi: 10.1002/ksa.12515



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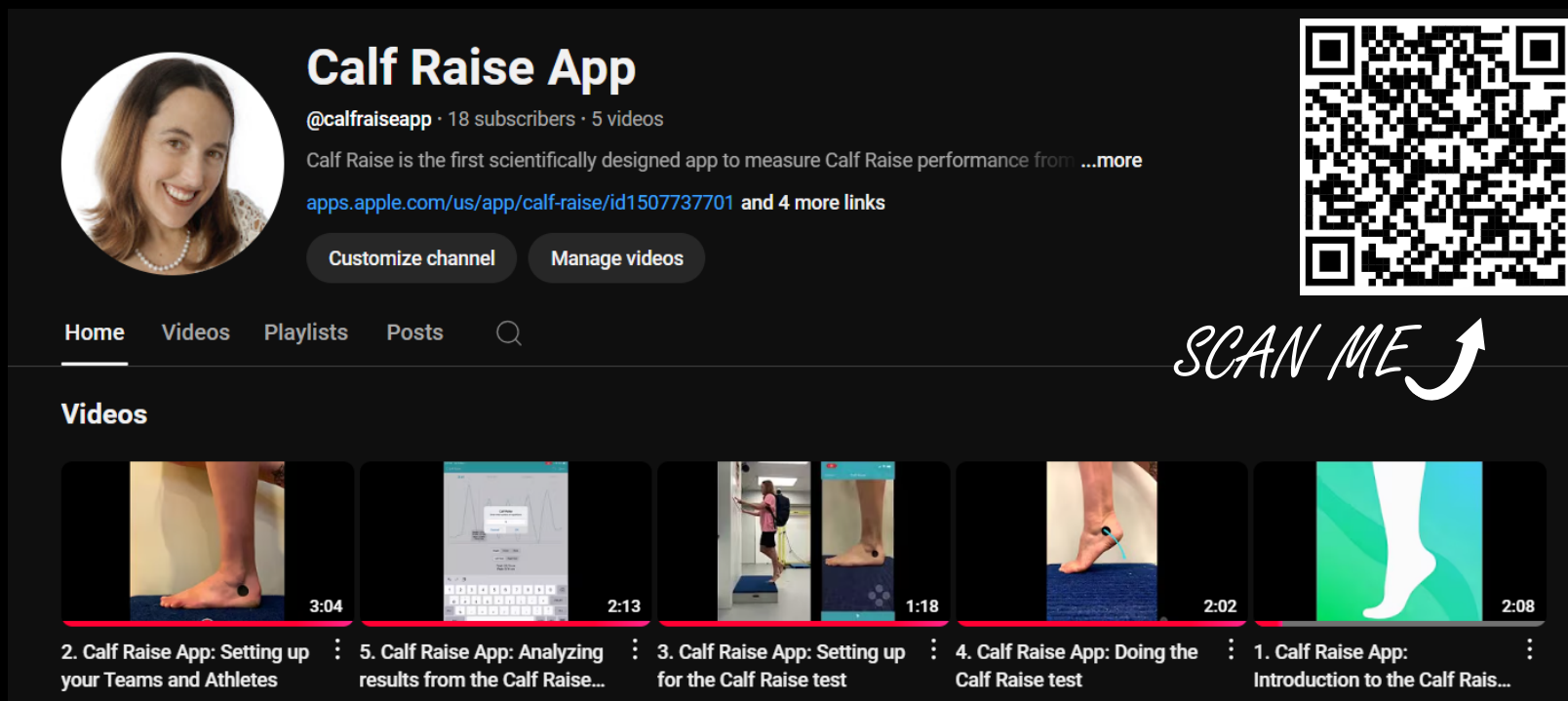
Calf raise



CALF RAISE APP

Five **YouTube** videos detailing best use of app

<https://www.youtube.com/@calfraiseapp>



The image shows a screenshot of the YouTube channel page for 'Calf Raise App'. The channel name is 'Calf Raise App' with the handle '@calfraiseapp', 18 subscribers, and 5 videos. The bio states: 'Calf Raise is the first scientifically designed app to measure Calf Raise performance from ...more' followed by a link to the app on the App Store and '4 more links'. There are buttons for 'Customize channel' and 'Manage videos'. A QR code is displayed on the right. Below the channel header, there are tabs for 'Home', 'Videos', 'Playlists', and 'Posts'. The 'Videos' tab is selected, showing a list of five videos. The first video is '2. Calf Raise App: Setting up your Teams and Athletes' (3:04). The second is '5. Calf Raise App: Analyzing results from the Calf Raise...' (2:13). The third is '3. Calf Raise App: Setting up for the Calf Raise test' (1:18). The fourth is '4. Calf Raise App: Doing the Calf Raise test' (2:02). The fifth is '1. Calf Raise App: Introduction to the Calf Rais...' (2:08). A handwritten note 'SCAN ME' with an arrow points to the QR code.

Calf Raise App
@calfraiseapp · 18 subscribers · 5 videos

Calf Raise is the first scientifically designed app to measure Calf Raise performance from ...more
apps.apple.com/us/app/calf-raise/id1507737701 and 4 more links

Customize channel Manage videos

Home Videos Playlists Posts

Videos

- 2. Calf Raise App: Setting up your Teams and Athletes 3:04
- 5. Calf Raise App: Analyzing results from the Calf Raise... 2:13
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Calf raise





Take home messages



Calf Raise App can be **recommended** for use (valid and reliable)

Calf Raise App provides more than repetitions (height and work)

Lateral marker recommended over posterior marker (less errors)

Fatigue index should not be used to inform practice

Set-up and **calibration** are important considerations (**check YouTube**)



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Calf raise



LET'S DO THIS



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Calf raise



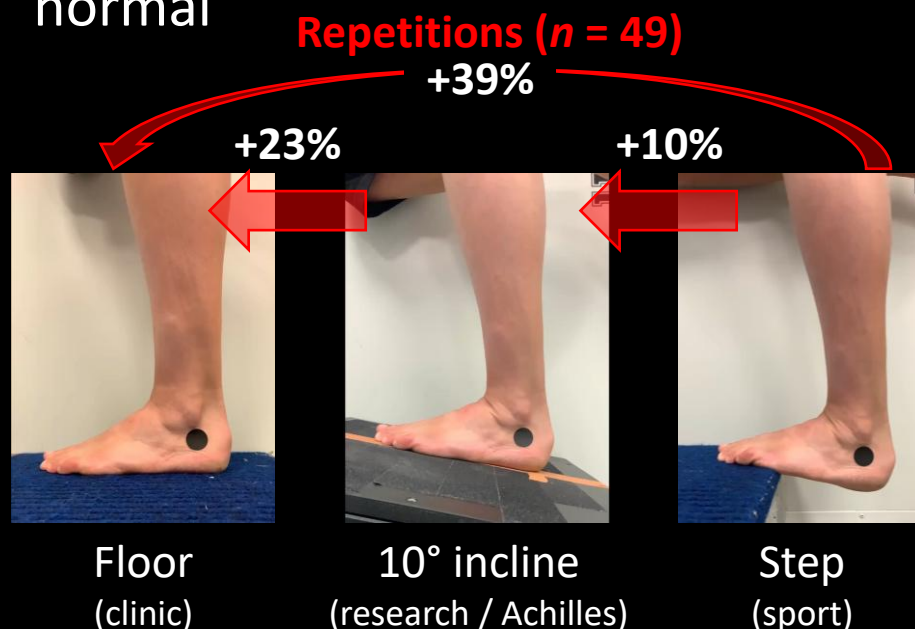
A FEW CONSIDERATIONS

Number of repetitions used in clinics as outcome

25 repetitions considered “normal”

❌ Age, sex, PA, BMI

❌ Foot position¹



¹Hebert-Losier et al. *Foot (Edin)*. 2024;17(60):102112



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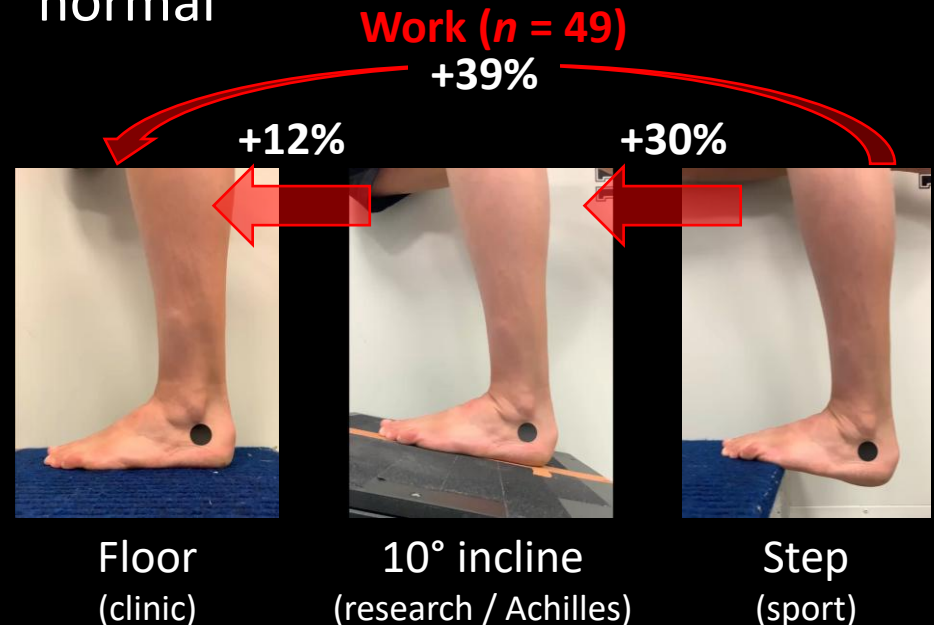


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Number of repetitions used in clinics as outcome

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Calf raise



A FEW CONSIDERATIONS

+23%

CLINIC



	Repetitions	
Age	Males	Females
20 y	47	38
30 y	41	34
40 y	36	31
50 y	30	28
60 y	25	25
70 y	18	21
80 y	12	18

* Using calf raise app
and lateral marker*

RESEARCH



	Repetitions ($n = 566$)	
Age	Males	Females
20 y	38	31
30 y	33	28
40 y	29	25
50 y	24	23
60 y	20	20
70 y	15	17
80 y	10	15

Work – 1200 to 2000 J
Height – 8 to 10 cm

* Depends on protocol
and population*

¹Hebert-Losier et al. *Physiotherapy*. 2017;103(4):446-52

²Hebert-Losier et al. *Foot (Edin)*. 2024;17(60):102112



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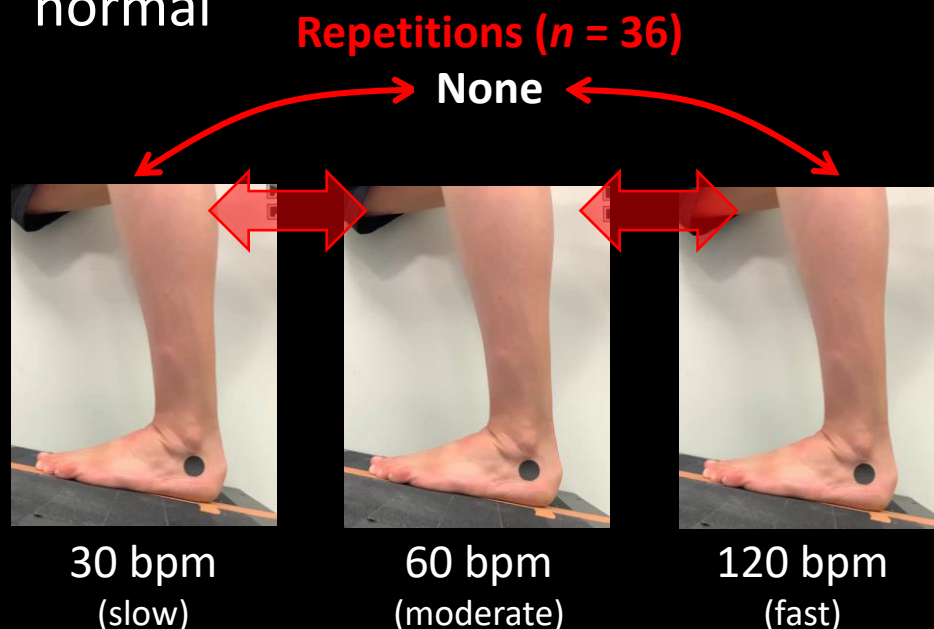


A FEW CONSIDERATIONS

Number of repetitions used in clinics as outcome

25 repetitions considered “normal”

- ❌ Age, sex, PA, BMI
- ❌ Foot position
- ❌ Cadence¹



¹Hebert-Losier et al. *J Appl Biomech.* 2025;41(2):179-88



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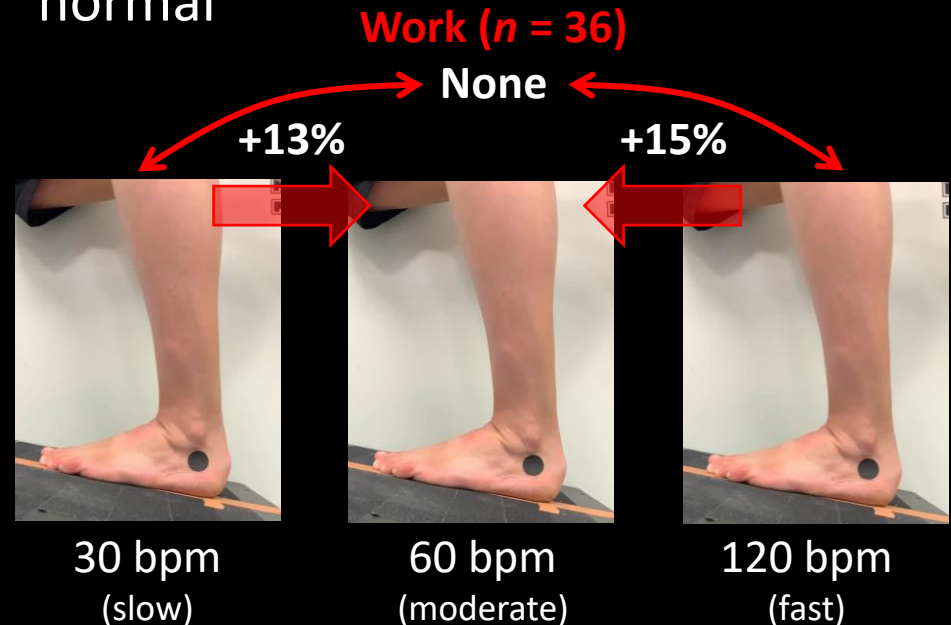


A FEW CONSIDERATIONS

Number of repetitions used in clinics as outcome

25 repetitions considered “normal”

- ❌ Age, sex, PA, BMI
- ❌ Foot position
- ❌ Cadence¹



¹Hebert-Losier et al. *J Appl Biomech.* 2025;41(2):179-188.



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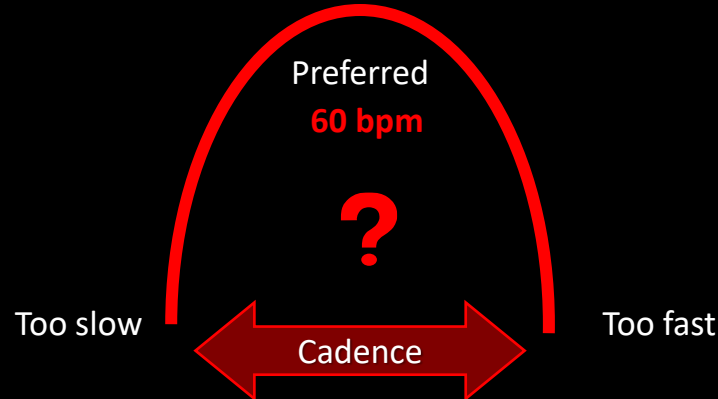
Calf raise



A FEW CONSIDERATIONS

 work at **60 bpm**

Recommended for now as seems to 'maximise' work outcome
U-curve suggests existence of a preferred movement velocity



¹Hebert-Losier et al. *J Appl Biomech.* 2025;41(2):179-188.



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Calf raise



A FEW CONSIDERATIONS



Achilles Tendon Thickness Tool

This tool estimates calf muscle strength-endurance during the heel rise test.

INSTRUCTIONS

To estimate normative values for calf muscle strength-endurance during the heel rise test, follow the instructions below.

How to use When to use Pearls / Pitfalls

About us

The normative values are based on data from a large international database.

Heel Rise Endurance Test Tool

Height (in cm):

Weight (in kg):

Your BMI:

Age (in years):

Sex:
☐ Male ☐ Female

PAL*:
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6

*** PAL key:**

1 = Hardly any physical activity

2 = Mostly sitting, sometimes walk, easy tasks/play

3 = Light physical activity for about 2-4 times a week (e.g., fishing, talking, dancing)

4 = Moderate exercise 1-2 hours a week (jogging, swimming, gymnastics)

5 = Moderate exercise at least 3 hours a week (jogging, swimming, gymnastics)

6 = Hard or very hard exercise regularly and several times a week during which the physical exercise is great (jogging, rugby, football)



Example of the Calf Raise Application.

A round sticker with a diameter of 2.5 cm is placed just below the distal tip of the lateral malleolus of the participant. The Calf Raise Application allows for tracking of this sticker. As the participant goes up, the heel with the adjusted sticker moves upwards and forwards in the screen.





Heel Rise Endurance Test Tool
(ONLINE)



Normative **Calf Raise App** values from
international database ($n = 500$)
(10° incline and 60 bpm)

* Height * * Age * * Mass * * Sex * * PA level *

¹Visser et al. *Braz J Phys Ther.* 2025;29(3):101188

Take home messages

CRT **foot position** and **cadence** matter (for most outcomes)

Outcomes **not generalisable** when parameters change

10° incline (or floor) and **60 bpm** recommended for testing (for now)

Select rehab and training **parameters** based on goals

HRET Online Tool provides norm values for Calf Raise App



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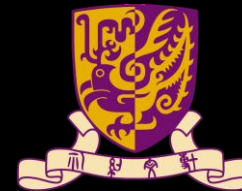


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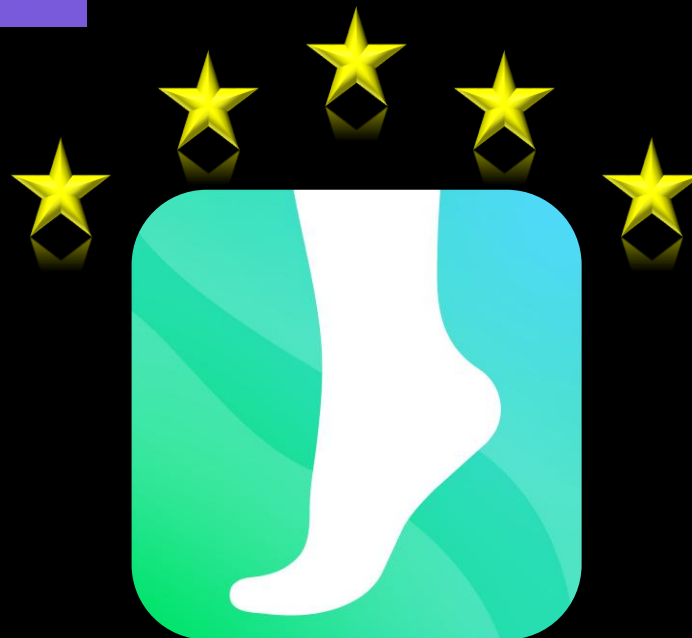




Thank you
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