Handcycling Classification

INFLUENCE OF TRUNK STRENGTH ON PERFORMANCE

VU VRIJE UNIVERSITEIT AMSTERDAM Faculty of Behavioural and Movement Sciences

Reade revalidatie | reumatologie

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The Research

Towards an Evidence-based Classification System in Handcycling
[2018-2022]

- Performance differences between sport classes
- Influence of trunk strength on performance

Project — **Classification** — Research — Results — Discussion

H1 **H2** **H3** **H4** **H5**

Impaired range of motion

Strength impairment

Limb deficiency

Coordination — Ataxia — Dystonia — Spasticity

H1	H2	H3	H4	H5
-- Trunk stability	-- Trunk stability	- Trunk stability	+Trunk stability	++ Trunk stability
-- Lower limb function	-- Lower limb function	- Lower limb function	+ Lower limb function	+ Lower limb function
-- Handgrip	-- Handgrip	++ Handgrip	++ Handgrip	++ Handgrip
-- Arm extension	- Arm extension	++ Arm extension	++ Arm extension	++ Arm extension
+ Arm flexion	+ Arm flexion	++ Arm flexion	++ Arm flexion	

Arm Strength

Grip Strength

Trunk Strength

Measures of Impairment

Manual Muscle Test: Trunk

Handheld Dynamometry (Microfet2)

Trunk Strength

Measures of Performance

20s Isokinetic sprint

Time Trial average velocity

Measures of Impairment

MMT Trunk

Scale-based test currently used during handcycling classification

Conducted according to Daniel and Worthingham's technique

0 Zero
1 Trace
2 Poor
3 Fair
4 Good
5 Normal

Measures of Impairment

Handheld Dynamometry

50° seating position.

Microfet2 placed on the sternum

Maximum voluntary contraction - flexion

4 trials – average force used as outcome (N)

Measures of Performance

20s Isokinetic sprint

Athlete's handbike

5' warm-up + 2' rest

20sec maximal sprint

Isokinetic – limited by cadence

- 100rpm (H1)
- 130rpm (H2-H4)

Cool-down

Time trials results

Emmen World Cup 2018

Maniago World Championship 2018

n= 35 handcycling athletes (27 men; 8 women)

Sport classes
- H1 (5)
- H2 (1)

Upper limb impairments

- H3 (17)
- H4 (12)

No upper limb impairments

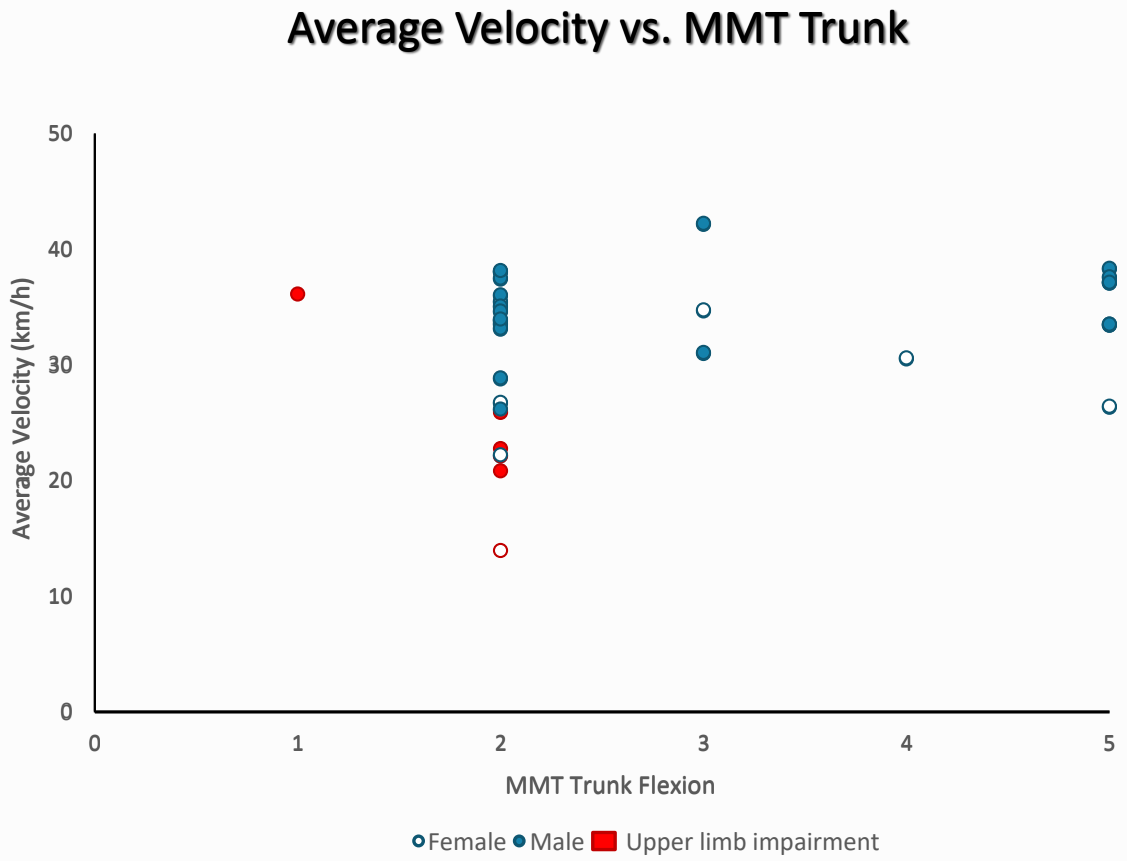
Time trial n = 32 (24 men; 8 women)
Sprint n = 24 (18 men; 6 women)

N=32 (6 UpL; 8 women)

rs= 0.24 (p=0.19)

N=26 (7 women)

rs= 0.14 (p=0.48)

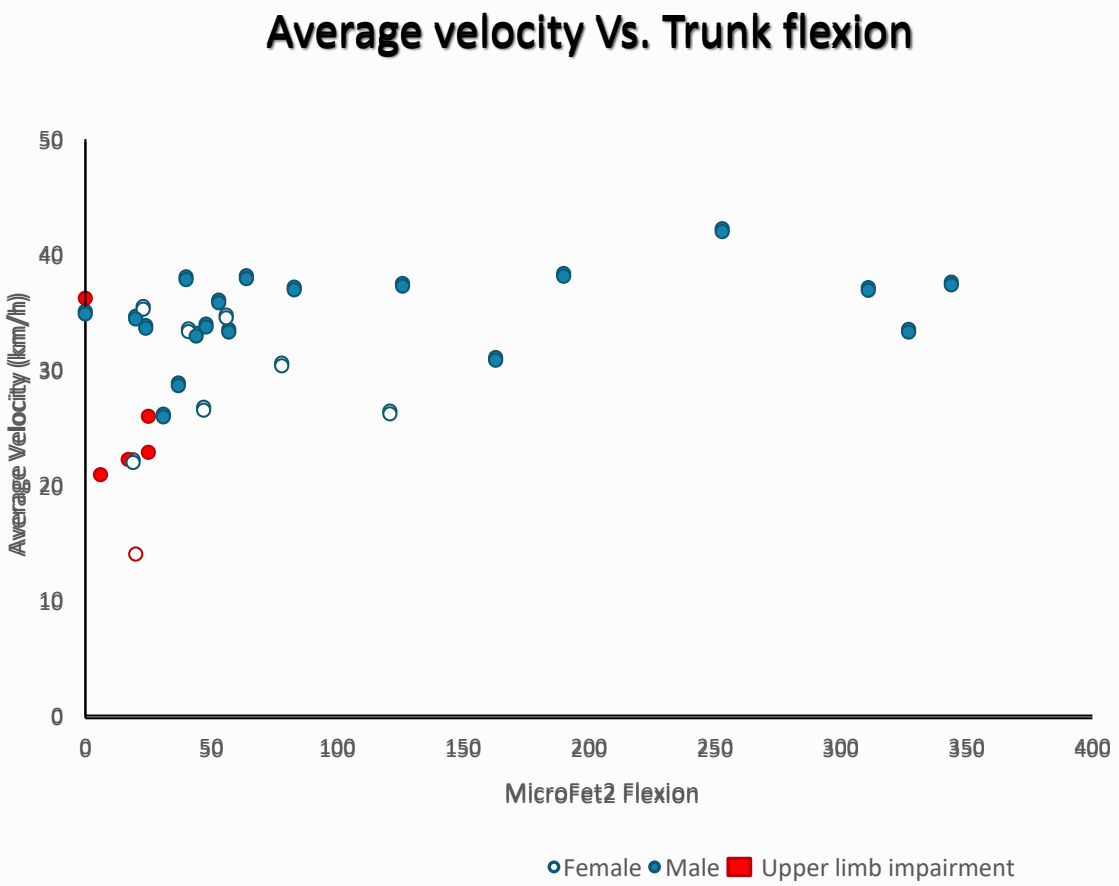


N=32 (6 UpL; 8 women)

r= 0.48 r^2=0.18 (p=0.005)

N=26 (7 women)

r=0.36 r^2=0.13 (p=0.07)



Handheld dynamometry (Microfet2)

+ Ratio scale

+ Discriminative

Not isometric

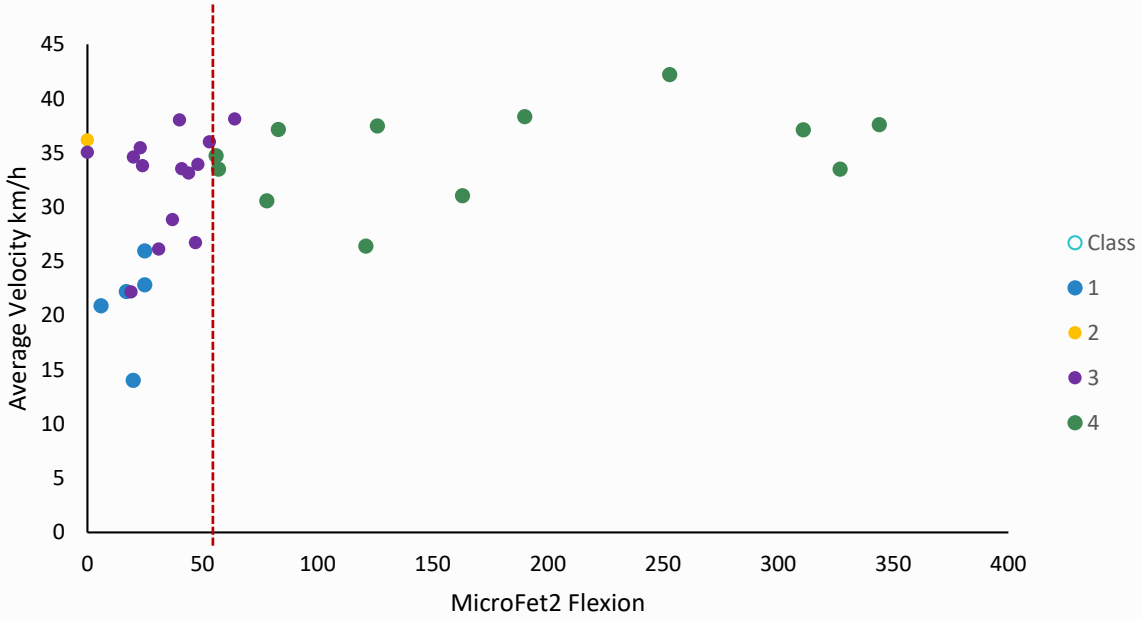
Dependent on the tester

Trunk flexion

Not a significant involvement of trunk strength during handcycling in a recumbent position

Reinforced by previous multilevel analysis showing small differences between H3 and H4

Trunk is an important factor during current class allocation → Handbike setup development through the years



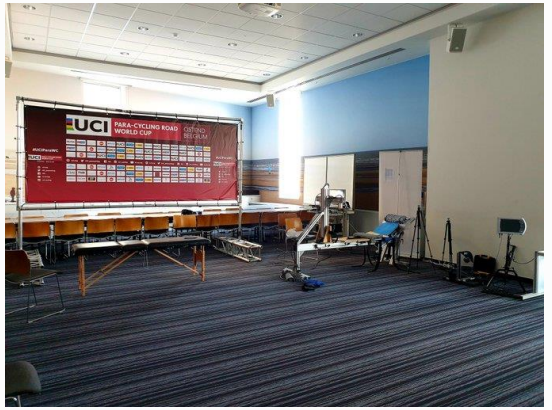
Upright position

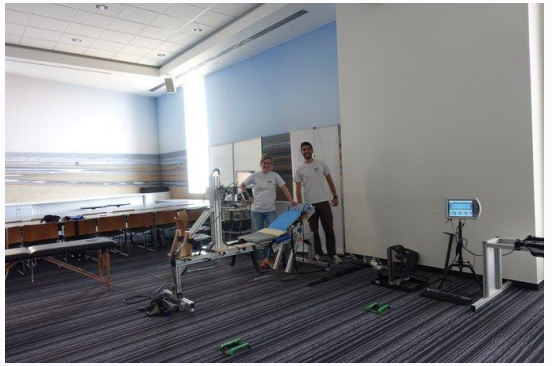
Laying down position

Need to investigate further the variability between and within classes

Research on how other different physical impairments affect performance

Trunk stability Lower limb strength Hand strength Taping/strapping





Thank you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