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The relation between performance measures in para-cycling classification research

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Para-cycling

Para-cycling

- Limb deficiency (amputations)
- Muscle strength impairments
- Range of motion impairments

Cycling performance

- Able-bodied: large knowledgebase
- Para-cycling:
  - Small samples
  - Sedentary or inactive population, or addresses rehabilitation Lai et al. 2017
  - Cycling → muscle strength, balance, fitness, gross motor function Armstrong et al. 2019
  - Elite para-cyclists different physiology from untrained individuals

Purpose:

To determine the association between the 20-second sprint test and time trial results in elite para-cyclists

– *Handcyclists*

– *Bicyclists*

20-second sprint tests

- Cyclus2, RBM Electronics
- Own bike
- 20 seconds – all out, from flying start - seated
- Peak power output (POpeak), mean power output (Pomean) Watt and Watt/kg

Time trial results

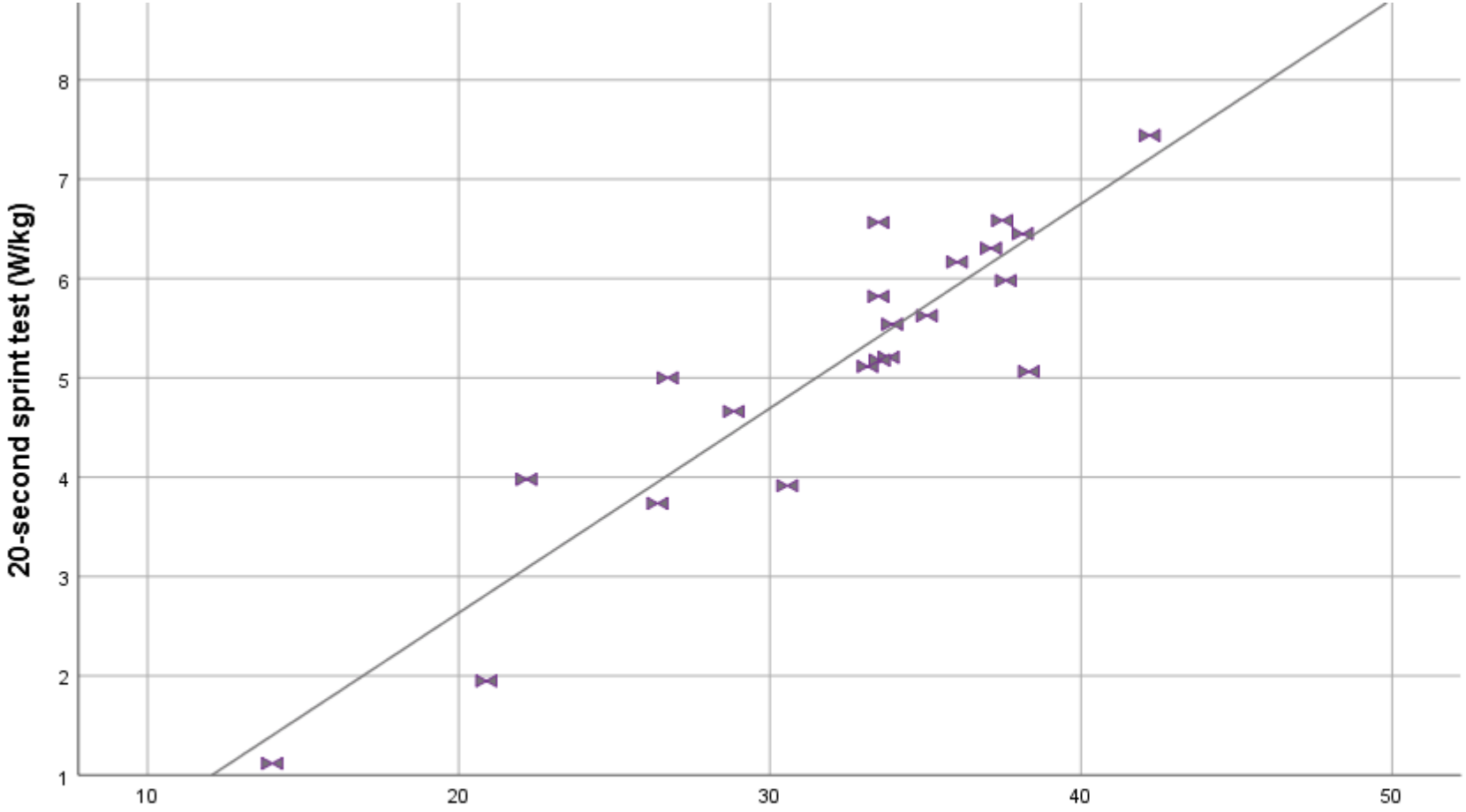
- Official UCI results from international competition were athletes performed 20-second sprint test
- Mean speed in km/h

WORLD CUP	.989	(2)	1:05.815	(2)	2:04.420	(1)	**2:58.691**	0.000	200
	50.838	(22)	1:05.606	(1)	2:07.137	(2)	**3:02.646**	+3.955	160
	48.896	(59)	1:06.483	(6)	2:08.877	(6)	**3:05.096**	+6.405	140
	51.063	(15)	1:07.847	(20)	2:08.377	(5)	**3:05.577**	+6.886	125
	51.985	(8)	1:06.789	(8)	2:09.615	(8)	**3:05.830**	+7.139	110
	50.748	(24)	1:07.171	(9)	2:07.896	(3)	**3:05.892**	+7.201	95
	51.798	(9)	1:07.717	(17)	2:08.996	(7)	**3:06.372**	+7.681	90
	53.087	(1)	1:06.257	(3)	2:10.390	(12)	**3:06.787**	+8.096	85
	49.484	(46)	1:07.308	(11)	2:10.419	(13)	**3:07.629**	+8.938	80

Descriptives

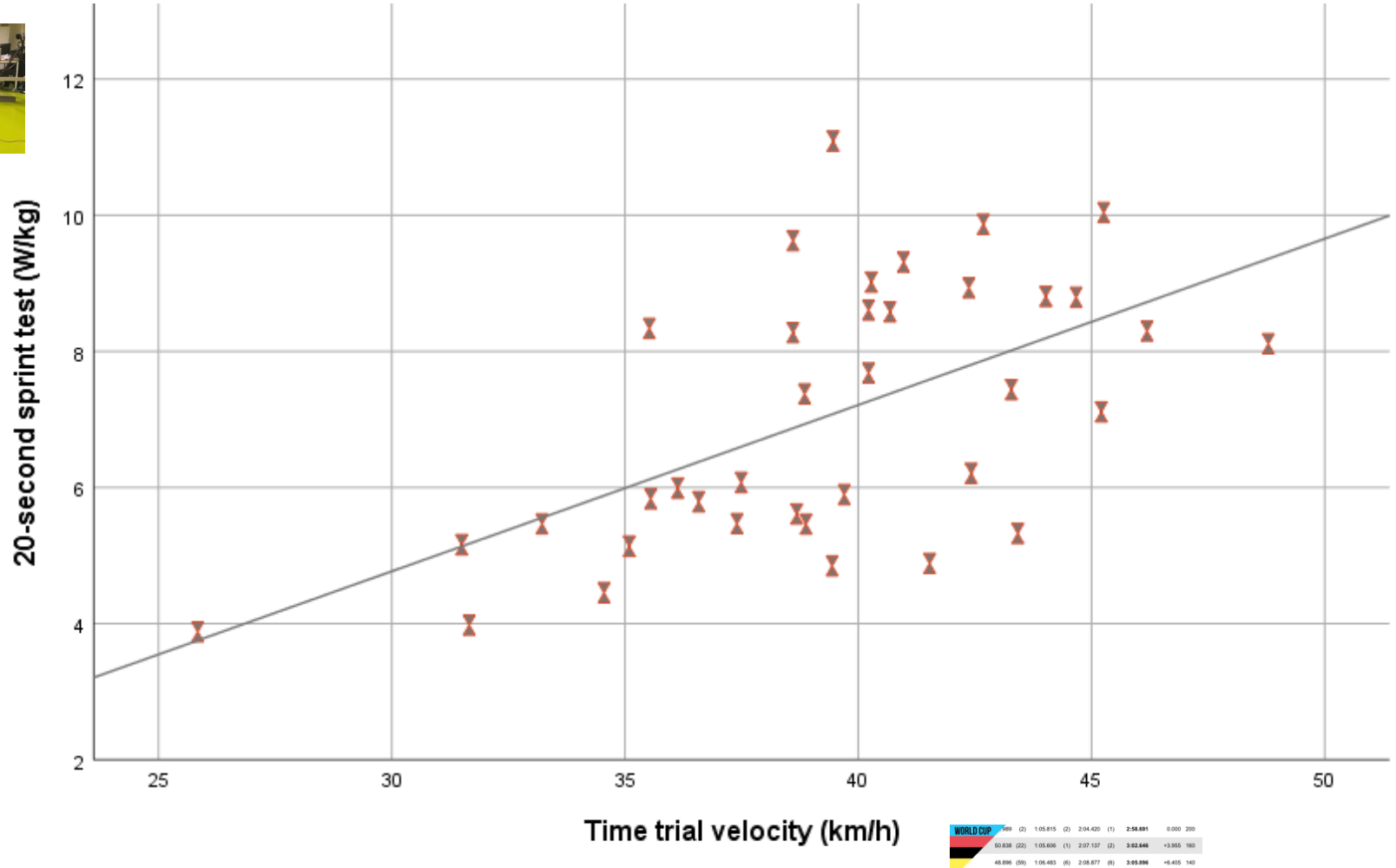
			Para- cyclists			
			Handcyclists n=21 (6 women)		Bicyclists n=37 (8 women)	
			Median	IQR	Median	IQR
20-second sprint test	POpeak	Watt	432	253	643	300
		Watt/kg	6.6	2.2	9.4	4.5
	POmean	Watt	349	203	459	219
		Watt/kg	5.2	1.9	7.1	3.2
Time trial speed		km/h	33.5	9.5	39.5	6.2

Results – handcyclists



Handcyclists:
ρ=0.81, p<0.01

Results – bicyclists



Bicyclists:
ρ=0.57, p<0.01

Discussion

→ *What is surprising? High or moderate correlation?*

- In able-bodied: sprint and endurance performance also moderate correlation Martin et al. 2007, Faria et al. 2005
- Arm vs leg
  - Handcyclists: previously found high correlations between sprint power and aerobic power Janssen et al. 1993
  - Time trial and aerodynamics
  - Other factors

What to use as a performance measure in classification research?

20-second sprint test:

Standardized, good indicator of biomechanical possibilities without being affected by factors that we do not want to include, such as aerobic capacity

Why not maximal exercise test?

Time trial results:

Available!!

But… weather, course, flat tires?

- Handcyclists

Strong relation

- Bicyclists

Moderate relation

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