The relation between performance measures in para-cycling classification research

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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
  - Cycling $\rightarrow$ muscle strength, balance, fitness, gross motor function
  - Elite para-cyclists different physiology from untrained individuals

Lai et al. 2017
Armstrong et al. 2019
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

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<th>Time</th>
<th>Time</th>
<th>Time</th>
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# Descriptives

<table>
<thead>
<tr>
<th></th>
<th>Para-cyclists</th>
<th>Handcyclists n=21 (6 women)</th>
<th>Bicyclists n=37 (8 women)</th>
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<tbody>
<tr>
<td><strong>20-second sprint test</strong></td>
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<tr>
<td>POpeak Watt</td>
<td>432</td>
<td>253</td>
<td>643</td>
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<td>POpeak Watt/kg</td>
<td>6.6</td>
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<td>POmean Watt</td>
<td>349</td>
<td>203</td>
<td>459</td>
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<td>POmean Watt/kg</td>
<td>5.2</td>
<td>1.9</td>
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<td><strong>Time trial speed</strong></td>
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<td>km/h</td>
<td>33.5</td>
<td>9.5</td>
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</table>
Results – handcyclists

Handcyclists: $\rho=0.81, p<0.01$
Results – bicyclists

Bicyclists: $\rho=0.57$, $p<0.01$
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
  o Handcyclists: previously found high correlations between sprint power and aerobic power. Janssen et al. 1993
  o Time trial and aerodynamics
  o 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