The relationship between isometric and dynamic leg strength in elite para-cyclists and its use in para-cycling classification

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Para-cycling

- In need of an evidence-based classification system
  Tweedy, S.M., & Vanlandewijck, Y.C. (2009)

- Current system

- Ratio-scaled, reliable and training-resistant

- Isometric muscle strength tests
C-class

- Classes C1-C5, where C1 consists of the athletes with the greatest impairments
- Mixed impairments within classes
Research question

- Assess the relationship between isometric and dynamic leg strength tests
- Is the dynamic test a potential test for classification?
Data collection

- Para-cycling Road World Cup in Emmen, July 2018
- Para-cycling Road World Championship in Maniago, August 2018

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Muscle strength and/or ROM impairment</th>
<th>Limb deficiency</th>
<th>Average training hours/week</th>
<th>Years competing internationally</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>29</td>
<td>19</td>
<td>10</td>
<td>16</td>
<td>3</td>
</tr>
<tr>
<td>Female</td>
<td>8</td>
<td>7</td>
<td>1</td>
<td>15</td>
<td>2</td>
</tr>
</tbody>
</table>
Customized isometric force measurement system

Bjerkefors et al (2019)
- 3 seconds maximal effort
- 2 trials each leg → best try for each leg added together
- Newton, not corrected for weight
- Starting resistance 100 N
- 2-5 trials each leg → best try for each leg added together
- Watt/kg, corrected for weight
Results – isometric vs dynamic push

\[ \rho = .67 \quad (p < .001) \]
Results – isometric vs dynamic pull

\[ \rho = 0.50 \ (p < 0.01) \]
Discussion

- Different results between pushing and pulling
  - Ankle dorsiflexion
- Athlete’s weight correction
The dynamic test in classification

- Pros
  - Easy
  - Less equipment
  - Instant results
  - Sport-specific
  - Training-resistant
  - Ratio-scaled
  - Correlates to the isometric test

- Cons
  - Logistics
  - Upper body
Thank you for your attention!

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