Reliability and Validity of a Wheelchair Rugby Skills Test

Thomas Janssen, Sonja de Groot, Boudine van der Pols, Anick Spiekermann, Susan Silverman, Scott Bickel, Laurie Malone

Center for Adapted Sports Amsterdam | Reade
Amsterdam Rehabilitation Research Center | Reade
MOVE Research Institute Amsterdam, VU University Amsterdam
Centre for Human Movement Sciences, UMCG, University of Groningen
Lakeshore Foundation, Department of Research, Birmingham, Alabama, USA
University of Alabama at Birmingham, Dept of Physical Therapy, Birmingham, USA
Classification in wheelchair rugby.
Every team can have 4 athletes with a maximum point value on court of 8 points.
The highest eligible sport class for wheelchair rugby is 3.5.
The athlete sport class can be seen from: Role on court (offensive or defensive)
-Posture (H) -Pushing (P) -Braking (B) -Ball activities (A) -Equipment (E)

Besides a point value for their arms, athletes also get a point value for their trunk and legs. The minimum point value is 0 (no active trunk or leg function) and the maximum value is 1.5 (good to normal trunk and leg function). The value for trunk and legs is added to the average value for both arms for the entrance sport class. An athlete in the 3.5 class can have a combination of arm, trunk and leg function.

IWRF
International Wheelchair Rugby Federation
For more information visit:
www.iwrf.com
Training Elite Players

- Tactical skills
  - Club team, national team
- Wheelchair skills
  - Pushing drills
  - Slalom
  - Circuit
- Ball handling
- Strength training
- > 4 */wk
Skills Testing

- Essential for
  - Evaluation progression/status players
  - Individualize training program
  - Motivation
- Tests developed based on other sports (e.g., basketball): not specific
- Orr & Malone (Lakeshore Foundation, USA): developed new specific test
- Pilot study Malone (2009): correlation with classification, suggesting validity
- However: classification stable, but performance changes with training
- Reliability unknown
Purpose Study

- **Test Reliability**: reproducibility
- **Test Validity**:
  - Relation test result with specific muscle strength (dependent on lesion level/disorder AND training)
Methods

N=18 wheelchair basketball players
- N=8 Neth (Reade, Amsterdam)
- N=10 USA (Lakeshore, Alabama)
## Dutch Participants

<table>
<thead>
<tr>
<th>Participant</th>
<th>Age (yrs)</th>
<th>Injury Level, completeness</th>
<th>Time since Injury (yrs)</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>47</td>
<td>C5/6, C</td>
<td>20</td>
<td>0.5</td>
</tr>
<tr>
<td>2</td>
<td>35</td>
<td>C5/6, C</td>
<td>17</td>
<td>0.5</td>
</tr>
<tr>
<td>3</td>
<td>40</td>
<td>C6, C</td>
<td>21</td>
<td>0.5</td>
</tr>
<tr>
<td>4</td>
<td>23</td>
<td>C6, IC</td>
<td>6</td>
<td>1.0</td>
</tr>
<tr>
<td>5</td>
<td>43</td>
<td>C5/6, IC</td>
<td>23</td>
<td>1.0</td>
</tr>
<tr>
<td>6</td>
<td>39</td>
<td>C7, C</td>
<td>13</td>
<td>2.5</td>
</tr>
<tr>
<td>7</td>
<td>37</td>
<td>C6/7, C</td>
<td>22</td>
<td>2.5</td>
</tr>
<tr>
<td>8</td>
<td>28</td>
<td>C8, C</td>
<td>3</td>
<td>3.0</td>
</tr>
<tr>
<td>Mean</td>
<td>36.5</td>
<td></td>
<td>15.6</td>
<td></td>
</tr>
</tbody>
</table>
Wheelchair Rugby Skills Test (1)

- 5 tests in own rugby wheelchair, twice within 2 weeks
  - Passing test
  - 20m sprint
  - Endurance sprint
  - Forward/backward sprints “suicide”
  - Slalom with/without ball
Wheelchair Rugby Skills Test (2)

- 20-m sprint, standing start, 3 attempts
- Endurance sprint around basketball court, clockwise & counterclockwise, 3 X
- Ups and Backs, “suicide”
Wheelchair Rugby Skills Test (3)

- Slalom
  - Without ball
  - With ball (dribble every 10s)
  - Penalty seconds
Specific Strength

- Isokinetic dynamometer (Biodex)
- Closed chain attachment
- Pushing-Pulling, 0.22 m/s
- 2 sets, 3 reps
- Left-Right
- Max. torque (avg)
### Results: Reliability

<table>
<thead>
<tr>
<th>Item Test</th>
<th>ICC</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passing Skill</td>
<td>0.781</td>
<td>0.011</td>
</tr>
<tr>
<td>20-m Sprint</td>
<td>0.997</td>
<td>0.000</td>
</tr>
<tr>
<td>Endurance Sprint clockwise</td>
<td>0.992</td>
<td>0.000</td>
</tr>
<tr>
<td>Endurance Sprint counterclockwise</td>
<td>0.990</td>
<td>0.000</td>
</tr>
<tr>
<td>Ups and Backs</td>
<td>0.903</td>
<td>0.001</td>
</tr>
<tr>
<td>Slalom without ball</td>
<td>0.962</td>
<td>0.000</td>
</tr>
<tr>
<td>Slalom with ball</td>
<td>0.968</td>
<td>0.000</td>
</tr>
</tbody>
</table>

- Passing Skill: total points
- Ups and Backs: 1 trial
- Sprint tests (20m, endurance): average of 3 trials
- NB: ICC’s of peak scores were similar
Results: Validity

- Spearman correlations between skills test items and muscle strength (averaged peak torques pushing-pulling, left-right)

<table>
<thead>
<tr>
<th>Item Test</th>
<th>Spearman’s rho</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passing Skill</td>
<td>0.319</td>
<td>0.538</td>
</tr>
<tr>
<td>20-m Sprint</td>
<td>-0.943</td>
<td>0.005</td>
</tr>
<tr>
<td>Endurance Sprint clockwise</td>
<td>-0.943</td>
<td>0.005</td>
</tr>
<tr>
<td>Endurance Sprint counterclockwise</td>
<td>-0.943</td>
<td>0.005</td>
</tr>
<tr>
<td>Ups and Backs</td>
<td>-0.771</td>
<td>0.072</td>
</tr>
<tr>
<td>Slalom without ball</td>
<td>-0.943</td>
<td>0.005</td>
</tr>
<tr>
<td>Slalom with ball</td>
<td>-0.943</td>
<td>0.005</td>
</tr>
</tbody>
</table>

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- Ups and Backs: 1 trial
- Sprint tests (20m, endurance): average of 3 trials
Discussion - Conclusion

- Small subject group, results preliminary, USA-data necessary, maybe more
- Wheelchair rugby skills tests are reliable, except for ‘passing’, and can be used to monitor wheelchair rugby players.
- Because passing is an important aspect of wheelchair rugby, taking this test is recommended, but interpreting test scores should be done carefully.
- Muscle strength is important for short and longer propulsion tasks and should be optimized
- Reference values necessary, for each class/point
- Testing on a regular basis is essential: we currently test the Dutch team 3 times/yr
The only full contact wheelchair sport in the world.