Reliability of a Test Battery for Evidence-Based Classification in Cerebral Palsy Football

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Introduction

EVIDENCE-BASED CLASSIFICATION IN CP-FOOTBALL

Qualitative descriptions → Individual interpretations
(Bicici, Tweedy & Vanlandewijck, 2012)

IMPAIRMENT
Ataxia
Hypertonia
Athetosis

FT5  FT6  FT7

FT8
Introduction

- Running – Agility - Coordination
- Trapping - Balance
- Jumping - Heading
- Goalkeeping
- Dribling - Tackling
- Passing & Kicking

Reliability
Between-groups differences
Methods: Participants

53 to 129 Football Players with hyperthonia, ataxia or athetosis (CPFP)

- Age: 26.27 ± 7.09 yr
- Height: 175.57 ± 7.08 cm
- Weight: 70.08 ± 9.01 kg
- Experience: 11.42 ± 7.08 yr

12 to 36 Non-Impaired Football Players (NIFP)

- Age: 19.44 ± 3.29 yr
- Height: 178.03 ± 5.86 cm
- Weight: 72.59 ± 7.81 kg
- Experience: 9.85 ± 5.17 yr

2013 CPISRA INTERCONTINENTAL CUP

COORDINATION (N=6)

- SPRINT (N=2)
- AGILITY (N=4)
- POWER (N=5)
- BALANCE (N=6)
Methods: Test Battery

COORDINATION TEST

SPLIT JUMPⁱ

RUNNING IN PLACEⁱ

HEEL-TOE PLACEMENT²

Methods: Test Battery

COORDINATION TEST

SIDE STEPPING

HEXAGON $^2$

10M SKIP $^1$

Methods: Test Battery

SPRINT TEST

40M
40M WITH BALL

STOP & GO
STOP & GO WITH BALL

Methods: Test Battery

**AGILITY TEST**

1. **MAT**

2. **ILLINOIS**

3. **ILLINOIS WITH BALL**

4. **TURNING & DRIBBLING**

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Methods: Test Battery

POWER TEST

COUNTER MOVEMENT JUMP (CMJ) ²

STANDING BROAD JUMP (SBJ) ¹

Methods: Test Battery

POWER TEST

4 BOUNDS $^1$

TRIPLE HOP (R ; L) $^2$

DYNAMOMETRY (FORCE PEAK) $^3$

Methods: Test Battery

**TANDEM WALK**
(10st; 5m)

**ONE LEG STANCE**
(OLS)

**SIDE – STEP (R; L)**

Methods: Data Analysis

Reliability measures

- SEM: Standard Error Measurement
- ICC: Intra-Class Correlation

Between-groups differences

- One way ANOVA
- Both groups comparison

\[ \% \Delta = \frac{\text{CPFP} - \text{NIFP}}{\text{NIFP}} \times 100 \]

Weir, (2005)
Hopkins, (2000)
### Results: Coordination test

Table 1. Reliability and between-groups differences for coordination test

<table>
<thead>
<tr>
<th>TEST</th>
<th>GROUP</th>
<th>N</th>
<th>SEM</th>
<th>ICC</th>
<th>P - valor</th>
<th>%Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEEL-TOE (R – L)</td>
<td>CPFP</td>
<td>129*</td>
<td>11.8 – 8.2</td>
<td>0.86 – 0.92</td>
<td>&lt; .001</td>
<td>56.26 – 53.14</td>
</tr>
<tr>
<td></td>
<td>NIFP</td>
<td>37</td>
<td>5.6 – 8.9</td>
<td>0.9 – 0.82</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>SPLIT JUMP</td>
<td>CPFP</td>
<td>108</td>
<td>10.4</td>
<td>0.88</td>
<td>&lt; .001</td>
<td>71.17</td>
</tr>
<tr>
<td></td>
<td>NIFP</td>
<td>36</td>
<td>4.4</td>
<td>0.92</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>RUNNING IN PLACE</td>
<td>CPFP</td>
<td>102</td>
<td>7.3</td>
<td>0.84</td>
<td>&lt; .001</td>
<td>17.36</td>
</tr>
<tr>
<td></td>
<td>NIFP</td>
<td>33</td>
<td>6.9</td>
<td>0.71</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>SIDE STEPPING</td>
<td>CPFP</td>
<td>112</td>
<td>9.1</td>
<td>0.89</td>
<td>&lt; .001</td>
<td>50.88</td>
</tr>
<tr>
<td></td>
<td>NIFP</td>
<td>35</td>
<td>5.6</td>
<td>0.87</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>HEXAGON</td>
<td>CPFP</td>
<td>122</td>
<td>10.9</td>
<td>0.89</td>
<td>&lt; .001</td>
<td>59.40</td>
</tr>
<tr>
<td></td>
<td>NIFP</td>
<td>36</td>
<td>7.4</td>
<td>0.78</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>SKIP 10M</td>
<td>CPFP</td>
<td>71</td>
<td>11.4</td>
<td>0.82</td>
<td>&lt; .005</td>
<td>19.62</td>
</tr>
<tr>
<td></td>
<td>NIFP</td>
<td>21</td>
<td>7.7</td>
<td>0.89</td>
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</table>
## Results: Sprint test

Table 2. Reliability and between-groups differences for sprint test

<table>
<thead>
<tr>
<th>TEST</th>
<th>GROUP</th>
<th>N</th>
<th>SEM</th>
<th>ICC</th>
<th>P - valor</th>
<th>%Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td>40m</td>
<td>CPFP</td>
<td>71</td>
<td>3.9</td>
<td>0.85</td>
<td>&lt; .001</td>
<td>12.74</td>
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<tr>
<td></td>
<td>NIFP</td>
<td>15</td>
<td>1.4</td>
<td>0.94</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40m_BALL</td>
<td>CPFP</td>
<td>63</td>
<td>6.5</td>
<td>0.73</td>
<td>&lt; .001</td>
<td>22.75</td>
</tr>
<tr>
<td></td>
<td>NIFP</td>
<td>14</td>
<td>3.4</td>
<td>0.78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SG</td>
<td>CPFP</td>
<td>83</td>
<td>6.2</td>
<td>0.53</td>
<td>.001</td>
<td>4.82</td>
</tr>
<tr>
<td></td>
<td>NIFP</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SG_BALL</td>
<td>CPFP</td>
<td>78</td>
<td>9.8</td>
<td>0.48</td>
<td>&lt; .001</td>
<td>20.32</td>
</tr>
<tr>
<td></td>
<td>NIFP</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
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</tr>
</tbody>
</table>
## Results: Agility test

### Table 3. Reliability and between-groups differences for agility test

<table>
<thead>
<tr>
<th>TEST</th>
<th>GROUP</th>
<th>N</th>
<th>SEM</th>
<th>ICC</th>
<th>P - valor</th>
<th>%Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT</td>
<td>CPFP</td>
<td>88</td>
<td>5.8</td>
<td>0.82</td>
<td>&lt; .001</td>
<td>31.72</td>
</tr>
<tr>
<td></td>
<td>NIFP</td>
<td>35</td>
<td>3</td>
<td>0.76</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>ILLINOIS WITH BALL</td>
<td>CPFP</td>
<td>83</td>
<td>6.3</td>
<td>0.84</td>
<td>&lt; .001</td>
<td>23.80</td>
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<tr>
<td></td>
<td>NIFP</td>
<td>24</td>
<td>3.7</td>
<td>0.28</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>TURNING &amp; DRIBBLING</td>
<td>CPFP</td>
<td>76</td>
<td>10</td>
<td>0.57</td>
<td>&lt; .001</td>
<td>20.24</td>
</tr>
<tr>
<td></td>
<td>NIFP</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
## Results: Power test

Table 4. Reliability and between-groups differences for power test

<table>
<thead>
<tr>
<th>TEST</th>
<th>GROUP</th>
<th>N</th>
<th>SEM</th>
<th>ICC</th>
<th>P value</th>
<th>%Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBJ</td>
<td>CPFP</td>
<td>113</td>
<td>5.4</td>
<td>0.93</td>
<td>&lt; .001</td>
<td>29.23</td>
</tr>
<tr>
<td></td>
<td>NIFP</td>
<td>36</td>
<td>3.2</td>
<td>0.78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CMJ (h)</td>
<td>CPFP</td>
<td>107</td>
<td>9.2</td>
<td>0.88</td>
<td>&lt; .001</td>
<td>32.43</td>
</tr>
<tr>
<td></td>
<td>NIFP</td>
<td>10</td>
<td>10.4</td>
<td>0.81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 BOUNDS</td>
<td>CPFP</td>
<td>85</td>
<td>3.8</td>
<td>0.96</td>
<td>&lt; .001</td>
<td>32.10</td>
</tr>
<tr>
<td></td>
<td>NIFP</td>
<td>35</td>
<td>2.9</td>
<td>0.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRIPLE HOP (R – L)</td>
<td>CPFP</td>
<td>82*</td>
<td>6.8 - 6.7</td>
<td>0.97 - 0.97</td>
<td>&lt; .001</td>
<td>40.81 - 34.84</td>
</tr>
<tr>
<td></td>
<td>NIFP</td>
<td>34</td>
<td>3.8 - 3.7</td>
<td>0.82 - 0.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FORCE PEAK (R – L)</td>
<td>CPFP</td>
<td>114*</td>
<td>11.9 - 11.3</td>
<td>0.84 - 0.87</td>
<td>&gt; .05</td>
<td>11.36 - 12.36</td>
</tr>
<tr>
<td></td>
<td>NIFP</td>
<td>34</td>
<td>14.5 - 15</td>
<td>0.86 - 0.86</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Results: Balance Test

Table 5. Reliability and between-groups differences for balance test

<table>
<thead>
<tr>
<th>TEST</th>
<th>GROUP</th>
<th>N</th>
<th>SEM</th>
<th>ICC</th>
<th>( P ) value</th>
<th>%( \Delta )</th>
</tr>
</thead>
<tbody>
<tr>
<td>TANDEM WALK 10st</td>
<td>CPFP</td>
<td>122</td>
<td>16.7</td>
<td>0.85</td>
<td>&lt; .001</td>
<td>123</td>
</tr>
<tr>
<td></td>
<td>NIFP</td>
<td>35</td>
<td>3.9</td>
<td>0.94</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TANDEM WALK 5m</td>
<td>CPFP</td>
<td>124</td>
<td>10.5</td>
<td>0.95</td>
<td>&lt; .001</td>
<td>115.9</td>
</tr>
<tr>
<td></td>
<td>NIFP</td>
<td>33</td>
<td>7.4</td>
<td>0.81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIDE-STEP (R – L)</td>
<td>CPFP</td>
<td>86*</td>
<td>4.3 - 4.4</td>
<td>0.91 - 0.92</td>
<td>&lt; .001</td>
<td>32.96 – 31.9</td>
</tr>
<tr>
<td></td>
<td>NIFP</td>
<td>25</td>
<td>2.9 - 2.8</td>
<td>0.85 - 0.88</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>OLS (BVE) (R – L)</td>
<td>CPFP</td>
<td>129</td>
<td>39.2 - 38.9</td>
<td>0.84 - 0.80</td>
<td>≤ .001</td>
<td>88.9 - 100</td>
</tr>
<tr>
<td></td>
<td>NIFP</td>
<td>23*</td>
<td>16.5 - 14.1</td>
<td>0.79 – 0.97</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Conclusions

Running in Place

Side - Step

4 Bounds

SEM

C

B

A

P

40m Sprint

Illinois
Conclusions

Tandem Walk (5m)

Heel – Toe

ICC

C

B

P

A

S

40m Sprint

Illinois
Conclusions

- Tandem Walk (10st) 123%
- Split jump 71%
- 40m Sprint with ball
- Mat

Tasks:

- Tandem Walk (10st) 123%
- Split jump 71%
- 40m Sprint with ball
- Mat
The higher differences showed between groups in coordination and balance test allow us to remark the importance of this ability for these population.

PROPOSED BATTERY TEST COULD HELP IN EVIDENCE-BASED CLASSIFICATION IN CP FOOTBALL
Reliability of a Test Battery for Evidence-Based Classification in Cerebral Palsy Football

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