Clinical assessment of selective motor control in children aged 5 - 7 years with cerebral palsy

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Background
- Selective Motor Control (SMC) is ‘the ability to move an individual joint, independently from posture and other joints in the same limb’.
- Children with CP have been reported to have loss of SMC.
- SMC is considered to be a predictor for functional activities.
- For clinical assessment of SMC, in particular in young children with CP, information is scarce.
- Two SMC tests have been identified in literature: Boyd & Graham1 and Trost2.
- Reliability of both SMC tests have not been reported.

Aim
To explore the inter-tester reliability of two instruments for clinical assessment of Selective Motor Control (SMC) in children aged 5 - 7 years with Cerebral Palsy (CP).

Methods
- 22 children (mean age 6.5 years [SD 1.0]; 14 male) with spastic CP (14 unilateral, 8 bilateral, severity across all GMFCS levels) were assessed with both instruments.
- Clinical assessment of SMC: a five points scale for muscle activation in ankle dorsiflexion by Boyd & Graham (Fig 1 and 3) and a three points scale for joint movement by Trost. To our knowledge, the latter does not have a published protocol, so we modified the scale (Fig 2) and developed a protocol for ankle dorsiflexion (Fig 3), and also for knee movements (Fig 4) and hip movements.
- Each child was assessed with both instruments by two independent testers with a time interval of 1 hour. Weighted Cohen’s Kappas were calculated per joint.

Results
- For ankle dorsiflexion left and right, weighted Kappas were 0.61 and 0.72 (‘Boyd & Graham’ scale, Table 1) and 0.65 and 0.89 (modified ‘Trost’ scale, Table 2).
- For knee and hip movements (modified ‘Trost’ scale only), weighted Kappas ranged from 0.65 to 0.89 (Table 2).

Table 1. Inter-tester reliability ‘Boyd & Graham’

<table>
<thead>
<tr>
<th>Test</th>
<th>Right Weighted Kappa</th>
<th>Left Weighted Kappa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ankle dorsiflex</td>
<td>0.72</td>
<td>0.61</td>
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</tbody>
</table>

Table 2. Inter-tester reliability modified ‘Trost’

<table>
<thead>
<tr>
<th>Test</th>
<th>Right Weighted Kappa</th>
<th>Left Weighted Kappa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ankle dorsiflex</td>
<td>0.89</td>
<td>0.65</td>
</tr>
<tr>
<td>Knee extension</td>
<td>0.71</td>
<td>0.79</td>
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<tr>
<td>Hip flexion</td>
<td>0.88</td>
<td>0.84</td>
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<tr>
<td>Hip abduction</td>
<td>0.80</td>
<td>0.76</td>
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</tbody>
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Conclusion
This study shows that selective motor control can reliably be assessed in children aged 5 - 7 years with CP:
- for ankle dorsiflexion with substantial agreement with the ‘Boyd & Graham’ scale (muscle activation)
- for ankle, knee and hip movements with substantial to almost perfect agreement with the modified ‘Trost’ scale (joint movement)

References