Predictors Of Proficient Power Mobility In Young Children With Severe Motor Impairments

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Disclaimers

• This work was completed in partial fulfillment of my Doctor of Science degree in Rehabilitation Science from The University of Oklahoma Health Sciences Center.

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Background

- Proficiency might be associated with:
  - **age** (Furumasu, Guerette, & Tefft, 1996)
  - **cognition** (Furumasu, Guerette, & Tefft, 2004; Tefft, Guerette, & Furumasu, 1999)
  - **amount of practice** (Bottos et al., 2001; Nilsson, 2010)
  - **practice with a professional** (Nilsson, 2010)
  - Lack of consensus regarding proficiency
Purpose

1) Determine if one or more factors are associated with or predict proficient power mobility in young children with severe motor impairments, aged 14-30 months

2) Determine if performance on the Wheelchair Skills Checklist (WSC; Butler et al., 1984) is associated with performance on the Powered Mobility Program (PMP; Furumazu et al., 1996)
Intervention and Task Parameters

Proficient Power Mobility

Cognition

Amount of practice

Wheelchair control mechanism

Practice with professional

Motor Skills

Mobility

Diagnosis

Maternal Education Level

Age

Environmental Factor

Child Factors

Outcome

Intervention and Task Parameters
## Participants

<table>
<thead>
<tr>
<th></th>
<th>RCT 1 (Jones et al., 2012)</th>
<th>RCT 2 (Jones et al., 2013)</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants, n</td>
<td>11</td>
<td>20</td>
<td>31</td>
</tr>
<tr>
<td>Proficient, n</td>
<td>4</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>Mean age in months</td>
<td><strong>22.2 (5.7)</strong></td>
<td><strong>22.6 (4.8)</strong></td>
<td><strong>22.4 (5.1)</strong></td>
</tr>
<tr>
<td>(SD); min-max</td>
<td>14.3–30.3</td>
<td>15.3–31.2</td>
<td>14.3–31.2</td>
</tr>
</tbody>
</table>
### Participants

<table>
<thead>
<tr>
<th></th>
<th>RCT 1</th>
<th>RCT 2</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diagnosis, n</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involving brain</td>
<td>7</td>
<td>14</td>
<td>21</td>
</tr>
<tr>
<td>Not involving brain</td>
<td>4</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td><strong>Wheelchair control, n</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joystick</td>
<td>7</td>
<td>17</td>
<td>24</td>
</tr>
<tr>
<td>Non-proportional</td>
<td>4</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td><strong>Baseline cognition AE; mean (SD)</strong></td>
<td>10.9 (4.32)</td>
<td>11.6 (2.93)</td>
<td>11.4 (3.43)</td>
</tr>
<tr>
<td><strong>Baseline gross motor AE; mean (SD)</strong></td>
<td>4.5 (1.75)</td>
<td>4.9 (2.01)</td>
<td>4.8 (1.90)</td>
</tr>
</tbody>
</table>
Intervention

• Power wheelchairs provided x 12 months

• RCT 1 (Jones et al., 2012)
  • Parent-supervised practice

• RCT 2 (Jones et al., 2013)
  • Addition of researcher-directed practice
    • Frequency 3x/week → 1x/month
    • Structured and unstructured practice
Data Analysis

- Proficiency = 7 skills on WSC
- a priori $\alpha$-level = 0.10

- Associations: Bivariate analysis
- Predictors: Multivariate logistic regression
- WSC and PMP Agreement: Percent agreement
Variables Associated with Proficiency

- The following variables were associated with proficiency in bivariate comparisons
  - Cognition (p = <0.01 to 0.03)
  - Wheelchair control mechanism (p=0.09)
  - Fine motor skills (p=0.02)
## Predictors

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Adjusted Odds Ratio (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosis&lt;sup&gt;a&lt;/sup&gt;</td>
<td><strong>1.89</strong> (1.29, 2.76)</td>
<td>0.002</td>
</tr>
<tr>
<td>Cognition</td>
<td><strong>1.07</strong> (1.01, 1.13)</td>
<td>0.017</td>
</tr>
<tr>
<td>Wheelchair Control Mechanism&lt;sup&gt;b&lt;/sup&gt;</td>
<td><strong>0.65</strong> (0.45, 0.94)</td>
<td>0.024</td>
</tr>
<tr>
<td>Age</td>
<td>0.98 (0.95, 1.01)</td>
<td>0.327</td>
</tr>
<tr>
<td>PEDI Mobility Standard Score</td>
<td>0.98 (0.97, 1.01)</td>
<td>0.166</td>
</tr>
<tr>
<td>PEDI Mobility Scaled Score</td>
<td>1.00 (0.98, 1.03)</td>
<td>0.619</td>
</tr>
</tbody>
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<sup>a</sup>Diagnosis involving the brain was the reference.  
<sup>b</sup>Joystick use was the reference.
Proficiency Measures

- Significant association between performance on WSC and PMP ($p < 0.001$)

- Percent agreement = 94.7%
  - Same conclusion for 18 of 19 children
Limitations

- Small sample size (n=31)

- Limitations in assessing cognition
  - Tools dependent on motor and speech abilities beyond the ability of the participants (Jones et al., 2012)
  - Tools might not identify differences between children
Conclusions

• Cognition, wheelchair control mechanism, and diagnosis might predict power mobility proficiency in young children with severe motor impairments.

• These factors, however, should not be used to determine whether a child is offered the opportunity to participate in a trial or training program.
Acknowledgements

• Advanced Practice Project Committee
  Irene McEwen, PT, DPT, PhD, FAPTA (Chair)
  Maria Jones, PT, PhD
  Lorraine Sylvester, PT, PhD

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References


