Physiotherapy interventions to improve gross motor skills in people with an intellectual disability aged six years and older: a systematic review.

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Abstract

Intellectual disability is a life-long condition occurring during the early developmental years, resulting in impaired learning ability, reduced adaptive behaviour skills, and decreased functional independence. It affects approximately one percent of the world’s population, and affected individuals have poorer health outcomes. People with an intellectual disability may benefit from specific teaching and learning approaches in therapy interventions which accommodate their cognitive and behavioural needs.

Gross motor skills (GMSs) are larger movements of the body, such as standing and walking, which are typically attained before the age of six. Deficits in GMSs may occur due to congenital conditions, such as cerebral palsy or Down syndrome, in which there occurs altered neuromuscular coordination and tone. GMS deficits can negatively affect a person’s functional independence.

People with an intellectual disability who also suffer from GMS deficits can benefit from physiotherapy interventions to help improve their GMSs. Previous research has reported improvements in walking and balance for this population. Much research has supported early intervention programmes for children aged under six years. There is a comparative lack of research for people with an intellectual disability aged older than this, and no prior systematic review. A systematic review would inform clinicians and consumers regarding identifying effective interventions.

The object of this thesis was to conduct a systematic review which investigated the effectiveness of physiotherapy interventions to improve GMSs in people with an intellectual disability aged six years and older. The data sources for identifying quantitative research were: PubMed, CINAHL, Embase and ProQuest. Reference lists of relevant identified papers were hand-searched. Papers published in English from 1-1-2008 to 22-10-14 were considered for inclusion. Types of eligible study designs were randomized controlled trial (RCT), pseudo-RCT, repeated measures, and case report.
Overall, 866 potential articles were identified, of which 42 were retrieved for full-text review, and seven were finally included. Critical appraisal was conducted by two reviewers independently using the Joanna Briggs Institute (JBI) appraisal checklists; no papers were excluded following critical appraisal. Data extraction was performed using JBI Meta Analysis of Statistics Assessment and Review Instrument (MAStARI) data extraction instruments.

High heterogeneity between the studies precluded meta-analysis of the results, and a narrative synthesis was completed instead. Two RCTs, two pseudo-RCTs, two repeated measures studies and one case report were included. Studies varied in regard to participants’ intellectual disabilities, and also regarding the interventions used. All interventions were well tolerated with negligible adverse effects. Significant improvements were reported for: cadence and non-dimensionalized gait velocity following body-weight supported gait training; cadence following lower limb strengthening exercises; and for the Gross Motor Function Measure-88 measure following adapted Judo training. These results suggest that task-specific training may be useful. However, based on the critical appraisal the overall quality of evidence was low.

The systematic review found limited evidence supporting physiotherapy for improving GMSs in people with an intellectual disability. Further research is needed to validate the early significant findings identified in this review and to define effective physiotherapy approaches which meet the learning needs of people with an intellectual disability.
Declaration

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint award of this degree.

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I also give permission for the digital version of my thesis to be made available on the web, via the University’s digital research repository, the Library Search, and also through web search engines, unless permission has been granted by the University to restrict access for a period of time.

Signed

Judith Hocking,

on this date: …/…/…… .
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During my candidature I have received ongoing and consistent encouragement from my family, most specially from my husband, daughter and mother. Dr Rebekah Das gave moral support at very timely intervals, and also helped me to refine my ideas during the early stages of writing this thesis.

I am also grateful for the support of The Joanna Briggs Institute, where I completed the studies reported in this thesis, and in particular to A/Prof Craig Lockwood, HDR Coordinator, for overseeing my Master of Clinical Science candidature within this School.
## List of abbreviations

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<tr>
<th>Abbreviation</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>ABS</td>
<td>Australian Bureau of Statistics</td>
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<tr>
<td>APA</td>
<td>Australian Physiotherapy Association</td>
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<tr>
<td>BMI</td>
<td>Body Mass Index</td>
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<tr>
<td>BOT-2</td>
<td>Bruininks-Oseretsky Test of Motor Proficiency, 2nd edition</td>
</tr>
<tr>
<td>BWS</td>
<td>body-weight supported</td>
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<tr>
<td>CP</td>
<td>cerebral palsy</td>
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<td>DMD</td>
<td>Duchenne Muscular Dystrophy</td>
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<td>DS</td>
<td>Down syndrome</td>
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<tr>
<td>GMAE</td>
<td>Gross Motor Ability Estimator</td>
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<td>GMFCS</td>
<td>Gross Motor Function Classification Scale</td>
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<tr>
<td>GMFM</td>
<td>Gross Motor Function Measure</td>
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<td>GMS</td>
<td>gross motor skill</td>
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<td>HEP</td>
<td>home exercise programme</td>
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<tr>
<td>ICF</td>
<td>International Classification of Functioning, Disability and Health</td>
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<tr>
<td>ID</td>
<td>intellectual disability</td>
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<tr>
<td>ITT</td>
<td>Intention to treat</td>
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<tr>
<td>JBI</td>
<td>The Joanna Briggs Institute</td>
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<tr>
<td>MASTARI</td>
<td>Meta-Analysis of Statistics Assessment and Review Instrument</td>
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<tr>
<td>MDC</td>
<td>minimum detectable change</td>
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<tr>
<td>MID</td>
<td>minimum important difference</td>
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<tr>
<td>MMSE</td>
<td>Mini-Mental State Examination</td>
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<tr>
<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>MS</td>
<td>multiple sclerosis</td>
</tr>
<tr>
<td>N</td>
<td>No</td>
</tr>
<tr>
<td>N/A</td>
<td>not applicable</td>
</tr>
<tr>
<td>NDIS</td>
<td>National Disability Insurance Scheme</td>
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<tr>
<td>PBWSTT</td>
<td>partial body-weight supported treadmill training</td>
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<tr>
<td>PICO</td>
<td>Population, Intervention, Comparator, Outcome</td>
</tr>
<tr>
<td>PWS</td>
<td>Prader-Willi syndrome</td>
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<tr>
<td>QOL</td>
<td>quality of life</td>
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<td>RCT</td>
<td>randomized controlled trial</td>
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<td>SD</td>
<td>standard deviation</td>
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<tr>
<td>SR</td>
<td>systematic review</td>
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<tr>
<td>Ss</td>
<td>sample size</td>
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<td>SWAPS</td>
<td>Supported Walker Ambulation Scale</td>
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<td>OGS</td>
<td>Observational Gait Scale</td>
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<tr>
<td>UN CRPD</td>
<td>United Nations Charter on the Rights of Persons with Disabilities</td>
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<tr>
<td>WHO</td>
<td>World Health Organization</td>
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<tr>
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