Physiotherapy to improve gross motor skills in people with intellectual disability: a systematic review protocol

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Review question/objective
The objective of this systematic review is to identify the best available evidence regarding the effectiveness of physiotherapy interventions in improving gross motor skills in people with an intellectual disability.

More specifically, the objectives are to identify:

• The best available evidence regarding the types of physical therapy interventions used to improve gross motor skills in people with an intellectual disability.

• The best available evidence regarding the effectiveness of physical therapy on improving gross motor function in people with an intellectual disability.

Background
Physiotherapy (PT) assists in the attainment and retention of improved physical function to better enable a person to undertake their daily activities and participatory roles. PT outcomes can be achieved through alterations in physiological and learning processes involving the cardio-respiratory, musculoskeletal and neurological systems. PT treatment interventions include but are not limited to muscle exercise and rehabilitation, strengthening and stretching, training of specific skills, aquatic therapy, gait education, helping to decrease the risk of falls and improving balance strategies.

Commonly, PT works to assist an individual to improve their level of gross motor skills (GMS). GMS are skills that every person attains during their physical development. The GMS commonly attained are rolling, sitting, standing, walking, running and ball skills. Usually, most GMS are attained during the first
five years of life. Pervading intellectual disability (ID) with and without physical debility can impede the attainment of GMS, resulting in increased need for carer support with daily activities, decreased independence, a greater likelihood for pain and other health issues related to a relative lack of movement. Improvement in GMS may be possible irrespective of a client's baseline level of GMS.

A client’s level of GMS can be accurately assessed and re-assessed in the clinical setting using recognized outcome measurement tools, including tools specifically for GMS and balance. Additionally, usual clinical assessment of a client, including subjective/interview and observational/objective assessment processes, and appraisal of the client's engagement in general physical activity such as sport and recreation, also help to determine an individual client's GMS level. Any deficit in GMS may be due to a combination of biomedical and psychosocial reasons; accordingly, there exists a challenge for the health practitioner to carefully assess the client's needs to ensure accurate clinical deductions are made, including liaising with multi-disciplinary team members to ensure the best possible clinical outcomes.

Intellectual disability (ID), or intellectual developmental disability, is diagnosed when a person has significant impairment in mental functioning and limitations in adaptive behavior, with onset occurring in the person’s developmental years. Causes for ID can be varied, including but not limited to genetic reasons, various syndromes and CNS insult or disease. Not infrequently, a cause for the ID cannot be identified. ID can affect a person in varying ways: skill sets of communication and learning ability are commonly impaired. Additionally, people with ID suffer a poorer quality of life (QOL), increased morbidity, a higher frequency of mental health issues, social vulnerability and poor self-efficacy and esteem. Decreased access to mainstream health care services and therapy interventions can compound the impact of the ID, further inhibiting the person's ability to cope with and adapt to the demands of daily living. More focused planning on the delivery of health services to people with an ID in order to overcome these potential risks is warranted.

GMS in people with ID can range from a level of normal functioning, through to profound physical disability. When a person with ID has GMS impairment, one result is increased difficulty accessing learning opportunities. Consequently, the impact of impairments related to their GMS and also to the ID itself are less likely to be overcome or moderated. This may result in increased functional dependence and poorer health status. There is apparent clinical relevance and need to systematically identify effective ways of providing PT for improving GMS in people with ID. There is some evidence to suggest that an integrated physical activity experience can improve adaptive skills for people with an intellectual disability. Regardless of the level of baseline functioning, PT may be able to influence GMS and therefore positively influence the level of independence, health status and QOL of the patient.

When assisting people with disabilities, PT can be provided as a stand-alone clinical intervention, or as part of a clinical multi-disciplinary team context, alongside nursing, occupational therapy, psychology, social work, and medical staff; and both intra- and inter-disciplinary.

To date, no systematic study has been identified that appraises physiotherapy interventions used to improve gross motor skills in people with an ID. The initial search looking for existing systematic reviews and systematic review protocols was conducted by the author during mid-2013. Key search terms utilized for this initial search included physiotherapy, physical therapy, intellectual disability, intellectual developmental disability, mental retardation, gross motor +/- skills, humans. The databases searched were The Joanna Briggs Institute Library, PEDro and the Cochrane Library. Additionally, PubMed was
searched in the same timeframe looking for literature on PT to assist with improved GMS in people with an ID and no reviews were identified within this search. It is therefore warranted to systematically review the existing literature reporting on PT interventions (in isolation and in association/as part of a multi-disciplinary team treatment) to improve gross motor skills in people with ID. Examples of systematic reviews about topics related to, but not specifically addressing this review’s focus, were identified.\textsuperscript{30,31}

Much research and development has been invested to develop early intervention programs for children with disabilities, aged around 0-5 years old.\textsuperscript{32-34} There is a considerable history of early intervention as a health focus;\textsuperscript{35} it affords medical practitioner oversight.\textsuperscript{34} These programs are now widely recognized and implemented: there is evidence to support intensive PT input,\textsuperscript{36} careful screening of developmental delay,\textsuperscript{37} and the use of outcome measurement tools.\textsuperscript{38} There is comparatively less literature reporting on habilitative programs for persons aged six years and older and particularly for the adult and older adult with ID. It is therefore of worth to systematically review the available literature for persons aged six years and over with ID, in order to identify the best evidence to support PT practice for this population. Additionally, there is indication of benefit in researching across the lifespan for clients with ID; there has previously been research application of an ID pediatric pain assessment tool to develop a related adult ID assessment tool.\textsuperscript{39} A similar approach may also be applicable in the review field of PT for gross motor skill improvement in people with ID.

People with ID can experience positive physical benefits from exercise therapy interventions, such as increased muscle strength.\textsuperscript{40,41} Improvement in strength can facilitate gains in GMS and functional independence. However, because many people with ID experience difficulty accessing and/or engaging with mainstream PT, it appears that modified or alternative clinical PT paradigms may be relevant to this area of PT; including the following:

- There may be indication for specific approaches of communication and client engagement to be incorporated into therapy.\textsuperscript{41}

- There may be specific areas requiring greater clinical attention that are unique to some people with ID, such as deeper proprioceptive sensation for improving static balance in patients with Down Syndrome.\textsuperscript{42}

- It may be that specific patterns of neuro-physiological impairments require investigation, so that newer models of physical therapy can be used successfully and that the application of usual models of PT does not achieve any useful improvement in diagnostic groups of ID, as is the case at least for some sub-populations of people with ID.\textsuperscript{43}

- More novel modes of intervention, which are not considered as main-stream PT, but with which PT can work alongside, such as hippotherapy, have been used successfully to improve motor function.\textsuperscript{44}

- Improved engagement could be advanced with creative group therapy approaches which optimize peer modelling.\textsuperscript{45}

- An improvement in important clinical indicators such as moving from a sedentary to a non-sedentary lifestyle behavior, can be achieved by targeting a gross motor skill with seemingly only limited direct impact.\textsuperscript{46}
Keywords

intellectual disability; gross motor skill; physiotherapy

Inclusion criteria

Types of participants

This review will consider studies that include people (children aged six years and over and adults of all ages) with intellectual disability (mild through to profound), with and without physical disability (mild through to profound).

For the purposes of this systematic review, intellectual disability (ID) refers to a person having impaired academic ability and decreased adaptive behavior, academic skills and learning, with the onset of the ID occurring during the developmental years.\(^{14,47}\)

For the purposes of this systematic review, gross motor skill deficits resulting in physical disability will be defined as a person having physical limitations assessed using recognized outcome measurement tools, resulting in impaired movement and function due to biomedical and/or psychosocial causes, as outlined in the World Health Organization International Classification of Functioning, Disability and Health framework.\(^{48}\)

Types of intervention(s)/phenomena of interest

This review will consider studies that evaluate any physiotherapy interventions designed to improve gross motor function including, but not limited to: aquatic therapy, strength training, task-specific practice, group programs, individual sessions, peer-facilitated contexts. The review will include interventions/treatments provided by a registered physiotherapist working either as a sole professional, or within a multi-disciplinary context and providing direct or supervised physiotherapy interventions. Settings for interventions can be any usual clinical setting including the client’s home, residential facilities and hospital outpatient departments.

For the purposes of this systematic review, a registered physiotherapist refers to an individual who has successfully completed a recognized tertiary qualification, enabling formal professional registration as a physiotherapist with an accredited registering body. PT is a nationally controlled profession and as such there are different registration requirements for PTs in each nation that has the profession of PT practicing within it. This systematic review will accept on face value the statement within study reports that the intervention was provided by a physiotherapist.

Types of comparators: No-physiotherapy interventions and/or general physical activity programs led by professionals other than PTs (for example school teachers or exercise physiologists).

Types of outcomes

Primary outcomes:

• Level of attainment of gross motor skills such as balance and gait, measured using validated measurement instruments. Where possible, these instruments will be assessed in terms of their reliability and validity for the specific cohort.
Secondary outcomes:

- Engagement in physical activity (freedom in physical activity is directly related to GMS proficiency; improving physical activity results in improved health),\textsuperscript{49} which can be measured in different ways, including level of endurance\textsuperscript{50} and time spent in non-sedentary activity.\textsuperscript{46}

**Types of studies**

This review will consider both experimental and epidemiological study designs including randomized controlled trials, non-randomized controlled trials, quasi-experimental, before and after studies and case control studies.

This review will also consider descriptive epidemiological study designs, including case series and individual case reports.

Systematic reviews of topics related to that of the present review will also be considered for the purpose of hand-searching their reference lists in order to identify relevant primary research articles to be considered for inclusion in this review.

**Search strategy**

The search strategy aims to find published studies. A three-step search strategy will be utilized in this review. An initial limited search of PubMed, CINAHL, PEDro, Embase and Scopus will be undertaken, followed by analysis of the text words contained in the title and abstract and of the index terms used to describe the article. A second search using all identified keywords and index terms will then be undertaken across all included databases. Thirdly, the reference lists of all identified reports and articles will be searched for additional studies. Studies published in English will be considered for inclusion in this review. Studies published from 2008 onwards will be considered for inclusion in this review in order to optimize the likelihood that the studies reflect the tenets of the 2006 United Nations convention on the rights of people with disabilities, which was assigned formal status as a Human Rights Treaty in 2008;\textsuperscript{51} it also ensures recent models of physiotherapy practice and theory will be represented in the review’s findings. If there are too few studies identified from within this timeframe, the timeframe will be broadened to also include any relevant studies published between 2001 and 2008. The year 2001 marks the publication of the World Health Organization's initial version of the International Classification of Functioning, Disability and Health; this classification system provides a comprehensive framework for assessing and appraising disability.\textsuperscript{52}

Initial keywords to be used when searching the databases will include:

- Children, adolescents, adults, older adults, geriatric, very old adult
- intellectual disability, intellectual developmental disability, mental retardation, developmental disability, learning disability
- physiotherapy, physical therapy, rehabilitation, multi-disciplinary therapy, habilitation
- assessment, treatment, intervention, therapy, group, individual
- exercise, hydrotherapy,
- gross motor +/- skill, function, delay, development
functional in/dependence
developmental milestones
balance, falls

Assessment of methodological quality

Papers selected for retrieval will be assessed by two independent reviewers for methodological validity prior to inclusion in the review, using standardized critical appraisal instruments from the Joanna Briggs Institute Meta Analysis of Statistics Assessment and Review Instrument (JBI-MAStARI) (Appendix V). Any disagreements that arise between the reviewers will be resolved through discussion, or with a third reviewer.

Data collection

Data will be extracted from papers included in the review using the standardized data extraction tool from JBI-MAStARI (Appendix VI). The data extracted will include specific details about the interventions, populations, study methods and outcomes of significance to the review question and specific objectives.

Data synthesis

Quantitative data will, where possible, be pooled in statistical meta-analysis using JBI-MAStARI. All results will be subject to double data entry. Effect sizes expressed as odds ratios (for categorical data) and weighted mean differences (for continuous data) and their 95% confidence intervals will be calculated for analysis. Heterogeneity will be assessed statistically using the standard chi-square test and also explored using subgroup analyses, based on the different study designs included in this review. Whilst conducting the analyses, sub-group analyses will be performed where possible to compare age-groups, level of ID and present comorbidities. Where statistical pooling is not possible, the findings will be presented in narrative form including tables and figures to aid in data presentation where appropriate.

Conflicts of interest

Nil.

Acknowledgements

A/Prof Craig Lockwood, The Joanna Briggs Institute, for assistance in developing the review topic.
References


30. Damiano, DL, DeJong, SL. A systematic review of the effectiveness of treadmill training and body


Appendix I: Appraisal instruments

MAStARI appraisal instrument

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<th>JBI Critical Appraisal Checklist for Randomised Control / Pseudo-randomised Trial</th>
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1. Was the assignment to treatment groups truly random?  Yes  No  Unclear  Not Applicable
2. Were participants blinded to treatment allocation?  Yes  No  Unclear  Not Applicable
3. Was allocation to treatment groups concealed from the allocator?  Yes  No  Unclear  Not Applicable
4. Were the outcomes of people who withdrew described and included in the analysis?  Yes  No  Unclear  Not Applicable
5. Were those assessing outcomes blind to the treatment allocation?  Yes  No  Unclear  Not Applicable
6. Were the control and treatment groups comparable at entry?  Yes  No  Unclear  Not Applicable
7. Were groups treated identically other than for the named interventions?  Yes  No  Unclear  Not Applicable
8. Were outcomes measured in the same way for all groups?  Yes  No  Unclear  Not Applicable
9. Were outcomes measured in a reliable way?  Yes  No  Unclear  Not Applicable
10. Was appropriate statistical analysis used?  Yes  No  Unclear  Not Applicable

Overall appraisal:  Include  Exclude  Seek further info.

Comments (Including reason for exclusion):
_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
# JBI Critical Appraisal Checklist for Descriptive / Case Series

**Reviewer** __________  __________  **Date** __________  __________

**Author** __________  __________  **Year** _______  **Record Number** _______

1. Was study based on a random or pseudo-random sample?  
   - Yes [ ] No [ ] Unclear [ ] Not Applicable [ ]

2. Were the criteria for inclusion in the sample clearly defined?  
   - Yes [ ] No [ ] Unclear [ ] Not Applicable [ ]

3. Were confounding factors identified and strategies to deal with them stated?  
   - Yes [ ] No [ ] Unclear [ ] Not Applicable [ ]

4. Were outcomes assessed using objective criteria?  
   - Yes [ ] No [ ] Unclear [ ] Not Applicable [ ]

5. If comparisons are being made, was there sufficient descriptions of the groups?  
   - Yes [ ] No [ ] Unclear [ ] Not Applicable [ ]

6. Was follow up carried out over a sufficient time period?  
   - Yes [ ] No [ ] Unclear [ ] Not Applicable [ ]

7. Were the outcomes of people who withdrew described and included in the analysis?  
   - Yes [ ] No [ ] Unclear [ ] Not Applicable [ ]

8. Were outcomes measured in a reliable way?  
   - Yes [ ] No [ ] Unclear [ ] Not Applicable [ ]

9. Was appropriate statistical analysis used?  
   - Yes [ ] No [ ] Unclear [ ] Not Applicable [ ]

**Overall appraisal:**  
- Include [ ]  
- Exclude [ ]  
- Seek further info [ ]

**Comments (Including reason for exclusion)**

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doi: 10.11124/jbisrir-2013-1180  
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### JBI Critical Appraisal Checklist for Comparable Cohort/ Case Control

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**Author**  
**Year**  
**Record Number**

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**Overall appraisal:**  
**Include**  
**Exclude**  
**Seek further info.**

**Comments (Including reason for exclusion)**

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**doi:** 10.11124/jbisrir-2013-1180
Appendix II: Data extraction instruments

MAStARI data extraction instrument

JBI Data Extraction Form for Experimental / Observational Studies

Reviewer ___________________________ Date ___________________________

Author ___________________________ Year ___________________________

Journal ___________________________ Record Number __________________

Study Method

RCT □ Quasi-RCT □ Longitudinal □
Respective □ Observational □ Other □

Participants

Setting ___________________________

Population ___________________________

Sample size

Group A ___________________________ Group B ___________________________

Interventions

Intervention A ___________________________

Intervention B ___________________________

Authors Conclusions: ___________________________

Reviewers Conclusions: ___________________________
Study results

Dichotomous data

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