Swimming and Water Safety Skills for Children with Disability: A Systematic Review

Karen Graham (PhD candidate, UQ)

Dr Katarina Ostojic (USyd), Associate Professor Leanne Johnston (QCH, UQ), Dr Georgina Clutterbuck (UQ)

karen.graham@student.uq.edu.au

LinkedIn: www.linkedin.com/in/karen-graham-108b4b23a

Instagram: @karenbynamenotbynature

The University Of Queensland AUSTRALIA

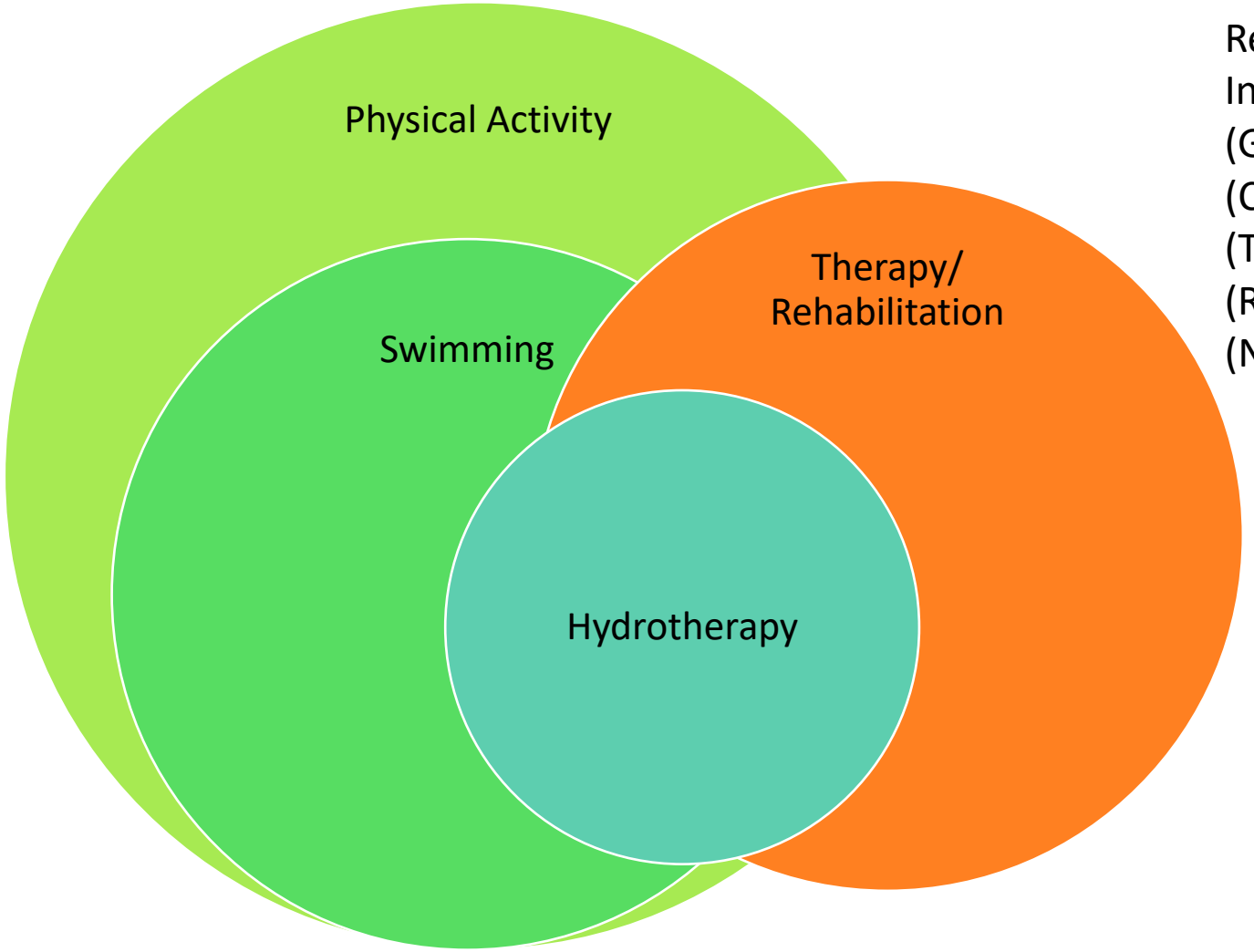
CREATE CHANGE

The University of Sydney

Celebrating 175 years

Children's Motor Control Research Collaboration

Background/Aim



Reviews of Hydrotherapy and Aquatic Interventions:
(Getz et al., 2006)
(Cavalcante Neto et al., 2023)
(Tapia et al., 2023)
(Roostaei et al., 2017)
(Naumann et al., 2021)

Reviews of the effects of swimming for Autistic Children:

- (Martin & Dillenburger, 2019)
- (Bremer et al., 2016)
- (Lawson & Little, 2017)

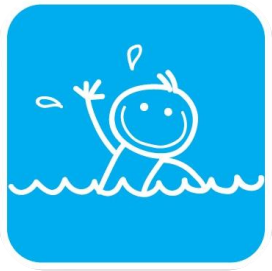
Children's Motor Control
Research Collaboration

Aim

- To identify, evaluate and summarise all individual studies on **swimming programs for children with disability**, with a focus on those that had **swimming or water safety skill outcomes**.

Children's Motor Control
Research Collaboration



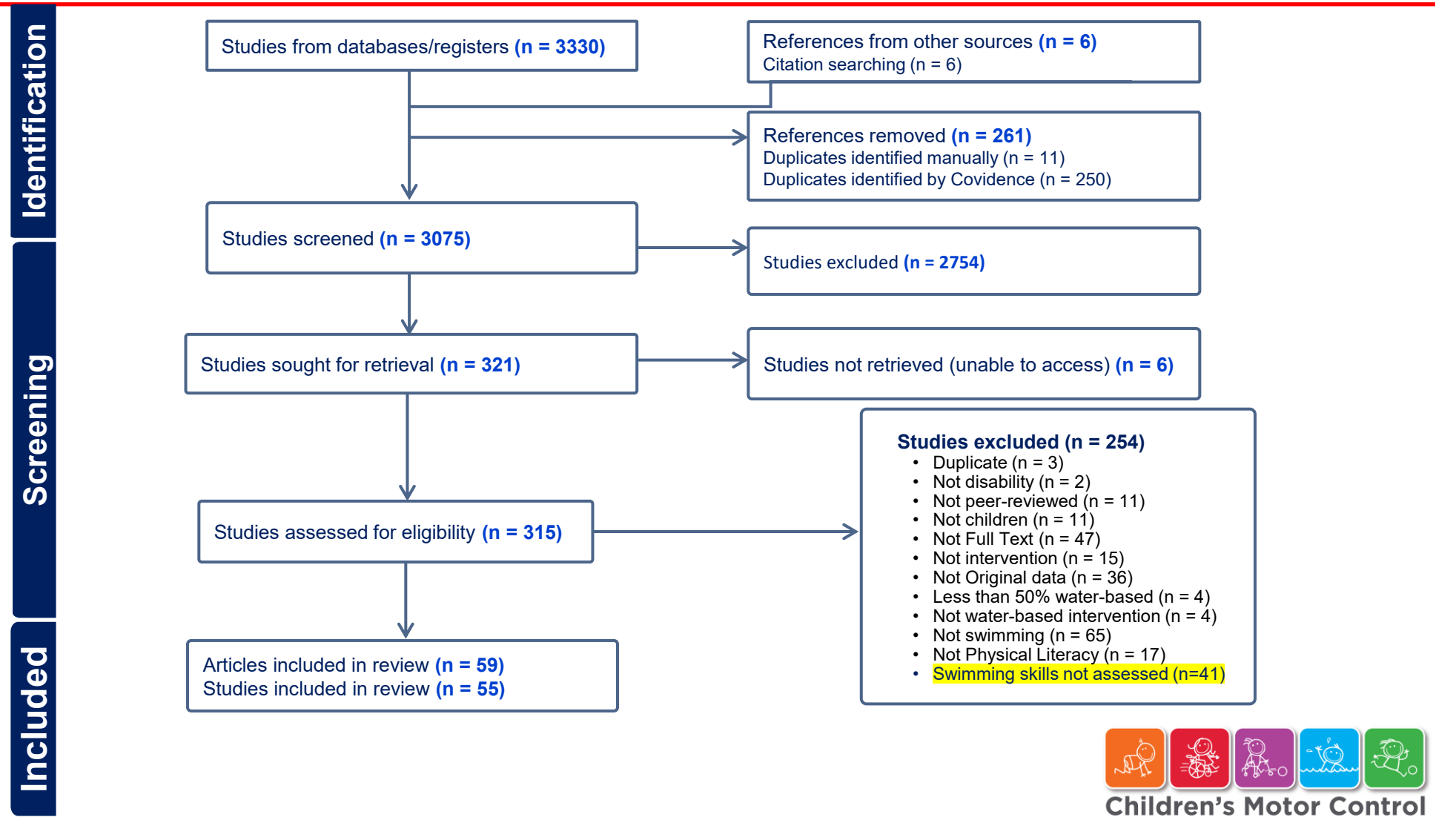




Methods

Population	Children with disability (aged 0-18 years)
Intervention	• Swimming and water safety programs
Comparison/control	• Both qualitative and quantitative studies included
Outcomes	• Swimming skill outcome measures

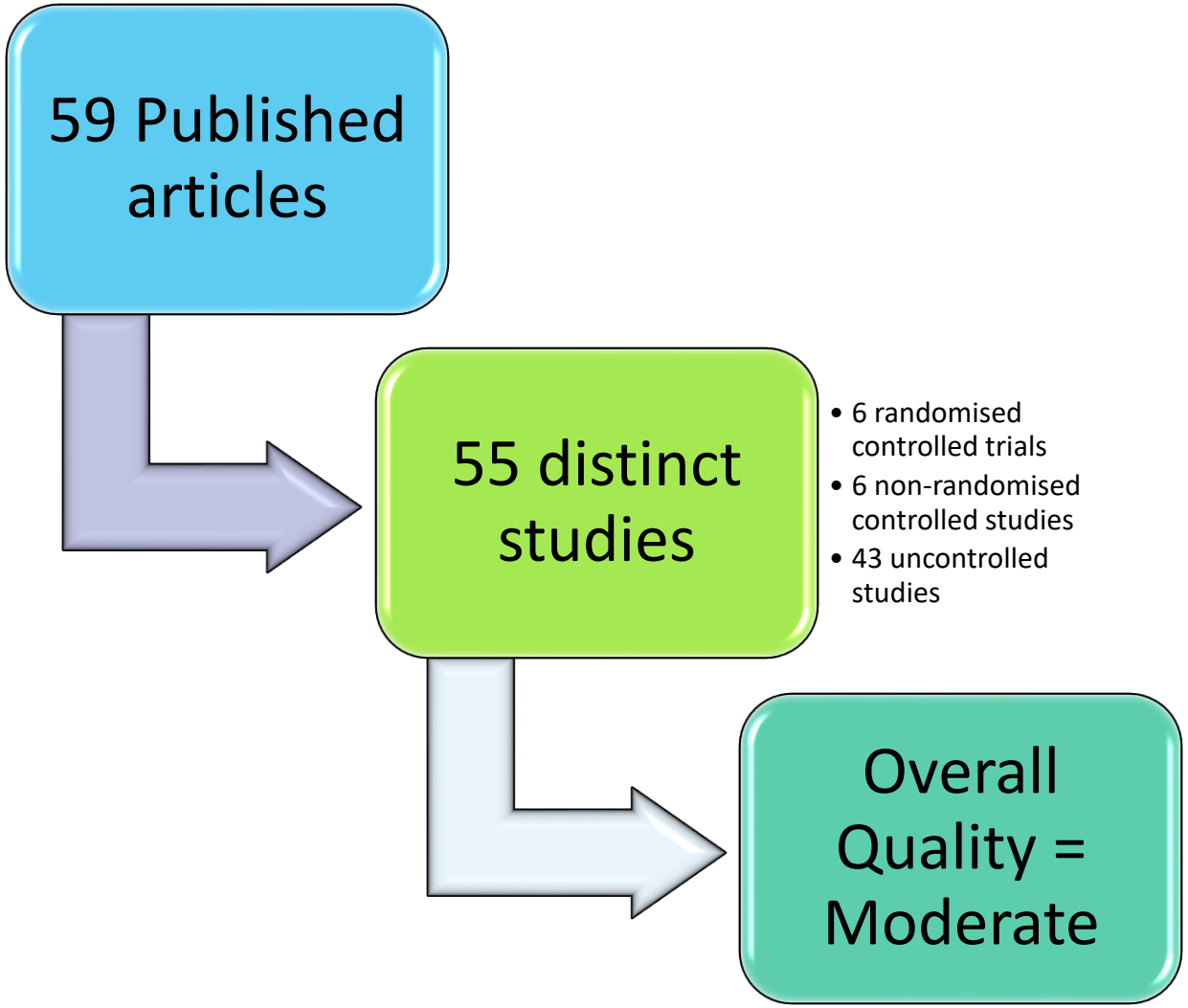
Children's Motor Control
Research Collaboration

Results



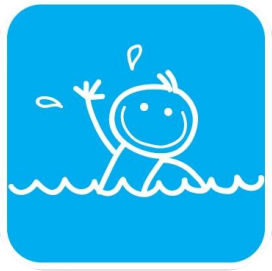
Children's Motor Control
Research Collaboration

Results



Children's Motor Control Research Collaboration




Diagnoses

Autism
(n studies=28)
Participants: n=408

Cerebral Palsy
(n studies=14)
Participants: n= 230

Developmental Coordination Disorder
(n studies=2)
Participants: n=28

Down Syndrome
(n studies=2)
Participants: n=34

Intellectual Disability
(n studies=2)
Participants: n=41

Neuromuscular Disorders
(n studies=1)
Participants: n=11

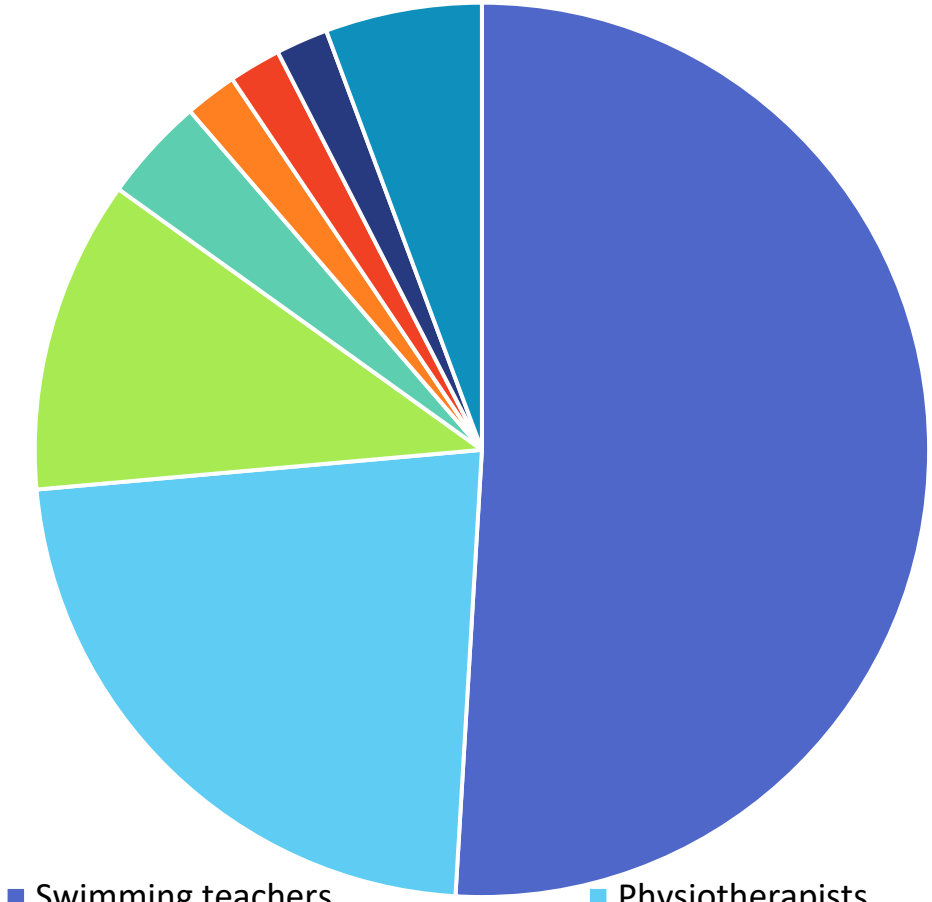
Multiple/Complex/Varied
(n studies=4)
Participants: n=199

Visual Impairment
(n studies=1)
Participants: n=1

Acquired Brain Injury
(n studies=1)
Participants: n=1

Children's Motor Control
Research Collaboration

Professionals Delivering Programs



Children's Motor Control
Research Collaboration

Intervention Content

National Swimming and Water Safety Framework
Royal Life Saving Australia

\+

Strengthening activities
(n studies=12)

Sensory strategies
(n studies=5)

Image used with permission from Royal Life Saving Australia

Children's Motor Control
Research Collaboration

Swimming and Water Safety Skill Outcomes

Standardised swimming scales (n=26)

- Water Orientation Test Alyn (WOTA) (n=16)
- Humphries Assessment of Aquatic Readiness (HAAR) (n=6)
- Swimming Classification Scale (n=2)
- Aquatic Independence Measure (n=1)
- Stochl Scale (n=1)

Customised/modified tools (n=21)

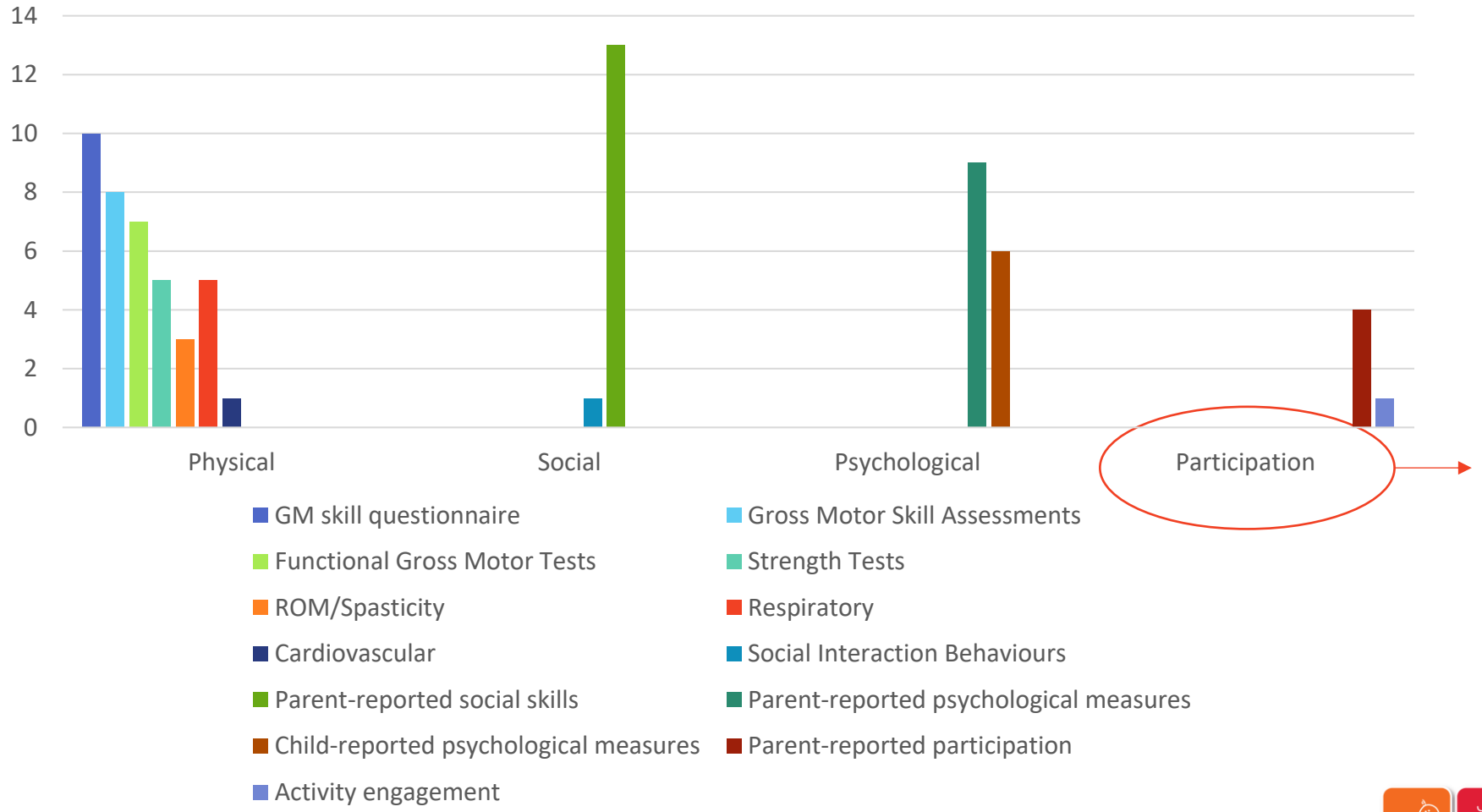
Number of sessions to skill acquisition (n=5)

Speed / distance (n=3)

Children's Motor Control Research Collaboration

Swimming Intervention Results = Positive!

Other Outcomes (n=31)



Promising results for inclusive aquatic programs!

Children's Motor Control Research Collaboration





Future Directions and Practice Implications

Clinical Outcomes

Swimming Programs are Effective.

Swimming and Water Safety Skills Improve with Swimming.

Additional Physical, Social, Psycholgical and Participation Benefits.

Gaps for Clinicians

Clinicians need clear frameworks and terminology to understand, describe and provide effective swimming interventions for children with disabilities.

Gaps in Research

Robust Study Designs

Detailed Intervention Descriptions

Explore Long-Term Effects

Participation Measures

Children's Motor Control
Research Collaboration

References

- Bremer, E., Crozier, M., & Lloyd, M. (2016). A systematic review of the behavioural outcomes following exercise interventions for children and youth with autism spectrum disorder. *Autism*, *20*(8), 899-915. https://doi.org/10.1177/1362361315616002
- Cavalcante Neto, J. L., Draghi, T. T. G., & Weber, M. D. (2023). Effects of Aquatic Activities on Motor Performance and Physical Fitness of Children and Adolescents with Neurodevelopmental Disorders: a Systematic Review. *Review journal of autism and developmental disorders*. https://doi.org/10.1007/s40489-023-00401-6
- Chu, C.-H., & Pan, C.-Y. (2012). The effect of peer- and sibling-assisted aquatic program on interaction behaviors and aquatic skills of children with autism spectrum disorders and their peers/siblings. *Research in autism spectrum disorders*, *6*(3), 1211-1223. https://doi.org/10.1016/j.rasd.2012.02.003
- Franklin, R. C., Pearn, J. H., & Peden, A. E. (2017). Drowning fatalities in childhood: the role of pre-existing medical conditions. *Archives of disease in childhood*, *102*(10), 888-893. https://doi.org/10.1136/archdischild-2017-312684
- Getz, M., Hutzler, Y., & Vermeer, A. (2006). Effects of aquatic interventions in children with neuromotor impairments: a systematic review of the literature. *Clin Rehabil*, *20*(11), 927-936. https://doi.org/10.1177/0269215506070693
- Kucher, G., Moore, K., Rodia, R., & Moser, C. S. (2015). Aquatic Therapy for Children. *Journal of occupational therapy, schools & early intervention*, *8*(4), 277. https://doi.org/10.1080/19411243.2015.1113104
- Lawson, L. M., & Little, L. (2017). Feasibility of a Swimming Intervention to Improve Sleep Behaviors of Children With Autism Spectrum Disorder. *Therapeutic Recreation Journal*, *51*(2), 97-108. https://doi.org/10.18666/trj-2017-v51-i2-7899
- Ma, L.-L., Wang, Y.-Y., Yang, Z.-H., Huang, D., Weng, H., & Zeng, X.-T. (2020). Methodological quality (risk of bias) assessment tools for primary and secondary medical studies: what are they and which is better? *Military Medical Research*, *7*(1), 7. https://doi.org/10.1186/s40779-020-00238-8
- Martin, C., & Dillenburger, K. (2019). Behavioural Water Safety and Autism: a Systematic Review of Interventions. *Review journal of autism and developmental disorders*, *6*(4), 356-366. https://doi.org/10.1007/s40489-019-00166-x
- Mortimer, R., Privopoulos, M., & Kumar, S. (2014). The effectiveness of hydrotherapy in the treatment of social and behavioral aspects of children with autism spectrum disorders: A systematic review. *J Multidiscip Healthc*, *7*(default), 93-103. https://doi.org/10.2147/JMDH.S55345
- Naumann, K., Kernot, J., Parfitt, G., Gower, B., & Davison, K. (2021). Water-based interventions for people with neurological disability, autism, and intellectual disability: A scoping review. *Adapt Phys Activ Q*, *38*(3), 474-493. https://doi.org/10.1123/apaq.2020-0036
- *Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies*. (2021). https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tools Shields, N., Synnot, A., & Barr, M. (2011). Perceived Barriers and Facilitators to Physical Activity for Children With Disability: A Systematic Review. *British Journal of Sports Medicine*. https://doi.org/10.1136/bjsports-2011-090236
- Roostaei, M., Baharlouei, H., Azadi, H., & Fragala-Pinkham, M. A. (2017). Effects of Aquatic Intervention on Gross Motor Skills in Children with Cerebral Palsy: A Systematic Review. *Phys Occup Ther Pediatr*, *37*(5), 496-515. https://doi.org/10.1080/01942638.2016.1247938
- Sterne, J. A. C., Hernán, M. A., Reeves, B. C., Savović, J., Berkman, N. D., Viswanathan, M., Henry, D., Altman, D. G., Ansari, M. T., Boutron, I., Carpenter, J. R., Chan, A.-W., Churchill, R., Deeks, J. J., Hróbjartsson, A., Kirkham, J., Jüni, P., Loke, Y. K., Pigott, T. D.,…Higgins, J. P. T. (2016). ROBINS-I: a tool for assessing risk of bias in non-randomised studies of interventions. *BMJ*, *355*, i4919-i4919. https://doi.org/10.1136/bmj.i4919
- Sterne, J. A. C., Savović, J., Page, M. J., Elbers, R. G., Blencowe, N. S., Boutron, I., Cates, C. J., Cheng, H.-Y., Corbett, M. S., Eldridge, S. M., Emberson, J. R., Hernán, M. A., Hopewell, S., Hróbjartsson, A., Junqueira, D. R., Jüni, P., Kirkham, J. J., Lasserson, T., Li, T.,…Higgins, J. P. T. (2019). RoB 2: a revised tool for assessing risk of bias in randomised trials. *BMJ*, *366*, l4898-l4898. https://doi.org/10.1136/bmj.l4898
- Tapia, C., Constanzo, J., González, V., & Barría, R. M. (2023). The Effectiveness of Aquatic Therapy Based on the Halliwick Concept in Children with Cerebral Palsy: A Systematic Review. *Dev Neurorehabil*, *26*(6-7), 371-376. https://doi.org/10.1080/17518423.2023.2259986

Children's Motor Control Research Collaboration

Questions?

karen.graham@student.uq.edu.au
LinkedIn: www.linkedin.com/in/karen-graham-108b4b23a
Instagram: @karenbynamenotbynature

Children's Motor Control
Research Collaboration