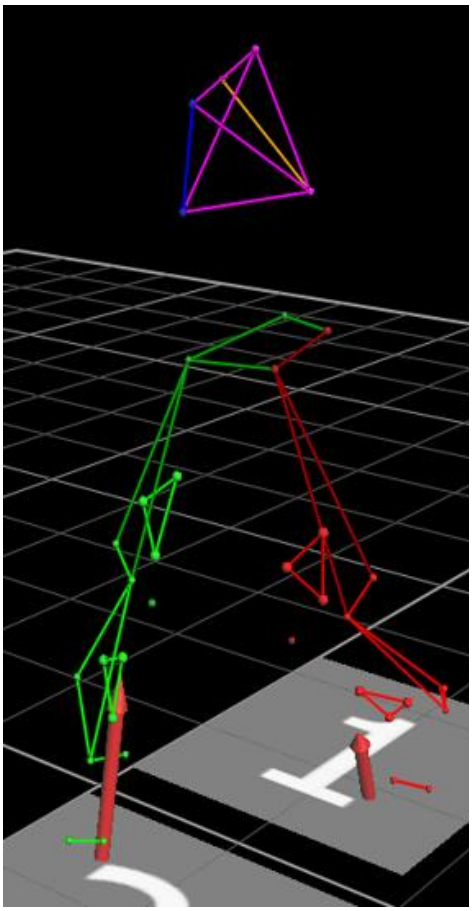
THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

Child Health Research Centre
Faculty of Medicine

Queensland Cerebral Palsy and Rehabilitation Research Centre

Faculty of Medicine, Child Health Research Centre
The University of Queensland

2017 Research Report



Report prepared by:
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Queensland cerebral palsy & rehabilitation research centre

Message from the Scientific Director of QCPRRC

2017 research highlights and achievements:

Building on 2016, the Queensland Cerebral Palsy and Rehabilitation Research Centre and our collaborators have had some outstanding successes and achievements in 2017.

Although first reported last year, the Advancing Cerebral Palsy in Queensland Partnership program really kicked into gear in 2017. This program, funded by the Queensland government's Advance Queensland Innovation Partnerships (AQIP) scheme unites The University of Queensland, the Australian e-Health Research Centre (AeHRC), Griffith University, the Cerebral Palsy Alliance and Children's Health Queensland in a quest to develop, test and implement new "toolboxes" of biological and clinical markers, for very early detection of CP in preterm and term-born infants.

Launched in early 2017, the national NHMRC funded Australasian Cerebral Palsy Clinical Trials Network (AusCP-CTN) Centre for Research Excellence has a mission to advance early detection of cerebral palsy, fast track children to clinical trials of new neuro-protectants, develop and test new rehabilitation methods, and translate knowledge into clinical practice through training and development of clinical guidelines.

Many of the activities of these two programs are synergistic, with the following outcomes in 2017:

1. We brought experts to Australia from around the globe to train our health professionals in techniques for early detection of cerebral palsy, including the Hammersmith Infant Neurological Examination (Professor Leena Hataaja from Helsinki), the General Movements Assessment (A/Prof Andrea Guzzetta) and the Hands Assessment of Infants (Dr Sue Greaves) methods.
2. We welcomed 17 parents of children with cerebral palsy to a research training workshop led by consumer engagement expert, Ann McKenzie AO, from Western Australia's Telethon Kids Institute. The workshop aimed to demystify research for families and to identify priority areas for future research that families feel are of high importance. The aim of the workshops was to develop consumer councils in each hub of the AusCP-CTN, to ensure consumer engagement in every aspect of the research process from development through to implementation.
3. Our inaugural Hot Topics in CP Research event brought together 120 researchers, families and clinicians from all over Australia and New Zealand to showcase work being done to improve early diagnosis and intervention for children with, or at risk of, cerebral palsy.
4. We hosted an intensive grant-writing workshop for 15 network members, clinicians and researchers from around Australia to hone their grant writing skills and boost their chances of funding success.

Senior Research Fellow, Dr Leanne Sakzewski was awarded two multi-site project grants from the NHMRC for ≈AUD$1M each to commence in 2018. The HABIT-ILE study will test the efficacy of intensive rehabilitation for children with bilateral CP in intensive camps for 2 weeks, assisted by collaborators from Belgium, CP Alliance and Curtin University. The Participate CP study is in collaboration with McGill University, Canada, CP Alliance and Curtin University to l test the efficacy of a behaviour modification, active leisure program to enhance children's participation in active sports and leisure activities.

Announced in late 2017, the QCRRC will be the lead centre for a new Cerebral Palsy Alliance (CPA) funded project known as VISIBLE to study an early vision intervention for seeing impaired babies through learning and enrichment. Also successful with new funding from the CPA to commence in 2018 was Endeavour QEII Fellow, Dr Kath Benfer for an extension to the LEAP CP program to be conducted in Queensland for indigenous families of infants at risk of Cerebral Palsy. This program, which uses video taken on a smart phone to screen at risk infants for early detection and to fast track intervention for babies at high risk of Cerebral Palsy, will be culturally adapted to suit remote indigenous Australian communities. A third CPA grant was awarded to Dr Koa Whittingham for Early PACT (Parenting Acceptance and Commitment Therapy). This study aims to explore the psychological impact for families at point of detection of cerebral palsy risk and to trial the efficacy of an innovative online parenting course.

Two of our researchers received National Fellowships in 2017. Dr Katherine Benfer was awarded a prestigious National Health and Medical Research Council Early Career Fellowship to conduct a

randomised trial of the Learning through Everyday activities with Parents Program for Indigenous families with infants at high risk of cerebral palsy. Dr Lee Barber received a Queensland Government Advance Queensland Fellowship for his study entitled “CP muscle-movement toolbox: to expand early detection of cerebral palsy.

Paediatric neurologist, Associate Professor Karen Barlow, was appointed as our inaugural Motor Accident Insurance Commission (MAIC) Chair in Paediatric Rehabilitation. Associate Professor Barlow specialises in the neurobiology and treatment of post-concussion syndrome (PCS) and was previously the Director of the Complex Concussion and Traumatic Brain Injury Research Program at the Alberta Children’s Hospital in Canada. The position is funded by MAIC, Child Health Queensland, the Child Health Foundation and the University of Queensland.

The commitment and dedication of graduating students was demonstrated as Emma Bacque, Joanne George, Alex Pagnozzi, Lee Reid and Piyapa Keawutan all achieved their PhDs at the end of 2017. We are proud of their dedication, drive and for the work they have done to advance our understanding of children with cerebral palsy.

Research Snapshot

New project funding achieved in 2017

- National Health and Medical Research Council (2018-2021), $1,014,872,”Participate-CP: Optimising participation in physically active leisure for children with cerebral palsy: A randomised controlled trial Investigators”, Sakzewski L, Elliott C, Boyd RN, Ziviani J, Novak I, Trost S, Majnemer A.
- National Health and Medical Research Council (2018-2021), $1,100,903,” HABIT-ILE: A randomised trial of Hand Arm Bimanual Intensive Training Including Lower Extremity training for children with bilateral cerebral palsy”, Sakzewski L, Boyd RN, Bleyenheuft Y, Novak I, Elliott C, Morgan C, Dowson N, Pannek K.
- Research Foundation of Cerebral Palsy Alliance project (2018-2019) $100,000 “Peer delivered early intervention for Indigenous Australian infants at high risk of cerebral palsy: a pilot RCT study” Benfer K. Boyd RN.,
- Research Foundation of Cerebral Palsy Alliance project (2018-2019) $172,730 “VISIBLE: Vision Intervention for Seeing Impaired Babies through Learning and Enrichment” Guzetta A, Boyd RN.
- Research Foundation of Cerebral Palsy Alliance project (2018-2019) $91,000 “Early Parenting Acceptance and Commitment Therapy 'Early PACT' for parents of infants with cerebral palsy” Whittingham K., Boyd RN., Sheffield J.

Total new competitive funding for QCPRRC: $2,479,505

- National Institute of Health (USA) (2017-2018) ($21,438) Machine Learning Algorithms to Measure Physical Activity in Children with Cerebral Palsy O’Neil M, Turchi R, Trost S, **Boyd RN**, Chandran C.

Total new competitive funding administered outside of QCPRRC: $21,438

New fellowship & scholarship funding achieved in 2017

- Queensland Government Advance Queensland Research Fellowship (2017-2019) $180,000 “CP muscle-movement toolbox: Expand early detection of cerebral palsy”, Barber L.
- NHMRC Early Career Research Fellowship (2018-2021) $322,952 “Peer delivered early intervention for infants at high risk of cerebral palsy in Indigenous Australia” Benfer K.

Total new competitive people support: $502,952

Awards and achievements

- In 2017 our QCPRRC staff and students have published 37 peer reviewed journal articles (36 published, one under review)
- Professor Roslyn Boyd was the winner of the Leader of the Year 2017 for the Faculty of Medicine at the University of Queensland.
- Dr Alex Pagnozzi received the Best Poster Award at the Australasian Academy of Cerebral Palsy & Developmental Medicine 2017.
- The Queensland Paediatric Rehabilitation Team was awarded the Child Health Queensland Research Excellence Award (accepted by Meredith Winter, Megan Kentish and Roslyn Boyd)

Figure 1: Professor Roslyn Boyd is congratulated by Professors Peter Høj (Vice-Chancellor) and Robyn Ward (Deputy Vice-Chancellor, Research) for winning Leader of the Year award for the Faculty of Medicine, University of Queensland.

- **Significant involvement in premier international conferences** throughout 2017:
  - At the 71th Annual Meeting of the American Academy of Cerebral Palsy and Developmental Medicine (AACPDM) in Quebec, Canada, the QCPRRC team gave a total of 8 free paper (podium) presentations and a 3 workshops on “Advance brain Imaging in CP’, “participation in CP” and ‘Mindfulness Yoga in CP”.
  - At the 29th European Academy of Childhood Disability Conference in Amsterdam, The Netherlands, the team gave 19 presentations including several seminars on “The PREMO toolbox”; “Advance brain Imaging in CP’ and “Muscle development in CP”.
- In 2017, the QCPRRC team had **five graduating PhD students**: Drs Emmah Baque, Piyapa Keawutan, Joanne George, Alex Pagnozzi and Lee Reid.

Key research themes at QCPRRC

The QCPRRC has seven key research themes reflecting the significant areas of need for investigation in infants, children, adolescents and adults with Cerebral Palsy and Acquired or Traumatic Brain Injury.

1. *Early detection of CP:* To develop early biomarkers of CP and fast track families to early interventions.
2. *Neuroscience*: nature of the brain structure relationships and measures of neuroplasticity.
3. *Neurorehabilitation* and the impact on motor, executive function and musculoskeletal outcomes.
4. *Novel therapies*: including the potential of neuroprotection strategies.
5. *Longitudinal outcomes*: Growth, nutrition, physical activity and cognitive outcomes.
6. *Novel outcomes*: Muscle development, function and biomechanics in cerebral palsy
7. *Interventions* to enhance child and family quality of life.
8. *Translational research*: Implementation of evidence based interventions to clinical practice.

Program Updates

AQIP: Advancing Cerebral Palsy in QLD
Early detection and early intervention for Infants at risk of Cerebral Palsy

Chief investigators: Prof Roslyn Boyd (QCPRRC), Prof Paul Colditz (UQCCR), Prof Stephen Rose (CSIRO), Dr Mohanraj Karunanithi (CSIRO), Prof Anthony Smith (COH), Prof Paul Scuffham (Health Economics, Griffith Uni), Dr Priya Edwards (Children's Health Queensland), Prof Iona Novak, Dr Cath Morgan, Prof Nadia Badawi (Cerebral Palsy Alliance).
Co-investigators: Dr Koa Whittingham, Dr Jeanie Sheffield, Prof Giovanni Cioni, Dr Andrea Guzzetta.
Competitive funding: Queensland Government Department of Science, Information Technology and Innovation "Advance QLD Innovation Partnership" $1,499,710 (2017-2019), with matching funding from partners (UQ, CSIRO, MCF, CHQ, CPA, GU) totalling $1,590,111. Total $3,079,821 over 3 years.

Advancing Cerebral Palsy in Queensland is a partnership between the University of Queensland, the Australian e-Health Research Centre (AeHRC), Griffith University, and the Cerebral Palsy Alliance. Cerebral palsy (CP) is the most common physical disability in children (1 in 500 children) arising from a brain injury occurring before or around birth. The lifelong consequences inflict enormous personal and financial burden on both families and society - it is Australia's 5th most expensive health condition. Despite the early brain injury, infants are frequently not diagnosed until 19 months-of age, even later for families in remote areas, delaying access to early interventions at a time of maximum neuroplasticity (brain remodelling capability).

All staff and students have been recruited and commenced working on all components of the project, as planned. Study recruitments for PPREMO and PACT have commenced as planned, including families and infants ahead of schedule. All required equipment (technology for remote interaction with families) has also been purchased and implemented into projects. Additionally, applications for ethical approval have been submitted to relevant committees across multiple Queensland sites.

Connecting with clinical professionals from across a number Hospital & Health Services across Queensland, we have established a clinical network (Queensland Early Detection and Early Interventiopn Network for infants at high risk of CP-QEDIN-CP) which aims to achieve earlier and more accurate identification of babies at high risk of later diagnosis of cerebral palsy, by providing support and training to inform and/or upskill clinicians and other health professionals (on the General Movements Assessment and the Hammersmith Infant Neurological Examination HINE). This network is open to all interested clinical professionals, and has been promoted on the Queensland Cerebral Palsy & Rehabilitation Research Centre (QCPRRC) website and newsletters. Families and babies from across Queensland is already benefiting from the QEDIN-CP network; the network has already reached out to clinicians across the state via telehealth and commenced in house training at the RBWH, Townsville Hospitals to assist in identifying infants who are at risk of CP.

In 2016 our national General Movements (GM) course trained 105 clinicians trained, of whom 78 were based in Queensland, from a range of locations including Brisbane, Sunshine Coast, Gold Coast, Ipswich, Cairns and Townsville)> Based on well received reviews a further 3 basic and advanced GMs course were offered in 2017.

Partnering with the Australasian Cerebral Palsy Clinical Trials Network (AusCP-CTN), a one-week cerebral palsy research forum, collaborative networking and consumer events was held 6th – 10th November 2017, attracting more than 120 researchers, families and clinicians from all over Australia and New Zealand. In particular, three basic and one advanced internationally accredited GM (General Movement) trainings were delivered to 77 researchers, allied health professionals and clinicians. Two international guest speakers lead training on the HINE (Prof Leena Hataaja from Finland) and GMs (A/Prof Andrea Guzzetta from Pisa). A national speaker A/Prof Mark Mackay gave an update on the national stroke guidelines.

Prof. Roslyn Boyd (Project Lead) has given multiple presentations to promote the AQIP research program across Queensland. These include three state-wide presentations (delivered via QLD Telehealth systems to >27 sites) and five in house presentations to neonatal/infant care units in South East Queensland. Members of the team have also attended and presented at the European Academy of Childhood Disability (see research achievements).

Please visit the Advancing Cerebral Palsy in Queensland web site for more information.
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Figure 2: Attendees at clinical training in the General Movements Assessment, November 2017

CRE: Australasian Cerebral Palsy Clinical Trials Network (AusCP-CTN)
Optimizing interventions and effective services for children with Cerebral Palsy

Chief investigators: Prof Roslyn Boyd, Prof Iona Novak, Prof Euan Wallace, Prof Nadia Badawi, A/Prof Michael Fahey, Prof Stephen Rose, Prof. Paul Colditz, Prof Jenny Ziviani, Prof Catherine Elliott, Prof Ngaire (Sue) Stott.

Associate investigators: A/Prof Andrea Guzzetta, Prof Anthony Smith, A/Prof Jenny Whitty, Dr Koa Whittingham, Dr Lee Barber, Prof Peter Davies, A/Prof Ray Russo, Prof Robert Ware, Dr Sarah McIntyre, Dr Jurgen Fripp, Dr Kerstin Pannek.

Competitive funding: NHMRC Centre for Research Excellence (CRE) #116442. $2,499,287 (2016-2020).

The **Australasian Cerebral Palsy Clinical Trials Network Centre for Research Excellence** (AusCP-CTN CRE) will uplift earlier detection of CP across Australasia, fast track children to multisite randomised clinical trials of new neuroprotectants and develop and test new rehabilitation. Knowledge translation studies will ensure effective transfer to enhanced clinical practice. The CRE will overcome known barriers to implementation by developing Clinical Care Pathways and International Clinical Practice Guidelines, guided by a consumer network. The changes in outcomes of children with CP due to the new clinical trials will be tested in Australian Cerebral Palsy Register (ACPR).

The CRE held a very successful week of training (3 Basic and 1 Advanced General Movements Course for 66 participants; the Hand Assessment of Infants Course (20 Participants); Intensive Grant and Fellowship writing course (15 Participants); HINE: Hammersmith Infant Neurological Assessment for Training the trainers (21 participants) and a two day Hot Topics Symposium (15 speakers, 109 participants) and two Consumer training workshops (21 participants). We welcomed three international GMs trainers (A/Prof Guzzetta, Dr Vittorio Belmonte, Dr Natascia Bertoncelli) and A/Prof Alicia Spittle from UniMelb; an international expert on the HINE Prof Leena Haataja from Helsinki, Mr Richard Ellenson, and Rachel Bryne from the International CP Foundation in New York and National Speaker A/Prof Mark Mackay head of the Childhood Stroke network at MCRI Melbourne.

One highlight in the varied program was a non-research perspective from guest speaker, Mr Richard Ellenson, father of a 20 year old son with cerebral palsy and CEO of the Cerebral Palsy Foundation in New York. Mr Ellenson is a passionate advocate for children with disabilities and was behind the development of a range of assistive technologies and a purpose-built cerebral palsy channel aimed at families that features videos from disability advocates and world experts on cerebral palsy.

Please visit the CRE web site for more information.

QCPRRC Publications in 2017

Journal Articles

1. Baque, E.*, Barber, L.*, Sakzewski, L.*, Ware, R.* & Boyd, R.* (2017) Characteristics associated with physical activity capacity and performance in children and adolescents with an acquired brain injury. Brain Injury, 31(5): 1-7.
2. Baque E, Barber L*, Sakzewski L* & Boyd RN. (2017). Randomized controlled trial of web-based multimodal therapy for children with acquired brain injury to improve gross motor capacity and performance. Clinical Rehabilitation, 31(6), 722-732.
3. Baque E*, Sakzewski L*, Boyd RN* & Barber L* (2017) Validity of accelerometry to measure physical activity in children with brain injury. Pediatric Physical Therapy, 29(4): 322-329.
4. Barber, L.*, Carty, C., Modenese, L., Walsh, J., Boyd, R.* & Lichtwark, G.* (2017) Medial gastrocnemius and soleus muscle-tendon unit, fascicle, and tendon interaction during walking in children with cerebral palsy. Developmental Medicine and Child Neurology, 59(8): 843-851.
5. Benfer KA, Weir KA, Bell KL, Ware RS, Davies PSW, Boyd RN. Oropharyngeal Dysphagia and Cerebral Palsy. Pediatrics. 140(6): e20170731.
6. Benfer, K.*, Weir, K., Bell, K.*, Ware, R.*, Davies, P.* & Boyd, R.* (2017) The eating and drinking ability classification system in a population-based sample of preschool children with cerebral palsy. Developmental Medicine and Child Neurology, 59(6): 647-654.
7. Benfer, K.*, Weir, K., Ware, R.*, Davies, P.*, Arvedson, J., Boyd, R.* et al. (2017) Parent-reported indicators for detecting feeding and swallowing difficulties and undernutrition in preschool-aged children with cerebral palsy. Developmental Medicine and Child Neurology, 59(11): 1181-1187.
8. Boyd, R.*, Davies, P.*, Ziviani, J.*, Trost, S., Barber, L.*, Ware, R. et al. (2017) PREDICT-CP: Study protocol of implementation of comprehensive surveillance to predict outcomes for school-aged children with cerebral palsy. BMJ Open, 7(7), 014950.
9. Boyd RN*, Ziviani J*, Sakzewski L*, Novak I, Badawi N, Pannek K et al. (2017) REACH: Study protocol of a Randomised trial of Rehabilitation very EArly in Congenital Hemiplegia. BMJ Open, 7(9).
10. Branjerdporn N, Ziviani J, Sakzewski L. Goal-directed occupational therapy for children with unilateral cerebral palsy: categorising and quantifying session content. *British Journal of Occupational Therapy* 2017; 21 December 2017 (epub ahead of print).
11. Bautista, M., Whittingham K*., Edwards P., Boyd RN. (2017). Psychometric Properties of parent and child reported sleep assessment tools in children with cerebral palsy: a systematic review. Developmental Medicine and Child Neurology. 2017. P1-11; doi:10.1111/dmcn.13609.
12. Campbell M, Rabbidge B, Ziviani J, Sakzewski L. Clinical feasibility of preoperative neurodevelopmental assessment of infants undergoing open-heart surgery. *Journal of Paediatrics and Child Health* 2017, 53(8):794-799.
13. Comans, T., Mihala, G., Sakzewski, L.*, Boyd, R.* & Scuffham, P. (2017) The cost-effectiveness of a web-based multimodal therapy for unilateral cerebral palsy: the Mitii randomized controlled trial. Developmental Medicine and Child Neurology, 59(7): 756-761.
14. Evans T, Boyd R, Colditz P, Sanders M & Whittingham K.* (2017). Mother-Very Preterm Infant Relationship Quality: RCT of Baby Triple P. *Journal of Child and Family Studies*, 26(1), 1-12.

15. George, J., Fiori, S., Fripp, J., Pannek, K., Bursle, J., Moldrich, R.* et al. (2017) Validation of an MRI brain injury and growth scoring system in very preterm infants scanned at 29-to 35-week postmenstrual age. American Journal of Neuroradiology, 38(7): 1435-1442.

16. George, J.*, Pannek, K., Rose, S., Ware, R.*, Colditz, P.* & Boyd, R.* (2017) Diagnostic accuracy of early magnetic resonance imaging to determine motor outcomes in infants born preterm: A systematic review and meta-analysis. Developmental Medicine and Child Neurology.

17. Kainz, H., Graham, D., Edwards, J., Walsh, H., Maine, S., Boyd, R.* et al. (2017) Reliability of four models for clinical gait analysis. Gait and Posture, 54: 325-331.

18. Kainz, H., Hoang, H., Stockton, C., Boyd, R.*, Lloyd, D. & Carty, C. (2017) Accuracy and reliability of marker-based approaches to scale the pelvis, thigh, and shank segments in musculoskeletal models. Journal of Applied Biomechanics, 33(5): 354-360.

19. Keawutan, P.*, Bell, K.*, Oftedal, S.*, Davies, P., Ware, R.* & Boyd, R.* (2017) Habitual physical activity in children with cerebral palsy aged 4 to 5 years across all functional abilities. Pediatric Physical Therapy, 29(1): 8-14.

20. Keawutan, P., Bell, K., Oftedal, S.*, Ware, R.*, Stevenson, R., Davies, P.* et al. (2017) Longitudinal physical activity and sedentary behaviour in preschool-aged children with cerebral palsy across all functional levels. Developmental Medicine and Child Neurology, 59(8): 852-857.

21. Larmar S, O'Leary P, Chui C, Benfer K, Zug S, Jordan LP. Hazardous child labor in Nepal: the case of brick kilns. Child Abuse & Neglect. 2017; 72: 312-325.

22. Laporta-Hoyos O, Pannek K, Ballester-Plané J, Reid LB, Vázquez É, Delgado I, Zubiaurre-Elorza L, Macaya A, Póo P, Meléndez-Plumed M, Junqué C, Boyd R* & Pueyo R. (2017). White matter integrity in dyskinetic cerebral palsy: Relationship with intelligence quotient and executive function. *NeuroImage: Clinical, 15*, 789-800.

23. Mailleux, L., Klingels, K., Fiori, S., Simon-Martinez, C., Demaerel, P., Locus, M. et al. (2017) How does the interaction of presumed timing, location and extent of the underlying brain lesion relate to upper limb function in children with unilateral cerebral palsy?. European Journal of Paediatric Neurology, 21 (5): 763-772.

24. Mak, C.*, Whittingham, K.*, Cunnington, R.* & Boyd, R.* (2017) MiYoga: A randomised controlled trial of a mindfulness movement programme based on hatha yoga principles for children with cerebral palsy: A study protocol. BMJ Open, 7(7).

25. Mak C., Whittingham K*, Cunnington R. & Boyd RN. (2017) Efficacy of Midfulness based interventions for Attention and Executive Function in Children and Adolescents _ A systematic review. *Mindfulness*. doi:10.1007/s12671-017-0770-6 (published 26th July,2017)

26. Novak, I., Morgan, C., Adde, L., Blackman, J., Boyd, R.*, Brunstrom- Hernandez, J. et al. (2017) Early, accurate diagnosis and early intervention in cerebral palsy: Advances in diagnosis and treatment. Jama Pediatrics, 171 (9): 897-907.

27. Obst S.J.*, Boyd R.*, Read F. & Barber L.* (2017) Quantitative 3-D Ultrasound of the Medial Gastrocnemius Muscle in Children with Unilateral Spastic Cerebral Palsy. Ultrasound in Medicine and Biology, 43(12): 2814-2823.

28. Obst S, Read F, Boyd R, Barber L., Quantitative 3D ultrasound of muscle in children with unilateral cerebral palsy. Developmental Medicine & Child Neurology 2017, 59:52-53.

29. Obst SJ, Barber L, Miller A, Barrett RS. Reliability of Achilles Tendon Moment Arm Measured In Vivo Using Freehand Three-Dimensional Ultrasound. Journal of applied biomechanics, 2017, 33 (4), 300-304

30. Oftedal, S.*, Davies, P.*, Boyd, R.*, Stevenson, R., Ware, R.*, Keawutan, P.* et al. (2017) Body composition, diet, and physical activity: a longitudinal cohort study in preschoolers with cerebral palsy. American Journal of Clinical Nutrition, 105(2): 369-378.

31. Pagnozzi, A.*, Dowson, N., Doecke, J., Fiori, S., Bradley, A.*, Boyd, R.* et al. (2017) Identifying relevant biomarkers of brain injury from structural MRI: validation using automated approaches in children with unilateral cerebral palsy. PLoS One, 12(8).

32. Read, F.*, Boyd, R.* & Barber, L.* (2017) Longitudinal assessment of gait quality in children with bilateral cerebral palsy following repeated lower limb intramuscular Botulinum toxin-A injections. Research in Developmental Disabilities, 68: 35-41.

33. Reedman, S.*, Boyd, R.*, Elliott, C. & Sakzewski, L.* (2017) ParticiPAte CP: a protocol of a randomised waitlist controlled trial of a motivational and behaviour change therapy intervention to increase physical activity through meaningful participation in children with cerebral palsy. BMJ Open, 7(8).

34. Reedman, S.*, Boyd, R.* & Sakzewski, L.* (2017) The efficacy of interventions to increase physical activity participation of children with cerebral palsy: a systematic review and meta-analysis. Developmental Medicine and Child Neurology, 59(10): 1011-1018.

35. Reid, L.*, Pagnozzi, A.*, Fiori, S., Boyd, R.*, Dowson, N. & Rose, S. (2017) Measuring neuroplasticity associated with cerebral palsy rehabilitation: an MRI based power analysis. International Journal of Developmental Neuroscience, 58: 17-25.

36. Sakzewski L, Lewis M, Ziviani J. Test retest reproducibility of the Assessment of Motor and Process Skills for school-aged children with acquired brain injuries. *Scandinavian Journal of Occupational Therapy* 2017, 24(3):161-166.

Journal Articles under Review

1. Benfer KA, Novak I, Morgan C, Whittingham K, Khan NZ, Ware RS, Bell KL, Bandaranayake S, Salt A, Ghsoh AK, Bhattacharya A, Samanta S, Moula G, Bose D, Tripathi S, Boyd RN. Community-based parent delivered early detection and intervention program for infants at high risk of cerebral palsy in a low-resource country (Learning through Everyday Activities with Parents (LEAP-CP): protocol for a randomised controlled trial. Under review BMJ Open.

Published Conference Abstracts

1. Barber, L., Alexander, C., Boyd, R., Reid, S., Valentine, J., Stannage, K., Elliott, C. (2017). *Validity and intra-rater reliability of freehand 3D ultrasound for the determination of lower leg muscle volume in children with cerebral palsy.* Oral presentation at the European Academy of Childhood Disability, Amsterdam, The Netherlands. *Developmental Medicine and Child Neurology 2017; 59*

2. Barber, L., Carty, C., Walsh, J., Boyd, R., Lichtwark, G. (2017). *Medial gastrocnemius fascicle function during walking in children with cerebral palsy following gastrocnemius lengthening surgery*. Oral presentation at the European Academy of Childhood Disability, Amsterdam, The Netherlands. *Developmental Medicine and Child Neurology 2017; 59*

3. Benfer, K., Wier, K., Bell, K., Ware, R., Davis, P., Boyd, R. (2017). *Eating and Drinking Ability Classification System in a population-based sample of preschool children with cerebral palsy*. Oral presentation at the European Academy of Childhood Disability, Amsterdam, The Netherlands. *Developmental Medicine and Child Neurology 2017; 59*

4. Benfer, K., Wier, K., Davis, P., Boyd, R., Arvedson, J., Bell, K. (2017). *Risk factors for identifying feeding difficulties and undernutrition in children with cerebral palsy.* Oral presentation at the European Academy of Childhood Disability, Amsterdam, The Netherlands. *Developmental Medicine and Child Neurology 2017; 59*

5. Benfer, K., Weir, K., Bell, K., Ware, R., Davies, P., Boyd, R. (2017). *When is a problem a problem? Evaluation of oropharyngeal dysphagia in preschool children with cerebral palsy*. Presentation at the European Academy of Childhood Disability, Amsterdam, The Netherlands. *Developmental Medicine and Child Neurology 2017; 59*

6. Branjerdporn, N., Ziviani, J., Sakzewski, L. (2017). *Content of Standard Occupational Therapy Sessions for Children with Unilateral Cerebral Palsy.* Presentation at the Occupational Therapy Australia Conference, Perth, Australia.

7. Boyd, R., Guzzetta, A., Pagnozzi, A. (2017). *Brain structure and Function in children with Cerebral Palsy: State of the clinical science.* Developmental Medicine & Child Neurology: Abstracts of the American Academy for Cerebral Palsy and Developmental Medicine 71st Annual Meeting, Quebec, Canada. *Developmental Medicine & Child Neurology, 59*.

8. Boyd, R., Reid, L. (2017). *Neuroplasticity in a randomised clinical trial of multi-modal training of children with unilateral cerebral palsy?* Presentation at the Developmental Medicine & Child Neurology: Abstracts of the American Academy for Cerebral Palsy and Developmental Medicine 71st Annual Meeting, Quebec, Canada. *Developmental Medicine & Child Neurology, 59*.

9. George, J., Fiori, S., Fripp, J., Pannek, K., Guzzetta, A., Coulthard, A., Ware, R., Rose, S., Colditz, P., Boyd, R. (2017). *Brain structure at 29–35 weeks postmenstrual age is related to cognitive outcomes at 12 months corrected age in infants born very preterm*. Poster presentation at the European Academy of Childhood Disability, Amsterdam, The Netherlands: 29th European Academy of Childhood Disability Conference (EACD); Amsterdam, The Netherlands: *Developmental Medicine and Child Neurology 2017; 59: 64. doi: 10.1111/dmcn.13456*

10. George, J., Fiori, S., Fripp, J., Pannek, K., Guzzetta, A., Coulthard, A., Ware, R., Rose, P. , S., Colditz, Boyd, R. (2017). *New structural MRI scoring system at 29-35 weeks postmenstrual age is associated with motor outcomes at 12 months corrected age in infants born very preterm.* 29th European Academy of Childhood Disability Conference (EACD); Amsterdam, The Netherlands: *Developmental Medicine and Child Neurology* 2017; 59:21. doi: 10.1111/dmcn.13455

11. George, J., Fiori, S., Fripp, J., Pannek, K., Bursle, J., Moldrich, R., Guzzetta, A., Coulthard, A., Ware, R., Rose, S., Colditz, P., Boyd, R. (2017). *Novel early structural MRI scoring system for use at 29-35 weeks postmenstrual age in very preterm infants.* The 71st Annual Meeting of the American Academy for Cerebral Palsy and Developmental Medicine (AACPDM). Montreal, Canada*: Developmental Medicine and Child Neurology 2017; 59(S3):14-5. 10.1111/dmcn.16_13511*

12. Gillett, J., Lichtwark, G., Boyd, R., Barber, L. (2017). *Muscle function in young adults with cerebral palsy walking uphill and downhill.* Oral presentation at the European Academy of Childhood Disability, Amsterdam, The Netherlands. *Developmental Medicine and Child Neurology 2017; 59(S3)*

13. Gillett, J., Lichtwark, G., Boyd, R., Barber, L. (2017). *The impact of functional anaerobic and strength training on muscle volume, strength and functional capacity in young adults with cerebral palsy.* Oral presentation at the European Academy of Childhood Disability, Amsterdam, The Netherlands. *Developmental Medicine and Child Neurology 2017; 59(S3)*

14. Laporta-Hoyos, O., Pannek, K., Ballester-Plane, J., Vazquez, E., Delgado, I., Zubiaurre-Elorza, L., Macaya, A., Póo, O., Melendez-Plumed, M., Junqué, C., Boyd, R., Pueyo, R. (2017). *Relationship between executive function and white matter microstructure in dyskinetic cerebral palsy.* Oral presentation at the European Academy of Childhood Disability, Amsterdam, The Netherlands. *Developmental Medicine and Child Neurology 2017; 59(S3)*

15. Laporta-Hoyos, O., Pannek, K., Ballester-Plane, J., Vazquez, E., Delgado, I., Zubiaurre-Elorza, L., Macaya, A., Póo, O., Melendez-Plumed, M., Junqué, C., Boyd, R., Pueyo, R. (2017). *White matter microstructure is related to intelligence quotient level in dyskinetic cerebral palsy.* Poster presentation at the European Academy of Childhood Disability, Amsterdam, The Netherlands. *Developmental Medicine and Child Neurology 2017; 59(S3)*

16. Mak, C., Boyd, R. (2017). *Application of MiYoga, a novel embodied mindfulness movement program, for children with cerebral palsy.* Developmental Medicine & Child Neurology: Abstracts of the American Academy for Cerebral Palsy and Developmental Medicine 71st Annual Meeting, Quebec, Canada. *Developmental Medicine & Child Neurology, 59*(s9).

17. Mak, C., Whittingham, K., Boyd, R., Cunnington, R. (2017). *MiYoga – A Randomized controlled trial of a novel Mindfulness Yoga program to enhance attention for child-parent dyads with unilateral and bilateral cerebral palsy.* Presentation at the Developmental Medicine & Child Neurology: Abstracts of the American Academy for Cerebral Palsy and Developmental Medicine 71st Annual Meeting, Quebec, Canada. *Developmental Medicine & Child Neurology, 59*(s9).

18. Mak, C., Wittingham, K., Cunnington, R., Boyd, R. (2017). *MiYoga: a randomized controlled trial of an embodied mindfulness yoga program to enhance attention for child-parent dyads with unilateral and bilateral cerebral palsy*. Oral presentation at the European Academy of Childhood Disability, Amsterdam, The Netherlands. *Developmental Medicine and Child Neurology 2017; 59(S3)*

19. Obst, S., Barber, L., Boyd, R. (2017). *Quantitative 3D ultrasound of muscle in children with unilateral cerebral palsy.* Presentation at the Developmental Medicine & Child Neurology: Abstracts of the American Academy for Cerebral Palsy and Developmental Medicine 71st Annual Meeting, Quebec, Canada.

20. Pagnozzi, A. (2017). *Measuring Neuroplasticity in Cerebral Palsy: What cohort sizes are needed for MR imaging?* Poster presentation at the Developmental Medicine & Child Neurology: Abstracts of the American Academy for Cerebral Palsy and Developmental Medicine 71st Annual Meeting, Quebec, Canada.

21. Pagnozzi, A. (2017). *Optimization of MRI-based scoring scales of brain injury severity in children with unilateral cerebral palsy.* Presentation at the Developmental Medicine & Child Neurology: Abstracts of the American Academy for Cerebral Palsy and Developmental Medicine 71st Annual Meeting, Quebec, Canada. *Developmental Medicine & Child Neurology, 59*(s9).

22. Pagnozzi, A., Dowson, N., Doecke, J., Fiori, S., Bradley, A., Boyd, R., Rose, S. (2017). *Classification of brain injury from structural MRI: validation using automated approaches in children with unilateral cerebral palsy.* Oral presentation at the European Academy of Childhood Disability, Amsterdam, The Netherlands. *Developmental Medicine and Child Neurology 2017; 59(S3)*

23. Peterson,M., Dayanidhi, S., Barber, L. (2017). *Exercise and Musculoskeletal Health in Cerebral Palsy: Mechanisms to Prescription.* Presentation at the European Academy of Childhood Disability, Amsterdam, The Netherlands. *Developmental Medicine and Child Neurology 2017; 59(S3)*

24. Read, F., Boyd, R., Barber, L. (2017). *Relationship between plantar flexor muscle volume and gait quality on the Edinburgh Visual Gait Score in ambulant children with cerebral palsy.* Oral presentation at the European Academy of Childhood Disability, Amsterdam, The Netherlands. *Developmental Medicine and Child Neurology 2017; 59(S3)*

25. Reedman, S., Boyd, R., Sakzewski, L. (2017). *Efficacy of a participation-focused therapy intervention on participation in physical activities, health-related quality of life, and behavioural barriers to participation in children with cerebral palsy.* Presentation at the Developmental Medicine & Child Neurology: Abstracts of the American Academy for Cerebral Palsy and Developmental Medicine 71st Annual Meeting, Quebec, Canada. *Developmental Medicine & Child Neurology, 59*(s9).

26. Sakzewski, L. (2017). *Self-care in children with cerebral palsy and its relationship to manual ability: A longitudinal study.* Presentation at the Developmental Medicine & Child Neurology: Abstracts of the American Academy for Cerebral Palsy and Developmental Medicine 71st Annual Meeting, Quebec, Canada. *Developmental Medicine & Child Neurology, 59*(s9).

27. Sakzewski, L., Reedman, S., Willis, C., et al. (2017). *Pearls and pitfalls of participation-focused interventions for children with physical disabilities.* Developmental Medicine & Child Neurology: Abstracts of the American Academy for Cerebral Palsy and Developmental Medicine 71st Annual Meeting, Quebec, Canada. *Developmental Medicine & Child Neurology, 59*(s9).

28. Sgandurra, G., Braito, I., Maselli, M., Beani., Cecchi, F., Sicola, E., Dario, P., Cioni, G., Boyd, R. (2017). *Asymmetry of upper limb activity in children with unilateral cerebral palsy: validation of a triaxial accelerometer approach.* Oral presentation at the European Academy of Childhood Disability, Amsterdam, The Netherlands. *Developmental Medicine and Child Neurology 2017; 59(S3)*

Other Conference Abstracts

1. Branjerdporn, N., Ziviani, J,, & Sakzewski, L . (2017). *Content of Standard Occupational Threapy Sessions for Children with Unilateral Cerebral Palsy* National Conference Occupational Therapy Australia.

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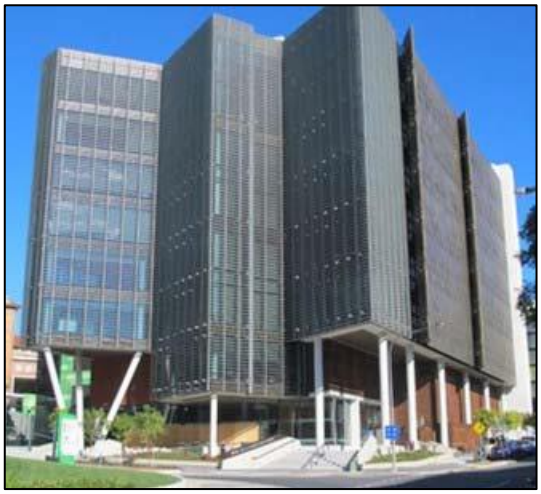

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