The IOPTP Newsletter

The International Organisation of Physical Therapists in Paediatrics | Edition 22, October 2019

President's Message

Once again the WCPT Congress brought together several thousand Physical Therapists from around the world. Geneva was a grand city to visit and the conference center and hotel were convenient and comfortable. The IOPTP booth had many visitors who gathered to discuss pediatric physical therapy and to receive a yo-yo embossed with the IOPTP logo and website. It was quite fun to see how many could play with the yo-yo. Barbara Connolly and I were the representatives for the IOPTP at the General Meeting of WCPT. Over 2 days, delegates from most of the WCPT member organizations learned more about re-organization of the WCPT headquarters, updated policies, and upcoming events. The **2021 Congress in Dubai** has already been announced and more information was shared. The **2023 Congress will be held in Tokyo, Japan**. Mark your calendars now for one or both of these exciting events.

The IOPTP business meeting was held on Saturday following programming. **15 "official" delegates** represented their countries/member organizations and participated in elections. Individuals representing the member-elect groups: Belgium, Greece and the United Kingdom, were also in attendance. Additional members included those from Australia, Belgium, Canada, Italy, Japan, Korea, Netherlands, New Zealand, South Korea, Switzerland, Taiwan, and the United States.

Elections

The following organizations were unanimously approved as member organizations: **Welcome to Belgium, Colombia, Greece, Saudi Arabia, Spain, and the United Kingdom.**

The following officers were elected:

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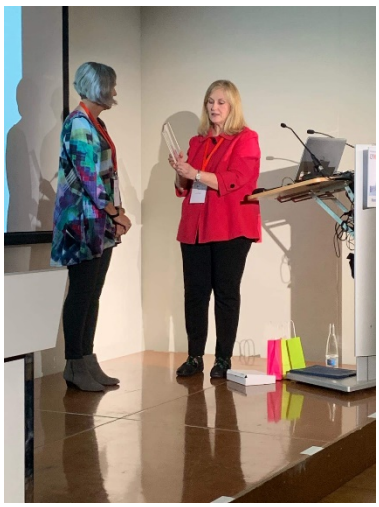
For submissions or questions regarding the newsletter please contact the newsletter editor Erin Wentzell PT, DPT, PCS at

IOPTP Board	Elected Officer
President	Sheree York (USA)
Vice President	Karen Hurtubise (Canada)
Treasurer	Anjo Janssen (Netherlands)
Secretary	Barbara Connolly (USA)
Member-at-Large	Nikki Milne (Australia)

School-based forum lead by Chantal and Hilda, Barbara and Sheree at WCPT General Meeting, and IOPTP reception.

Congratulations



IOPTP Barbara Connolly Distinguished Service Award (newly created and so named for our inaugural president) was announced with Barbara (*USA, picture on the left)* and our first recipient, **Maria vander-Sanden (Netherlands)**, receiving the award (*picture on the right*).

IOPTP's first research grant (newly created) was described and awarded to **Hilda Mulligan (New Zealand) and Chantel Camden (Canada)**. 4 proposals were submitted and reviewed by an appointed group of 4 reviewers from the Research Committee. This project will focus on describing pediatric physical therapy services around the world (you may receive a request to participate in their survey). A networking session was held with over 100 participants on Sunday to provide insights for this study: The SCOOPPP study: An international perspective of Scope, Context, Organization of services and Practices in Paediatric Physiotherapy. In addition, a smaller group met separately to discuss school-based services.

Posters and Programming

Paediatrics was well represented at the Congress. Suzanne Campbell and Susan Harris presented the TIMP and HINT, respectively, in a pre-conference course on Friday. Sheree York facilitated a panel discussion on Transitions from Childhood to Adult Services on Sunday with a lively discussion from the panel members and the audience. There were 89 posters: 69 paediatric and 20 paediatric cerebral palsy. The recipient of the paediatrics awards: Kuan-Yu Huang (Taiwan)
Correlation Between Trajectories Of General Movements Of Premature Infants And Their Cognitive Development At Three Years Of Age (PO-K-27-SUN1)
Paediatric platforms were presented all 3 days with several presentations from Taiwan.
Check out the IOPTP webpage at www.ioptp.wcpt.org for resources, announcements, and newsletters
Just an update on activities since WCPT Congress:

- Other **paediatric PT conferences** are being planned by the Netherlands (Nov 2019) and the United Kingdom (Nov 2020). Watch for more information about these conferences. IOPTP officers have been in discussion about ways to support and contribute to more regional conferences such as these. We will be posting information on the IOPTP webpage to help promote paediatric PT conferences.

- **Dale Scalise-Smith** was nominated and accepted to the 2019 WCPT Congress Program Committee. Congratulations Dale. She will do a great job making sure paediatrics programming is relevant and high quality.

The IOPTP officers and committee chairs welcome your ideas and questions.

Committee	Committee Chair Person(s)	Goals	Activities
Practice Committee	Marquerithe Barree reappointed	• Explore and share resources related to paediatric PT practice	• Providing content to various IOPTP Newsletters • Posting on the IOPTP Facebook Group **Suggestions for the future:**

			• List of (freely accessible) Assessment Tools • List of post-academic training options in the field of Paediatrics • Initiate more special interest groups • Member problem solving
Education Committee	Barbara Connolly, outgoing, Donna Cech, newly appointed	• Identify teaching/educational modules or webinars for academic teaching or continuing education based on high priority topics and disseminate by posting/linking on the IOPTP website • Develop IOPTP guideline for pediatric content in physical therapist professional entry level education based on 2017 survey of IOPTP Members • Identify and publish post-entry level programs, residencies and fellowships in paediatric PT • Identify and explore opportunities for learning (clinical and academic) and collaborative exchanges for short-term work: students, clinicians, educators, researchers	• Contract with MedBridge finalized in 2018 . Courses now available to IOPTP members at discount rate • IOPTP Guideline is now available to IOPTP members on WCPT/IOPTP Website • www.ioptp.wcpt.org • The information was obtained on the 2017 survey of IOPTP members and will be published on the IOPTP website in 2019 • Some information was obtained on the 2017 survey of IOPTP members but needs to be further explored in 2019
Program Committee	Dale Scalise Smith reappointed	• Plan programming for WCPT conference • Identify priority topics, speakers • Encourage proposals for posters and presentations	• Judge posters and select winner of award at WCPT Congress 2019 • Suggestions for the Future • Explore opportunities to partner with other organizations' continuing education conferences • Communication with member organizations and other associations to identify roles and opportunities for partnering, sharing information • Identify state of the art topics and speakers • Discussion with The Netherlands to collaborate for 2019 European Paediatric PT Conference • Discussions to collaborate with UK for 2020 conference
Research Committee	Hilda Mulligan outgoing, Chantal Camden and	• Knowledge dissemination • Promote dissemination of research	• 2017 Database of research committee member's research interests, research 'spots' in newsletter • 2018 Mentors for WCPT presenters

	Kine Johansen, newly appointed	• Supporting research • Supporting research collaboration • Knowledge Translation • Develop/disseminate guidelines for practice • Develop a database of international/inter-country exchange opportunities to build links and projects	• 2018 Abstract reviewers for WCPT • 2016 Ethics in research & practice with children (in newsletter) –Brenda Morrows (South Africa) • 2017 Survey of member organizations sent to explore the experience of PTs in assessing and treating pediatric obesity. Responses received from 248 therapists. • Obesity survey results indicate the learning needs of therapists in assessing and managing obesity in children. • 2018 proposal approved for funding research projects – application process developed and approved-first recipient to be announced • 2019 Collaborative research project (Scope and Practice of pediatric PT worldwide) – Chantal Camden & Hilda Mulligan with Research committee & Executive committee IOPTP, Networking Session at WCPT • Development and dissemination of the Community-based Childhood Early Intervention handbook (into Chinese language) – Hua-Fang Liao (Taiwan) • Paediatric group in NZ has developed an approach to identify, appraise and recommend clinical guidelines to its members • Inter-country exchange – e.g. i) Linda Fetters (US) on Fullbright Scholarship to Australia, ii) Chantal Camden on sabbatical to NZ and Australia
Communications Committee	Erin Wentzell reappointed	• To communicate with members • To provide a conduit of information dissemination and discussion for paediatric physical therapists around the world	• Seek out submissions from around the world on various topics • Reach out to member countries regarding therapists to recognize for their great work • Organize submissions and generate the bi-yearly newsletters • Increase use of the Facebook page and the website to discuss research, support therapists and engage the international community • Increase the number of newsletters as the number of submissions increases • Welcome new ideas and committee members

Congratulations to the Newly Appointed and Re-Appointed Committee Chairs and Thank You for your Service and Commitment to Paediatric Physical Therapy.

Best regards,

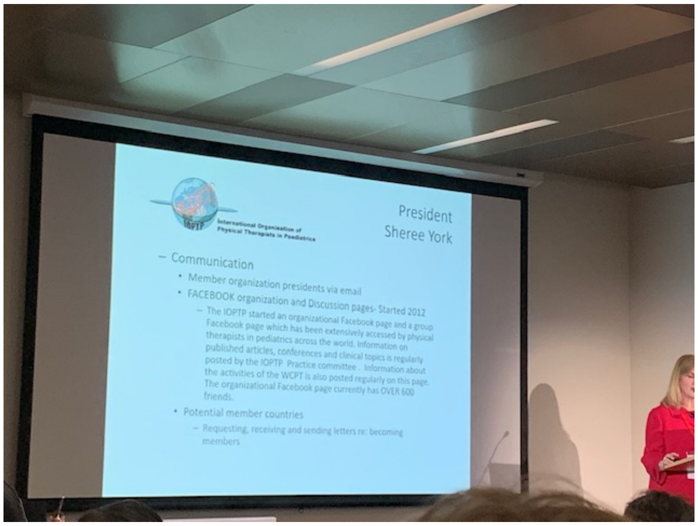
Sheree York PT,DPT,PCS,cNDT

President, IOPTP

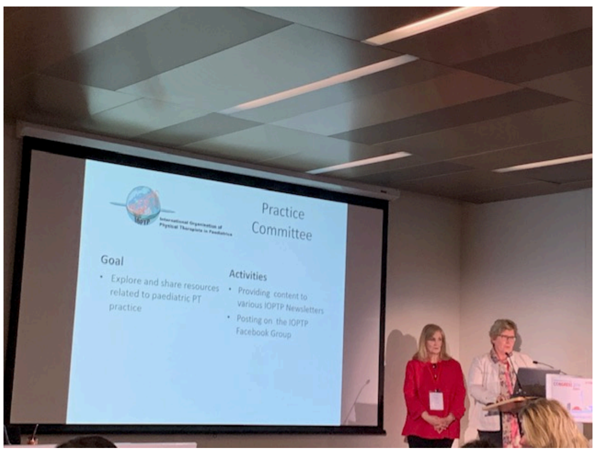
Congress Spotlight: Geneva 2019 Highlights

World Confederation for Physical Therapy
CONGRESS 2019
Geneva
10-13 May

The IOPTP general meeting featured presentations by committees & board members.


International Organization of Physical Therapists in Paediatrics
President
Sheree York
– Communication
• Member organization presidents via email
• FACEBOOK organization and Discussion pages- Started 2012
– The IOPTP started an organizational Facebook page and a group Facebook page which has been extensively accessed by physical therapists in pediatrics across the world. Information on published articles, conferences and clinical topics is regularly posted by the IOPTP Practice committee. Information about the activities of the WCPT is also posted regularly on this page. The organizational Facebook page currently has OVER 600 friends.
• Potential member countries
– Requesting, receiving and sending letters re: becoming members


Vice-President
Maria Van-derSanden
2015
2016
2017
2018
2019
Revenue
Expenses
Balance


International Organization of Physical Therapists in Paediatrics
Practice Committee
Goal
• Explore and share resources related to paediatric PT practice
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• Providing content to various IOPTP Newsletters
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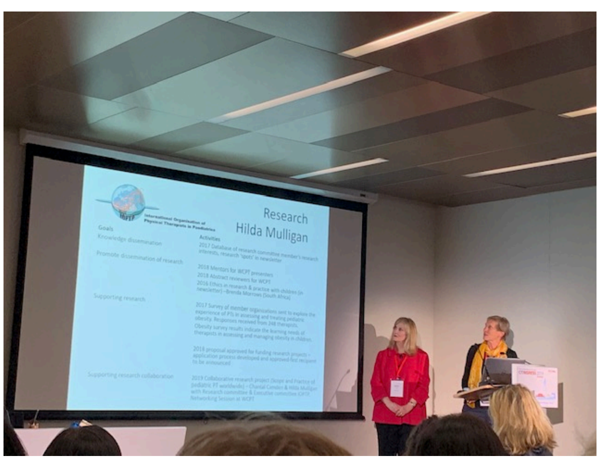
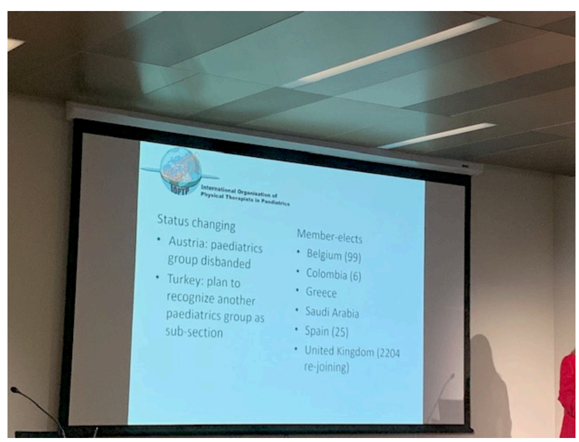
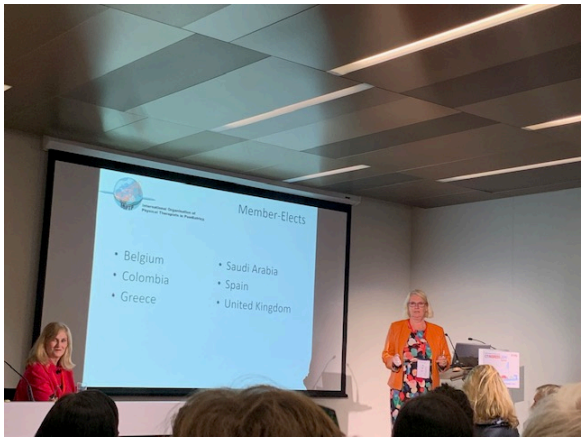
International Organization of Physical Therapists in Paediatrics
Education
Barbara Connolly
GOAL
• Develop IOPTP guideline for pediatric content in physical therapist professional entry level education based on 2017 survey of IOPTP Members
ACTIVITY
• IOPTP Guideline is now available to IOPTP members on WCPT/IOPTP Website
www.ioptp.wcpt.org


Research
Hilda Mulligan


International Organization of Physical Therapists in Paediatrics
Status changing
• Austria: paediatrics group disbanded
• Turkey: plan to recognize another paediatrics group as sub-section
Member-elects
• Belgium (99)
• Colombia (6)
• Greece
• Saudi Arabia
• Spain (25)
• United Kingdom (2204 re-joining)



The IOPTP Business Meeting featured presentations from the board chairs on the progress and goals for each position. New member countries were announced, and awards were handed out. President Sheree York can be seen welcoming Greece (represented by Chrysoula Papasemmanouil) as a new IOPTP member. Overall, the congress was a wonderful opportunity for paediatric physical therapists from around the world to gather to network, learn and develop.

We can't wait for the next congress in Dubai!

Board & Committee Chair Spotlights: Meet the Leaders of the IOPTP

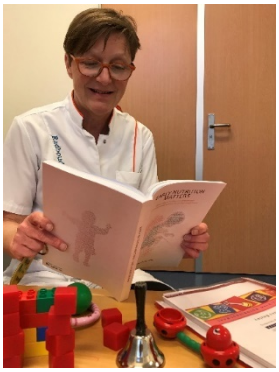
IOPTP Treasurer

Introducing Anjo Janssen

Hi, my name is Anjo Janssen! I am working as a pediatric physical therapist and researcher at the Radboud University Medical Center in Nijmegen, the Netherlands. My topics in patient care are Neonatology, mitochondrial diseases, Juvenile Dermatomyositis, Ataxia telangiectasia. I am also working as lecturer at the pediatric physical therapy section of the Master Physical Therapy program at the HU University of Applied Sciences Utrecht.

My PhD in 2012 was on longitudinal motor performance in very preterm infants. The focus in my research is on motor development, preterm infants and movement quality observed by pediatric physical therapist with the Observable Movement Quality scale.

I have been an active member of the Dutch society for pediatric physiotherapy, on the scientific and educational committee (1999-2013) and was author of the professional profile written in the CAN-MEDS model (2014). I wrote one chapter on Neonatology in the Pediatric Physical Therapy Handbook used in the Netherlands.



Besides my family, husband and two kids, I like to work in the garden and try to keep in shape twice a week with combifit and field hockey on a recreational basis.

As treasurer of the IOPTP a new challenge for me is to get all the contributions to the account with international transfers between different countries. I am quite precise so this will help me to get this accurately done and Ria Nijhuis-van der Sanden has made a nice Excel sheet to control all these transfers.

IOPTP Member At Large

Introducing Nikki Milne

Hello to all IOPTP members from Australia!

My name is Nikki Milne and I work at Bond University on the Gold Coast, Australia, as an academic and researcher. I teach paediatric physiotherapy in our Doctor of Physiotherapy Program and undertake research in the fields of child health, fitness and learning. I completed my PhD in 2014 on the topic of child obesity and performance related fitness. I currently supervise PhD students in the areas of child

health and fitness, motor proficiency and academic performance, fitness and injury in youth athletes, and also health professional education.



Prior to starting work in the academic setting, I worked as a paediatric physiotherapist for NSW Health and Queensland Education which led me to my research interest in child health and wellbeing. I have a special interest in child health, learning and paediatric physiotherapy and I am passionate about the inclusion of paediatric curriculum in entry-level physiotherapy programs, to ensure that all graduates of accredited entry-level programs have knowledge and skills to safely and effectively work with children.

I spend most of my weekends at either the football (AFL) with my son and daughter who love their footy or at the beach with my children doing surf lifesaving. We had an amazing holiday with our children earlier this year, travelling around Italy and France before the WCPT congress in Geneva.

As the new member at large for the IOPTP, I am excited to have the opportunity to reach out to our member countries to enhance the connectivity between paediatric physical therapists around the world and to continue working with the Education subcommittee.

IOPTP Research Committee

Introducing Kine Johansen

Kine Johansen was born in Oslo, Norway. She pursued her bachelor's degree in physiotherapy in Enschede, the Netherlands, before moving to Uppsala, Sweden, in 2002. Since 2004 Kine has worked at Uppsala University Children's Hospital, mainly with developmental neurology and neonatology. She finished her master's degree in physiotherapy at Karolinska Institute in Stockholm in 2007, and in 2012 she became a specialist in pediatric physiotherapy. In 2017 she finished her PhD at Uppsala University. In her PhD she investigated the clinical utility of the Structured Observation of Motor Performance in Infants (SOMP-I), a standardized method to assess early motor performance (0-1 years), when used by child health nurses in routine care. Her research focuses on early detection of motor problems and she is advocating the importance of timely intervention. She now has a position as a postdoctoral fellow at Uppsala University and she is in the start-up of a follow-up study of children diagnosed with developmental coordination disorder (DCD) at 6.5 years, now in their thirties.

During and after her PhD she has been a project leader for two quality improvement projects at Uppsala University Children's Hospital, which included collaboration between the government, the healthcare and the municipality. Both projects have now moved on to be integrated parts of regular care. Furthermore, she has worked as an operations development officer for the child health services in Uppsala County and has been a member of the Swedish National Board for the Child Health Services as well as participating as an expert in quality improvement work regarding children's health led by the Swedish National Board of Health and Welfare. She regularly lectures for students at different academic levels, for healthcare personnel and at national conferences, as well as supervises student's writing their theses.

Kine is married and has two children. Kine is grateful and excited for the opportunity to become a member of the Research committee of IOPTP. She is up for the new challenge of being a co-chair and she looks forward to the work ahead and the possibility to network with other physiotherapists. Tusen takk! Tusen tack! (A thousand thanks in Norwegian and Swedish).

Introducing Lizz Carrington

Lizz Carrington is an alumni of the Otago University School of Physiotherapy in Dunedin, New Zealand. She has worked in public and private physiotherapy sectors as well as for the School of Physiotherapy and she has a particular passion for paediatrics. Lizz is a recent addition to the Neurorehabilitation lecturing team in the Otago University School of Physiotherapy and is preparing to embark on PhD study. Her research will focus on the use of play-based programmes as family-centered care in outdoor environments (specifically playgrounds/parks which are considered 'green' spaces & beaches which are considered 'blue' spaces). She is interested in exploring the impacts that play and family-centered care have on children's participation and family empowerment as well as looking at alternative ways to provide accessible interventions for children with disabilities. Lizz is married to a fellow physio and they have three young children together. Lizz is very grateful for the opportunity to become a member of the Research committee of IOPTP at this early stage of her research career and is excited about the possibilities to network with other committee members and hopefully in the future collaborate with like-minded colleagues. Ngā mihi maioha (Many thanks with appreciation).

WCPT Pediatric Platform Presentations 2019 by IOPTP Members

Non-IOPTP members in Red

TITLE	NAME	email
PLATFORM : CLASSIC SATURDAY May 11		
Family- Centered Care Improved Executive Function in Preterm Infants with Very Low Birth Weight at Preschool Age	Fang Wei Liu (Taiwan)	r06428004@ntu.edu.tw
Characteristics of Certified Neonatal Therapists (CNTS): A Certification Promoting Evidence-Based Practice in the Neonatal Intensive Care Unit	Consuelo Kloosterman (United States)	kloostefamily@gmail.com
Family-Centered Intervention Favored Language Outcome Via Improved Quality of Mother-Infant Interaction in Firstborn Preterm Infants in Taiwan	Fang- Chi Liu (Taiwan)	woosababy810@gmail.com
Preterm Birth Interacts with Dopamine-Relate Genes on Neurodevelopment in Children up to Three Years of Age	Nai-Jia Yao (Taiwan)	Lindayao0717@gmail.com
Risks for Alterations in Neurodevelopment: Applying General Movement Assessment in Infants Born to Mothers with Zika Virus	Carolina Yuri Panvequio Aizawa (Brazil)	

Infections During Pregnancy		
Impact of a 12-week Classroom-Based Gross Motor Program on Motor Proficiency, Mathematics and Reading Performance of Year 1 School Children	Kirsty Macdonald (Australia)	kmacdona@bond.edu.au
The Perceived Physical Challenges in Adolescents with Perinatally Acquired HIV	Nicolette Comley-White (South Africa)	nicolette.comley-white@wits.ac.za
Muscle Strengthening and Endurance in Children Living with HIV	Joanne Potterton (South Africa)	joanne.potterton@wits.ac.za
PLATFORMS: CLASSIS SUNDAY May 12		
Torticollis of Infancy: Reliability of visual Estimation in the Assessment of Cervical Spine Active Rotations and Head Tilt	Anthea Seager (Ireland)	Antea.seager@cuh.ie
Cultural Adaptation and Validation of Mullen Scales of Early Learning – Taiwan Version in 24 to 36 months old Taiwanese Toddlers	Yi-Chung Wang (Taiwan)	b06408036@ntu.edu.tw
Physical Therapy Interventions in Interdisciplinary Pain Treatment Programs Designed for Youth with Disabling Chronic Pain: A Scoping Review	Karen Hurtubise (Canada)	khurtubise@gmail.com
Relationships between Motor Proficiency and Academic Performance in Mathematics and Reading in School-Aged Children and	Kirsty Macdonald (Australia)	kmacdona@bond.edu.au

Adolescents: A Systematic Review		
Efficacy of A Training By Physiotherapists to Health Workers on the Detection of Impairments in Children under 5 in Nepal	Smriti Suwal (Nepal)	
Efficacy of Pediatric Integrative Manual Therapy in Cervical Dysfunction Associated with Positional Plagiocephaly in Infants	Iñaki Pastor (Spain)	
Prevalence and Pattern of Musculoskeletal Complications of Sickle Cell Paediatric Children in Northern Nigeria: A Ten-Year Retrospective Study	Kabir Isah Mayana (Nigeria)	K.mayana@edu.salford.ac.uk
Wheelchair Use Confidence Scale for Dutch Youth Using a Manual Wheelchair	Manon Bloemen (Netherlands)	manon.bloemen@hu.nl
PLATFORMS – CLASSIC MONDAY MAY 13		
Functional Gait Assessments in Children with Developmental Coordination Disorder: A Useful Complement to the Current Motor Skill Investigation?	Ellen Smulders (Netherlands)	
Sport-focused Gross Motor Assessments for Ambulant Children with Cerebral Palsy	Georgina Clutterbuck (Australia)	gclutterbuck@csu.edu.au
The Effects of Serial Casting on the Lower Limb for Children with Cerebral Palsy: A Systematic Review with Meta-Analysis	Nikki Milne (Australia)	nmilne@bond.edu.au

Factors Associated with Infant Motor Development from Birth Til Independent Walking : A Systematic Review of Longitudinal Research	Marike Boonzaaijer (Netherlands)	
Do Physical Therapy Services for Children with Motor Disabilities Abide by the Laws? A Qualitative Exploratory Research	Nilly Waiserberg (Israel)	
The Dutch Go Slow? Canadian Norm Values of the Alberta Infant Motor Scale Evaluated for Dutch Infants	Imke van Maren-Suir (Netherlands)	imke.vanmaren-suir@hu.nl
Postural Control Predicts Gross Motor Coordination in Primary School Children with and without Coordination Difficulties	Gemma Allinson (Australia)	gemma.allinson@health.qld.gov.au
PLATFORM – RAPID 5 MONDAY MAY 13		
Attention-Neuromuscular Training for Children with Developmental Coordination Disorder: A Randomized Controlled Trial	Shirley Fong (Hong Kong)	smfong@hku.hk
Clubfoot Treatment Around the World: Progress, Challenges, and the Role of the Physiotherapist	Rosalind Owen (UK)	Rosalind.owen@globalclubfoot.org
Physical Fitness, Back Pain and Health-Related Quality of Life of Children and Youth Carrying Schoolbags	Rui Soles Gonçalves (Portugal)	ruisolesgoncalves@gmail.com
Intervention for Children Living with HIV (CLWHIC) That	Natalie Benjamin-Damons (South Africa)	natalie.benjamin@wits.ac.za

Have HIV Sensory Neuropathy		
The Utility of EEG as a Measure of Motor Developmental and Intervention Outcomes	Thubi H. A. Kolobe (United States)	Thubi-Kolobe@ouhsc.edu
Every Breath Count! Inspiratory Muscle Training in Children with Neuromuscular Diseases: A Cross-Over Study	Anri Human (South Africa)	anrihuman@gmail.com
The 6-minute Push-Test in Wheelchair- Using Youth with Spina Bifida: Reliability and Physiologic Response	Manon Bloemen (Netherlands)	manon.bloemen@hu.nl
Reproducibility of the Timed Up and Go (TUG) Standard and Dual Task in School-Aged Children With and Without Coordination Difficulties	Gemma Allinson (Australia)	gemma.allinson@health.qld.gov.au
Barriers, Facilitators and Solutions for Active Inclusive Play for Children with a Physical Disability in the Netherlands: A Qualitative Study	Marike Boonzaaijer (Netherlands)	

Pediatric Abstracts from the Geneva Congress

Family-Centered Care Improved Executive Function in Preterm Infants with Very Low Birth Weight at Preschool Age

Fang-Wei Liu [1], Wu-Shiun Hsieh[2], Jui-Hsing Chang[3], Yuh-Jyh Lin[4], Shulan Hsieh[5-7], Chia-Lin Lee[8], Nai-Jia Yao[1], Suh-Fang Jeng[1, 9]

[1] School and Graduate Institute of Physical Therapy, College of Medicine, National Taiwan University, Taipei, Taiwan; [2] Department of Pediatrics, National Taiwan University Hospital, Taipei, Taiwan; [3] Department of Pediatrics, Mackay Memorial Hospital, Taipei, Taiwan; [4] Department of Pediatrics, National Cheng Kung University hospital, Tainan, Taiwan; [5] Department of Psychology, National Cheng Kung University, Tainan, Taiwan; [6] Institute of Allied Health Sciences, National Cheng Kung University, Tainan, Taiwan; [7] Department and Institute of Public Health, National Cheng Kung University, Tainan,

Taiwan; [8] Graduate Institute of Linguistics, National Taiwan University, Taipei, Taiwan; [9] Physical Therapy Center, National Taiwan University Hospital, Taipei, Taiwan.
Background: Preterm infants with very low birth weight (VLBW, birth weight <1,500 g) are at increased risk of cognitive, motor and behavioral disorders than term infants. Accumulating data have demonstrated short-term motor benefit and medium-term cognitive benefit of family-centered care in preterm infants with VLBW, however, the neurophysiological pathways underlying effective intervention have rarely been explored. The electroencephalography/event-related potential (EEG/ERP) is a neurophysiological assessment increasingly applied in the executive function tasks to examine the neural basis of information processing in pediatric populations. Through electrical cap to collect the micro electrical current on the scalp, the ERP components can be processed and analyzed to represent different stages of information processing of brain.
Purpose: This study aimed to investigate the effects of a family-centered intervention program (FCIP) on motor and cognitive function in preterm infants with VLBW at four years of age in Taiwan compared to a usual care program (UCP), and to examine neurophysiological mechanisms of effective intervention.
Methods: This was a multi-centered, single-blinded, randomized controlled study in which preterm infants with VLBW were randomly assigned to the FCIP (N=129) and UCP group (N=140). The FCIP group infants received child-, parent- and dyad-focused intervention from hospitalization until 12 months of corrected age; whereas, the UCP group infants received standard care. Their motor function was assessed using the Movement Assessment Battery for Children, 2nd Edition; cognitive function was examined using the Wechsler Preschool and Primary Scale of Intelligence, Revised Edition, and executive function was assessed using the EEG/ERP in the inhibitory control task of Go/No-go.
Results: A total of 102 FCIP group children (50%) and 102 UCP group children (50%) returned for motor and cognitive assessment at four years of age. The FCIP and UCP groups were comparable in the motor score (7.4±2.4 vs. 7.4±2.1) and full scale IQ (96.8±14.4 vs. 94.3±16.7). As for the executive function, the FCIP group children manifested significantly higher correct rate (84% vs. 77%, p=0.01).
Conclusions: The FCIP yielded beneficial effect on cognitive function, specifically executive function with longer response time but greater accuracy in inhibitory control, in preterm children with VLBW at preschool age.
Implications: The EEG/ERP assessment provides useful information to help reveal the neurophysiological mechanisms underlying developmental benefit in preschool-aged preterm children with VLBW following family-centered care. While inhibitory control is the core ability of executive function that predicts subsequent adaptive function and academic performance, a continued follow-up of intervention effect on long-term outcomes in preterm children with VLBW at school age is warranted.
Keywords: Prematurity, Early intervention, Executive function

Family-Centered Intervention Favored Language Outcome via Improved Quality of Mother-Infant Interaction in Firstborn Preterm Infants in Taiwan

Fang-Chi Liu[1,2], Jui-Hsing Chang[3], Hui-Chin Hsu[4], Yen-Tzu Wu[1], Suh-Fang Jeng[1,5]
[1] School and Graduate Institute of Physical Therapy, College of Medicine, National Taiwan University, Taipei, Taiwan [2] Department of Physical Medicine and Rehabilitation, Shin Kong Wu Ho-Su Memorial Hospital, Taipei, Taiwan [3] Department of Pediatrics, Mackay Memorial Hospital, Mackay Medicine, Nursing and Management College, Taipei, Taiwan. [4] Department of Child and Family Development, University of Georgia, GA, USA. [5] Physical Therapy Center, National Taiwan University Hospital, Taipei, Taiwan

Background: The advancement of perinatal care has significantly improved the survival rate of preterm infants with very low birth weight (VLBW, birth weight <1500 g), however their risk of

neurodevelopmental disorders remains high and their parent often encounter difficulty in interaction. Although early intervention may yield developmental benefit in preterm infants, the social pathway of effective intervention such as mother-infant interaction has rarely been investigated.
Purpose: The aim of this study was to investigate the effect of a family-centered intervention program (FCIP) on developmental outcomes and quality of mother-infant interaction in preterm infants with VLBW compared with a usual care program (UCP), and to examine if mother-infant interaction mediated the developmental effect.
Methods: This was a multi-centered, single-blind, randomized controlled study that enrolled preterm infants with VLBW from three medical centers in Taiwan. The FCIP group received parent-, child- and dyad-focused intervention during hospitalization and seven home- and clinic-based intervention sessions until 12 months of corrected age; whereas the UCP group received standard care during hospitalization and seven phone calls for general consultation after discharge. Infants were examined for cognitive, language, and motor development by the Bayley Scales of Infant and Toddler Development- 3rd edition at 6, 12 and 24 months, and were video recorded for quality of mother-infant interaction in a free-play procedure at 6 and 12 months with coding of maternal, infant and dyadic interactive behavior.
Results: The FCIP (N=120) and UCP groups (N=124) showed comparable developmental scores across ages. However, subgroup analysis revealed significantly higher language score in the FCIP group than in the UCP group among those firstborns (6 months: 100.1±7.7 vs. 97.5±9.2; 12 months: 95.1±7.9 vs. 93.0±8.0; 24 months: 102.5±12.6 vs. 99.1±15.3, p=0.03). The FCIP dyads showed significantly more high-quality maternal interactive behavior (6 months: 67.7%±20.4% vs. 60.0%±24.1%; 12 months: 73.7%±21.9% vs. 67.0%±19.7%, p=0.01) together with less inactive maternal interactive behavior (6 months: 16.0%±15.7% vs. 23.7%±20.5%; 12 months: 14.1%±16.7% vs. 18.8%±16.8%, p<0.01), less mother discordant pattern (6 months: 8.6%±12.3% vs. 15.4%±18.0%; 12 months: 6.5%±11.7% vs. 10.3%±12.6%, p<0.01) together with more child discordant pattern than the UCP group (6 months: 29.5%±19.4% vs. 22.2%±16.1%; 12 months: 29.5%±17.5% vs. 28.4%±15.7%, p=0.03). Mediator analyses revealed that the intervention effect on language outcome among those firstborns was markedly attenuated when the significant maternal or dyadic interactive measure was included in the model.
Conclusions: The FCIP benefited maternal and dyadic interactive behavior in interaction in preterm infants with VLBW in Taiwan throughout the first year of age. Furthermore, the FCIP favored the language development at 6 to 24 months in those firstborn preterm infants only for which intervention effect appeared to be mediated via improved quality of mother-infant interaction.
Implications: The population-specific developmental effect and the identified social pathway provided insightful information for the design and application of early intervention in preterm infants with VLBW in culturally similar societies.
Keywords : mother-infant interaction, family-centered intervention, preterm infants.

CHARACTERISTICS OF CERTIFIED NEONATAL THERAPISTS (CNTS): A CERTIFICATION PROMOTING EVIDENCE-BASED PRACTICE IN THE NEONATAL INTENSIVE CARE UNIT

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Background: Medical advances in neonatology have led to redefining best practices in the neonatal intensive care unit (NICU), with an increased need for specialized personnel who can focus on the survival of premature infants and the long-term developmental outcomes of NICU graduates. Physical therapists (PTs), occupational therapists (OTs), and speech-language pathologists (SLPs) are an integral part of the NICU team. The Neonatal Therapy National Certification Board (NTNCB) was created in 2014 with the purpose of developing an interdisciplinary certification to recognize NICU therapists who have neonatal

expertise, and to define minimum levels of education and experience. The certification process opened to applicants worldwide in November 2016.
Purpose: The main purposes of this presentation are to outline the requirements for neonatal therapy certification, describe the characteristics of Certified Neonatal Therapists (CNTs), and create international awareness about the certification process to validate the experience and knowledge of therapists working with high-risk infants in the NICU.
Methods: Applicants were informed and agreed that the Board could use their certification information in aggregate form for descriptive analysis and program evaluation purposes. Records included geographical practice location, discipline, total years of practice and years in NICU, examination scores, other certifications, and continuing education. Data from May 2016 to July 2018 was analyzed with IBM SPSS 25 for descriptive statistics, and to explore relationships between examination scores and characteristics of CNTs.
Results: In the first 18 months, 196 therapists completed the certification process and are designated as CNTs. The majority practice in the USA (97.4%), whereas 5 practice in 3 other countries. Fifty-nine (30.1%) CNTs are PTs, 97 (49.5%) OTs, and 40 (20.4%) are SLPs. Their clinical experience ranges from 4-42 years, with an average of 20.4 (± 9.5) years; and their NICU experience ranges from 3-39 years, with an average of 13.8 (± 7.7) years. The average certification exam score was 94.4% (± 3.6%). Total number of years of experience was not significantly related to exam performance ($p>0.05$). CNTs claimed an average of 64.4 (±30.8) professional education hours within the previous 3 years, and 137 CNTs (70.0%) had at least one other certification.
Conclusion(s): The current cohort of CNTs represents a good mix of disciplines, years of experience, and educational background. The average certification exam score was high irrespective of applicant experience beyond the minimum certification requirements. Current CNTs predominantly practice in the USA, but the certification is open to applicants worldwide and provides value to the profession by recognizing therapists who can provide safe, effective, and evidence-based services to at-risk infants and their families.
Implications: Neonatal therapy has been recognized as an advanced practice area by US professional associations (APTA, AOTA, ASHA). The number of clinicians from all three disciplines that deliver direct and consultative services in the NICU has grown in the last 15 years. The neonatal therapy certification process aims to acknowledge and test the common interdisciplinary knowledge required to provide these therapy services. International growth of the certification will foster the creation of a worldwide community of qualified therapists.
Keywords: Neonatal Therapy ,Certification ,NICU

Cultural Adaptation and Validation of Mullen Scales of Early Learning-Taiwan Version in 24 to 36 Months Old Taiwanese Toddlers

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Background: The Mullen Scales of Early Learning (MSEL) is a comprehensive norm-referenced developmental test for testing child's cognitive, language, and motor developments from ages 0 to 68 months. It has been widely used for the research of children with Autism Spectrum Disorder (ASD). However, the reports of cultural adaptation of the MSEL in non-western societies was scarce. Few studies has investigated the psychometric properties for Asian populations, and the validation of the MSEL-Taiwan version (MSEL-T) for Taiwanese children has yet to be established.
Objectives: This study aimed to 1) establish a Taiwan version of the MSEL which was culturally and linguistically adapted for using on Taiwanese population; 2) examine the age-effect of MSEL-T subscales scores from ages 24 to 36 months; 3) examine the discriminative validity of the MSEL among typically developing (TD) toddlers, toddlers with multiple developmental delays (DD) and toddlers with ASD; and

4) examine the predictive validity of MSEL-T ELC scores from ages 24 to 36 months with VABS T score at 36 months.
Methods: A total of 100 toddlers aged 24 to 36 months were recruited during the years of 2015 to 2017, which consisted of 16 toddlers with DD, 26 toddlers with ASD and 58 TD toddlers. The MSEL scales was translated into Mandarin Chinese. The vocabularies and sentence structure of all items in the scoring sheet were modified for the accommodation of the terms used in Taiwan. All participants were assessed using the MSEL-T at 24, 30 and 36 months old. Furthermore, child's adaptive behavior at 36 months was assessed using the VABS. The correlations between the MSEL-T and VABS subscales scores were estimated by the Pearson correlation coefficients. The group differences of MSEL-T subscale scores were examined by using the Kruskal-Wallis test and post-hoc test for pairwise comparisons. The prediction of MSEL-T scores at younger ages for the scores at older ages were examined by using the Generalized Estimating Equation (GEE).
Results: The MSEL-T and VABS showed moderate to high correlations in all subscale scores ($r = 0.49 \sim 0.91$, all p's > 0.05). Furthermore, the MSEL-T scores could distinguish from toddlers with ASD, toddlers with DD and TD toddlers in all MSEL-T subscales (all p's < 0.05), except for the Gross Motor scales ($p = 0.97$). Moreover, all MSEL-T subscales showed an increase of scores with the advancing ages (all p's > 0.05).
Conclusions: The preliminary findings showed that the MSEL-T revealed acceptable validity for developmental assessments in Taiwanese toddlers with typical or atypical development. Overall, these findings suggest that the MSEL-T is a promising tool that could be used by pediatric physical therapist for assessing multiple developmental functions in Taiwanese toddlers.

Preterm Birth Interacts with Dopamine-Related Genes on Neurodevelopment in Children up to Three Years of Age

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Background: Previous studies have shown that dopamine-related genes are involved in neurotransmission in the nervous system of children with developmental disorders. Whether dopamine-related genes play a role in more common forms of developmental variation in preterm and term children remains unclear
Purpose: This study aimed to examine the association of dopamine-related genes with mental and motor development, and the gene-environment interaction on development in preterm and term children from 6 to 36 months of age, and further replicate the findings in an independent sample.
Methods: The selection criteria for preterm children included birth weight < 1,500 g, gestational age < 37 weeks, and absence of congenital abnormality and severe neonatal diseases (e.g., hydrocephalus, periventricular leukomalacia, grade III-IV intraventricular hemorrhage, stage IV retinopathy of prematurity, necrotizing enterocolitis with colostomy, and severe cardiopulmonary disease requiring ventilator use at 44 weeks of post-menstrual age). A total of 201 preterm children and 111 term children were prospectively examined for their mental and motor development using the Bayley Scales of Infant Development – Second Edition at 6, 12, 18, 24, and 36 months of age, and buccal cell samples were collected for genotyping of 15 single-nucleotide polymorphisms (SNPs) including rs1800497, rs167771, rs27072, rs2550948, rs4818,

rs4680, rs2075507, rs12843268, rs5905859, rs3027400, rs2235186, rs2235185, rs2072744, rs2239448, and rs3027407, which are located in five dopamine-related genes (*DRD2*, *DRD3*, *DAT1*, *COMT* and *MAOA*). An independent sample of 256 preterm children was used for replication. Mixed-effects models of longitudinal data using the intention-to-treat approach were used to analyze the repeated measures of each developmental outcome in relation to these SNPs in preterm and term children.
Results: Because preterm children exhibited different age trends in development from those of term children, the analyses were stratified by preterm and term birth. Of the 15 SNPs of dopamine-related genes, only the 8 SNPs of the *MAOA* gene were significantly associated with the mental scores of preterm children after false discovery rate corrections, with rs2239448 as the tag being the most significant for main effect ($p = 0.0031$) and interaction with age trend ($p < 0.0001$; largest effect size of 0.65 at 24 months). Similar findings for rs2239448 were replicated in the independent sample ($p = 0.02$ and 0.03, respectively). However, none of the SNPs were associated with the motor scores of preterm children and none were related to the mental or motor scores of term children.
Conclusion(s): The genetic variants of the *MAOA* gene appear to yield influence on the mental development from 6 to 36 months of age for preterm, but not term, children. Moreover, our findings for the *MAOA* rs2239448 were robustly replicated in an independent preterm sample.
Implications: Our results provide important insights into the understanding of genetic influences on development in preterm children. Future research is warranted to investigate whether the *MAOA* variants can identify preterm children who may benefit most from early intervention to improve mental outcome.
Keywords: Gene, Child development, Preterm infants

Factors associated with infant motor development from birth to independent walking: A systematic review of longitudinal research
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Background: In the first two years of life, gross motor development, is an important indicator of infant developmental status. According to the dynamic systems theory, gross motor development is an ongoing product of contextual motor behavior. Multiple factors contributing to the acquisition of motor abilities have to be considered, in which both the child and its environment play crucial roles. An important element characterizing development is time. It becomes more and more apparent that multiple observations over time are needed to gain a true image of the immense variability in infant gross motor development. Therefore, results of especially longitudinal studies are of great interest and importance.
Purpose: The purpose of this study was to provide a broad overview of the body of longitudinal research on factors associated with the diversity in developmental pathways from birth until independent walking including a critical review of the quality of the included studies and a discussion of possible strands for future research.
Methods: The PRISMA statement (Preferred Reporting Items for Systematic Reviews and Meta-analysis) guided the conduct and reporting of this review. A literature search was conducted by an experienced librarian in PubMed, CINAHL, PsycINFO and SCOPUS from inception till February 2018. The search contained three main building blocks: motor development, infants and cohort studies with as many synonyms as possible to maximize sensitivity of the search. All articles published in English peer-reviewed journals and full text available, were included in the study. Inclusion criteria were: 1. A longitudinal design with repeated measures on gross motor development. 2. Participants are healthy infants, term or preterm

born, from birth till independent walking. 3. At least one measurement of a factor (infant- or environmental) hypothesized to be associated with gross motor development. Eligible articles were assessed with the Quality in Prognostic Studies (QUIPS) to establish risk of bias. Screening abstracts, reading methods, rating risk of bias and extracting data, were performed independently by two researchers.
Results: After screening 2910 titles/abstracts, 38 studies were included. In 45% of the studies mixed populations were investigated, 40% were on term born infants and 15% examined premature born infants. Factors associated with gross motor development were grouped into: 1. Infant factors (45%) e.g., sex, anthropometry, 2. Physical environmental factors (26%) e.g., sleeping position and 3. Social environmental factors (29%). e.g. parental perceptions. Despite the longitudinal designs, the majority of studies used cross sectional statistical methods for analysis. Poor study attrition was the main cause for high risk of bias on the QUIPS (>50% of the studies). Due to mixed populations and a variety of investigated factors and outcome measures, performing a meta-analysis was not possible. Therefore, the results were descriptively displayed.
Conclusion: This systematic review confirms that there is an extensive variety of factors associated with gross motor development of infants from birth until independent walking. Among the factors included in longitudinal studies on early gross motor development those related to the child itself seem most prominent.
Implications: Pediatric physical therapist need evidence-based knowledge about factors associated with infant gross motor development for clinical reasoning in practice
Keywords: Systematic review, infant gross motor development, longitudinal design, infant- and environmental factors

"Every breath counts! Inspiratory muscle training in children with neuromuscular diseases: a cross-over study"

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Background: Progressive respiratory muscle weakness and ineffective cough contributes to morbidity and mortality in children with neuromuscular diseases (NMD). Inspiratory muscle training (IMT) aims to preserve or improve respiratory muscle strength, optimise ventilation, improve cough ability, reduce morbidity, delay the onset of respiratory failure and ultimately improve health-related quality of life. The use of IMT in this subpopulation remains controversial, and there is currently insufficient evidence to guide clinical practice.
Purpose: To determine the safety and efficacy of IMT on clinical outcomes (hospital admissions, adverse events, upper and lower limb function, upper limb coordination, spirometry, inspiratory muscle strength and peak expiratory cough flow (PCF)).
Methods: In a cross-over study design, participants were randomly allocated to two groups: Group 1 trained twice daily for three months (30 breaths with a tapered flow threshold device), after which they stopped training and were monitored monthly, for three months. Resistance was set at 30% of the patient's inspiratory muscle strength (Pimax) and adapted every two weeks during intervention. Group 2 did not train for the first three months after which they crossed over to the same IMT intervention for three months. Post-intervention monitoring was continued for a further three months.
Results: Preliminary results of the first 10 participants (n=9 male; median (IQR) age 12.3 (10.1-14.3) years) are presented. Six participants were non-ambulant; none of the participants received daytime ventilation, whilst one received nocturnal noninvasive ventilation. Participants had baseline median (IQR) lower limb

function score (Vignos scale) of 7.5/10 (3-9). Upper limb function was more preserved, with median Brooke scale score of 1.5/6 (1-3) and upper limb coordination was high with Motor Function Measure (MFM) score of 28/30 (24-29).
One patient was hospitalised twice during the intervention period for an intercurrent respiratory tract infection. No adverse events related to IMT were reported. There were no significant changes in lower limb function, upper limb function and coordination scores, or spirometry following the IMT intervention. However, median (IQR) Pimax and PCF improved by 11.5 (-4.0 to 26.0) cmH_2O and 30 (-10 to 80) L/min in the intervention group, compared to change of -5 (-12.0 to 3.0) cmH_2O ($p = 0.04$) and -30 (-40 to -10)L/min ($p = 0.02$) respectively during the control period. Order assignment had no effect on results. Patient satisfaction with IMT based on a 10 point scale was extremely high, with a median (IQR) of 10 (8-10).
Conclusion(s): The use of a three month IMT programme in children with NMD improved inspiratory muscle strength and cough flow, with very high patient satisfaction.
Implications: Inspiratory muscle training appears safe and well-tolerated, with improved, clinically relevant outcomes. Larger randomised controlled trials are recommended to confirm these findings and determine the long-term outcome of IMT on morbidity and mortality.

POSTURAL CONTROL PREDICTS GROSS MOTOR COORDINATION IN PRIMARY SCHOOL CHILDREN WITH AND WITHOUT COORDINATION DIFFICULTIES

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Background: Developmental Coordination Disorder (DCD) is a neurodevelopmental disorder which is present in 5-6% of children. Poor postural control is thought to contribute strongly to these motor coordination difficulties. However, treatment of postural control has been limited by assessments that do not assess all postural control dimensions. Research is needed to explore the utility of new, more comprehensive assessments of postural control and the relationships between postural control domains and motor coordination difficulties.
Purpose: To (i) evaluate postural control in primary school aged children using the new 'Kids Balance Evaluation Systems Test' (Kids-BESTest), a comprehensive assessment of all postural control domains; and (ii) compare this with a commonly used postural control subset assessment (Bruininks-Oseretesky Test of Motor Proficiency, Second Edition: BOT-2 Balance Subscale); then (iii) determine the relationship between postural control performance on these tests with motor coordination (Test of Gross Motor Development, Second Edition: TGMD-2).
Methods: Fifty-five children aged 4-12 years with normal intelligence attending mainstream schools participated in a physiotherapy assessment of (i) postural control using the comprehensive Kids-BESTest and BOT-2 *Balance Subscale* and (ii) motor coordination using the TGMD-2. Performance on each measure was examined using descriptive statistics (mean(SD)). Relationships between measures were examined using Spearman's Rank Correlation for categorical variables or Pearson's Product-Moment Correlation for continuous variables. Linear regression was calculated to determine postural control and demographic factors predicting motor performance.
Results: TGMD-2 *Total* scores ranged from the 3rd to the 97th percentile (mean 51st percentile) indicating the cohort included children with a wide range of motor abilities. Kids-BESTest *Total* scores ranged from 69 to 105 (64 - 97%) out of a possible 108 points ($\bar{x}$=92.4 ± 8.54 points; 86% ± 7.9%) indicating the children also showed a wide range of postural control abilities. TGMD-2 *Total* scores (overall coordination) correlated strongly with the comprehensive Kids-BESTest *Total* Scores (ρ=0.60, p=< 0.01) and moderately with scores on the BOT-2 *Balance Subscale* (r=0.45, p< 0.01). Regression analysis showed

that age and the Kids-BESTest *Total* score predicted 44% of the TGMD-2 *Total* score ($p< 0.01$) while the BOT-2 *Balance Subscale* predicted 19% ($p< 0.01$).
Conclusion(s): These results show that postural control predicts a substantial degree of the variance in motor performance in primary school aged children. The more comprehensive Kids-BESTest was a better predictor of motor coordination than the BOT-2 balance subscale which only includes a few postural control items.
Implications: Children with motor coordination difficulties are known to have postural control difficulties that contribute to their motor control problems. We recommend that Physiotherapists use the Kids-BESTest if wanting to perform a comprehensive postural control assessment for primary school aged children in order to plan more targeted interventions.
Key-words: 1. Paediatrics 2. Postural Control 3. Motor Coordination

IMPACT OF A 12-WEEK CLASSROOM-BASED GROSS MOTOR PROGRAM ON MOTOR PROFICIENCY, MATHEMATICS AND READING PERFORMANCE OF YEAR 1 SCHOOL CHILDREN

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Background: Decreasing levels of physical activity (PA) in children has recently led to an increased focus on the effects of classroom-based PA programs on school children's PA and academic outcomes. Findings from the few studies investigating this topic have been inconsistent, with variability in methodological quality and study designs.
Purpose: To investigate whether Year 1 school children participating in a 12-week classroom-based gross motor program, involving the integration of gross motor activities into either mathematics or reading lessons, would demonstrate greater improvements in motor proficiency, mathematics and reading performance than students undertaking a regular school program.
Methods: A prospective cohort study was conducted with a sample of Australian Year 1 primary school children (n=55, age=6.77±0.40 years). Participants were divided into one of three groups where they were exposed to either i) their regular school program (CG) (n=17) or (ii) a Physiotherapist-led 12-week program comprised of gross motor circuits (4x15 min/week) and activities integrated into: a) mathematics lessons (MG) (3x15 min/week) or b) reading lessons (RG) (4x10 min/week). Motor proficiency and academic performance in mathematics and reading were assessed using the Bruininks-Oseretsky Test of Motor Proficiency (2nd Edition) and the Wechsler Individual Achievement Test II (Australian Standardised Edition), respectively. To determine whether there were significant differences in mean *change* scores between the three groups for each outcome from baseline to 12 weeks later, one-way analyses of variance (ANOVA) with Bonferroni post hoc analyses (using an alpha of .05) were performed.
Results: No significant differences were identified between groups in mean academic scores at baseline. A one-way ANOVA revealed significant differences between groups in mean *change* scores in mathematics, $F(2, 46)=8.48$, $p=.001$. Post hoc comparisons indicated mean change scores in mathematics were significantly greater in the MG (7.57±5.79, $p=.019$) and RG (9.61±5.62, $p=.001$) compared to CG (0.76±8.00). Significant differences between groups for mean *change* scores in motor proficiency were also found, $F(2, 49)=4.06$, $p=.023$. Post hoc comparisons indicated mean change scores in motor proficiency were significantly greater in the MG (6.12±5.07, $p=.034$) than the CG (0.82±4.38). Finally, significant differences were found between groups for mean *change* scores in reading, $F(2, 45)=5.71$, $p=.006$. Post hoc comparisons indicated mean change scores in reading were significantly greater in the MG (11.54±7.51, $p=.005$) than the CG (3.88±6.02).

Conclusion(s): Year 1 children exposed to a 12-week program involving gross motor activities integrated into either mathematics or reading lessons had significantly greater improvements in mathematics performance than students undertaking their regular school program. Year 1 children who had gross motor activities integrated into their mathematics lessons also demonstrated significantly greater improvements in motor proficiency and reading performance than students in a regular school program. These findings may inform future experimental studies to investigate further the effect of classroom-based gross motor interventions on motor proficiency and academic outcomes of early year primary school students.
Implications: A role exists for physiotherapists to collaborate with education professionals in developing appropriate gross motor programs in the school setting that aim to optimise both the physical development and learning outcomes of children in the early years of primary school.
Keywords: 1. motor proficiency; 2. academic performance; 3. school children

Functional gait assessments in children with Developmental Coordination Disorder: a useful complement to the current motor skill investigation?
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Background: Children with Developmental Coordination Disorder (DCD) have problems in their fine and gross motor skills, which causes difficulties in activities of daily life (ADL; e.g. while playing or participating in sports and school activities). Parents often report that their children are clumsy and often trip and/or fall. Additionally, children with DCD more often have accidents and fractures compared to their peers. Research until now mainly focused on fine motor skills, ball skills and static balance in children with DCD. However, their frequent falls point at problems in whole body coordination during ambulatory tasks. Since walking in daily life involves interacting with the physical environment and may also include several forms of distraction, it is necessary to investigate the gait problems that children with DCD experience under such circumstances. This is called functional gait.
Purpose: To compare functional gait between children with DCD and typically developing (TD) children.
Methods: Functional gait assessments were conducted in 23 children with DCD and 57 TD children (6-12 years old), both on the C-mill[1] and overground. The C-mill (Roerdink & Beek, 2009 Forcelink BV) is a treadmill, with embedded force plates, that evokes gait adjustments by projecting visual context (i.e. stepping targets or obstacles). We measured obstacle avoidance performance (with and without motor and cognitive dual tasks) on the C-mill. Overground functional gait tasks involved the obstacle avoidance item of the Emory Functional Ambulation Profile and the Timed Agility Ladder-test. In addition, we also measured spatiotemporal characteristics and variability during regular walking. Scores of the DCD and TD children were compared by means of Mann-Whitney U tests.
Results: Children with DCD performed worse on all functional gait tasks, both on the C-mill and overground ($p<0.01$). They showed no differences compared to TD children regarding regular walking characteristics, except for a larger step width and greater gait variability ($p<0.05$).
Conclusion(s): During regular walking, children with DCD show relatively minor differences compared to their TD peers. Yet, during more complex ADL-related tasks (also including different forms of distraction), the problems of children with DCD become apparent. These problems may contribute to the large number of trips and falls in this population.
Implications: Children with DCD have more problems with functional gait than TD children. From other populations it is known that functional gait can be improved by training. Therefore, we recommend future studies evaluating the efficacy of functional gait training in children with DCD.
Keywords: functional gait, gait adaptability, DCD

RELATIONSHIPS BETWEEN MOTOR PROFICIENCY AND ACADEMIC PERFORMANCE IN MATHEMATICS AND READING IN SCHOOL-AGED CHILDREN AND ADOLESCENTS: A SYSTEMATIC REVIEW

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Background: Positive associations exist between physical activity (PA), cognition and academic performance in children and adolescents. The exact parameters of PA required to impact cognitive functioning in youth remains unclear. Therefore, further research is required to investigate how the components of fine and gross motor proficiency may be related to the academic performance of school students.
Purpose: To identify, critically appraise, and synthesize findings of studies examining relationships between motor proficiency and academic performance in mathematics and reading in typically developing school-aged children and adolescents.
Methods: A systematic search of electronic databases (EBSCO, PubMED, PsycINFO, and Web of Science) was undertaken in February 2018 to identify relevant observational and experimental studies investigating relationships between motor proficiency and academic performance in mathematics and reading in typically developing school-aged children and adolescents. Eligible studies were critically appraised using a modified Downs and Black checklist and key data were extracted. Significant and non-significant associations reported by observational studies were summarized, coded and narratively synthesized. Key findings from experimental studies examining the impact of motor skill interventions on academic performance were also synthesized.
Results: Fifty-five studies (51 observational, 4 experimental) were eligible for inclusion. Findings revealed significant very weak-to-strong positive associations between mathematics performance and fine motor precision (4/6 studies); fine motor integration (15/16 studies); manual dexterity (6/10 studies) and total fine motor scores (9/9 studies). Significant very weak-to-weak positive associations were found between mathematics performance and upper limb coordination (4/6 studies), speed and agility (6/9 studies), and total gross motor scores (10/14 studies). There was evidence to support a significant very weak-to-strong positive relationship between reading performance and fine motor integration (17/22 studies) and total fine motor scores (6/7 studies). Significant very weak-to-weak positive associations were reported between academic performance in reading and upper limb coordination (4/6 studies) and total gross motor scores (9/15 studies). Finally, the findings from four experimental studies revealed significant effects of motor skill interventions on academic performance in mathematics/reading for students in the early years of school, however, several methodological limitations relating to the external and internal validity of these studies were apparent.
Conclusion(s): Fine motor proficiency was significantly and positively associated with academic performance in mathematics and reading, particularly during the early years of school. Significant positive associations were also evident between academic performance and several components of gross motor proficiency. Preliminary evidence from a limited number of experimental studies suggests motor skill interventions in primary school settings may have a positive impact on academic performance in mathematics and/or reading. Future research should include more robust experimental designs to explore more extensively the effect of motor skill interventions on the academic performance of school-aged children and adolescents.
Implications: Findings supporting associations between several components of motor proficiency and academic performance in mathematics and reading are relevant to both education and paediatric health professionals (including physiotherapists and occupational therapists) through their role in the assessment of children's motor proficiency and delivery of motor skill programs within the school setting.
Keywords: 1. Fine and gross motor proficiency; 2. academic performance; 3. School-aged children

THE EFFECTS OF SERIAL CASTING ON THE LOWER LIMB FOR CHILDREN WITH CEREBRAL PALSY: A SYSTEMATIC REVIEW WITH META-ANALYSIS.

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Background: Serial casting of the lower limb is commonly used as a therapeutic intervention in paediatric clinical practice with minimal evidence or clinical guidelines to support its efficacy. Evidence-based and best practice methods of serial casting to enhance functional outcomes for children with Cerebral Palsy (CP) remain unclear.
Purpose: This systematic review aimed to determine; i) the effects of serial casting in isolation or in combination with other therapies (with or without pharmacological interventions) for the management of lower limb dysfunction in children with CP and; ii) the longitudinal effects of serial casting at different points in time, post final cast removal.
Methods: A systematic review with meta-analysis was undertaken in November 2017. A literature search was conducted across eight databases (PUBMED, EMBASE, CINAHL, PEDro, OTSeeker, Cochrane, Scopus and Proquest) using the key terms 'Cerebral Palsy' and 'serial casting' or synonyms for these terms. Studies were screened, and data were extracted from articles that met selection criteria before critically appraising studies using the Downs and Black critical appraisal checklist. Effects of serial casting on lower limb function were synthesised using findings from fair to good quality studies only. When sufficient evidence existed, relevant to functional outcomes, key findings were extracted, and meta-analysis was undertaken.
Results: From 3084 possible citations identified, 24 articles remained eligible for inclusion. Serial casting of the lower limb was found to be effective for improving ankle dorsiflexion (DF) passive range of motion (PROM), standardised gait assessment measures, modified Ashworth scale (MAS) scores, modified Tardieu scale (MTS) angle, and gross motor function (GMFM). For most measures, desirable effects were observed to be stronger immediately after casting and decreased over time (up to 6 months). Few studies reported outcomes at 12 months or beyond. Serial casting with pharmacological intervention was found to be significantly more effective for improving ankle DF PROM than serial casting alone (MD -3.19 degrees; 95% CI -5.76 to -0.62; $P = 0.01$; $I^2 = 0\%$), however the clinical importance of an additional three degrees is unclear. Several methodological limitations relating to internal validity, inadequate blinding and adjustment for confounding variables were apparent.
Conclusion(s):
Serial casting alone is effective in the management spasticity and soft-tissue contractures in children with CP and was shown to improve several outcomes relevant to lower limb function. Further research using stronger methodological study designs, is indicated to explore long-term effects of serial casting on functional lower limb outcomes in children with CP. Further systematic reviews on this topic would be enhanced by clear reporting of the type of CP and the Gross Motor Function Classification of participants, and the clinical methods of serial casting used, to assist with determining evidence-based methods.
Implications: The findings of this systematic review support the clinical use of lower limb serial castings for improving functional outcomes in children with CP and suggest that the effects may be slightly enhanced when coupled with pharmacological interventions. Clinicians can use this information when developing individualised treatment plans for children who have CP during shared decision-making consultations.
Keywords: Cerebral Palsy, serial casting, lower-limb.

REPRODUCIBILITY OF THE TIMED UP AND GO (TUG) STANDARD AND DUAL TASK IN SCHOOL-AGED CHILDREN WITH AND WITHOUT COORDINATION DIFFICULTIES

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Background: Developmental Coordination Disorder (DCD) is a neurodevelopmental disorder which is present in 5-6% of children. Poor postural control is thought to contribute strongly to these motor coordination difficulties. Sound assessment of postural control has been limited by assessments that do not have adequate psychometric data. Research is needed to establish the reliability of a common test of postural control: the 'Timed Up and Go'.

Purpose: The purpose of this study was to evaluate intra-rater and test-retest reproducibility of the Timed-Up-and-Go (TUG) standard and dual-task subtests in children with and without coordination difficulties.

Methods: Children were recruited for intra-rater (n=28, age 7-12 years) and test-retest (n=21, age 4-6 years) reproducibility evaluation of the TUG-*standard*, TUG-*motor* and TUG-*cognitive*. Motor function was quantified with the *Test of Gross Motor Development (TGMD-2).* Reproducibility was examined by reliability and agreement. Reliability of raw scores was examined using Intra-class Correlation Coefficients. Agreement of category scores for the *TUG-standard* and *TUG-cognitive* was examined using exact agreement, kappa, limits of agreement and smallest detectable change.

Results: Performance on all TUG subtests improved with age. Reliability of the TUG subtests was good-excellent (ICC = 0.63-0.86) for all intra-rater and test-retest analyses, except intra-rater reliability of *TUG-cognitive* (ICC=0.44). For all subtests, data from Trial-2 showed better reliability than Trial-1 or Trial-average. Both the *TUG-standard* and *TUG-cognitive* showed excellent agreement (Kappa = 0.77-1.0).

Conclusion(s): This study provides new data on the reproducibility of the original TUG protocol and its motor and cognitive subtests for children. All three TUG subtests are reproducible clinical tools for children aged 4-12 years. During assessment, children should be provided with one practice turn, then the results of their second trial recorded. Further research is required to complete normative data for school-aged children 4-12 years and examine performance in other paediatric populations.

Implications: The TUG-*standard* and its subtests the TUG-*motor* and TUG-*cognitive* can be recommended to physiotherapists for assessment of dynamic balance during gait in school aged children.

Key-words: 1. Paediatrics 2. Postural Control 3. Motor Coordination

The perceived physical challenges in adolescents with perinatally acquired HIV.

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Background: As the global availability of antiretrovirals for paediatric patients continues to increase, so the body of perinatally HIV-infected adolescents (PHIVA) grows, creating a unique population of people living with a chronic disease. In 2016 there were an estimated 2.1 million adolescents living with HIV, with 84% living in sub-Saharan Africa.

It is well documented that perinatally acquired HIV results in neurological, physical and cognitive developmental delays in children. As they develop into adolescents, there are residual problems in neurocognitive functioning and increased mental health problems. However, there is still a paucity of literature on the physical sequelae of perinatally acquired HIV in adolescents and there has been a clear call for further studies to be done in this area.

As a starting point to establishing what some of the physical sequelae of perinatally acquired HIV may be in the adolescent population, one needs to consider what their experiences are and what they perceive as challenges.

Purpose: This aim of this study was to establish the perceived challenges that PHIVA face with regards to physical sequelae.

Methods: A qualitative study design with semi-structured, individual interviews was conducted. Participants were sourced from an out-patient clinic and research unit for paediatric infectious diseases, in Johannesburg, South Africa. Early and middle phase adolescents (age 10-14 and 15-16 years, respectively) with perinatally acquired HIV were invited to participate. The interviews were audio-recorded and transcribed verbatim. Substantive statements were identified by two separate coders and thematic analysis was done via the general inductive approach. Manifest analysis was used to quantify the data. Field notes were used as an added aspect of triangulation.
Results: After 19 participants were interviewed data saturation was reached. Eleven (57.9%) participants were in early adolescence and eight (42.1%) were in middle adolescence. The mean age was 13.1 ±2.2 years and 12 (63.2%) were female.
Of the 19 participants, only one (5.3%) did not express that they had any challenges. The other 18 participants discussed difficulties with pain (n=10 [52.6%]), endurance (n=9 [47.4%]), fatigue (n=7 [36.8%]), community participation (n=4 [21.1%]), muscle strength and/or motor skills (n=3 [15.8%]), emotional issues (n=2 [10.5%]), and other health issues such as dizziness, forgetfulness, nausea (n=1 [5.3%]).
Conclusions: Pain, decreased endurance and fatigue are commonly voiced as challenges for PHIVA. This leads to decreased levels of participation which in turn could lead to other mental and physical health complications.
Implications: Establishing and understanding the perceived challenges that PHIVA face helps to address some of the gaps in knowledge that clinicians experience when working with this vulnerable population. Addressing these challenges through the correct assessment, treatment, referral and education hopefully increases the adolescents' participation, improving their quality of life.
Keywords: Adolescents; perinatal; HIV.

Muscle strength and endurance in children living with HIV (PL-2768)
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Background: Myopathy and muscle weakness has been described in HIV-infected adults but little research has been done investigating muscle strength and physical endurance in children infected with HIV. HIV infection is associated with intestinal protein malabsorption, depletion of the body's protein reserves, and abnormal protein metabolism. These abnormalities can lead to decreased muscle bulk which may affect muscle strength and subsequently delay gross motor development.
Purpose: The aim of this study is to determine the muscle strength and endurance levels of children infected with HIV and initiated on antiretroviral treatment at an early age.
Methods: The CHANGES Bone Study follows 219 HIV-infected children and 219 HIV-uninfected children in Johannesburg, South Africa. At a cross-sectional visit, 175 HIV-infected and 171 HIV-uninfected children were assessed for endurance and muscle strength. Endurance was assessed using the Six Minute Walk Test. The American Thoracic Society guidelines for administering the test were adhered to. Blood pressure, heart rate and oxygen saturation were monitored pre- and post-test. Muscle strength was assessed using a hand held dynamometer using a 'make' test. Measurements included shoulder abduction,

shoulder forward flexion, elbow flexion, elbow extension, hip flexion, hip extension, knee flexion, knee extension, ankle plantarflexion and ankle dorsiflexion. Each measurement was taken three times and the maximum reading was recorded. Shoulder and elbow values were summed to give an overall upper limb score and hip, knee and ankle scores were summed to give a lower limb score. Clinical and anthropometric data were extracted from the child's clinical file. We compared measurements of HIV-infected to HIV-uninfected children.

Results: The results for 175 HIV positive and 171 HIV negative children were analysed. The two groups were well matched for age (p=0.88) and sex (p=0.23). There were no significant differences between the two groups for pre- and post- test blood pressure or oxygen saturation. The HIV infected group had significantly higher pre test (p=0.007 and post test (p=0.006) heart rates than the HIV uninfected group. The distance walked on the Six Minute walk test was similar in both groups but markedly lower than reported in other studies. There were no significant differences between the two groups for muscle strength in either the upper (p=0.984) or lower (p=0.845) limbs.

Conclusions: The muscle strength and submaximal endurance of young children infected with HIV may be similar to that of HIV uninfected children. The HIV infected children in this study were all initiated on antiretroviral treatment early in life and their disease was well controlled. The fact that both groups had relatively poor levels of endurance in comparison to international studies warrants further investigation.

Implications: The results of this study suggest that children infected with HIV who are well managed have the potential to perform well in assessments of muscle strength and submaximal endurance compared to their uninfected peers. The endurance levels of children, both infected and uninfected, in this community need to be investigated further.

Keywords (3): paediatric HIV; muscle strength; endurance

Intervention for children living with HIV (CLWHIV) that have HIV sensory neuropathy

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Aim: Sensory neuropathy is one of the complications associated with HIV. The prevalence of HIV-SN is known to be increasing with more children living longer in the Anti-Retroviral Treatment (ART) era. The aim of this study was to determine the outcome of an intervention programme on the gross motor function of CLWHIV that develop HIV-SN.

Methods: Children attending the Rahima Moosa Mother and Child Hospital were screened for signs and symptoms of PN using the Brief Peripheral Neuropathy Screen and gross motor function was assessed using the Movement ABC-2. Twenty-eight CLWHIV agreed to participate.

Data analysis of mean and standard deviation was used. Linear logistic regression was used to determine differences in MABC zones.

Results: Of the total number of participants n=28, 50% (n=14) were female. The mean age of the children was 8.6 years (SD = 1.7). The intervention started with 11 participants (45.8%) being classified as being 'at risk' (red and amber zones) to only three (15.8%) on completion.

A stepwise linear regression model was used to determine differences at each point of assessment. The results were statistically significant, p = .023, where baseline scores were the lowest, indicating an improvement during the intervention period.

Discussion and conclusions: The intervention programme yielded positive results with balance as well as aiming and catching scores showing statistical significance. A more rigorous clinical trial is recommended. Currently CLWHIV are not routinely screened or managed for HIV-SN or motor deficits. This study highlights the importance of physiotherapy intervention for this specific study population.

Clinical relevance of study: This study has highlighted that CLWHIV do have motor ability deficits and are more likely to develop HIV-SN. It is important that physiotherapists screen for these motor deficits and manage HIV-SN early in order to prevent further loss of motor skills.

Sport-focussed gross motor assessments for ambulant children with cerebral palsy

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Background: Sports are an important social experience and long-term intervention for children with disabilities, however, children with cerebral palsy (CP) participate less in sport than typically developing peers. Physiotherapy assessment of sports-specific gross motor skills is critical when identifying sporting opportunities. However, common CP-specific assessments demonstrate ceiling effects for ambulant children (e.g. Gross Motor Function Measure) and 'higher-level' assessments frequently employ tasks unrelated to sport. More challenging assessments are available, but psychometric data for children with CP is limited.

Purpose: To investigate: (1) performance of ambulant children with CP on sports-focussed gross motor assessments; (2) concurrent validity of mainstream sports-focussed fundamental movement skills assessment, the Test of Gross Motor Development-2 (TGMD-2), with the CP-specific Gross Motor Function Measure-Challenge Module (GMFM-Challenge), and (3) concurrent validity between these assessments and performance on running, jumping and throwing field tests.

Methods: Participants were 54 children (35 male) aged 6-12 years (8.8± 2.03 years), with ambulant CP (GMFCS I=17, II=37). Children participated in one 120-minute sport-focussed gross motor assessment session, including: the TGMD-2 (generating total, locomotor and object control scores and percentile ranks); the GMFM-Challenge (total score including locomotor and object control items) and sports field tests for running (Muscle Power Sprint Test (MPST) and 10x5m Shuttle Run Test (10x5mSRT)), jumping (Vertical Jump and Broad Jump) and throwing (Seated Throw). Data was examined with SPSS using non-parametric analyses. Performance on each measure was examined using medians and interquartile ranges. Possible associations between measures were examined using Spearman's correlations.

Results: All children with CP, GMFCS-I/II, in this study could attempt all TGMD-2, GMFM-Challenge items and field tests. Discriminative ability was good for both batteries. Children achieved TGMD-2 percentile ranks of <1 to 92% for overall performance, <1 to 95% for locomotion and <1 to 95% for object control. GMFM-Challenge scores ranged from 2.3 to 81.3 of a possible 112. Children at GMFCS I demonstrated higher scores on all locomotor assessments than children at GMFCS II ($p<0.001$). Children with higher TGMD-2-*Total* scores also achieved higher GMFM-Challenge scores ($r(52)=0.729$, $p<0.001$). Children with higher TGMD-2-*Total*, TGMD-2-*Locomotor*, and GMFM-Challenge scores also demonstrated higher scores in field tests involving running (MPST and 10x5mSRT: $r(52)=-0.535$ to -0.816, $p<0.001$) and jumping (Vertical Jump and Broad Jump: r(52)0.499 to 0.774, $p<0.001$). Seated Throw was not strongly correlated with any other assessment item.

Conclusion(s): All ambulant children with CP could attempt all sports-focussed gross motor assessments studied. Performance ranged from <1 to 95% showing a good ability to discriminate performance. Performance was strongly associated with GMFCS level. Concurrent validity of the TGMD-2 was established with the GMFM-Challenge and locomotor gross motor field tests.

Implications: Physiotherapists should assess sports-related gross motor function for ambulant children with CP to guide sports participation options. The GMFM-Challenge and TGMD-2 are valuable in assessing a range of sport-focussed skills. Due to their specificity, running, jumping and throwing field tests are best positioned to monitor change, or assess higher-level sport potential, particularly in sports closely related to the assessment. Further research could evaluate relationships between clinical assessment and on-field sports performance.

Keywords: Disability, Sport, Assessment.

THE DUTCH GO SLOW? CANADIAN NORM VALUES OF THE ALBERTA INFANT MOTOR SCALE EVALUATED FOR DUTCH INFANTS

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Background: The Alberta Infant Motor Scale (AIMS) is an elegant, psychometrically strong and widely used observation instrument. Pediatric physical therapists use the instrument to assess gross motor development of infants from birth until independent walking. It is well known that child rearing practices and beliefs differ between societies and cultures, which in turn possibly influence infant motor development. This raises the question whether the (original) Canadian normative values of the AIMS are applicable to infants living in other countries.

Purpose: The AIMS-NL study examined whether the currently used original Canadian normative values of the AIMS are appropriate for infants in The Netherlands.

Methods: This cross-sectional cohort study included 499 Dutch infants in the age of 14 days to 19 month representative of the current Dutch population. Infants with known neuromotor impairments were excluded. Infants were divided in monthly age-groups. A validated eHealth method, the AIMS home-video method, was used for data-collection. The recordings were assessed with the AIMS by four trained researchers/pediatric physical therapists. AIMS scores of the Dutch infants were compared to infants included in the original Canadian norm study (n=2202) matched on age. Data analysis was comparable to the scaling method used in a recent re-evaluation of the Canadian norms (2014). Using the scaling method, 45/58 items met the criterion for stable regression in the original Canadian as well as the Dutch dataset. Standard logistic regression of probability of ´passing´ an item as a function of age (item location) was calculated for each item of the AIMS and compared between the two samples.

Results: 499 home-videos were assessed with the AIMS. 5.8% of the infants had a non-Western ethnic background and 7.6% of the infants were born prematurely. The sequence of AIMS items, i.e. the order of the emergence of milestones was similar between Canadian and Dutch infants. Dutch infants pass 42/45 items at a later age compared to the Canadian infants. The biggest difference was 15.71 weeks for early stepping (item Stand 12): Canadian infants passed this item at a mean age of 50.99 weeks (11.8 months), and Dutch infants at a mean age of 66.70 weeks (15.4 months).

Almost all monthly age groups of Dutch infants show significant lower mean AIMS scores.

Conclusion(s): The Canadian norms are not appropriate for the Dutch population. Dutch infants appear to develop in a similar sequence, but in a slower rate. This raises the question: Which factors are associated to infant motor development and the considerable differences in gross motor development rate of infants?

Implications: The results affect research as well as clinical decisions based on AIMS data, with over-referral and perhaps even unnecessary parental concern and treatment of infants with gross motor developmental delay as a consequence. The advice for paediatric physical therapists is to use the Dutch norms from now on. But still considering the infant as part of its environment and its influences on the motor development, one should use the Dutch norms next to other available diagnostics as family concerns, medical history and clinical tests.

Key-words: 1. normative values 2. motor development 3. infants

THE UTILITY OF EEG AS A MEASURE OF MOTOR DEVELOPMENTAL AND INTERVENTION OUTCOMES

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Background: Research suggests that interventions that produce sustained gains tend to be those that also show changes in brain structure and functioning, however, the brain-behavior relationship during motor development or skill acquisition is poorly understood. Less clear are neural biomarkers of motor performance that can be used to measure change following intervention, or to distinguish between potential specific intervention responders or non-responders.

Purpose: This study examined the utility of electroencephalography (EEG) as a biomarker of motor performance by determining changes in brain activity and movement proficiency during the development of prone locomotion, comparing differences between intervention modes, and between infants with and without Cerebral Palsy (CP).

Methods: We employed repeated measure design with twenty-two 4-5 month old infants with CP and without (TD), who were a part of a larger study on prone locomotion training using the Self-initiated Prone Progression Crawler (SIPPC) robotic system. The TD group (17) was further assigned to three SIPPC training modes resulting in four comparison groups. The study protocol involved weekly baseline recording of the infants' brain activity for 5 minutes using a 124 channels EEG followed by videotaped training in prone locomotion on the SIPPC for 15 minutes bi-weekly for 16 weeks. Movement proficiency scores were coded from the videotaped performance using the Movement Observation Coding System (MOCS). We used repeated measures ANOVA to compare weekly MOCS scores and EEG power densities. The power densities were plotted spectrally and spatially.

Results: The results showed progressively increasing mean MOCS motor proficiency scores over time, with the largest mean change in the TD groups ($p<0.01$) compared to CP group ($p<0.08$). Similarly, for the TD groups, the EEG peak distributions showed increasingly higher peak frequencies and mu rhythm shift from 6.6 Hz to 7.3 Hz at 5 to 8 months. Small differences between the TD groups were noted in the alpha, delta, and theta band activity. In contrast, the results of the infants with CP revealed large weekly fluctuations that prevented aggregating EEG data but allowed close inspection. The mu rhythm activity, which emerged around 5 months in the TD group, emerged around 7 months in CP group and showed different distribution patterns.

Conclusion: Progressive shifts towards higher alpha and theta band peak frequency and mu-rhythm were consistent with trends in the movement proficiency change scores. However, these preliminary findings revealed important information regarding the potential for EEG as a biomarker of performance and to determine intervention effects that implicate age, type and timing of intervention, type of brain insult, and analytic approaches. Our results also revealed changes in the distribution of EEG rhythmic activity in different parts of the motor cortex that merit further exploration.

Implications: Besides monitoring brain performance during development, a combination of changes in the various EEG rhythmic patterns and their distribution may inform activity-dependent neuroplasticity studies and distinguish potential treatment responders and non-responders.

Funding: *This study was partially funded the National Science Foundation NRI #1208639.*

THE 6-MINUTE PUSH-TEST IN WHEELCHAIR-USING YOUTH WITH SPINA BIFIDA; RELIABILITY AND PHYSIOLOGIC RESPONSE.

Damen KMS , Takken T , de Groot JF , Backx FJG , Radder B , Roos ICPM , Bloemen MAT Institute(s): HU University of Applied Sciences Utrecht, Research Group Lifestyle and Health, Research Centre for Healthy and Sustainable Living, Utrecht, Netherlands, HU University of Applied Sciences Utrecht, Master Program Physiotherapy, specialisation Paediatric Physiotherapy, Utrecht, Netherlands, University Medical Center Utrecht, Child Development & Exercise Center, Wilhelmina Children's Hospital, Utrecht, Netherlands, University Medical Center Utrecht, Department of Rehabilitation, Physiotherapy Science and Sports, Utrecht, Netherlands Text: **Background:** Youth with spina bifida (SB) encounter difficulties in everyday activities, resulting in lower levels of physical activity and physical fitness. This often leads to deconditioning which results in even lower levels of physical fitness. For measuring functional performance in the ambulatory pediatric population, the 6-minute walk test is the most widely used functional exercise test. Verschuren et al. (2013) developed the 6-minute push (6MPT) test for wheelchairusing youth as alternative for the 6-minute walk test in the ambulatory population. They stated that the 6MPT is a reliable, functional test for wheelchair-using youth with cerebral palsy. Diagnosis in wheelchair-using youth influences the physiologic response during exercise testing, so we do not know if the 6MPT is also a reliable and functional test for wheelchair-using youth with SB.

Purpose: The purpose of this study was to determine reliability and physiologic response of the 6MPT in youth with SB who self-propel a wheelchair.

Methods: A sample of 53 youths (5-19 years, mean age 13 years and 7 months; 32 boys/21 girls) with SB who use a manual wheelchair for daily life, long distances or sports, performed a minimum of two exercise tests: the 6MPT and the Shuttle Ride Test to maximal exhaustion. Heart rate, minute ventilation, respiratory exchange ratio and oxygen uptake were measured using a calibrated mobile gas analysis system and a heart rate monitor. For reliability, the 6MPT was administered twice in 26 youths with SB and the Intra Class Correlation coefficients (ICC), Standard Error of Measurements (SEM) and Smallest Detectable Changes (SDC) for total covered distance and heart rate were calculated. Physiologic response during the 6MPT was expressed as percentages of maximal values achieved during the Shuttle Ride Test.

Results: The ICC for total distance was excellent (ICC 0.95), the ICC for heart rate was good (ICC 0.81). The SDCs for both covered distance and heart rate were ±15% of the mean scores. The mean value of the physiologic response for all parameters during the 6MPT was 85-89% of its maximal value, except minute ventilation, which was 71% of the maximal value. However, there was a broad range in the intensity of the 6MPT compared to the Shuttle Ride Test in wheelchair-using youth with SB (range absolute VO 34-135%).

Conclusion(s): Reliability of total covered distance during the 6MPT in wheelchair-using youth with SB seems to be excellent. Reliability for heart rate was good. In general the 6MPT is a functional performance test on a vigorous level of exercise for youth with SB who use a manual wheelchair for mobility or sports participation.

Implications: The 6MPT is easy to administer in clinical practice because no special equipment is needed. Pediatric physiotherapists are recommended to use the total covered distance in 6 minutes to determine and evaluate the level of functional performance of wheelchair-using youth with SB. The 6MPT can be used for all wheelchair-using youth with SB, but seems to be less appropriate for youngsters under ten years of age and for youngsters with a cognitive impairment.

Keywords: youth, 6-minute push test, Spinal Dysraphism

Funding acknowledgements: Foundation Innovation Alliance - Regional Attention and Action for Knowledge circulation, 2011-13-35P. PhD grant HU University of Applied Sciences Utrecht. Ethics approval: Yes Institution: University Medical Centre Utrecht Ethics Committee: Medical Ethical Committee Ethics number: “Let’s Ride… study” procedures: number 11-557

Clubfoot treatment around the world: progress, challenges, and the role of the physiotherapist.

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Background: Clubfoot affects around 174,000 children born annually, with approximately 90% of these in low and middle income countries (LMIC). Untreated clubfoot causes life-long impairment, affecting individuals' ability to walk and participate in society. The minimally invasive Ponseti treatment is highly effective and has grown in acceptance globally. Several studies have shown that physiotherapists are effective in providing Ponseti treatment.

Purpose: The objective of this cross-sectional study is to quantify the numbers of countries providing services for clubfoot and children accessing these. Additional commentary will cover the roles of physiotherapists in providing Ponseti treatment services for children with clubfoot, and how physiotherapists might be involved in scaling up treatment coverage globally.

Methods: In 2015-2016 expected cases of clubfoot were calculated for all countries, using an incidence rate of 1.24/1000 births. Informants were sought from all LMIC, and participants completed a standardised survey about services for clubfoot in their countries in 2015. Data collected was analysed using simple numerical analysis, country coverage levels, trends over time (using data collected bi-anually since 2007), and by income group. Qualitative data was analysed thematically.

Results: There were 173,996 expected cases of clubfoot worldwide; 157,935 (91%) of these were born in low and middle income countries. Data were included from 650 clinics in 55 countries, in which nearly 80% of all expected cases of clubfoot in LMIC were born. Within these countries 24,436 children were enrolled for Ponseti treatment for clubfoot in 2015, and nearly 32,000 in 2017. Trends over time showed a steady increase in the numbers of children starting Ponseti treatment in LMIC, with increasing numbers of countries reporting on treatment and offering services. There were higher levels of response and coverage within the lowest income country group. 31 countries reported a national programme for clubfoot, with the majority provided through public-private partnerships. Physiotherapists' roles in managing clubfoot cover a range of activities: national clubfoot programme coordination, management and training, treatment of clubfoot, working with families to increase adherence, monitoring and evaluation and service improvements.

Conclusions: This is the first study to describe global provision of, and access to, treatment services for children with clubfoot. The numbers of children accessing Ponseti treatment for clubfoot in LMIC has risen steadily since 2005. However, coverage remains low, and we estimate that less than 15% of children born with clubfoot in LMIC start treatment. More action to promote the rollout of national clubfoot programmes, build capacity for treatment, including human resources and enable access and adherence to treatment in order to radically increase coverage and effectiveness is essential and urgent in order to prevent permanent disability caused by clubfoot.

Implications: Physiotherapists have a very important role in increasing coverage of treatment for children born with clubfoot. Physiotherapists' manual, critical thinking and reasoning skills, and the time that they are able to spend with patients' families, mean that they are well placed to lead, provide, and improve many aspects of clubfoot treatment.

Physical therapy interventions in interdisciplinary treatment for paediatric pain: A scoping review.

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Background: Chronic pain in children and adolescents is increasing in prevalence worldwide, affecting 1 to 4 youth. For 5% of these youth, the condition can be a highly disabling and costly. In addition to psychology and medical intervention, physical therapy is recognized as a key component of interdisciplinary paediatric pain treatment programs. Traditionally designed for youth with complex regional pain syndrome (CRPS), these programs, targeting on self-management and participation in age-appropriate activities, have expanded their model to treat highly disabled children with various types of pain. Although strong evidence exists for physical therapy interventions in adult chronic pain, treatments reported to be successful in adults, these treatments may not be appropriate for the paediatric population.

Purpose: To report findings of a scoping review investigating: ¨What physiotherapy interventions and strategies are used in interdisciplinary paediatric pain treatment programs?" Therapeutic dose and the theory underpinning these interventions were also explored.

Methods: A three-pronged search strategy and the 6-step methodological framework proposed by Levac et al, 2010 was used. Descriptive statistics and thematic analysis helped analyse the extracted data. Interpretation of the findings was discussed with an advisory committee, including PTs working with these youth.

Results: Only 3 articles specific to PT in interdisciplinary pain treatment programs surfaced. When the search was narrowed to 'interdisciplinary pain treatment programs only, 21 additional articles were detected; studies describing the same program were eliminated (n= 7). Articles originated from 7 different countries; authors were primarily psychologists (n=10) and physicians (n=4) and included large samples of youth with CRPS. A total of 51 different interventions were emphasized with the most common including strength training (n=10), aerobic activity (n=6), and desensitisation (n= 5); TENS (n=6), contrast baths (n=4) and hydrotherapy (n=4). Multiple evidence-based behavioural change techniques (n=16) were detailed, in PT authored articles (n=3). The use of group interventions was frequent (63%). The therapeutic dosing was rarely reported as a reference to physiotherapy session duration (mean =2-hours daily) and frequency (mean=4 times weekly for 3.5 weeks). The theoretical underpinning of the interventions resided consistently in a biopsychosocial approach, normalization, and restorative models typically with a functional goal-oriented focus. Despite, physiotherapists being included within team descriptions, 6 studies failed to specify any PT-specific intervention. Inconsistent use of terminology and poorly described interventions added complexity to data interpretation. Some strategies regularly incorporated in paediatric physical therapy practice were also under-reported or assigned to other disciplines in the literature reviewed.

Conclusions: Over the past two decades, physical therapists in paediatric interdisciplinary pain programs have evolved, incorporating sensorimotor interventions, behaviour change strategies and group-based service delivery models in the treatment of the biopsychosocial complexities of youth with disabling chronic pain. However, well-designed studies using detailed intervention protocols, developed and conducted by PTs are needed to investigate the effectiveness and efficiency these practices within the context of broader paediatric pain populations.

Implications for Practice: The complexity of chronic pain in youth requires a biopsychosocial approach, with a focus on self-management and functional restoration. Physical therapists knowledge and skills are a recognized as a critical to interdisciplinary pain treatment programs designed for these youth.

Key Words: Physical therapy, interdisciplinary pain treatment program, paediatric chronic pain, paediatric pain-related disability

PREVALENCE AND PATTERN OF MUSCULOSKELETAL COMPLICATIONS OF SICKLE CELL PAEDIATRIC CHILDREN IN NORTHERN NIGERIA: A TEN-YEAR RETROSPECTIVE STUDY

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Background: The prevalence of Sickle cell in increasing in developing countries due to lack of awareness and other socio-cultural challenges. The hereditary blood disorder caused by an abnormality in oxygen-carrying protein hemoglobin found in red blood cells presents various types of clinical manifestations, including musculoskeletal manifestations. Musculoskeletal complications of SCD result from vessel occlusion, leading to tissue ischemia, infarction, progressive and organ damage, and bone marrow hyperplasia. This study aimed to find out the prevalence and pattern of musculoskeletal complications in pediatric sickle cell children.
Purpose: This study aimed to find out the prevalence and pattern of musculoskeletal complications in pediatric sickle cell children.
Methods: A retrospective descriptive study of hospital-based records using patients case folders. Ten years case notes (2005-2015) of SCA patients were reviewed in three hospitals in Kano, North Western Nigeria. Information on age, gender, type of musculoskeletal complication, Joint affected and the annual distribution of the complications were recorded.
Results: Records shows a total of 500 case folders in which patients presented with musculoskeletal complications. Results revealed 280(56%) males and 220(44%) females. The musculoskeletal complications were found to be acute osteomyelitis (64%), chronic osteomyelitis (30.4%), Leg ulcer (2.2%), septic arthritis (1.8%) and Juvenile ankylosing spondylitis (0.2%). The pattern of musculoskeletal complications in children was found to be 227(45.4%) among 0-5years and 273(54.6%) among 6-12years. The lower limbs were found to be commonly affected by 349(69.9%).
Conclusion(s): The study found acute osteomyelitis as the most common musculoskeletal disorder representing (64%) of the disorders, and thus, identified as children advance in age, there was an increase in the development of musculoskeletal complications, and the lower limb was found to be most commonly affected.
Implications: This study shows a high prevalence of musculoskeletal disorder in sickle cell children. This has caused a significant burden on children and caregivers. More attention should be given to awareness of prevention of the disease.
Keywords: 1. sickle cell 2. prevelance 3. Nigeria

Physical fitness, back pain and health-related quality of life of children and youth carrying schoolbags

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Background: Physiotherapists would have an increasingly important role to play in health promotion of school-aged children and youth. A broader understanding of HRQoL determinants in school-aged children and youth might help in designing more specific and effective physical therapy interventions, and maximizing individual's potential according to its specific characteristics and needs.
Purpose: The aim of this study was to evaluate the relationships between characteristics of schoolbags, physical fitness performance, back pain intensity and health-related quality of life (HRQoL) profile; and, to

estimate the contributions of the different characteristics of schoolbags, physical fitness components and back pain intensity to variations in HRQoL dimensions.
Methods: The sample included 308 Portuguese school-aged children and youth (gender: 44.8% females, 55.2 % males; age: 13.6± 2.5 years; grade: 14.3% 5th, 14.0% 6th, 8.1% 7th, 12.3% 8th, 18.2% 9th, 9.1% 10th, 9.4% 11th, 14.6% 12th). Characteristics of schoolbags were assessed with a questionnaire (type, method of carrying, duration of carrying) and a portable digital luggage scale (weight). Physical fitness performance was assessed with the FITescola battery of tests. The FITescola tests assess the components of body composition, cardiorespiratory fitness, muscular strength, muscular endurance and flexibility. Back pain intensity was assessed with four numeric pain scales (NPS): lumbar pain, dorsal pain, cervical pain and shoulders pain. HRQoL profile was measured with the validated Portuguese Pediatric Quality of Life Inventory (PedsQL), child self-report 8-12 and 13-18, which includes four subscales: physical functioning, emotional functioning, social functioning and school functioning. Statistical analyses were performed using Pearson's correlation coefficients, independent samples t-test and multiple stepwise regression models.
Results: Specific characteristics of schoolbags (type: backpacks with two shoulder straps; method of carrying: on both shoulders; weight: lower), better FITescola tests scores and lower back pain intensity NPS scores were related to higher PedsQL subscales scores ($p<0.05$). Multiple stepwise regression analysis revealed that gender, grade, specific characteristics of schoolbags (method of carrying), FITescola tests (total handgrip strength, lower limb flexibility test, abdominal strength test, upper limb flexibility test and body mass index) and back pain intensity NPS (cervical pain, dorsal pain and shoulder pain) were predictors of PedsQL subscales. In the final models, selected combinations of those predictors explained 5.3% to 29.6% of the variance in PedsQL subscales scores: physical functioning 29.6%, emotional functioning 16.6%, social functioning 5.3% and school functioning 8.0%. The cervical pain intensity was the variable with highest predictive value to all PedsQL subscales.
Conclusion(s): This study highlighted the importance of gender, grade, method of carrying the schoolbag, cervical pain intensity, dorsal pain intensity, shoulder pain intensity, body composition, muscular strength, muscular endurance and flexibility as predictors of HRQoL dimensions among school-aged children and youth.
Implications: Prevention and rehabilitation programs for school-aged children and youth should emphasize the most relevant characteristics of schoolbags, physical fitness components and back pain intensity.
Keywords: physical fitness; back pain; health-related quality of life; children; youth; schoolbags

Wheelchair Mobility Confidence Scale for Dutch Youth using a manual wheelchair.
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PURPOSE: The objective of this study was to develop a questionnaire to assess confidence in wheelchair mobility in Dutch Youth (WheelCon-Mobility Dutch Youth).
METHODS: (1) A forward-backward translation process was used to translate the original WheelCon-M from English into Dutch. (2) Items related to wheelchair mobility in Dutch youth were selected and adapted based on focus groups with youth, parents and health care professionals to create the WheelCon-Mobility Dutch Youth. (3) The WheelCon-Mobility Dutch Youth and the Utrecht Pediatric Wheelchair Mobility

Skills Test 2.0 (UP-WMST 2.0) were administered to 62 participants to evaluate internal consistency and construct validity.
RESULTS: Translation and cultural adaptation led to general adaptations in instructions, sentence structure and response scale. At the item level, 24 items were included with (n=17) and without (n=7) adaptation, 10 items were deleted and 7 new items were included. The WheelCon-Mobility Dutch Youth had an excellent Cronbach's alpha of 0.924 and a significant correlation ($r = 0.44$, $p < 0.001$) with the UP-WMST 2.0.
CONCLUSIONS: This study resulted in the adaptation of the WheelCon-M into the WheelCon-Mobility for Dutch youth using a manual wheelchair. Our study suggests there is evidence supporting the internal consistency and construct validity of the WheelCon-Mobility Dutch Youth.

BARRIERS, FACILITATORS AND SOLUTIONS FOR ACTIVE INCLUSIVE PLAY FOR CHILDREN WITH A PHYSICAL DISABILITY IN THE NETHERLANDS. A QUALITATIVE STUDY.

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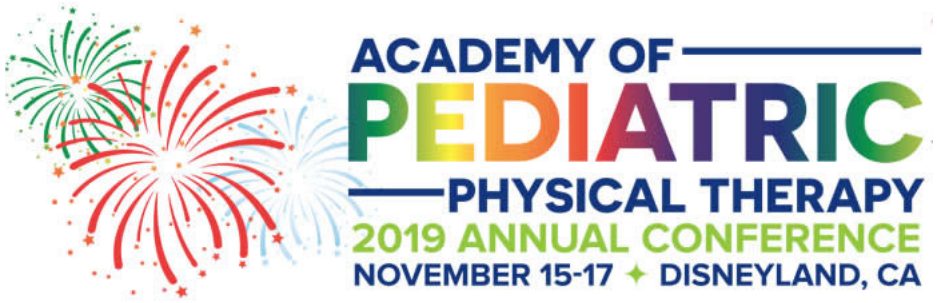
Background: Children with physical disabilities are less physically active than typically developing peers. The most important contributor to physical activity is outside play for primary school-aged children and should be part of the life of all children. However, children with disabilities experience multiple barriers regarding participation in playgrounds. De Speeltuinbende (the Playground gang) is a foundation and a community of children with and without disabilities and their parents and advices in accessibility of playgrounds and inclusive play. Despite several improvements of the physical accessibility of Dutch playgrounds, participation of children with disabilities did not increase.
Purpose: The purpose of this study was to explore facilitators, barriers and solutions that influence participation of children with disabilities in Dutch outdoor playgrounds from both a parental and professional's perspective. Methods: This study has a descriptive qualitative design. Purposive sampling was used to include parents from children with several physical disabilities and ages between 2-12 years and professionals with different levels of experience and various professions. Twelve semi-structured interviews with parents and five focus groups with professionals (n=25) working with children with disabilities (such as pediatric physical therapists) were conducted and transcribed verbatim. To assure data saturation, we performed three member check meetings (n=21). Two independent researchers analyzed the data using an inductive thematic approach, in case of no consensus a third researcher was consulted. Barriers, facilitators and solutions were coded and themes were constructed using the modified Physical Activity for person with a Disability model as a background scheme (adjusted PAD-model). Critical peer review sessions were established to avoid bias.
Results: Similar barriers, facilitators and solutions were mentioned by parents and professionals and observed for all domains of the modified PAD-model. The most important environmental factor was that the Dutch community is not inclusive yet. People often find it difficult to interact with children with disabilities, making participation and inclusiveness a challenge. The most important personal factors were physical and social problems that were experienced when children with disabilities wanted to join outdoor play. Interestingly, parents and professionals believed that the social barrier was far more important than the physical barrier. Two additional themes were emphasized upon from the professional's perspective,

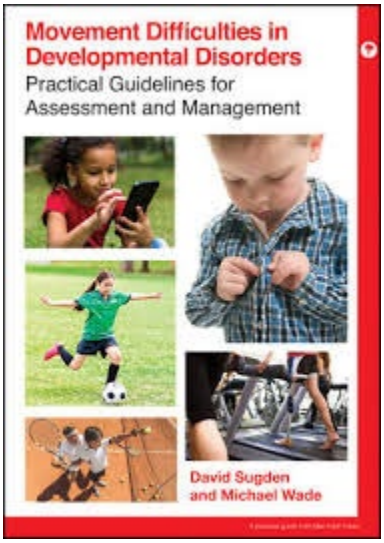
namely to introduce children with disabilities to the playground at a young age and the role of professionals in facilitating active inclusive play.
Conclusions: According to both parents and professionals, the most important barrier for outdoor active play is that children with disabilities do not join typically developing peers because of social problems. To overcome these problems, professionals should take an active role in empowering children with disabilities and their parents. Furthermore, it is important to introduce outdoor active play at a young age, so it becomes part of normal daily life. In addition, a change in the mindset of typically developing peers and their parents seems essential to achieve true inclusive active play. Implications: Social-emotional aspects such as social skills and empowerment of both children and parents should be part of pediatric physical therapy interventions.
Keywords: Children with disabilities, Inclusive active play, Pediatric Physical Therapy Funding acknowledgements: na
Ethics approval: No Institution: HU Univeristy of Applied Sciences Utrecht Ethics Committee: Medical Ethical Screening committee Please state the reasons why ethics approval was not required. The study used interviews with no emotional burden

IOPTP International Organisation of Physical Therapists in Paediatrics

The IOPTP board encourages participation in the **European paediatric conference in the Netherlands** this November. We are also collaborating with the development of the UK conference in November 2020. https://husite.nl/euppt/

The **American Physical Therapy Association Academy of Pediatric PT** will be celebrating their 45th year and the 10th pediatric conference in Anaheim, CA (Disneyland) November 15-17 with pre-conferences Nov 13 and 14th. Anyone who is not a member of APTA can join as an APPT Partner by going to the website: www.pediatricapta.org under "join us" to have access to information and discounted registration for conferences.





MacKeith Press, a non-profit publisher of the journal Developmental Medicine and Child Neurology (DMCN) and book series Clinics in Developmental Medicine est. 1959, has recently published the book **Movement Difficulties in Developmental Disorders: Practical Guidelines for Assessment and Management** by David Sugden and Michael Wade

http://www.mackeith.co.uk/shop/movement-difficulties-in-developmental-disorders-practical-guidelines-for-assessment-and-management/

This book presents the latest evidence-based approaches to assessing and managing movement difficulties in children. Uniquely, children with developmental coordination disorder (DCD) and children with movement difficulties as a co-occurring secondary characteristic of another development disorder, including ADHD, ASD, and Dyslexia, are discussed.

From the Foreword by Prof. Jane E. Clark

"The book shares with the reader, the wisdom of these two scholars who have spent their careers engaged in the scientific study of motor learning and development, assessment, and intervention to better understand those with movement difficulties."

More information
The first chapter can be downloaded for free.

10% discount
IOPTP members are offered a 10% discount on the book using coupon code **SOC10%** at the Mac Keith Press shop.

The NEW IOPTP Research Grant

The IOPTP Research Committee has developed a proposal for a research grant. We plan to fund a project each year going forward. Be thinking about research projects you are interested in. Expect the call for 2020 to go out through this newsletter in early 2020.

The IOPTP FACEBOOK page is a great resource for upcoming events and information on the IOPTP and the WCPT. It is also a great resource for information on pediatric physical therapy with an international prospective on research, practice and advocacy.

The IOPTP's partnership with MedBridge allows for on-line continuing education at a reduced annual rates for IOPTP members.
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We are seeking submissions for the next newsletters.

March 2020 **Pain Management in Paediatrics**

September 2020 **School-based Physical Therapy**

Please send submissions to Erin Wentzell at ewentzell@gmail.com