DCD X

June 28 - July 1, 2013



OURO PRETO
MG - Brazil

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10th International Conference on Developmental Coordination Disorder

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Escola de Educação Física Fisioterapia e Terapia Ocupacional
Federal University of Minas Gerais

DCD-X

Conference Book

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WELCOME

DCD X | Ouro Preto - MG
Brazil

Almost two decades ago, a small group of researchers gathered to discuss their research about individuals who have Developmental Coordination Disorder (DCD). Today the 10th anniversary of international conferences around the world deserves celebration!

We want to take a moment to reflect upon the past and to discuss our ideas and hopes for the future of the field. The 10th conference presents you with a myriad of papers that will expand our knowledge on DCD across the life span.



I'm pleased to welcome all participants to the 10th Conference of the International Society for Research into Developmental Coordination Disorder organized by the Federal University of Minas Gerais

Lívia C. Magalhães

Celebrating the past, anticipating the future

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Australia
Dr. Peter Wilson
USA:
Dr. Jane E. Clark
The Netherlands
Dr. Bowien Smits-Engelsman



Marcio Oliveira
looking forward to see what's next !



Marcia B. Rezende
enjoy the conference, it is time to share !

DCD X - Scientific Program

UFOP convention center

Friday June 28, 2013

5:00 - 7:00 **Espaço Sabará**

Registration open

7:00 - 7:15 **São João Del'Rey**

Opening Remarks

Lívia C. Magalhães

Federal University of Minas Gerais, Brazil

7:15 - 8:15 **São João Del'Rey**

A celebration of the journey from DCD I to X: "Opportunities multiply as they are seized"

Keynote Speaker: Sheila Henderson

Institute of Education, University of London, England

Coord. Lívia Magalhães

3:00 - 7:00 **Espaço Sabará**

Welcome Reception

Saturday June 29, 2013

8:30 - 9:30 **São João Del'Rey**

DCD Research: Is the past prologue or epilogue?

Keynote Speaker: Jane E. Clark

University of Maryland, United States of America

Coord. Marcio Oliveira

9:35 - 10:15 **São João Del'Rey**

Lightning Session - Neurocognitive Correlates of DCD

Coordinator: Jill Whitall

University of Maryland, United States of America

10:15 - 11:10 **Espaço Sabará**

Poster Session 1 | ☕

Coordinator: Marcio Oliveira

University of Maryland, United States of America

Oral Presentations A **São João Del'Rey**

11:10 - 11:30

An fMRI study of the procedural learning deficit hypothesis in Developmental Coordination Disorder and/or Developmental Dyslexia.

Chaix, Yves | Biotteau, Maelle | Vayssiere, Nathalie | Lelong, Sandrine | Albaret, Jean-Michel

11:30-11:50

Mild impairments of motor imagery skills in children with DCD: Is motor imagery related to anticipatory action planning?

Noten, Malou | Wilson, Peter | Ruddock, Scott | Steenbergen, Bert

11:50 - 12:10

Inhibitory constraints on the goal-directed reaching of children with Developmental Coordination Disorder (DCD)

Ruddock, Scott | Hyde Christian | Piek, Jan | Sugden, David| Morris, Sue| Wilson, Peter

12:10 - 12:30

Neural underpinnings of impaired predictive motor timing in children with Developmental Coordination Disorder

Van Waelvelde, Hilde | De Brabant, Julie | Gheysen, Freja | Caeyenberghs, Karen | Vingerhoets, Guy

Oral Presentations B **Tiradentes**

11:10 - 11:30

Executive functioning in children with and without motor difficulties.

Leonard. Hayley | Hill, Elizabeth L. | Bernardi, Marialivia | Henry, Lucy. A.

11:30-11:50

Hot executive function in children with Developmental Coordination Disorder

Rahimi-Golkhandan, Shahin | Wilson, Peter

11:50 - 12:10

Low (affective) engagement and reduced pleasure during physical performance in children with poor motor skill: A real-time physiological investigation

Butson, Michael | Wilson, Peter

12:10 - 12:30

Is DCD associated with language and emotional-behavioural problems in pre-school children?

King-Dowling, Sara| Cairney, John

12:30 - 1:30 **Tiradentes**

Lunch Break

Oral Presentations C **Tiradentes**

1:40 - 2:00

Smooth Manual Pursuit and Visual Occlusion: a Study on Predictive Control in Children with DCD

Smits-Engelsman, Bouwien. C. M | Ferguson, Gillian

2:00-2:20

Relationship between measures of body composition, physical activity and developmental coordination disorder over time

Joshi, Divya | Missiuna, Cheryl | Hanna, Steven | Hay, John | Faught, Brent | Cairney, John

2:20-2:40

How does focus of attention influence explicit and implicit motor learning in children with Developmental Coordination Disorder?

Jarus, Tal | Abel R | Davidson, S | Fomenoff, S | Lundberg, J | Zwicker; Jill

Oral Presentations D **São João Del'Rey**

1:40 - 2:00

Walking patterns of individuals with and without Developmental Coordination Disorder on even and uneven terrains

Gentle, Judith | Wilmut, Katen| Barnett, Anna

2:00-2:20

Graphomotricity and handwriting in children with developmental coordination disorder

Huau, Andréa | Jover, Marianne | Velay, Jean-Luc

2:20-2:40

Control of dynamic balance in children with DCD compared to control children: a force plate analysis

Geuze, Reint. H.| Jelsma, Dorothee L.| Smits-Engelsman, Bouwien. C. M.

2:40-3:40 **Tiradentes**

Collaborative Café Mineiro – round tables – selected topics

3:40-4:40 **São João Del'Rey**

DCD, Dyspraxia, and Sensory Integration: In the Eyes of the Beholder

Keynote Speaker - Sharon Cermak

University of Southern California, United States of America

Coord. Lívia C. Magalhães

4:45 **São João Del'Rey**

ISR-DCD Meeting – International Society for Research into DCD

Coordinator: Peter Wilson

DCD X - Scientific Program

UFOP convention center

Sunday June 30, 2013

8:30 - 9:30 **São João Del'Rey**

DSM5 - What is new for DCD?
Keynote Speaker: Gillian Baird
King's College London, United Kingdom
Coord. Luiz T. Dantas

9:35 - 10:15 **São João Del'Rey**

Lightning Session - Assessment & Indicators of DCD
Coordinator: Anna Barnett
Oxford Brookes University, United Kingdom

10:15 - 11:10 **Espaço Sabará**

Poster Session 2 |
Coordinator: Ana Maria Pellegrini
UNESP Rio Claro, Brazil

Oral Presentations A **Tiradentes**

11:10 - 11:30
Can a Little instrument make a big noise? A cross-cultural collaboration for identifying motor delay in young preschoolers
Rihtman, Tanya| Wilson, Brenda N. | Cermak, Sharon |Rodger, Sylvia | Schoemaker, Marina | Cantell, Marja. | Jover, Marianne | Van Waelvelde, Hilde | Hultsch, Daniela | Nakai, Akio | Green, Dido | Albaret, Jean-Michel | Ray-Kaeser, Sylvie | Magalhães, Livia. | Cardoso, Ana Amélia R. | Martini, Rose | Parush, Shula | Tseng, Mei-Hui | Sun, Shih-Heng | Pienaar, Anita. | Coetzee, Dané

11:30-11:50
European French adaptation of the Little DCD-Q questionnaire (Little DCDQ E-French).
Jover, Marianne | Albaret, Jean-Michel | Ray-Kayser, Sylvie| Parush, Shula. | Ritman, Tanya. |Wilson, Brenda N.

11:50 - 12:10
Adolescent and adults coordination questionnaire- AAC-Q: development and psychometric properties
Tal-Saban, Miri | Parush, Shula | Ornoy, Asher

12:10 - 12:30
Validity of the Little Developmental Coordination Disorder Questionnaire-US
Cermak, Sharon | Cohen, Nurith | Foran, Amanda

Oral Presentations B **São João Del'Rey**

11:10 - 11:30
Translation and cultural adaptation of the detailed assessment of speed of handwriting: conceptual and semantic equivalence
Cardoso, Monique. H. | Capellini, Simone. A.

11:30-11:50
Translation and cultural adaptation of Early Years Movement Skills Checklist
Iwamizu, Juliana S. | Dantas, Luiz Eduardo P. B. T.

11:50 - 12:10
Cross-cultural validity of the Movement Assessment Battery for Children – second edition: the Czech national study
Psotta, Rudolf | Hendl, Jan

12:10 - 12:30
Development of the Handwriting Legibility Scale (HLS): an examination of reliability and validity
Barnett, Anna | Rosenblum, Sara | Prunty, Melissa

12:30 - 1:30

Lunch Break

Oral Presentations C **Tiradentes**

1:40 - 2:00
Measuring physical fitness in adolescents with DCD: Do we use the right measures?
McIntyre, Fleur | Hands, Beth | Larkin, Dawne | Rose, Elizabeth

2:00-2:20
Standardization of the German Version of the BOT-2: process, findings and comparison with the English Version
Vincon, Sabine | Jenetzky, Ekkehart| Blank, Rainer

2:20-2:40
Congenital Muscular Torticollis and risk of Developmental Coordination Disorder
Green, Dido | Schertz, Mitchell | Zuk, Luba | Plumby, Mary S.

Oral Presentations D **São João Del'Rey**

1:40 - 2:00
Perinatal and neonatal predictors of developmental coordination disorder in very low birth weight children
Zwicker, Jill | Mackay, Margot | Petrie-Thomas, Julie | Rogers, Marilyn | Synnes, Anne

2:00-2:20
Identification of coordination difficulties through the Movement Assessment Battery for Children I and II in the Brazilian context
Ferracioli, Marcela C. | Pellegrini, Ana M. S. | Hiraga, Cynthia Y.

2:20-2:40
A motor proficiency profile of Grade 1 learners in the North West Province of South Africa
Pienaar, Anita | Kemp, Chanel

2:45-3:45 **São João Del'Rey**

A brief history of time and space: Disorder, Coordination and Development
Keynote Speaker: Reint Geuze
University of Groningen, The Netherlands
Coord. Cynthia Hiraga

7:30 - 9:30 **Restaurant**

Dinner at Bené da Flauta – RSVP

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DCD X - Scientific Program

UFOP convention center

Monday July 1, 2013

8:30 - 9:30 **São João Del'Rey**

Spreading the word: A systematic approach to translating knowledge about DCD

Keynote Speaker: Cheryl Missiuna
McMaster University, Canada
Coord. Ana Maria Pelegrini

9:35 - 10:15 **São João Del'Rey**

Lightning Session - Therapeutic approaches for DCD

Coordinator: David Sugden
University of Leeds, United Kingdom

10:15 - 11:10 **Espaço Sabará**

Poster Session 3 | ☕

Coordinator: Marcio Oliveira
University of Maryland, United States of America

Oral Presentations A **Tiradentes**

11:10 - 11:30

Best Practice Principles in Developmental Coordination Disorder: A scoping review

Camden, Chantal | Wilson, Brenda N. | Kirby, Amanda | Missiuna, Cheryl

11:30-11:50

Effectiveness of an innovative summer camp for children with developmental coordination disorder

Zwicker, Jill | Rehal, Harpreet | Sodhi, Sharon | Hilliard, Mike | Jarus, Tal

11:50 - 12:10

Parental perception and selected motor abilities improve after a group intervention program for children with DCD

Caçola, Priscila | Henry, Danielle | Ibana, Melvin | Romero, Michael | Chuang, Jennifer | Deo, Ketaki

12:10 - 12:30

Evaluation of an online workshop to support evidence-based physiotherapy management of children with DCD

Camden, Chantal | Rivard, Lisa | Missiuna, Cheryl | Pollock, Nancy

Oral Presentations B **São João Del'Rey**

11:10 - 11:30

Nintendo Wii-Fit game and a video observation protocol (VOT-B) used as a tool to observe and analyze movement strategies in children with DCD/balance problems

Jelsma, Dorothee L. | Timmerman, Marike. E. | Geuze, Reint. H. | Smits-Engelsman, Bouwien C. M.

11:30-11:50

Efficacy of Neuromotor Task Training in Small Groups of Children with DCD attending Mainstream Primary Schools in Cape Town

Ferguson, Gillian | Jelsma, Dorothee L.| Jelsma, Jennifer | Smits-Engelsman, Bouwien. C. M.

11:50 - 12:10

Virtual reality in an intervention program for children with developmental coordination disorder

Campelo. Alexandre M. |Rocha, Paulo Ricardo. H. | Pellegrini, Ana Maria

12:10 - 12:30

A Mindfulness-Enhanced Cognitive Orientation to Daily Occupational Performance intervention to help children with Developmental Coordination Disorder attain individual motor skill acquisition goals

Jackman, Monica | Adkins Singh, Angela

12:30 - 1:30 **Tiradentes**

Lunch Break

Oral Presentations C **São João Del'Rey**

1:40 - 2:00

Handwriting speed in children with DCD: Are they really slower

Prunty, Melissa | Barnnet, Anna | Plumb, Mandy | Wilmut, Kate

2:00-2:20

Non-proficient handwriting: a decision-tree to guide the assessment and the intervention

Kaiser, Maurie Laure | Albaret, Jean- Michel

2:20-2:40

Effectiveness of the handwriting intervention program: 'I can'

van Waelvelde, Hilde | Verheyen, Els | Dewitte, Griet | De Mey, Barbara | Ampe, Joke

2:40-3:00

Physical self perceptions of adolescents with DCD before and after a 13 week exercise intervention

Hands, Beth | McIntyre, Fleur | Larkin, Dawne | Rose, Elizabeth

Oral Presentations D **Tiradentes**

1:40 - 2:00

The correlation between attention and motor function among children with comorbid ADHD and DCD.

Bart, Orit | Liron, Daniel | Bar Haim, Yair

2:00-2:20

Effects of resistance training on peripheral bone mineral density and muscle strength in adolescents with motor difficulties

Bervenotti Filho, Fracisco. C. | Hands, Beth | Mcintyre, Fleur| Blee, Tanya | Bulsara, Max | Siafarikas, Aris

2:20-2:40

Children with DCD can perceive and adapt to perceptible and subliminal rhythm changes

Roche, Renuka | Viswanathan, Priya | Clark, Jane E. | Whitall, Jill

2:40-3:00

Development and evaluation of a new service delivery model for children with DCD in Sherbrooke, Québec, Canada

Léger, France | Camden, Chantal | Morel, Julie

3:00-4:00 **São João Del'Rey**

DCD the uncharted course: Are we there yet?

Keynote Speaker: Helene J. Polatajko
University of Toronto, Canada
Coord. Clarice Ribeiro

4:00 **São João Del'Rey**

DCD X - Final Remarks

Livia Magalhães
Federal University of Minas Gerais, Brazil

DCD X - Scientific Program

UFOP convention center - Poster Session 1

Saturday June 29, 2013 - 10:15 - 11:10

29PS01 **Muscular strength and flexibility of children with probable Developmental Coordination Disorder**
Oliveira, Jorge Alberto | Ihara, Amanda Yuri | Cano, Roberto Carlos M. | Jesus, Luana Fernandes | Nascimento, Roseane O.

29PS02 **Physical fitness in children with and without Developmental Coordination Disorder**
Nascimento, Roseane O. | Lima, Allana M. V. | Machado, Daniele R. | Oliveira, Jorge Alberto

29PS03 **Practical applications of the concept of affordances on the assessment of children´s motor performance**
Monteiro, Margareth V. | Souza, Alana | Silva, Janielma | Melo, Karina

29PS04 **Cardiorespiratory fitness in children with probable Developmental Coordination Disorder**
Jesus. Luana F. | Ferreira, Lucio F. | Gonçalves, Beatriz Dias | Cano, Roberto Carlos Munoz | Goulardins, Juliana B.

29PS05 **Relationship between Executive Functions and Motricity in Children with ADHD**
Harsanyi, Estefania | Freitas, Gabriela Maria P. M. | Magalhães, Lívia C. | de Paula, Jonas J. | Kummer, Arthur M. | Ricardo, Laiss B. M. | Lima, Isabela Maria M. | Malloy-Diniz, Leandro F.

29PS06 **Handwriting and Motor Coordination: A Pilot Correlational Study**
Matias, Ana Rita Martins. Rui | Carita, Ana Isabel | Vasconcelos, Olga

29PS07 **Gender Comparison of Motor Coordination Level in Childhood Education**
Nunez, Paulo, R. M.

29PS08 **Young children with Developmental Coordination Disorder have difficulties estimating reach space with a tool**
Caçola, Priscila | Ibana, Melvin | Romero, Michael | Britt, Diana | Gabbard, Carl

29PS09 **Age-related changes in left-or-right motor selective inhibition in children with and without Developmental Coordination Disorder**
Tallet, Jessica | Albaret, Jean-Michel | Barral, Jérôme

29PS10 **Does risk for DCD impact the perceived competence and social acceptance of four year old children?**
Pridham, Elizabeth Jane | Hillier, Susan | Esterman, Adrian

29PS11 **Sleep disturbance in children with and without DCD and links with daytime functioning**
Barnett, Anna | Wiggs, Luci | Sparrowhawk, Masakso | Lloyd, Lisa

29PS12 **Motor imagery: is there a difference between children with and without DCD?**
Smits-Engelsman, Bowien C. M. | Martens, L. A. | Ferguson, Gillian

29PS13 **The differences of motor skill and visual perception between developmental coordination disorder and Asperger's syndrome.**
Kashiwagi, Mitsuru | Takuya, Tanabe | Shuichi, Shimakawa | Hiroshi, Tamai

29PS14 **Children with DCD have specific deficits in running strategy that limit speed and efficiency.**
Morris, Sue | Diamond, Nicola | Downs, Jenny

29PS15 **Is there a neuropsychological profile associated with developmental coordination disorder?**
Harrison, Kimberly | Cantin, Noémie | Stipanicic, Annie

29PS16 **The way strength is measured determines whether children with mild motor coordination problems (DCD) have less strength then their age matched peers.**
Verhoef-Aertssem, Wendy | Ferguson, Gillian | Versfeld, Pamela | Smits-Engelsman, Bouwien C. M.

29PS17 **Visual-motor coordination and global development of preterm children: evaluation and risk's detection in the begining of schooling**
Pinheiro, Raquel C. | Martinez, Cláudia

29PS18 **Prevalence of motor, neuropsychological and school performance deficits and their associations in preterm children**
Moreira, Rafaela S. | Magalhães, Lívia C. | Lemos, Stela Maris A. | Siuves, Jordana Dourado | Decaris, Yasmim F. Vilaça | Gonze, Pollyanna V. | Alves, Cláudia Regina L.

29PS19 **Factors associated with the motor development of preterm children at school age**
Moreira, Rafaela S. | Magalhães, Lívia C. | Lemos, Stela Maris A. | Siuves, Jordana Dourado | Decaris, Yasmim F. V. | Gonze, Pollyanna V.

29PS20 **Typical cognitive ability drives desired performance in mental imagery tasks in children with DCD**
Caçola, Priscila | Kondraske, George | Henry, Danielle | Deo, Ketaki

29PS21 **Kinematic and kinetic characteristics of vertical jump in children with developmental coordination disorder**
Rocha, Paulo Ricardo H. | Freitas, Paulo | Barela, José | Hiraga, Cynthia

29PS22 **Why are children with Developmental Coordination Disorder less physically active? Perspectives from exercise psychology**
Cairney, John | Kwan, Matt

29PS23 **Age-related differences of sensorimotor estimation in children with and without Developmental Coordination Disorder**
Ramalho, Maria Helena S. | Oliveira, Marcio A.

29PS24 **The motor function of preschool children exposed in-utero to anti-epileptic drug monotherapy**
Rihtman, Tanya | Ornoy, Asher | Parush, Shula

29PS25 **Physical activity in physical education sessions: Lower levels in children with developmental coordination disorder**
Spessato, Bárbara | Valentini, Nadia Cristina | Coutinho, Mônia | Souza, Mariele | Ramalho, Maria Helena

29PS26 **Analysis of the term "Developmental Coordination Disorder"in the National Production of Occupational Therapy**
Jóia, Andressa F. | Martinez, Cláudia M. S. | Della Barba, Patrícia, C.de S. | Sanches, Rodrigo R.

29PS27 **Prevalence of Developmental Coordination Disorder of Children from a Medium-Sizes City of São Paulo**
Jóia, Andressa F. | Martinez, Cláudia M. S.

29PS28 **Social Vulnerablity and Motor Performance: a pilot study**
Sartori, Rodrigo F. | Grassi-Oliveira, R. | Lima, Mariana Silva, Luis Eduardo W.

29PS29 **The concept of motor and physical performance: a literature review**
Monteiro, Margareth V. | Silvia, Janielma | Melo, Karina | Monteiro, Margareth

29PS30 **Does Motor Coordination and Perceived Scholastic Competence Influence Academic Performance in Children with Developmental Coordination Disorder?**
Faught, Brent E. | Hay, John | Cairney, John

29PS31 **The Role of Social Competence in the Relationship between Free Play and Motor Performance in Preadolescent Children**
Faught, Brent E. | Martin, Britney | Liu, Jian | Narushima, Miya | Cairney, John | Hay, John

DCD X - Scientific Program

UFOP convention center - Poster Session 2

Sunday June 30, 2013 - 10:15 - 11:10

30PS01 **A Comprehensive Special Educational Diagnostic Assessment of Five Year Old Children with Developmental Coordination Disorder**
Tercon, Jerneja | Filipcic, Tjasa

30PS02 **Concurrent Validity of MABC-2 and TGMD-2 for Brazilian Children Movement**
Valentini, Nadia CristinCoutinho, Mônia | Ramalho, Maria | Oliveira, Marcio A.

30PS03 **Psychometric Properties of a Chinese Version of the Little Developmental Coordination Disorder Questionnaire**
Tzu-Han, Chung

30PS04 **Relationship Between Motor Skill Impairment and Autistic Traits in Children with Autism Spectrum Disorders**
Hirata, Shogo | Hideyuki Okuzumi | Yoshio Kitajima | Tomio Hosobuchi | Nakai, Akio | Mitsuru, Kokubun

30PS05 **MABC Checklist: classroom and physical education teachers' assessments are similar despite of their differing work environment**
Ferreira, Lucio F. | Freudenheim, Andrea M.

30PS06 **Finding children with mild motor impairment in poor resource area in Cape Town**
Ferguson, Gillian | Jelsma, Jennifer | Smits-Engelsman, Bouwien C. M.

30PS07 **Application of Developmental Coordination Disorder Questionnaire (DCDQ) with children aged 5-8 years: reality of são carlos/brazil**
Della Barba, Patricia C. S. | Felício, Thauana

30PS08 **European French cross-cultural adaptation of the Developmental Coordination Disorder Questionnaire'07: qualitative pre-test**
Ray-Kaeser, Sylvie | Jover, Marianne | Wilson, Brenda N. | Martini, Rose

30PS09 **The assessment of adults with DCD: do we have the tools?**
Barnett, Anna | Wilmut, Kate | Byrne, Maia

30PS11 **Descriptive study of motor performance in children with developmental coordination disorder**
Goulardins, Juliana B. | Castro, Marília | Casella, Erasmo C. | Lima, Alana | Oliveira, Jorge

30PS12 **Does sex and type of school influence motor performance in 6 years old children?**
Agostini, Olivia S. | Magalhães, Lívia C. | Carvalho, Lívia Paula F.

30PS13 **Test-retest reliability of the Assessment of Motor Coordination and Dexterity in six years old children**
Agostini, Olivia S. | Magalhães, Lívia C.

30PS14 **Children with probable Developmental Coordination Disorder and their risk: prevalence of difficulty in different classes of motor skills**
Nascimento, Roseane O. | Freudenheim, Andrea Michele | Oliveira, Gabriela B. Costa | Silva, Nathaniel P. | Ferreira, Lucio Fernandes

30PS15 **Development of the Little DCDQ-Canadian for Preschool Children**
Wilson, Brenda N. | Creighton, D. | Crawford, S. | Wilson-Brust, M. | Holub, A. | Babcock, S. | Gibbard, B. | Semple, L. | Brewin, B. | Neil, K. | Sabourin, K. | Tan, Ben

30PS16 **Reliability and Concurrent Validity of the DCD-Q-07 in Preschool Children**
Cairney, John

30PS17 **Visual-motor integration in children with Developmental Coordination Disorder**
Sulino, Rafael M. | Fischer, Franz | Pasculli, Adriane | Hiraga, Cynthia

30PS18 **Further assessment of the validity of the Hebrew Little Developmental Coordination Disorder Questionnaire**
Rihtman, Tanya | Parush, Shula

30PS19 **Prevalence of DAMP (Deficits in attention, motor control and perception) syndrome in Japan: A Nation-Wide Study, using Japanese version of DCDQ and ADHD-RS**
Nakai, Akio | Wilson, Brenda N. | Ohnishi, Masafumi | Yoshizawa, Masatada | Mitsuhashi, Yoshinori

30PS20 **How Do Teachers in Japan Assess "Clumsiness" and "Attention" in Children? Lesson from a Nation-Wide Study, using he Japanese version of the Motor Observation Questionnaire for Teachers (MOQ-T)**
Nakai, Akio | Ohnishi, Masafumi | Yoshizawa, Masatada | Mitsuhashi, Yoshinori | Schoemaker, Marina M.

30PS21 **Cognitive Profile on the WISC-IV of Children With Developmental Coordination Disorder (DCD) and/or Developmental Dyslexia (DD)**
Biotteau, Maëlle | Albaret, Jean-Michel | Lelong, Sandrine | Chaix, Yves

30PS22 **The prevalence of DCD like difficulties in child patients with Benign Epilepsy with Centro-Temporal Spikes (BECTS)**
Kirby, Amanda | Williams, Natalie

30PS23 **Risk identification of developmental disorder of coordination in the elementary school children**
Coppede, Aline C. | Santos, Jair Licio F. | Martinez, Claudia M. Simões | Hayashi, Maria Cristina P. I.

30PS24 **Motor profile of students with dyslexia**
Okuda, Paola M. M. | Ramos, Fabiana Garcia | Padula, Niura Aparecida M. R. | Capellini, Simone Aparecida | Pinheiro, Fabio Henrique | Herrera, Monique C. | Germano, Giseli D. | Capellini, Simone Aparecida

30PS25 **Motor performance of students with learning disabilities and dyslexia: a comparative study.**
Okuda, Paola M. M. | Pinheiro, Fabio Henrique | Herrera, Monique C. | Germano, Giseli Donadon | Capellini, Simone Aparecida

30PS26 **Prevalence of children with DCD in elementary education schools of the PR, Rolandia**
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30PS27 **The relationship between motor problems and attention deficit in children with Developmental Coordination Disorder : challenge for both diagnosis and therapeutic issue**
Monge, Sibylle G. | Jaffres, Marie Vialle, Sarah Maba, Laurence | Feige, Magali | Thevenon, Celine | Tur, Aurelie | Vaillot Pol, Nicole

30PS28 **Prevalence of association between ADHD and DCD: A Literature Review**
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30PS29 **Motor tests used in children in Brazil: bibliographic**
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30PS31 **Does socioeconomic Status Influences Motor, Cognitive and functional Skills in Preterm Children at Preschool Age?**
Maggi, Eliane F. | Magalhães, Lívia C. | Campos, Alexandre F. | Bouzada, Maria Cândida F.

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DCD X - Scientific Program

UFOP convention center - Poster Session 2

Monday July 1, 2013

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01PS02 **Kinematic and kinetic assessment of graphomotor disorders using a new high-tech pen**
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01PS03 **Normative data for the German version of the DCDQ**
Jenetzky, Ekkehart| Blank, Rainer | Vinçon, Sabine

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01PS08 **Performance of 7 years old children with and without Development of Coordination Disorder in the handwriting items of the Assessment of Motor Coordination And Dexterity (AMCD)**
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01PS12 **Motor ability in gym classes and participation in leisure activities among children with DCD - unique characteristics and relationships**
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Coetzee, Dané | Pienaar, Anita E.

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Jelsma, Dorothee L. | Geuze, Reint H. | Mombarg, Remo | Smits-Engelsman, Bouwien C. M.

01PS19 **Motion education for youth with Autism Spectrum Disorders and coordination challenges**
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01PS21 **Motor Stimulation: Effect of a Developmental Activity Program in Elementary School**
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Ramalho, Maria Helena S. | Oliveira, Marcio A. | Valentini, Nadia Cristina | Machado, Zenite | Silva, Camila F.

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01PS28 **Ecosystemic needs assessment for children with DCD in elementary school: Multiple case studies**
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Traub Bar-Ilan, Ruth | Parush, Shula | Katz, Noomi

01PS33 **Play activities of 7 and 8 years old children: differences between brazilian children with and without DCD**
Galvão, Cecilia P. | Rodrigues, Ana Amélia C. | Rezende, Márcia | Carmo, Isabella O. | Alcântara, Pollyanne M. L.| Lima, Cynhtia G. S. | Van Petten, Adriana M. V. N. | Magalhães, Lívia C.



DCD X

OURO PRETO

MG - Brazil



IMPORTANT INFORMATION

Location
Ouro Preto (from Portuguese, Black Gold) is a city in the state of Minas Gerais, Brazil, a former colonial mining town located in the Serra do Espinhaço mountains and designated a World Heritage Site by UNESCO because of its outstanding Baroque architecture.

Weather
Ouro Preto has a humid subtropical climate (Cwa, according to the Köppen climate classification), with warm and humid summers and mild, dry winters - The weather channel | Averages high 24.5 ^{0}C (76.5 ^{0}F), low 9.8 ^{0}C (49.6 ^{0}F)

Attire
Conference: Business Casual
Ouro Preto is a city of valleys and hills; wear comfortable shoes.

Voltage 110/120V (power outlet) (you may need an adapter)

Cuisine:
Lunch will be provided by conference organizers
Banquet: The conference banquet will take place on the last night at the restaurant Bené da Flauta, that is very typical of Ouro Preto, that will be decorated for the evening. Let's celebrate our 10th anniversary! Join us to enjoy the music and try some very delicious Brazilian food. Dinner is not included in the registration free.
Minas Gerais is also known nationally for its cuisine. The cultural basis of its cuisine is the small farmhouse, and many of the dishes are prepared using locally produced vegetables and meats, especially chicken and pork. The best-known dish from Minas Gerais is "pão de queijo", a small baked roll (known internationally as "Brazilian cheese rolls"). The state is also Brazil's most traditional producer of cheese. Minas cheese is renowned nationwide. Cachaça is also a local product and famous around the world. Enjoy some caipirinhas!

Music
Music is one of the most striking features of Minas Gerais and has been part of the history of the state since the early 16th and 17th centuries. The most varied rhythms and sounds have their origins in the state. Ary Barroso, who in 1939 composed one of Brazil's best known songs throughout the world, Aquarela do Brasil, was born in Ubá, in the Zona da Mata Mineira.

Tourism
Most attractions close on Mondays. Some churches charge an admitance fee; some churches do not allow photos or filming.There are many "tour guides" offering their services everywhere in town, but you should only hire people endorsed by the tourist offices.

An fMRI study of the procedural learning deficit hypothesis in Developmental Coordination Disorder and/or Developmental Dyslexia

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Biotteau, Maelle
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Introduction: Understanding the reasons of frequent co-morbidity in Developmental Coordination Disorder (DCD) and Developmental Dyslexia (DD) is an actual challenge for both theoretical and practical reasons. Their association (40 to 60%) suggests that etiological bases are partly common. In this context, Nicolson & Fawcett (2007) suggested a specific disorder of procedural learning. However the brain networks involved in this learning could be achieved separately, namely cortico-striatal and cortico-cerebellar loops. We intend to study the neural networks involved in motor procedural learning and compare these networks among children with specific learning disorder alone or in association. We consider how the neural activity differs or shares commonalities depending on the learning processes. Methods: 65 right-handed children were recruited. Inclusion criteria were: 8 to 12 years old, with DCD or DD or DCD and DD. They had no history of neurological or psychiatric disorder and no cons-indication for MRI. Children with Specific Language Impairment, Attention Deficit/Hyperactivity Disorder or Mental Retardation were excluded. Motor tasks during fMRI included three different conditions that were administered in a counterbalanced order. In the first condition, children realized continuously, and as fast and accurately as possible, a simple and highly automatized finger sequence, previously learned during fifteen days. In the second condition, participants had to execute a newly just learned finger sequence The third one is a control condition where children had to perform random tapping. For each run, subjects alternated 6 epochs of 30 s of rest and 30 s of motor tasks. Finally only 56 children (19 DD, 20 DCD and 17 DD+DCD) were included in the study. Nine children were excluded for incomplete assessment or excessive movements in fMRI. Results: Data analysis is currently in progress. The statistical parametric mapping software (SPM8) was used for both individual and group analyses of the functional imaging data. We expect differences in brain activity according to the three groups of disorders (DD, DCD or both) and to the type of motor sequences (random, new learned, automated condition), specially in cortico-striatal and cortico-cerebellar loops. Our central interest is to precisely identify the effects of the co-morbidity on brain organization with regard to a possible additive effect.

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DCD X | Ouro Preto
MG · Brazil

Oral Presentations A
11:10 · 11:30am
June 29, 2013

Mild impairments of motor imagery skills in children with DCD: Is motor imagery related to anticipatory action planning?

Noten, Malou
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Background: The underlying mechanism of clumsy motor behavior in Children with Developmental Coordination Disorder (DCD) has been hypothesized to be an internal modeling deficit. Internal models predict the consequences of motor actions based on forward modeling of the efference copy of the motor command. An internal modeling deficit can be shown on a behavioural level by mental imagery tasks, for example the mental rotation task of hands. In order to measure how the efference copy is used to plan actions before their onset a motor planning task can be used. Motor planning refers to the anticipation of the end state of an action during the preparation of that action. This can be shown by the end state comfort effect which shows that people try to attain a comfortable posture at the end of an action. A prerequisite for the end state comfort effect is motor imagery as this enables proper planning. Motor imagery and motor planning have not been tested within the same child, except for children with cerebral palsy. In children with DCD the question remains whether motor imagery is related to motor planning skills. Aim: The aim of this study is to investigate the relation between skills in motor planning and motor imagery in children with DCD. It is hypothesized that children with DCD have less motor imagery and motor planning skills than typically developing children and that motor imagery and motor planning are positively related to each other. Method: Motor planning and motor imagery skills were assessed in 82 children between 6 and 12 years of age. 5-10 percent of these children meet the criteria for DCD, which was assessed by the McCarron Assessment of Neuromuscular Development. Motor imagery was tested by a mental rotation task of hands that were shown from a palm and back point of view. Advanced motor imagery skills are concurrent with less mistakes and a reaction time pattern that follows the same biomechanical constraints as real movements. A motor planning task has been used in which a differently-oriented rotated bar has to be grasped and subsequently be put vertically in a holder. A comfortable end position is defined as an end position with the thumb up and an uncomfortable end position is defined as an end position with the thumb down. Results and Conclusion: Data collection and data analysis are currently in progress. The results and conclusions from this study will be presented at the conference.

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DCD X | Ouro Preto
MG · Brazil

Oral Presentations A
11:30 · 11:50am
June 29, 2013

Inhibitory constraints on the goal-directed reaching of children with Developmental Coordination Disorder (DCD)

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Piek, Jan
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Introduction: The development of frontal executive systems (e.g. inhibitory control) may impact the way children enlist basic motor control functions like (predictive) online control (Desmurget & Grafton, 2003). Children with DCD show deficits in online motor control processes as well as areas of executive function such as response inhibition. As such, performance-related issues may be more pronounced under conditions where children with DCD are required to implement online corrections concurrently with the inhibitory demands of more complex motor tasks. Aim and Hypothesis: We examined how children with and without DCD corrected their arm movement mid-flight whilst completing a double-step perturbation paradigm. We predicted that children with DCD would have difficulty implementing fast online corrections and, critically, that the addition of an inhibitory load would further exacerbate these performance deficits.Method: A sample of 180 children aged between 6 and 12 years was recruited from government and private primary schools across metropolitan Melbourne and Perth, Australia; 35 children met the research criteria for DCD as measured using the McCarron Assessment of Neuromuscular Development (MAND). All children were free of intellectual disability and medical condition affecting movement. Using a double-step perturbation paradigm (Hyde & Wilson, 2011), online control was compared between groups as a function of trial type (non-jump, jump, anti-jump) defined by target location. Target shift occurred to one of two peripheral locations, left and right of midline. For the anti-jump condition, children were asked to reach and touch a location to the opposite side of the cue.Results: Similar movement times were found for both groups under non-jump conditions. For perturbation (or jump) trials, the DCD group showed slower MT relative to control children. Importantly, while all children recorded longer movement time on anti-jump trials, the effect was significantly more pronounced for the DCD group. Kinematic analysis showed that the DCD group took longer to initiate corrections in trajectory, particularly on anti-jump trials.Conclusion: The results highlight a relationship between the ability to implement rapid online adjustments and executive processes, particularly when inhibitory constraints are imposed. While both DCD and control groups were able to perform basic reaching movements (non-jump trial) with a similar level of control, the DCD group were slower to adjust to target perturbation. Critically, this effect was exacerbated when demands were imposed on executive (inhibitory) systems (as per anti-jump trials). This pattern of performance in DCD suggests that the ability to integrate (frontal) executive control with the online motor control system may be impaired in children with DCD. More precisely, the ability to integrate fronto-inhibitory control with predictive estimates of limb position during action may be impaired in DCD, or require a more protracted period of development before it is integrated seamlessly. It remains to be seen whether these difficulties persist into later childhood and adolescence.

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DCD X | Ouro Preto MG · Brazil

Oral Presentations A
11:50 · 12:10pm
June 29, 2013

Neural underpinnings of impaired predictive motor timing in children with Developmenta Coordination Disorder

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Background: Predictive timing allows preselecting motor programs of upcoming events in order to decrease the processing load, thereby facilitating efficient reactions. Although the underlying functional and neural deficits of DCD remain ill-defined, a dysfunction in predictive motor timing is hypothesized to contribute to DCD-related motor problems. Method: The task involved motor responses to briefly presented visual stimuli of which the temporal predictability was manipulated using predictive (regular) or unpredictive (irregular) intervals between stimuli. Functional magnetic resonance imaging (fMRI) was used to investigate the neural correlates of motor timing abilities in 17 children with DCD (mean age 9.4 ± .6 years) and 17 age-gender matched typically developing children (mean age 9.2 ± .9 years). Results: Behavioural data showed a limited RT advantage and fewer anticipatory responses at predictive stimuli in DCD children compared to typically developing children. At the neural level, typically developing children showed increased activation at right dorsolateral prefrontal cortex (DLPFC) and the right inferior frontal gyrus (IFG) for response performance at unpredictive relative to predictive intervals, whereas activations in DCD children did not differ between these interval types. Also, DCD children showed less activation than typically developing children at left posterior cerebellum (crus I) and right temporo-parietal junction (TPJ) when responding at unpredictive vs. predictive stimuli. Notably, activation in the right temporo-parietal junction (TPJ) positively correlated with RT as an indicator of processing load in both typically developing and DCD children. Conclusions: These data indicate extra processing demands for motor timing performance in children with DCD due to impaired predictive encoding systems.

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DCD X | Ouro Preto
MG · Brazil

Oral Presentations A
12:10 · 12:30pm
June 29, 2013

Executive functioning in children with and without motor difficulties

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Introduction While impairments in executive functions (EF), such as planning, switching between tasks, inhibiting responses and controlling memory load, have been highlighted in anecdotal reports of children with DCD, relatively little research has systematically investigated EF in children with poor motor skills. The current research aimed to conduct a comprehensive battery of EF tasks with children with a DCD diagnosis compared to children identified through school screening as having either 'typical' or 'poor' motor skills. Methods Using data from parental questionnaires and the Movement ABC-2, children in a school screening programme were split into groups of those with 'typical' or 'poor' motor skills. Participants then completed a battery of verbal and nonverbal tasks assessing executive-loaded working memory, fluency, planning, switching and inhibition. Data from both of these groups will be compared to data from children with a DCD diagnosis on the same battery of tasks. Results Initial analyses of parent report data in the schools samples revealed significantly lower scores for working memory and organisation in the 'poor' motor group compared to the 'typical' motor group. All three groups will also be compared on the experimental measures of EF. Within-group analyses will be presented, addressing the predictive value of motor skills on EF in the two school screened groups, as well as the group of children with a DCD diagnosis. Conclusion The initial results demonstrate that poor motor skills can be identified through parent questionnaires and that those children highlighted may have other difficulties in aspects of EF, which can affect their success in the classroom and in activities of daily living. The results have implications for the way in which EF is tested in groups with poor motor skills in the future.

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Hot executive function in children with Developmental Coordination Disorder

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Deficits of cool executive function (EF) have been shown in children with motor problems (or Developmental Coordination Disorder—DCD), with implications for the planning of goal-directed action. However, there is little if any work on the possible link between DCD and hot EF. We aimed to investigate hot EF using state-of-the-art measures designed for children. Given the elevated incidence of emotional disorders in DCD, we predicted these children would show deficits of hot EF. Study 1: Participants were 12 children with DCD and 22 typically developing (TD) children aged between 6 and 12 years. Motor skill was assessed using the McCarron Assessment of Neuromuscular Development (MAND). The measure of hot EF was the 100-trial version of the Hungry Donkey Task (HDT). Participants select from a set of four doors which provide gains or losses in rewards. Two doors (A & B) are disadvantageous in the long run (high immediate reward, but high loss overall), while the other two (C & D) are advantageous (low immediate reward, but low loss overall). DCD group performed significantly worse than controls on the HDT (d [net score] = 0.81); making more selections from A and B, and less from C and D. While both groups chose doors with low frequency loss (B & D) more often, the DCD group opted for door B which yields high infrequent loss, but also high reward. Constant reward, instead of probabilistic loss, served as the subordinate dimension of choice on the HDT for the DCD group. This suggests DCD group may find it harder to resist rewarding stimuli, suggesting deficits of hot EF. Study 2 then investigated the ability of clumsy children to resist emotionally significant stimuli. Study 2: The participants were 13 children with DCD and 28 TD children aged between 7 and 12 years. Children completed two versions of a Go/No-go task tapping cool and hot EF. The cool version presented male and female faces with neutral expressions. Stimuli for the hot version were fearful and happy faces. Both expressions were used as targets and non-targets in each version, giving four conditions. A total of 40 trials were presented per run. In each trial, a face appeared for 500ms, followed by a randomised inter-stimulus interval. The frequency of commission errors was roughly equal between groups on all conditions ($d < 0.17$) except for No-Go "responses" to a happy face. The DCD group had significantly higher false alarms than controls ($d = 0.72$), and failed to withhold a response to happy faces on more than 50% of the trials. This finding supports the argument that children with DCD are more sensitive to rewarding stimuli, and suggests this group have poor impulse control in suppression of response to emotionally significant stimuli. Conclusion: This is the first study to show deficits of hot EF in DCD. Poor ability to resist temptation and high sensitivity to positive social cues may impair the ability to suppress thoughts and actions and undermine self-regulation to some extent.

DCD X | Ouro Preto
MG · Brazil

Oral Presentations B
11:30 · 11:50am
June 29, 2013

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Low (affective) engagement and reduced pleasure during physical performance in children with poor motor skill: A real-time physiological investigation

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Introduction: Reduced levels of participation and higher performance anxiety have been associated with children with poor motor skill. However, few studies have examined the affective responses of such children during motor performance. Physiological techniques can offer insight into unconscious affective processes associated with actual and imagined motor performance in real-time. We approached this issue from an embodied perspective, arguing that imagined motor performance is the neural re-instantiation of core elements of the bodily experiences associated with past actions. **Aim and Hypothesis**: The aim was to explore the momentary affective responding of children with different levels of motor skill when they performed physical activities or when they imagined performing an activity. We predicted that children with low motor skill (LMS) would display significantly less positive affect than children with high motor skill (HMS) at baseline, during performance, and during the post-activity rest periods. We also predicted that this pattern would be preserved for imagined performance. **Method**: 20 children aged between 8 and 11 years participated (11 with low motor skill and 9 with high motor skill). The children's electrodermal and heart activity responses were recorded before, during, and after (i) overt performance of several motor skill tasks or (ii) imagined performance. The order of presentation of tasks was counterbalanced. Those children who imagined performing an activity were also asked to describe what they had imagined. The Compumedics and Bioderm systems were used to measure heart activity response (mean HR, IBI) and skin conductance response (mean SCR amplitude, rise time, and half recovery time). **Results:** For overt performance, the pattern was complex but showed several strong effects. During baseline, there was a tendency for higher HR, lower IBI, and shorter SCR rise and half recovery times in the LMS group, suggesting that they were more anxious. During activity, HR was further elevated in the LMS group, regardless of the metabolic demands of the activity and HR remained elevated in the post-activity rest periods. While SCR rise and half recovery times were not significantly different between groups, the children with LMS generally had shorter times. For the imagined condition, the pattern of responses was more variable and harder to interpret. Nevertheless the LMS group demonstrated a higher HR when imagining performing a physical activity. **Conclusion:** In general, these preliminary results suggest that children with LMS displayed more negative affect at baseline, during an activity, and in the rest-period following an activity. Data are consistent with aversive (or avoidant) responding in relation to physical activities. These real-time physiological indices are consistent with subjective data in showing a negative orientation to physical activity in children with low motor skill. Implications for intervention are discussed.

DCD X | Ouro Preto MG - Brazil

Oral Presentations B
11:50 - 12:10pm
June 29, 2013

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Is DCD associated with language and emotional-behavioural problems in pre-school children?

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Background: Developmental Coordination Disorder (DCD) has been known to co-occur with emotional, behavioural and language problems in school-aged children. Exactly when these problems begin to emerge however, is much less studied. The purpose of this study was to determine if deficits in language and emotional-behavioural problems are apparent in preschool-aged children. Methods: One hundred and eighty six preschoolers (aged 4-6 years) performed the Movement Assessment Battery for Children 2nd Edition (M-ABC-2). Children falling below the 16th percentile were classified as having probable DCD (pDCD). Auditory comprehension and expressive communication were examined using the Preschool Language Scales 4th Edition (PLS-4). Emotional and behavioural problems were assessed using the Child Behavior Checklist (CBCL), completed by the parent or person most knowledgeable of the child. Independent sample t-tests were conducted to determine if children falling into the pDCD group performed significantly worse on the PLS-4 and/or if they had significantly more emotional-behavioural problems than typically developing children. Results: 33 children scored below the 16th percentile on the M-ABC-2 (24 boys and 9 girls). The pDCD group performed significantly worse on the PLS 4 ($t=2.45$, $p=.015$), indicating that preschool children with motor coordination problems also experience delays in language and communication skills compared to their typically developing peers. However, scores on the CBCL between the two groups were not significantly different ($t=1.21$, $p=.25$), suggesting that behavioural problems are not associated with DCD in pre-school aged children. Discussion: These results suggest that emotional-behavioural problems in children with DCD may not begin to emerge until later childhood. Motor coordination problems and co-occurring speech language problems may be pre-cursers to later behavioural and emotional issues. Future longitudinal research is needed in order to determine the nature of this association.

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Smooth Manual Pursuit and Visual Occlusion: a Study on Predictive Control in Children with DCD

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There is a converging body of evidence that hints that the motor deficits in children with DCD are closely tied to problems with mentally representing action and using this internal representation for online movement control. This paper reports on findings from an experimental study testing predictive motor control during the smooth pursuit of partly occluded visual targets. The hypothesis tested is based upon the ideas of active prediction of the trajectory of a moving target, in which subjects try to minimize their prediction error. Participants in this study were children, aged 6-10 years, attending a mainstream primary school. The motor performance of children was determined using the Movement Assessment Battery for Children II Two groups of participants (n=30, DCD and TD) were subjected to two tasks, administered by pediatric physical therapists. Both tasks consisted of manually tracking a red target (diameter 2.7 cm) presented on a flat screen computer monitor. However, in the occlusion task the target disappeared at random time intervals and the participant had to predict where the target was until in re-appeared. A digitizing tablet used to record the participants' response, was horizontally mounted on the table top, directly in front of the participant. The child moved the cursor, a small yellow dot (diameter 0.53 cm) that was also displayed on the monitor, by moving a wireless, electronic pen on a white sheet of paper (A3 format), positioned on the digitizer. The 2D position of the pen on the surface of the digitizer was sampled at a frequency of 206 Hz and with an accuracy of 0.1 mm. Results showed that in the occlusion task children with DCD performed worse than the TD children, as shown for instance by the greater number of errors made. There were also clear differences in the kinematic profiles of the two groups. In both tasks, children with DCD made more sub-movements than their TD peers. The data suggest that children with poor motor skills make more use of feedback in comparison to their TD peers, even when the use of predictive control is indispensable to successfully complete the task. The ability to predict movement outcomes is fundamental to motor control. Consequently, relying heavily on feedback makes movements slower and less responsive to changes in the environment. Moreover, because of the time lag of feedback loops, the errors will be larger before they are corrected.

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DCD X | Ouro Preto
MG - Brazil

Oral Presentations C
1:40 - 2:00pm
June 29, 2013

Relationship between measures of body composition, physical activity and developmental coordination disorder over time

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Background: Cross-sectional studies have shown that children with developmental coordination disorder (DCD) are more likely to be physically inactive and have higher body mass and excess weight when compared to typically developing children. However, longitudinal studies examining the relationship between DCD and measures of body composition (BMI and waist circumference) over time are lacking. It is also not known if gender, socioeconomic status, and physical activity have an effect on the relationship between DCD and measures of body composition over time. Objective: 1) To examine if BMI and waist circumference in children with and without DCD remain constant overtime or change as children age, and whether this relationship varies by gender. 2) To examine if differences in physical activity between children with and without DCD account for differences in BMI and waist circumference overtime. Methods: Physical Health Activity Study Team (PHAST) data was used for this longitudinal analysis. At baseline, a total of 2278 (DCD=103) children aged 9-10 years were included in the analysis. Mixed-effects modelling was used to estimate change in body composition measures in children over time. Results: Children with DCD have higher BMI and waist circumference compared to typically developing children, and this difference increases over the study period. The relationship between DCD and BMI and DCD and waist circumference over time also varies by gender. Specifically, boys with DCD were found to have a rapid increase in BMI and waist circumference compared to girls with DCD. Physical activity did not have a mediating or a moderating effect on the relationship between DCD and measures of body composition. However, it was independently negatively associated with measures of body composition. Conclusions: DCD is associated with higher body mass and waist circumference, which are important risk factors for cardiovascular disease, type 2 diabetes, and psychological problems among other health conditions. Physical inactivity, while associated with overall lower BMI and waist circumference estimates, did not account for differences in BMI and waist girth between children with and without DCD. Future research should examine more sensitive measures of physical activity that do not rely solely on self-report.

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DCD X | Ouro Preto
MG · Brazil

Oral Presentations C
2:00 · 2:20pm
June 29, 2013

How does focus of attention influence explicit and implicit motor learning in children with Developmental Coordination Disorder?

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Introduction: Children with Developmental Coordination Disorder (DCD) experience difficulties in their ability to learn motor skills. Motor learning is associated with practice or experience that lead to permanent change in performance, and can be divided into implicit (unconscious awareness) and explicit (conscious awareness) learning. Little is known about implicit and explicit learning in children with DCD and which type of learning is best to incorporate into intervention. In addition, it is unknown whether they learn motor skills more effectively with an external focus of attention (focusing on impact of movement on the environment) or an internal focus of attention (focusing on one's body movements) during both explicit and implicit learning. Objective: To investigate the effectiveness of an external or internal focus of attention on explicit and implicit motor skill acquisition in children with and without DCD. Method: DCD was defined as = 5th percentile on M-ABC, DCD range on DCDQ, and IQ > 80. Children between the ages of 8-12, with and without DCD, were recruited. They were instructed to focus attention externally or internally while completing a computerized motor task during three sessions; retention and transfer tasks was done in a fourth session. The motor task involved tracking both repeated and random patterns, which represent explicit and implicit learning respectively. For analysis of the data, a repeated measures 4-way MANOVA—focus of attention (internal/external) x diagnosis (DCD/control) x type of learning (implicit/explicit) X Trial Block with repeated measures for the last two factors was completed for each of the study phases. Results: Preliminary results of 21 children (n=8 DCD, n=13 typical) showed that children with DCD scored lower on motor task and performed better in the random pattern, indicative of explicit learning. In addition, a trend for better accuracy with external focus of attention compared to an internal focus of attention during transfer for the control group was detected. Although, an external focus of attention benefited the acquisition phase for children with DCD, no difference was found during retention and transfer. Data collection is ongoing. Conclusion: Findings to date suggest that children with DCD may learn better with explicit motor learning, supporting the current best practice of using explicit cognitive strategies to promote motor learning and functional skills in children with DCD. This will also enable us to incorporate an internal or external focus of attention within current rehabilitation. Effective intervention will help reduce motor learning difficulties for children with DCD.

DCD X | Ouro Preto MG · Brazil

Oral Presentations C
2:20 · 2:40pm
June 29, 2013

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Walking patterns of individuals with and without Developmental Coordination Disorder on even and uneven terrains.

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Walking is an inherently unbalanced activity, with 80% of the gait cycle spent in single leg stance. Given the importance of walking in everyday life, and the balance constraints experienced by individuals with Developmental Coordination Disorder (DCD), research into the walking patterns in this population is particularly pertinent. Previous studies have concentrated on children with DCD (aged 4-10 years) walking in a very predictable environment. Results suggest that children with DCD walk with a shorter step length and spend longer in double support compared to their peers. As it is rare that we walk on an uncluttered flat terrain, adjustments to walking patterns are needed to accommodate specific circumstances. The aim of the current study was to examine the step characteristics of individuals with and without DCD from a wider age group, whilst walking in a less predictable environment. Thirty-five individuals aged 8-32 years with DCD and 35 age and gender-matched controls (divided into 3 age ranges: 8-12; 13-17; 18-32 years) participated in this study. Participants walked up and down a 6m long surface under two conditions: a level walking condition where the pathway was flat and unobstructed and; an unlevel walking condition where non-slip 'pebbles' (9cmx10cmx2cm) were stuck at irregular intervals to the underlying floor surface. A VICON 3D motion analysis system tracked the motion of small reflective markers attached to the feet, legs, trunk and head. These locations provided measurements including velocity, stride length, step width ratio, time in double support, and vertical and lateral movement of the trunk. Additionally, step-to-step variability was analysed using standard deviations (SD) of each individual's data.Results indicated different walking patterns were adopted by both groups on each of the two terrains. The DCD group were significantly more variable than their peers whilst walking on the even pathway, and were more affected by the uneven terrain; walking significantly slower with shorter, wider steps. Conclusions to be drawn from this research will be discussed in terms of the additional balance constraints facing individuals with DCD whilst negotiating the everyday environment.

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Graphomotricity and handwriting in children with developmental coordination disorder

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Introduction Graphomotor (i.e. drawing, following a line…) and handwriting specificities have been described in developmental coordination disorder (DCD; Chang and Yu, 2010; Rosenblum and Livneh-Zirinski, 2008; Smits-Engelsman and al, 2001, Zwicker and al., 2010). However, these studies either consider the former or the latter task, but seldom both together. This study explored the features of graphomotor production across tasks that implied different motor processes in order to clarify the nature and intensity of graphomotor difficulties among children with DCD. Methods: 10 typically developing (TD) children and 10 children with DCD participated in the study. Children were between 8 and 11 years old. All children were evaluated using the French adaptation of the M-ABC (Soppelsa and Albaret, 2004) and of the BHK (Charles, Soppelsa, & Albaret, 2004). They were asked to perfom graphomotor tasks (copy some forms, complete two precision tasks, a cyclic drawing,) and to perform handwriting tasks (learn to write a pseudo-letter, write a letter, a word and a sentence), self-paced or rapidly. All tasks were performed on a digital tablet. Results: Half of the children of the DCD group had a score below -1.5 SD with the BHK. Copying forms did not differentiate between children with and without DCD. In the precision task, children with DCD drew faster and didn't improve between the first and second trial, unlike TD children. During the first trial of the learning task, breaks were shorter in children with DCD than in TD children. Differences between group's handwriting appeared only in the rapid condition: the duration and the strokes were longer for children with DCD. Children with DCD exerted a greater pressure on the tablet. Conclusions: Children with DCD encounter several difficulties in graphomotor and handwriting tasks. In this study, the most discriminating task was fast writing. However, differences between groups were already present during in simple graphomotor tasks as the precision or the learning ones. A dysfunction during the motor learning processes may explain some of the difficulties DCD children demonstrate in graphomotor and handwriting tasks (Nicolson and Fawcett, 2011).

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Control of dynamic balance in children with DCD compared to control children: a force plate analysis

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Control of static balance has been shown to be poor in the majority of children with DCD. Moreover, the control of dynamic balance has hardly been studied in this group, except for walking. A frequently noticed aspect of gait in DCD is variability in cadence. This increased variability in gait pattern and atypical patterns suggest major anomalies in the way children with DCD acquire and automate their walking. Aim: To assess differences in the way children with and without DCD control their balance when playing a simulated ski slope descent using the Wii-fit system. Method: Force plate data of 16 children at risk for DCD and with poor balance (DCD-BP) were compared to 16 age-matched controls. In the ski slope descent – game the aniMII (the animated figure) is controlled by laterally shifting weight. With the Wii-fit balance board placed on a force plate we recorded these shifts of weight. During a six week intervention period children played other Wii-fit games during 30 minutes 3 times a week. The control of dynamic balance was compared before and after this intervention. Analysis: Using the force plate data center of pressure (CoP) signals were calculated from which the trajectories of the decent were reconstructed. First the ideal trajectory was determined: 18 'perfect' descents (not a single gate missed) of control children were selected to determine this ideal trajectory and its lateral 95 % confidence interval (CI's). Individual descents of DCD-BP children were then compared to the ideal trajectory. The frequency and duration of the COP being outside the CI's of the ideal trajectory was determined. Preliminary results: Children with DCD-BP passed less gates correctly compared to controls. The lateral position during the decent outside the CI of the ideal trajectory of children with DCD-BP was longer in duration but not more frequent. The effect of intervention in children with DCD-BP was positive in the number of gates passed correctly, but they realized this with an increase of frequency and time outside the CI of the ideal trajectory. This points at a change in dynamic control strategy from more passive to more active control. The relation between the variability in the force plate signals and number of gates missed seems to be U- shaped; the (high number of gates missed may be due to either too little shifting of weight (i.e. being too passive) or too effortful (but using poor control). We still have to analyze if the shape of the non-linear relation is different between the two groups indicating poorer control in the DCD-BP group.

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Can a Little instrument make a big noise? A cross-cultural collaboration for identifying motor delay in young preschoolers

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Introduction: Even though the diagnosis of DCD is not recommended before 5 years, it is essential to find ways of identifying and monitoring younger preschool children who are at risk of being diagnosed with DCD. Difficulties in motor function appear to exist before school age, and provision of early support may mitigate more severe deficits as well as secondary complications. Screening tools to identify motor difficulties are needed, but instruments developed in one country may not be psychometrically sound when shared between cultures. The purpose of this collaborative study was to collaboratively develop the Little Developmental Coordination Disorder Questionnaire (LDCDQ) (a screening instrument to identify motor difficulties in young preschoolers) between several countries, while ensuring numerous psychometrically sound, comparable versions of the tool. This project, the first of its kind in the field of DCD, will enable the analysis and comparison of different patterns of motor development and/or delay in different cultures. Method: Based on the DCDQ, the Little DCDQ was developed in Hebrew and psychometric testing revealed a psychometrically sound, easy-to-use screening tool to identify motor delay in young preschoolers. At the first phase of this cross-cultural collaboration, an English version of the Little DCDQ was generated following recommended guidelines for the translation of assessment instruments. 21 researchers from 16 countries/locations adapted the instrument to their local cultures and languages and followed a similar protocol for psychometric assessment of their local Little DCDQ. During the next phase, each collaborator used their local version of the Little DCDQ to assess 40 children between the ages of 3-4.11 (20 typically developing and 20 with suspected motor difficulties) following the same protocol, and the data was compared to assess motor development across cultures. Results: The process and outcomes of the first phase of this cross-cultural collaboration will be described. Initial cross-cultural comparative results will be reported based on data collected to date. Conclusions: The outcomes of this collaboration have important implications for DCD research and practice. The use of different motor screening tools between studies is often cited as a limitation to understanding results of multiple studies. This is the first attempt to develop an instrument with the aim of facilitating cross-cultural comparison, which will enable a unified language for researchers investigating typical motor development as well as motor delay in young preschoolers.

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DCD X | Ouro Preto
MG - Brazil

Oral Presentations A
11:10 - 11:30am
June 30, 2013

European French adaptation of the Little DCD-Q questionnaire (Little DCDQ E-French)

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Introduction Early screening of the risk for Developmental Coordination Disorder is an important medico-social issue. However, the identification process is complex, interdisciplinary and, in France and in Switzerland, is based on an assessment done by a psychomotor therapist or occupational therapist (Albaret & De Castelnau, 2005). Since they often come into more frequent contact with young children, psychologists and nursery school teachers would benefit from the use of a valid questionnaire in French, designed to identify preschool children at risk of motor difficulties, who would benefit from standardized motor testing. For this reason, we conducted the European French adaptation of the Little Developmental Coordination Disorder Questionnaire (Little DCDQ E-French) (Rihtman et al, 2011) for children aged between 3 years and 5 years 11 months, i.e. during nursery school. Methods The Little DCD-Q contains 15 statements describing a number of tasks commonly performed by young children. The parent is asked to rate the ability of their child to perform each task, on a five points Likert scale ranging from not at all, a little, moderately, or strongly. The instructions emphasize that the parent should compare the level of coordination of the child with other children of the same age and gender. The questionnaire provides an overall score of 75, comprised of three sub-scores of 25 for three distinct factors: motor control, fine motor and general coordination (Rihtman et al, 2011). The cross-cultural adaptation was based on the recommendations of Vallerand and Halliwell (1989) and Beaton et al. (2000). Stages of translation and back-translation were performed and yielded a first working version whose quality was estimated by 8 English native speakers. This version was then presented to a panel of experts (including psychomotricians and pediatricians) as well as parents of children aged 3 to 5 years 11 months. The suitability of the tool to the European Francophone culture, to the children's age and clarity of the items were evaluated. Scores and comments resulted in additional adjustments to the French version of the questionnaire. Results A first French version of the questionnaire was proposed in a preliminary sample of 89 mothers and fathers of children aged 3 to 5 years 11 months. The value of Cronbach's alpha averaged 0.78. The difference between the scores of children aged 3 and 4 years was not significant for any of the factors (overall score: 72 ± 3 and 72 ± 4), while children aged 5 had significantly higher scores (score overall 74 ± 1). A second version of the questionnaire with responses categories more closely aligned with the original version was also tested and the data analysis is currently in progress. Conclusion Preliminary results suggest that the European French adaptation of Little DCDQ has satisfactory psychometric qualities; however, further analysis and development of valid cut-off scores on a larger sample is recommended. The use of this version of the questionnaire for children above 4 years and 11 months has yet to be demonstrated. The adaptation of a screening tool for motor disorders amongst young preschoolers from the European Francophone population will enable better identification of children who would benefit from standardized motor assessment performed by a developmental specialist.

DCD X | Ouro Preto MG - Brazil

Oral Presentations A
11:30 - 11:50am
June 30, 2013

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Adolescent and adults coordination questionnaire- AAC-Q:development and psychometric properties

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Introduction: The purpose of this paper is to describe the development of a brief, ecologically valid, self-report questionnaire, the AAC-Q, used to identify developmental coordination disorder (DCD) in adolescents and adults. In recent years we have learned that DCD can continue into adulthood, influencing participation in daily life, learning and quality of life. Despite this increasing awareness of the implications of DCD, only a few tests include older age ranges. Method: The development of the AAC-Q included three phases; development of the questionnaire, establishment of psychometric properties and determining cut-off scores. We began with a pool of functional tasks and activities that can cause difficulties for adolescents and adults with DCD, in accordance with DSM-4 RT. This pool of items was narrowed down to 18 potential questions which then underwent content validity, ecological validity and qualitative evaluation. At the completion of the first phase the AAC-Q included 12 questions. Psychometric properties were then established based on 28 adolescents and adults with suspected DCD, ages 16-35 yrs (M=21.18), and 28 matched peers without DCD (M=26.64) who completed the questionnaire. Reliability of the AAC-Q was determined using Cronbach a (a=.88) and test-retest reliability (r=.94; p < .001). An independent sample t-test to assess construct validity revealed significant differences between groups (t27=9.37; p<.001). Cut-off scores were established using data from a random sample of 2379 adolescents and young adults aged 19-25 (1081 males [45.4%]; mean age=20.68 SD=3.42). Conclusion: The overall purpose of this study was to establish a questionnaire for identifiying DCD in adolescents and adults. The AAC-Q was found to be a standardized, reliable, valid, brief, ecological and user friendly measure to screen DCD.

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Validity of The Little Developmental Coordination Disorder Questionnaire-US

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Introduction: Early identification and intervention of motor disorders is key to enhancing motor skills, self-efficacy, and reducing later social emotional problems. There is a need for a screening tool to identify young children at risk for motor delays or impairments PURPOSE AND OBJECTIVES As part of an international collaboration, this study was designed to examine the ability of a new screening tool, the Little Developmental Coordination Disorder Questionnaire (LDCDQ), to identify young children at risk for motor impairments. There were four phases: (1) content analysis of the items, (2) the ability of the test to discriminate among children with and without risk for motor impairment, and (3) the relation of performance on the DCDQ and a performance-based test of motor impairment, the Movement Assessment Battery-2. METHOD In Phase I of the study, the questionnaires were given to occupational therapists to examine content. In Phase 2, the LDCDQ, a 15 item questionnaire were given to parents of children ages 3 and 4 years old, 50 parents of typical children and 50 parents of children who were identified by their parents as having poor motor skills and/or who had received OT, PT, or EI services for their motor impairments. In Phase 3, 10 children ages 3 and 4 years old identified on the DCDQ as not having risk for motor impairment, and 10 children of comparable age identified as being at risk for motor impairment were given the Movement Assessment Battery for Children-2. RESULTS Phase 1: Thirty occupational therapists reviewed the items on the Little DCDQ. For each item, more than 80% of therapists agreed that the item measured an aspect of motor skill, was clearly stated, and was not culturally biased. Phase 2: In examining differences between groups with and without motor impairments, there were no significant differences in age in months, height, weight gestational age or birth weight between the two groups. The group with motor difficulties had a mean higher BMI percentile (mean 71%) compared to children with average coordination (mean 50%). There were significant between group differences in Total DCDQ scores ($p<.0001$), with parents of children in the typical group reporting less impairment. In addition, each item significantly differed between the groups (all items, $p<.001$ to $<.0001$). Phase 3: Children at risk for motor impairment performed significantly more poorly on the MABC-2 than children without risk. CONCLUSION Results support the validity of the LDCDQ as a screening tool to identify children with motor impairments.

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Translation and cultural adaptation of the Detailed Assessment of Speed of Handwriting: conceptual and semantic equivalence

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Introduction: In Brazil there are few studies that investigate the calligraphy, making difficult the establishment of the calligraphic profile of students. Thinking about it, this study done the translation and cultural adaptation of the procedure Detailed Assessment of Speed of Handwriting (DASH) to Brazilian Portuguese. Methods: The methodological procedure followed two steps: (1) review of conceptual equivalence and items, and (2) evaluation of semantic equivalence, involving four steps: (2a) Translation was realized by two professionals, one with degree in letters with specialization in English, and the other in translation with post-graduation in English language; (2b) Retranslation was realized by two other professionals, a Master in Computer Science in the area of Software Engineering, and English speaker that residing for two years in New Zealand, and the other degree in translation with postgraduate in Text Revision; (2c) Review by an expert committee was composed by educators, speech therapists and occupational therapists; (2d) Pretest was realized with 40 students, five from each age group (09-16 years). Results: In the first step it was verified that through literature reviews and discussions with members of the judges committee, the concepts and items are equivalent in cultures British and Brazilian. In step 2a it was verified that two tasks of the original procedure used a sentence classified as a pangram in English. Therefore, when performing the unification of translations, an adaptation of the sentence was created for a pangram in Portuguese. Next, it was found that translation is valid and that there were no differences in significance and content of the original instrument and the translated instrument. The expert committee (2c) consolidated all versions produced in a single version, in Portuguese, and confirmed that the only adjustment to be made was the modification of the sentence for a pangram in Portuguese. In step 2d they verified that it was easily applicable, due to acceptability and understanding of the students in the proposed tasks, without the need for semantic adjustments in the final adapted version of the procedure. Based on these results, it can be concluded that this procedure can be applied in the Brazilian population and with future studies, will result in an assessment tool available to raise additional and useful information to develop intervention programs for children with writing difficulties.

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DCD X | Ouro Preto
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Oral Presentations B
11:10 - 11:30am
June 30, 2013

Translation and cultural adaptation of Early Years Movement Skills Checklist

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Several studies have suggested the importance of identifying children with motor difficulties at an early age, as well as identifying their deficits for future intervention. However, very few instruments that have helped this identification are available in Portuguese. For this reason, we conducted a translation and cultural adaptation of the Early Years Movement Skills Checklist (EYMSC) to the Brazilian context: in this present study, we verified the concurrent validity of the Portuguese Version of EYMSC. Two hundred and forty-five children (between 3 and 5 years old), chosen randomly from selected public schools in the city of São Paulo, were evaluated by their teachers using the Portuguese Version of EYMSC and by the researcher through the MABC–Test. Seventy-seven percent of the children were classified in the same categories ("movement difficulty", "at risk" or "no movement difficulty") on both evaluations. Spearman's rank correlation coefficient was -0,10 (it was a negative correlation because in the EYMSC higher scores indicate the greater the motor difficulty and in the MABC test it is the inverse), the correlation wasn't significantly different from zero ($p = 0.087$). Considering the ages separately, only in the group of 5 year olds, the Spearman's rank correlation coefficient of -0.204 was considered significantly different from zero ($p=0,012$), however, the correlation is close to zero. The sensitivity of the Portuguese Version of EYMSC was 44.4% and the specificity was 97.9%. Thus, the Portuguese Version of EYMSC might help to identify motor skills difficulties. However, the efficiency of the instrument could be improved if teachers were trained to implement the instrument.

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Cross-cultural validity of the Movement Assessment Battery for Children – second edition: the Czech national study

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Introduction. The Movement Assessment Battery for Children – 2nd edition (MABC-2) (Henderson et al., 2007) recently edited as one of the most developed instruments for child's motor coordination assessment and identification of DCD. However, results of the MABC-2 can be affected by cultural and socio-economical specificity of the cohorts of children. To use the MABC-2 with Czech children by professionals in educational, psychological and clinical practice, the aim of the study was to examine the cross-cultural validity of this test battery. Methods. The investigation of the cross-cultural validity of the MABC-2 was based on the analysis of performance differences in the test tasks of the MABC-2 achieved in the Czech representative of 7-15 year-old children (n=1076) and the United Kingdom (UK) normative sample reported in the MABC-2 Examiner's manual. Sample representative of the Czech population of children was selected using a stratified sampling plan to ensure the representative proportions of children from each geographical region, demographic, gender and age group. Practical and statistical significance was assessed by the Cohen's effect size coefficient d and z-test (a=0.05). Results. Performance of all groups of the Czech sample in the gross motor coordination tests (aiming & catching) did not differentiate significantly from the mean performance of UK sample. From three manual dexterity tests of the MABC-2 performance in unimanual visuomotor coordination (Drawing trail) test in the 7-8 and 11-15 year-old age groups of Czech children of both genders was significantly higher as compared to the mean performance of the UK sample (d=0.50-1.89, p <0.05, and d=0.68-1.32, p<0.01). Almost all age groups of Czech girls showed significantly higher performance in the static balance test (d=0.52-1.17, p<0.01), while Czech boys only did in an age period of 7-9 years, as compared to the UK sample. Similarly, the six age groups of Czech girls achieved significantly higher performance on the two dynamic balance tests in comparison to the UK sample. 1.4% of Czech boys and 0.6% of Czech girls were found to have a significant movement difficulty (total test score TTS = 5th percentile), and 4.5% of Czech boys and 2.9% of girls were identified as those being at risk of having a movement difficulty (TTS = 15th percentile). Conclusion. The study revealed that the MABC-2 is valid for assessment of gross motor coordination in the Czech children. For broader use of the MABC-2 in the Czech Republic, adjustments of the UK norms for some manual dexterity and balance tests in given age groups are needed

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DCD X | Ouro Preto MG · Brazil

Oral Presentations B
11:50 · 12:10pm
June 30, 2013

Development of the Handwriting Legibility Scale (HLS): an examination of reliability and validity

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Background. Parents and teachers of children with DCD frequently comment on their slow handwriting that is often untidy and hard to read. Handwriting difficulties are mentioned in the formal DSM-IV description of the condition and are the most common reason for referral to Occupational Therapy. Despite this, there has been little research to describe and quantify the nature of handwriting difficulties associated with DCD. This is in part due to the lack of robust assessment instruments, particularly for assessing handwriting legibility. These are needed to identify those with difficulties, provide effective support and thereby avoid academic underachievement. The aim of the current study was to develop a quick and easy (one page) tool to provide a reliable, valid and practical assessment of handwriting legibility. Methods. There were 4 phases to the development of this tool. Phase 1 was based on professional experience of the authors validated by a review of the literature. Five legibility criteria (each scored on a 5-point scale) were described to form the basis of the tool. These were applied to 'free writing' samples and the scores summed to provide a global legibility score. Ten scripts were scored independently by each of the authors, leading to clarification of the wording and layout of the scoring sheet to improve ease of use. In Phase 2 content validity was judged by 12 experts from different professions. Following minor revisions, Phase 3 involved the examination of internal consistency on 58 scripts and inter-rater reliability on 20 scripts. In Phase 4 discriminant validity was examined by comparing scores from a group of 29 children with DCD and 29 typically developing (TD) children matched on age and gender. Results. (1) Five elements of handwriting legibility were established: global legibility, effort required to read the script, layout on the page, letter formation and alterations to the writing. (2) Expert opinion supported the inclusion of these elements and feedback led to clarification of the descriptions and scoring instructions. (3) Internal consistency has high (Cronbach's alpha 0.92); Inter-rater reliability on total scores was acceptable (r=.85; Kappa 0.67, p<.001) (4) Scores obtained for the scripts of children with DCD (Mean=17.28, SD=3.66) were significantly higher than those for the TD group (Mean=9.83, SD=2.59), U=42.50, p<.001. Conclusions. The HLS provides a quick (2-3 minutes) and easy to use global score of handwriting legibility. Initial examination shows good internal consistency and discriminative validity. However, further refinement of instructions is needed to improve the reliabilty of scoring. The HLS may be a useful tool to identify those with poor legibility and to quantify levels of performance to help plan how best to support those with poor handwriting.

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Measuring physical fitness in adolescents with DCD: Do we use the right measures?

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Introduction: Measuring physical fitness in adolescents with DCD using standard tests is problematic as their poor coordination and inconsistent motor performance may confound the outcome. Consequently, identifying change in fitness associated with an exercise intervention is challenging. Methods: A sample of 33 adolescents with movement difficulties ranging in age from 13 to 17 years participated in a twice weekly 13-week exercise intervention study (AMPitup) based on strength training and aerobic conditioning. To be eligible, participants needed a score below 1 SD of the mean Neuromuscular Developmental Index derived from the MAND (McCarron, 1997) and/or a history of movement difficulties. We examined the results from several perspectives. Data for standard fitness measures including aerobic fitness (PWC170, MSFT), muscle strength (vertical and broad jump), flexibility and balance were taken pre and post the intervention. Linear mixed models compared the measures across time adjusting for sex, age and sessions. Correlations were used to compare data for tests designed to measure the same fitness component. Finally, the individual session records for several cases were examined for performance changes and consistency in a range of aerobic and strength exercises. Results: When we compared the data for the standard fitness tests a significant difference for time was only found for the number of curl ups (p = .015), although a positive trend was apparent for the MSFT (p =.10). The correlations between tests measuring similar fitness components were weak for the aerobic tests (PWC170 and MSFT; r =.21) and moderate for the strength tests (e.g. vertical and broad jump; r= .53). Although the records showed overall improvements in aerobic and strength outcomes, inconsistency was present from week to week. Conclusion: Although the sessional reports and personal feedback indicated fitness improvements, these were not reflected in most of the standard tests used. The low correlation between the aerobic tests reflects differing coordinative demands, whereas the strength tests were similar. Task demands may confound the measurement of fitness elements. The only standard test (curl up) able to detect performance changes in these adolescents had simple task demands, provided both intrinsic and extrinsic motivation to improve, and was closely aligned to the exercise program. The participants were unable to generalise fitness improvements in the gymnasium to unfamiliar standard tests.

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Standardization of the German Version of the BOT-2: process, findings and comparison with the English Version

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The 2011 German-Swiss Guidelines for children with DCD identify the BOT-2 as a useful measure for the assessment and diagnosis of DCD. As there were no German norms for this measure, the Child Center Maulbronn, together with Pearson Assesment, undertook a standardization study of the BOT-2 suitable for German-speaking countries. As a first step the study translation and cultural adaptation was carried out. As well, improvements to the instructions for the examiner and item instruction for the children were made in cooperation with the authors of BOT-2. An electronic data capturing system was created and evaluated to reduce recording errors. For the standardization process over 80 research assistants (occupational- or physiotherapists) in various regions in Germany, Switzerland and Austria, were trained in BOT-2 administration and data collection in a two day workshop. The sample consisted of boys and girls between 4 and 14 years of age (700 to date). In all cases parents were asked to complete a screening questionnaire, which was used for inclusion purposes and to describe the sample. To date, the findings indicate high reliability of the eight existing subtests. Up to now we could include about 700 non-clinical participants. First analyses showed differences in performance across samples, with the German data having higher values in most the subtests. These differences and their implications for the cross cultural use of motor-based measures will be discussed. These findings indicate that, despite the high cost of culture-specific standardiziation, it is necessary if such an instrument will be used for multiple clinical decisions or scientific purposes in diagnosis and treatment.

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Congenital Muscular Torticollis and risk of Developmental Coordination Disorder

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Congenital muscular torticollis (CMT) is a common condition which has recently been shown to be a significant risk factor for later neurodevelopmental conditions such as Developmental Coordination Disorder (Schertz et al., 2012). This paper contrasts the motor profiles of children with CMT with sternocleidomastoid contracture (muscular CMT; mCMT) and with positional CMT (pCMT) from a population cohort followed up from birth. Methodology: From a sample of 68 children with a history of CMT aged 7 to 9 years, 32 of 38 (84.2%) children who were available for medical examination, were assessed using the Movement Assessment Battery for Children. Domain scores were available for 21/32 (66%) of these children. Results:A significant number of children with a history of CMT, who had been discharged from physiotherapy at one year of age when assessed as having typical developmental profiles, demonstrated a developmental delay/disorder (30/68; 44.1%) at 7 to 8 years. In the total sample, there was a trend for children with pCMT to be at greater risk for neurodevelopmental disorder which was mitigated by other neonatal and developmental factors. Significant differences were identified between children with muscular versus postural CMT on manual dexterity (t (19) 2.45, p=0.02, CI: 4.6-58.4) and balance (t (19) 2.70, p=0.014, CI: 5.78-45.9) domains but not on ball skills (t (19) 1.11, p>0.05, CI -11.6-37.9) with children with pCMT having the poorer performance. Conclusion: Congenital muscular torticollis is a risk factor for later developmental difficulties in which children with pCMT appear to be at greatest risk for specific movement difficulties. These results will be discussed, with emphasis given to the varying presentation of neurodevelopmental disorders at different stages of development

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DCD X | Ouro Preto
MG · Brazil

Oral Presentations C
2:20 · 2:40pm
June 30, 2013

Perinatal and neonatal predictors of developmental coordination disorder in very low birth weight children

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Introduction: Developmental coordination disorder (DCD) is 6-8 times more common in children born preterm than term. Etiology, perinatal and neonatal risk factors in prematurity associated DCD are not well understood. Our objective was to evaluate the association of perinatal and neonatal risk factors for DCD in a cohort of children born preterm assessed at 4-5 years of age. Methods: From May 2005 to October 2009, 179 very low birth weight (< 1250g) children seen in the Neonatal Follow-Up Program completed the Movement Assessment Battery for Children (MABC) at age 4.5-5.9 years. Children with cerebral palsy (n=11) or cognitive delay (full scale IQ < 70)(n=11) were excluded. Differences between perinatal (antenatal steroid exposure, prolonged rupture of membranes, vaginal versus Caesarean delivery, singleton or multiple birth, sex, 5-minute Apgar score, gestational age, and birth weight) and neonatal (days of supplemental oxygen, days of ventilation, postnatal steroid exposure, patent ductus arteriosus, necrotizing enterocolitis, severe retinopathy of prematurity, sepsis, hyponatremia, and cranial ultrasound abnormalities) risk factors by DCD group (severe DCD <= 5th percentile on MABC; mild-moderate DCD <= 15th percentile; non-DCD > 16th percentile) were calculated using Pearson chi-square tests and one-way ANOVAs; significant variables were entered in a two-step logistic regression model. Results: Using <= 15th percentile on the MABC as the cut-off, 42% (65/157) of participants had DCD. Perinatal variables significantly associated with DCD were male sex (p<0.001) and lower birth weight (p<0.001), accounting for 20% of the variance in MABC scores. Neonatal variables of postnatal steroid exposure (p=0.002), ventilation days (p<0.001), oxygen days (p=0.002), severe ROP (p=0.001), and hyponatremia (p=0.01) differed across DCD groups; however, only postnatal steroid exposure (p=0.01) was significant in the regression model, and accounted for an additional 3% of the variance in MABC scores. Boys performed more poorly than girls on all subtests of the MABC.Conclusion: Male sex and very low birth weight were significant predictors of DCD, suggesting that these infants should be followed for detection of this common, but under-recognized disorder. It was possible to identify DCD in children as young as 4.5 years.

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Identification of coordination difficulties through the Movement Assessment Battery for Children I and II in the Brazilian context

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About 6% of school-age children show Developmental Coordination Disorder, a condition related to impairment in the performance of motor tasks when compared with the performance of typically developing children. Versions of the Movement Assessment Battery for Children I and II have been recognized by clinicians and researchers as an important tool for the diagnosis of coordination difficulties. The objectives of this study were: to examine whether the prevalence of children, from a local sample, with coordination difficulties identified through the M-ABC I and II is consistent over time; and to examine whether the percentile distribution of the data used for construction and validation of the M-ABC I and II is similar to the distribution of the data from Brazilian sample. We assessed 840 children aged 4 to 10 years old (397 boys and 443 girls) using the M-ABC I, in 2006 and 2007, and 687 children aged 4 to 16 years old (362 boys and 325 girls) using the M-ABC II, from 2008 to 2012. All children were from the same public school. The prevalence of children identified with coordination difficulties was verified over the years. Additionally, the 5th and the 15th percentile of the distribution of the final score and of the components score (manual dexterity, ball skills and balance) obtained from the M-ABC I and II were compared to the distribution of the data obtained by the authors of the M-ABC to validate the batteries. Results showed that, of the 1527 children assessed, 7.7% were identified with coordination difficulties, whereas 11.8% were at risk of developing them. The prevalence of children identified with coordination difficulties decreased over the years, except for 2010, indicating the need for a continuous monitoring of the environmental, cultural and biological determinants of changes in the development of coordination. In addition, the 5th and the 15th percentile of the distribution of the final score of Brazilian sample (score 16 and 11 respectively) are similar to the 5th and 15th percentile of the distribution validated for the MABC I (score 13.5 and 10 respectively). However, the 5th and the 15th percentile of the distribution of the final score of Brazilian sample (score 21 and 29 respectively) are not similar to the 5th and 15th percentile of the distribution validated for the MABC II (score 56 and 67 respectively). The 5th and the 15th percentile of the distribution of the component scores in this Brazilian sample were closer to those presented in the M-ABC I than in the M-ABC II. In sum, the prevalence of children with coordination difficulties was consistent over time and the percentile distribution of the data used for validation of the M-ABC I was similar to the distribution of the data from Brazilian sample.

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DCD X | Ouro Preto
MG · Brazil

Oral Presentations D
2:00 · 2:20pm
June 30, 2013

A motor proficiency profile of Grade 1 learners in the North West Province of South Africa

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Motor Proficiency has a significant influence on school performance, sport performance and physical activity levels as children grow older. It is therefore important to know if young children's motor proficiency is on par and to determine possible backlogs which can be addressed by remedial programs. The aim of this study was to establish a global profile of the motor proficiency status of Grade 1 learners in the North West Province of South Africa, with explanation regarding possible gender and racial differences. Data were collected by means of a stratified randomised sampling procedure from 816 Grade 1 learners (419 boys, 397 girls) with a mean age of 6.84 years (+ 0.39) who participated in the NW-CHILD longitudinal study. Motor proficiency was measured by making use of the short form of the 'Bruininks-Oseretsky Test of Motor Proficiency-2. The results showed that Grade 1 learners exhibit below average (49.63%) to average (48.16%) motor proficiency. The motor proficiency of the boys was mostly average (63.96%) as opposed to that of the girls, which was largely classified as below average (64.74%), although the girls' manual dexterity and bilateral co-ordination was significantly better than that of the boys. The average motor proficiency of most of the white children was 69.27%, compared to the average of 58.73% of the black children, whose motor proficiency was below average. The poorest skills exhibited were strength, fine motor integration and fine motor precision. Racial differences were found where white children performed better in 6 subcomponents and black children in 2 subcomponents. It was concluded that the motor proficiency of more than 50% of school beginners was below average, while girls and black children experienced motor skills problems to a greater extent. These shortcomings should be addressed, especially during the preschool years and the initial years of the primary school phase in order to prevent problems relating to health and educational success.

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Best Practice Principles in Developmental Coordination Disorder: A scoping review

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Introduction: Although Developmental Coordination Disorder (DCD) still remains relative unknown among many professional groups, the scientific literature has ballooned in the past 10 years. The evidence on effective and efficient identification and management of DCD is growing, but evidence-based information about DCD is not easily accessible, nor are most research articles tailored specifically for clinicians. A Scoping Review was chosen as the best type of literature search to inform Best Practice, to 'map' the breadth and depth of current written guidelines, protocols, decision tools and publications in English-speaking countries that inform best practice in the identification and management of children with DCD. Methods: Scholarly and Grey literature were searched. The 'snow-balling' technique was used within OT and PT practice communities in Canada and the UK to gather written protocols, care pathways and service delivery models. Over 500 documents were screened; 34 representing 25 unique projects were included. The data was extracted in a transparent, replicable manner by an interdisciplinary team. Results: The primary units of analysis were best practice principles related to identification and diagnosis, to management and intervention, or to a service delivery model, for children with DCD. Several themes and practice principles emerged. Implications for practice and service delivery will be presented and include the need for: - a service delivery model with a filtered or graduated approach, starting intervention at the general level and moving to specific individualized approaches as needed. - clearer care pathways with greater inter-professional collaboration - increased awareness of DCD; knowledgeable professionals need to provide resources and education to other professionals, parents and schools - move from the medical model to a broader bio-social-educational model - awareness of the contextual life of the child and family - fostering of function and participation, to prevent secondary consequences - incorporating child and family views and acknowledging the change over time in areas of concern from 'motor' to 'social' - acknowledging the significant social-emotional impact of even a mild motor disorder - a functional approach in intervention, with the ultimate goal of successful participation of the child with DCD in their community Conclusion: Given scant resources and the low priority given DCD over more overt physical disabilities, it is important to identify Best Practice Principles which have the potential to improve services for the identification and management of children with DCD.

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DCD X | Ouro Preto
MG - Brazil

Oral Presentations A
11:10 - 11:30am
July 1, 2013

Effectiveness of an innovative summer camp for children with developmental coordination disorder

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Introduction: Children with developmental coordination disorder (DCD) experience lower self-efficacy and participation in physical activities compared to typically developing children. Current evidence suggests that task-specific approaches and goal-oriented group interventions may be an effective treatment method for children with DCD. Our objective was to examine the effectiveness of an innovative two-week summer camp for children with DCD to meet their functional motor goals and increase their self-efficacy and participation in physical activity. Methods: Nine of 15 children diagnosed with DCD who participated in the summer camp consented to participate in this research. Camp activities included 2 children:1 volunteer intervention using cognitive strategies to meet child-chosen goals, participation in group physical activities in the community, and self-esteem games. Pre-post testing included the Perceived Efficacy and Goal Setting system (PEGS) [parent and child], Canadian Occupational Performance Measure (COPM), and Children's Self-Perceptions and Adequacy in Predilection for Physical Activity (CSAPPA); the Children's Assessment of Participation and Enjoyment (CAPE) was administered prior to the camp and at three-month follow-up. Differences between pre and post outcomes were assessed using paired t-tests. Results: Clinically and statistically significant improvements were noted in COPM performance (p=0.001) and satisfaction (p=0.002) ratings of child goals. No significant differences were noted in child (p=0.53) or parent (p=0.68) PEGS or CSAPPA scores (p=0.39) from pretest to posttest. No significant differences were noted in participation (diversity, intensity, or enjoyment) from pre-camp to 3-month follow-up (p=0.36-0.79). Conclusion: This two-week summer camp was successful in meeting child-chosen goals, suggesting that this is an effective mode of service delivery for children with DCD. This study provides further evidence that intensive task-specific interventions, combined with cognitive strategies, can improve functional motor performance of children with DCD. Longer summer camp duration and/or longer follow-up may be required to observe significant changes in self-efficacy and participation

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Parental perception and selected motor abilities improve after a group intervention program for children with DCD

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The group setting approach for motor intervention has been investigated in children with DCD, failing to detect a significant improvement in motor skills after 10 weeks or reporting similar gains in motor performance with a group or individualized approach after 8 weeks of intervention. Here, we aimed to examine the effects of a 24-session intervention program in a group of 7- to 11-year-old children (2 females, 6 males) diagnosed with DCD. To confirm the DCD diagnosis, participants were screened with the Kaufman Brief Test of Intelligence – 2nd Edition (KBIT-2) and the Movement Assessment Battery for Children – 2nd Edition (MABC-2). Before and after the program, parents filled out the Developmental Coordination Disorder Questionnaire (DCD-Q), and all children were tested with the Test of Gross Motor Development – 2nd Edition (TGMD-2), a process-oriented assessment for gross-motor skills; the Bruininks-Oseretsky Test of Motor Proficiency – 2nd Edition (BOT-2), a product-oriented assessment for overall motor proficiency; and the Beery-Buktenica Developmental Test of Visual-Motor Integration, 6th Edition (Beery-VMI-6), an assessment examining the extent to which individuals can integrate their visual and motor abilities. The intervention focused equally on the training of upper-body coordination, balance, and fine-motor (handwriting) skills. The initial screening results (KBIT-2, MABC-2) were not significantly different than the screening scores at the end of the program. DCD-Q results indicated that all children were still categorized with "possible DCD" after the end of the program, but parents reported significantly higher scores for all categories of the questionnaire. Results on the TGMD-2, BOT-2, and Beery-VMI-6 revealed higher scores for all subtests, but only the Manual Coordination, Body Coordination, and Total Score of the BOT-2 presented significant improvements (ps < .05). Despite the heterogeneity of the condition, these preliminary results provide evidence supporting improvement in motor skills through a group intervention program. Parents reported that children performed better in activities of daily living, indicating that functional skills improved throughout the program. It is possible that the performance subtleties of functional skills observed by parents were not picked up by assessments such as the TGMD-2 and Beery-VMI-6. More research is needed to confirm those results and to explore other aspects that are part of a group setting, such as social interaction and perceived competency.

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DCD X | Ouro Preto
MG · Brazil

Oral Presentations A
11:50 · 12:10pm
July 1, 2013

Evaluation of an online workshop to support evidence-based physiotherapy management of children with DCD

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Introduction. Developmental Coordination Disorder (DCD) is a chronic and prevalent health condition that increases the risk for development of significant secondary physical health issues that are preventable. Physiotherapists (PTs) are ideally positioned to address these issues but, to do so effectively, they must have an understanding of the most current DCD research evidence. To help decrease the current knowledge-to-practice gap, an evidence-based online workshop was developed that is tailored for PTs. The workshop includes evidence and practical strategies for identification, goal-setting and evidence-based intervention approaches for children with DCD. The aim of this study was to evaluate the impact of the workshop with PTs in increasing knowledge, promoting understanding and supporting evidence-based management of children with DCD. Specifically, we evaluated the impact of the workshop on 1) increasing PT knowledge; 2) improving self-reported skills; and 3) changing PT practice. Methods. Convenience samples of pediatric PTs were recruited from children's rehabilitation centres and school health settings in Ontario, Canada. PTs in the Hamilton region (n=20 PTs (English version)) and in the Ottawa region (n=20 PTs (French version)) completed pre- and post- questionnaires examining self-reported knowledge about DCD and skills. Following a two-month period of ongoing application of this knowledge, PTs completed a follow-up questionnaire to report their perception of the usefulness of the workshop and whether there have been any changes in their clinical practice. Descriptive statistics were used for analytic purposes; questionnaires were compared using paired t-tests. Socio-demographic information was (e.g. therapists' clinical experience, work setting, language spoken) used to describe the sample and explored the potential impact of these variables on the effectiveness of the workshop. Results. Characteristics of the two samples will be presented, as well as the results for each questionnaire, the reported impact of the module on PTs knowledge and practice, and the recommended modifications for improvement of the workshop. Following completion of the study, improvements will be made to the workshop and to both versions, English and French. Workshops will be posted online on the CanChild website and will be made available to PTs internationally at no cost. This workshop will also be used as a template to develop workshops for other health professionals (e.g., occupational therapists and physicians) to support them in providing evidence-based services for children with DCD. This study contributes at a more general level to knowledge transfer science by evaluating the effectiveness of an online training workshop as a mechanism to change practice and improve services offered to children with DCD

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DCD X | Ouro Preto MG · Brazil

Oral Presentations A
12:10 · 12:30pm
July 1, 2013

Nintendo Wii-Fit game and a video observation protocol (VOT-B) used as a tool to observe and analyze movement strategies in children with DCD/balance problems

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Purpose To define dynamic balance strategies and to evaluate the effect of training using the Nintendo Wii-Fit Balance Board in children with DCD/balance problems (DCD-BP). With the general availability of the Wii-Fit there may be a motivating way to expand assessment and intervention of balance problems. Twenty eight children with DCD-BP participated. They were between 6-12 years old, scored below the 16 percentile on the Motor Assessment Battery for Children (MABC2) and below the 16th percentile on the component balance. Sixteen typically developing children (TD-group) with adequate balance skills were matched on distribution of age and gender (>P16 on the MABC2 and >P16 on the balance component). All children were video recorded according to protocol and scored by blind testers using a video-observation tool (VOT-B). Half of the group of DCD-BP was videotaped before and after intervention (T1-T2), the other half was videotaped three times, including a baseline measure before a no-intervention period (T0-T1-T2). The TD-group was measured at T0 and six weeks later (T1). Intervention consisted of playing the Wii-Fit Balance games three times a week for a period of six weeks. Cluster analysis is in progress and is used to determine and interpret specific movement strategies to categorize the children by strategy. Variables of Wii scores (accuracy and time) and motor outcomes of two balance components of MABC2 and Bruininks Oseretsky test-2 have been used to rank the clusters (strategies) in terms of efficiency. Comparison between pre- and post intervention is evaluating whether efficiency of strategy changed after intervention. From preliminary analyses, movement strategies were based on the degree of mediolateral and rotational movements of body parts. Five different strategies were found. Frequency distributions between the two groups differ for balance strategies (=0.001). The most efficient movement strategy using hip displacement is more common in the group of children without balance problems. Frequency of efficient movement strategy changes after intervention. This study gives insight into the different motor strategies of children with DCD-BP and their TD peers, while playing a Wii Fit game. Interestingly training with the Wii Fit induced a change towards more efficient movement strategies.

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DCD X | Ouro Preto
MG · Brazil

Oral Presentations B
11:10 · 11:30am
July 1, 2013

Efficacy of Neuromotor Task Training in Small Groups of Children with DCD attending Mainstream Primary Schools in Cape Town

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Neuromotor Task Training (NTT) is a task-orientated intervention approach developed for children with motor coordination problems. The tasks used in NTT engage children in functional activities that closely resemble the skills required to be learned. Previous studies investigating the effectiveness of NTT in individual children in the Netherlands have yielded positive results. However, the efficacy of NTT has never been explored using a small group format in low socioeconomic settings. The aim of this study was therefore to evaluate the efficacy of NTT on the motor performance of children with DCD attending mainstream primary schools located in a resource poor community in Cape Town. A pragmatic, single-blinded, experimental study design was used to measure the difference in motor performance of children with DCD who received NTT, and an age-matched control group who received usual care (UC). In the context of this study, UC was defined as the health promotion services rendered by physiotherapy students. Participants in the study were children, (age 6-10 years) who scored on or below the 5th percentile on the Movement Assessment Battery for Children 2 (MABC-2) and whose parent or teacher reported them as having a functional motor problem. No specific exclusion criteria were applied and thus participants included some children who also had psychological, social and/or learning difficulties. Children were stratified into groups based on the school they attended. Children attending schools A and B (n=51) received NTT for two hours per week over a period of nine weeks and children attending school C (n=37) received UC. At the conclusion of the intervention, children in the NTT group achieved a significantly higher total score on the MABC-2 compared to children in the UC group; $F=18.74$ (1,86) $p<0.01$, eta=0.18. On investigation of component scores, children in the NTT group achieved significantly higher scores in manual dexterity; $F=6.81$ (1,86) $p=0.011$, eta= 0.07 and balance; $F=8.65$ (1,86) $p=0.04$, eta =0.09. No significant differences were detected between groups on the aiming and catching component; $F=1.09$ (1,86) $p=0.29$, eta=0.01. The results of this study add to the growing body of evidence on the effect of NTT on motor performance. In this case, the efficacy of NTT is proven as a viable approach to delivering physiotherapy services in a group format at schools in low socioeconomic settings where resources are limited. The fact that participants in this study included children who also presented with significant co-morbidities such a learning disabilities, attention deficit disorders and language problems, adds to the generalization of the effect in children less suited to cognitive remediating strategies.

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DCD X | Ouro Preto MG · Brazil

Oral Presentations B
11:30 · 11:50am
July 1, 2013

Virtual reality in an intervention program for children with developmental coordination disorder

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Introduction: Some children throughout development show difficulties in the performance of motor tasks of daily life and they can be identified as having Developmental Coordination Disorder (DCD). As a consequence of such difficulties, these children get away from physical activity avoiding playing with their peers and consequently having a negative impact in many aspects of their lives. In the present study, children performed activities in virtual reality environments. The last generation of videogames like Nintendo Wii and Xbox/Kinect allow for the subject interaction with the environment. In this condition subject´s action is used for the projection of the environment future states Aim: To measure the efficacy of the practice of physical activity by children with DCD in two different virtual environments that require spatial and temporal body displacements. Method: A total of 28 children were assessed by the "Movement Assessment Battery for children 2" (M-ABC2), with 14 of them with coordination problems matched by age and gender with typically developing (TD) children. All participants were submitted to a daily intervention program developed in two virtual environments, the Wii and the Xbox/Kinect. The intervention program was conducted throughout 5 sessions per week from Monday to Friday in each one of the environments. The order of the environments was counterbalanced between groups so that one group had in the first week 5 sessions in the Wii and in the second week 5 sessions of the Xbox/Kinect. The other group had in the reversed order. Each session lasted 20 minutes. The games chosen were Balance Bubble by Wii Fit Plus and Reflex Ridge by Kinect Adventures. Both games were used to explore dynamic balance. Pre and Post Intervention (the effect of intervention) was assessed by scores in each game and by sum of the scores of the four KTK battery tasks. Results: Two-Way ANOVA ($p < 0,05$) were performed on the KTK´s scores and showed that the main effect group reached level of significance with the TD group obtaining higher scores compared to the DCD group. Repeated Measures ANOVA ($p<0,05$) were performed on the scores of the Wii game and showed significant day by day progressive increase as a result of the intervention program but no difference between TD and DCD groups. Analysis of Kinect game´s score showed differences between days of intervention and between TD and DCD groups. In the present study all measures showed better results for the TD group compared with DCD group. Conclusion: The intervention program employed in the present study using Virtual Reality had a positive contribution to dynamic balance for both groups. The properties of Virtual environments were explored by all children who participated in the present study.

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DCD X | Ouro Preto MG · Brazil

Oral Presentations B
11:50 · 12:10pm
July 1, 2013

A Mindfulness-Enhanced Cognitive Orientation to Daily Occupational Performance intervention to help children with Developmental Coordination Disorder attain individual motor skill acquisition goals

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Introduction: Developmental Coordination Disorder (DCD) is a disorder of motor coordination that has worldwide prevalence. In addition to problems in motor coordination that impact daily activities, children with DCD often experience concomitant behavioral and psychosocial conditions, as well as diminished self-esteem, self-efficacy, and participation and engagement in many sports and leisure activities. The Mindfulness-Enhanced Cognitive Orientation to Daily Occupational Performance (ME-COOP) intervention was designed to address primary and co-morbid symptoms of DCD using a holistic occupation-based approach. The purpose of this project was to determine whether the ME-COOP intervention was effective in helping children with DCD attain motor acquisition goals. Methods: Participants were assessed at pre- and post-intervention with the Canadian Occupational Performance Measure (COPM), Performance Quality Rating Scale (PQRS), Movement Assessment Battery for Children-II (MABC-II), and the Behavioral and Emotional Screening System for Children (BASC-2). The ME-COOP intervention was provided in both individual and structured group sessions over a six-week period. Results: Following intervention, all children (n=6) demonstrated improvement in subjective (COPM) and objective (PQRS) measures of motor skill acquisition goal attainment, one or more subscales of the MABC-II, and the BASC-2 T-score. Large effect sizes were noted for the participant group for all outcome measures. Parent satisfaction survey results revealed the following qualitative themes: appreciation of child-centered cognitive strategy approach, increased participation in sports and social play, generalization and transfer of strategies, and positive results noted in a short time frame. Conclusion: The holistic intervention format was designed to address the complex difficulties that often present in individuals with DCD, and although the sample size was small, participants demonstrated improvement across multiple functional domains. Study outcomes provide proof of concept for the potential effectiveness of an integrated and occupation-based ME-COOP intervention for children with DCD, and have implications for future research and evidence-based practice.

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Handwriting Speed in children with DCD: Are they really slower?

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Background. Difficulties with handwriting are often included in descriptions of Developmental Coordination Disorder (DCD), including that provided in the formal classification scheme, DSM-IV. Slow and poorly formed handwriting can lead to difficulties in the classroom and academic under-performance. However, surprisingly few studies have examined handwriting in DCD in a systematic way. Those that are available, have been conducted outside of the UK, in alphabets other than the Latin based alphabet. In addition, most work has focussed on short tasks, usually copying, rather than longer 'free writing' tasks that are more common in the classroom. The aim of this study was to compare handwriting performance in English children with and without DCD across four handwriting tasks. Methods. Twenty eight 8-14 year-old children with a diagnosis of DCD (in line with DSM-IV criteria) participated in the study, with 28 typically developing (TD) age and gender matched controls. Reading, spelling and receptive vocabulary were assessed and children with dyslexia were excluded. The children completed two sentence copying, writing from memory (alphabet task) and a 10-minute 'free writing' task from the Detailed Assessment of Speed of Handwriting (DASH) on a graphics tablet. Both the 'product' in terms of words per minute and the 'process' in terms of speed of pen movements ('execution time') and the time spent pausing (above a threshold of 30msec) were analysed in the different tasks. Results. For the raw scores (words/letters per minute) there was a significant effect of group ($F[1,53] = 19.75$, $p<.001$) on all four tasks, indicating that children with DCD wrote fewer words/letters per minute than the TD group. There was no effect of group for execution speed ($F[1,53]=.009$,$p=.925$) but a significant group effect for the percentage of time spent pausing ($F[1,53]=10.40$,$p=.002$, ?2 =164), as children with DCD paused for longer during each of the tasks. Conclusions. The findings confirmed what many parents and professionals report, that children with DCD have a reduced writing output compared to their peers. However, this was not accounted for by slow movement execution. The children with DCD were able to move the pen at a similar speed to their TD peers. Rather, their reduced performance on the DASH is a result of longer time spent pausing during writing, regardless of the type of task. Further examination of pattern of pauses may help to understand the mechanisms underlying their handwriting difficulties.

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Non-proficient handwriting (NPHW): a decisional tree to guide the assessment and the intervention

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Introduction: Endogenous and exogenous factors influence quality and speed of handwriting. Non-fluent or non-readable handwriting can affect the participation of the child in school. Non-proficient handwriting (NPHW) can be related to the dysfunction of endogenous factors such as digital dexterity, proprioception, visual motor integration, visual perception, visual attention or memory. These factors can also be included in a more global diagnosis of developmental disorders such as Developmental Coordination Disorder (DCD), specifically in the subtype "fine motor skills dysfunction and graphomotor disorders", dyslexia, Learning Disorders and Attention-Deficit Hyperactivity Disorder. Exogenous factors include inappropriate handwriting teaching methods, position of the child, the type of paper and writing tools as well as adverse sociocultural conditions. Children with NPHW are often referred for intervention. Assessment of children is needed in order to identify the causes of NHPW. In fact, effective intervention should target the specific causes of the NPHW, whether due to exogenous or endogenous factors. Therefore, a decision tree was needed in order to guide the assessment and to allow professionals to first identify the need for intervention and then to choose the most efficient approach in relation to the causes of NHPW and the age of the children concerned. Method: A systematic review was used to establish this decision tree, on the one hand with regards to endogenous and exogenous factors that can influence handwriting and, on the other hand, concerning the most efficient approaches that have been identified in the domain of instruction and remediation of handwriting as well as in the domain of therapy. Results: The results of the studies that make up the foundation of this decision tree will be presented along with the decision tree itself. Case studies will be presented in order to illustrate the process. Generally speaking, if only exogenous factors are involved in NHPW, the remediation will focus on these factors specifically and therefore directly on handwriting at school. When endogenous factors such as fine motor skills are found to be the cause, intervention will target fine motor skills as well as handwriting. Conclusion: Although further studies are needed to prove the pertinence of this decision tree for assessment and intervention, this work already helps professionals to identify different profiles of children with NPHW and to choose the most appropriate intervention with respect to the factors which are involved.

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DCD X | Ouro Preto
MG - Brazil

Oral Presentations C
2:00 - 2:20pm
July 1, 2013

Effectiveness of the handwriting intervention program: 'I can'

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'I can' is a program that can be used to treat children with handwriting impairment. After the therapist evaluates in-depth the child and the context, the child comes together with the therapist to a small number of therapy goals. With the help of an attractive personal booklet the child lays down the goals, discuss the time slot to reach the goals, defines exercise moments, supporters and the reward to receive when finishing the program successfully. In that way the child becomes motivated and focused on the goals. A limited number of treatment sessions have to be combined with homework. Cooperation with school teachers and parents is absolutely necessary to reach the goals. Treatment is custom-made and based on the principles of the neuro-motor task training. In a pilot study 21 Flemish children from first or second class (7-8 years-old) were recruited from a sample of 268 children in regular schools, based on a repeated score below the 15th percentile on the SOS test [1], a Dutch screening Instrument to identify handwriting impairments. Exclusion criteria to participate were an IQ below 85, a medical diagnosis which could affect motor development or receiving therapy for handwriting problems. Children were treated during 6 weeks with the 'I Can' approach. After the treatment period the children were assessed with the SOS, followed by a six weeks wash out period and a final SOS assessment. There were no significant differences between the 1st and the second SOS assessment and between the third and 4th assessment, neither for handwriting quality or speed. Between the second and third SOS assessment, covering the treatment period, the difference was significant for as well handwriting quality as speed. The therapeutic effect was not related to general motor competence (M-ABC-2 score), first SOS score, score on the Developmental Test of Visual Motor Integration (VMI, Beery, 2004) or reading level. There was a trend to significance for the negative correlation between the gain in writing speed and the reading level, at the start of the program. These preliminary results indicate that the 'I can' approach could be effective to treat children with handwriting problems. At this moment the study is repeated with a blind cross-over design. Results will be ready to present at DCD-X. Reference [1] Van Waelvelde, H., Hellinckx, T., Peersman W., & Smits-Engelsman B. (2012). SOS: A Screening Instrument to Identify Children with Handwriting Impairments. Physical & Occupational Therapy in Pediatrics, 1–14.

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Physical self perceptions of adolescents with DCD before and after a 13 week exercise intervention

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Introduction: Adolescents with low motor competence have diminished perceptions of their physical self. Consequently they tend to avoid activities that develop physical fitness and strength. This study of adolescents with Developmental Coordination Disorder (DCD) examined the outcomes of an exercise intervention that focused on improving aerobic fitness, strength, and self-perceptions in the physical domain. We predicted positive changes in fitness as well as perceptions of physical self worth in sub domains targeted by the intervention. Methods: The sample of 35 adolescents with DCD, comprising boys (n = 25) and girls (n = 10) ranging in age from 13 to 17 years, participated in the twice weekly 13 week exercise intervention study (AMP it up). To be included in the intervention, participants needed a score below 1 SD of the mean Neuromuscular Developmental Index (MAND; McCarron, 1997) and /or a history of movement difficulties. Physical self-perceptions were measured before and after the intervention using the Physical Self Perception Profile (PSSP)(Fox & Corbin, 1990) comprising five 6 item subscales. Four of these (sports competence (SC), physical conditioning (PC), attractiveness of body (AB), and physical strength (PS)) assess perceptions within specific sub domains. A fifth subscale measures global physical self –worth (PSW), that reflects feelings of satisfaction with the physical self. Participants also completed the Perceived Importance Profile which consists of four 2 item subscales that measure level of importance attached to each domain of PSW. Results: AB and PS sub domain scores were the best predictors of PSW at pre-test ($F=22.915$, $p<.001$), joined by PC at post test ($F=22.78$, $p<.001$). Significant improvements in PC ($p=.012$) and PS ($p=.049$) sub domain scores were identified between pre and post test. Adolescents ranked PC and AB as most important at pre test, but these changed to PS followed by PC at post test. Conclusion: The observed improvements in specific subdomains of physical self-worth were directly related to the focus of the intervention. That is participants showed increases in perceptions of physical condition (PC), and physical strength (PS) as well as actual improvements in fitness and strength. This is consistent with the view that changes in specific aspects of PSW can be facilitated by interventions that focus on related areas of fitness, and that these can occur after a relatively short period of time. These results highlight the importance of appropriate programs for adolescents with DCD when positive attitudes towards exercise are encouraged.

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DCD X | Ouro Preto MG - Brazil

Oral Presentations C
2:40 - 3:00pm
July 1, 2013

The correlation between attention and motor function among children with comorbid ADHD and DCD

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Introduction: Individuals with Attention Deficit Hyperactive Disorder (ADHD) often have coexisting Developmental Coordination Disorder (DCD). The positive therapeutic effect of Methylphenidate (MPH) on ADHD symptoms is well documented, but its effects on motor coordination are less studied. We assessed the influence of MPH on motor performance in children with comorbid DCD and ADHD. MATERIALS & METHODS In study 1 Participants were 18 children (13 boys, mean age 8.3 years) diagnosed with comorbid DCD and ADHD. In study 2 Participants were 30 children (24 boys) aged 5.10 to 12.7 years diagnosed with both DCD and ADHD. Conners' Parent Rating Scale was used to reaffirm ADHD diagnosis and the Developmental Coordination Disorder Questionnaire was used to diagnose DCD. The Movement Assessment Battery for Children-2(MABC-2) and the Online Continuous Performance Test (OCPT) were administrated to allparticipants twice, with and without MPH. The tests were administered on two separate days in a double-blind design. RESULTS Motor performance and attention scores were significantly better with MPH than without it ($p<0.001$ for improvement in the MABC-2and $p<0.006$ for OCPT scores). CONCLUSIONS The findings suggest that MPH improves both attention and motor coordination in children with coexisting DCD and ADHD. More research is needed to disentangle the causality of the improvement effect and to assess whether improvement in motor coordination is directly affected by MPH or mediated by improvement in attention.

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Effects of resistance training on peripheral bone mineral density and muscle strength in adolescents with motor difficulties

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Introduction: Maximum accrual of Bone Mineral Density (BMD) is reached during adolescence and is related to a lower risk of fracture and osteoporosis later in life. Adolescents with motor difficulties are at risk of not fully developing their BMD potential, and consequently have a higher fracture risk due to limited participation in high impact physical activities that improve BMD. Equipment constrained resistance training (RT) interventions may be an effective way to improve both muscle strength and BMD in this population. The aims of this study were to investigate the effect of a gym- based RT intervention on peripheral BMD, and to determine the extent of the relationship between BMD and muscle strength, among adolescents with motor difficulties. Methods: Participants were 21 adolescents (13 intervention and 8 control) with motor difficulties, with a mean age of 14 (1.54) years. The participants were recruited from a larger research project (Adolescent Movement Program; AMPitup) and its wait list. The intervention was a 13-week aerobic and resistance exercise program that participants attended for 90-minutes twice a week. The exercise program included 5 pre-set exercises targeting the forearm and lower leg (Leg–press, push-ups, seated row, calf raises, and up-right rows) to be completed every session. Measures taken pre and post intervention included peripheral BMD scans (tibia and radius; trabecular and cortical density) using peripheral Quantitative Computer Tomography (pQCT), height, weight, upper (grip strength, chest pass) and lower (IRM leg press, distance and vertical jump) body muscle strength. General linear models, adjusting for physical maturity, and correlations were used to analyse the data. Results: Improvements in muscle strength, in particular for the upper body (right hand grip strength p = .01; chest pass p = .01) were observed in the intervention group but not the control group. Changes in BMD measures from pre to post test in the intervention group were less conclusive due to the small sample size and short time frame, however positive trends were apparent. Muscle strength and BMD was related as evidenced by moderate to strong correlations, particularly for the lower leg. Conclusion: A targeted resistance training program may be effective in improving muscle strength and stimulating bone changes in adolescents with motor difficulties. Further research is needed to clarify the most effective exercises for site specific BMD improvements in this group.

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DCD X | Ouro Preto MG - Brazil

Oral Presentations D
2:00 - 2:20pm
July 1, 2013

Children with DCD can perceive and adapt to perceptible and subliminal rhythm changes

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Children with DCD demonstrate impairments in bimanual finger tapping during self-paced tapping and tapping in synchrony to different frequencies. As an extension of this work, we examined their ability to adapt from stable to unstable rhythms in two conditions: 1) a perceptible change in the synchronizing auditory stimuli and 2) a subliminal change in stimuli. We then compared their performance to age- and gender-matched peers. We examined both perceptual awareness of the rhythm change and the motor response to the change. Nineteen children with DCD (MABC percentile < 3%) between ages 6-11 years (mean age in months = 114 + 21) and 17 age- and gender-matched typically developing controls (TD) (mean age in months = 113 + 21) participated in this study. We first established a child's auditory perceptual threshold defined as the phasing difference at which the change in rhythm was perceptible. Children then tapped their fingers alternately to two auditory signals. In the first condition, perceptible (abrupt), they initially tapped to an anti-phase beat and then to a perceptible change in rhythm brought about by changing the relative phasing by 45 deg between the auditory beats without a change in frequency. In the second condition, subliminal (gradual), they had to transition from baseline to a gradual change in rhythm where the phasing difference between the auditory signals was less than 45 deg. We found that children with DCD were able to perceive changes in rhythm similar to TD children, but that there was a developmental trend in those with DCD. The data suggest a slight delay in development rather than atypical development in this ability. Children with DCD were able to adapt to both perceptible and subliminal changes in rhythms similar to their TD counterparts. However, these children were significantly more variable compared to TD children. These results suggest that the performance impairments in tapping may be a result of motor "noise" rather than a perceptual-motor coupling process. Examination of individual data, suggests that this group of children with DCD were heterogeneous in their performance.

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DCD X | Ouro Preto
MG - Brazil

Oral Presentations D
2:20 - 2:40pm
July 1, 2013

Development and evaluation of a new service delivery model for children with DCD in Sherbrooke, Québec, Canada

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Centre de Réadaptation Estrie, Sherbrooke, Québec

Camden, Chantal
CanChild, McMaster University

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Introduction. Since 2003, children with DCD living in Sherbrooke, Quebec, Canada, have received services from a "dyspraxia" program in the Children and Teenager Program (CTP) of a rehabilitation centre. The CTP is responsible to offer services to all children with physical disabilities and to foster their participation. However, due to long waiting lists, many children were waiting over a year before getting services. In 2006, the CTP decided to completely reorganize its services. The aims of this proposal are to: 1) present the Apollo model which guided service delivery in the CTP, 2) present how service accessibility and perceptions of service quality changed after implementation of the model, and 3) outline the services now provided by the CTP to children with DCD. Methods. 1) The Apollo model was developed in 2006-07 within a participatory action research project by a committee composed of service providers, managers and researchers. 2) Wait-times were identified using the administrative database system for all children with physical disabilities registered in the CTP, including those with DCD, during the 3 study periods: before (2007), during (2008) and after (2009). Each year, a sample of families was selected to evaluate their perception of service quality, using the Measure of Processes of Care (MPOC), and to record the number of hours of services their children received. From the 222 families who participated over the three year period, 20 children had DCD. Anovas were used to identify changes in service quality perception and number of hours of services provided specifically to these children. Means were plotted to track changes in waiting times. 3) Since the results of the service reorganization project were made available in 2009, the CTP has continued to improve the quality of its services and develop a clear pathway for children with DCD. Results. The Apollo model includes 5 main service delivery components: first contact, service delivery coordination, community-, group- and individual-interventions. Wait-times decreased following the implementation of the model, from 214 days in 2007 to 63 in 2009. The overall number of hours of services provided to each child ($p=0.93$) and the service quality perception ($p>0.15$) remained stable over time. Most interventions are now based on life habits, using top-down approaches. The pathways guiding service delivery for children with DCD currently are age-based and include an early-intake social work intervention to share information with families, interdisciplinary intervention groups (e.g., cycling and swimming) and occupational therapy groups (e.g. independence in daily life, organizing homework and mathematics). This study contributed to increasing knowledge in the DCD field, where little has been published regarding the development and implementation of new models of service delivery. Models, such as the one developed by the CTP, are promising to increase accessibility and the quality of rehabilitation services for children.

DCD X | Ouro Preto MG · Brazil

Oral Presentations D
2:40 · 3:00pm
July 1, 2013

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Muscular strength and flexibility of children with probable Developmental Coordination Disorder

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Introduction: Physical fitness and physical activity levels in the general population are indicators of health and quality of life. However, low levels of these when observed in children and adults have determined the style and habits of life. Children with Developmental Coordination Disorder (DCD) are potentially at greater disadvantage due to the nature of the disorder. Physical fitness may be expressed by various components, and also types of tests. Thus, muscle strength/endurance (MSE) and flexibility (FLEX) are two components that closely interact. The development and maintenance of strength contributes to better performance on tasks of everyday life that use joints. Also, flexibility helps range of motion. Both assist in the performance and execution of motor skills, while limiting their movement's restricted development with marked impairment. Objective: The aim of this study was to measure the components of physical fitness, muscle strength and endurance and flexibility of children with probable DCD with severe motor problems (pDCD) and children 'at risk' of having movement difficulties (rDCD). Methods: The sample included 42 children aged 6-10 years, 22 of these presented pDCD and 20 children were rDCD according to the MABC-2. Tests from the Fitnessgram battery were utilized - curl up, push up (both MSE) and sit and reach – side right and left (FLEX). Results: The results indicated that at MSE the pDCD children held on average of 2.5 at abdominal -curl up and 2.4 at push up, while the rDCD children had the average of 5.3 and 2.8 respectively. At FLEX – sit and reach - the pDCD children performance obtained average of 25.6 cm and rDCD children 23.2 cm to both sides. Conclusion: It is concluded that children with pDCD and rDCD perform more poorly on MSE, while for FLEX, most are in a healthy zone; many are in a risk zone in relation to level of physical fitness. This suggests the need for major attention to these groups and also for the implementation of a motor intervention program. Support: Research Foundation of the State of Amazonas / FAPEAM

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DCD X | Ouro Preto MG - Brazil

June 29, 2013
Poster Session 1
29PS01

Physical fitness in children with and without Developmental Coordination Disorder

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Introduction: Children with Developmental Coordination Disorder (DCD) have high levels of inactivity due to various reasons such as: difficulty in performing activities, social exclusion, fear of failure when performing activities, among others. The inactivity is directly related to physical fitness (PF). Objective: the aim this study was to analyze the PF, from the results obtained in the tests and compare children with probable DCD and typically developing children (TD). Method: We analyzed 88 children, 42 with probable DCD obtained in the MABC-2, and 46 TD. This study used four tests from the Fitnessgram Battery : abdominal (Ab); arm flexion (Af), dorsal extension (De) and flexibility -sit and reach- side right (Fr), the left (Fl) and body mass index (BMI). Results: There was no statistically significant difference between the groups in the analyzed variables on the tests of PF: BMI, Af, De, Fr and Fl, except in the abdominal test, where with pDCD (4.0 Ab) was significantly greater than the TD (1.7 Ab). We should highlight the high intraindividual variability of performance in the tests, however, there was no statistically significant difference. Conclusion: Therefore, despite the presence of disorder, no significant differences in task performance between both groups, only the test Ab presented with a significant difference, and the best result was achieved by the DCD group, so the results do not corroborate with the literature.

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DCD X | Ouro Preto MG - Brazil

June 29, 2013
Poster Session 1
29PS02

Practical applications of the concept of affordances on the assessment of children´s motor performance

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The term affordance was first introduced by Gibson (1977) in the context of his direct perception proposition. For Gibson, perception and action are inseparable and the environment has characteristics that indicate latent possibilities to act on it (affordances). The information captured by the sensory systems is sufficient to mediate the perception without requiring cognitive processes for deciding on the action. Currently, the concept of affordance expands to other areas of behavior. The objective of this paper is to present practical applications of the concept of affordances for those interested in research on human actions, particularly on the assessment of children´s motor performance. If the environmental settings are perceived directly by the individual and his/her actions emerges from his/her relationship with environmental constraints, then the concept of body-environmental ratio on spatial and temporal measures play a decisive role on action performance for most functional tasks (the ones used on Movement Assessment Battery for Children). We will present and discuss some of the tasks and settings used on a Movement ABC standardized motor assessment that may influence children behavior.

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DCD X | Ouro Preto MG · Brazil

June 29, 2013
Poster Session 1
29PS03

Cardiorespiratory fitness in children with probable Developmental Coordination Disorder

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Introduction: Developmental Coordination Disorder (DCD) is a prevalent condition characterized by a delay in the development of motor skills, more particularly the coordination of movements, that interferes in the activities of daily living of children. Children with DCD present high levels of inactivity, which may be caused by many factors: difficulties doing activities, social exclusion, fear of failure, and they often experience compromised health-related fitness components such as cardiorespiratory fitness (CRF). Objective: This study was to compare the submaximal CRF of children with and without probable DCD (pDCD). Method: The study had 75 children aged 6-10 years from public school in Manaus – AM. The measure utilized was the maximum volume of oxygen (VO2Max.); higher rates indicate better physical fitness. VO2Max measurement can be conducted in many ways; one is estimating VO2Max by calculating the results ofa one mile test, with shorter durations reflecting higher VO2Max. The Movement ABC test was used to evaluate the motor abilities of children, allowing the formation of the following groups: 24 subjects with probable DCD (pDCD), 22 'at risk' DCD (rDCD) and 29 matched controls who were typically developing children (TD). Results: One mile test results indicate that time for the pDCD (11.54 min) was higher than for the others (rDCD – 11.22 min and TD – 10.76 min). We can verify too that differences in VO2Max were not significant across the three groups: TD – 45.99 ml/kg/min, rDCD – 45.88 ml/kg/min pDCD – 45.79 ml/kg/min. Based on these results, pDCD had a longer time in the one mile test than rDCD and both were longer than TD, suggesting a worse VO2Max for both DCD groups, but when VO2Max is estimated has no significant difference between the three groups. Conclusions: Findings from this study did not show a significant difference in cardiorespiratory fitness between DCD and TD groups, which does not corroborate the literature.

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DCD X | Ouro Preto MG - Brazil

June 29, 2013
Poster Session 1
29PS04

Relationship between Executive Functions and Motricity in Children with ADHD

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Attention Deficit/Hyperactivity Disorder (ADHD) has received considerable focus regarding its relationship with executive dysfunction and evidence of the presence of motor deficits. One hypothesis that can be raised is that motor deficits may be related to deficits in executive functioning. The aim of this study was to evaluate children with ADHD, investigating the relationship between performance on tests of executive function and motor coordination. Participants included 26 children diagnosed with ADHD (aged 7 to 14 years), not medicated at the time of evaluation, and 26 typically developing children. The groups were matched for age, intelligence and resources in the family environment. We used the following evaluation tests of executive functions: the Tower of London Test, Verbal Fluency Test, Wisconsin Card Sorting Test and Children's Gambling Task. Movement Assessment Battery for Children (MABC) was used for motor evaluation. It was demonstrated that the ADHD group's manual dexterity and balance were correlated with planning skills, phonological and semantic verbal fluency, and the MABC total score was correlated with planning skills and semantic verbal fluency only. We concluded that the relevance of the research and impairment of executive and motor functioning in children with ADHD is based on the importance of these functions for functional performance in everyday actions and, by extension, the quality of life of the individua.l

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DCD X | Ouro Preto MG - Brazil

June 29, 2013
Poster Session 1
29PS05

Handwriting and Motor Coordination: A Pilot Correlational Study

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Children with poor motor coordination show difficulties in performing manipulative skills such as handwriting. Motor Assessment tools heavily value manipulative skills to diagnose DCD. However, the existing sub-set of manual tasks requires further investigation. The main purpose of this study is to understand relationships between motor coordination (global and fine) and writing quality, using both the Movement Assessment Battery for Children-2 (MABC-2, age band 2) and Echelle d'évaluation rapide de l'écriture chez l'enfant (BHK), respectively. Methods: First, a translation and cultural adaptation was made to European Portuguese of both instruments. After this step we developed a pilot study, in a conveniently chosen sample of 51 Portuguese right-handed children (20 boys and 31 girls), with an average age of 7.90±0.92 years old. Manual preference was assessed using the Manual Preference Questionnaire from Van Strien (2002). Exclusion criteria were: children with neurological impairment (e.g. Cerebral palsy, epilepsy); psychiatric disorders; behavioral disorders; vision and hearing problems; referenced in Special Education Services; with one or more school retentions; children which mother tongue was not Portuguese; left handed children. All children were typically developing. Results: Our results showed that: (i) Correlations between BHK and global motor coordination, in the total sample and according to gender, were low and did not reach statistical significance; (ii) According to BHK and fine manual dexterity, the correlation coefficient value was higher in girls than in boys; (iii) Furthermore, the correlation between BHK and fine dexterity and balance were negative in girls; (iv) The correlation between BHK and writing speed was statistically significant in boys, but not in girls; (v) Both genders did not differ significantly in the variables considered. Conclusion: This study reveals the need and the importance of further research on this topic to leading to a better understanding of the phenomenon underlying the variables investigated. The second phase is ongoing, and involves the application of both instruments to a broad sample, in order to analyze if it is possible to use both instruments as predictors of dysgraphia and, consequently, help in clarifying DCD diagnostic criteria.

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DCD X | Ouro Preto MG - Brazil

June 29, 2013
Poster Session 1
29PS06

Gender Comparison of Motor Coordination Level in Childhood Education

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Along the trajectory of school Physical Education teachers notice life there are some differences in the process of motor proficiency between boys and girls. This difference may be due to some factors of opportunity as lack of encouragement from family, lack of an appropriate and creative program or traditional culture. The aim of this study was to evaluate the motor coordination and motor disorder among boys and girls from kindergarten as well. The model of this study was descriptive and comparative under a quantitative perspective. The participants were Kindergarten students of Coopema Interactive School / MT / Brazil, 41 girls and 44 boys, represented by 15 First-year children (7 female and 8 male) , 23 Second-year children (9 female and 14 male) , 28 Third-year children (14 female and 14 male) and 19 Fourth-year children (11 female and 8 male), an amount of 85 children aged 6-9 years. The children were divided into two groups, male and female, and they were evaluated by Kiphard and Schilling's Motor Coordination for Children Test (2000) (Körperkoordination Test für Kinder - KTK) which consists in a four-test battery: balance on the beam, side jumps, leaps and monopedals transfer on platforms where the coordination levels are classified into four categories: coordinative insufficiency, coordination disturbance, normal coordination, good coordination and high coordination. The level of confidence expressed in this validation was above 70% (KIPHARD; SCHILLIN, 1974). The statistical procedures adopted were: a) descriptive statistics through the absolute values, b) the statistic itself contained into the test manual. The positive results to an appropriate coordination level indicated one girl and two boys into the good classification, 14 girls and 26 boys to the normal classification, 19 girls and 11 boys showed levels of motor disorder and coordinative disturbances, and 7 girls and 5 boys coordinative failure. These results show both the aspects of good coordination and motor disorder among the boys were higher and lower compared to the girls, respectively. Therefore, according to the results we can conclude the boys showed better motor performance compared to the girls, other studies corroborate to these demonstrating this classification could be justified by the environmental conditions these children are in, the preference of certain activities, and the characteristics for each gender as well. The results of the girls are worrying since children who demonstrated coordinative disorders deficiency also showed sensory and motion perception problems.

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DCD X | Ouro Preto MG - Brazil

June 29, 2013
Poster Session 1
29PS07

Young children with Developmental Coordination Disorder have difficulties estimating reach space with a tool

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Children with Developmental Coordination Disorder (DCD) often have difficulties with planning and generating a precise visuospatial representation of intended actions, however; little is known about their accuracy when planning motor actions with tools that extend reach space. In Typically Developing (TD) children, research suggests that accuracy for hand and tool reach estimations is similar as early as 6 years of age. The purpose of this study was to compare accuracy of TD and DCD children for reach estimations with tools of 20 and 40cm in length. Five 7-year-old children with DCD and five age- and gender-matched typically developing (TD) controls participated in two experiments using an estimation of reach paradigm with a 20cm (Experiment 1) and 40cm (Experiment 2) tool. The experiments involved reach estimation from a first-person perspective in peripersonal (near) and extrapersonal (far) space. Each participant estimated reach with their Hand, a Tool, and a Switch-Block (SB) of the opposite conditions, with an 'extension' from Hand to Tool and a 'retraction' from Tool to Hand. The intent of the switch-block condition was to gain insight into estimation accuracy after an abrupt change in conditions. Order of experiment presentation was counterbalanced. With Experiment 1, analysis of variance results indicated that DCD children approached significance in being less accurate than their controls when estimating reach with the Tool ($p = .06$) and were significantly less accurate with the extension SB condition ($p < .05$), but not with the Hand or retraction SB condition. With Experiment 2, DCD children were significantly less accurate than their typically developing counterparts in all conditions (all ps $< .05$). Overall, the results hint that: (1) young children with DCD have difficulties incorporating space with a tool to reflect accurate estimations; and (2) tool length influences estimations and accuracy when switching conditions. With additional data, our expectation is that the results will be more conclusive. Further studies are necessary to explore the integration of hand and tool spaces in order to improve accuracy in motor skills that requires use of tools, in both physical (i.e., tennis racquet) and virtual (i.e., Wii) actions.

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DCD X | Ouro Preto MG - Brazil

June 29, 2013
Poster Session 1
29PS08

Age-related changes in left-or-right motor selective inhibition in children with and without Developmental Coordination Disorder

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Introduction: The present study investigates the developmental changes of the capacity to selectively inhibit left or right hand after performing symmetrical movements in typically developing (TD) children and with Developmental Coordination Disorder (DCD) from 7 to 12 years old. METHODS: Right-handed TD children (N=12; 107 +/-14 months; MABC score >15th centile) and age- and sex-matched children with DCD (N=12; 108 +/-15 months; MABC score <15th centile) participated. First, the spontaneous tempo of each child was tested. Then, he/she was required to (1) start with a bimanual symmetrical tapping (in synchrony with an auditory metronome) and then (2) inhibit the tapping of their left finger while continuing the tapping of the right finger or conversely. We assessed the number of additional taps for the finger expected to stop and the changes in the mean tempo and its variability for the continuing finger after the inhibition cue. For each condition, t-tests were carried out to compare the group differences in each variable independent of age. Correlations were performed for each group and each condition in order to assess age-related changes of each variable. The p value was fixed at p=.05. RESULTS: No Group difference was found in the spontaneous tempo (600ms). TD children presented an age-related decrease in the number of additional taps of the left finger's tapping ($r(12)=-0.659$; $p<0.05$) which was not the case for the right finger. In addition, TD children presented an age-related increase of the stability of the continuing left finger's tempo ($r(12)=0.805$; $p<0.05$) which was not the case for the right finger. Compared to children with DCD, TD children significantly accelerated the right finger's tapping ($t(11)=2.270$; $p<0.05$) during the transition between bimanual and unimanual tapping. Children with DCD produced less accurate symmetrical tapping ($t(11)=2.193$; $p=0.05$), revealed an increased instability of the right finger's tapping ($t(11)=2.262$; $p<0.05$) and more supplementary left taps ($t(11)=2.407$; $p<0.05$) without any age-related change. INTERPRETATION: TD children exhibited an age-related improvement in inhibiting and continuing their non-dominant left finger, suggesting a left-right asymmetrization in the control of each hand. This pattern of results was not observed in children with DCD who exhibited difficulties in inhibiting the left finger's tapping and continuing the right finger's tapping, suggesting no left-right asymmetrization. These findings provide a substantial contribution to researches about development of mirror movements' inhibition in TD and DCD children. Particularly, they put forth the importance to take into account left-right asymmetries to detect fine motor difficulties in children with DCD.

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DCD X | Ouro Preto MG - Brazil

June 29, 2013
Poster Session 1
29PS09

Does risk for DCD impact the perceived competence and social acceptance of four year old children?

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Introduction: Developmental Coordination Disorder (DCD) primarily affects children's motor performance. A deficit in motor performance can have secondary consequences such as reduced participation in physical activity, social isolation and loneliness. The self-esteem, perceived competence and social acceptance of school-age children with DCD has been found to be lower than children without DCD. Findings for perceived competence and social acceptance for preschool children at risk for DCD have been equivocal. Methods: This study investigated the perceived competence and social acceptance of four year old children at risk for DCD and those not at risk. Parents and teachers of 454 four year old preschool children completed the Children's Activity Scale (ChAS) screening questionnaire for DCD. One hundred and eighty six children's scores fell below the recommended scores for either the parent (3.83) or teacher (3.43) ChAS, indicating risk for DCD. The children in the risk for DCD group were assessed using the Movement Assessment Battery for Children (MABC) to confirm their risk for DCD. The children were also assessed using Harter's Pictorial Scale of Perceived Competence and Social Acceptance (PSPCSA) for children from four to eight years. The PSPCSA assesses a child's perceived cognitive competence, physical competence, peer acceptance and maternal acceptance using a scale of one to four. Fifty-six children (44 boys) scored below the 15th percentile on the MABC and were confirmed to be at risk for DCD and 130 children (82 boys) who scored at or above the 15th percentile were determined not to be at risk. Independent samples t-tests were performed for each PSPCSA domain score to identify differences between the two groups. Analysis was also undertaken to determine if differences existed for gender. The alpha level was 0.05. Results: The mean scores for each domain of the PSPCSA were lower for children confirmed by the MABC to be at risk for DCD. The difference reached statistical significance for the domains of physical competence (p=0.035) and peer acceptance (p=0.005). Comparison of boys' and girls' domain scores found that boys' peer acceptance mean scores differed significantly (p= 0.008) but girls did not. However, the latter should be viewed with caution as the number of girls in the at risk for DCD group was small (12). Conclusion: Preschool children at risk for DCD perceive themselves as less physically competent than their peers and less accepted by them, more particularly for boys than girls. This would suggest that it is important to identify and support four year old children at risk for DCD so that they maintain their confidence to engage in physical activity and limit possible consequences of social isolation and loneliness.

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DCD X | Ouro Preto MG · Brazil

June 29, 2013
Poster Session 1
29PS10

Sleep disturbance in children with and without DCD and links with daytime functioning

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Background. Impaired sleep is associated with a range of negative effects on children's quality of life and their behavioural, emotional and cognitive functioning. Previous research has shown a higher rate of sleep disorders in children with a range of developmental disorders including ADHD and Autism Spectrum Disorders in comparison to the general population. In our previous work parents of children with and without DCD completed the Children's Sleep Habits Questionnaire. This showed significantly higher overall sleep disturbance for children with DCD compared to the control group. Sub-scale scores indicated particular problems with bedtime resistance, sleep anxiety, parasomnias and daytime sleepiness. These preliminary results suggested that sleep patterns of children with DCD should be investigated further. The aim of the current study is to examine sleep in DCD using more extensive and objective measures and to examine possible links with daytime functioning. Methods. Data collection is underway at the time of writing. Two groups of children with DCD are being recruited, one from primary school (8-11 years), one from secondary school (12-16 years). Typically developing children are being recruited to match the DCD groups in terms of age and gender. The children's sleep behaviour is assessed using the Children's Sleep Habits Questionnaire plus actigraphy (movement sensors), which provides an objective assessment of children's sleep-wake patterns over a one week period. A sleep diary is also completed to help interpret the actigraphy data. Aspects of self-rated child functioning which may be associated with the presence of sleep disturbance are assessed with various questionnaires (the Pre-sleep Arousal Scale, the Pediatric Daytime Sleepiness Scale, the PedsQL Multidimensional Fatigue Scale and Harter's Self-Perception Scale for Children). The teacher version of the Strength & Difficulties Questionnaire is used to describe behavior at school. Information is also requested from teachers concerning their impressions about key aspects of the child in the classroom. Results. Relationships between the sleep measures will be examined to obtain a detailed picture of sleep in each group. Data on all measures will be compared across the DCD and control group and between primary and secondary age children. The relationship between the sleep measures and other measures of child functioning will also be examined.Conclusions. Information about the frequency and nature of sleep problems in children with DCD and potential links with daytime behaviour will aid our theoretical understanding of this developmental disorder. It may also be clinically helpful, alerting parents and clinicians to potential difficulties so that these can be identified early on and appropriate support offered.

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DCD X | Ouro Preto MG · Brazil

June 29, 2013
Poster Session 1
29PS11

Motor imagery: is there a difference between children with and without DCD?

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Motor imagery is the process by which an individual rehearses or simulates a given action. Earlier work on motor control in children with DCD suggests that the lack of internal movement representation as measured by imagery tasks may represent one of the limiting factors in their motor performance. In a recent review it was suggested that children with DCD have a broad-based deficit in predicting the results of their action. One of the hypotheses posed is that many children with DCD have a limited ability to build internal models. The aim of the present study was to test internal movement representation by using a motor imagery task in children with DCD (n = 28) with a MABC at or below the 5th percentile and an age- and gender-matched control group (n = 28). All children were attending mainstream schools in the Metro Central Education District, a low socio-economic area of Cape Town, South Africa. A paper version of the Visual Guided Pointing Task (VGPT) was used to determine their Motor Imagery ability. The children were instructed to both execute and imagine hand movements from a starting point to a target of varying size. Participants were required to move a pencil from the starting point at one side of a line to a black target box ten times per trial as quickly and as accurately as possible. A black target box was with its closest edge 150 mm from the vertical line. Five different sheets were used with target boxes of 2.5, 5, 10, 20 or 40 mm. The five sheets, two conditions (real and imagined) and two repetitions yielded 20 trials. Movement time (MT) was recorded using a stopwatch. Results showed that the children in the control group were quicker in both executed and imagined movements in comparison to the DCD group, with the largest difference between groups in executed movements. The correlation between the MT under the condition that the children performed the movement (Real MT) and the time they thought they would need to make the movement (Imagined MT) was 0.46 and 0.18 (both $p<0.05$) for the control group and DCD groups, respectively. These findings suggest that children with DCD show an inferior ability to imagine the time needed to complete goal-directed movements with differential difficulty levels. In a recent developmental study using a computerized VGPT the mean correlation for typically developing children for 5-7, 8-10, year old participants were .35, .59, respectively. So values for the typically developing African children were close to their European age-matched peer group.

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DCD X | Ouro Preto MG - Brazil

June 29, 2013
Poster Session 1
29PS12

The differences of motor skill and visual perception between developmental coordination disorder and Asperger's syndrome.

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Introduction: Many studies have demonstrated that children with developmental coordination disorder (DCD) and Asperger syndrome (AS) display deficits on motor skill and visual perception, but details of these differences are not clear. Purpose: The purpose of this study was to investigate differences in motor skill and visual perception between DCD and AS. Method: The study involved 13 boys with DCD (mean age: 124.2±10.9 months) and 12 age-matched boys with AS (mean age: 121.3±11.1 months). To assess and match the general intellectual development between the DCD and control groups, Wechsler Intelligence Scale for Children, third edition (WISC-III) and Raven's coloured progressive matrices test (RCPM) were used. Motor skill was tested using the Movement Assessment Battery for Children (M-ABC). Visual perception was tested with Birmingham Object Recognition Battery (BORB) and Developmental Test of Visual Perception - Second Edition (DTVP-2). Results: Scores from the full intelligence quotient of WISC-III and the RCPM did not differ significantly between the two groups. The M-ABC, total impairment score and the score of three components (manual dexterity, ball skills, static and dynamic balance) also did not differ significantly between the two groups. On the BORB, the score of match tasks (length, size, orientation) did not differ significantly between the two groups but the score in the position of gap did differ significantly (DCD>AS). In the DTVP-2, the score (eye hand coordination, copying, figure-ground, form constancy position in space, spatial relations, visual closure) did not differ between the two groups, but the only score (visual-motor speed) differed significantly (DCD>AS). Conclusion: This study showed that the differences between DCD and AS appeared not in motor skill but in visual perception.

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Children with DCD have specific deficits in running strategy that limit speed and efficiency.

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Introduction Participating in playground running activities is often problematic for children with DCD. Specific deficits in running strategy in children with DCD have not been explored in the research literature. Gait requires the body mass to be advanced by a combination of push off at the ankle (A2) and pull through at the hip (H3). The ability to generate and recycle of the elastic energy of the Achilles tendon in gait is essential in the development of an efficient gait propulsion strategy. This study reports on strategies of power generation during propulsion in children with DCD during walking and running. Methods 35 children between 9 and 12+ years of age with healthy BMIs were assessed for motor coordination (McCarron Assessment of Neuromuscular Development [MAND]). 11 children (6 male) with DCD were identified (lowest MAND NDI scores in the group) and matched by sex with 11 TD children (highest MAND scores in the group). The kinematics and kinetics of gait were measured for trials of normal walking, fast walking, jogging and sprinting using a 3 dimensional motion analysis system (VICON 14 camera). Speed of gait was not controlled but was measured. Propulsion strategy was defined as the ratio of peak ankle power generation at push off (A2) to the peak power generation of the hip and ankle into swing (A2+H3). Results The two groups TD and DCD were similar in weight, height and age. Although children with DCD walked at a similar speed, they ran more slowly than TD children (mean difference jog 0.3m/s; sprint 0.8m/s). Gait speed (average speed of the pelvis during the trial) was included as a covariate in the following analyses to control for effect of speed on power generation. Walking strategies were similar between TD and DCD groups ($p>0.05$). In the transition from fast walking to jogging the TD children increased their propulsion strategy (A2/A2+H3) by 10% while the group with DCD increased by less than 5% ($p = 0.001$). The children with DCD demonstrated a significantly smaller A2 compared with TD children during jogging and sprinting (TD>DCD; $p<0.001$) (mean difference 2.5 W/kg) and appeared to compensate for this by increasing H3 (DCD>TD; $p=0.013$) (mean difference 0.75 W/kg). Conclusion Children with DCD have difficulty with the transition from walking to running due to their inability to generate sufficient ankle power during push off. This leads to a slower and less efficient running gait as they attempt to compensate by pulling the limb through using the hip flexors. This deficit may is likely to be related to insufficient musculo-tendinous stiffness, strength and control or may reflect developmental delay. A program of specific strength training of the ankle muscles in combination with specific running training focussing on ankle push off may be beneficial in improving their efficiency and enjoyment of running.

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DCD X | Ouro Preto MG · Brazil

June 29, 2013
Poster Session 1
29PS14

Is there a neuropsychological profile associated with developmental coordination disorder?

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Background: It is well acknowledged that children with developmental coordination disorder (DCD) frequently present with co-occuring conditions in addition to their motor difficulties.The heterogeneity of this group has led researchers to look for specific subtypes and clinical portraits that would allow a more accurate identification and description of children with DCD. However, to date, there has been little progress made in the identification of subtypes of DCD. As such, the need to refine our assessment protocol remains. Objective: Considering that cognitive deficits are often associated with DCD), neuropsychology - a field based on information-processing theories - could offer a new perspective on information-processing models of action related to the dyspraxia characteristic of DCD. Methodology: Different models of dyspraxia commonly recognized from a neuropsychological clinical point of view were identified, along with the potential neural substrates implicated in DCD (cerebellar, parietal, frontal). Then, studies on cognitive deficits associated with DCD were compiled and analyzed using the neuropsychological frameworks that were identified. Results: The results are currently being analyzed. The cognitive deficits identified include intellectual potential, language, speed information processing, visual perception and processing, attention, working memory, visual memory and executive functions. Conclusion: This will offer a new way to look at dyspraxia in children with DCD, to rekindle the search on DCD subtypes that could explain the heterogeneity of this group. Eventually, such results will lead to refinement of an assessment protocol of children with DCD.

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June 29, 2013
Poster Session 1
29PS15

The way strength is measured determines whether children with mild motor coordination problems (DCD) have less strength then their age matched peers.

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There is a small body of evidence denominating that children with DCD may have less strength than children without motor coordination deficits. The Hand-Held Dynamometer (HHD) and the Medical Research Council Oxford Scale are commonly used to assess muscle strength. However these measures do not provide information about how the force is used within a functional task. The aim of this study was to test whether children with DCD attending ordinary mainstream primary schools in a resource poor community in Cape Town, South Africa had less strength than their age matched peers. Two measures of strength were used, the HHD break and make tests, and the Functional Strength Measure (FSM). The FSM is a newly developed tool to assess the strength needed to perform specific tasks. The final version comprises 8 items; four focus on the upper extremities and four focus on the lower extremities. Of these 8 items, four measure explosive one repetition force, and 4 measure the number of repetitions completed in 30 seconds. The study participants were 50 children (age 6-10 years) who scored on or below the 5th standard score on the Movement Assessment Battery for Children 2 (MABC-2) and whose parent or teacher reported them as having a functional motor problem (DCD n=50). An aged matched peer group (PG), attending the same schools, scored on or above the 8th standard score and there were no parental or teacher concerns about their motor coordination (PG n=60). Groups were age (mean age 7.5, SD 4.1) and gender matched (56 % boys and 44% girls). The mean standard score on the MABC-2 was 3.4 (SD 1.51) and 11 (SD 1.96) for the DCD and peer group, respectively. Results showed that children with DCD did not score differently on outcomes of the elbow flexion and extension force and knee extension measured with the break HHD method. However, on grip force, which was tested using the “make” method, they scored almost 20% lower than their peers, on both the left and right side ($p < 0.001$). The outcomes values of all FSM items were lower for the DCD group (p 0.03 - p 0.001). Why do different methods of testing muscle strength yield different results? Firstly when using the HHD muscle groups are tested in the midrange of joint motion using an isometric contraction. In comparison, the FSM engages muscles in different ranges using eccentric as well as and concentric muscle action. The FSM items were designed to establish the role played by muscle strength in performing a skill. Therefore accuracy constraints were reduced as much as possible. However timing of muscle activity and transfer the muscle forces into a sequence of movements is still an essential part of performing the test items and it this aspect that seems to lacking in children with coordination problems

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June 29, 2013
Poster Session 1
29PS16

Visual-motor coordination and global development of preterm children: evaluation and risk's detection in the begining of schooling

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The literature reveals relationships between prematurity and Developmental Coordination Disorder (DCD), and between DCD and disorders of visual-motor integration. Evaluation and research become essential in the search for intervention approaches in children considered at risk. This study aimed to describe visual-motor coordination and global development of preterm infants at the beginning of school and to discuss the implications of performance in occupational roles envisaged for this stage of the life cycle. It is a case-control and descriptive-correlational study. The Study Group (SG) was composed by 18 children with a history of preterm birth who were included in the municipal school, attending preschool or first grade of elementary school, who did not have serious neurological damage. Participants who were selected as matches included - Compared Group (CG) - by sex, age, and often the same classroom. Parents/tutors answered the Developmental Coordination Disorder Questionnaire-DCDQ-Brazil 2. The children were assessed using the Denver Development Screening Test II -DDST-II and the Test of Visual-Motor Integration-VMI. Descriptive analyses and statistical tests were conducted to assess the significance of the results. In DDST-II premature infants presented more probability for delay in several areas of development; in DCDQ-Brazil 2 none of the children presented the classification "probable DCD", but it was possible to observe lower average score for the ones in SG; children's performance on the VMI test revealed that premature children had lower scores in all areas. Statistical tests revealed significant differences between SG and CG for the variables Visual-Motor and Fine Motor of VMI. Pearson's correlation test showed that the strongest correlations are among the dimensions of the VMI instrument (,674***; ,607***; , 364*), but also correlations are shown, although weaker, between the instrument DCDQ-Brazil 2 and the visual-motor and fine motor scales of VMI (,342*; ,355*). More complex skills, required during school for writing and reading, can be influenced by visual-motor, fine motor and visual perceptual difficulties. Other skills are demanded at the beginning of schooling which require the integrity of many sensorimotor systems. Difficulties in these areas can influence the performance of children in their occupational role as a student, and in other occupational areas present in their lives

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June 29, 2013
Poster Session 1
29PS17

Prevalence of motor, neuropsychological and school performance deficits and their associations in preterm children.

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Introduction: Preterm "apparently normal" children may have impairment of fine and gross motor development, including deficits in perceptual-motor skills and visuospatial, balance and handwriting that can interfere with functional skills at school age. The objective of this study was to describe the prevalence of motor, neuropsychological and school performance deficits in school age preterm children and check for associations between motor deficits and other outcomes. Methods: Cross-sectional study involving preterm children born =35 weeks and/or weighting =1500 g, ages 8 to 10 years old, and their families who participated in a follow up program, at the Ambulatório de Crianças de Risco(ACRIAR/UFMG) in Belo Horizonte, MG. The Movement Assessment Battery for Children(MABC-2) was used to assess motor development with the cut off criteria set at the 15th percentile. Neuropsychological function was assessed with the Token Test(TT), the Strengths and Difficulties Questionnaire(SDQ) was used as a behavioral index and school performance was assessed with the Academic Performance Test(TDE). Parents answered a structured questionnaire concerning the children´s autonomy in activities of daily living. Chi-square and Fisher's exact tests were used to verify the association between the results of the MABC-2 and others outcomes. Significance level was set at 0.05. Results: We evaluated 100 "apparently normal" children. Prevalence of motor deficits was 39%. Manual dexterity was the most affected subarea(49%), followed by balance (35%) and ball skills(26%). About 30% of children showed deficits in the TT and/or SDQ and/or TDE. There was no significant association between the MABC-2 and the TDE(p=0.09), TT(p=0.47) and SDQ(p=0.45). There was, however, association between the MABC-2 and functional skills such as "Tying shoes"(p<0.001) and "Open and close zipper and/or buttons(p=0.01). Conclusion: Although there was no significant association between motor, neuropsychological and school performance, the high prevalence of motor problems, with impact on functional skills, in preterm "apparently normal" children indicates that follow up programs should be expanded at least to school age. As children were recruited from a follow up program, in which families are continuously oriented, the impact of prematurity on behavior and school performance might have been lessened. The data highlights the need to provide early guidance for parents to facilitate the provision of support before difficulties at school and with social skills are evident.

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June 29, 2013
Poster Session 1
29PS18

Factors associated with the motor development of preterm children at school age

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Introduction: Preterm children are biologically more vulnerable and may present with worse motor performance. Brazilian preterm children might be exposed to multiple risks and, due to low socioeconomic conditions, the environment might be a determining factor. The objective of this study was to verify the effect of environmental and biological factors on the motor development of school age preterm children. Methods: Cross-sectional study involving children born <35week and/or weight <1500g, ages 8 to 10 years old and their families, who were followed at the Ambulatório de Crianças de Risco(ACRIAR/UFMG) in Belo Horizonte, MG. Parents responded to a Structured Questionnaire and the Inventory of Family Environmental Resources(RAF). The Movement Assessment Battery for Children(MABC-2) was used to evaluate motor development, with scores below the 15-percentile considered to be atypical. Fisher and Kruskal-Wallis chi-square tests were used to verify if there was association between the MABC-2 and the risk factor, followed by logistic regression with hierarchical model. Significance level was set at 0.05. Results: 100 "apparently normal" children were evaluated. Children were born with a median weight of 1.370g, 31 week's gestational age and 80% by cesarean section. They were hospitalized about 30 days, used oxygen for 5 days and 6% had intraventricular hemorrhage grades II or III. Over 60% of the children were breast fed for more than 6 months, 10% presented cephalic perimeter below expectation at the age of 2 and 16% were submitted to physiotherapy and/or occupational therapy during the follow up period. The mothers, on average, were 27 years old by the time children were born; the per capita income was 0.5 of the minimum wage, and more than 60% of the mothers worked away from home. The RAF median was 85.48. According to the regression model, the lower the birthweight, the mother age and the RAF score. the higher the risk of getting an atypical score on the MABC-2. The odds of getting an atypical score on the MABC-2 was 4 times greater when the mother did not work outside the home. Conclusion: The motor performance of "apparently normal" preterm children is associated with birthweight, the mother´s age, the availability of resources in the home environment and with the mother's condition of work away from home. With higher incomes, working mothers tend to expose the children to more stimulating environments. The results of this study stress the relevance of environmental factors for preterm children motor performance, expanding over already known factors, such as birthweight.

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June 29, 2013
Poster Session 1
29PS19

Typical cognitive ability drives desired performance in mental imagery tasks in children with DCD

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Visual and motor imagery are components of mental imagery and the capacity to use those abilities depends on a specific level of cognitive and/or motor abilities. It has been suggested that children with DCD are less accurate and more variable in tasks that require components of visual and motor imagery. Here, we used a visual and a motor imagery task to compare performances of 7- to 11-year-old typically developing children (n = 7) and children with DCD (n = 7). Visual imagery was assessed with the Grid task, where participants needed to memorize a grid with shaded squares and later match it to a grid with two letter X's in it. Motor imagery was assessed with a finger tapping task, where participants observed a number sequence on a screen while being required to tap their fingers according to the sequence, in both imagined and executed conditions and in three levels of complexity. Results indicated no significant differences in TD and DCD children, for speed or accuracy of responses in both mental imagery tasks. While the overall results were somewhat expected (due to the simplicity of the tasks), subtle and interesting differences emerged when further exploring the data. For example, while all TD children were able to comply with the rules of both tasks (100%), only 58% of the DCD children were able to understand and complete the tasks (7 out of 12). With the Grid task, all but one child with DCD fidgeted and touched the screen during the memorization process at all times while performing the task, which was not the case for any of the TD children. With the finger tapping task, while the correlation for Imagined and Executed tasks increased gradually across complexity for TD children, no pattern was found for DCD children. Furthermore, when averaging across levels of complexity, the final correlation coefficient was .52 for DCD children and .83 for TD children. It appears that the cognitive performance resources in most children with DCD were sufficient to drive acceptable performance in the tasks proposed, even in the case of motor imagery (over half of the DCD sample was above the 90th percentile for IQ). Because the motor aspect of the finger tapping task made relatively low demands on motor performance capacities, it appears that the capacities in DCD children were sufficient. Future studies using the General Systems Performance theory may shed light into performance resources that either limit or support the desired level of success in functional activities in children with DCD.

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June 29, 2013
Poster Session 1
29PS20

Kinematic and kinetic characteristics of vertical jump in children with developmental coordination disorder

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Introduction: Children with developmental coordination disorder (DCD) have consistently shown lower performance on physical fitness tests (e.g., aerobic power, muscular strength, etc.) compared to their typically developing (TD) peers. Lack of motivation, being overweight, and low perceived competence, are some of the explanations for such poor performance on physical fitness of these children. However, some of the tests that often are part of the physical fitness test batteries are complex and require high demand in terms of neuromuscular coordination. One example is the maximal vertical jump. The aim of this study was to compare the performance and kinetic and kinematic components of the maximal vertical jump between children with DCD and TD children. Method: Twenty-eight children aged from 7 to 10 years participated in this study. For the purpose of the study, participants scoring equal to or below the 16th percentile on the MABC-2 comprised the probable developmental coordination disorder (pDCD) group. Children scoring equal to or above the 25th percentile on the MABC-2 formed the TD group. Fourteen children composed the typically developing (TD) group, and other 14 children matched by gender and age composed the pDCD group. Participants were required to jump as higher as possible on a force platform and to land on the same surface in two different arm swing conditions: with arm swing (WAS) and without arm swing (NAS). The dependent variables of interest in the present study were: jump height, kinematic (duration of eccentric phase, duration of concentric phase, and maximal downward displacement of center of mass) and kinetic variables (peak power, and peak force). Results: The results indicated that children with pDCD jumped lower than TD group, [$F(1,26) = 10.58$, $p < .05$], regardless of the arm swing conditions. With respect to the kinetic and kinematic variables, the results indicated that children with pDCD displayed lower peak power, [$F(1,26) = 10,71$, $p < 0,05$], and higher duration of eccentric phase, [$F(1,26) = 9.94$, $p < .05$], compared with their TD peers, respectively. Conclusion: In summary, these results indicate that children with pDCD and TD children showed differences in the performance of maximal vertical jumps. In addition, both groups examined in the present study showed differences in kinematic and kinetic pattern and were not affected by the use of arm swing.

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June 29, 2013
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Why are children with Developmental Coordination Disorder less physically active? Perspectives from exercise psychology

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Introduction: Children with Developmental Coordination Disorder (DCD) are at greater risk of being physically inactive, owing to difficulties in performing adequate or complex motor skills required for activity tasks. Physical inactivity may subsequently result in secondary health problems, such as obesity and increased risk of cardiovascular disease. Therefore, the current study aimed to understand why children with DCD are less physically active than their typically developing peers, using theories derived from exercise psychology. In particular, we seek to identify which psychological theory might best explain the physical activity behavior of children with DCD. Methods: Using four different psychological theories, including Social Cognitive Theory (SCT), Self-Determination Theory (SDT), the Theory of Planned Behavior (TPB) and the Health Activity Processing Approach (HAPA) as guiding frameworks, we conducted a systematic literature review of the determinants of participation in physical activity of children with DCD. Results: According to our review, self-efficacy from SCT and perceived motor competence from SDT were the most commonly studied predictors of engagement in physical activity in children with DCD. Most studies concluded that children with DCD who took part in less physical activity had low self-efficacy and perceived motor competence than the typically developing children. Nevertheless, there was not any published article applying the frameworks of the TPB or the HAPA to investigate physical activity behaviors in DCD childhood population. Conclusion: In spite of the fact that both self-efficacy and perceived motor competence have been shown to play important roles in the relationship between DCD and physical activity, so far, there is lack of robust evidence to support any psychological theory to fully explain the patterns or levels of physical activity of children with DCD. Thus, more research using existing theories of physical activity behaviour is required. Such knowledge is useful for intervention aimed at enhancing participation in physical activity for children with motor difficulties.

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June 29, 2013
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29PS22

Age-related differences of sensorimotor estimation in children with and without Developmental Coordination Disorder

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Planning and execution of discrete movements involves sensorimotor estimations. The accuracy of these processes is thought to be acquired over time as the dynamic relationships between the external environment and body constraints are learned. This study took a developmental perspective to explore the age-related trajectories of children with and without developmental coordination disorder (DCD). Sixty children with DCD and sixty typically-developing children between the age of 7 and 12 years (males and females) were recruited from schools in Juazeiro do Norte, Brazil and participated in the study. Children with DCD scored below the 5th percentile on the Movement Assessment Battery for Children (MABC-2). The typically developing (TD) children scored above the 30th percentile. We compared the accuracy of visual estimation to actual performance of two motor tasks (horizontal jump and reach with the foot). The results demonstrated significant mean differences between typically developing children and those with DCD. Overall, the children with DCD showed greater difficulties estimating their own performance. In addition, the age-related trajectory of children with DCD when compared with typically developing children was delayed, suggesting that sensorimotor deficits in children with DCD do not progress or resolve as a function of age.

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Poster Session 1
29PS23

The motor function of preschool children exposed in-utero to anti-epileptic drug monotherapy

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Introduction: Epilepsy is the most common neurological condition requiring continuous treatment during pregnancy. Anti-epileptic drugs (AEDs) are human teratogens, crossing the placenta with potential developmental implications, yet seizures may also be detrimental to the fetus, thus most practitioners continue to prescribe AEDs during pregnancy. Most studies investigating intra-uterine AED exposure focus on shorter-term (post-natal) effects and/or are limited to cognitive outcomes. Further, there is a tendency to prescribe AED polytherapy causing difficulty to gauge the effects of individual drugs. This prospective study aimed to assess the motor function of preschool children who were exposed in-utero to AED monotherapy.Design and procedure: In this prospective study, control children were recruited through a convenience sample and study children were recruited through the Israel National Teratology Information Service. Parents and teachers completed questionnaires and children were invited for occupational therapy and psychological assessments. T-tests, ANOVAs, MANOVA's, Pearson correlations, logistic regression and generalized linear models were employed for statistical analyses.Participants: Three groups of children aged 3 years-6 years 11 months were identified: sodium valproate (SV) exposed (n=30; mean age 52.00[15.22] months; 16 males), lamotrigine (LT) exposed (n=42; mean age 50.12[12.77]) and control (n=52; mean age 59.96[14.51]; 25 males). Inclusion and exclusion criteria were related to type and length of AED exposure, existence of genetic and developmental conditions and fluency in the local language.Instruments: Psycho-social intake, Stanford-Binet Intelligence Scales (5th edition); Miller Function & Participation Scales; Beery-Buktenica Developmental Test of Visual-Motor Integration (5th edition); Developmental Coordination Disorder Questionnaire and Little Developmental Coordination Disorder Questionnaire Results: Significant group differences were found for most measures of motor function, with AED exposed children performing worse than controls. While controlling for demographic and cognitive variables, generalized linear models revealed that both SV and LT exposure were predictive of group placement for various motor scores. However, while SV dosage was also predictive of group placement for some of the motor scores, LT dosage was not.Conclusions: The results of this study are important for both clinicians and researchers investigating motor function of young preschoolers. Understanding the mechanisms by which the development of motor functioning may be effected by environmental factors during the prenatal phase may have important implications for understanding typical and atypical motor development of children

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June 29, 2013
Poster Session 1
29PS24

Physical activity in physical education sessions: Lower levels in children with developmental coordination disorder

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Low levels of physical activity have been found in children. Habitual physical activity is a preventive factor to several health problems such as cardiovascular disease and obesity. Researchers argue that motor competence is a key element to understanding physical activity, especially for children with motor difficulties including children with developmental coordination disorder (DCD). The context of physical education classes provides opportunities for motor skill development and systematic physical activity engagement. Physical education sessions can be important for children with different levels of motor proficiency, especially the ones with motor difficulties that might have restricted opportunities of engagement in physical activity otherwise. Our goal was to investigate if children with DCD are less active in physical education sessions than their peers. We assessed 5-10 year old children (n = 231) in Porto Alegre, Brazil. The study had the approval of the Federal University of Rio Grande do Sul ethical committee. Motor skills were assessed with M-ABC and physical activity with pedometer (Yamax SW200) during 4 physical education sessions. All the physical education sessions had a similar format: first, a warm up with an aerobic component (eg. playing tag); second, the main part, mostly games and station activities; and third part, free play and cool down. We found the prevalence of: 29% of children with DCD, 19,5% at risk, and 51,5% with typical development. We found a small negative relationship between physical activity and M-ABC total score $r = -.17$, $p < .05$ (the smallest the score the better the development). ANOVA results showed differences in PA levels among children with DCD ($F(2,228) = 6.12$, $p < .05$), at risk and with typical development. Children with DCD (Msteps per min = 61.25, SD = 19.31) showed lower levels of PA then children at risk (Msteps per min = 73.5, SD = 22.76) and with typical development (Msteps per min = 72.31, SD = 24.14). No significant differences were found between children at risk and with typical development. Physical activity levels in children with DCD are lower than their peers when given a similar opportunity of engagement, such as Physical education sessions. Research has practical implications for intervention and physical education classes.

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June 29, 2013
Poster Session 1
29PS25

Analysis of the term "Developmental Coordination Disorder"in the National Production of Occupational Therapy

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Since the 60s, many words were used to refer to children with impaired development of motor skills such as dyspraxia, clumsy child syndrome, a disorder of motor skills and perceptual-motor dysfunction. In the late 80s, the Psychiatric Association (APA) and the World Health Organization (WHO) conceived as universal naming the term Developmental Coordination Disorder - DCD (ICD-10 F.82), referring to the global motor deficits child, not justified by lesions in the neuromotor system. The impairment in motor performance, educational, emotional, social and day to day activities are some of the characteristics of DCD, so occupational therapy has much to contribute, as part of its operations to analyze the development of motor skills, as well how to apply these in the context of the child's life. The aim of this study is to describe the configuration of the scientific field of Developmental Coordination Disorder in national databases specific Occupational Therapy, describe the historical change of the term used, and list the authors who have published in the area. The methodology consists of three steps: definition of databases; definition of search terms, content analysis of the data found. The collection will be held in national databases specific Occupational Therapy "Cadernos de Terapia Ocupacional da UFSCar", "Revista de Terapia Ocupacional da USP" and " Revista Bahiana de Terapia Ocupacional" Therefore, the search terms were defined to be used by different editions of the Diagnostic and Statistical Manual of Mental Disorders (DSM) and International Classification of Diseases (ICD), and the first edition was consulted prior to the first year of publication magazine oldest, followed by current issues. The data already point to the use of old terms, despite the validation of ICD-10 F.82, about Developmental Coordination Disorder. The results showed the use of the terms Developmental Coordination Disorder and Disorder of motor skills such as synonyms and differentiated terms, resulting in differences of understanding and retrieval of related articles

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June 29, 2013
Poster Session 1
29PS26

Prevalence of Developmental Coordination Disorder of Children from a Medium-Sizes City of São Paulo

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The development of motor skills is considered essential to the acquisition of autonomy in simple functional activities and for an active and healthy life. The Developmental Coordination Disorder (DCD) causes damage in the development of motor coordination, affecting school performance and/or activities of daily living of children. Some children beyond the difficulties in day to day activities and sports, also have other disorders and comorbidities such as Attention Deficit Disorder / Hyperactivity Disorder (ADHD), dyslexia, language impairment or a combination of these disorders. This study aims to determine the motor performance and the prevalence of TDC in children 7 years age, enrolled in the public schools of Araraquara - São Paulo / SP. The sampling plan consists of 101 children with 7 years age, being 55 coming from state schools and 46 from municipal schools. This is a research of descriptive and exploratory character, cross-sectional and quantitative approach to employ for data analysis quantitative. The instruments for data collection are: 1) Movement Assessment Battery for Children - Movement ABC-2, to evaluate the motor performance of the students, 2) SNAP-IV to document signs of difficulty in attention deficit and hyperactivity disorder (comorbidity), and 3) DCDQ-Brasil, to evaluate the impact of TDC in functional activities at home and at school. The results already indicate children with motor difficulties inherent to the TDC, as well as children who have motor difficulties coupled with signs of ADHD. With this study we intended to identify profile motor own children 7 years of public school of Araraquara-SP, besides exposing the performance possibilities of Occupational Therapy with the Developmental Coordination Disorder, by using assessment instruments conceptualized.

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June 29, 2013
Poster Session 1
29PS27

Social Vulnerablity and Motor Performance: a pilot study

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The search for understanding motor development in combination with neural and cognitive development is a growing tendency in the field of interdisciplinary studies. There is evidence that children submitted to ill-treatment and negligence exhibit impairments in motor behaviour and cognitive functions. On the basis of this evidence, it is possible to formulate a hypothesis that justifies how negligence affects the growth of prefrontal cortical areas and, therefore, the executive functions, impairing the development of said areas, thus making children in vulnerable situations more prone to develop characteristics related to Developmental Coordination Disorder(DCD). The aim of this work is to investigate the impact of the contexts of social vulnerability on the motor and cognitive development of children taking part in a social project in the city of Porto Alegre (RS). The tool utilized for the analysis of their level of motor development was the Movement Assessment Battery for Children – 2nd edition (M-ABC-2). The subjects were also submitted to a neuropsychological assessment which aimed to investigate their cognitive behaviour, verifying functions such as: planning, inhibition, working memory, verbal fluency and immediate and delayed memory. Up to the present moment, 29 children (median age 11.72±1.08) submitted to ill-treatment and negligence were assessed. Regarding Manual Dexterity, 27.8% of the evaluated children reached scores which were equal to or below percentile 10; regarding Balance, this figure went down to 13.9%; and, regarding Aiming and Catching, 5.6% were in the risk zone for the development of DCD. In total, 16.7% of the socially vulnerable children were in the risk zone to develop motor impairment. In reference to the correlation between these data and the information obtained from the neuropsychological assessment in tasks that involved planning, inhibition, working memory, verbal fluency and immediate and delayed memory, there were no significant findings (but this might be related to the number of subjects evaluated so far). Some published studies have already attested that exposure to negligence and traumatic events can lead to damage on the myelinated areas of the brain. The working hypothesis supposes that the lack of experiences and stimulation can lead to delayed myelination impairing the intrahemispheric integration skills of neglected children. The low scores obtained by the children on the motor competence assessment are worrying. This study brings forth a prospect of the planning and the interventions for future evaluations, so that the most adequate approach to improve the abilities that presented low scores may be identified

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June 29, 2013
Poster Session 1
29PS28

The concept of motor and physical performance: a literature review

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Introduction: The specificity of the terms used to describe the motor proficiency, motor coordination and motor skills in children brings up questions about how these concepts are designed and implemented in daily practice. In motor behavior literature, the term "motor" is not synonymous with "physical". For example, physical and motor skills are different valences. The term “motor” implies eminence of processes linked to the central nervous system that predominantly deals with the perception of visual and proprioceptive (kinesthetic, tactile, vestibular) in the event of the implementation of the action. The term physical relates to processes predominantly linked to other systems for generating energy or for power generation, or for organic properties such as muscle elasticity and endurance. In this work we report the results of a literature review on the meaning attributed to motor and physical capacities. Methods: Thirty one periodicals classified as B1 by the QUALIS classification system of CAPES, published from 1992 to 2012, were screened using the terms “transtorno do desenvolvimento da oordenação”,“desenvolvimento da coordenação“,“transtorno da coordenação motora“, “coordenação motora“, “transtorno das habilidades motoras“,“habilidades motoras“,“desempenho motor“,“função motora“ in Portuguese. One hundred and sixty three papers were found but only thirteen presented the meaning of the terms of interest. Results: The results showed that motor and physical performances are used interchangeably in a number of articles although they refer to different constructs of action. This may have an implication for intervention and assessment, causing delay in development of this field in Brazil

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Poster Session 1
29PS29

Does Motor Coordination and Perceived Scholastic Competence Influence Academic Performance in Children with Developmental Coordination Disorder?

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Introduction: Developmental Coordination Disorder (DCD) is characterized by poor movement skills that are not the result of a general intellectual, primary sensory, or neurological impairments. Decreased academic performance in children with DCD has been demonstrated and may be attributed to difficulty with manual dexterity and an associated diminishing of perceived academic competence. While it is established that overall academic performance in children with DCD is at a lower level than their unimpaired peers, it is unclear whether there is variance in difficulty among different subjects. At the present time it is not known which subjects are more problematic for children with DCD and whether perceived academic competence moderates this association. Methods: A sub-sample of 126 grade six children with probable DCD (N=63) and matched controls (N=63) in a nested case-control design were selected from the Physical Health Activity Study Team (PHAST) cohort investigation. Motor coordination status was confirmed using the MABC-2. Children who scored at or below the 15th percentile were classified as being probable DCD. Final grades for all academic courses were provided by the District School Board of Niagara. Perceived academic competence was measured using the Harter Perceived Competence Scale (six items). Results: Children with DCD had significantly ($p<0.05$) lower final grades in English, French, Science, Physical Education/Health, Social Studies, and specific components of Math (measurement, algebra) compared to controls. However, children with DCD and controls had similar final grades in Visual arts, Drama, Music, and the remaining elements of Math (data management, geometry) ($p>0.05$). Similarly, Multiple Linear Regression analysis indicated that perceived scholastic competence moderates the relationship between motor coordination and academic success in all courses, except Visual Arts, Drama, Music, and the Math components of algebra and geometry. Conclusion: These results suggest that the evaluation of academic achievement is not influenced by motoric challenges similarly in all courses. A greater understanding of why these differences exist may provide parents and educators with strategies to allow children with DCD to experience academic success in all subjects. That student with DCD appears to demonstrate resilience to academic weakness in some subject areas provides a hopeful perspective.

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June 29, 2013
Poster Session 1
29PS30

The Role of Social Competence in the Relationship between Free Play and Motor Performance in Preadolescent Children

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Introduction: Lifestyle habits in childhood are retained in adulthood, emphasizing the importance of developing strong physical activity habits among children. It is recognized that children with motor impairments have a distinct activity deficit and that socially competent children are capable of having supportive friendships, which aid in adopting healthy active lifestyles. The inter-relationship of these two factors has not been explored. Therefore we examined the role that social competence (SC) plays in the relationship between motor performance (MP) and free play activities. Methods: We examined data from 1958 sixth grade children (50.2% males) from the Physical Health Activity Study Team study in the Niagara Region of Ontario. Free play participation was determined using the Participation Questionnaire; MP was established with the short form of the Bruininks-Oseretsky Test of Motor Proficiency (BOTMP), and SC using Harter's Self-Perception Scale. Multiple regression models were created by gender adjusting for BMI and SES. Odds ratios (OR) were created with z scores (<0 vs. =0) used as free play participation and SC cut offs with BOTMP quartiles as high or low MP (reference= 3rd/4th BOTMP quartile with Harter z score =0). Results: MP and SC are both independent predictors of free play participation. Children with low MP and low SC were at significantly greater risk of low free play participation (ORmales(m)=2.0489; ORfemales(f)=1.7307) with similar but lessened effects seen with high MP and low SC (ORm=1.9052; ORf=1.5192). However, females with low MP and high SC demonstrated no significantly increased risk of low physical activity levels (OR=0.7666) while males with low MP and high SC displayed significant resilience to inactivity with an OR of 0.7362. Conclusion: SC plays an important role in free play participation during childhood and high SC appears to attenuate the risk of inactivity associated with low MP. Females with high SC display no increased risk for inactivity while males with low MP but high SC appear to participate significantly more in free play relative to their low SC peers. Activity promotion campaigns need to attend to the role that SC plays among children at risk of low free play activity, particularly those with low MP, and recognize SC as an important factor in childhood (in)activity.

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June 29, 2013
Poster Session 1
29PS31

A Comprehensive Special Educational Diagnostic Assessment of Five Year Old Children with Developmental Coordination Disorder

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By Slovene legislation DCD is considered to be a specific learning disability and, as such, it affects different areas of individual's everyday living nad learning. Slovene children with DCD are often diagnosed late, at school age, when difficulties with writing, organisation and executive functions arise, even though one could see signs of probable DCD very early in childhood. The aim of this study was to further assess five-year-old, preschool children who had been diagnostically assessed as children with DCD using the M-ABC, the VMI and the DCDQ, and to develop a model of a comprehensive special educational diagnostic assessment of abilities and skills in five-year-old children with DCD. The comprehensive diagnostic assessment was comprised of observations and assessments of children's everyday skills in their kindergarten. It also included semi-structured interviews with children, their parents and their preschool teachers. Furthermore, children's skills and abilities in all developmental areas (sensory and motor skills, cognitive abilities, social and emotional development, speech and language development, including emerging literacy skills, and early math skills) were assessed. Qualitative analysis was made, comparing individual children's comprehensive assessments. The model, which was developed, included both strengths and weaknesses of the assessed children.

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June 30, 2013
Poster Session 2
30PS01

Concurrent Validity of MABC-2 and TGMD-2 for Brazilian Children Movement

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The Movement Assessment Battery for Children 2nd edition (MABC-2) is a assessment used to identify children with Developmental Coordination Disorder (DCD) and the Test of Gross Motor Development 2nd edition (TGMD-2) is an assessment used to identify motor delays. Researchers and practitioners have been using both assessments across Brazil. Concurrent validity for this particular population is yet to be investigated; therefore it was the objective of this study. A group of 43 children, from 6- to 11-years old (M = 7.9, SD = 1.7) was assessed using the MABC-2 and TGMD-2, administered in schools by trained professionals with more than 3 years of experience with the MABC-2 and TGMD-2. Inter-rater and intra-rater reliability were high for the MABC- 2 and TGMD-2 values from (.68 to .99). Pearson's correlations indicated a significant, positive and moderate relationship between TGMD-2 and MABC standards scores ($r = .30$; $p < .02$) for the total sample. The correlation between performance on TGMD-2 and MABC explained 9% of the variance. Correlations in each classification group, DCD ($r = .54$; $p = .08$), risk of DCD ($r = .26$, $p = .20$) and TD ($r = - .05$, $p = .40$) lose significance; although the magnitude of correlation between MBC-2 and TGMD-2 scores for children with probable DCD increased. A related samples t-test revealed no significant differences between both instruments for the total sample ($t (42) = 1.36$, $p < .18$) and also within each classification group (p values range from .16 to .31). The concurrent validity was satisfactory, a moderate, significant and positive association was found between MABC-2 and TGMD-2 standard scores for the total sample (.30). However, we must acknowledge that concurrent validity should be stronger. Previously, low-to-moderate correlations between MABC and TGMD-2 (values from .13 to .40) have been reported for preschool children. To conclude, the fragile result of the present study could be related to the purpose of each assessment. The MABC was designed to identify motor impairments in everyday tasks whereas the TGMD-2 identifies children who are delayed in fundamental motor skills

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Poster Session 2
30PS02

Psychometric Properties of a Chinese Version of the Little Developmental Coordination Disorder Questionnaire

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Introduction: To our knowledge, no published studies are concerned with the prevalence of Developmental Coordination Disorder (DCD) in preschoolers in Chinese-speaking countries. However, identifying children with DCD for timely intervention is critical and questionnaires are the most efficient assessments for DCD. Little Developmental Coordination Disorder Questionnaire (LDCDQ) based on the widely used Developmental Coordination Disorder Questionnaire (DCDQ) was developed for children between 3~4.9 years old. The aims of this study were to translate and culturally adapt the LDCDQ into Chinese (LDCDQ-C) and to examine its psychometric properties. Methods: The LDCDQ was translated and culturally adapted into Chinese following the international guidelines. Parents of 1124 typically developing children aged from 3.0 to 5.9 years completed the LDCDQ-C and 115 parents repeated it after 2 weeks for test-retest reliability. Inter-rater reliability was examined using 48 questionnaires filled out by teachers and parents. Discriminative validity was examined by comparing the LDCDQ-C total scores of DCD, suspect DCD, and non-DCD groups as defined by the Movement Assessment Battery for Children-2. Concurrent validity was examined by computing the correlation between the total scores of LDCDQ-C and MABC-2 on 162 children. Sensitivity and specificity were examined using the MABC-2 as the criterion. Results: Internal consistency was high (Cronbach alpha=0.95). Test-retest reliability was good (r = 0.97) and inter-rater reliability was poor (r =0.45). Confirmatory factor analysis showed that the three-factor model was a good fit (CFI=0.999, NNFI=0.998, RMSEA=0.028, SRMR=0.014, 2=109.51, and d.f.=58). One-way ANOVA showed a significant group difference in the total score of the LDCDQ-C (F(2,159)=24.41, p<0.001). The results of post hoc tests, using the Scheffe's test, showed that the non-DCD group scored significantly higher than the DCD (p<0.001) and the suspect DCD group (p<0.001) but the latter two did not differ significantly. The total score of LDCDQ-C showed moderate correlation with the total score of the MABC-2 (n=162, r=0.52, p<0.001). The sensitivity was 0.96 and the specificity was 0.68 with a cutoff point of 58. Conclusion: This questionnaire demonstrated an acceptable reliability and validity when used in Chinese-speaking countries. Furthermore, the three-factor model provides implication for establishing children's treatment program. However, due to the fact that the LDCDQ-C can't differentiate children with DCD from suspect-DCD, further standardized performance-based assessments are recommended to confirm children's motor coordination problems and the degree of severity.

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June 30, 2013
Poster Session 2
30PS03

Relationship Between Motor Skill Impairment and Autistic Traits in Children with Autism Spectrum Disorders

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Autism spectrum disorders (ASD) appear to be a biologically-based condition with an early onset and a lifelong course, and include several autistic disorders such as autism, Asperger's disorder, and pervasive developmental disorders not otherwise specified (PDD-NOS). Many empirical studies revealed the existence of motor skill impairment in children with ASD. However, an individual range of impairment has also been observed. The purpose of this study was to investigate the relationship between individual differences in motor skill impairment and autistic traits in children with ASD. Several parent questionnaires were used to quantitatively assess motor skill impairment and autistic traits. A Movement Assessment Battery for Children-2 (MABC-2) was also conducted. Methods: The subjects were 19 children with ASD, aged 7 to 16 years. Their Intelligence Quotients (IQ) ranged from 73 to 137. We conducted three tasks: MABC-2, Developmental Coordination Disorder Questionnaire 2007 (DCDQ'07), and a Social Responsiveness Scale (SRS). SRS is a parent questionnaire that can assess individual differences in autistic traits. In this study, the mothers evaluated their children. Results: As for the children in this study, their MABC-2 total T scores ranged from 4 to 13 (8.21 ± 2.5). A Spearman's rank correlation coefficient was conducted to analyze the correlation between the measures. Significant strong negative correlations existed among the SRS total scores and the index of motor skill impairments such as MABC-2 and DCDQ'07 total scores. Thus, the higher the SRS score (i.e., the subject's autistic traits are stronger), the lower the subject's level of total motor ability. Conclusion: Individual differences in motor skill impairment are interrelated with the autistic traits of children with ASD. Future studies should investigate what factors determine such a 'social-motor link' in children with ASD. And, we will also investigate whether 'social-motor link' can be documented in children with Developmental Coordination Disorder using tasks similar to those in this study.

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June 30, 2013
Poster Session 2
30PS04

MABC Checklist: classroom and physical education teachers' assessments are similar despite of their differing work environment

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The MABC test checklist was conceived to assess the functional competence in everyday life context of children and to be filled out by parents, teachers or other professionals concerned with child development. The four sections are organized according to ascending child-environment interaction complexity: (1) Child still/ environment stable; (2) Child moving/ environment stable; (3) Child still/ environment unstable; (4) Child moving/ environment unstable (Henderson & Sugden, 1992). Usually classroom teachers (CTs) work in less complex child-environment interaction conditions than physical education teachers (PETs). The purpose of this study was to investigate if, regarding the same children, the results of the classroom teachers' (CTs) assessments differ from the ones of the physical education teachers (PETs). Fifteen CTs and nine PETs evaluated 7 (n = 17) and 8 years (n = 30) old children. The checklists have been filled out by means of test and retest by the CTs and the PETs. The results showed a significant difference between the checklists of the CTs and the PETs only in section 3 at the age of 7 years (z = -1.963, p =, 05). These findings are in line with the assumption that CTs and PETs are similar for the completion of the list despite of their differing work environment. Interestingly, order of sections according to the magnitude of the scores was for ages 7 and 8, respectively: CTs (2 <1 = 4 < 3) and PETs (1 = 2 = 4 < 3) and CTs (4 <1 = 2 < 3) and PETs (1 < 2 <4 <3). It seems that the supposed complexity order of the sections was not accompanied by gradual higher scores on sections one to four. Future research may address this subject.

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June 30, 2013
Poster Session 2
30PS05

Finding children with mild motor impairment in poor resource area in Cape Town

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There are few studies on the prevalence of mild motor impairment in children in low income countries, yet many factors that may cause developmental motor disorders occur in these areas. However, identification of children with probable motor problems is difficult, since the major agents of referral used in western countries, i.e. school health care (nurses/doctors) and medical services are less available. The purpose of the study was to determine if a newly developed Motor Coordination Traffic Light for Teachers (MQTL) might be helpful to detect children with motor problems. The MQTL requires teachers to classify children as "Has a motor coordination problem"(Red) or "Does not have a motor coordination problem" (Green). If the teachers are unsure they rate the child Orange. A two-step procedure was used. Step one involved the screening of the entire population of children aged 6–10 years of 3 schools in the study area, using the MQTL. In stage two, the Red and Orange children underwent a motor assessment. We also chose to select every tenth child who tested negative on the questionnaire to undergo assessments. A total of 1138 children were screened, of whom 220 (19.3%) were Red on the MQTL and 58.8% Green. The teachers were unsure of the grading of 249 (21.9%) of the children (Orange). In total, 435 underwent a full assessment, including all red and orange ones on the MQTL for which informed consent was obtained. Of these children rated as "Has a motor coordination problem" or Traffic Light "Red" 46% had a score within the normal range of the MABC. On the other hand, if a teacher had rated the child as "Does not have a motor coordination problem" or "Green" 8.6% scored in the impaired range on the MABC. Of the children rated Green 82.4 % scored in the normal range on the MABC. Overall, teachers overestimated the number of children having motor problems. We therefore combined Green (no motor problems) and Orange (doubt) to one category and compared these to the category normal and clinical range on the MABC. This yielded a sensitivity of 0.86 (CI: 0,79 to 0,91) and specificity of 0.45 (CI: 0,37 to 0,52). The diagnostic odds ratio was 5.1 (CI: 2,8 to 9,2). It seems that teachers in resource-poor areas can detect children who have no motor problems but have a hard time selecting the ones that have difficulties. Only 53% of the children indicated as Red scored in the clinical range of the MABC. Although teacher's rating did not have the same cut offs as the test, the means of the three categories (Red, Orange, Green) based on the MQTL were significantly different on all the items of the MABC. The two step procedure is often used for research purposes (Wright & Sugden, 1996). Most of the time long questionnaires are used, like the DCD-Q or the MABC-Checklist. Because of class sizes (mean 40 students) and work load, that is often not an option. In those cases marking a child with a color on the class list may be way to find the children who may be OK and also have a 5 times higher chance of finding children who have movement problems.

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Poster Session 2
30PS06

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Application of Developmental Coordination Disorder Questionnaire (DCDQ) with children aged 5-8 years: reality of são carlos/brazil

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Introduction: Studies have shown the risk factors involved with motor coordination problems in children, especially the lack of experience in driving games. Irrespective of the cause, prevention and detection of Developmental Coordination Disorder (DCD) require careful evaluation. Children may have difficulty reaching school age, slowness or lack of interest in school activities of daily living and games requiring motor coordination, difficulty learning new motor skills and lack of interest in physical education classes. The objective of this study was to identify children 5 to 8 years attending 1st and 2nd year of elementary school, using the Developmental Coordination Disorder Questionnaire (DCDQ) with their parents and teachers. Methods: 67 questionnaires were administered to teachers and 44 parents in a school in São Carlos, State of São Paulo, Brazil. We used self-administration in a meeting environment for parents and teachers. Results: We identified 7 children with probable DCD, 3 males and 4 females, which can be explained by the characteristics of the classrooms involved, which contained greatest number of females (40) than males (28), but that goes in the opposite direction to the research conducted so far, pointing to a higher prevalence in males (3: 1) (LIMA et al, 2011). It was possible to verify the potential of the questionnaire as a tool for identification of DCD, the role of parents as essential to recognize the disorder as well as the need for more training for teachers regarding the perception of risks to child development. Conclusion: The DCDQ has proved a useful tool for the Brazilian reality as it is a questionnaire that is low cost and easy to implement, can be completed by parents or teachers, proving effective for screening and evaluation of children's performance in daily activities. It can provide qualitative information about the exact abilities of these in the family since parents are the people who spend the most time with the children. Another important person is the teacher, who must recognize children with difficulties and who must be able, if not to deal with them,to refer them so they have guaranteed the opportunity to achieve and maintain a satisfactory level of learning.

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June 30, 2013
Poster Session 2
30PS07

European French cross-cultural adaptation of the Developmental Coordination Disorder Questionnaire'07: qualitative pre-test

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Introduction Developmental coordination disorder (DCD) is one of the most under-identified causes of functional deficits in developing children with a considerable influence on their social participation and emotional wellbeing. Early and accurate identification of this condition is crucial to enable effective intervention and to mitigate its negative impacts on occupational performance and social participation. The strategy offering the best cost-benefit ratio, according to the European Academy for Childhood Disability (EACD), is for healthcare professionals to initially identify the impacts of this condition on children's activities of daily living with a validated parent self-report questionnaire such as the Canadian English Developmental Coordination Disorder Questionnaire'07 (DCDQ'07; Wilson & Crawford, 2007). Once a child is positively identified using such a questionnaire, then subsequent confirmation of this condition with a standardized norm-referenced motor test is required. The DCDQ'07 is the only available parent self-report questionnaire for the identification of DCD that has shown good psychometric properties. While various cultural adaptations of the DCDQ'07 have been described, including a French-Canadian translation, it has not been adapted to recognize DCD in European French countries yet. As the availability of a reliable and valid first-step screening questionnaire in European-French would represent a major advance in identifying and supporting children with DCD, the cross-cultural adaptation of the DCDQ'07 was conducted. Methods A pre-final French-language version of the DCDQ'07 was produced following the guidelines of Beaton, Bombardier, Guillemin and Ferraz (2000) for cross-cultural adaptation of health-related questionnaires. These guidelines offer a systematic procedure to preserve the content validity of the source instrument. Firstly, two independent French-speaking translators produced two French versions the DCDQ'07. An expert committee from Switzerland and France compared both versions with the Canadian-French version and synthetized them in one French version. Then, two English-speaking translators back translated this French version. Finally, the expert committee compared the two back-translations with the source version. This process could not guarantee that this pre-final version was clear and appropriate for the target population and it therefore needed to be pre-tested in the field before further psychometric testing. In order to identify response problems, thirteen French-speaking respondents living in Western Switzerland, parents of typically developing children between the age of 5 and 14, were interviewed using the Three-Step Test Interview method (TSTI; Hak & van der Veer, 2008). This method is a form of cognitive interviewing undertaken in three steps: (1) a concurrent think-aloud technique, (2) follow-up probes and (3) a debriefing interview. A qualitative content analysis was used to identify response problems that were discussed among the expert committee and the developers of the DCDQ'07. Solutions to minimize the response problems were consensually decided and applied. Results Thinking aloud provided a good indication that eight items out of fifteen were understood with the intended meaning and were appropriate for the children and the context. Seven questionnaire items and the scale response options were problematic and impacted respondents' response process. The problems were related to semantic, idiomatic, experiential and conceptual issues. Six of the items and scale options were consequently revised to achieve equivalence with the source version. The final European-French version of the questionnaire was submitted to a panel of seven parents of typically developing children aged 6 to 12 from France, who answered the questionnaire and responded to a written survey regarding its clarity and appropriateness. The results indicated that this final version was clear for the parents from France and appropriate to their children. Conclusion The result of this qualitative pre-test demonstrates the usefulness of qualitative cognitive methods to improve the understanding and appropriateness of a parent questionnaire. This process provides a more culturally sensitive European French version of the DCDQ'07, more equivalent in content and truer to the meaning of the original version than the version of the questionnaire with which the study began. The resulting questionnaire is promising for identifying children with DCD in a European French-speaking population, along with normative tests. Further research is under way to ensure that the European-French version of the DCDQ'07 demonstrates the psychometric properties needed for screening DCD in children.

DCD X | Ouro Preto MG - Brazil

June 30, 2013
Poster Session 2
30PS08

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The assessment of adults with DCD: do we have the tools?

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Background. It is well established that DCD often persists into adolescence and adulthood, continuing to have a negative impact on everyday life skills, education and employment. For children, there is consensus on the recommended assessment instruments to help identify DCD and plan support for individuals. For adults, however, there are few tools available for use in the UK and each has limitations. The Movement ABC-2 (MABC-2) Test has UK norms, but these only extend to the age of 16; the 2nd Edition of the Bruininks-Oseretsky Test (BOT-2) has norms up to 21 years but these are from the USA and their applicability to other countries is unknown. Although the recently developed Adult DCD Checklist (ADC) has been a welcome addition, it includes items beyond the domain of motor skill and only limited information is available on the use of this tool. The aim of this study was to examine how well these three assessment tools identify motor difficulties in a group of young adults who report significant motor problems. Methods. 22 individuals aged 18 to 32 took part, all having reported current motor problems and significant motor difficulties in childhood, consistent with DCD. A developmental, educational and medical history was also taken. 19 typically developing adults, matched on age and gender to the DCD group, also took part. Participants were assessed with the MABC-2 and BOT-2 Brief Tests plus the ADC. Sensitivity and specificity values were calculated to examine the ability of each test to correctly identify participants from each group. Relationships and agreement between the tests were also examined. Results. Using the 5th percentile as a cut off point to categorise scores, sensitivity was .91 and .64 for the MABC-2 and BOT-2 Brief respectively. For both tests, the value for specificity was 1.0. On the ADC the recommended cut off point for 'probable DCD' (taken from scores based on performance in adulthood) was applied. The value for specificity was 1.0 and for sensitivity was .36. There was a significant positive correlation between MABC-2 and BOT-2 Brief percentile scores (r=.84, p<.001) and when scores were categorised as above or below the 5th percentile the Kappa coefficient was .81. There were also significant correlations between the ADC and the BOT-2 Brief (-.76) and the ADC and MABC-2 (-.72). When ADC scores were categorised as 'probable DCD' or not and compared with the test categorisations above and below the 5th percentile, the Kappa coefficient was .35 with MABC-2 and .37 with BOT-2 Brief. Discussion. The three tests examined all accurately categorised adults from the control group as being well coordinated. The MABC-2 was the most accurate at identifying those with DCD, although norms from a younger age group were used and may not always be appropriate for adults. The BOT-2 Brief was less accurate, which may relate to the use of North American norms with this UK sample. Sensitivity of the ADC was poor, possibly due to the emphasis on organizational difficulties (e.g. being disorganized, losing possessions), which may not be problematic in this particular sample. Agreement between the MABC-2 and BOT-2 scores suggest that they measure similar aspects of performance, while the ADC seems to identify different individuals. Further work is needed to develop tests and questionnaires for adults, focusing specifically on motor control and coordination, with UK norms.

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June 30, 2013
Poster Session 2
30PS09

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Descriptive study of motor performance in children with developmental coordination disorder

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Introduction: Developmental coordination disorder (DCD) is a frequently occurring disorder with estimates of 5 to 6% of school-aged children and resulting in significant problems in social and/or academic functioning. The commonly used standardized motor test for the DCD identification is the Movement Assessment Battery for Children-Test (MABC). The MABC-2 (second version) comprises a standardized Test and a Checklist focused on the identification and description of motor impairments of motor function in children. The MABC-2 Test provides qualitative information on how the child approaches and performs the tasks and quantitative data on movement competence in the three components of the Test, Manual Dexterity, Aiming & Catching and Balance. For these components and for the total score, age-adjusted standard scores and percentiles are provided. However, despite the fact that the percentile value is important to identify the disorder, it is necessary to evaluate performance in each task to determine which skills are most affected and thus promote a better direction for treatment. The aim of the current study was to describe the motor performance of children with probable DCD. Methods: A cross-sectional study was conducted on 253 children, aged 6–10 years from a public school in Manaus, Brazil. Forty-six children were indentified with probable DCD and were compared with 46 typically developing children. They were assessed using the MABC-2. Results: The results showed that the means of standard scores in all tasks studied were lower in the probable DCD children than in the typically developing children, approximately three points of difference, and statistically significant differences between groups were observed in manual dexterity (p< 0,000), aiming and catching (p< 0,000), and balance (p< 0,000). The worst performance, withthe lowest standard scores, appeared in the task of dynamic balance - hopping on mats - in both groups; on the other hand, the static balance sub-test - two board balance - was the smallest difference between groups (1,83). Conclusion: Difficulties in motor performance were observed in the children with probable DCD. The identification of such deficits may assist in the design of therapeutic protocols for the treatment of children with DCD.

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June 30, 2013
Poster Session 2
30PS11

Does sex and type of school influence motor performance in 6 years old children?

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Introduction: There is evidence in the literature of differences in motor performance by sex; in addition, motor experiences related to studying at public or private school may also influence motor skills. In Brazil there is a great discrepancy between schools, with private schools offering more varied resources, such as sports court, pool and playgrounds. The aim of this study was to investigate whether the motor performance, as assessed by performance items of Assessment Coordination and Motor Dexterity (ACOORDEM), is influenced by sex and type of school (public or private). METHOD: The study included 85 children six years old from Belo Horizonte and São João del Rei, which were sorted and selected according to inclusion and exclusion criteria. Children were assessed at school by an occupational therapist and an undergraduate research assistant trained in the evaluation process and with inter-examiner reliability ranging from 0.80 to 1.0. The ACOORDEM aims to detect motor coordination difficulties in children four to eight years old and the items are designed to assess the child's motor performance in three areas: (1) Manual Dexterity and Coordination (16 items), (2) Bilateral Coordination and Motor Planning (26 items) and (3) Activities and Participation at Home and School (Parents Questionnaire with 54 items; Teachers Questionnaire with 30 items). The questionnaires were not analysed in this study. Previous studies indicated that the ACOORDEM has adequate reliability and validity. Descriptive statistics, chi-square test and Mann-Whitney tests were used for data analysis, with significance levesl of 0.05 and confidence intervals of 95%. RESULTS: Nine items (15.79%) showed significant differences, with boys performing better in ball activities (throwing, bouncing, catching) and girls performing better in cutting, hopscotch and balance. Regarding the type of school, only eight items (14.04%) showed significant difference; in all of them children from private schools performed better (writing, motor circuit, balance and stitching). CONCLUSION: The influence of sex and the amount of stimulation received at school should be considered in evaluating motor development. Consistent with the literature, Brazilian boys have an easier time with ball tasks, and girls do better on tests that require more attention and coordination. The enriched environment and demands of private schools seem to lead to better motor performance, especially in writing.

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30PS12

Test-retest reliability of the Assessment of Motor Coordination and Dexterity in six years old children

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Introduction: Motor development tests play a key role in identifying coordination problems, but most standardized tests for diagnosing developmental problems were not submitted to full validation studies in Brazil, which complicates the identification of children with discrete motor disorders. This prevents these children from receiving appropriate support. The Assessment of Motor Coordination and Dexterity (ACOORDEM) represents an attempt to provide standardized and reliable resource for the evaluation of motor coordination in Brazilian children. The ACOORDEM aims to identify motor coordination difficulties in children four to eight years and the items were designed to assess motor performance in three areas: (1) Manual Dexterity and Coordination (16 items), (2) Bilateral Motor Coordination and Planning (26 items) and (3) Activities and Participation at Home and School (Parents Questionnaire with 54 items, Teacher Questionnaires with 30 items). As previous studies indicate adequate interrater reliability and validity, the objectives of this study were to examine the test-retest reliability of the ACOORDEM (performance items and questionnaires) and to identify test items that should be revised or eliminated. METHOD: The study included 10 children six years old from Belo Horizonte and São João del Rei selected by convenience, as well as their parents and teachers. Children were tested twice with the ACOORDEM with a four to seven day interval. The children were assessed at school by an occupational therapist or an undergraduate research assistant trained in the evaluation process and with inter-examiner reliability between 0.80 and 1.0. Test-retest reliability was examined with ICC (2.1), considering a significance level of 0.05 and confidence interval of 95%. RESULTS: Test-retest reliability was above 0.60 (good to excellent) for 44% of performance items, 70% of the items of the Questionnaire of parents and 97% of the teachers questionnaire. We identified items that must be reviewed to facilitate the performance of children aged four to six years old: reduction of size and number of pins and coins, reducing jump spaces on hopscotch and elimination of alphabet and sentence copy as well as complex tracing and cutting. CONCLUSION: The questionnaires showed better reliability, especially the teacher questionnaire, supporting the adequacy of the questions. Performance items showed poorer reliability probably due to the use of raw scores which are more prone to instability. Further analysis should be conducted with standardized scores, and sub area composites. After reviewing instructions and criteria for the items identified with poor quality, data collection should proceed with children ages four and five years old, to obtain a sample of the entire age range of the test, which will allow better evaluation of its qualities.

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June 30, 2013
Poster Session 2
30PS13

Children with probable Developmental Coordination Disorder and their risk: prevalence of difficulty in different classes of motor skills

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Developmental Coordination Disorder (DCD) is characterized by a delay in development of motor skills, more particularly coordination movements, which significantly impair actions and daily tasks of a child. Children with DCD often try very hard but do not learn motor skills as easily as their peers and become frustrated when they are unsuccessful. To identify children with DCD, the most used instrument is MABC, which is in its second edition and has been used in various populations, and has proved to be a reliable and valid measure to verify motor competence in children with DCD. This study has adopted the second edition (MABC-2), the updated version of the original MABC. This test consists of eight fine and gross motor tasks, grouped into three subscales: three of Manual Dexterity (MD1, MD2, MD3), two of Aiming and Catching (AC1, AC2), and three of Balance (B1, B2, B3). The aim of this study was to investigate the prevalence of impairments of motor function in three components evaluated by the Movement Assessment Battery for Children-2 (manual dexterity, aiming & catching and balance) of boys and girls identified with probable DCD and their risk. The sample consisted of 45 children whose mean age was 8.2±1.0 years. In which, 23 were identified as having probable developmental coordination disorder (percentile =5%) and 22 were identified at risk of such disorder (percentile =15%), based on the Movement Assessment Battery for Children-2, allowing the formation of two groups: pDCD and rDCD. Significant interactions were found for manual dexterity (p = 0.000) and balance (p = 0.002). More specifically, MD1 (p = 0.007), MD2 (p = 0.000) and MD3 (p = 0.000), B2 (p = 0.002). Yet, for the component Aiming & Catching, only in task AC1 (p=0.038) significant interactions have been found. The most affected components by motor difficulties were manual dexterity and balance. Manual dexterity showed greater deficits, especially in the group of children with probable DCD. The identification of these deficits may aid in the preparation of intervention programs for the treatment of children with DCD, focusing on the skills most affected.

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30PS14

Development of the Little DCDQ-Canadian for Preschool Children

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Introduction: Early identification of motor coordination challenges may facilitate provision of support to ameliorate the secondary consequences of unrecognized Developmental Coordination Disorder (DCD). The purpose of this study was to assess the reliability and validity of the Canadian version of a parent questionnaire designed to identify DCD among 3 & 4 yr olds. Methods: 264 children (144 boys/120 girls), ages 3 & 4, were recruited from regular preschools and special needs programs. 98 children were typically developing (TD), had never been referred for developmental delay and were not receiving therapy services. 166 children were At-Risk and had been referred or were receiving services for developmental concerns. Parents completed the Little DCDQ, the SDQ and a demographic survey, and 86 of the children received standardized motor testing. Results: Test-retest reliability (r=.90; p<0.001) and internal consistency (Alpha=.93 to .94) were high. No age-group differences were found. Factor analysis with varimax rotation showed two factors accounting for 62.5% of the variance: gross and fine motor skills. Construct validity was demonstrated by significant group differences between TD and At-Risk groups for total scores (F(1, 262)=15.48, p<.001), as well as within each age group [3yr: F(1,136)=9.72, p<.01) & 4 yr: F(1,124)=5.85, p<.05)]. 86 children were tested with the Movement Assessment Battery for Children-2 and Beery-Buktenica Test of Visual Motor Integration, to define motor impairment (MI). MI and non-MI groups were significantly different on total scores of the Little DCDQ for both age groups (F(1,84)=20.12, p<.001), for 3 yr (F(1,44)=17.07, p<.001), and for 4 yr (F(1,38)=5.42, p<.05). Discriminant function analysis showed an overall significant model (X2(15)=42.88, p<.001). Logistic regression modeling taking into account sex, age, attention and social problems, revealed a significant overall model (X2(2)=21.59, p<.001); lower total scores on the Little DCDQ significantly predicted the presence of MI (p<.001), as did being male (p<.05). Child's age, social problems, and attention were not significant predictors of MI. For boys, AUC=.76, sensitivity was 72%, and specificity was 64%. For girls, AUC=.73, sensitivity was 70%, specificity was 67%. Within the At-Risk group, logistic regression showed that only the total score was a significant predictor of MI, not gender, age, or behaviour. For the At-Risk group, the AUC=.81, sensitivity was 83%, and specificity was 69%. Conclusion: The development of a preschool parent questionnaire for DCD has important implications for the provision of improved services.

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Reliability and Concurrent Validity of the DCD-Q-07 in Preschool Children

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It is important to identify DCD early to allow for proper and timely treatment and support, and to reduce the negative consequences of the condition continuing into adolescents and adulthood. In this study we assessed the psychometric properties (construct validity, concurrent validity, reliability and test accuracy using ROC analysis) of the Developmental Coordination Disorder Questionnaire (DCD-Q-07) in preschool children using the Movement Assessment Battery-2nd edition (M-ABC-2) as our criterion measure. A reasonably large sample of children ages 4, 5 and 6 (n=183) and their parents were recruited from community organizations and were assessed for motor difficulties with the M-ABC-2 administered by a trained research assistants. 33 children (24 boys and 9 girls) scored below the 16th percentile, showing they were at risk of motor difficulties and were identified as having probable DCD. Parents of the children completed the DCD-Q-07, blind to the results of the M-ABC-2 test. The DCD-Q-07 demonstrated high internal reliability for both the full scale (alpha=0.887) and each subscale: control during movement (alpha=0.807), fine motor and handwriting (alpha=0.862) and general coordination (alpha=0.724). Moderate correlations (r=0.473-0.631) were found between the subscales on the DCD-Q-07; the strongest correlation being between control during movement and general coordination (r=0.631). However when compared to the M-ABC-2, the DCD-Q-07 incorrectly identified 33 children (13 false positives and 20 false negatives) as to having the condition. The DCD-Q-07 showed overall poor sensitivity (26%), but high specificity (91%); the overall accuracy of the test was low (AUC of 0.665). Even though it is essential to screen for DCD early in child development, due to its low test accuracy, caution should be warranted before using the DCD-Q-07 as a screening tool for DCD in preschool children ages 4, 5 and 6.

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June 30, 2013
Poster Session 2
30PS16

Visual-motor integration in children with Developmental Coordination Disorder

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Introduction: Visual information is fundamental in every human motor action. The assessment of visual-motor integration is essential in clinical and educational perspectives, especially for those who exhibit motor or cognitive disabilities. It has been shown that children diagnosed with developmental coordination disorder (DCD) display difficulties or lower performance in tasks requiring visual-motor integration when compared with their typically developing peers (Schoemaker et al., 2001; Waelvelde et al., 2004). The experimental tasks often are complex and require more than simple visual-motor integration (Kagerer et al., 2006). Aim: To examine the performance of children with DCD in a simple task requiring visual-motor integration. It was also the aim of the present study to examine the performance of these children in a clinical neuropsychological assessment, the Beery-Buktenica Developmental Test of Visual-Motor Integration (VMI - Beery & Beery, 2010). Methods: The present study included 18 children recruited from public schools in São Paulo state who were aged from 7 to 10 years. Nine children composed the typically developing (TD) group, and another 9 children matched by gender and age composed the probable developmental coordination disorder (pDCD) group. For the purpose of the study, children scoring equal to or below the 5th percentile on the MABC-2 (Henderson, Sugden & Barnett, 2007) comprised the pDCD group. Children scoring equal to or above the 37th percentile on the MABC-2 formed the TD group. Participants completed the Berry-Buktenica Developmental Test of Visual-Motor Integration - (Berry & Berry, 2010) in one session lasting approximately 20 minutes. In another session (i.e., different day), lasting about 20 minutes, participants were required in a experimental task related to tracking task moving a pointer over a sinusoidal path displayed on a computer screen by moving an unseen digitizer pen over a tablet. Two conditions of speed were required from participants, slow (1.85 cm/s) and fast (2.64 cm/s). Results: For the VMI test the results from Mann-Whitney U test indicated that pDCD group showed significant lower scores than DT group, ($U=10$; $Z=-2.7$; $p<0.05$). For the tracking task the ANOVA 2x2 (Group x Condition) with repeated measures on the last factor showed that the variability of spatial error was significantly higher for pDCD than DT group, ($F(1,16)=7.06$; $p<0.05$). Conclusion: Overall, the results of the present study indicated that children with pDCD display problems in visual-motor integration both in clinical assessment and in an experimental computerized task. The present data further suggest that accuracy consistency of visuo-motor control might be a useful parameter in the diagnosis of one aspect of developmental coordination disorder.

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DCD X | Ouro Preto MG · Brazil

June 30, 2013
Poster Session 2
30PS17

Further assessment of the validity of the Hebrew Little Developmental Coordination Disorder Questionnaire

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Introduction: Even though DCD is not commonly diagnosed before the age of 5, motor difficulties may be identified earlier than this and children with suspected motor delay should be monitored with the aim of providing timely and suitable intervention. The Little Developmental Coordination Disorder Questionnaire (Little DCDQ) was developed in Hebrew to provide a brief, easy to use screening tool to identify motor concerns amongst young preschoolers. Initial assessment of the Hebrew questionnaire has revealed it to have good psychometric properties, yet further assessment is recommended. Design and procedure: After ethical approval was attained to perform this descriptive study, children were recruited through a large Jerusalem-based child development center. Children who were referred for developmental assessment due to motor concerns were administered the Movement Assessment Battery for Children (second edition) (MABC2) as well as the Hebrew Little DCDQ by a developmental occupational therapist or physiotherapist. Participants: Forty children aged 3 years-4 years 11 months were recruited in two age groups (3-year-old children [n=20] and 4-year-old children [n=20]). Inclusion criteria stipulated that both parents and children were fluent in Hebrew and that children had been referred to a child developmental center for assessment due to developmental motor concerns. Exclusion criteria included a diagnosis of mental retardation, ASD, neuromuscular deficits (CP, MD) and sensory loss. Instruments: Children were assessed using an intake questionnaire developed for the purposes of the study, the Hebrew Little DCDQ and the MABC2. Results: The profile of the referred children will be described using the Little DCDQ as well as the MABC2. Correlations between the two instruments will be discussed. Conclusions: An assessment of the criterion validity as compared to the current gold standard of identifying DCD is important to establish the usefulness of the Hebrew Little DCDQ as a screening instrument for identifying motor delay in young preschoolers. Further evidence of the validity of the questionnaire will support its continued use as an efficient means of identifying and supporting young children at risk of being diagnosed with DCD at school age.

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30PS18

Prevalence of DAMP (Deficits in attention, motor control and perception) syndrome in Japan: A Nation-Wide Study, using Japanese version of DCDQ and ADHD-RS

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Background and Purpose: Clinically, children with attention-deficit hyperactivity disorder (ADHD) often have motor coordination dysfunction, and previous studies have shown the prevalence of the comorbidity as high as 30~50%. This frequent and specific comorbidity has lead to new concepts or terms, such as DAMP (Deficits in attention, motor control and perception) syndrome (Gillberg 1982), DCD-Plus (Gibbs et al 2007), or different subtype of ADHD (Fliers 2008). It is reported that these comorbidity or co-occurrence could be led more severe prognosis than when each condition occurs separately. The purpose of a nation-wide study in Japan was to investigate the relationships between DCD and ADHD tendencies, using the Japanese version of Developmental Coordination Disorder Questionnaire (DCDQ-J). Methods: DCDQ is a parent questionnaire, designed to screen for coordination disorders in children (Wilson et al., 2000; Wilson et al., 2009). Recently, we developed the Japanese version (Nakai, et al. 2011). The DCDQ-J and the Japanese version of ADHD-rating scale IV (ADHD-RS) were completed by parents on a nationally-representative sample of 25,484 children, age 6-15. With regard to the cut-off point of DCDQ-J, we adopted the 15th percentile and the 5th percentile, according to the statement of the Leeds Consensus 2006. Results: All subscales and total scores of the DCDQ-J were significantly associated with the total and each subscales scores of ADHD-RS, which suggested that children with poor coordination more frequently showed inattention and hyperactivity. The results, using the 5th percentile cut-off point, revealed that, in Japan, 3.9% had DCD alone, 4.0% of children had ADHD alone, and 1.4% had DAMP syndrome. Vice versa, 26% of children that had DCD had ADHD and 26% of children had ADHD had DCD. Discussions and Conclusion: Gillberg reported that 1.7% of Swedish 7 year-old children had so-called severe form of DAMP syndrome, and they also met criteria for Autism Spectrum disorder, including Asperger's syndrome. While, recent brain imaging study revealed that lower rCBF of some brain lesions and different rCBF response to MPH were found in ADHD comorbid DCD group compared to ADHD alone, and genome-wide association study suggested that MAP2K5 and CHD6, and 15 SNPs might be involved in this combination. The screening or assessment as DAMP syndrome, using the DCDQ-J and ADHD-RS, could help to identify the under treatment of these problems and to promote the new concept of the pathophysiology. Acknowledgement: This study was supported, in part, by Grant-in-Aid for Scientific Research from the JSPS and Health and Labour Science Research Grants from Ministry of Health, Labour and Welfare

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Poster Session 2
30PS19

How Do Teachers in Japan Assess "Clumsiness" and "Attention" in Children?: Lesson from a Nation-Wide Study, using he Japanese version of the Motor Observation Questionnaire for Teachers (MOQ-T)

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Background and Purpose: DCD interferes with academic performance, self-esteem and participation in play or physical activities at school. Teachers have many opportunities to observe a variety of motor skills at school. However, "clumsiness" in children has hardly attracted attention and there is no suitable questionnaire to identify DCD by teachers in Japan. The aim of this study was to conduct a nation wide survey with the Japanese version of the Motor Observation Questionnaire for Teachers (MOQ-T-J), gathered with ADHD-rating scale (ADHD-RS). It is reported that DCD and ADHD often comorbid, and this combination, so-called DAMP (Deficits in attention, motor control and perception) syndrome could be led more severe prognosis than when each condition occurs separately. Methods: MOQ-T is a questionnaire for teachers, consisting of 18 items and originally designed for aged 5–12 years. There are 2 subscales, namely, Gross motor skills and Fine motor skills, scored by 4-Likert scales. Significant correlation has reported between the MOQ-T and the DCDQ (Developmental Coordination Disorder Questionnaire) (Schoemaker MM, 2008). Recently, we have developed the Japanese version, with the additional age-band, to 15 years. (Nakai A, 2009, 2011). We conducted the nation-wide school-based survey, and the collected sample consisted of 8,301 children, aged 6 to 15 years. With regard to the cut-off point of MOQ-T-J, we adopted the 15th and the 5th percentile, according to the statement of the Leeds Consensus 2006. Results: Total scores of the MOQ-T-J were significantly associated with the total and each subscales scores of ADHD-RS. The results, using the 5th percentile cut-off point, revealed that, in Japan, 2.7% had DCD alone, 3.0% of children had ADHD alone, and 2.4% had DAMP syndrome in school. Vice versa, 46.9% of children that had DCD had ADHD and 44.0% of children had ADHD had DCD. Discussions and Conclusion: The results of the study suggested that the Japanese teachers could assess the children's coordination and attention, using MOQ-T-J and ADHD-RS. However, in comparisons with the results, using DCDQ-J and ADHD-RS of the nation-wide study, the estimated prevalence of DCD, ADHD, and DAMP syndrome in school are somewhat different from parental assessment or recognition. It is important to promote the understanding and the assessment of motor impairment and inattention/hyperactivity in children as DAMP syndrome in school. This could help teachers to identify the underestimated and undertreatment of these problems in Japan. Acknowledgement: This study was supported, in part, by Grant-in-Aid from the JSPS and from Ministry of Health, Labour and Welfare

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DCD X | Ouro Preto MG - Brazil

June 30, 2013
Poster Session 2
30PS20

Cognitive Profile on the WISC-IV of Children With Developmental Coordination Disorder (DCD) and/or Developmental Dyslexia (DD)

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Introduction: A lot of studies available in the literature have underlined the high frequency of co-morbid associations in specific learning disorders (eg. Kaplan et al. 1998; Nicolson & Fawcett, 2007). About 40 to 60% of DD or DCD subjects exhibit the double association. However few studies give details on the cognitive functions (especially with the WISC-IV) of DCD or DD children. Even fewer are interested in the neuropsychological profiles of children with DCD and DD. The main purpose of this contribution is to compare intellectual characteristics of the three populations and in particular cognitive profiles of children with co-morbidity (DD-DCD). Moreover the influence of attention level (as a confounding variable (Chaix et al. 2007)) and the impact of psychological/behavioral skills are investigated too. Methods: A group of 65 children (21-44) were recruited: 20 DD (8-12), 22 DCD (6-16) and 23 DD+DCD (7-16). Inclusion criteria were: 8 to 12 years old, with DCD or DD or DCD and DD, no known psychiatric or neurological disorder and an IQ score greater than 70. Diagnosis DD and DCD were in accordance with the DSM-IV-TR criteria with M-ABC test for motor skills and L'Alouette and ODEDYS-2 test for reading skills. Children with Specific Language Impairment and/or Attention Deficit/Hyperactivity Disorder according to the DSM-IV-TR criteria were excluded. Participants were submitted to the same neuropsychological evaluation including an assessment of intellectual abilities (WISC-IV) and attention (CPT-II). Children's behavior checklist was completed by parents (CBCL). Results: The three groups are homogenous in terms of age. There are no significant differences for the attention test (CPT) and for behavioral characteristics (CBCL). A significant difference between groups was observed only for the Processing Speed Index (PSI) score ($F(2, 64) = 4.096$; $p = .021$) and the two subsets "block design" ($F(2, 64) = 4.728$; $p = .012$) and "symbols search" ($F(2, 64) = 4.631$; $p = .013$). The post-hoc assessessments showed that DD were better than DCD children and the results of the co-morbid group (DD-DCD) were at an intermediate position between these groups. In addition, block design, symbols search, Processing Speed Index (PSI) and Perceptual Reasoning Index (PRI) were significantly correlated with M-ABC total score.

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DCD X | Ouro Preto MG · Brazil

June 30, 2013
Poster Session 2
30PS21

The prevalence of DCD like difficulties in child patients with Benign Epilepsy with Centro-Temporal Spikes (BECTS)

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Introduction Understanding differential diagnosis in DCD is essential in considering whether a child has DCD or another condition. Most of the research has considered common conditions such as Cerebral Palsy and to a lesser degree considered Joint Hypermobility Syndrome. Even less is known however, about the potential association between DCD and a childhood condition known as Benign Epilepsy with Centro Temporal Spikes (BECTS), despite the deficits arising from the motor cortex. One small study conducted in Italy by Scabar et al. in 2006. presented exciting findings and showed that 30.8% (4 of 13) of the children who were diagnosed with BECTS scored below the 5th percentile on the Movement ABC Battery, and displayed severe movement difficulties consistent with a diagnosis of DCD. Using a larger sample size (n=20), the aim of the study was to expand and further confirm Scabar et al.'s findings and also to identify if there were any specific patterns of difficulties if any. Method Working collaboratively with Cardiff and Vale NHS Trust and The Cardiff University Brain Research Imaging Centre (CUBRIC), Wales FMRI, MEG and psychobehavioural data was and continues to be collected on 20 child patients aged 8-16 years of age who have previously been given a diagnosis of BECTS by a paediatric neurologist. Results So far data has been collected on 14 children (8 females and 6 males) with a diagnosis of BECTS. The ages ranged from 8.1-15.0 years, mean age = 10.8 years (SD. = 1.96). Results: Using the screening tool DCDQ'07 showed that 38.5% of the sample was classified as 'suspect' DCD based on the parental questionnaire report. Follow up assessment on all revealed that using Movement Assessment Battery for Children – 2 (Movement ABC-2) three children out of 14 were on or below the 5th percentile for the overall total MABC score. Additionally, three of the 14 were on or below the 5th percentile for the manual dexterity, four for the aiming and catching subtest and two for the balance subtest. Additionally, three children fell between 6-15th percentile on the overall MABC score Therefore, almost half (42.8%) of the children indicated being worthy of monitoring, or currently demonstrated a significant movement difficulty on the basis of performance on the MABC. Other psychobehavioural measures, including IQ and language measures were undertaken. Initial relevant results from fMRI will also be presented in the poster and data from the 20 patients included. Conclusion The results a) indicate that significant motor impairment is associated with BECTS and this needs to be considered as a differential diagnosis; and b) suggest that EEG studies in DCD need to be considered in light of these conclusions.

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DCD X | Ouro Preto MG - Brazil

June 30, 2013
Poster Session 2
30PS22

Risk identification of developmental disorder of coordination in the elementary school children

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Early identification of DCD allows preventive actions to avoid side effects of the disorder, such as social isolation and poor school performance. The aim of this study was to identify the risk of DCD in elementary school children in relation to gender, socioeconomic status and condition of prematurity. The study included 140 families of public school children in Ribeirão Preto-SP, divided into 3 groups: G1 - 25 families of children 5-7 years and 11 months; G2 - 44 families of children 8-9 years and 11 months; G3 - 70 families of children 10 to 13 years and 11 months. Questionnaires of children who had a clinical diagnosis of physical or cognitive deficits, or children attending some kind of rehabilitation service were excluded. The instruments used are the Economic Classification Criterion Brazil (2012), the Questionnaire DCDQ - Brazil, and a data sheet on conditions of birth and development of the child. The study was approved by the Ethics Committee on Human Research UFSCar (N°- 112.547). After scoring the questionnaires for cases in which children had signs of DCD, parents were instructed to search for specialized services in the city. Data were statistically analyzed using nonparametric techniques. As main results found by the Fisher exact test significant differences in the prevalence of signs indicating the DCD between groups. In G1, 4% of the children had signs of DCD, none of them were premature, and 40% of these children belong to the economy class B2. In G2, 29% had signs of DCD. Six children were premature, 34% of these were included in the group of children with signs of DCD; the incidence were higher in girls (77%), and economy class these children concentrated in C1 (30%) and C2 (23%). In G3, 43% had signs of DCD, from 8 premature infants 50% were included in the group of children with signs of DCD, the incidence was higher among girls (70%), and economy class these children are concentrated in C1 (33%) and B2 (32%). The G1 differs from G2 (P = 0.012) and G3 (P <0.001). The G2 and G3 did not differ (P = 0.120). The study revealed a high incidence of signs of DCD in elementary school children, especially in premature infants (30 to 50%), however, specific motor tests need to be applied to these children to confirm the diagnosis. Furthermore, this study contributes to national scientific research in the area, because there is not yet an epidemiological study on the prevalence of DCD in Brazil.

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June 30, 2013
Poster Session 2
30PS23

Motor profile of students with dyslexia

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Introduction: Most studies with dyslexic students is mainly focused on describing cognitive-linguistic behaviors related to reading and writing, as well as their influence on academic performance. However, studies indicate the presence of changes in the motor skills of this population. The objectives of this study were to characterize and compare the motor performance of students with dyslexia in relation to students with good academic performance. Methods: Participating in this study were 79 students, of both genders, aged 8 to 11 years old, who attended the 3rd to 5th grade of public schools in Marília-SP, divided into: GI: 19 students with dyslexia and GII: 60 students with good academic performance. After signing the consent form, every student was administered the Bruininks-Oseretsky Test of Motor Proficiency. Results: The results of this study showed that the motor performance of students of the GII was superior to the performance of GI students in almost every motor area assessed which points the description of the relationship between dyslexia and changes in fine and gross motor coordination. However, the motor area in which there was a higher statistically significant difference between GI and GII was the fine manual control, which involves precision and fine motor integration skills, components that are responsible for motor control and coordination of the distal muscles of the hands and fingers, especially for grasping, drawing, cutting and writing. Conclusion: The results of this study showed that both fine motor and gross motor skills are altered in children with dyslexia, which can compromise academic skills. These findings indicate the need for early intervention in the motor alterations found in this study to minimize the negative impacts on social and academic performance of students with dyslexia.

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DCD X | Ouro Preto MG - Brazil

June 30, 2013
Poster Session 2
30PS24

Motor performance of students with learning disabilities and dyslexia: a comparative study.

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Introduction: Studies related to dyslexia and learning disabilities indicate the presence of changes in motor skills of these populations, such changes may co-occur with the frames of dyslexia and learning disabilities, in this case, specifically the so-called Developmental Coordination Disorder (DCD). The objectives of this study were to characterize and compare the motor performance of students with dyslexia and learning disabilities in relation to students with good academic performance and identify DCD in co-occurrence in this population. Methods: Participated in this study 118 students, of both genders, aged 8 to 11 years old, who attend the 3rd to 5th grade of public schools in Marília-SP, divided into: GI: 19 students with learning disabilities; GII: 19 students with dyslexia; GIII: 60 students with good academic performance. After signing the consent form every students were submitted to the Bruininks-Oseretsky Test of Motor Proficiency. Results: The results of this study showed that the motor performance of GIII, was superior to the performance of GI in all motor areas, whereas the motor performance of GIII was higher only in the motor area of fine manual control compared to GII. As for the performance classification of the groups related to motor areas, the results were shown below average for all students, with discrepancy in the comparison between chronological age and the motor ages. So, any chance to consider the DCD as co-occurrence in children with learning disorders in this study is not valid, because the students with good academic performance also showed similar motor changes. Conclusion: These findings indicate the necessity of studies that include early intervention and early identification of motor changes with all studied populations to ensure that the diagnosis of Developmental Coordination Disorder in co-occurrence with learning disorders be done properly.

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DCD X | Ouro Preto MG - Brazil

June 30, 2013
Poster Session 2
30PS25

Prevalence of children with DCD in elementary education schools of the PR, Rolandia

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Studies have found a high prevalence of children with motor disabilities (VALENTINI et al., 2012; SILVA et al., 2012), which can influence on the academic performance of the student, intervening negatively in the learning process. The aim of this study was to investigate the prevalence of children with Developmental Coordination Disorder (DCD) in the elementary education schools in the city of Pr, Rolandia. After approval of the local education network, 12 schools were visited to explain the study. The pedagogical coordination of the 3 schools, didn't indicate children with motor disabilities that could fit the profile of the children with DCD and one school didn't give consent. Thus, 9 schools participated, giving a total of 2656 students between kindergarten and fifth grade of elementary school. A total of 55 children (7.47 ± 1.50 years old) with report of motor disabilities were indicated for evaluation. Then, was delivered to the pedagogical coordination the checklist proposed in Movement ABC-2 (2007) and, based on their results, we conducted a motor assessment on all children. The tasks used with the children were of the manual dexterity, ball skills, and static and dynamic balance, according to the Movement ABC procedures. The results were analyzed on the percentile score, indicating DCD when the total percentile rank score is at or below the 5th percentile, and borderline DCD is indicated when the total percentile is between 6th and 15th percentile. The results of the total percentile score identified 10 children classified with DCD, however, one child had visual impairment and another manual constraint on the day of the assessment. Thus, the 8 children classified with DCD represent 0.30% of the students of the elementary education school of the city and the research participant. Eight children were classified at the 9th percentile, considering as borderline for developing DCD. Based on initial data from the study, we can conclude that there is a low prevalence of children with motor coordination problems in the sample studied.

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June 30, 2013
Poster Session 2
30PS26

The relationship between motor problems and attention deficit in children with Developmental Coordination Disorder : challenge for both diagnosis and therapeutic issue

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The association between motor problems and attention deficit in children with Developmental Coordination Disorder (DCD) was widely reported by the literature; but the relationship between these both disorders remains unclear. Does this association result from a co morbidity or a common underlying mechanism? To answer this question represents a challenge for both diagnosis and therapy. The aim of our study was to present 2 children identified as having DCD following DSM-IV-TR criteria. Each child had a full-scale IQ-score above 70 on the WISC-IV and a score below the 5% cut-off point on M-ABC-test. Moreover, these 2 children were identified as having ADD (Attention Deficit Disorder) following DSM-IV-TR. For the first (male) child aged 10 years old , we observed an uneven DTVP (Developmental Test of Visual Perception) profile characterised by a significant difference between the VMIQ (Visual Motor Integration Quotient) and the NMVPQ (Non Motor Visual-Perceptual Quotient), a low scores on block design test (WISC-IV). This profile reflected a deficit in eye-hand coordination and in praxis constructional abilities. At the same time, the neuropsychological evaluation of the attention (TEA-Ch, Test of Everyday Attention for Children) confirmed the low scores in the visual modality of the attention. For the second (female) child aged 8 years old , we observed a normal range of scores on DTVP-II, block design test (WISC-IV) and Benton-Three-dimensional constructional praxis test. But, this child presented a disorder of gesture characterised by a wide range of motor symptoms. Moreover, she presented a phonological pronunciation deficit. At the same time, attention problems were present in school and at home. The rating scales completed by parents and teacher were in favour of attention problems and we observed very low scores on test of attention (TEA-Ch) in the visual and auditive modalities for all the components of attention (selective, sustained and divided). To conclude, these two case studies show us the importance of deepening the neuropsychological investigations in children with DCD and attention problems. Indeed, the improvement of our comprehension of the relationship betwwen motor and attention problems will lead to more effective and better targeted therapeutic strategies.

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June 30, 2013
Poster Session 2
30PS27

Prevalence of association between ADHD and DCD: A Literature Review

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Attention Deficit/Hyperactivity Disorder (ADHD) is a current nosological category for children who have significant problems resulting from inattention and/or impulsivity and overactivity. It is often associated with a variety of comorbidities. Among the many developmental problems that co-occur in children with ADHD are problems with motor control. There is evidence that up to 50% of ADHD cases may have motor problems severe enough to give the affected subject the diagnosis of Developmental Coordination Disorder (DCD). Given the plausibility of the association between ADHD and DCD, the objective of this study was to review literature on the prevalence of the association between these two disorders. A research was performed in the PubMed database in October 2012. After analyzing the results of the search, data regarding the association of ADHD and DCD were identified in only 12 studies. The association of both disorders is high, ranging between 27.1% and 68.7%. The knowledge about clinical characteristics, their evolution, and how they impact the daily lives of affected people is of utmost importance to choose intervention strategies as well as to evaluate the effectiveness of such strategies. Therefore, it is crucial that the diagnostic process to identify associated conditions is performed effectively and preferentially involves an interdisciplinary work, from diagnosis to implementation of interventions.

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DCD X | Ouro Preto MG - Brazil

June 30, 2013
Poster Session 2
30PS28

Motor tests used in children in Brazil: bibliographic

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Introduction: Movement Assessment Battery Assessment/Movement ABC (Henderson, Sugden, and Barnett, 2007) is a frequently used tool for assessing motor competence in children. This tool has been validated in many countries all over the world and has proven to be an efficient and important instrument for classifying children as Developmental Coordination Disorder. Movement ABC assesses manual dexterity, dynamic and static balance as ball skillsin three separated age sections and using very functional motor task which are considered very familiar to all children between 3 and 16 years old. This work investigated if the standardization for the original sample is applicable for a sample of children from Rio Grande do Norte. Methods: Twenty five children, from seven to nine years old, were assessed by a Physical Education Teacher, trained by an experienced assessor, using the Movement ABC (second edition). They all were enrolled and attending elementary schools, public and private network, were included only those whose parents signed a consent form allowing the evaluation with the MABC test. Results: The mean age in months was 97.8, standard deviation 8.4. The sample was comprised of 12 boys age equivalent to 99.6 months (standard deviation 8.6) and 13 girls aged equivalent of 95.6 months (standard deviation 8.1). No significant difference was found between boys' and girls' scores. The average total score for the 25 children was 7.9 with a standard deviation of 1.6. This score is at a point that is less than 1 standard deviation below the 50th percentile (the midpoint of the distribution of scores of the standardization sample for this age band) whose score is 10 and standard deviation of 3. Partial scores showed also to be very similar with the distribution of the standardization sample. Partial scores for Locomotion (N = 24), minimum scores 4.0 and maximum score 12.3, 10th percentile 4.8, average locomotion score 8.1 with a standard deviation of 2.2; Object Control (N = 25), minimum score 4.0 and maximum 12.5, 10th percentile 4.5, the average score in Control Objects 7.1 with a standard deviation of 2.4; Manual Dexterity (N = 25) minimum score 4.7 and maximum 11.3, 10th percentile 5.5, mean score of Manual Dexterity 8.2 with a standard deviation of 1.9.Based on the total and partial scores distribution for this sample compared to the standardization sample. We may confirm that, as a result of a preliminary standardization study, MABC can be used for assessing the motor performance in samples of children similar to the one used in this study.

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DCD X | Ouro Preto MG · Brazil

June 30, 2013
Poster Session 2
30PS29

Preschool children born prematurely already show worse motor, cognitive and functional skills than peers born fullterm

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Introduction. Motor development is highly influenced by biological risk factors, such as prematurity. The aim of this study was to compare the motor and cognitive development and the functional skills in four years old children born preterm and fullterm and evaluate the effect of the cognitive function, measure by the Columbia, on the motor performance, as measured by the MABC-2.Methods: This was a cross-sectional study in which 124 four years old children were distributed in two groups, according to gestational (below 34 and above 37weeks) and birthweight (below 1500 g and above 2500g), with groups paired by sex, age and socioeconomic status. All the children were assessed by the Movement Assessment Battery for Children – Second Edition (MABC-2), the Pediatric Evaluation of Disability Inventory (PEDI) and the Columbia Mental Maturity Scale (CMMS).Results: The preterm children presented worse performance in all tests and 29.1% of the preterm children and 6.5% of the full term children presented scores on the MABC-2 indicative of motor coordination disorder. In the Columbia, both groups scored within average, with no significant difference between the preterm (99.0 ±13.75) and fullterm (103.0 ±12.25) groups. On the PEDI, preterm children had more limited repertoire of functional skills and required more caregiver than the fullterm children.Conclusion: The results reinforce evidence that children born preterm are more likely to present delays in motor development which impact on daily activities and parents' burden.

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June 30, 2013
Poster Session 2
30PS30

Does socioeconomic Status Influences Motor, Cognitive and functional Skills in Preterm Children at Preschool Age?

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Introduction: Preterm birth is a major risk factor for motor coordination problems. When prematurity is associated with poverty, the developmental outcomes might be even more limited. The objective of this study was to compare the motor and cognitive development as well as the functional performance of children born preterm and full term from different socioeconomic levels, at the age of four.Methods: Cross-sectional study that included 124 four years old children, distributed in four different groups, according to gestational age, birthweight and socio-economic status. All children were evaluated with the Movement Assessment Battery for Children – Second Edition (MABC-2), the Pediatric Evaluation of Disability Inventory (PEDI) and the Columbia Mental Maturity Scale (CMMS).Results: Concerning motor development, 35.5% of the preterm children from low socioeconomic level (RNPT LS), 22.6% of the preterm from high socioeconomic level (RNPT HS) and 6.5% of the full term children, from either high (RNT HS) and low socioeconomic level (RNT LS) presented scores in MABC-2 indicative of developmental coordination disorder (DCD). In the Columbia, RNPT HS had better performance than RNPT LS and RNT HS had better performance than RNPT HS, between RNPT LS and RNT LS there was no significant difference. In the PEDI, RNPT HS presented more limited repertoire of functional skills and required more assistance from the caregiver than the RNT HS; the RNPT LS showed more limited functional skills than the RNT LS, however, there was no significant difference in caregiver assistance; RNPT HS presented more limited functional skills´ repertoire than RNPT LS, with no difference in caregiver assistance.Conclusion: The results reinforce evidence that children born prematurely are more likely to present with developmental delays than their fullterm peers and adds new information indicating that socioeconomic level interferes with these children's development.

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Revision and extension of the European Guidelines on DCD for the UK context

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Introduction. Guidelines for those working with individuals with Developmental Coordination Disorder (DCD) have recently been published by the European Academy of Childhood Disability (EACD). These include recommendations on definition, diagnosis, assessment and intervention, based on an international consensus of experts and evidence drawn from a thorough review of the research literature. This publication should be welcomed by all those working in the field of DCD, as it provides a thorough and evidence-based document to guide our work. However, it is recognised that these guidelines were initiated by medical practioners in Germany and as such reflect that context in which there is a greater emphasis on the medical model compared to the UK. Furthermore, these guidelines are aimed at those working in German-speaking countries. This poster summarises the process of revising the guidelines to better reflect the health, educational and social context of the UK. Since many professionals in the UK are also working with students in further and higher education with DCD, an extension of the guidelines was also proposed for young adults. Method. The process of revising and extending the EACD guidelines was initiated by Movement Matters, an umbrella organisation bringing together groups concerned with DCD in the UK. Representatives from a range of professional bodies were invited to attend a one-day workshop to discuss the relevance of the EACD guidelines to the UK context. A range of professions was represented including primary and secondary school teachers, learning support specialists, educational psychologists, occupational and physio-therapists, paediatricians and medics in general practice. Parents of individuals with DCD and researchers were also represented. The workshop was followed up by circulating a revised document for comment. At a second one-day workshop, information leaflets aimed at parents and different professional groups were drafted. These were later circulated for comment to those who had attended the workshops. Revised drafts were circulated more widely for feedback. Results. This consensus process culminated in the agreement of minor revisions to the EACD guidelines for a UK audience and an extension with recommendations for those working with adults with DCD. A series of information leaflets to disseminate this information was also produced. A website for Movement Matters was established to allow wide dissemination of these materials. Conclusions. The new website and leaflets will be displayed at the conference. The website has a growing number of 'hits' and is proving useful to a range of professionals and parents of children with DCD.

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DCD X | Ouro Preto MG - Brazil

June 30, 2013
Poster Session 2
30PS32

Here's how I write: a child's self-assessment of handwriting and goal setting tool

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Introduction: Proficient handwriting is an essential component of literacy and an important foundation needed to support a child's participation in the general education curriculum. Handwriting is a daily occupation of children who spend 30-60 % of the school day engaged in fine motor tasks, the majority of which involve handwriting. A key component in the handwriting assessment and intervention process that is often neglected is the inclusion of the child in the planning process. This presentation describes the purpose, use, and psychometric properties of a new assessment, Here's How I Write (HHIW): A Child's Self-Assessment and Goal Setting Tool. A tool of this nature is important because a child's involvement in the identification of their needs and selection of goals is likely to increase their motivation to learn, and promote academic achievement. PURPOSE AND OBJECTIVES This study examines the discriminate validity of Here's How I Write tool. It examines what children with and without handwriting problems think about specific aspects of their own handwriting in comparison to what their teachers think. Responses of children with good handwriting are compared to children with handwriting problems to determine if the test is able to discriminate between the two groups. A case is presented to illustrate use of the assessment and goal setting process. METHOD The participants were 40 second through fifth grade students, 20 with good handwriting and 20 with poor handwriting and their teachers recruited from an urban public school. The children completed the Here's How I Write tool, a 24 item scored card game administered by an occupational therapist; Each item presented a different feature of handwriting (e.g. I stay on the lines; I have good spaces between my letters). Each child's teacher completed a matching 24-item questionnaire. The study compared differences between the children with and without handwriting problems and examined agreement between the child and teacher. Item analysis was conducted. A case study examined application of the assessment and goal setting process. RESULTS Statistically significant differences were found between children with good and poor handwriting, with children with poor handwriting self-identifying poorer performance. Children with good handwriting had a high level of agreement with their teachers regarding aspects of their handwriting performance; children with poor handwriting rated themselves consistently higher than their teachers. CONCLUSION The results of this study support the ability of the HHIW handwriting assessment to discriminate between children with and without good handwriting. This assessment can provide a platform for discussions with children with handwriting problems so that they may take a more active role in partnering with professionals to identify, set and monitor their own goals. A case study is presented to illustrate the use of the tool.

DCD X | Ouro Preto MG - Brazil

July 1, 2013
Poster Session 3
01PS01

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Kinematic and kinetic assessment of graphomotor disorders using a new high-tech pen

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Graphomotor skills describe the necessary movement coordination, the management and control of fingers and hands in combination with cognitive and sensory information processing and other executive functions when using a pen. About 5% of all children may be affected by graphomotor problems. Since the writing process requires very complex skills and functions, it can also be used as an indicator of the general level of development of a child. The Child Center Maulbronn and Iuvaris, a spin-off of the Karlsruhe Institute of Technology, are currently developing new approach for evaluating the graphomotor skill of children. This new approach enables faster and more objective diagnostics by using a standardized test and a mesurement system. Therefore, a sensor pen called iu.pen has been developed to support the diagnosis and therapy of graphomotor disorders. The iu.pen consists of a writing instrument with sensors and software for analysis and documentation of the child's graphomotor skills. The system allows recording of forces acting on the three handles, the writing lead and the acceleration forces of the pen in three spatial directions. The results are then compared to a database with standard values. Currently, the sensor pen is being used in a medical study. The goal of this study is the identification of appropriate parameters to evaluate the graphomotor skills of children of different ages and the derivation of related reference ranges. Besides being diagnostic, the system can give direct feedback to the user during therapy –for example, by vibrating at excessive forces of the pen. In combination with appropriate software it is intended to promote the use of a pen and the motor skills in a fun way. Within the scope of this presentation, we will give insight into the developmental process of our new approach and will provide actual results from the study.

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July 1, 2013
Poster Session 3
01PS02

Normative data for the German version of the DCDQ

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Purpose: The purpose of the study was to standardize the German version of Brenda Wilson´s DCD questionnaire (DCDQ-G). Method: The population-based sample consisted of 700 children, aged 4 to 14 from the areas of Germany, Switzerland and Austria. Children with current occupational or physiotherapy, further children with mental handicaps were excluded. Results: Structured analyses indicate that age effects explain about 9% of the variance of the total DCDQ-G score up to the age of 9-11, about 1.5% of variance between the age of 10-0 and 14-11. Up to the age of 10, a further 2% of the variance is explained by gender differences. In accordance with the English original version, the cut off for the youngest boys and girls (5th percentile as critical value for probably DCD) was found at a raw score of 46. The English cut-off value for older children however would have been in the German sample between the 10th and 20th percentile meant that too much children would have wrongly been identified as "probable DCD". Further, the factorial structure could only partly be confirmed for the German DCDQ. Scree plot and Guttman-Kaiser criterion clearly recommend a four factorial solution, dividing the first factor into two separate factors: “ball playing (item 1-3)” and “sport activities (items 4-6)”. On this factor some of the items (11,12,13) of the former third factor “general coordination” also loaded. The former second factor “fine motor and manual writing (items 7-10)”, seems to be in accordance with the English original. The lack of tonus is a separate fourth factor (items 14,15); this factor highly correlates with ADHD scores of another questionnaire. Conclusion: Community based norms increase the knowledge of an instrument and are an complementary approach to clinical based cut-off scores. Similar to the English version the DCDQ-G has clear age ond only slight gender effects. But the factorial structure seem to be only partly transferable, showing cross-cultural differences.

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July 1, 2013
Poster Session 3
01PS03

Convergent validity of the Bruininks-Oseretsky Test of Motor Proficiency 2 (German Version)

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Purpose The German-Swiss guideline for children with DCD, published in 2011, recommend the Bruininks-Oseretzky Test of Motor Proficiency 2 (BOT-2) or the Movement Assessment Battery for Children 2 (M-ABC-2) as assessment instruments. Whereas the M-ABC-2 has already been translated into German and is in wide use, a translation, re-standardisation und subsequently also a re-evaluation of the BOT-2 as assessment instrument for German-speaking children became necessary. The present study presents the results of the convergent validity of the BOT-2 with the M-ABC-2 for typically developing children. Method: From a population-based sample, 22 typically developing children between four and six years (age group 1) were recruited for examination of the convergent validity of the BOT-2 and the M-ABC-2. The correlations between different subtests and the total score across both test batteries will be presented. Results: Three subtests of BOT-2 and M-ABC-2 are comparable. The subtest balance achieves a correlation of 0,57, the subtest manual dexterity a correlation of 0,49, but the comparable BOT-2-test upper limb coordination which is comparable to M-ABC-2-test ball skills correlates only with 0.26. Considering the 15th percentile as critical only 3 person in two subtests achieved low score, with an unacceptable low Kappa of 0,07. Conclusion: As previously confirmed for Anglosaxon countries, the BOT-2 and M-ABC-2 (German) also seem to measure fairly different constructs. Further studies in a sample with adequate DCD cases are needed to see to what extent the clinical problems of children with DCD are reflected in both tests.

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July 1, 2013
Poster Session 3
01PS04

Reliability of the In-Hand Manipulation Test (TIHM) and the relationship between in-hand manipulation and handwriting

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Introduction: The European Academy of Childhood Disability recognizes a subtype among Children with Developmental Coordination Disorder (DCD) who present fine motor skill dysfunction and non-proficient handwriting (NPHW). The TIHM is a test to assess rotation and translation of pegs within the hand. This test is often used to evaluate fine motor skills but there is a lack of studies which analyze the reliability of the TIMH with an added item of shift. The aim of this study is to test interrater reliability and the test-rest reliability of the TIHM, to investigate age and gender differences and to analyze the relationship between the TIMH and the results of a handwriting test. Methods: The TIMH and the Concise Assessment of handwriting (BHK) were administered to 83 children aged between 6.4 and 8.8 years (mean age = 7.5 ; SD = 0.6), 52% of whom were boys. The time taken to complete the test was considered, not the quality of performance for each item. For 23 children, the TIHM was administered twice, at two-day intervals, and both sessions were both recorded on video. For 75 children, two judges rated the TIMH on the basis of the video recording. To test the reliability of the TIMH, Pearson or Spearman correlations were used depending on the linear relation: t-tests were used for paired data. In order to compare age group and gender differences concerning the speed in executing the tasks, non-parametric tests were used (Kruskal-Wallis one-way analysis of variance and Mann-Whitney U, respectively). To test the relation between the time scores of the TIMH and BHK, Pearson or Spearman correlation was used, depending on the linear relation. Results: Although significant interrater correlation for all the items was found (r = .90 to .97 ; p<.05), weak test-retest correlation was revealed (r =.40 to .65, p>.05) except for rotation (r=0.90; p>.05). A learning effect for rotation [t(19)=2.52 ; p=<.05] and shift was observed, with the speed being significantly faster at the second session[t(16)=3.06 ; p=<.05]. No significant effects of gender or age were identified. There is a relationship between the speed of the TIMH and thus of BHK, for the rotation (r=-.254, p<.05), the translation of 3 pegs (r=-.273, p<.05), of 4 pegs (r=-0.279, p<.05), and of 5 pegs (r=-.339, p<.05). Conclusion: The TIMH shows good interrater reliability. The test-retest reliability was weak which means that the results are not stable over time. Although a relationship between the time score of the TIMH and the speed of the BHK has been found, the value of the coefficient was moderate. Further investigations are needed to confirm these results and to examine the construct validity.

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July 1, 2013
Poster Session 3
01PS05

Using Factor Analysis to determine underlying factors in Developmental Coordination Disorder

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In typically developing (TD) children, scores from two commonly used motor assessments, the Test of Gross Motor Development-2nd edition (TGMD-2) and the Movement Assessment Battery for Children (MABC), are only low to moderately correlated to each other (Logan, Robinson, & Getchell, 2012; Logan et al., in press). Conversely, there is a high level of agreement between each of these assessments to identify children as likely to be diagnosed with Developmental Coordination Disorder (DCD). The purpose of this study is to investigate these associations further using factor analysis to identify underlying factors of the skills measured by these motor assessments that represent one or more common elements within DCD. This study compared performances on the TGMD-2 and MABC (N = 424; age range: 4-11 yrs). All children were tested on non-consecutive days in a balanced order in Rio Grande do Sul, Brazil. After testing, groups were formed based on MABC score (DCD: < 5th %, n = 58; At-Risk: > 5th to < 15th %, n = 133; TD >16th %, n = 233). From the TGMD-2, individual raw scores for each skill within the object control and locomotor subscales were used. For the MABC, raw scores for three manual dexterity, two ball skills, and one static and two dynamic balance tasks were used for analysis. Prior to data analysis, data were examined using an anti-image correlation matrix to assess variables for inclusion, then screened using KMO and Bartlett's tests and were determined to be acceptable for factor analysis. Factors for each group were then extracted using principal components, limited to three. Only coefficients loading > .4 were used. For both the TD and at-risk groups, the three underlying factors that emerged were the total TGMD-2 and two different factors related to the MABC. However, for the DCD group, the primary factor that emerged was a "sport skill" factor that included all of the TGMD-2 skills in addition to the two ball skill tasks and dynamic balance test items of the MABC; these factors accounted for a total of 24.9% of the variance. The second and third factors were a general skills and a manipulative skills factor, respectively. All three factors accounted for a total of 42.3% of the variance. These findings suggest that a characteristic of DCD is a specific deficiency in sport-related skills such as object control and locomotor skills. It appears that there is an additional underlying factor of children with DCD that explains more of the variance in the data that was not identified by performance on either the TGMD-2 or the MABC. Future studies should include additional assessments that include a variety of skills to further identify the underlying structure of DCD

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July 1, 2013
Poster Session 3
01PS06

Screening tools for children with Developmental Coordination Disorder

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Introduction: The purpose of this study is to develop an observational screening tool of motor learning problems for teachers to support their educational work to enhance all children's motor learning. However, basic information about available and suitable methods for this purpose is lacking. Therefore, as the first step of the developmental process, a systematic review of motor observation questionnaires will be done. This study is a part of developmental and research project (2012–2014) for children and adolescent with mild motor limitations and is executed in collaboration with the Finnish CP Association, Niilo Mäki Institute, LIKES Research Center and University of Jyväskylä. The main financier of the project is the Finland´s Slot Machine Association (RAY). Methods: Studies will be reviewed in terms of: (a) method/measure, (b) filled in by, (c) aim (d) age, (e) scope, population and (f) sensitivity/specificity. A systematic literature search is going to be conducted using eight electronic databases: Eric, Medline, Psych Info, Spolit, SportDiscus, Academic Search Elite and CINAHL. Databases' controlled vocabulary is used whenever possible. These keywords will be: clumsy, clumsiness, clumsy children, developmental coordination disorder (DCD), dyspraxia, minimal brain dysfunction, minor neurological dysfunction, motor delay, incoordination, motor-impairment, motor skills disorder, movement disorders, motor problems, motor difficulties, motor learning difficulties, psychomotor performance. First, the keywords related to DCD will detected. In order to specify the search, keywords related to screening tools (screening, questionnaire, checklist) will be added. A study's title and abstract must contain at least one term from each group to be considered for inclusion in the review. The accepted articles for the systematic review have been published in peer-reviewed journals from January 1994 to December 2012 in English or German. Results and Conclusions: This method provides a reliable and useful method for development of a teacher questionnaire suitable for the Finnish school context. Therefore, based on the results of the systematic review, one screening instrument will be chosen. In the culture and language adaptation into Finnish, the Beaton, Bombardier and Guillemin (2000) guidelines for the Process of Cross-Cultural Adaptation of Self-Report Measures will be followed. The goal is to develop a web-based assessment form with instant feedback of those motor competence areas needing special support.

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DCD X | Ouro Preto MG · Brazil

July 1, 2013
Poster Session 3
01PS07

Performance of 7 years old children with and without Development of Coordination Disorder in the handwriting items of the Assessment of Motor Coordination And Dexterity (AMCD)

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Introduction: Handwriting is considered to be an extremely complex skill that involves perceptual, cognitive, motor, and sensorimotor factors. Poor handwriting patterns are often observed in school contexts, have significant impact on academic performance, self-esteem development and child's self-concept and may be associated with motor difficulties such as DCD. OBJECTIVES: To verify whether there are differences in the performance of handwriting tasks (Alphabet and Sentence Copying) of the Assessment of Motor Coordination and Dexterity (AMCD) in seven year old children with and without DCD. METHODS: Handwriting samples of seven year old children from public and private schools in the metropolitan area of Belo Horizonte were analyzed. Of the 88 samples obtained, 15 children had DCD and 73 were typically-developing. Eighteen samples were not analyzed because children could not do cursive writing. Performance was scored using both quantitative criteria (i.e., speed, number of errors) and a qualitative score on a scale of 1 to 4, where 1 = poor performance an 4 = consistent performance. For statistical analysis of quantitative variables, the Mann-Whitney nonparametric test was used and for qualitative variables the Pearson Chi-Square was used with a significance level set at $p < 0.05$. RESULTS: In both Alphabet and Sentence Copying, children with DCD had significantly lower performance on the same items (Number of letter copied correctly and legible; Starting letters at the appropriate place; letters correctly positioned on the line; Letters well formed, without distortions and Letters of uniform size). In the Number of correct letters, differences were observed only for Alphabet Copy; the time difference on the copying task was significant only for Sentence Copy. CONCLUSION: The results support the potential for AMCD handwriting items to detect handwriting difficulties in seven year old children. Further studies involving children of different ages and from other regions of the country should be conducted to continue the validation process of the instrument. It is expected that this test will contribute to valid and reliable detection of handwriting problems, and DCD, in Brazilian children.

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July 1, 2013
Poster Session 3
01PS08

Relationship between performance motor, cognition, and family school environment in children with history of neuropsychomotor developmental delay

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Introduction: Neuropsychomotor developmental delay is a term often used in rehabilitation to identify young children with delays in one or more areas of development. It is a condition in which there is failure to acquire the typical cognitive, language, motor and social development, and any of these areas may have greater or lesser commitment. One problem, however, is that as the children grow up many of them remain with the diagnosis of neuropsychomotor developmental delay, which is not a real diagnosis and does not inform the true condition of the child. Objective: To examine the correlation between motor coordination, quality of resources in the home environment, school participation and cognition in seven and eight years old children diagnosed with neuropsychomotor developmental delay in the first two years of life. Method: The sample comprised 45 children (57.8% boys), mean age 95.84 months (± 7.72), attending regular school and without obvious physical, sensory and mental disabilities. Children were recruited on the basis of chart review from the Associação de Assistência à Criança Deficiente (AACD) in the city of Uberlândia - MG, Brazil. All children had a history of neuropsychomotor developmental delay and presented a variety of neonatal conditions, such as prematurity (55.56%), jaundice (37.8%), oxygen supplementation at birth (31.1%), seizures (28.9%) and hypoxic ischemic (26,7%). The following assessment tools were used: the Movement Assessment Battery for Children (M-ABC II), the Weschsler Intelligence Scale for Children (WISC-III), the School Function Assessment (SFA) and the Recursos do Ambiente Familiar (RAF). Since the Shapiro-Wilk´s test did not confirm normal distribution, nonparametric test (Spearman correlation) was used to investigate the relationship between variables. Results: The M-ABC II had moderate correlation with the WISC-III (r: 0.58, p <0.01), both verbal (r: 0.52, p <0.01) and performance (r: 0.61, p <0.01) scales, and a weaker correlation with the SFA (r: 0.42, p <0.01). The WISC-III showed weak correlation with the SFA cognitive-behavioral tasks in both the Intellectual Quotient (IQ) (r: 0.46, p <0.01) and the performance scale (r: 0.49, p <0.01). The RAF showed no significant correlation with any of the variables. Conclusion: The results indicate that motor performance is related to intellectual ability and school participation. Environmental factors did not seem to be related to cognitive and motor performance, suggesting that biological factors associated with the early diagnosis of neuropsychomotor developmental delay may have a greater relationship with the motor and cognitive development of these children.

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July 1, 2013
Poster Session 3
01PS09

Influence of Full-time School Education in the Neuropsychomotor Development in Children

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Introduction: Human development is influenced by environmental, biological and psychosocial factors. Due to these interactions, each person has a proper time to develop and acquire motor skills. When these individual variations evolve below normal parameters, they are described as a disorder. Although these deviations are associated with neurological disorders, there are cases of motor difficulties that are presented separately, which characterize the Developmental Coordination Disorder (DCD). Objectives: Investigate the prevalence of DCD among Brazilian children between 7 and 10 years of age, enrolled in a public school, participating in a full-time school program (8 hours of school activities per day) and children who attend a regular school (4 hours and 30 minutes per day); Evaluate the influence of different performance components related to motor development observed in DCD. Methods: A sample of 50 children, divided in two groups, according to the type of education received (full-time or regular) was established. The neuropsychomotor development was assessed using the Movement ABC-2 (MABC-2) Test, according to UK norms for 4-16 year olds. The Brazilian Economic Classification Criterion was used to assess the socioeconomic characteristics of the population. The prevalence of DCD was calculated according to the test results. The relationship between form of education and motor development was analyzed using the Mann-Whitney test; the correlation between performance components was analyzed with the Spearman Rank Order Correlation coefficient (rho). The study was approved by University of Brasilia's Ethics Committee on Human Research. Results: The prevalence of DCD among participating children was 8%. Although male children have shown a higher prevalence of DCD (p = 0.041), no significant relationship between educational program and motor performance among children was observed. The results indicate a strong correlation between disturbances in manual dexterity components of the MABC-2 and the presence of DCD. Conclusion: Our findings are consistent with studies previously conducted that show the absence of a significant relationship between type of education received and motor development in children. However, the results of this research suggest the need to review full-time education programs that have been developed in public schools, as their actions have not contributed to an adequate stimulation of children that attend this type of institution.

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July 1, 2013
Poster Session 3
01PS10

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Motor performance and academic achievement

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Nowadays the problems related to learning disabilities in children have increased significantly in the school environment. In a perspective of understanding child development as a process that links different fields of development, it is important to conduct studies that seek to relate cognitive, motor and social aspects of human being. DCD is related to several complications for the child and the main consequences involve all aspects of human development, like inefficiency in the maintenance of self-care and in education, dysgraphia prevalence, etc. In this way this study aims to assess the level of motor performance and academic achievement of children in a public school. Participating in this study were 51 children with a mean age of 10.9 years old(+ -1.1). They are students at a state school in the city of Porto Alegre. We used the Movement Assessment Battery for Children - 2nd edition (MABC-2). School performance was measured from the grades of the first and second quarter of the year. These results had being assessed according to the criteria of the child's teacher. From the data collected, was observed that, in the Manual Dexterity, 21.4% of the sample was in the area at risk for developing some difficulty with movement. For Balance, 30.9% and Launch / Receive 33.3% of the children was in the area at risk for developing some difficulty with movement. The tool also presents us a total score of the Test, composed of the scores of the three areas mentioned. Overall, 25.8% of children are located in the risk zone for developing any difficulty in movement. It was possible to see that the main area affected was the Launch / Receive. In academic achievement, the results showed that grade point average in the two quarters was 7.21 on a scale of 0-10. Relating the 3 categories of MABC-2 test with academic achievement showed no correlation, however, for some students, it was evident that the poor performance in the skills of manual dexterity directly related to underperforming achievement school. It is worrying to find the low score of the degree of motor competence in children and found that the methodological aspects of the evaluation by the teachers should be better investigated to better analyze the correlation of these investigated variables.

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DCD X | Ouro Preto MG · Brazil

July 1, 2013
Poster Session 3
01PS11

Motor ability in gym classes and participation in leisure activities among children with DCD - unique characteristics and relationships

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Introduction: DCD negatively affects child's performance and participation in school and in leisure activities. This may lead to social isolation and low self esteem. The ICF model emphasizes that participation is essential for a child's optimal development. However, the literature about participation patterns of children with DCD in school and in leisure activities, as well as the relationship between them, is limited. This study aimed to profile the child's motor participation in gym classes and in leisure activities and to examine whether relationships exist between both profiles. Methods: This correlative study included 35 children with DCD, 6 – 9.83 years of age. DCD was diagnosed by a pediatrician and was based on the Movement ABC (M-ABC) percentile. The participants' gym teachers were asked to complete the Teacher Estimation of Activity Form (TEAF). Participation in leisure activities was evaluated by the Preference for Activities of Children (PAC), which was completed by all participants. Results: Based on gym teachers reports, the participants showed lower physical ability (in terms of strength and endurance), as well as lower physical involvement, enjoyment and confidence when participating in gym class and physical activities during school recess. Participants reported lower preference to participate in recreational; physical, social and skill based activities. Pearson correlation revealed that the children's motor ability in school not only correlated with lower M-ABC scores, but also with lower preference to participate in leisure activities, such as: recreational (r=-.43**); active physical (r=-.51**) and self improvement activities (r=-.34*). Conclusion: The results highlight the importance of evaluating motor ability and participation of children with DCD in various school and home/social environments. Since participation is essential for a child's optimal development, the child's evaluation should include standardized tools which capture information from varied surroundings/daily schedule. This may enhance the child's social involvement and elevate the child's self esteem.

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DCD X | Ouro Preto MG - Brazil

July 1, 2013
Poster Session 3
01PS12

The progression over time of profiles of children with Developmental Coordination Disorder

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Developmental coordination disorder (DCD) affects 5% of schoolchildren of both sexes, can disrupt their academic progress, participation in leisure and physical activities and wellbeing. Longitudinal studies suggest DCD extends into adulthood usually with poor outcomes depending on context, yet the course of development and prognosis are difficult to predict and not fully understood. Children with DCD more often than not have associated difficulties in such attributes as attention, language, social interaction and specific learning difficulties. Yet few studies have examined the nature of their interaction and effect on overall outcomes. This study reports of the first stage of an investigation examining profiles of children with DCD for motor and associated characteristics over a two-year period analysing stability and change. It uses a mixed methodology to compare typically developing children with children with DCD in groups from7 to 16 years of age, using standardised motor assessments, child self report, interviews and parent questionnaires. Groups of participants include, those with DCD as a 'pure' condition; those with DCD plus associated characteristics; and those who are typically developing. Group statistics are employed as a first level of analysis followed by sub group analysis followed by case study examples.

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July 1, 2013
Poster Session 3
01PS13

Does vision therapy have a positive influence on children diagnosed DAMP?

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Introduction: The literature reports a 50% co-morbidity between developmental coordination disorder (DCD) and attention deficit hyperactivity disorder (ADHD). Children who display characteristics of both of these conditions are diagnosed with DAMP (deficiencies in attention span, motor control and perception). DAMP represents between 1.5% and 7% of this population. Children with DAMP usually experience problems with gross motor and perceptual skills, manipulation skills, fine motor activities, academic skills and ocular motor control deficiencies. From the literature, it appears that ocular motor control problems, motor skills, attention span and academic skills can be treated with vision therapy. The aim of this study was to determine whether vision therapy will have a positive influence on the DCD and ADHD status of children diagnosed with DAMP. Method: Children (N=32) with a mean age of 7.98 years were part of the study. The MABC was used to classify children into DCD categories (<15th percentile) and The Taylor Hyperactivity Screening list and Modified Conner's Abbreviated Teacher were use to classify children with/without ADHD. A pre-test-post-test two-group cross-over design was followed with a retention test two years after completion of the intervention. The 18-week vision therapy program was executed once a week for 30 – 45 minutes to a group of children classified as DAMP (ADHD & DCD, n=14) and a DCD group (n=18). Results: Children with DAMP and DCD showed a significant improvement in their MABC total and the sub-sections (p=0.050), after vision therapy was received; which was also still evident two years later during the re-test. Although the ADHD total of children with DAMP and DCD did improve after vision therapy was received, only children with DAMP showed a significant improvement (p=0.000). Conclusion: The results, consequently, indicate that both ADHD and DCD were addressed by vision therapy and that it can, therefore, be viewed as an effective intervention method with which to treat children diagnosed with DAMP or DCD. Children with DAMP who suffer from DCD and ADHD deviations can particularly benefit because both problems with vision therapy are addressed.

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July 1, 2013
Poster Session 3
01PS14

PadovanTM method: does it help children with developmental coordination disorder?

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Introduction: Developmental coordination disorder (DCD) is a neurodevelopmental condition which affects around 6 % of children. Several interventions for DCD exist but literature on the effects of some of them remains controversial and limited. One intervention clinically used by Occupational Therapists (OT) in many countries is the PadovanTM method. It aims to improve the organization of the central nervous system through repetitions of typical developmental movements. Presently, no published scientific study has examined the types of effects of this intervention for children with DCD. Aims: This study explored the types of effects of the PadovanTM method in children with DCD. Method: A multiple case study design was used. To be included, children needed to be diagnosed or in the process of having the diagnosis of DCD, be aged between 5 and 13 years old and have been treated with the PadovanTM method for at least three months. OTs participating in the study needed to have completed at least three modules of the PadovanTM training. For each case, data was collected through semi-structured interviews with a parent and analysis of the OT's clinical records. Results: Recruitment is currently ongoing (n = 4). Based on the analysis of three cases, improvements were noted by parents and the OT on fine and gross motor skills, visuo-motor integration and task organization. Regarding occupational performance, improvements were reported in self-care, school functioning and leisure. Conclusion: These preliminary results show that PadovanTM method may enhance occupational performance of children with DCD.

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July 1, 2013
Poster Session 3
01PS15

The effect of vision therapy on the behaviours associated with children diagnosed with DAMP and DCD

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Introduction: The literature reports a 50% co-morbidity between developmental coordination disorder (DCD) and attention deficit hyperactivity disorder (ADHD). Children who display characteristics of both of these conditions are diagnosed with DAMP (deficiencies in attention span, motor control and perception). It appears from the literature that an overlapping between certain behaviour-related problems such as social problems, emotional problems and distractibility, impulsiveness, and hyperactivity appear to occur in children, diagnosed with both DCD and ADHD according to the DSM-IV criteria, whom then get a DAMP diagnosis. Children diagnosed with DAMP, display deviations with regard to visual-motor integration, visual perception, and ocular motor control. Researchers report that inadequate ocular motor control can be manifested in gross motor delays, which indirectly contribute to poor concentration and attention span, anxiety, dejection, low motivation levels, and a low self-image. From the above-mentioned literature findings, it appears that there may be possible associations between visual problems, DAMP, DCD, and various obstructive behaviours that could handicap the school beginner's school work and sport skills if these are not addressed. It furthermore appears that ocular motor control problems, attention span and academic skills can be treated with vision therapy. The aim of this study was to determine whether vision therapy will have a positive influence on the behaviours associated with children diagnosed with DAMP and DCD. Methods: Children (N=32) with a mean age of 7.98 years (sd±0.30) were part of the study. The MABC was used to classify children into DCD categories (<15th percentile) while the Taylor Hyperactivity Screening list and Modified Conner's Abbreviated Teacher were use to classify children with/without ADHD. The MABC Checklist section 5 was used to evaluate the subjects' behaviours. A pre-test-post-test two-group cross-over design was followed with a retention test two years after completion of the intervention. An 18-week vision therapy program was executed once a week for 30 – 45 minutes to a group of children classified as DAMP (n=14) and DCD (n=18). Results: Children with DAMP and DCD showed a significant (p=0.05) improvement in their behaviours associated with DCD and DAMP after vision therapy was received; which was also still evident two years later during the re-test. Conclusion: Vision therapy is recommended for school-age children with DAMP and DCD who experience behaviour problems associated with these conditions.

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July 1, 2013
Poster Session 3
01PS16

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Partnering for change: transforming health services for children with developmental coordination disorder in school settings

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Introduction: Developmental Coordination Disorder (DCD) is a common, chronic health condition that often goes unrecognized, yet research evidence indicates that children with DCD are at high risk for secondary physical health (obesity) and mental health issues (depression, anxiety). Early identification and intervention is required to enhance children's participation; however, even when children's motor challenges are recognized and children are referred for occupational therapy (OT) in Ontario, families are often turned down or face wait-times of 18-24 months. Methods: Stakeholders from government, health services, schools and families were engaged in a participatory action research project designed to inform system level change. An innovative school-based occupational therapy (OT) service delivery model "Partnering for Change" (P4C) was developed that focuses on the school as the target of intervention, rather than the individual child, and includes key components of knowledge translation, relationship building, collaboration and coaching, rather than 1:1 remediation. P4C promotes early identification, chronic disease self-management and prevention of secondary consequences and provides a service that is accessible to all children. Following the Medical Research Council Framework for developing a complex intervention, we synthesized evidence, outlined the "active ingredients", pilot-tested and refined the model and then conducted a larger study. Results: This poster showcases the results of the Demonstration Project conducted with 8 OTs providing service one day a week for a full year in 11 Ontario schools. Over 2600 children were served, 230 at an individualized level. Pre- and post-questionnaires and interviews showed that P4C was highly successful. The P4C model was well accepted by educators, parents and occupational therapists and achieves the aims of facilitating earlier identification of children with DCD, building the capacity of teachers and parents to understand and manage the needs of these children and enhancing their ability to participate successfully at home and at school. Discussion: Future research is planned to evaluate more rigorously the effectiveness of the P4C model.

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July 1, 2013
Poster Session 3
01PS17

What is the impact on dynamic balance skills of a Wii Fit Balance Board intervention in children with balance problems/DCD?

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Background: The aim of this study was to examine the effect of a Wii Fit intervention for children with balance problems (BP) by comparing pre- and posttest Wii Fit-, balance- and motor scores. Additionally, we asked the children whether they enjoyed the intervention. We also looked at differences between children with DCD and Typically Developing children (TD) on a WII Fit task. Methods: Twenty-eight children suspected of DCD/ balance problems were participating in the intervention study. A TD group of 15 children with normal motor development was recruited by matching with 15 children of the experimental group (BP) for gender and age. Motor performance was classified based on the scores of the Movement Assessment Battery for Children- second edition (MABC2). All children were tested with three subcomponents of the Bruininks Oseretsky Test 2 (BOT2); Bilateral Coordination, Balance and Running Speed and Agility. The Wii Fit test protocol has been developed to measure accuracy of movements and seconds used. All children with BP have taken up an intervention on Wii Fit Balancing Games. Results: The BP group had poorer performance on the Wii Fit ski slalom game in contrast to the TD group. After the training the children with BP showed significant improvement on the accuracy of Wii scores ($t(27)=4.2, p<.0001$), while time used for the game did not change significantly ($p=.12$). Motor scores on subscales of balance on both MABC2 ($t(27)=-5.2, p<.0001$) and BOT2 ($t(27)=4.4, p<.0001$) also improved significantly. GLM repeated measure showed that the changes on the MABC after the intervention period of 6 weeks were larger than in the 6 weeks non- treatment period prior to the intervention. BOT2 balance scores showed similar results. Children in the BP group scored the Enjoyment Scale three times and most frequently scored fun and super fun. Interpretation: Children with DCD and balance problems in our study are less proficient than TD in playing exergames in which dynamic balance control is needed. Training with the Wii Fit improved their Wii Fit balance skills, but also has an impact on balance tasks of the MABC2 and BOT2. The improvements were not the result of normal development or test retest effect, since the improvement was significantly larger after training than after a similar no intervention period. Importantly most children enjoyed this Wii Fit intervention throughout the training period.

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July 1, 2013
Poster Session 3
01PS18

Motion education for youth with Autism Spectrum Disorders and coordination challenges

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Introduction Individuals with Developmental Coordination Disorder (ASD) often experience challenges with body coordination, spatial awareness, imitation, and other issues which can contribute to the impairments in fine and gross motor skills, and commonly carry a co-morbid diagnosis of Developmental Coordination Disorder (DCD). In addition, individuals on the Autism spectrum may have difficulty interpreting or regulating sensory information, and are likely to excessively seek out or avoid sensory input. Motion Education (ME), a customized learning program for individuals with special needs such as ASD and DCD, uses gymnastics and martial arts as the vehicles for building developmental, educational, and therapeutic skills such as motor planning, concentration, problem solving, balance, sensory regulation, and coordination. This series of individual case studies examined the effect of participation in ME classes on youth with ASD who also had documented coordination problems. The case studies explored changes in motor and socioemotional skills, including level of enjoyment, motivation, and interaction with therapists and classmates, and physiological effects such as changes in balance, speed, agility, and body coordination. Methods Youth with ASD participated in ME classes 1-3 times per week for approximately 45 minutes each session over the course of six months. Participants were evaluated during their first session with a custom motor and social skills assessment based on developmental milestones provided by the American Academy of Pediatrics. Videorecordings and reassessments were completed periodically, and following six months of participation. Videos, assessment scores, and daily session notes from ME therapists were used to describe each case in an effort to evaluate the efficacy of the ME program. Results Qualitative analysis was conducted on written and videorecorded data, and presented in a case-series format. Analysis included a summary of the level of assistance each subject needed to participate in ME classes, learning effect over the course of the program, and participants' social and motor skill level pre- and post-intervention. Simple correlations were performed to explore the relationships between social and motor skills outcomes and parameters such as enjoyment and demographic profile. After six months, youth with ASD demonstrated enhanced confidence, engagement, and motor ability. Conclusions The benefits of participation in ME classes for youth with ASD and coordination challenges who may not typically have access to organized sports programs and other opportunities for physical activity in the community are reported. Results of this study are valuable for the development of more accessible athletic programming. We describe the ability of youth with ASD to learn gymnastics and martial arts skills, levels of enjoyment/motivation, and physiological effects of participation. For youth with ASD who are typically sedentary, who have comorbid coordination issues, or who have sensory integration/regulation difficulties, the Motion Education model allows participants to have fun without realizing they are learning critical developmental skills. Participants demonstrated improved physical, social, and cognitive skills through individually tailored movement activities using aspects of occupational, speech/language, cognitive, and

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01PS19

An application guidelines manual for parents of children from 5 to 8 years on developmental coordination disorder

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Introduction: Early detection of cases of delayed development and specifically, the poor motor performance, has been considered essential to prevent future disorders. When there is a diagnosis in time to be proposed forms of intervention (eg, stimulation through toys and games appropriate to the age group, suggestions for modifications of the places children frequent, specific techniques such as sensory integration), chances are that children attain their potential and live together among their peers in a natural way.Parents and educators need guidance about signs of developmental delay and to collaborate on ways to minimize the consequences. Furthermore, when children who exhibit any deficit are inserted into a stimulating context, with people prepared to receive them and work with their potential and limitations, the inclusion occurs naturally. Methods: Four parents of children identified with signs of Developmental Coordination Disorder by the instrument Developmental Coordination Disorder Questionnaire (DCDQ) participated in the study. Children attended the 1st and 2nd year of an elementary school. Parents were invited to join a orientation group performed at the school at night. The intervention was done by conducting four meetings in the form of educational workshops. Dynamics were applied to the contents of the manual "Children with Developmental Coordination Disorder: at home and in the Classroom" (translation of Magalhaes, L., UFMG). Results: Four meetings were held in the form of educational workshops, where they worked to identify the characteristics of DCD noticed by parents and to develop strategies for dealing with them. There is an understanding of the disorder and changing perception of the problem; changing attitudes in the face of difficulties of children and recognition of the importance of participation in academic life. Conclusion: DCD can lead the child to experience failure in their daily life and academics. It is important to help families and educators to get them to understand the child's difficulties in contexts of occupational performance and help them cope with such difficulties.

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July 1, 2013
Poster Session 3
01PS20

Motor Stimulation: Effect of a Developmental Activity Program in Elementary School

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A Physical Education program must contemplate moments in which the learners can experience your own body, discover yours individual and group potentiality, think and act creatively, creating new ways of movements. The aim of this study was investigate the motor profile among children that participated of a developmental program during a year. These children had classes twice a week, with 50 minutes each class. In this longitudinal descriptive study participated 85 children with age between 06 to 09 years old, being 41 girls and 44 boys. In the children were made an exam of motor coordination for children (Körperkoordination Test für Kinder – KTK) of Kiphard and Schilling (2000). This test consist of four tests: balance on the beam, lateral jumps, monopedals jumps and transference on platforms. In this last one, the levels of motor coordination are classified in four categories: coordinative insufficiency, perturbation on coordination, normal coordination, good coordination and high coordination. The confiability level expressed for validation of the test was above 70% (KIPHARD; SCHILLIN, 1974). The statistical procedures used were: a) descriptive statistical through absolute values; b) the own statistical contained in the test manual. It was observed that before the start of the program only a child showed good coordination, 24 children with normal coordination, 26 children with perturbation on coordination and four children with coordinative insufficiency and no child with high coordination. After application of development program, the children showed these results: three children with good coordination, 40 children with normal coordination, 30 children with perturbation on coordination and 12 children with coordinative insufficiency. Therefore, according to the results obtained, we can note that the program was sufficient to improve coordination of children classified with good and normal, but there was not improvement in the children classified with perturbation and coordinative insufficiency. We can conclude that maybe two classes a week, a year of intervention or wrong application of program do not be sufficient to reach significant improvement for all levels of coordination. Regardless of these results, it is important provide opportunity for child to experience organized and planned activities based in scientific nature.

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July 1, 2013
Poster Session 3
01PS21

The effect of practice with Nintendo Wii games on Developmental Coordination Disorder

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Introduction: Children with developmental coordination disorder (DCD) have difficulty performing tasks that require basic motor skills, such as catching a ball, handwriting, or manipulating knife and fork. Although the evidence suggests that motor intervention and rehabilitation might improve their motor skills, limited evidence is available on the efficacy of virtual reality for DCD. The use of virtual reality as a way to provide treatment to individuals with motor problems is growing around the world. Aim: To examine the effect of practice based on the games of Wii console for children with DCD.Methods: This study included 34 children recruited from public schools in São Paulo state who were aged from 7 to 10 years. Seventeen children composed the typically developing (TD) group, and other 17 children matched by gender and age composed the probable developmental coordination disorder (pDCD) group. For the purpose of the study, children scoring equal to or below the 16th percentile on the MABC-2 (Henderson, Sugden & Barnett, 2007) comprised the pDCD group. Children scoring equal to or above the 37th percentile on the MABC-2 formed the TD group. The intervention was based on practice sessions of 30 minutes using the Nintendo Wii console and a range of games. Specifically, the practice occurred three times a week during eight weeks. The best score of each of the four games played by children every week were collected and registered by the experimenter. The games were Shooting Range, Pose Mii (Wii Play), Tennis (Wii Sports) and Wakeboard (Wii Resort). Results: The results of statistical analyses (ANOVA 2X8 – Group x Session) for Shooting Range showed significant effect for Group, $F(1,32)= 4.6$, $p<.05$, and for Session, $F(7,224)= 46.4$, $p<.001$. The results for Pose Mii showed significant effect for Group, $F(1,32)= 6.7$, $p<.05$, and for Session, $F(7,224)= 47.7$, $p<.001$. The results for Tennis indicated significant effect for Group, Session, as well as a significant interaction between Group and Session, $F(7,224)= 4.6$, $p<.001$. Lastly, the results for Wakeboard showed a marginal effect for Group, $F(1,32)= 3.6$, $p=.06$, and a significant effect for Session, $F(7,224)= 33.7$, $p<.001$.Conclusion: The findings of the present study indicated that (a) children with pDCD consistently exhibited lower performance compared with TD children throughout practice sessions; and (b) children with pDCD are capable of gradual improvements throughout the sessions, not as much as TD children. Overall, intervention based on practice with games of Wii console had a positive effect on children with pDCD. Potential underlying mechanisms related to sensory motor integration will be further discussed in the study

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01PS22

Levels of Physical Activity of children with Developmental Coordenation Disorder: a study in physical education classes

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Physical education programs must promote the participation of all children despite their levels of motor proficiency and fitness. This study investigated the levels of physical activity of children with Developmental Coordination Disorder (DCD) in Physical Education classes. We assessed physical activity levels of 11 school-age children, (8 to 11 years old) from the south of Brazil (Caxias do Sul, RS) with pedometers in 20 physical education lessons (4 sections per week/ 50 minutes each lesson). All 11 children investigated in the present study scored below the fifth percentile in the Movement Assessment Battery for Children – MABC. The results suggested that (1) children engage in motor activities and practice their skills during 64.5% of the lesson (M= 35.25 min); the remaining time was spent by teachers with instruction, class' organization and children disciplinary issues; (2) lower levels of engagement time were observed for the children with probably DCD (M=9.28 min) corresponding to only 18.57% of the lesson's total time; (3) the number of the steps that children with probable-DCD spend for practice during the 9.28 minutes was around 1,000 steps (M = 1,219; SD = 957.37). Teachers should develop and implement strategies to help children with probable-DCD to engage more often in the motor activities in order to promote the acquisition of new skills and develop motor competence.

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01PS23

Constant practice improves learning ability of children with Developmental Coordination Disorder (DCD)

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It is well known from the literature that children with Developmental Coordination Disorder (DCD) show higher movement variability. However, as the intervention aimed at minimizing the effects on DCD, we do not know whether these children rely on different motor learning mechanisms than their typically developing cohorts. In this study, we examined the effect of practice (variable and constant) in twelve children with DCD (9.3 ± 0.3 years) and twelve age- and gender-matched typically developing peers (9.1 ± 0.4 years). Children with DCD scored below the 5th percentile on the Movement Assessment Battery for Children (MABC-2). The typically developing (TD) children scored above the 30th percentile. All children practiced on twelve sessions, performing four selected X-box 360 videogames (Kinect Adventures). Twelve children (6 with and 6 without DCD) practiced the same game across the twelve sessions (constant practice), and the other twelve children practiced four other different games across the twelve sessions (variable practice). Each session last fifteen minutes in which they played the games three times. The twelve sessions were evenly distributed throughout four weeks. The final game score was used to measure individual's performance. With practice, all children improved their game scores. Across practice conditions, children with DCD showed higher variability as compared to TD children. Our findings suggest that constant practice may be a better strategy for children with DCD to improve their motor performance as compared to variable practice.

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Poster Session 3
01PS24

Participation profile of young adults with Suspected Developmental Coordination Disorder (DCD)

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Introduction: The purpose of this study was to assess the daily functioning of young adults with Developmental Coordination Disorder (DCD), their emotional state and the impact of DCD on the formulation of specific strategies and executive strategies during activity performance. Studies imply that, when DCD continues into adulthood, it can result in slowness, clumsiness, avoidance of daily living tasks, decreased quality of life and reduced participation. The purpose of this study was to provide additional insight regarding DCD in young adults; specifically, the non-academic and academic aspects, self-perception, handwriting and use of organizational strategies as compared to young adults without difficulties. Method: A random sample of 2379 adolescents and young adults aged 19-25 (M=20.68, SD=3.42) was recruited through the Israel Army Health Survey. Using a cutoff point on the Adolescents & Adults Coordination Questionnaire (AAC-Q), three study groups were identified (N=429): probable DCD (n=135), suspected borderline DCD (n=149) and control (n=145). Groups were compared based on their participation and functional ability. Subjects completed five questionnaires: The AAC- Q (an ecological tool used to screen adolescents and young adults for motor coordination deficits), The Daily Life Functions Questionnaire (assessing non-academic and academic functioning), The Recent Emotional State Test (assessing feelings resulting from task performance), the Internal Factors Attributed to Success questionnaire and The Problem Solving Questionnaire (assessing strategy use). Results: The study showed that DCD continues into adulthood and can effect academic and non-academic function as well as the emotional state of the individual. MANOVA revealed a statistically significant between-group difference ($F[7,422]=16.19$; $p<0.001$). Post-hoc analyses revealed differences for all measures (except the Problem Solving Questionnaire) with the study groups performing consistently worse than the control group. Logistic regression revealed that non-academic functioning was the most significant predictor of group placement ($B=-1.32$; $p<.001$). Conclusion: The study results show that DCD appears to continue into young adulthood and affects participation, function and emotional state. As the demand for evidence-based practice continues to grow, there is a need to continue to expand the current knowledge base regarding DCD in adulthood.

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July 1, 2013
Poster Session 3
01PS25

Participation in Physical and Leisure Activities and Quality of Life of Children with Developmental Coordination Disorder

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Introduction: Participation in physical and leisure activities is essential for children's development and positively affects health and quality of life (QOL). Children with developmental coordination disorder (DCD) are limited in daily functions and often avoid physical activities. This may influence their health and QOL, yet evidence on this issue is minimal. This study compared the participation in physical and leisure activities and QOL of children with and without DCD and examined the correlation between motor skills, participation and QOL. **Methods**: This study employed a comparative and correlative design. It included 3 groups of children aged 6-11 (N=77): 22 with DCD (MABC-2≤16%), 21 Typical (MABC-2≥25%) and 34 Intermediate (16%<MABC-2<25%). Parents filled out the Participation in Physical Activity and Sedentary Behavior Questionnaire (PQ) and the Pediatrics Quality of Life Inventory (PedsQL parent form). Children were administered the MABC-2, filled out the children's PedsQL and wore an accelerometer Actical® device for 5 days. **Results**: Overall, compared to typical children, those with DCD participated less (Actical®; Z=-1.75, p=.04), specifically in physical activities, but not in sedentary ones; yet, both groups spent more time in sedentary than physical activities (based on PQ). Compared to typical children, those with DCD were found to have an overall lower QOL, according to the children (t=-2.06, p=.04) and their parents (t=-3.7, p=.00). Significant correlations (N=77) were found between: motor skills and participation (.22<r<.31), as well as motor skills and QOL (.23<r<.39). **Conclusion**: Participation and QOL of children with DCD were found lower than their peers. Both groups' preference for sedentary behavior (e.g. internet, social networks) emphasizes the contemporary use of technology as a means for leisure and social participation, thus reducing participation in physical activity. Correlations between motor skills, participation and QOL support the bio-psycho-social approach, relating between body functions, activities, participation and QOL. These results suggest that when working with children with DCD it is also important to focus on their participation in physical and leisure activities as well as their QOL.

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July 1, 2013
Poster Session 3
01PS26

The relationship between motor performance and economic status: a study on a sample of school children from Rio Grande do Norte.

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Introduction: According to new theoretical models of human development, both environment and individual differences play an interdependent role in the development of motor abilities. For instance, sociodemographic factors may, at short and long term, directly interfere in the access to culture, environments and practices that may positively help to build a motor repertoire appropriate to chronological age and maturational status. A number of studies on children in the population in Brazil have related socioeconomic status and motor performance, but little is known about this relationship for samples of children from Rio Grande do Norte. The aim of this study was investigate the nature of the relationship between socioeconomic factors (derived from the combination variables such as income, education, occupation, profession, offspring, among others) and the level of motor development of school children between seven and nine years in Natal-RN. Methods: A sample of 25 school children, from seven to nine years old, was assessed using Movement Assessment Battery for Children (second edition). Their families' socioeconomic status was classified using the sociodemographic questionnaire by ABEP (Brazilian Association of Research Companies) and CCEB (Economic Classification Criterion of Brazil). Results: No statistically significant difference was found when motor performance was compared on the basis of socioeconomic status. But, a tendency to higher scores was found for children of families with higher economic status. The lack of statistical difference may reveal that motor proficiency does not depend on social class, but the small sample, low statistical power, low test sensitivity for this sample - since there are no validity studies of the instruments used to assess the degree of motor performance in children of this age group in Natal – may also justify these results. Some children showed a very low motor profile. Individual analysis would be very useful for clinical purposes and a larger scale replication could also contribute.

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July 1, 2013
Poster Session 3
01PS27

Ecosystemic needs assessment for children with DCD in elementary school: Multiple case studies

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Background: To date, few studies have defined, systematically, the needs of children with DCD and their family. There are almost no needs assessments for children with DCD. However, it is a recommended step in planning and developing services. Frames of reference: The process of this needs assessment is based on the Bronfenbrenner's ecosystemic model, but refers also the Disability Creation Process model. Objective: To identify the needs of children with DCD, in relation to their social participation, with an ecosystemic point of view. Method: Multiple case studies and mixed methods will be used to conduct the study. Participants included children with DCD, 6 to 13 years of age, as well as one of their parents, their main teacher and significant providers. Data collection involved a review of child's records, validated questionnaires and semi-structured interviews. Results: Ten children with DCD, twelve parents, nine teachers, four occupational therapists, one special educator and one remedial teacher participated in this study. Regarding the ontosystem (skills of the child), difficulties concern mainly fine and gross motor skills, attention, organization, self-efficacy and handwriting. In the microsystems (life habits, family, school, community), the major preoccupations are related to participation in homework, academic activities, writing, feeding, dressing, physical activities, sports and cleaning. Also, they indicated the lack of supplementary services at school, and of formation and information on DCD. The mesosystem (relationships between family, school and community) reveal the need for coordination of services between school and rehabilitation, consultation of significant providers in the planning of interventions at school and child's involvement in his intervention's goals. In the exosystem (health and school systems), it is recommended to make available information and formations on DCD and supplementary services for these children in schools. The chronosystem indicates that parents want information on prognosis of children with DCD, as well as there is no medium or long term planning in place for these children. Conclusion: It seems that employing an ecosystemic frame of reference provides a better understanding of the needs of children with DCD. It may contribute to the improvement of services for these children and their family, in order to optimize their social participation and quality of life.

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July 1, 2013
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01PS28

Literate and non-literate children with probable DCD: prevalence, global self-worth and motor competence

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Children with Developmental Coordination Disorder (DCD) show difficulties performing motor skills, social isolation and low perceptions of competence. Prevalence of DCD varies across countries and it is estimated to be around 6%. The objectives of this study were to: (1) investigate the prevalence of probable Developmental Coordination Disorder (p-DCD) and the motor tasks were children showed more difficulties; (2) investigate children levels of PC; (3) compare the perceptions of competence (PC) of children (literate and non-literate) with p-DCD with their peers; (4) examine associations between motor sores and PC. Literate (N=186) and non-literate (N= 199) children (from 4 to 10 years-old) were assessed using the Movement Assessment Battery for Children, the Pictorial Scale of Perceived Competence and the Social Acceptance and Self-Perception Scale for Children. Oneway ANOVA and Tukey Post Hoc Tests (p =.05) were used. Results showed: (1) high prevalence of p-DCD (28.6% = 58.2% girls and 42.8% boys); (2) high prevalence of difficulties in manual dexterity; (3) lower levels of PC (56.9% total sample; 47.3% of the p-DCD children; 21.6% non-literate children with p-DCD; 23.3% of literate children with p-DCD); (4) non-literate children with p-DCD demonstrated lower perceptions of social adjustment (p=.02), motor skills (p=.03) and global-self worth (p=.01) compared to their peers; non significant results were found for literate children with p-DCD. A closer look at the age groups suggest that: (1) non-literate children with p-DCD perceive themselves less accepted and less competent than their peers, specifically at 4-years-old (social adequacy: p=.001; maternal acceptance: p=.01; global self-worth: p=.02) and 8-years-old (social adequacy, and global self-worth p=.05, p =.04); (2) literate children with p-DCD showed lower perceived motor competent than their peers (p=.003) at 10-years-old; they also perceived to be less satisfied with their appearance (p=.05) at 9-years-old. Interesting results were found for the literate children at 8-years-old; those children seems to lack parameters to assess their motor performance as they perceived their selves as more motor competent than typically developed children. Regarding the association, for non-literate children weak correlations were found between motor scores and social PC (r=-.15, p=.01), motor PC (r=-.11, p=.05), maternal acceptance (r=-.12, p=.03) and global self-worth (r=-.16, p=.01). For the literate children correlations were restricted to motor scores and the perception of physical appearance (r=-.17, p=. 01). Prevalence of p-DCD were higher than the world estimates. The DCD implications exceed the motor sphere, undermines the perception of social acceptance and global self-worth.

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July 1, 2013
Poster Session 3
01PS29

Knowledge-to-Action: involvement of physiotherapists in developing an online workshop to support management of children with DCD

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Introduction: Developmental Coordination Disorder (DCD) is a chronic and prevalent health condition among children. Physiotherapists (PTs) are ideally positioned to prevent and address secondary physical health issues of children with DCD. To do so effectively, they need to integrate contemporary thinking and research evidence into routine clinical management. Evidence-based information needs to be easily accessible and applicable to the treatment context. The purpose of this knowledge creation project was to identify PTs' information needs and learning preferences with regard to an online workshop that would synthesize and contextualize current evidence related to DCD, be accessible and support implementation of evidence into practice.Method: Development of the online PT DCD workshop was guided by the Knowledge to Action (KTA) framework. Workshop development focused on the 'knowledge creation' and 'knowledge contextualization' phases. Current research evidence on DCD was synthesized. Semi-structured telephone interviews were conducted with 7 pediatric physiotherapists in 3 provinces in Canada to identify needs and preferences, contextualize the workshop content and ensure that the knowledge presented would be relevant. Therapists came from diverse work settings. Interviews were summarized to identify key themes for content and recommendations for the format. The workshop was developed accordingly. Results: PTs wished to have evidence from research about DCD, and descriptions of their role as PTs, contributions to differential diagnosis, measurement tools, task adaptation and best approaches to management. PTs recommended that resources such as links to published journal articles, websites on adapted physical education and cognitive interventions, and blogs written by professionals and teens with DCD be included. PTs desired information in user-friendly formats such as tip sheets and short checklists, with case scenarios and learning components (e.g., question/answer) embedded. They emphasized the importance of interactive media, including video clips demonstrating all phases of the PT role: identification, assessment, and management. The evidence-informed PT DCD workshop that was developed has 3 main sections: identification, goal setting, and best practice for intervention. Each section includes information on different topics and resources mentioned above, including clinical chart for PTs to download and use in their practice. A fourth section provides direct access to all resources.Conclusions: Interviews designed to involve the end user from the start greatly increased the relevance and applicability of the workshop and ultimately will increase the quality of the services offered to children with DCD. Once completed, the workshop will be available for free on the CanChild website.

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July 1, 2013
Poster Session 3
01PS30

Developing and Evaluating an Online Workshop for Parents to Promote Understanding About DCD

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Introduction: DCD is a chronic health condition that affects approximately one child in every classroom. Despite its prevalence, DCD is not well recognized by educators, health professionals or families. CanChild has systematically worked to develop resources that are evidence-based and user-friendly to increase awareness and promote greater understanding of children with DCD. Methods: Educational materials (e.g., flyers, booklets, tip sheets) for knowledge exchange have been made available online in up to 10 languages. Resources were designed through work with end users of the information and focus on identification, symptom and comorbidity recognition, as well as strategies for best practice with children who have DCD.Recently, an online workshop was developed in English that brings all of these resources together for families. The workshop's effectiveness was evaluated with 24 families who completed questionnaires pre-, post-, and at 3 month follow up.Results: Parents who completed the online workshop demonstrated a significant increase in knowledge about DCD and in their sense of empowerment at post-test and at 3 month follow-up. In addition to implementing strategies from the module in their daily routines, families also disseminated the module to educators and other family members as a resource. Conclusion:This evidence-based DCD workshop is an effective online resource (www.canchild.ca), that is being widely accessed and will soon be posted in French. Workshops for health professionals (family physicians, PTs, OTs) are in the process of being developed and evaluated. All educational materials are user-friendly and available at no cost. Samples of all resources and access to the online workshop will be available at the conference.

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July 1, 2013
Poster Session 3
01PS31

The impact of Developmental Dyspraxia on the functional outcomes of children with learning disabilities

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The purpose of the study was to create a functional profile of children with learning disabilities (LD) with and without Developmental Dyspraxia (DD) according to the levels defined in the ICF (body functions, activity performance and participation) and to determine whether praxis has unique and predictive value with regard to participation within and outside of the school environment. Background: In 2000, the American Psychiatric Association expanded the description of children with LD claiming that many of those children also suffer from different developmental disorders such as DD. In the LD literature, there is a lack of research regarding non-academic functioning, and there is need to consider the multi-dimensional implications of this disorder since they affect different aspects of the child's functioning. These may cause as much distress to the child and his family as his poor academic performance, since they may define the child's level of participation at different environments.Methods: Participants: 90 children (68 boys : 22 girls), between the ages 7.3 - 12.4 years, diagnosed with LD from regular, inclusion and special education classrooms, forming a representative sample of children with LD.. Exclusion criteria were psychiatric or neurological disorder. Design: comparative study design between two groups (LD with and without DD). Ethical approval and informed consent were obtained. Performance measures were administered by an experienced OT. Children were assessed in 3 sessions, while parents completed questionnaires. Teachers were interviewed by telephone. MANOVA was computed for between-group analyses on multiple outcome variables. Regression was conducted to predict degree of participation. Measures: Assessment measures included those of body functions (Dynamic Occupational Therapy Cognitive Assessment for Children; Test of Everyday Attention for Children; the Conner's Abbreviated Parent-Teacher Questionnaire), behavior problems and participation (Child Behavioral Checklist), non-academic activity and participation (School Function Assessment).Results:MANOVA analyses revealed significant differences between LD with DD (45%) and without DD, on most Variables, primarily in participation (P<.02, ?2=.06)) pointing to lower participation scores amongst the LD with DD group. A significant regression model with the variables: praxis, reading, writing , math and ADHD symptoms, suggested that praxis performance has a unique contribution to predicting the participation of the child within the school (R2=.26, ?R2=.10, ß=.35, p<.01), beyond the other variables in the model. Limitations: This study lacked a child's self-report on participation in different occupations and degree of satisfaction with his/her roles and involvement in occupations within and out of school environment. Conclusions: Children with LD and DD have substantial difficulties on all 3 levels suggested by ICF. Moreover, praxis has a significant role in the functional implications on all levels, and was found to predict the overall participation of the child. Future studies should employ measures of self-efficacy and level of satisfaction of one's participation in different occupations.

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01PS32

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Play activities of 7 and 8 years old children: differences between brazilian children with and without DCD

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BACKGROUND: The Parent and Teacher Questionnaires of the Assessment of Motor Coordination and Dexterity (AMCD) were created to enable the gathering of information about activities and social participation in children, which is a diagnostic criteria for DCD. The Parent Questionnaire has a section that addresses activities common to Brazilian children 4-8 yearsold. OBJECTIVES: To verify if according to parents´ report there are differences in the repertoire of play activities of Brazilian children ages 7 and 8 years old with and without DCD. METHOD: The study included 181 children aged 7 and 8 years from the great Belo Horizonte area, 34 with DCD. Parents responded to the AMCD Parents Questionnaire, and only the section about the repertoire of activities was analyzed. This session is composed by 24 activities, and parents should answer how much the child likes, how often it is practiced and with whom the child usually performs each activity. Chi-square test, with significance level of 0.05, was used to identify differences between children with and without DCD. RESULTS: Significant differences were observed in relation to how much they enjoy the activities in the following items: tag ($p = 0.023$), volleyball and basketball ($p = 0.040$), other ball games ($p = 0.016$), board games and playing cards ($p = 0.020$), and in all items typically developing children scored more often as "likes a lot" than children with DCD. Regarding the frequency of practice, differences were observed in jumping rope ($p = 0.028$) and playing video games ($p = 0.016$), where children without DCD practice activities less often than children without the disorder. When considering with whom the children performed the activities, significant differences were observed for hopscotch ($p = 0.013$), playground ($p = 0.040$) and reading comics ($p = 0.012$), where children with DCD play more frequently with adults than with friends than children without DCD. CONCLUSION: The results suggest there are some differences in playing habits of children with and without DCD. Children with DCD seem less likely to play ball and running games, they get involved with some play activities less frequently than children without the disorder, and they seem to prefer playing with adults instead of age related peers. Further studies should include children of other ages and from different regions of Brazil.

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01PS33