

Impact case study (REF3b)

Institution: University of Leeds
Unit of Assessment: 25
Title of case study: Case Study 1: The Movement Assessment Battery for Children: a universal standard of assessment and intervention to improve the lives of children showing movement difficulties.
<p>1. Summary of the impact (indicative maximum 100 words)</p> <p>Research examining the best ways of identifying and diagnosing motor impairment in children has established a universal standard of assessment: the Movement Assessment Battery for Children (MABC). Co-authored by Sugden (University of Leeds), a complete new edition was developed in 2007. The second edition contains a new standardised test of motor impairment, a new criterion referenced checklist and a new intervention manual based on participation and learning, all informed by the authors' theoretical, empirical and professional research. The MABC is used in educational, health, and psychological services globally to provide detailed and accurate profiling of children 3 – 16 years, and through assessing children's motor skills and providing guidelines for intervention, it is used to determine strategies across the world to improve participation in activities in daily living for children with movement difficulties.</p>
<p>2. Underpinning research (indicative maximum 500 words)</p> <p>Co-authors, Sugden (University of Leeds, 1977 - present), Henderson (Institute of Education, London) and Barnett (Oxford Brookes University) have made their careers' work the study of motor development and impairment, particularly in children, including those with Developmental Coordination Disorder (DCD), known as dyspraxia in the UK, learning difficulties, mild cerebral palsy and autistic spectrum disorder. The authors have brought theoretical, empirical and professional knowledge of the motor domain and used this information to inform the Movement Assessment Battery for Children (MABC) and its assessment, diagnosis and intervention for children with movement difficulties.</p> <p>A complete new edition of this assessment and intervention package (MABC2) was developed in 2007 drawing upon earlier work. MABC2 [1] was a total revision and re-standardisation of the three components of assessment, diagnosis and intervention, working from the most recent empirical evidence and feedback from professionals in education, health, psychology and researchers worldwide. This edition contains a new normative referenced <i>Test</i> and a new criterion referenced <i>Checklist</i>. Used together as a two-step approach to assessment and diagnosis, informed by the research work of Sugden [2], they help identify a child with motor difficulties by comparing the child's score to the normative and criterion referenced data, and then offering intervention guidelines in the third new part of MABC2 – the <i>Ecological Intervention</i> manual.</p> <p>Test: The <i>Test</i> is divided into three sections; manual skills, aiming and catching, and balance skills, allowing an examiner to see exactly how the child's performance compares with his/her peers, giving a percentile ranking for each item, each section of the <i>Test</i> and for the overall score. The <i>Test</i> also allows for qualitative observations to be made by the examiner on how the child performs, with a summary as to how the sections affect the child's overall education in school. Data were collected throughout the UK, from 1200 children between the ages of 3 and 16, with roughly 100 children in each age. The sample was representative of the UK population of children from the 2001 census data according to geographical region, gender, age, parental education and race/ethnic groups. The co-authors engaged an external specialist statistician (from Cambridge Assessment Centre), an expert panel was convened comprising of nine professionals, and over 50 standardisation examiners were used. Confirmatory factor analysis verified the structure and the construct validity of the MABC, and various measures of reliability and validity were taken during the development of the <i>Test</i>. Detailed work on this continues with different population groups of children [3].</p> <p>Checklist: Data were collected on 395 children for the <i>Checklist</i> and sampled according to the 2001 census norms in the same way as the <i>Test</i> above. The <i>Checklist</i> is divided into three sections: firstly, tasks are performed in a stable environment and are predictable such as a standing jump or writing; secondly, in an environment that is moving and unpredictable, such as throwing and catching or tag, and thirdly, assessment is made of the child's personal qualities during movement, such as planning and organisation, impulsivity, passivity and confidence.</p>

Intervention Manual - Ecological Intervention: The revised guidelines for intervention, co-authored by **Sugden**, Henderson and Barnett, are also informed by specific research by carried out by **Sugden** from 2003 – 2006 [4] – [6]. *Ecological Intervention* is not restricted to recognised 'experts' but involves numerous individuals (in the home, schools, community, health services) who can help children overcome movement difficulties in two ways. Firstly, there is the modification of the context or environment enabling the child to participate, which is a prerequisite for learning. Secondly, it employs the most up to date teaching/therapeutic methods to enable the child to learn. The revised procedures in *Ecological Intervention* are also informed by research from grants from 1999 – 2006, awarded by Action Medical Research, ESRC, NHS and Regional Health Commission Research [grants i – v], all with **Sugden** as Principal Investigator.

3. References to the research (indicative maximum of six references)

[1] Henderson, S.E., **Sugden, D.A.** & Barnett, A. (2007). The Movement Assessment battery for Children. London: Pearson. 2nd Edition. ISBN: 978 0 749136 08 6 for manual and 978 0 749136 031 for *Ecological Intervention*.

[2] Wright, H.C. & **Sugden, D.A.** (1996). A two step procedure for the identification of children with developmental co-ordination disorder in Singapore. *Developmental Medicine and Child Neurology*, 38, 1099-1105. DOI: 10.1111/j.1469-8749.1996.tb15073.x. *Using the Test and Checklist directly addresses the assessment and diagnostic criteria for DCD laid out in the APA Diagnostic Manual and the WHO Classification leading to 2nd edition.*

[3] Schulz, J., Henderson, S.E., **Sugden, D.A.** Barnett, A. (2011). Structural validity of the Movement ABC-2 test: Factor structure comparisons across three age groups. *Research in Developmental Disabilities*, 32, 1361-1369. DOI:10.1016/j.ridd.2011.01032. *A special edition of this journal with this paper using confirmatory factor analysis to verify the structure and the construct validity of the MABC 2. Data for this collected during the Test development period.*

[4] **Sugden, D.A.** & Chambers, M.E. (2003) Intervention in children with Developmental Coordination Disorder: The role of parents and teachers. *British Journal of Educational Psychology*, 73,545-561. DOI: 10.13.48/000 709903322591235. *The use of the MABC showing how teachers and parents can enact an intervention programme leading to improvements in children with DCD providing empirical and practical support for all three components of the Movement ABC 2*

[5] **Sugden, D.A.** (2005) La prise en charge dynamique du trouble d'acquisition de la coordination-TAC. (Dynamic management of coordination disorders). In R. Geuze (Ed) *La maladresse chez les enfants presentant un trouble d'acquisition des coordination motrices: revue des approches actuelles.* (Developmental coordination disorder: a review of current approaches). Solal: Marseille. Pp197-227. English Translation 2007. ISBN 2-9914513-70-4. *A chapter describing and analysing overall research conducted at Leeds leading to Ecological Intervention.*

[6] **Sugden, D.A.** & Chambers, M.E. (2007) Stability and change in children with developmental coordination disorder. *Child: Care Health and Development*, 33, 520-528. DOI:10.1111/j.1365-2214.2006.00707x *Two year period to examine longitudinal changes in children with DCD following intervention, confirming validity of assessment procedures and intervention guidelines of MABC.*

Grants (all awarded to **Sugden** as Principal Investigator)

[i] Action Medical Research. 1999-2001. £44,176. Reference: SP3410. *Management and intervention in children with developmental coordination disorder using teachers and parents. 1st intervention study.*

[ii] Action Medical Research, 2001-2003. £46,749. Monitoring the Educational Performance of Children with Developmental Coordination Disorder. Reference SP 3733. *Longitudinal 2 year follow up to 1st intervention study.*

[iii] NHS, Regional Health Commission Research, 2001-2003. £71,704. Effective Intervention in Children with Developmental Coordination Disorder. *2nd intervention study on a larger scale comparing hand-outs to parent and teachers engaging with the actual intervention.*

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[iv] Action Medical Research, 2004-2006. £74,001. Reference SP 3912. Coordination Disorders in the early Years. 3rd *intervention study with younger children (3-5 year olds)*.

[v] ESRC, 2004-2006. £15,000. Reference RES-451-26-0163. Seminar Series. Developmental Coordination Disorder as a Specific Learning Difficulty. *4 x 2 day meetings at Leeds with attendance for UK, Europe, North America (USA/Canada) and Australia.*

4. Details of the impact (indicative maximum 750 words)

The MABC is recognised as a universal standard in the assessment of motor impairment in children, including DCD and other developmental disorders such as dyslexia, attention deficit disorder, autistic spectrum disorder, speech and language disorder and cerebral palsy. It has also been described as a “gold standard” for measuring and describing the severity of children with motor impairment [A]. With the information provided by the *Test* and the *Checklist* together, both an individualised and group programme of intervention can be developed from the *Ecological Intervention* manual, helping to determine strategies to improve the lives of children showing movement difficulties.

Educational and Clinical usage - indicating ease of and widespread use with potential for beneficial effect on children’s lives

The MABC is seen as the first choice for clinicians such as paediatricians, educational psychologists, physiotherapists and occupational therapist from across the world, including the UK, Europe, USA and Canada [A – H]. Head of Research at The Children’s Trust, a national charity working with children with acquired brain injury and multiple disabilities, describes the MABC as “*the assessment of choice for therapists working with children with coordination difficulties*” and that it is “*easy to use and children readily engage with it*” [C]. The Director of the Dyscovery Centre, a centre of excellence in the UK for children and adults with specific learning difficulties, further describes the MABC as “*integral in our education/clinical and research work*”. Initially set up to co-ordinate services for children across the UK, the Dyscovery Centre now sees children and adults from as far afield as Ecuador, Hong Kong and the UAE, successfully treating thousands of children and training over 10,000 health and educational professionals [D].

Research usage - indicating reliability and validity

Research articles regularly feature in prestigious journals examining and noting the excellence of the reliability and validity of the MABC, with a recent example in *Developmental Medicine and Child Neurology*, which noted that, “*The MABC-2 is a reliable and valid measure to assess motor competence in children with DCD and the scores provide the reference point for clinical decision making in the management of the individual child.*” [E]

The establishment of the MABC as an internationally reliable and valid research tool therefore allows researchers and professionals in laboratories and developmental centres across the world to agree on perceptions of children’s movement difficulties, contributing to accurate evaluation of intervention and provides a reliable assessment tool to document improvements in the motor performance of thousands of children. Examples of its research use include:

- A team in Germany conducted the largest survey of diagnosis, assessment and intervention methods for children with DCD, and published it as the Swiss–German guidelines in 2011. Accepted by other international bodies, including the European Academy for Childhood Disability, it awarded MABC an ‘A’, positioning it as the nearest instrument available to a gold standard (A* is the highest standard; no instrument has achieved this) [F]
- In the USA, a major longitudinal study is being directed by Stanford University, examining the early childhood trajectory of children born prematurely with very low birth weights. The study chose MABC as the assessment tool to assess the motor development of these children [G]
- In the UK, a longitudinal study involving 7000 premature children is being carried out the University at Bristol, which chose to use the MABC to assess the motor capabilities of the children at various stages of their development [H]

Usage worldwide - indicating global impact - and requests for clinical and research training

The field of motor disorders involves individuals who are both educators/clinicians and researchers, with their work encompassing both empirical work in schools and clinics and practical work with the children. Conferences on the topics also involve both research and practical work.

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Since 1993 there have been nine world conferences on DCD in the UK, Europe, USA, Canada, Australia, USA and Switzerland, and the MABC is used more than any other instrument for the for the selection of children in the research and professional papers. Moreover, in the last 15 years there have been four special editions of Journals totally devoted to DCD: Research In Developmental Disabilities; International Journal of Development, Disability and Education; Journal of Human Movement Studies (2). For the identification of children the majority of research papers have used the MABC.

The co-authors have all conducted training workshops in the UK and abroad, with specific named invitations to **Sugden** to conduct workshops in UK, Ireland, Holland, Denmark, Norway, Canada, USA and South America. **Sugden** has also successfully supervised six PhD students using the MABC, and has been external examiner for ten others. Furthermore, **Sugden** has made over ten keynote addresses at international meetings and conferences about the MABC since 1993, and as further evidence of its global reach, the MABC has been translated into German, Dutch and Swedish, with French, Portuguese, Italian and Japanese currently being planned by the publisher.

5. Sources to corroborate the impact (indicative maximum of 10 references)

[A] Director, CanChild Centre for Childhood Disability, McMaster University, Canada: *"The MABC has become the gold standard that is now used for research around the world for measuring and describing the severity of children with motor impairment"*.

[B] Head Occupational Therapist of the Paediatric Occupational Therapy Service at St Johns Hospital in West Lothian: *"The MABC is widely used in Scotland by a range of Allied Health professionals to support clinical decision making for a range of children with neurodevelopment disorders"*.

[C] Head of Research, The Children's Trust, Tadworth: *"The MABC is the assessment of choice for therapists working with children with coordination difficulties...sound theoretical base, easy to use, and children readily engage with it"*.

[D] Director of the Dyscovery Centre, University of Wales, Newport: *"We use the MABC as the first line of assessment and guidelines for intervention when we are examining movement characteristics of children. It is valid and reliable and the children enjoy it and engage with it appropriately. It has been integral in our educational/clinical and research work over the past 15 years"*. Further details of the work of the Dyscovery Centre:

<http://www.newport.ac.uk/research/researchcentres/Centres/Dyscovery%20Centre/About/Pages/BackgroundInformation.aspx>

[E] Yee-Pay Wang et al (2012) Reliability and responsiveness of the Movement Assessment Battery for Children–Second Edition Test in children with developmental coordination disorder. *Developmental Medicine and Child Neurology*, 54, 2, 160-165. DOI:10.1111/j.1469-8749.2011.04177.x

[F] 2011 Swiss German European Guidelines. Child Centre Maulbronn & University of Heidelberg, Germany. Blank R, et al (2011) European Academy for Childhood Disability (EACD): Recommendations on the definition, diagnosis and intervention of developmental coordination disorder. *Developmental Medicine and Child Neurology*, 54, 1, 54-93. DOI: 10.1111/j.1469-8749.2011.04171.x

[G] Professor of Paediatrics (Neonatology), Division of Neonatal and Developmental Medicine, Stanford University, USA: *"The MABC is an extremely important and robust tool for both care providers and investigators in long-term neurodevelopmental outcomes among high risk infants. We are using it in our School Age Follow Up study of extremely premature infants in the Neuroimaging and Neurodevelopmental Outcomes Cohort"*

[H] Avon Longitudinal Study of Parents and Children. A study of 7000 children using MABC as their assessment instrument for motor development <http://www.bristol.ac.uk/alspac> Lingam R., et al (2009) Prevalence of Developmental Coordination Disorder Using the DSM-IV at 7 Years of Age: A UK Population–Based Study. *Pediatrics* 123, 4, 693-700. DOI: 10.1542/peds.2008-1770