

University of Groningen

Developmental coordination disorder

Geuze, R. H.; Jongmans, M.; Schoemaker, M.; Smits-Engelsman, B.

Published in:
Human Movement Science

DOI:
[10.1016/S0167-9457\(01\)00026-4](https://doi.org/10.1016/S0167-9457(01)00026-4)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2001

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Geuze, R. H., Jongmans, M., Schoemaker, M., & Smits-Engelsman, B. (2001). Developmental coordination disorder. *Human Movement Science*, 20(1-2), 1-5. [https://doi.org/10.1016/S0167-9457\(01\)00026-4](https://doi.org/10.1016/S0167-9457(01)00026-4)

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.



ELSEVIER

Human Movement Science 20 (2001) 1–5

HUMAN
MOVEMENT
SCIENCE

www.elsevier.com/locate/humov

Editorial

Developmental coordination disorder

1. The past

One way of evaluating the success of an initiative is to see how it subsequently generates interest from other parts of the world. In 1995 a small-scale meeting was organised by Sheila Henderson in London (England) on developmental coordination disorder (DCD). This initiative has spread like an oil slick first to Leeds (England, 1995), then Cardiff (Wales, 1997) before crossing the Channel to Groningen (Netherlands, 1999). Moreover, plans are currently being developed to organise a fifth DCD meeting in Banff (Canada) in May 2002. The atmosphere at the meetings has always been such that young researchers feel comfortable in presenting their data and that there is ample time for thorough discussion both during the scientific and social events. In 1998, a theme issue on “‘clumsiness’ as a syndrome and a symptom’, that included a number of papers from the Cardiff meeting was published by Human Movement Science (HMS). The 1999 meeting in Groningen generated the idea to initiate a second theme issue of HMS on DCD. We are grateful to the editors of HMS to offer this opportunity.

2. The present

The present collection of eight papers can be divided into four categories addressing the following issues: (1) when does a decreased level of motor coordination become a real problem for the child (*diagnosis*)?, (2) what kinds of motor coordination problems and concomitant problems are frequent among children with DCD (*description*)?, (3) what processes can be identified

underlying the motor coordination problems (*processes*)?, and (4) is it possible to improve motor performance in children with DCD (*treatment*)?

With respect to the issue of diagnosis, Geuze et al. present a review of the diagnostic criteria that have been reported in 176 studies on children with developmental motor problems. The selection criteria in a subgroup of studies using DCD as a label for these children were compared to those of DSM-IV (APA, 1994) and recommendations for improving selection criteria put forward. Because the review lists over 200 articles and/or chapters related to developmental motor problems it may serve in addition as a valuable reference work for those who are new to the field as well as those who have been part of it for some time.

Two papers deal with the issue of describing the population of children with DCD. Since children with DCD show a wide variety of symptoms, researchers have used different rationales to form subgroups or subtypes of DCD with reduced heterogeneity; one is by statistical approaches. Macnab et al. discuss cluster analysis as a method of identifying subtypes of DCD and provide the reader with information that will facilitate interpretation of studies using such techniques. Although the authors are hesitant to present their study as a replication of a study by Hoare (1994) we think the paper is valuable in this respect, because the subgroup structure was surprisingly well replicated given that the DCD group and some of the measurement instruments differed. The paper by Skinner and Piek investigates the psychosocial consequences of poor motor coordination. In spite of the absence of the predicted interaction between motor coordination status and age on measures of perceived competence and social support this well-designed study shows (again) the powerful influence motor behaviour has on the (perceived) quality of social-emotional status.

Half of the papers in this special issue are concerned with the search for processes that might underlie the motor coordination problems in children. Coleman et al. address the development of motor ability and kinaesthetic acuity in a group that is younger than those previously studied. They compared a group of four-year-old children at risk for DCD with a matched control group, and assessed them again one year later. Differences between the groups and developmental change were thus documented in an age range that may be critical for the development of DCD. Schoemaker et al. investigated the relations between kinaesthetic, visual and haptic skills and DCD in a referred sample and a matched control group. Haptic acuity, that is the ability to recognise the shape of objects by tactile manipulation, has not previously been investigated in children with DCD. Their study thus provides an insight in the relations between several perceptual skills and motor ability. Individual analyses proved to be important for the correct interpretation of the data. The

paper by Wilson et al. presents an intriguing pattern of similarities and differences that emerges when comparing real and imagined goal directed movement sequences between children with DCD and matched control subjects. Fitts' Law seems to hold for imagined movements under normal conditions. Differential results were found for the DCD group when an extra mass was involved. They discuss the possibilities of imagery training, an issue that has not been the subject of studies in DCD research before. The contribution by Smits-Engelsman et al. concerns both processes and treatment and we chose to include it in the Treatment section, The first part concentrates on an analysis of poor grapho-motor skills. They analysed children's handwriting and performance on the flower trail item from the M-ABC test to study the speed and quality of fine motor coordination. This choice of tasks provides a link between the study of basic processes and daily life activities.

Finally, helping children with DCD to overcome their problems should be one of the ultimate aims of our scientific research endeavour in this field. Both the papers by Miller et al. and Smits-Engelsman et al. (second part) are good examples of the current status of research in the area of intervention. The intervention study conducted by Smits-Engelsman et al. reports positive results with respect to the improvement of both the quality and the speed of handwriting. Producing a piece of legible handwriting within a certain time limit is in most countries still regarded as an important academic goal to be achieved within the first years of formal schooling. It is therefore obvious that the children who participated in the study may have been protected from further negative learning experiences early in their school career.

Having derived a cognitive approach from psychology and transformed it to suit an occupational therapy setting, Miller et al. carried out a pilot study of the effectiveness of the therapy on the motor functioning of 10 children with DCD. The results of this study are encouraging and pave the way for the design of a randomised clinical trial to study the efficacy of the therapy and its possible effect on the quality of life of children with DCD.

The development of sound intervention procedures is currently gaining momentum. Indeed, in order to serve the heterogeneous population of children with DCD a diverse range of procedures should be developed to suit the individual needs of a child.

3. The future

Having read all contributions to this special issue the reader will, no doubt, still be left with a considerable number of unresolved issues. We have chosen

to briefly mention a few (in no particular order of importance) in the hope that these will be addressed in the not too distant future.

The paper by Smits-Engelsman et al. serves as a good example of drawing attention to pitfalls in the classification of DCD. The children who participated in this study were selected on the basis of their poor handwriting. It should be noted that the DSM-IV classification of disorder of written expression is not appropriate for these children, even though the label suggests so. In this disorder “the impairment in the ability to compose written texts may be marked with spelling errors, grammatical or punctuation errors, or poor paragraph organisation” (p. 51, APA, 1994), and “if poor handwriting is due to impairment in motor coordination, a diagnosis of developmental coordination disorder should be considered” (p. 51, APA, 1994). Because criterion A of the DSM-IV entry for DCD includes the example of poor handwriting as a possible expression of impaired motor coordination, it therefore seems appropriate to classify these children under the heading of DCD. However, poor handwriting is in some cases not associated with fine motor problems. In addition, the performance of the majority of the children in the study would not have been identified as impaired at all if only their total scores on a test of general motor functioning had been considered. An interesting point from this study is that in order to test for all possible developmental motor coordination problems, the diagnostic process should ideally include a wide variety of assessments. However, this is not yet common practice as the review by Geuze et al. shows. Moreover, the single most used assessment tool at the moment (the Movement Assessment Battery for Children; Henderson and Sugden, 1992) has the recognised disadvantage of not picking up specific motor coordination problems such as poor handwriting. In sum, handwriting problems interfering with academic achievement are an important reason for referring a child for assessment and/or treatment but how these children should be classified needs further consideration.

Parallel to the identification of the nature of the motor problems (by means of a broad assessment battery with items representative for the full motor domain) the severity of the motor problems needs to be determined. As the reader will notice from the contributions to this special issue, it is not yet common to make a distinction between moderate coordination problems (i.e., a score on a standardised test of motor functioning between the 15th and the 5th centile) and severe motor coordination problems (i.e., a score on a standardised test of motor function below the 5th centile). Even if this is done, this distinction is not applied at the level of data analysis. Future

studies should pay more attention to this issue in order to strengthen the link between experimental and clinical studies.

Finally, it remains remarkable that so little attention is being paid in the literature to the extent to which problems with activities of daily living (ADL) affect the lives and well being of children with DCD. In a clinical setting it seems self-evident that parents are questioned on this topic during the intake interview, but it is far from common practice to use this information in a systematic way to support research. Development of instruments to assess the quality of ADL of children is therefore necessary. Such ADL instruments should be age, culture, and social context specific. The ADL should be derived from the areas of school/academic achievement, home skills, sports/hobby, and include social skills, focussing on poor motor skills and consequences thereof. It would also help to tune any intervention to the individual needs of the child and its parents. In relation to this point the introduction of the concept of ‘quality of life’, which is currently a hot topic among, for example, children with a chronic disease, may be well worth investigating further among children with DCD.

Acknowledgements

We are grateful to the editors Piet van Wieringen and Peter Beek for giving us the opportunity to publish these papers in Human Movement Science. We thank Phillipa Butcher for her efforts to improve our clumsy English. The valuable work of the guest reviewers is much appreciated.

Reference

American Psychiatric Association (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington DC: American Psychiatric Association.

Reint H. Geuze
Marian Jongmans
Marina Schoemaker
Bouwien Smits-Engelsman
University of Groningen
Developmental and Experimental Clinical Psychology
Grote Kruisstraat 2-1
9712 TS Groningen, Netherlands
E-mail address: r.h.geuze@ppsw.rug.nl