European Academy of Childhood Disability

EACD Recommendations*

German-Swiss Interdisciplinary Clinical Practice Guideline

S3-Standard according to the Association of the Scientific Medical Societies in Germany (AWMF)

Pocket version**

Definition, Diagnosis, Assessment and Intervention of

Developmental Coordination Disorder (DCD)

Version – July 2011

* Terminology in this document is consistent with that of the International Classification of Functioning (ICF)
**Background and references are in the long version

EACD recommendations

International representatives:
Rainer Blank (Chair of the Scientific Committee of the EACD, Task Force “Recommendations”)
Hans Forssberg (Chair of the EACD)

The recommendations were approved by an European panel of experts at the EACD meeting in Brusselles 26th , 2010 and through further DELPHI rounds.
J.M. Albaret (F), A. Barnett (GB), R. Geuze (NL), D. Green (Israel/GB), M. Hadders-Algra (NL), S. Henderson (GB), M.L. Kaiser (CH), A. Kirby (GB), R. P. Lingam (GB), H. Polatajko (CAN), M. Schoemaker (NL), B. Smits-Engelsman (NL), H. van Waelvelde (BE), P. Wilson (AUS) S. Zoia (I) (alphabetical order).

Teams, advisory board, coordination

General coordination
Prof. Dr. med. Rainer Blank
Professor of the Univ. of Heidelberg
Child Centre Maulbronn
D 75433 Maulbronn
E-Mail: blank@kize.de

Coordination of the specific sections of the Clinical Practice Guideline:
“Underlying mechanisms”: P. Wilson (AUS),
“Consequences”, “Comorbidity”, “Definition and assessment”: R. Blank (D)
“Treatment”: B. Smits-Engelsman (NL)

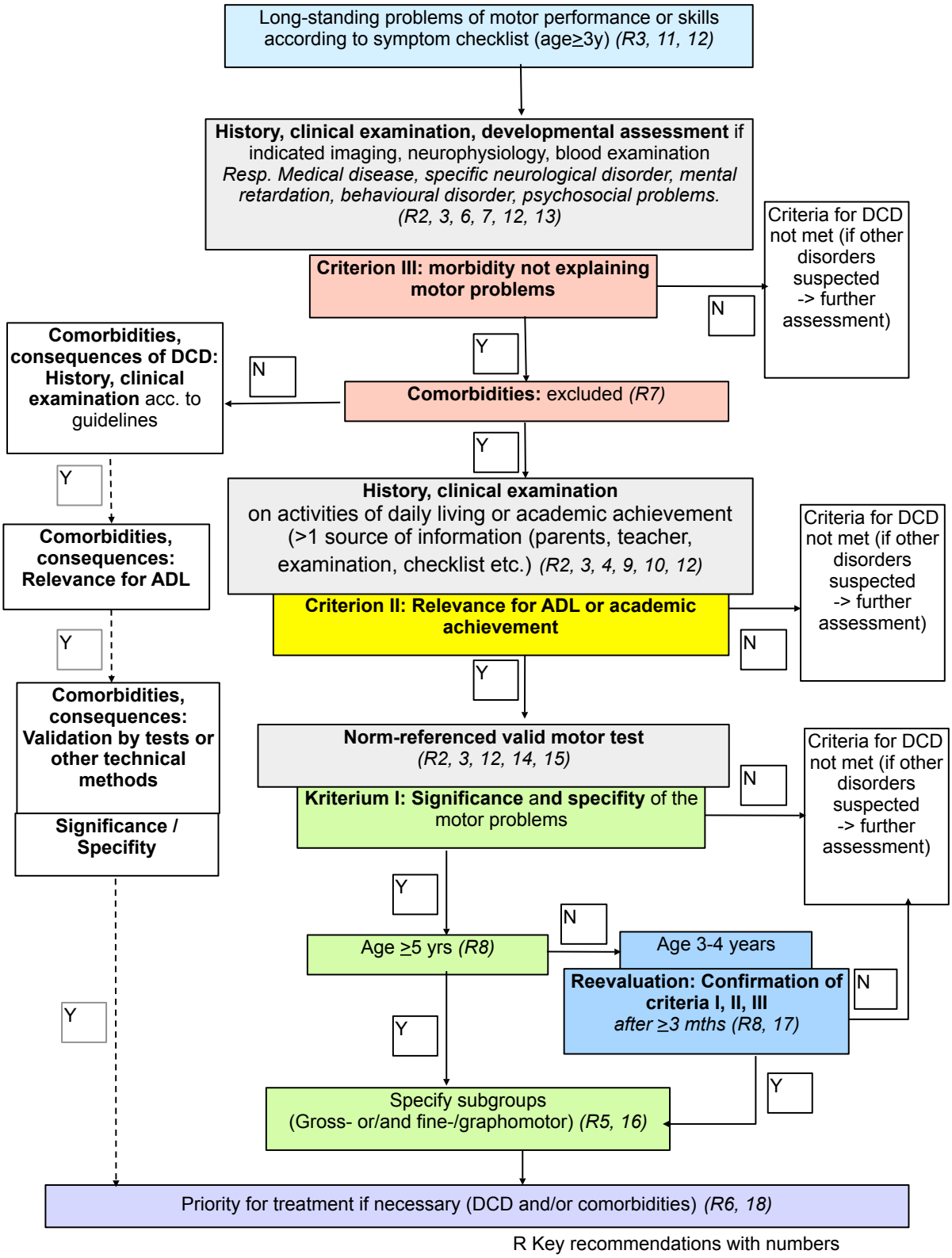
Writing group:
H. Becker (D), R. Blank (D), O. Jenni (CH), M. Linder-Lucht (D), H. Polatajko (CAN), F. Steiner (CH), R. Geuze (NL), B. Smits-Engelsman (NL), P. Wilson (AUS)

The full guideline process was **consistently advised by international experts** in the field:
Bouwien Smits-Engelsman (Physiotherapist, Netherlands)
Helene Polatajko (Occupational Therapist, Canada)
Peter Wilson (Neuropsychologist, Australia)
Reint Geuze (Clinical Physicist/Neuropsychologist, Netherlands)

POCKET VERSION

Recommendations (R) and Statements (S) (according to algorithms)

Definition, assessment, treatment indication (algorithm)



R Key recommendations with numbers

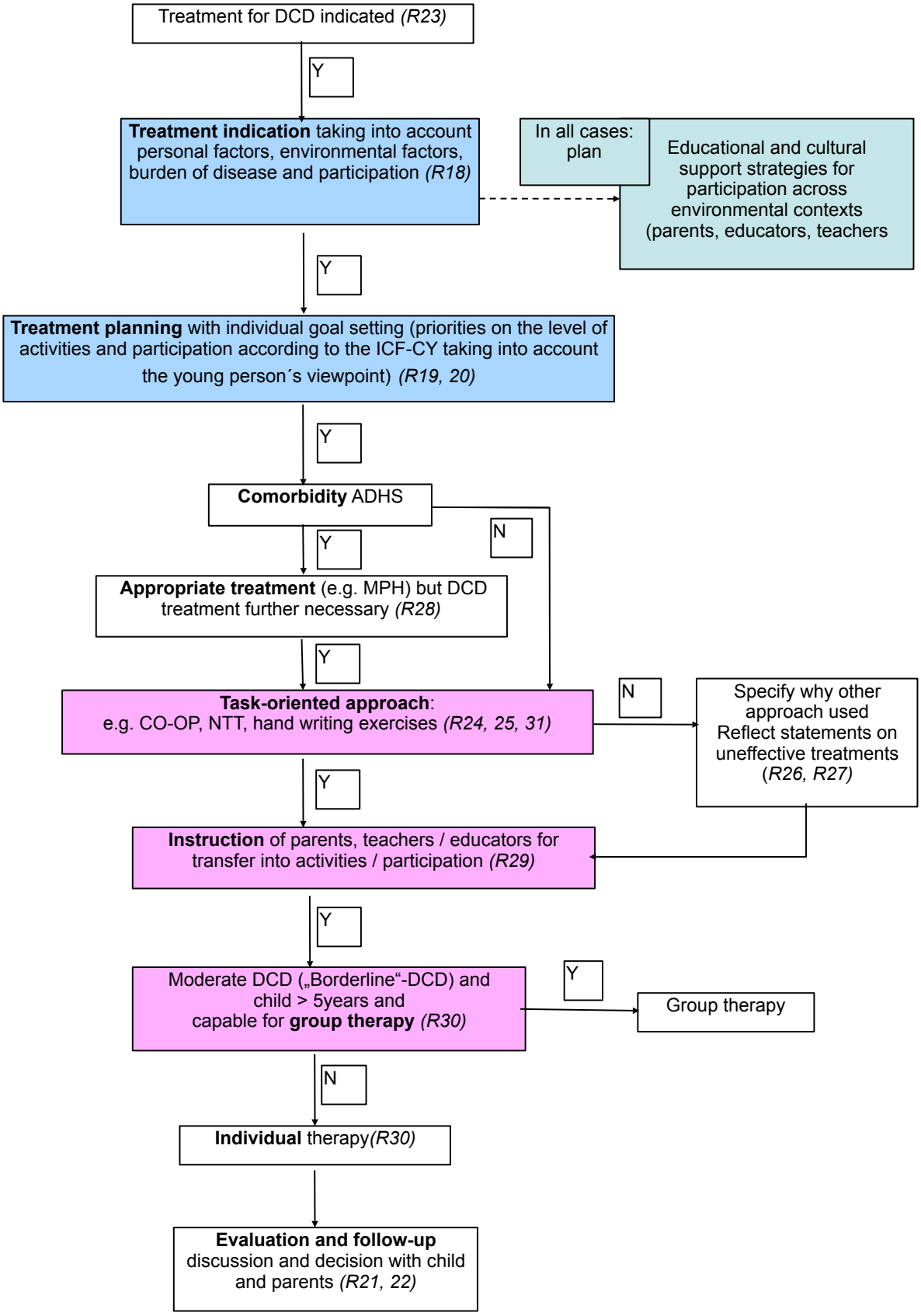
Definition, diagnostic criteria, assessment, treatment indication

R 1	The term Developmental Coordination Disorder (DCD) should be used to refer to children with developmental motor problems in countries which adhere to the DSM IV-TR classification. In countries where ICD 10 has legal status, the term Specific Developmental Disorder of Motor Functions (SDDMF) (F82, ICD 10) should be used.	GCP++
R 5	Children with DCD (SDDMF) having performance deficits in specific areas of motor performance (e.g., gross motor dysfunctions or fine motor dysfunctions (manipulative skills) should be classified according to the ICD subgroups (gross motor dysfunctions F82.0 or fine motor dysfunctions F82.1).	GCP++
R 3	The diagnosis DCD (SDDMF) should be made within a diagnostic setting by a professional who is qualified to examine the specific criteria.	GCP++
R 6	A dual diagnosis of DCD (SDDMF) and other developmental or behavioural disorders (e.g., ASD, learning disorders, ADHD) should be given if appropriate.	GCP++
R 8	The onset of DCD (SDDMF) is usually apparent in the early years, but would not typically be diagnosed before 5 years of age. If a child between 3 and 5 years of age shows a marked motor impairment, even though there have been adequate opportunities for learning and other causes of motor delay have been excluded (e.g., deprivation, genetic syndromes, neurodegenerative diseases), the diagnosis of DCD (SDDMF) may be made based on the findings from at least two assessments carried out at sufficiently long intervals (at least 3 months).	GCP++
R 11	The use of questionnaires (e.g., DCDQ, M-ABC-Checklist) is not recommended for population-based screening for DCD.	LOE 0 Level Aneg.
R 2	Criteria for the diagnosis of DCD (SDDMF) I: Motor performance that is substantially below expected levels given the child's chronological age and appropriate opportunities for skill acquisition. II: The disturbance in Criterion I significantly interferes with activities of daily living or academic achievement III: An impairment of motor coordination that is not solely explainable by mental retardation. The disturbance cannot be explained by any specific congenital or acquired neurological disorder or any severe psychosocial problem	GCP++
R 12	Careful history taking is essential to support the application of Criterion I, II, III. History should include following aspects: 1) Parental report (GCP++): • Family history including DCD (SDDMF), comorbidities, environmental factors (e.g., psychosocial factors), neurological disorders, medical diseases, mental disorders, social condition of the family • Personal history including exploration of resources and possible aetiology (pregnancy, birth, milestones, achievements, social contacts, kindergarten, school (grades, levels), previous and present disorders esp. neurological disorders, sensory problems (previous assessments), accidents • History of the disorder (child) including DCD (SDDMF) and comorbidities and exploration of resources, ADL and participation, individual/personal factors, burden of disease, consequences of the DCD (SDDMF) • Exploration of problems: present level / deficits of motor functions, ADL and participation 2) Teacher report (GCP++) • Motor functions, activities/participation, environmental factors/support systems, individual/personal factors (ICF) • School-based behaviour that bears on comorbidity for attentional disorders, autistic spectrum, learning disorders • academic achievement 3) Views of the child should be taken into account (GCP++); child adapted question-naires (see above) may be useful, but cannot be generally recommended (GCP++).	GCP++

R 13	Concerning criterion I, II, III: Appropriate clinical examination with respect to medical, neurological and behavioural problems is necessary to verify that the disturbance is not due to a general medical, neurological or behavioural condition.	GCP++
S 2	The clinical examination should include • Neuromotor status (exclusion of other movement disorders or neurological dysfunctions) • Medical status (e.g., obesity, hypothyreosis, genetic syndromes, etc.) • Sensory status (e.g., vision, vestibular function) • Emotional and behavioural status (e.g., attention, autistic behaviour, self-esteem) • Cognitive function should there be a history of learning difficulties at school	++
R 7	Co-morbidities should be carefully diagnosed and treated according to established clinical guidelines (e.g., ADHD, autism, dyslexia, specific language impairment).	GCP++
S 1	Because of the high probability of comorbidity in DCD (SDDMF), disorders like ADHD, ASD and learning disorder, particularly specific language disorder and in later age reading problems (e. g. reading comprehension) have to be checked by careful history taking, clinical examination and specific testing if possible according to existing clinical practice guidelines. If there is any hint for interference (e. g. attentional problems) with objective motor testing the motor testing should be repeated e. g. under medication or after other therapeutic intervention for attention problems.	++
R 4	Concerning criterion II: The complete assessment should include consideration of activities of daily living (e.g., self-care and self-maintenance, academic/school productivity, pre-vocational and vocational activities, leisure and play) and the views of the child, parents, teachers and relevant others.	GCP++
R 9	Concerning criterion II: It is recommended to use a validated questionnaire to collect information on the DCD (SDDMF) related characteristics of the child from parents and teachers to support and operationalize Criterion II.	GCP++
R 10	Concerning criterion II: Questionnaires like the DCDQ-R or the MABC2-checklist may be recommended for use in those countries where the questionnaire is culturally relevant and standardised.	LOE 2 Level B
R 14	Concerning Criterion I: An appropriate, valid, reliable and standardized motor test (appropriately norm-referenced) should be used.	
R 15	Concerning Criterion I: In the absence of a gold standard test for establishing Criterion I, the Movement Assessment Battery for Children (M-ABC-2) may be recommended (LOE 2, level B). Where available, the Bruininks-Oseretzky Test, 2nd version (BOTMP2) may also be recommended (LOE 2, level B). However, no German translation and standardisation of the BOTMP2 is currently available. In the absence of generally accepted cut-offs for identifying DCD (SDDMF), it is recommended that when using the M-ABC, or other equivalent objective measures, approximately the 15th percentile for the total score (standard score 7 or less) should be used as a cut-off.	LOE 2 level B
R 17	Concerning Criterion I: For children between age of 3 and 5 years, if the diagnosis is needed (e.g., for treatment purposes), a cut-off of ≤5th percentile is recommended for the total score on the M-ABC, or equivalent objective measures (see also R 8).	GCP++
R 16	Based on the limitations of the available instruments, classification of specific domains of dysfunction (e.g., gross motor or fine motor dysfunction (ICD-Nr. F82.0 and F82.1)), can be made on the basis of clinical judgement. The use of gross motor or fine motor items of standardised assessments may be recommended alongside observation and reports of difficulties across relevant gross motor or fine motor and/or grapho-motor tasks. The guideline group suggests the 5th percentile cut-off of the fine motor subdimension (e.g., M-ABC2, BOTMP2) be used for the diagnosis F82.1 if criteria II and III are met. If all criteria I, II and III are met and if fine motor function is within the normal range then the diagnosis F82.0 can be made.	GCP++

R 18	In determining if treatment is indicated, an account of personal factors, environmental factors, burden of disease and participation should be taken into consideration. Sources of information include history (incl. previous diagnostic and therapeutic history), clinical examination, parental report and if possible self-report, teacher or kindergarten reports, questionnaire information and motor test results.	GCP++

Treatment: indication, planning, intervention, additional support, evaluation (algorithm)



Treatment: indication, planning, intervention, additional support, evaluation

R 23	Children with the diagnosis DCD (SDDMF) should receive intervention.	LOE 1 Level A
R 19	If treatment is indicated, information on personal factors, environmental factors and the burden of disease concerning participation should be used for planning the treatment.	GCP++
S 3	In addition, when planning treatment, evidence of treatment efficacy including regime and/or dose should be considered. As children may have coexisting disorders, e. g. ADHD, treatment priorities need to be established. Individual factors, e. g. motivation or psychosocial factors (e. g. broken-home, parents with psychiatric disorders) may strongly limit the efficacy of motor treatment or treatment may not be possible at all. On the other hand, in some children with DCD (SDDMF) compensatory and environmental support may be sufficient.	++
R 20	For treatment planning, individual goal setting should be used. Goals set at the level of activities and participation should be given priority and the child's viewpoint should be taken into account.	GCP++
R 21	To evaluate treatment effects, measures that capture the level of activities and participation should be used. Sources of evaluation are clinical examination, parent report, teacher / kindergarten reports, questionnaire information, motor test results and child's view.	GCP++
R 22	If testing is performed during the intervention period it should inform adjustments to treatment through adaptation of individual goal setting.	GCP++
R 28	Methylphenidate may be applied in children with DCD (SDDMF) and comorbid ADHD to improve fine motor symptoms (handwriting). We suggest Methylphenidate, where there is appropriate clinical indication for the use of Methylphenidate in children with ADHD and DCD (SDDMF) in combination with further treatment and support to overcome functional problems like writing and drawing.	LOE 2 Level B
R 24	We recommend using task-oriented approaches to improve motor tasks or selected activities based on goal-setting.	LOE 1 Level A
R 25	Task-oriented approaches like the Cognitive Orientation to daily Occupational Performance (CO-OP) and Neuromotor Task Training (NTT) may be recommended as intervention in children with DCD (SDDMF).	LOE 2 Level B
S 4	On body function oriented approaches: Interventions that aim at improving body functions and structures may be effective but it seems that they are less effective in improving activities in children with DCD (SDDMF) than task oriented approaches.	++
S 5	Statements for body function oriented approaches Perceptual motor therapy (PMT) may be an effective intervention method for children with DCD (SDDMF) (LOE 2). The evidence is inconclusive for the effectiveness of Sensory Integration Therapy (SIT) as an intervention for children with DCD (SDDMF) (LOE 3). The evidence is inconclusive for the effectiveness of Kinesthetic Therapy (KT) for children with DCD (SDDMF) (LOE 3) As there is no evidence for the specific efficacy on kinesthesis and inconclusive evidence for the effectiveness of Kinesthetic Therapy (KT) in children with DCD (SDDMF) it is not recommended.	++
R 31	In children with poor handwriting, we suggest a task-oriented self-instruction method to improve the quality of the handwriting	LOE 2 Level B
R 26	There is no evidence that manual medical intervention is effective on the core symptoms of DCD (SDDMF).	LOE 3 Level 0
S 6	It is possible that training of gross motor functions and strength exercises may help in part of the children with DCD to achieve motor competence.	++
S 7	We do not know yet if MI is effective in children with DCD (SDDMF) (LOE 3).	++
R 27	We do not suggest fatty acids + vitamin E to improve motor functions as there is no evidence for an effect on motor functions (LOE 2, B neg.).	LOE 2 B neg

R 29	We recommend professional instruction to educate and coach the parents. This should promote a supportive attitude of parents and nursery nurses/teachers so that they recognize and understand the specific problems of the child with DCD (SDDMF) and so help the children with DCD (SDDMF) to get the opportunity to improve their motor abilities and their participation in daily activities (at home, school, leisure, sports).	GCP++
S 8	Children with DCD (SDDMF) need ample opportunity to learn and practice movements and their participation in daily activities (house, school, leisure, sports). Therefore support from parents and teachers and other related persons is important for regular everyday practice of home exercises in addition to professional treatment.	++
R 30	We suggest considering carefully if a group setting is appropriate for a child.	GCP ++
S 9	It is not suggested that children with DCD (SDDMF) at young ages (5-6years) participate in a non-specific group motor skill program (LOE 2). Group therapy is suggested for some children with DCD (SDDMF) , e. g. isolated graphomotor problems or DCD (SDDMF) with motor performance between the 5th and 15th percentile of a norm-referenced test. In children with borderline DCD (SDDMF) and in children with behavioural co-morbidities, occupational group therapy can be a method to achieve a positive effect on their self-esteem. Individual therapy may have more positive effects in children with severe DCD (SDDMF) (< 5th percentile of a norm-referenced test).	++
R 32	Prewriting exercises for children with poor handwriting may be considered.	LOE 3 Level B

Evaluation of the published peer-reviewed literature*

Level of EVI-DENCE	GRADE	Oxford level	Oxford definition (diagnostic studies)	Oxford definition (intervention studies)
1 (high)	Evidence from a meta-analysis or systematic review of randomized controlled or other well-controlled studies with homogenous findings; homogeneity of the results; Very good quality of the results (e. g. validity and reliability measures >0.8)	I a	Systematic review or meta-analysis of well-controlled studies with homogenous findings	Evidence from a meta-analysis or systematic review of randomized controlled trials (with homogeneity)
	Evidence from at least one randomized controlled trial (intervention study) or well-controlled trial with well-described sample selection (diagnostic study); confirmatory data analysis, good standards (e.g. QUADAS rating >10) Very good quality of the results (e. g. validity and reliability measures >0.8)	I b	Validating cohort study with good reference standard; clinical decision rule tested within on clinical centre. E. g. randomised / representative or consecutive sample; confirmatory statistics; prospective cohort study with good follow-up (>80%)	Evidence from at least one randomized controlled trial
2 (moderate)	Evidence from at least one well-designed, controlled study without randomization sufficient standards (e. g. QUADAS rating >7); homogeneity of the results; Good quality of the results (e. g. validity and reliability measures >0.6)	II a	Systematic review of level I or II studies	Evidence from systematic review of cohort studies (with homogeneity) or Evidence from at least one controlled study without randomization
	Evidence from at least one well-designed other type of quasi-experimental study (non-randomised, non-controlled) Good quality of the results (e. g. validity and reliability measures >0.6)	II b	At least one exploratory cohort study with good reference standards; clinical decision rule after derivation or validated on split-sample or databases or retrospective cohort study with consecutive sample	Individual cohort study (incl. low quality randomised studies e. g. <80% follow-up) Evidence from at least one other type of quasi-experimental study
3 (low)	Evidence from well-designed non-experimental descriptive or observational studies (e. g. correlational studies, case-control-studies QUADAS rating >4; Moderate homogeneity of the results; Moderate quality of the results (e. g. validity and reliability measures >0.4)	III	Non-consecutive cohort study or studies without consistently applied reference standards or descriptive study	Evidence from case-control studies or Evidence from observational studies
4 (very low)	Evidence from expert committee reports or experts	IV / V		Evidence from expert committee reports or experts

* According to the scientific evidence: levels of evidence (modified according to Oxford Centre for evidence-based Medicine (March 2009) and to SIGN 1999, hierarchy of evidence proposed by the United Kingdom National Institute for Health and Clinical Excellence) using the GRADE system.
Grading / Scorings adopted from the German S3-Guideline for Childhood Obesity (2009 available from http://www.adipositas-gesellschaft.de/daten/Leitlinie-AGA-S3-2009.pdf), and from the GRADE Working group (published in Britisch Medical Journal 2004;328:1490, Doi:10.1136/ bmj.328.7454.1490, Grading quality of evidence and strength of recommendations, Andrew D Oxman, Informed Choice Research Department, Norwegian Health Services Research Centre, PO Box 7004, St Olavs Plass, 0130 Oslo, Norway)

Levels of recommendations

Level of Evidence (LOE)	**Recommendation for / against**	**Description**
1	“should" „should not“ „is not indicated”	**A**
2	"may" „may not“	**B**
3 or 4	“may be considered“ or „do not know“	**0**

Strength of recommendations (R) based on level of evidence

Strength of R	**Description**	**Criteria**
A (Aneg.)	Strongly recommended that clinicians (do not) routinely provide the intervention / the assessment to eligible residents	Good quality of evidence and substantial net benefits Fair quality of evidence and substantial net benefit
B (Bneg.)	Recommended that clinicians (do not) routinely provide the intervention / the assessment to eligible residents	**or** Good quality of evidence and moderate net benefit **or** Fair quality of evidence and moderate net benefit
0	No recommendation for or against routine provision of the intervention / the assessment Insufficient evidence for recommendation of the intervention / the assessment	Good quality of evidence and small net benefit **or** Fair quality of evidence and small net benefit Poor quality of evidence (conflicting results; balance between benefits and risks difficult to determine; and poor study design)

(adaptation from the Canadian Guide to Clinical Preventive Health Care and from US Preventive Services Resources**)**

Recommendations based on formal consensus

A number of recommendations are based on a formal consensus within a nominative group process, particularly those dealing with definition. Rs based on group consensus (Good Clinical Practice (GCP)) are included in the guideline. A strong agreement (=strong consensus >=95%, if only 10 or less participants were present >=90% agreement) is marked as GCP ++, a moderate agreement (=consensus >=75 to 95% (90% if only 10 or less participants were present) is marked as GCP +.