Developmental Coordination Disorder

Clinical Practice Guidelines for Occupational Therapists in Western Australia

Context

Following enquires made to the Western Australian Occupational Therapy Association (WAOTA) about the role of occupational therapists working with individuals whose learning and development is affected by motor difficulties, a working party was formed by members of Developmental Occupational Therapy WA (Inc) – DOT(WA). This working party was established to create clinical guidelines for the identification, assessment and intervention of Motor Dysgraphia and Developmental Coordination Disorder (DCD).

Two working party sub-groups were created at the beginning of 2016; one to address guidelines for Motor Dysgraphia and the other to address guidelines for DCD.

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Purpose of the Clinical Practice Guidelines

DCD is a well-defined diagnosis in the Diagnostic and Statistical Manual of Mental Disorders (DSM-V), with national and international academic associations providing publications and resources on identification, assessment and management of children with DCD. The purpose of these clinical practice guidelines is not to replicate work already completed by these associations, but to provide occupational therapists working in Western Australia with an understanding of:

- The role of occupational therapy in the DCD diagnostic process;
- Current terminology;
- Reporting on DCD;
- Best practice occupational therapy intervention;
- Accommodations and special provisions available within the WA education system; and
- Evidence-based publications and resources in the community.

These guidelines have also been developed to inform other disciplines about the role of occupational therapists in the assessment and intervention of children and adolescents with DCD.

Contents

Section 1: Definition and Description

Background

Developmental Coordination Disorder (DCD) is a unique neurodevelopmental disorder occurring in an estimated 5 to 6% of the population across cultures, races, and socio-economic conditions (Blanke, Smits-Engelsman, Polatajko, Wilson, European Academy for Childhood Disability, 2012). DCD is highly heritable and seen more commonly in males than in females; male to female ratios vary from 2:1 to 7:1 (Blank et al, 2012; Dewey & Bernier, 2016). Co-morbidity with a number of other neurodevelopmental disorders is common with estimates up to 70% of children have a dual diagnosis (Blank et al, 2012; Cairney, Veldhuizen & Szatmari 2010; Dewey & Bernier, 2016).

Children with DCD have significant functional difficulties in everyday tasks that require motor coordination (Harris, Mickelson & Zwicker, 2015). These include:

- Sports – e.g. having difficulty in balance, being unable to jump, hop, skip.
- Self-care skills – e.g. poor body awareness, inability to coordinate dressing.
- School skills – e.g. handwriting, drawing, scissor skills.

There is strong empirical evidence that DCD may persist into adolescence and lead to the development of secondary educational and mental health issues (Gibbs, Appleton, & Appleton, 2007; Harris et al, 2015). This may include difficulties with social skills, academic and behavioural problems, poor self-esteem and further motor delay due to lack of practice (Wehrmann, Chiu, Reid & Sinclair, 2016).

Assessing the impact of motor abilities on everyday tasks is a core occupational therapy skill (Dunford, Missiuna, Street, & Sibert, 2005). Occupational therapists frequently receive referrals from health and educational professionals for children who present with delays in fine and gross motor skills, poor handwriting and clumsiness because of difficulty with motor coordination.

Assessment for DCD is conducted by health professionals most notably occupational therapists and/or physiotherapists, with a medical practitioner required to exclude other medical causes and make the final diagnosis. Early and effective intervention for this condition is imperative. Occupational therapy management of children with DCD should be holistic, family centred, comprehensive and individualised to meet the unique needs of each child. Intervention should include: obtaining goals from the child and family; involvement of teachers, caregivers, parents and relevant others; modification of the task and/or environment; consideration of educational accommodation and special provisions.

Terminology

Historically, there have been numerous terms used in the literature to describe children with motor difficulties including:

- Clumsy Child Syndrome;
- Minimal Brain Dysfunction;
- Developmental Dyspraxia;
- Perceptuomotor Dysfunction;
- Disorder of Attention and Motor Perception (DAMP);
- Sensory Integration Disorder; and
- Motor Learning Difficulty (Gibbs et al, 2007)

The different labels used to describe this condition created confusion and were counterproductive. In 1994, an International Consensus Meeting on Children and Clumsiness was held in order to agree on the diagnostic term to be used and future research strategies, which would investigate assessment and intervention. The term agreed upon was **Developmental Coordination Disorder** as described in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* (American Psychiatric Association, 1994). The diagnostic criteria were further refined in 2013, with the publication of the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)* (American Psychiatric Association, 2013).

DCD vs Dyspraxia

The term dyspraxia is used in many ways, by different people and professionals. In the past it has been used by occupational therapists and others as a broad way to describe children with motor coordination difficulties (Kirby & Sugden, 2007). However, there is no internationally agreed definition or description of the term dyspraxia and it is not included in the DSM-5 (Movement Matters UK, 2012). The International Consensus at DCD12: 12th International Conference

on Developmental Coordination Disorder in 2017 suggested DCD would encompass dyspraxia.

Developmental Coordination Disorder should be used to refer to children with substantial coordination and motor skills impairment, in line with the literature and international consensus.

Co-morbidities

Developmental Coordination Disorder is commonly associated with other childhood onset disorders and developmental conditions (Wilson, 2005). There is such a high probability of comorbidity, in fact, that some researchers have declared a child with only a diagnosis of DCD to be the exception rather than the rule (Visser, 2003). As DCD is a heterogeneous disorder, difficulties can be displayed across a variety of domains (Dewey & Bernier, 2016).

When a child meets the criteria for DCD and another co-occurring developmental condition, *a dual diagnosis should be given* and treated according to established clinical guidelines (Blank et al, 2012). Dual diagnosis also serves to set priorities for intervention (Blank et al, 2012).

It is important to note, if there is interference with objective motor testing such as attention difficulties, the motor testing should be repeated once this has been addressed e.g. under medication or after other therapeutic intervention for attention problems (Blank et al, 2012).

The most widely recognised conditions that commonly occur with DCD are outlined below:

Attention Deficit and Hyperactivity Disorder (ADHD)

Prevalence of DCD amongst children with ADHD is reported to be 50% (American Psychiatric

Association, 2013). In a study by Watumberg, Waiserberg, Zuk and Lerman-Sagie (2007) 55.2% of children diagnosed with ADHD were found to have DCD. Children with inattentive subtype of ADHD may have the highest rate of motor impairment (Kaiser, Schoemaker, Albaret & Geuze, 2014). Based on these findings it is recommended that all children with attention problems be assessed for signs of DCD.

It was noted by Dewey and Volkovinskaia (2018) that young people with a dual diagnosis of ADHD and DCD were similar to typically developing adolescents in overall Health Related Quality of Life (HRQoL); however they may be at higher risk of feeling lonely, unhappy and have more negative feelings towards school. Children with DCD and ADHD can also have poorer physical wellbeing (Dewey & Volkovinskaia, 2018). Young people with this dual diagnosis may have less favourable outcomes than children with only DCD and require more services and input from health care professionals.

Specific Learning Disorders/Disabilities (SLD)

Children with any level of motor impairment from mild to more severe can present with additional learning difficulties. This includes problems with reading, writing, spelling and mathematics (CanChild, 2018a). It can sometimes be difficult to determine if a child's performance is due to motor coordination issues, specific learning disabilities, or both. It can be helpful to carefully observe the academic tasks with which the child has difficulty. For example a child with only motor difficulties may avoid or have difficulties writing stories with the detail expected for their age, however verbally they can have excellent vocabulary and tell elaborate stories. A child who has learning difficulties alone will show difficulty in tasks which have no motor component (CanChild, 2018a). The recommendation is that all children presenting with learning difficulties should be assessed for signs of motor impairment. It may also be helpful to refer to a psychologist for formal assessment of learning and intelligence (CanChild, 2018a).

Specific Language Impairment (SLI)

Current research shows up to 90% of children with speech and language disorders can have co-occurring motor skill impairment (CanChild, 2018a). These high numbers suggest the potential of a common underlying cause of both language and motor disorders. With input from both an Occupational Therapist and Speech Pathologist it can be determined if a child has a motor-based problem, a speech and language issue or both (CanChild, 2018a).

Autism Spectrum Disorder (ASD)

In the DSM-IV, a diagnosis of ASD excluded the diagnosis of DCD. However, the DSM-5 has proposed to allow a joint diagnosis of ASD and DCD if the level of a child's social impairment is consistent with a diagnosis of ASD (American Psychiatric Association, 2013).

Joint Hypermobility Syndrome

The comorbidity figures for the incidence of Joint Hypermobility Syndrome and DCD are not currently available. However anecdotally occupational therapists in Western Australia are finding children presenting with DCD also have joint hypermobility, so from a clinical perspective this is an area of interest. More research is required before any recommendations can be made.

DCD and Mental Health

This area of comorbidity is clinically highly significant. Behavioural problems and social and emotional disorders may develop as a result of longstanding motor impairment, lack of participation and related functional difficulties. Mental health issues may also impact on the development of age appropriate motor skills. The relationship between mental health and motor coordination continues to be an area of research interest in Western Australia.

Children with DCD have high levels of emotional and behavioural problems (Crane, Sumner & Hill, 2017). Piek et al. (2007) found higher levels of depressive symptomology in children with a DCD diagnosis, while Pratt and Hill (2011) found children with DCD experienced significant levels of anxiety including panic disorder, social phobias and obsessive-compulsive behaviours. Cairney et al. (2010) reported both mood and anxiety disorders in children with DCD. Rigoli, Piek & Kane (2012) found motor coordination had an indirect impact on emotional functioning through negative self-perceived competence in occupations. It is recommended that health professionals monitor the mental health and well-being of a child with a diagnosis of DCD (Crane et al., 2017). Similarly, it is recommended those referred for social and emotional difficulties are assessed for motor coordination deficits (Rigoli et al, 2012).

When assessing a child for DCD it is important to consider and document any co-morbid conditions. Where required, refer to an appropriate health, education and/or medical professional for further assessment.

Section 2: Assessment Process

General Principles

- Although motor coordination difficulties can be identified from a young age, DCD is not typically diagnosed before 5 years of age (Blank et al, 2012).
- The complete clinical assessment should include family history; personal history of the child including milestones, comorbidities and possible aetiology; consideration of function in activities of daily living (e.g. self-care, school and vocational activities, leisure and play); and the views of the child, parents, teachers, and relevant others (Blank et al, 2012).
- Questionnaires: There are some parental and teacher questionnaires which may be useful as a screening or a first step diagnostic tool, and help clinicians gain information about the child's everyday activities and self-perception. Please see Section 6: Further Resources for direct links to checklists.
- Assessment for DCD is conducted by an experienced health professional (e.g. occupational therapist, physiotherapist or exercise physiologist). A medical practitioner must make the final diagnosis to rule out other possible explanations for the child's difficulties in motor coordination.
- The occupational therapist can administer standardised motor skill assessment measures and use these results alongside clinical observation to determine if a child's motor skills are substantially below the norm.
- The occupational therapist must ensure the standardised assessment results are considered a valid reflection of the child's motor skills. Factors that may render a score invalid include, but are not limited to: inattention, emotional dysregulation, communication impairments, low motivation, behavioural issues or the tool may be inappropriate for the cultural background.
- DCD should not be diagnosed if:
    - Motor performance cannot be assessed by a motor test (e.g. due to intellectual disability or a medical disorder); and/or
    - After a comprehensive assessment the motor dysfunction can be explained by another condition (Blank et al, 2012).

Addressing the diagnostic criteria for DCD

The two diagnostic frameworks currently in use are the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) and International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10).

The DSM–5 and the ICD-10 should be used clinically as companion publications (American Psychiatric Association, n.d.).

In Western Australia both the DSM-5 and ICD-10 classifications are used and have legal status. However, the DSM-5 is the primary diagnostic tool discussed in the DCD literature and as such DOT(WA) Inc. recommends this classification to be used where possible.

Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)

The DSM-5 is used by health care and medical professionals in Australia and much of the world as the authoritative guide for assessment and diagnosis of mental disorders. It is published by the American Psychiatric Association with the most recent edition released in 2013. The DSM-5 classifies DCD as a discrete motor disorder under the broader heading of neurodevelopmental disorders (Blank et al, 2012).

The specific DSM-5 criteria for DCD as cited in American Psychiatric Association (2013) are as follows:

A. ***The acquisition and execution of coordinated motor skills is substantially below that expected given the individual's chronological age and opportunity for skill learning and use. Difficulties are manifested as clumsiness (e.g., dropping or bumping into objects) as well as slowness and inaccuracy of performance of motor skills (e.g., catching an object, using scissors or cutlery, handwriting, riding a bike, or participating in sports).***

Occupational therapists often receive referrals for children who present with functional difficulties listed in criteria A. Parents and educational professionals are

often aware of the skills gap between the child and their peers and seek assessment and advice.

The use of a norm-referenced standardised assessment is recommended along with clear clinical reasoning to support a diagnosis of DCD. The Bruininks-Oseretsky Test of Motor Proficiency (Bruininks & Bruininks, 2005) or Movement ABC-2 (Henderson, Sugden & Barnett, 2007) are both valid assessments for addressing DCD criterion A. The European Academy for Childhood Disability recommends the Movement ABC in the first instance for clinicians wishing to evaluate motor performance in children with DCD (Blank et al., 2012). A diagnosis of DCD can be supported with the following assessment results:

Table One: Standardised assessments to support the diagnosis of DCD

The Movement ABC-2 (Henderson et al, 2007)	Criteria for DCD Diagnosis
3-5 years	≤5th percentile Caution is used in diagnosing children under 5 and it is recommended that diagnosis only be suggested after the child has scored ≤5th percentile on the MABC-2 in two assessments that have been completed at least three months apart (to avoid learning effect). (Blank et al., 2012; DCD12: 12th International Conference on Developmental Coordination Disorder, 2017; Blank et al., 2019)
5 years+	Total test score ≤16th percentile OR ≤ 5th percentile in one domain only (e.g. fine motor, balance or aiming and catching) providing all other diagnostic criteria sufficiently met. If a child shows significant difficulties on one domain (i.e., performs below the 5th percentile), but performs above the 16th percentile on other domains, the child may be considered to have a domain specific DCD (e.g., fine motor, gross motor). Repeated testing or an additional motor test may be used to support the diagnosis. (Blank et al., 2012; Blank et al., 2019)
The Bruininks-Oseretsky Test of Motor Proficiency, Second Edition (BOT-2) (Bruininks & Bruininks, 2005)	Criteria for DCD Diagnosis
3-5 years	≤5th percentile
5 years +	Total motor composite score ≤16th percentile. ≤5th percentile in any one domain providing all other criteria sufficiently met. (Blank et al., 2012; Blank et al., 2019)

B. ***The motor skills deficit in Criterion A significantly and persistently interferes with activities of daily living appropriate to chronologic age (e.g., self-care and self-maintenance) and impacts academic/school productivity, prevocational and vocational activities, leisure and play.***

Information from an occupational therapy initial assessment can be used to address Criterion B including consideration of activities of daily living (e.g. self-care and self-maintenance, academic/school productivity, prevocational and vocational activities, leisure and play) and the views of the child, parents, teachers, and relevant others (Blank et al, 2012). Standardised checklists can be used to help address this criterion. Please see Section 6: Further Resources for specific links.

C. ***Onset of symptoms is in the early developmental period.***

Information regarding developmental history can be gathered by the occupational therapist. Medical history gained from the medical practitioner may be required for this criterion. It is important to note that children with DCD may meet early developmental milestones however later show difficulties acquiring learned motor skills.

D. ***The motor skills deficits are not better explained by intellectual disability or visual impairment and are not attributable to a neurologic condition affecting movement (e.g., cerebral palsy, muscular dystrophy, degenerative disorder).***

Assessment by a medical practitioner is required to rule out other neurological conditions. A medical practitioner must make the final diagnosis so that the child can meet the above diagnostic criterion (American Psychiatric Association, 2013). A measure of intelligence is not a requirement for a diagnosis of DCD (Kamps and Hart, 2015). However, if intellectual impairment is suspected it is prudent to refer to a clinical psychologist for assessment to exclude intellectual disability as a reason for motor delay.

International Statistical Classification of Diseases and Related Health Problems, tenth revision (ICD-10)

The International Statistical Classification of Diseases and Related Health Problems is the World Health Organisation's standard diagnostic tool for epidemiology, health management and clinical purposes. It is used to monitor the incidence and prevalence of diseases and other health problems, providing a picture of the general health situation of countries and populations. ICD is increasingly used in clinical care and research to define diseases and study disease patterns, as well as manage health care, monitor outcomes and allocate resources. Australia has used the ICD-10 since 1998 (World Health Organisation, 2018b).

DCD can be found listed in the ICD-10 diagnostic manual under *F82.0. Specific developmental disorder of motor function* (SDDMF) and is cited by World Health Organisation (2016) as follows:

A disorder in which the main feature is a serious impairment in the development of motor coordination that is not solely explicable in terms of general intellectual retardation or of any specific congenital or acquired neurological disorder. Nevertheless, in most cases a careful clinical examination shows marked neurodevelopmental immaturities such as choreiform movements of unsupported limbs or mirror movements and other associated motor features, as well as signs of impaired fine and gross motor coordination.

IMPORTANT NOTE: The ICD-11 release is an advance preview only and will come into effect in 2022. At this current time ICD-10 is still in use (Terron Cuadrado, 2018; World Health Organisation, 2018a).

Section 3: Occupational Therapy Management

General Principles

- Occupational therapy management for children and young people with DCD needs to be holistic, family centred, comprehensive and individualised to meet the unique needs of each child within the context of their family and broader environment.
- Individual goal setting with the young person should always be used (Blank et al, 2012). Goals should be based around participation in specific functional activities which are meaningful for the young person. The family and school should be consulted when identifying priorities for intervention within the daily routine (Blank et al, 2012).
- The involvement of parents, teachers, teacher assistants, other health professionals and the child in managing DCD is successful in encouraging, promoting and practicing functional skills in different environments. Occupational therapists should contribute to a child's Individual Education Plan (IEP) to ensure there are adequate supports available in the school environment.
- It is beneficial to encourage an active lifestyle and supported participation in physical activity for all children with DCD (CanChild, 2018b).
- Modifications of the task and/or environment should always be considered in addition to addressing a child's skills.

Top-Down or Bottom-Up?

When reviewing interventions for children with DCD there is seen to be two main approaches: **task-oriented** or "top-down" and **process-oriented** or "bottom-up":

Process-oriented approaches operate under the premise that improving the child's underlying deficits in sensory integration, muscle strength or visual motor perception, for example, will enhance ability to perform the task as a whole (Blank et al, 2012; Kennedy, Brown & Stagnitti, 2013). Examples of process-oriented approaches are Sensory Integration Therapy (SIT), kinaesthetic training, Perceptual Motor Therapy (PMT), or combinations (Blank et al, 2012).

Currently, there is no evidence to support the use of process-oriented intervention approaches in the management of DCD (Pless & Carlsson, 2000; Preston et al., 2017; Smits-Engelsman et al., 2013; Smits-Engelsman et al., 2018).

Task-oriented approaches propose that changes in motor performance rely upon many variables that are task- and environment-specific. The child is observed completing a task to identify behavioural and environmental factors which may be impacting on performance (Blank et al, 2012). Interventions which are task-oriented teach specific motor skill activities and use cognitive processes to support the learning of new movements (Missiuna, Rivard & Campbell, 2017). Examples of these approaches are Cognitive Orientation to Occupational Performance (CO-OP) and Neuromotor Task Training (NTT) (Blank et al, 2012).

Task-oriented approaches which focus on the International Classification of Functioning, Disability and Health: Children and Youth Version (ICF-CY) level of activities and participation (World Health Organisation, 2007) are likely the most effective interventions for DCD (Miyahara et al., 2017; Preston et al., 2017; Smits-Engelsman et al., 2018; Yu et al., 2018).

When planning intervention, occupational therapists should consider the effectiveness and level of evidence for a particular treatment. Task-oriented approaches are recommended to improve performance in motor tasks (Blank et al., 2012). Please see Section 6: Further Resources for the most recent research to help guide you in the management of DCD.

Accommodation and Special Provisions

The School Curriculum and Standards Authority (SCSA) is responsible for Kindergarten to Year 12 curriculum, assessment, standards and reporting for all Western Australian Schools. The SCSA recognises that disability, impairment or medical conditions can significantly affect access to standardised assessments and that adjustments may be needed for these students (SCSA, 2018).

The *Guidelines for Disability Adjustments for Time Assessments* provides important information relevant to assessments including National Assessment Program – Literacy & Numeracy (NAPLAN), Online Literacy and Numeracy Assessment (OLNA), Externally Set Tasks (ESTs), school-based timed assessments for

courses and Australian Tertiary Admission Rank (ATAR) course examinations (SCSA, 2018).

Evidence of a diagnosis, impairment or medical condition is required for approval of adjustments and Occupational Therapists are frequently called upon to provide this. When recommending accommodations or special provisions for students in Western Australian schools, especially in timed assessments, it is imperative that therapists familiarise themselves with these guidelines.

Occupational therapists should thoroughly review the SCSA guidelines https://senior-secondary.scsa.wa.edu.au/assessment/disability-adjustment-guidelines as part of each individual application to ensure up to date, accurate and appropriate recommendations are made.

Any recommended adjustments should have the goal of supporting the student to access the assessment. The expectation from the SCSA is that the lowest level of support should be trialled, only moving to a higher form if the first is proven inadequate to access the task. The onus will be on the school to demonstrate a higher form of support is justified, and this will be supported by the occupational therapists' assessment and report. The following types of adjustments may typically be provided, depending on the assessment:

1. Rest breaks
2. Extra working time
3. Extra time at student's discretion
4. Special format papers – large print, Braille, black and white print
5. Oral/sign support
6. Support person
    a. Reader
    b. Scribe
7. Use of a computer/assistive technology – not applicable for OLNA
8. Modification to environment, e.g. separate supervision, special furniture, lighting
9. Access to medication, e.g. diabetic support (SCSA, 2018)

On Page 12 of the Guidelines for Disability Adjustments for Timed Assessments (2018) the following provisions are available to students diagnosed with DCD in timed assessments, dependent on the functional impact of the condition:

Table Two: Provisions available for students diagnosed with DCD

Possible difficulty/impairment in timed assessment		**Possible provisions available (dependent on functional impact of condition)**	**Minimum documentation**
DCD	Difficulties with planning and coordinating physical movement including handwriting	• Modified writing lines (dotted thirds or wide spaced) • Rest breaks • Extra working time • Use of a computer/ scribe	• Specialist medical report (Occupational Therapist) • School case management comments

Section 4: Reporting

General Principles

- Occupational Therapy reports are written for a variety of audiences including parents, teachers, school psychologists, the SCSA and other health professionals. Reports should therefore be written clearly and concisely with assessments described and unfamiliar language defined.
- An Occupational Therapy report should include:
  - Relevant family, medical and developmental history.
  - Assessments administered, their description and whether the score meets DCD criterion A.
  - Child and family's goals, strengths and priorities for intervention.
  - Any specific recommendations and requests for special accommodations.
- A clear description of the functional impact of DCD is imperative; including the issues a child is having with participating in school, home and leisure tasks. This allows parents, teachers and other health professionals to understand how DCD is affecting the child's everyday life and demonstrates how the child meets DCD criterion B.
- Occupational therapy reports written to substantiate and support the request for provision of special examination arrangements in ATAR course examinations and other Western Australian Certificate of Education (WACE) assessments need to be comprehensive and additionally include:
  - Clear statements as to the reason(s) the child or young person is experiencing difficulty accessing the curriculum.
  - **Clear description of the functional impact (including pain where applicable) on the young person's performance in education assessments. This is a vital part of reporting for SCSA, as significant functional impacts for the child or young person are more relevant than a specific diagnosis in isolation.**
  - Clear descriptions of the social and/or emotional impact DCD is having on the young person.
  - Clear recommendations regarding special provisions in ATAR course examinations and other WACE assessments being applied for as per the SCSA documentation of available provisions.
- Occupational therapy assessments and reports for SCSA need to be completed at the beginning of the year of application. This means that for special provisions for ATAR course examinations, the assessment and report need to occur at the beginning of Year 12. Please consult the current SCSA application form for specific information on closing dates for applications each year.

Example Reporting for DCD:

Following the administration of The Movement ABC-2 [and/or] *The Bruininks-Oseretsky Test of Motor Proficiency, Second Edition (BOT-2)* [CHILD'S NAME] *has demonstrated motor skills substantially below those expected for a child of his/her age. Furthermore, the DCDQ'07 assessment has revealed that* [CHILD'S NAME]*'s motor skills deficits significantly and persistently impact upon his/her participation in activities of daily living. As such,* [CHILD'S NAME] *meets criterion A and criterion B in the diagnosis of Developmental Coordination Disorder in the DSM-5.*

If the report will be used to substantiate and support a request for provision of special examination arrangements a clear statement is required:

These assessment results together with the functional limitations show [CHILD'S NAME] *requires special arrangements in order to access education assessments. These are as follows:…*

If a child has not yet been assessed by a medical practitioner, it may be necessary to add:

It is recommended that [CHILD'S NAME] *be assessed by their medical practitioner to ensure that their motor coordination difficulties cannot be better explained by another medical condition, for a diagnosis of DCD to be confirmed.*

Section 5: Conclusion

DCD is one of the most common neurodevelopmental disorders of childhood characterised by significant impairment in motor coordination that interferes with activities of daily living. Children with DCD can experience numerous functional difficulties including difficulty dressing, handwriting and playing team sports (Dewey & Bernier, 2016).

Historically, the terminology of coordination disorders has been confused; Developmental Coordination Disorder should be the term used to refer to children with substantial motor skills impairment, in line with the literature and international consensus.

Early diagnosis, treatment and education support are essential and more likely to provide a sustained improvement in motor coordination skills (Gibbs et al., 2007). As a direct consequence of early intervention programmes, young people show improved self-esteem, socialisation and more successful and rewarding participation in their community (Gibbs et al., 2007).

Occupational therapists have a key role in the diagnosis and management of a child or young person with DCD. Occupational therapy reports can be used by families and schools to support requests for accommodations and special provisions within the education system, including for examinations. This clinical practice guideline aims to provide Western Australian occupational therapists with an understanding of their role in working with children who have DCD; accommodations and special provisions within the education system; and evidence-based publications and resources currently available in the national and international community.

Section 6: Further Resources

The *European Academy of Childhood Disability* is an academic association of professionals working with children with disability throughout Europe. The aim of the EACD is to ensure the development of high quality research and teaching in the field of childhood disability; improve the care children receive and to raise professional standards.

- In 2011 the EACD published a Clinical Practice Guideline for health professionals detailing the definition, diagnosis, assessment and intervention of DCD. Both the full report and short report are excellent resources for occupational therapists and can be found here: https://www.eacd.org/publications.php
- In 2019 the EACD published an updated Clinical Practice Recommendations for DCD to reflect current research and understanding which can be found here: https://onlinelibrary.wiley.com/doi/full/10.1111/dmcn.14132
- The 2019 paper adds:
  - Updated international clinical practice guidelines.
  - Refined and extended recommendations on clinical assessment and intervention.
  - A critical synopsis of current research on mechanisms of DCD.
  - A critical synopsis of psychosocial issues in DCD.
  - The first international recommendations to consider adolescents and adults (Blanke et al., 2019)
- The EACD plan to revise these guidelines every 5 years, with the next publication due in 2022.

CanChild is a non-profit research and educational centre located within the School of Rehabilitation Science at McMaster University in Ontario, Canada. Their research is focused on improving the lives of children with a variety of developmental conditions and their families. *CanChild* is an excellent source of DCD information and evidence-based resources for both health professionals and families. The website can be found here: https://www.canchild.ca/en/diagnoses/developmental-coordination-disorder

Systematic Reviews

Miyahara, M., Hillier, S. L., Pridham, L., & Nakagawa, S. (2017). Task-oriented interventions for children with developmental co-ordination disorder. *The Cochrane database of systematic reviews.* 7, CD010914.

Preston, N., Magallón, S., Hill, L. J. B., Andrews, E., Ahern, S. M., & Mon-Williams, M. (2017). A systematic review of high quality randomized controlled trials investigating motor skill programmes for children with developmental coordination disorder. *Clinical Rehabilitation. 31*(7), 857-870.

Smits-Engelsman, B. C., Vinçon, S., Blank, R., Quadrado, V. H., Polatajko, H., & Wilson, P. H. (2018). Evaluating the evidence for motor-based interventions in developmental coordination disorder: A systematic review and meta-analysis. *Research in Developmental Disabilities.* 74, 72-102.

Yu, J. J., Burnett, A. F., & Sit, C. H. (2018). Motor Skill Interventions in Children With Developmental Coordination Disorder: A Systematic Review and Meta-Analysis. *Archives of Physical Medicine and Rehabilitation*. *99*(10), 2076-2099.

Books

Barnett, A. & Hill, E. (2018). Understanding Motor Behaviour in Developmental Coordination Disorder. Taylor & Francis Ltd, United Kingdom.

Cairney, J. (2015). Developmental Coordination Disorder and its consequences. University of Toronto Press, London.

Identification of DCD and Checklist

The following two DCD checklists can be downloaded for free:

Developmental Coordination Disorder questionnaire '07 (DCDQ-07): http://www.dcdq.ca/uploads/pdf/DCDQAdmin-Scoring-02-20-2012.pdf

- *Listening for DCD* checklist: http://elearning.canchild.ca/dcd_pt_workshop/assets/identification/listening-dcd-interview-guide.pdf

The *Little DCDQ* is also available for purchase to use with children aged 3 and 4 years http://www.dcdq.ca/little-dcdq-ca.html

The *CanChild* website provides a useful factsheet for physicians to aid with identification of children with DCD. https://canchild.ca/system/tenon/assets/attachments/000/000/608/original/RoleofPhysicianFlyer_08-05-2015.pdf

The *MABC-2 Teacher Checklist* (Henderson & Sugden, 2007) can be used by therapists to obtain the views of parents or teachers on a child's movement in everyday settings; complementing the information obtained from using the standardised assessment. Available for purchase by qualified professionals from: https://www.pearsonclinical.com.au

Assessment

The *CanChild* website provides a range of examples of assessment tools recommended for physiotherapists which can also be used by occupational therapists. http://elearning.canchild.ca/dcd_pt_workshop/resources/physiotherapists.html

The *CanChild McMaster* YouTube channel provides video clips of children with DCD performing motor skills tasks. https://www.youtube.com/watch?v=pGTuhWrPtWw,

ABC's of DCD by Dr Jill Zwicker is a presentation outlining diagnosis of DCD and recent research into brain imaging studies of children with DCD. https://www.youtube.com/watch?v=GDSgLjJ6_q0

The journal article *Diagnosis and Management of Developmental Coordination Disorder* by Harris, Mickelson & Zwicker (2015) provides a useful summary of the current literature regarding identification, assessment, dual diagnosis and treatment of DCD. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4467929/

Management

The *School Curriculum and Standards Authority (SCSA) Guidelines for Disability Adjustments for Timed Assessments* provides a summary of the adjustments that may be appropriate for a particular student in National Assessment Program – Literacy and Numeracy (NAPLAN), Online Literacy and Numeracy Assessment (OLNA), Externally Set Tasks (ESTs), school-based timed assessments for courses and ATAR course examinations. https://senior-secondary.scsa.wa.edu.au/assessment/disability-adjustment-guidelines

The *Western Australian Developmental Coordination Disorder* (DCD) Research Group have created a website which contains information about current DCD related research, intervention programs and services available to families and carers, and professional resources for teachers and health practitioners. The DCD Booklet and DCD Information Brochure are both excellent resources and can be downloaded for free. https://www.movegrowengage.com.au/

CanChild have some excellent resources on DCD identification and management which can be printed and provided to teachers, caregivers, health professionals and other community leaders. https://canchild.ca/en/diagnoses/developmental-coordination-disorder/dcd-educational-materials-for-home-school-physicians-and-other-health-professionals

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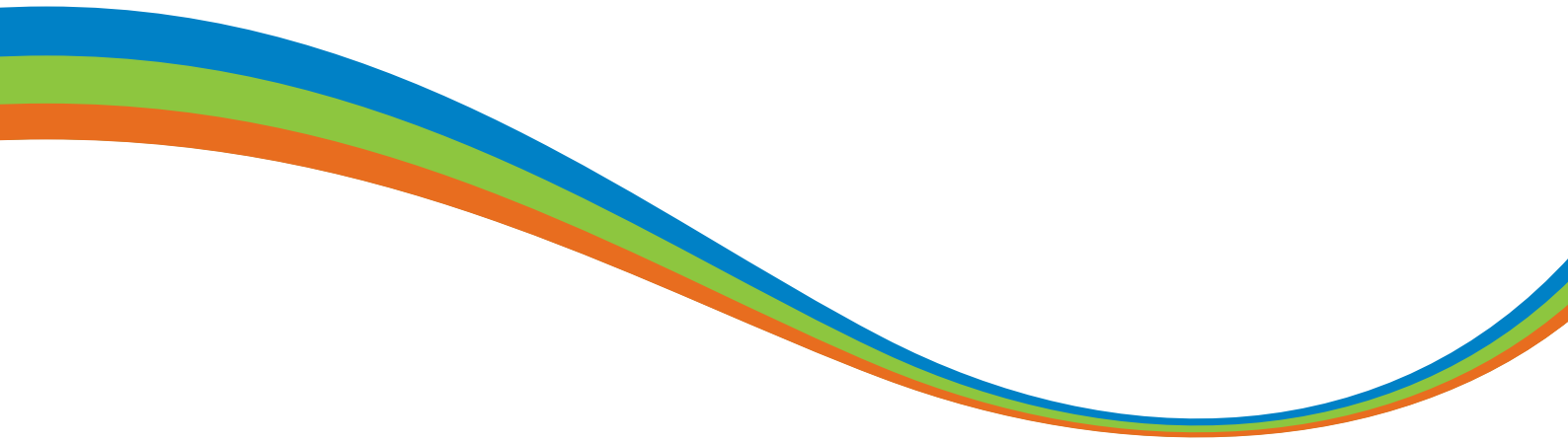

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