

Developmental Coordination Disorder (DCD): Information for Primary Care



Image credit: 123rf.com

Summary: Developmental coordination disorder (DCD) is a condition marked by significant problems with coordination that cause impairment in function. Unfortunately, children do not tend to grow out of motor coordination difficulties without interventions, as motor difficulties tend to persist into adulthood, along with other physical, psychosocial and academic difficulties. Because awareness of DCD is still growing however, children with motor coordination problems are often under recognized by health professionals. Fortunately, early identification can lead to school supports and interventions (such as occupational therapy (OT) and physiotherapy (PT)) that can make a significant improvement in the child's life.

Abbreviations

DCD, developmental coordination disorder; OT, occupational therapist; PT, physiotherapist.

Case: "He's so clumsy he still can't even tie his shoelaces on his own."

Cory is an 8-year old that you are seeing for his yearly check up. Parents express various concerns about problems at home and school. At school, he has troubles with written work, to the point where he can't keep up with what the teacher writes on the board. Written assignments and tests are a disaster. Getting him to do any homework involving written work leads to crying and frustrated parents. In gym, he is always picked last for any teams. He is bullied and picked on for being clumsy, and spends lunches and recesses alone. At home, he prefers sedentary activities such as television and video games. His father is quite concerned, saying, "Our relatives tell us that he's just lazy and we need to be firmer, but when we try to be firmer, he just gets overwhelmed and cries. We don't know what to do!"

What is DCD?

Developmental coordination disorder (DCD) is a neurodevelopmental condition where there are:

- Significant motor coordination difficulties that interfere with school, work or activities of daily living, and
- The motor skills deficits cannot be better explained by an intellectual disability, visual impairment, or a neurologic condition affecting movement (e.g. cerebral palsy, muscular dystrophy, or a degenerative

disorder)

Because motor skills are required for every aspect of our lives, DCD can cause significant impairment in all domains of the child's life (e.g. home, school and community) as well as affect the family.

Age-appropriate sensory/motor development contributes to physical, cognitive, emotional and social development as well, which means these areas may also be affected in a child with DCD.

Epidemiology

- 5% of children (i.e. 1 child in every classroom)
- Typically not diagnosed until after age 5

Diagnosis of DCD

- Children with DCD are defined as being:
 - Below the 5%ile on a standardized motor coordination test (or below the 15%ile, if functional difficulties are present) and
 - Have significant impairment in daily living, academic achievement or play.
- Some physicians may feel comfortable making a clinical diagnosis of DCD. If not, it is best to collaborate with an occupational therapist (OT) or a physiotherapist (PT) who can perform a motor assessment. A physician can give a formal diagnosis based on the recommendations of the OT/PT.

DSM-5 Criteria for DCD

- Acquisition and execution of coordinated motor skills are below what would be expected based on the child's chronologic age and opportunity for skill learning and use; difficulties are manifested as clumsiness (e.g., dropping or bumping into objects) and as slowness and inaccuracy of performance of motor skills (e.g., catching an object, using scissors, handwriting, riding a bike, or participating in sports)
- The motor skills deficit significantly or persistently interferes with activities of daily living appropriate to the child's chronologic age (e.g., self-care and self-maintenance) and impacts academic/school productivity, prevocational and vocational activities, leisure, and play
- The onset of symptoms is in the early developmental period
- The motor skills deficits cannot be better explained by intellectual disability or visual impairment and are not attributable to a neurologic condition affecting movement (e.g., cerebral palsy, muscular dystrophy, or a degenerative disorder)

Clinical Presentation

DCD presents slightly differently over the lifespan

Age 0-2 (Infancy)	<ul style="list-style-type: none"> • May present with developmental delays (e.g. sitting up, crawling, and walking) although less common • Parents may report history of under-active play, with child watching rather than doing and exploring
Age 2-4 (Toddler)	<ul style="list-style-type: none"> • Late tricycle riding; difficulty jumping, awkward running • May become easily frustrated when faced with physical activities or tasks
Age 4-5 (Preschooler)	<ul style="list-style-type: none"> • Difficulties with "tool" use (i.e. utensils, scissors, crayons), dressing, (i.e. buttons, zippers, tying shoes) and grooming (i.e. combing hair, brushing teeth) • Cannot catch/throw ball with accuracy

Age 5-8 (School-aged)	<ul style="list-style-type: none"> • Awkward pencil grasp; difficulty completing written work and frustration with homework • Poor academic test performance despite good verbal capabilities • Avoids active play (e.g. sports, active recreation) • Late bicycle riding • Fatigue and decreased fitness
Age 8-12 (School-aged)	<ul style="list-style-type: none"> • May become isolated or ostracized from peers • Limited participation in sports and extracurricular activities • Victimization/ bullying • Child may start to blame themselves for their difficulties and develop low self-esteem • May become anxious, depressed, withdrawn
Age 12-18 (Adolescence)	<ul style="list-style-type: none"> • Ongoing difficulties with written work and sports and leisure participation • Preference for sedentary activities may lead to obesity and poor physical health • Ongoing mental health challenges • Difficulties learning to drive a car

History / Screening Questions

Annual health examinations are ideal times to screen for DCD.

The questions from *CanChild's* "Listening for DCD Interview Guide" can be used to ask parents about their child in a structured fashion:

Question	Responses suggestive of DCD
Do you have any concerns about your child's development, learning or behavior?	Difficulty learning new, motor-based tasks, with the child using more effort and becoming easily frustrated
What type of activities does your child enjoy?	Non-physical activities [e.g., computer, TV, video games]
Are there activities that your child tends to avoid?	Avoids drawing, cutting with scissors, printing, ball games, sports, playground activities
How is your child managing self-care routines (e.g. dressing on his/her own, doing up buttons, zippers, tying shoes, cutting foods, spreading food with a knife)?	Parent needs to help the child and/or the child gets frustrated easily and gives up
Does your child play any sports or active games?	Child does not like organized sports or free play activities
Does your child enjoy school? What school activities are more challenging for him/her?	Child may have challenges with motor-based tasks at school with avoidance behaviours, symptoms of anxiety, or somatic symptoms such as headaches, stomachaches
Does your child have friends that s/he plays with?	Child may feel lonely, teased, victimized
When you think back, is there anything that you have tried to teach your child that has taken longer than you think it should have?	Doing up fasteners (i.e. buttons, snaps), bicycle riding, doing jumping jacks, tying shoes, ball games, soccer kicks

[Download a blank interview template that can be used during a visit](#)

Link: http://canchild.ca/elearning/dcd_pt_workshop/assets/identification/listening-dcd-interview-guide.pdf

Other screening options include:

- Self-administered questionnaire for parents (available at www.cmaj.ca/cgi/content/full/1.../DC1),
- Simple screening activities administered in the doctor's office (available at www.cmaj.ca/cgi/content/full/1.../DC1).

Children with symptoms or signs of a motor coordination disorder require further evaluation.

Differential Diagnosis of Motor Coordination Problems

Developmental coordination disorder (DCD) is a diagnosis of exclusion, after ruling out other medical causes that would better explain the coordination problems such as:

Condition	Possible Screening Questions
<ul style="list-style-type: none"> Genetic disorder (e.g. Down syndrome) 	Has your child received any other diagnoses, such as any developmental conditions? Etc.
<ul style="list-style-type: none"> Neurologic disorder (e.g. Cerebral palsy; Muscular dystrophy; Intracranial neoplasm; Seizure disorder) 	Has your child ever been seen by a neurologist? Etc.
<ul style="list-style-type: none"> Visual problems which lead to clumsiness 	Any problems with vision?
<ul style="list-style-type: none"> Severe inattention which leads to clumsiness 	Does your child get distracted easily?
<ul style="list-style-type: none"> Autism spectrum disorder 	Does the child have problems interacting with other people? E.g. holding a two way conversation, reading social cues? Does the child have any intense hobbies or interests?
<ul style="list-style-type: none"> Injury (e.g. traumatic brain injury) 	Any head or brain injuries ever?
<ul style="list-style-type: none"> Environmental problems (e.g. lead, pesticides) 	Where does the child live? When was the home built? What work do parents do?

Comorbid Conditions

Common conditions that often occur with DCD are:

Common Comorbid Conditions	Possible Screening Questions
<ul style="list-style-type: none"> ADHD 	Difficulties paying attention? Distracted easily? Impulsive? (e.g. acting before thinking through the consequences) Hyperactive? (e.g. unable to sit still)
<ul style="list-style-type: none"> Learning disorders 	What grades does the child receive on average? Are there any subjects where the child struggles (e.g. math, reading, writing)?
<ul style="list-style-type: none"> Autistic spectrum disorder (ASD) 	Does the child have problems interacting with other people? E.g. holding a two way conversation, reading social cues? Does the child have any intense hobbies or interests?
<ul style="list-style-type: none"> Sensory processing issues 	Is the child overly sensitive to sounds such as loud noises? Is the child overly sensitive to touch (e.g. clothing, being touched by others)?
<ul style="list-style-type: none"> Speech/Language Difficulties 	Has the child had a history of communication difficulties or delays? (e.g. sound production, language expression, or being understood)

Physical Exam

General observations	Any obvious signs of a developmental or neurologic condition, e.g. Down Syndrome?
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Head and Neck	Any dysmorphic features? Signs of recent head trauma? Poor eye contact? Difficulties engaging socially?
Skin	Any neurocutaneous lesions?
Neurologic exam:	Neurologic exam should not show any focal findings, however there may be 'soft neurological signs' and low muscle tone in trunk and/or extremities Try to observe the child doing motor activities such as <ul style="list-style-type: none"> • Doing buttons • Writing • Doing jumping jacks • Catching a ball

Management in General

- Refer to an OT, PT or pediatric multidisciplinary team, as they can help confirm the diagnosis, rule out comorbid conditions and initiate a management plan. Successful treatment approaches are multidisciplinary involving health professionals such as OT/PT as well as the child's parents and educators.
- Inform the school by writing a physician's letter that states the diagnosis of DCD as this may facilitate appropriate school accommodations, modifications and supports..
- Manage any comorbid issues such as:
 - Learning disorder(s):
 - Ensure school supports such as special education and/or psychology;
 - Consider referrals to services and supports for learning disorders.
 - ADHD:
 - Ensure appropriate school supports such as accommodations and modifications for ADHD
 - Consider services / supports for ADHD
 - Consider medications.
 - Anxiety / depression
 - Ensure appropriate school supports for students with anxiety/depression
 - Refer to services / supports for mental health.
 - Autism spectrum disorder (ASD):
 - Encourage appropriate school supports
 - Refer to services and supports for ASD.
 - Speech/language difficulties:
 - Refer to speech/language pathologist.
 - Provide psychoeducation such as:
 - Encourage participation in physical activities, with an emphasis on enjoyment rather than competition.
 - If the child is not interested in competitive or group activities, then encourage individual physical activities (e.g. walking, running, bicycling, swimming). Individualized lessons may be helpful.

Management: Strategies for Home

Below is a list of general recommendations that have been suggested by the CanChild Centre for Childhood Disability Research; note that these need to be individualized to meet the needs of the specific child and family.

General Principles to Help the Child with DCD Learn New Skills and Tasks:

- Be consistent: When teaching a task, try to practice it in the same place with the same materials each time.
- Provide repetition: Your child will need much more repetition than a child without DCD, and you may need to repeat the task for several days or even weeks. With each repetition, remain consistent in your instructions

and in the environment (i.e. same place, same materials – as above).

- Demonstrate visually. Try to avoid overloading your child with lots of verbal instructions. Also show your child what you want her/him to learn.
- Praise efforts as opposed to results. Often a child with DCD will put in a huge amount of effort and still not complete a task. It is important to praise the effort instead of the result.

General Strategies for Home and Community

- Encourage the child to participate in physical activities for the activity and enjoyment, rather than proficiency or competition. Encourage games and sports that are interesting to him/her and which provide practice in, and exposure to, motor activities.
- Introduce the child to new sporting activities or a new playground on an individual basis, before he/she is required to participate with a group. Review any rules and routines that are associated with the activity (e.g., baseball rules, soccer plays) at a time when the child is not concentrating on the motor aspects. Ask the child simple questions to ensure comprehension (e.g., "What do you do when you hit the ball?"). Private lessons may be helpful at certain points in time to teach the child specific skills.
- Encourage social participation. Encourage the child to interact with peers through social activities (e.g., cubs, music, drama, or art).
- Provide clothing that is easy for the child to manage. For example, sweat pants, sweat shirts, t-shirts, leggings, sweaters, and Velcro shoes. When possible, use Velcro closures instead of buttons, snaps or shoelaces. Teach the child how to manage difficult fasteners when you have more time and patience (e.g., on the weekend, or over the summer) rather than when you are pressured to get out the door.
- Encourage the child to participate in practical activities that will help improve his/her ability to plan and organize motor tasks. For example, setting the table, making lunch, or organizing a knapsack. Ask questions that help the child focus on the sequence of steps (e.g., "What do you need to do first?"). Recognize that, if your child is becoming frustrated, it may be time to help or to give specific guidance and direction.
- Recognize and reinforce the child's strengths. Many children with DCD demonstrate strong abilities in other areas – they may have advanced reading skills, a creative imagination, sensitivity to the needs of others, and/or strong oral communication skills.

Sample School Letter for a school aged child with DCD

Dear Educator:

I am writing to provide you with information regarding your student who has a diagnosis of Developmental Coordination Disorder (DCD), a neurologic condition that causes difficulties with motor coordination, and affects their ability to perform fine motor skills (e.g. handwriting, printing, copying from the board, doing up buttons), and/or gross motor skills (such as riding a bicycle, throwing a ball, jumping, hopping)

I would like to suggest:

- School accommodations. Accommodations are essential for this student to be able to access the curriculum and participate fully in all aspects of school life. Below are some recommended accommodations.
- A referral to an occupational therapist (OT) and/or physiotherapist, in order to help devise a plan for the student.

Specific accommodations will need to be determined in collaboration with the school, student and family. Below is a list of general recommendations from CanChild: an OT and/or PT will be able to individualize these suggestions.

Seating/Positioning	<ul style="list-style-type: none"> • Preferential seating near the teacher • Use of an angled desk or writing surface • Adjustment of chair and/or desk height to maximize posture and stability • Use of a “Wiggle” cushion or non-skid mat on the chair • Allowing the child to kneel on a chair or stand when working at a table • Providing opportunities to get up for movement breaks • Assigning the child the end locker or cubby • Labelling locker shelves • Having a seat or bench available for dressing at recess, dismissal and physical education
Tools/Materials	<ul style="list-style-type: none"> • Use of different types of paper (e.g., paper with highlighted margins or lines, colour-coded paper for letter sizing, graph paper for lining up numbers and letters) • Having the child write on alternate lines • Use of a variety of writing tools (e.g., ergonomically designed pens/pencils, gel pens, soft lead pencils, weighted pencils and pens) • Use of pencil grips • Use of spring loaded or loop scissors
Organization	<ul style="list-style-type: none"> • Use of a single binder with dividers and inside pockets to hold papers • Use of a pencil case with three holes to include in binder to hold basic tools • Providing an extra set of textbooks for the child to keep at home
Technology	<ul style="list-style-type: none"> • Use of a computer or word processor for written assignments • Use of spell check on computer • Providing computer software for word prediction, read back, speech recognition, and graphic organization • Use of clip art for title pages • Consider dictation programs rather than printing or typing
Time	<ul style="list-style-type: none"> • Providing extra time to complete tests or writing assignments • Allowing the child an early start to get ready for recess • Reviewing the pacing and/or timing of work to decrease fatigue • Providing extra time to get changed for gym or avoid changing altogether by allowing appropriate clothing to be worn for the day
Expectations	<ul style="list-style-type: none"> • Negotiating the level of neatness required in notebooks • Use of a date stamp rather than having the child writing the date each time • Reducing the total number of questions, while selecting from a range of difficulty throughout a worksheet (e.g., even numbered only) • Accepting parent scribing for homework • Allowing oral test-taking • Accepting point-form answers • Use of fill-in-the-blanks, or matching, where possible • On spelling tests, printing the spelling word only (rather than the whole sentence) • Accepting alternate assessment methods (e.g., displays, speeches)
Assistance	<ul style="list-style-type: none"> • Monitoring use of agenda and homework completion • Emailing homework assignments to the child • Assigning a writing buddy/peer secretary whose notes the child can photocopy • Photocopying notes for the child • Providing step-by-step instruction for new skills in physical education

For more information about DCD including classroom accommodations for specific ages, please visit the DCD section of the CanChild Centre for Childhood Disability website at: www.dcd.canchild.ca.

Thank you for your time and support of this student.

Feel free to contact me if you have any further questions,

YOUR NAME, MD

Sample School Letter for an Adolescent with DCD

Dear Educator:

I am writing to provide you with information regarding your student who has a diagnosis of Developmental Coordination Disorder (DCD), a neurologic condition that causes difficulties with motor coordination, and affects their ability to perform fine motor skills (e.g. handwriting, printing, copying from the board, doing up buttons), and/or gross motor skills (such as riding a bicycle, throwing a ball, participating in sports)

I would like to suggest:

- School accommodations. Accommodations are essential for this student to be able to access the curriculum and participate fully in all aspects of school life. Below are some recommended accommodations.
- A referral to an occupational therapist (OT) and/or physiotherapist, in order to help devise a plan for the student.

Specific accommodations will need to be devised in collaboration with the school, student and family. Below is a list of common issues and strategies that have been suggested by the CanChild Centre for Childhood Disability Research:

Difficulty with transition to high school	<ul style="list-style-type: none"> • Seek information from elementary school • Arrange for individual visits to the school ahead of time • Ensure a specific staff person is assigned to the student • Develop a timetable that is balanced across terms • Ask an older student to be a buddy • If the student is taking public transportation, encourage use of a bus pass rather than individual tickets
Difficulty keeping up with volume of writing	<ul style="list-style-type: none"> • Decrease expectations regarding volume of homework • Reduce the amount of copying from the board or text • Provide printouts of notes ahead of time • Permit audiotapes to be made of lectures • Arrange for another student to scribe, then photocopy notes • Use of a laptop computer as needed (a system will need to be in place for saving and transferring work, recharging and printing from the laptop)
Difficulty with self- organization - books, papers, getting to class on time, meeting deadlines	<ul style="list-style-type: none"> • Place the student's locker in a central place • Arrange for a key lock rather than a combination and provide a spare locker key (with key kept on a string or lanyard) • Provide organizer software, colour-coded disks or memory sticks for different subjects, set up the system with the student, and explicitly teach the student to use it • Encourage use of one large zippered binder with tabs for subjects • Allow for the use of notebooks, not individual papers • Post extra copies of the student's timetable in their locker • Suggest that an extra pencil case is kept at home
Difficulty completing homework	<ul style="list-style-type: none"> • Ensure clear communication between home and school • Have a buddy network with phone numbers • Provide essay templates and the use of study techniques • Provide time at the end of each day to ensure that the student has: 1) a written list of the homework, and 2) textbooks and notebooks needed for homework in his/her bag
Difficulty completing exams	<ul style="list-style-type: none"> • Provide extra time during exams • Allow the student to complete exams in another room • Allow the student to write the exam on a laptop • For practical exams, provide extra time to practice
Avoidance of physical education, extracurricular sports	<ul style="list-style-type: none"> • Ensure that the student has sufficient time before and after physical education for changing or schedule physical education at the beginning or end of the day so that the student only needs to change once • Encourage use of fitness machines and weight room - introduce equipment to the student on his/her own or in a small group • Buddy with an older student to target some fitness goals • Encourage involvement in other intramural activities - drama, martial arts, music, photography, computers, debate team

Difficulty with motor aspect of subjects

- Try a roller ball pen instead of ink pen
- Allow the student to use his/her own fingering for keyboarding
- Have the student work in pairs for subjects such as chemistry
- Provide adapted tools – e.g. ridged ruler, pens with rubber grippers, non-slip mat under protractor (math) or bowls (food sciences), graph paper for lining up math problems
- Provide pre-drawn maps in geography, a scribe to draw objects in art
- Consider classes that will be a good fit, given the student's abilities and challenges
- For co-op courses, have the student practice tasks in school first

For more information about DCD, please visit the DCD section of the CanChild Centre for Childhood Disability Research website (www.dcd.canchild.ca).

Thank you for your time and support of this student.

Feel free to contact me if you have any further questions,

YOUR NAME, MD

Case, Part 2

After you have observed Cory in your office during his yearly check up, you wonder about whether his difficulties are consistent with a clinical diagnosis of DCD, and thus you refer him to an OT. The motor assessment completed by the OT is consistent with DCD, and you make a formal DCD diagnosis. You write a letter to the school. He and his family start receiving input from the OT, including education around his motor difficulties and how to manage them. Over time he begins to show small improvements in his functional abilities despite the fact that his motor coordination difficulties persist. At school, he starts receiving accommodations and modifications for his coordination difficulties. His teachers become more understanding, and no longer rush or hurry him with motor activities. He starts coping with school better, and Cory no longer complains about stomachaches when he leaves for school. At the last visit to your office, he proudly tells you that he now looks forward to school, and seeing his friends and that he is enjoying participating in community swimming lessons. Most importantly, at home, he reports that his parents are more understanding of his coordination difficulties. As a result, they have modified their expectations of him, and he feels less stress and more accepted overall.

Websites

Information about DCD from the CanChild Centre for Childhood Disability Research website at McMaster University for children, families, educators and professionals <http://www.canchild.ca>

Online CME module for physicians about DCD at MacHealth.ca
https://machealth.ca/programs/developmental_coordination_disorder/

Clinical Practice Guidelines

European Academy of Childhood Disability DCD Guidelines: Definition, Diagnosis, Assessment and Intervention of Developmental Coordination Disorder (DCD). German-Swiss Interdisciplinary Clinical Practice Guideline according to the Association of Scientific Medical Societies in Germany, UK version, 2012. Retrieved July 17, 2015 from <http://www.eacd.org/publications.php>

About this Document

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