Dyspraxia and Apraxia

Synonym: developmental co-ordination disorder, DCD

This article refers to the International Classification of Diseases 10th edition (ICD-10) which is the official classification system for mental health professionals working in NHS clinical practice. The literature occasionally refers to the Diagnostic and Statistical Manual of Mental Disorders (DSM) classification system which - whilst used in clinical practice in the USA - is primarily used for research purposes elsewhere.

Definitions

Dyspraxia is the partial loss of the ability to co-ordinate and perform skilled, purposeful movements and gestures with normal accuracy. Apraxia is the term that is used to describe the complete loss of this ability.

The following may be affected:

- Gross and fine motor skills.
- Motor planning and the organisation of movement (planning what to do and how to do it).\(^1,2\)
- Speech and language.
- Ability to carry out activities of daily living.

Dyspraxia/apraxia may be acquired (eg, as a result of stroke or head injury) or associated with failure or delay of normal neurological development. Developmental co-ordination disorder (DCD) in children is the term used for dyspraxia due to a problem with normal neurological development. In popular English, when the word dyspraxia is used, it is usually used to mean this condition. DCD in children is classed as a motor learning disability.

Developmental co-ordination disorder in children

Aetiology

- It is thought to be due to a problem with motor neuron development and maturation.
- Risk factors may include:\(^1\)
  - Prematurity.
  - Family history of DCD.
  - Exposure to alcohol and drugs (including cocaine and metamfetamine) in utero.

Epidemiology\(^1\)

- DCD is thought to affect 1 in 10 children of school age in the UK.
- It is more common in boys than in girls.

Presentation

Presentation is variable in terms of severity from person to person. Difficulties may be identified first by parents or at school. They may affect participation and functioning of everyday life skills in education, work and employment.\(^3\) Intelligence is not affected but learning ability is.

Particular symptoms or signs in babies and toddlers can include:

- Hypertonia or hypotonia.
- Delay in reaching developmental milestones.
- Difficulty performing physical activities such as climbing stairs, running, hopping and jumping, when compared to other children of the same age.
- Difficulty chewing solid food.
- Difficulty with pincer grasp and holding a pencil/drawing. Drawings may appear immature for the child's age.
- Difficulty performing daily activities and self-care tasks such as getting dressed.
- Taking longer to acquire new skills.
- Falling over a lot or appearing clumsy.
- Problems grasping the concepts of 'on', 'in', 'in front of', etc.
- Difficulty establishing relationships and problems with social behaviour.
- Anxiety or agitation.
- Delayed language development or problems with speech.

As well as the problems above, particular symptoms or signs in children of school age include:
• Difficulty participating in group situations - being much better one-on-one.
• Problems with maths and writing, including having trouble copying things from the board in school.
• Disorganisation.
• Poor concentration and listening skills.
• An inability to follow instructions.
• Avoidance of physical education in school or physical activities with friends.
• Anger and frustration.

In adulthood, particular symptoms or signs may also include:[3]

• Problems with planning and organisation.
• Difficulty learning new skills at work and at home (such as DIY).
• Difficulty when learning to drive.

### Diagnostic and Statistical Manual of Mental Disorders - Fifth Edition (DSM-V) criteria for a diagnosis of DCD[4]

- There is a marked impairment in the ability to perform activities that require motor co-ordination and the performance level is below that expected for a person's age and intelligence.
- The impairment significantly interferes with academic achievement or activities of daily living.
- The impairment cannot be explained by another general medical condition (eg, cerebral palsy or muscular dystrophy) and the criteria are not met for a pervasive developmental disorder.
- If general learning disability is present, the motor difficulties are in excess of those usually associated with it.

#### Assessment

Any child for whom there are concerns about possible DCD should be assessed by a paediatrician in order to confirm diagnosis and to initiate a multidisciplinary management plan. Assessment by other healthcare professionals (eg, physiotherapists, occupational therapists and speech and language therapists) may also be required.

- Physical examination - look for dysmorphic features; perform a neurological examination.
- Ask the child to perform various everyday tasks.
- Observe play.
- Various screening tools and checklists are available to assist in assessment and diagnosis.[1, 5, 6] There is no true benchmark of criteria and assessment tools for establishing the diagnosis.
- Other tests and investigations may be required to rule out other conditions.

#### Differential diagnosis

- Cerebral palsy.
- Myotonic, myopathic or connective tissue disorder.
- Degenerative condition or a storage disorder.
- Joint hypermobility syndrome; Ehlers-Danlos syndrome.
- Neurofibromatosis type 1 (NF1).

#### Associated disorders

- It often co-exists with a poor attention span and poor concentration.
- Dyslexia, dyscalculia.
- Attention deficit hyperactivity disorder.[7]
- Asperger's syndrome.
- Tactile defensiveness - oversensitivity to touch.
- Pervasive developmental disorder.[8]

#### Management

The approaches to treatment may be varied, according to different theoretical assumptions about the aetiology of the condition and its developmental course.[9]

- Management may involve occupational therapists, physiotherapists, speech therapists and educational psychologists. The key is a co-ordinated approach between parents, carers, teachers and healthcare professionals.
- It is essential to share all assessment information and management recommendations with parents, teachers and anyone else involved with the child's education and welfare.
- Suggestions to help parents:
  - Provide suitable tools to help with difficult tasks - eg, adapted scissors, use of a computer instead of handwriting, organisational techniques.
  - Work on gross motor strength: introduce suitable sports such as swimming, riding, canoeing, walking and badminton.
  - Maintain self-esteem: look at hobbies that the child will enjoy.
  - Maintain good liaison with the school, so that there is a parent-school partnership.
Work on a child’s self-confidence, feelings of belonging and helping them to participate in daily activities is very important.\textsuperscript{[10]}

**Prognosis**
- Motor problems of children with DCD persist and although the adult may learn to cope, they are still present.
- Early diagnosis and treatment initiation are important to provide greater chances of improvement.\textsuperscript{[1]}
- Initial difficulties often lead to secondary physical health, mental health and educational problems - eg, poor physical fitness, poor social competence, academic problems, being bullied, behavioural problems and low self-esteem.

**Acquired apraxia/dyspraxia**

**Aetiology**\textsuperscript{[11]}
- Acquired apraxia/dyspraxia is usually due to disease affecting the left inferior parietal lobe, the frontal lobes or the corpus callosum.
- Stroke and dementia are the most common causes but any disease affecting these areas of the brain, including tumours, can be the cause.
- The disease process leads to loss of knowledge about how to perform skilled movements.

**Presentation**
There are various different types of apraxia, classified by the body area affected or by the type of movement sequence affected. For example:

- **By the body part affected:** eg, limb apraxia, buccofacial apraxia.
- **Ideational dyspraxia:** difficulty with actions requiring planning or sequencing.
- **Ideomotor dyspraxia:** inability to mime the use of an object even though action with the real object may be unimpaired.
- **Constructional dyspraxia:** inability to build a simple construction or to copy a drawing. This is mostly caused by non-dominant hemisphere lesions.
- **Dressing dyspraxia:** inability to dress due to an impaired sense of clothes’ orientation and sequence (non-dominant hemisphere).
- **Callosal dyspraxia:** left-hand inability upon verbal command.
- **Gait dyspraxia:** gait disorder in which individual components of walking are unimpaired. This is common in the elderly, seen with posterior temporal lesions, bilateral frontal lesions and hydrocephalus.
- **Constructional apraxia:** the inability to draw or copy quality pictures, such as interlocking pentagons.

Apraxia/dyspraxia can lead to inability to perform activities of daily living and self-care. Individuals may become apathetic and uninterested.

**Assessment**
- Perform a full neurological examination.
- Assessment by a multidisciplinary team is usual - including, for example, a neurologist, occupational therapist, physiotherapist and speech and language therapist.
- Various screening tools and checklists are available to assist in assessment and diagnosis.\textsuperscript{[6, 6]}
- The patient may be asked to perform various different tasks depending on the type of apraxia/dyspraxia suspected.
- CT/MRI scanning and other investigations may be carried out to look for the underlying cause.

**Management**
- Treatment of the underlying cause may be possible.
- A multidisciplinary management approach is suggested.

**Prognosis**
The prognosis of acquired apraxia/dyspraxia will depend on the nature and severity of the underlying cause.

**Further reading & references**
4. Diagnostic criteria (dyspraxia); DyspraxiaUK.com