Introduction
Occupational therapists in children’s community services have a long history of involvement with children presenting with difficulties consistent with a diagnosis of developmental coordination disorder (DCD). Increasingly, the expertise of occupational therapists with this client group is being recognised, demonstrated by requests for participation in a formal diagnostic process. Occupational therapists play a significant role in the diagnosis of DCD as part of a multi disciplinary pathway.

Children with DCD have a known risk of educational underachievement, subsequent unemployment, poor psychosocial outcomes and passive lifestyles (Losse et al 1991, Rasmussen and Gillberg 2000). Occupational therapists can provide interventions that aim to reduce the likelihood of these negative outcomes and promote strategies to enhance the child’s participation, enabling them to achieve their potential (Missiuna et al 2005). Intervention starts with assessment and diagnosis. Occupational therapists have a significant role to play in diagnosis, as applying the Diagnostic and Statistical Manual of Mental Disorders – 5 (DSM V) (American Psychiatric Association 2013) criteria has a specific focus on the impact on activities of daily living.

Facilitating the diagnosis of DCD can enable children to participate in their chosen occupations (Missiuna et al 2008). Other potential benefits include enabling parents to advocate for their child, through increasing their understanding (Ahern 2000), easing the process of gaining extra support in school and assisting teachers in understanding a child’s potential (Missiuna et al 2006). It can also help both teachers and parents access appropriate learning materials.

This briefing is intended as a guide for occupational therapists contributing to the multidisciplinary diagnosis for clients who are thought to have developmental coordination disorder.

Definitions and terminology
Developmental coordination disorder is a developmental disorder which results in a marked impairment in motor skills, which in turn has a significant impact on activities of everyday living, such as dressing, playing sports, holding a knife and fork, handwriting (American Psychiatric Association 2013, Polatajko et al 1995, Sugden 2006). DCD is the term used in the Diagnostic and Statistical Manual of Mental Disorders - 5. The International Statistical Classification of Diseases and Related Health Problems (World Health Organisation 1992) uses the term Specific Developmental Disorder of Motor Function (FB2), but states that this includes DCD, developmental dyspraxia and clumsy child syndrome. The European Association of Childhood Disability provides a useful comparison (EACD 2010). Whilst the term ‘dyspraxia’ has been in common usage to describe symptoms similar to those covered by developmental coordination disorder, DCD is the diagnostic term of choice following three consensus statements (Polatajko et al 1995, Sugden 2006, EACD 2010). Dyspraxia does not require a separate or specific assessment (Henderson 2006). Dyspraxia is also a lay term for DCD.

Onset
The onset of DCD is apparent in the early years but the condition would not typically be diagnosed before 5 years of age (Sugden 2006, American Psychiatric Association (APA) 2013).
Diagnostic criteria

As detailed above, the DSM-5 provides widely accepted criteria and therefore will form the basis of this briefing. There are four aspects of the DSM-5 criteria to be considered before a diagnosis can be made (see table 1):

<table>
<thead>
<tr>
<th>Table 1. DSM-5. Diagnostic criteria for Developmental Coordination Disorder</th>
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<tbody>
<tr>
<td>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).</td>
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<td>B. The motor skills deficit in Criterion A significantly and persistently interferes with activities of daily living appropriate to chronological age (e.g., self-care and self maintenance) and impacts academic/school productivity, prevocational and vocational activities, leisure and play.</td>
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<tr>
<td>C. Onset of symptoms is in the early developmental period.</td>
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<tr>
<td>D. The motor skills deficits are not better explained by intellectual disability (intellectual developmental disorder) or visual impairment and are not attributable to a neurological condition affecting movement (e.g., cerebral palsy, muscular dystrophy, degenerative disorder).</td>
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*(American Psychiatric Association 2013 p74)*

*There is a lack of correlation between diagnostic manuals and consensus statements. See section below on dual diagnosis and co-existing conditions.*

- **Criterion A - Motor coordination**

It is recommended that in applying Criterion A an individually administered, culturally appropriate and norm-referenced test of general motor competence is required. In this way the child’s motor skills are compared to those of their peers, with recommended cut off point as indicated by the relevant test (Sugden 2006). For example the Movement Assessment Battery for Children or Movement ABC has a cut off ‘at or below the 5th percentile’. The arbitrariness of this is recognised and occupational therapists should assess the functional deficits and impact of the child’s performance on daily occupations in order to inform their clinical reasoning and to supplement the findings of any standardised test (Geuze et al 2001, Green 2007). It is further recommended that children between the relevant percentiles (borderline score) are not diagnosed as having DCD but may be at risk and therefore should be closely monitored and provided with advice (Sugden 2006). However it is suggested that further assessment of those with a borderline score is necessary to ensure that the practice of certain skills or an uneven motor impairment profile does not preclude a child from an appropriate diagnosis. In this situation the severity of motor and functional deficits compared to cognitive and verbal skills will need to be considered.

Young children with DCD may be delayed in achieving developmental motor milestones but many achieve motor milestones at the expected age (APA 2013). There may also be delays in developing functional motor skills such as riding a bike and dressing (APA 2013). Older children and adults may be slow or inaccurate in activities requiring motor skills (APA 2013). Where there is no norm referenced test available, particularly for older children/young people and adults, then a developmental history can provide information for applying
Criterion A. This type of assessment is ‘well within the scope of practice of an occupational therapist’ (Missiuna et al 2008).

- **Criterion B - persistently interferes with activities of daily living appropriate to chronological age**
  Occupational therapists have a key contribution to make in applying this criterion (Missiuna et al 2008). The occupational therapist consults the child, parent(s)/carer and/or teacher to identify which activities of daily living are presenting difficulties to the child. It is important that, wherever possible, the child’s views should also be sought in line with person-centred practice. This process should identify difficulties in a range of tasks including schoolwork, self-care, play and leisure tasks requiring motor skills (Dunford et al 2005). These need to be checked for age and cultural appropriateness using developmental norms. Standardised checklists can also provide information on activities of daily living. Particular attention should be given to assessing handwriting as this frequently impacts on the child’s academic achievement (APA 2013, Sugden 2006). In adults motor tasks requiring speed and accuracy are seen to be effected (APA 2013).

- **Criterion C - Onset of symptoms is in the early developmental period**
  Whilst onset must be seen in the early developmental period diagnosis DCD is not usually diagnosed under 5 years (APA 2013, Sugden 2006).

- **Criterion D - not better explained by intellectual developmental disorder, visual impairment or neurological disorder**
  It is essential that a medical doctor is involved in the diagnostic process to rule out other possible diagnoses, such as intellectual developmental disorder, visual impairment or neurological disorders such as cerebral palsy or muscular dystrophy (APA 2013).

Given that there is not a ‘gold standard’ measure by which to diagnose DCD, there is a rationale that occupational therapists should ‘use clinical reasoning to examine the multiple sources of information about a child’s abilities’ (Crawford et al 2000). Where there is no local access to medical assessment and the child meets all the other criteria, the occupational therapist can recommend that the child’s difficulties are consistent with the criteria for DCD but this would need to be confirmed by medical examination and a referral to a paediatrician is therefore recommended.

**Differential diagnosis**
As part of the diagnostic process other conditions which may present as motor incoordination should be considered.

- **Other medical conditions**
  Motor incoordination is also a feature of other medical conditions such as visual impairments and specific neurological disorders. These need to be ruled out before a diagnosis of DCD can be given.

- **Intellectual developmental disorder**
  Children with a known, or presumed, Intelligence Quotient (IQ) below 70 are not generally diagnosed with DCD (Sugden 2006). A collaborative approach across agencies is required to identify the most appropriate professionals and process for applying Criterion D. Educational psychologists may often be involved but where IQ testing is not possible or deemed inappropriate, a child’s ability to follow a mainstream curriculum and their teacher’s opinion that their cognitive ability falls within the normal range can suffice. Where it is thought that learning disabilities are the main obstacle to development and learning, it is advised that the level of motor coordination should be below that expected for the child’s developmental stage (Sugden 2006).
However where the motor difficulties are considered to be in excess of the level expected due to the intellectual disability, and the criteria for DCD are met then DCD is diagnosed as well (APA 2013).

- **Attention deficit/hyperactivity disorder (ADHD)**
  Individuals with ADHD may present with apparent lack of motor competence but careful assessment is required to ascertain if they are bumping into things and knocking things over because of distractibility and impulsiveness rather than poor motor skills. If criteria for ADHD and DCD are met then both diagnoses should be given.

- **Autistic spectrum disorders**
  Individuals on the autistic spectrum may lack interest in activities requiring motor skills such as ball games. This will affect their test performance but not necessarily reflect a core motor deficit. Again careful assessment is required to establish if poor performance on tests reflects an underlying motor impairment. If criteria for autistic spectrum disorder and DCD are met then both diagnoses should be given.

**Co-morbidity**
Occupational therapists need to be aware of a number of known conditions that commonly co-occur with DCD, and assess or refer to other professionals as appropriate:
- Attention deficit/hyperactivity disorder
- Autistic spectrum disorders
- Joint hypermobility syndrome
- Specific learning disorder/dyslexia
- Speech and language impairments
- Social, emotional and behavioural issues.

The presence of co-occurring conditions makes assessment more difficult and requires care judgements to be made (APA 2013). Dual diagnosis of DCD and other developmental or behavioural disorders (e.g. autistic spectrum disorders, learning disorders, ADHD) should be given if appropriate and priorities for intervention should be determined in keeping with the dysfunction present.

**Assessment process**
Many children do not present to occupational therapy departments with DCD, but are often referred for a range of reasons including problems with handwriting, difficulties with dressing, lack of participation and success with activities such as bike riding and physical exercise classes at school. Research identified that a majority of children referred to occupational therapy for handwriting problems met the diagnostic criteria for DCD (Missiuna et al 2005). Children with DCD are commonly referred to occupational therapists but not all referrals are appropriate and it may be necessary to use screening and/or triage processes (Dunford et al 2004). The referral and screening process provides opportunities to gather information prior to contact with families. This not only ensures the appropriateness of the referral but also ensures that the initial assessment is structured to meet the families’ needs. This process also gathers valuable information which will guide the nature and content of the assessment. In addition to locally produced tools there are a variety of standardised structured tools to assist with the screening process. Wherever possible, standardised tools with UK norms should be used alongside ‘home grown’ tools to ensure adequate psychometric properties, such as reliability and validity, are used when interpreting the information.

Ideally, assessment and diagnosis is a collaborative process involving the child, their family, allied health, medical and education professionals. Ensuring the children’s and parents’ voices are heard should be an integral part of the child/family journey. Every effort should be made to avoid duplication in allied health and educational professional practice (Anon. 2007). The Northern Ireland Government is in the process of
developing an assessment model, adopting the principles of their ten year children’s strategy aiming to ensure a needs based assessment (NI Government 2006).

The multiple components listed in DSM-5 indicate a multidisciplinary approach to ensure each criterion is carefully considered. Clear local protocols for structuring this process will support effective collaboration with all those involved (Anon. 2007).

Assessment is a core occupational therapy skill alongside collaboration with the client, enablement, problem solving, using activity as a therapeutic tool, group work and environmental adaptation (COT 2003). Occupational therapists work as part of the team around the child to provide a coordinated approach across all agencies to support the delivery of appropriate, proportionate and timely intervention for all children (Department of Health and Department for Education and Skills 2004, Scottish Executive 2007).

The challenges in community settings
In reality, ascertaining IQ/cognitive abilities without the involvement of an educational psychologist (EP) can be complex. Many EP departments do not have the capacity to carry out IQ tests as part of a DCD pathway. Occupational therapists should, as outlined above, gather information from schools and consider the child’s profile i.e. their motor co-ordination in line with their other skills. If in doubt occupational therapists are advised not to consider a diagnosis but to work with presenting functional difficulties.

Engaging medical doctors to ensure alternative diagnoses are ruled out can be a challenge, but occupational therapists will be assisted by the DSM-5 criteria which state that this is an essential part of the diagnostic pathway.

Implications for occupational therapists
Occupational therapists wishing to undertake assessment as part of multi disciplinary team are advised to:

- Ensure full knowledge and understanding of diagnostic criteria and reach agreement with colleagues as to the local diagnostic pathway.
- Work in partnership with doctors to ensure that other possible diagnoses are excluded.
- If a medical opinion is not available a full diagnosis should not be given as criterion D cannot be met (see page 5).
- Familiarise themselves with the COT position statement: Access to community occupational therapy within developmental coordination disorder services (COT 2011).
- Ensure they maintain their knowledge regarding diagnostic criteria and the relevant assessments.
- Base subsequent intervention approaches on best available evidence.
- Consider the implications for their practice of emerging guidelines regarding DCD including the EACD UK specific guidelines available from: http://www.movementmattersuk.org/dcd-dyspraxia-adhd-spld/uk-dcd-consensus.aspx

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