Moving to learn-learning to move
Seeing the whole child
using DCD/developmental dyspraxia as a model

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MY PERSONAL AND PROFESSIONAL BACKGROUND

- Mother of 3 children, middle one with DCD (24 years)
- Medical doctor working in a specialist centre in a university School of Education
- Running an interdisciplinary centre for 13 years for developmental disorders assessing children and adults with DCD and related DDs
- Work in a university-undertake research in this field and also interested in policies and practices

4 KEY POINTS

1. Movement is essential for all every day tasks
2. Children with developmental disorders usually have overlapping difficulties
3. Knowledge of each professional influences the diagnosis received
4. Essential to consider the ‘whole’ child to meet their needs

WHAT IS TYPICAL MOTOR DEVELOPMENT?

Motor Development- 0-2 years
- Reflexes- e.g., selected-sucking, palmar grasp, ATN, Babinski, walking.
- Spontaneous movements- e.g., supine kicking.
- Postural control
- Locomotion
- Manual control

Motor Development- 2-7 years
- Body control
  - Walking
  - Running
  - Jumping
  - Hopping
  - Throwing
  - Balancing
  - Catching
Motor Development-
2-7 years

- Manual skills, including writing and drawing, self help skills.
- Spatial and temporal accuracy

Motor Development-
2-7 years

- There is an argument that says that by seven years of age a child has acquired all of the naturally developing skills s/he will ever have!
- After that period, they are refined, used for maximum performance, played with and utilised in novel situations. But no new ones emerge.
- If true, this period of a child’s life is crucial..

Motor Development-
7-puberty

- Essential that fundamental skills are in place
- During this period children start to:
  - refine skills
  - play with skills in different situations
  - combine them
  - social and recreational play
- Maximum performance starts to play a part
- Gender differences

Motor Development-
7-puberty

Spatial and temporal accuracy starts to play a major part and during this period it is one area that improves significantly in terms of:
- prediction
- performance

Motor Development and Learning

Resources of the Child

Outcomes

- Environment in which Activity occurs
- Manner of presentation

Children’s learning is a...

- Change in a......
- Set of processes measured by......
- Behaviour which is......
- Relatively permanent brought about by......
- Practice or experience and includes........
- Transfer/generalisation.. or does it?
Children’s learning is not always linear..........

Motor Impairment

- A number of children will have difficulties in movement
- 2 main categories:
  - Those with motor difficulties as a primary defining condition
  - Those with motor difficulties as a secondary defining condition

Motor Impairment

Motor difficulties as a primary defining condition e.g.
- Cerebral palsy
- Developmental Coordination Disorder

Motor Impairment

Motor difficulties as a secondary defining characteristic:

Learning difficulties- general/specifc
Sensory difficulties- sight/hearing/other
Behaviour difficulties
Other-ASD

WHAT IS MOTOR IMPAIRMENT?

AN EXAMPLE OF A COMMON MOTOR IMPAIRMENT AND ITS IMPACT ON DAILY LIFE
Sam is 9 years old
He walked at 19 months, talked indistinctly at 2 ½ years of age, very fidgety and hyperactive when 4 years of age.
He has difficulty copying from the board. He is slow changing for PE and he finds team sports hard to do.
He only has one best friend who is younger than him.
He has an older brother who is in the local football team. His dad is the local coach.
His writing looks like this:

......also known as Dyspraxia

Diagnostic criteria for Developmental Coordination Disorder (APA, 2000) (DSMIV)

A. Performance in daily activities that require motor coordination is substantially below that expected given the person’s chronological age and measured intelligence. This may be manifested by marked delays in achieving motor milestones (e.g., walking, crawling, and sitting), dropping things, “clumsiness”, poor performance in sports, or poor handwriting.

B. The disturbance in Criterion A significantly interferes with academic achievement or activities of daily living.

C. The disturbance is not due to a general medical condition (e.g., cerebral palsy, hemiplegia, or muscular dystrophy) and does not meet criteria for a Pervasive Developmental Disorder.

D. If Mental Retardation is present, the motor difficulties are in excess of those usually associated with it.
Dyspraxia

Developmental dyspraxia is an impairment or immaturity of the organisation of movement. It is an immaturity in the way that the brain processes information, which results in messages not being properly or fully transmitted. The term dyspraxia comes from the word praxis, which means ‘doing, acting’.

Dyspraxia affects the planning of what to do and how to do it. It is associated with problems of perception, language and thought.

Dyspraxia Foundation

“The term dyspraxic has been used to children demonstrating motor problems not due to documented basic motor impairment such as cerebral palsy”

Dowey, 1995

So DCD is:

- A movement disorder affecting children in more than one setting
- Pervasive
- Developmental
- Enduring
- Has multiple causes

DCD has also been called...

- “Awkward” - “in the wrong way” derived from “awke” or wrong from an Old Norse term “øfug” meaning backward
- 1949-MBD
- 1963-“minimal cerebral palsy”; “minimal cerebral dysfunction” (Bax & MacKeith)
- 1965- perceptual-motor dysfunction (Ayres)
- 1967-visuo-motor disability in school children (Brenner)
- 1968/70 -Clumsy child syndrome (Ilingworth)
- 1975- Developmental apraxia (Gubbay)
- 1982- Developmental dyspraxia (Denckla)

Signs and Symptoms of DCD

4-6 years

- Unable to throw ball with direction
- Unable to catch 12” ball
- Not exploring playground equipment
- Not alternating steps on descent of stairs
- Can’t do up zips
- Can’t cut along a line
- Difficultly sitting at table & chair
- Immature pencil grip

ICD10 SPECIFIC DEVELOPMENTAL DISORDER OF MOTOR FUNCTION

( WHO, 1993)

- The score on standardized test of fine or gross motor co-ordination is at least 2 standard deviations below the level expected for the child’s chronological age.
- The disturbance in criterion A significantly interferes with academic achievement or with activities of daily living.
- There is no diagnosable neurological disorder.
- IQ is below 70 on an individually administered standardised test.

WHO, 1993
7-8 years

- Writing
- Participating in ball sports
- Cannot ride a bike
- Messy eater - can’t cut meat
- Cannot tie shoes
- Self care tasks- cleaning teeth/wiping bottom still difficult

9-10 years

- Academic grades are impacted by written work
- Social isolation
- Decreased fitness level/weight gain
- Frustration with writing/homework
- Victimization/bullying

10-12 years

- Writing at speed
- Self organisation
- Organisation of work
- Still slow getting dressed/shoes etc
- Social interaction with peers- emotional mismatch
- Mathematics associated
DIFFICULTIES PERSIST

- 72% 25 year olds continued to have difficulties (Menkes and Menkes, 1967)
- 73% 15-17 years continued to have difficulties (small sample; n=15) (Lesse et al (1991) 10 year follow up study)
- 65% Finnish 17 year olds remained having some difficulties especially in visual motor integration (Cantell et al study, 1998)
- 50% 17 year olds still had difficulties (Van Dellen and Gueuze, 1988)
- 80% of the participants in the follow up study with DCD had poorer outcomes compared to 13% in the comparison group without DCD. (Rasmussen and Gillberg, 2000)

DCD IN ADULTHOOD

- Learning to drive
- Independent living skills
- Organisation of self and time
- Handwriting
- Anxiety and depression

OTHER ASSOCIATED FEATURES

- Overlap
  + Social and communication skills
  + Executive functioning skills
  + Literacy and numeracy

SECONDARY IMPACT

- Bullying
- Weight gain (Carney et al, 2005 International Journal of Obesity 29, 369-372)
- Self esteem (Skinner and Piek, 2001)
- Less peer-peer interaction:
  - Stigmatisation (Segal et al, 2002)
  - Internalisation (Sigurdsson et al, 2002)
- Anxiety and depression

BUT Learning is never in isolation nor is movement.....
**NO ACTION IS IN ISOLATION**

- Read and copy from a board and discuss the content
- Playing football in a playground

**Motor Development and Learning**

Resources of the Child

Outcomes

Environment in which Activity occurs

Manner of presentation

**Outcomes are interrelated by multiple factors**

ICF framework

Children may present in a variety of ways
• Delayed speech
• Fidgety
• Withdrawn
• Refusing to write
• Avoiding reading
• Delayed walking
• Failing at school
• ‘odd gait’
• Parent has DCD
• Poor organisation and time management

TERMINOLOGY CAN BE CONFUSING

• ADHD
• Dyslexia
• Aspergers Syndrome
• Dyspraxia
• DCD
• Autism
• Visual impairment
• Hearing impairment
• CP

Routes into services

Parent/teacher has a concern

Reading
Spelling
Motor delay
Writing
Self care
Social communication
Attention/ Negative behaviours

Recognition and Diagnosis

• May be dependent on GP/teacher/parent knowledge
• Service provision
• Age of the child
• Waiting lists
• Referral routes

Our interpretation of each of these behaviours may be different
The diagnosis a child gets
May be dependent on the door s/he goes through

Child and adolescent Psychiatrists defining DCD/Dyspraxia/DAMP

OTs' definition of ADHD

We try to sort the symptoms and signs into boxes and label them up so they can be better understood
**WHAT IS A DIAGNOSIS OF SPLD?**

- Undertaken using a test or from taking a “history” from others

- Undertaken using a test or from taking a “history” from others

- Undertaken using a test or from taking a “history” from others

- Undertaken using a test or from taking a “history” from others

**Diagnosis dependent on presenting symptoms**

**WHAT’S YOUR STYLE? (Trait)**

- Make some spelling errors, need to re-read words on the page, take longer than others to retain information

- Slower learning a new skill, difficulty with right and left, a bit clumsy, took longer than others to learn to drive

- Find it hard to sit still, prefer to flit from one thing to another, see the big picture but not so good at the detail

- Prefer detail, not so good at the big picture, uncomfortable in large social groups, don’t always get the jokes, take things literally
So what overlaps with what?

Overlap is the rule rather than the exception. For example:

- As many as 65% of children with ADHD will have one or more co-morbid psychiatric or other disorders (Beiderman et al., 1991).

Co-occurring Disorders in Children with ADHD (n=579)

- ADHD alone: 31%
- Tics: 11%
- Conduct Disorder: 14%
- Mood Disorders: 4%
- Anxiety Disorder: 34%
- Oppositional Defiant Disorder: 40%

DAMP
Deficit in Attention, Motor control and Perception

Study on DCD in Swedish 7-year-old children population

Approximately 50% of children with DCD had moderate to severe symptoms of attention-deficit/hyperactivity disorder (ADHD)


Diagnostic criteria for DAMP

- ADHD as defined by DSM IV
- DCD as defined by DSM IV
- Condition not better accounted for by cerebral palsy
- Not associated with severe learning disability (IQ above 50)
- Other diagnostic categories often apply (for example autism spectrum disorders, ODD, depression) but not are required to make a diagnosis

Gillberg, 2003 pp 905

DCD+ ADHD

Kirby and Salmon, 2007

ADHD + Asperger’s

(Fitzgerald and Conin, 2001)
50-75% of children referred to clinics for PDD also present with significant ADHD symptoms, for example inattention, hyperactivity, impulsivity.

(Goldstein & Schwebach, 2004; Sturm, Fernell, & Gillberg, 2004; Yoshida & Uchiyama, 2004; Lecavalier, 2006; Fombonne et al., 2001)

Asperger's + ADHD

More than 50% of adolescents with Asperger’s showed moderate to severe symptoms of inattention and hyperactivity

(Lecavalier, 2006; Fombonne et al., 2001)

ADHD + dyslexia

Approximately 33% of children with ADHD have been noted to have specific problems in spelling, reading and mathematics, unaccounted for by low intelligence (Szatmari et al., 1989).

ADHD + dyslexia + maths

- Approximately 33% of children with ADHD have
- specific problems in spelling, reading and mathematics,
- unaccounted for by low intelligence

ADHD + dyslexia + DCD

- A Canadian population study (Kaplan, Crawford, Wilson & Dewey, 1997)
  - Out of those showing DCD had also
    - 25% ADHD + Dyslexia
    - 22% Dyslexia
    - 10% ADHD
  - Additional work by (Biederman, Faraone, Mick, Moore, & Lelos, 1996; O’Hare and Khalid, 2002)
  - Kadesjo and Gillberg (2001) found that 47% of their ADHD children also had DCD

Behaviour + Language

Children with poor understanding have more behavioural difficulties

Children with difficulty expressing themselves—more socially withdrawn and anxious

Summary by the Centre for Integrated Healthcare Research, 2006
14 children in a PRU

<table>
<thead>
<tr>
<th>Diagnostic category</th>
<th>Number of students identified</th>
</tr>
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<tbody>
<tr>
<td>Dyslexia</td>
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<tr>
<td>Developmental Coordination Disorder</td>
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<tr>
<td>Joint Hypermobility Syndrome</td>
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<td>Attention Deficit Hyperactivity Disorder</td>
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<td>Autistic Spectrum Disorder</td>
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<td>Moderate Learning Disability</td>
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<tr>
<td>Conduct Disorder</td>
<td>1</td>
</tr>
<tr>
<td>Language Disorder</td>
<td>8</td>
</tr>
</tbody>
</table>

Speech and Language Impairment + DCD

- Early years speech difficulties- higher risk of those children having associated motor difficulties- 60% (Missiuna et al, 2007)
  - Hill (1998)
  - Rinaldi (1998)
  - Gems, Higg, & Hinshaw, (1996)
  - Elman, (1992)
  - Powell and Bishop (1992)

Mean RA 4.5 years behind
Mean SA 4.7 years behind

EXECUTIVE FUNCTIONING SKILLS ARE ALSO A COMMON FEATURE AMONG THOSE WITH DEVELOPMENTAL DISORDERS

EF AND SPECIFIC LEARNING DIFFICULTIES

- ADHD – all ADHD children have EF impairment to varying degrees (Barkley 2001)
- ASD – Pennington and Ozonoff (1996) found children performed 1 SD below control group on EF tasks
- DCD – children impaired on tests of working memory (Alloway & Temple, 2007)
- Dyslexia – studies have found WM deficits that compound their phonological problems (Wolf 2010)
- Dyscalculia – Askenazi & Henik (2010) found evidence of specific EFDs in university students with ‘pure’ dyscalculia
**Components**

+ Activation: organising, prioritising tasks, time estimation, initiation...
  procrastinate
+ Focus: sustaining and shifting...
  Reading over and over
+ Effort: regulating alertness, completing tasks, sleep pattern (can’t shut off)

+ Emotion: managing frustrations and modulating emotions...
  keeping things in perspective
+ Memory: using working memory and accessing recall...
  what has just been said, remembering a sequence
+ Action: monitoring and regulating self action...
  impulsive, not considering the context, can’t adjust pace

**4 Key Points**

1. Movement is essential for all day tasks
2. Children with developmental disorders almost always have overlap with other DDS’
3. Knowledge of each professional influences the diagnosis received
4. Essential to consider the ‘whole’ child to meet all needs

**For Practice**

- Considering a single diagnosis is not useful unless it leads to funding!
- Funding for a single diagnosis is useless unless it leads to further assessment of other diagnoses...
- Learning about a single diagnosis in isolation limits our understanding of the whole child
- Presentation changes with age and stage and external demands

**Children**

- Treatment for acne
- Scar Zone

- Imaging options for foot deformities
- Foot pain management
What might be the cause/differential diagnosis of motor difficulties?

Why does overlap occur?

Come back tomorrow for Part 2