Characteristics of children with clumsiness:

Age 5½ to 7 years:
• 5/16 with higher IQ – isolated motor problem
• 5/16 lowered IQ – considerable social and behavioural disorders; clumsiness only one of many difficulties
• 6/16 normal IQ and mixed ability; with a wide range of scores on motor and neuro-developmental tests.

1981
Nichols and Chen

Minimal Brain Dysfunction

1981-1983
Henderson & Hall
Concomitants of Clumsiness in Young Schoolchildren

Dev Med Child Neurol, 24, 448-460

Prospective study of 29,889 children – behaviour/ability at 7 years
3177 Learning Disabled (IQ m=97.4), Hyperactivity/inattention (IQ m=95.1), or Neurological ‘Soft’ Signs (IQ m=96.7)

MD – Nichols & Chen 1981

Percentages of children affected with individual symptoms
1982
Gillberg et al
Gillberg and Rasmussen
1983
Gillberg
Perceptual, motor control and attention deficits
 *JCPP/Dev Med Child Neurol*

1989
Gillberg & Gillberg
Children with preschool minor neurodevelopmental disorders IV:
Behaviour and school achievement at age 13
*Dev Med Child Neurol, 31,3-13*
Overlap of (mild-moderate and severe DAMP + ADHD and autistic features in 7 year olds

"Pure" ADHD
2-7%

Severe DAMP
1.2-1.7%

Hyperkinetic Disorder

Developmental coordination disorder/clumsy child syndrome

Reading Disability
n=19

Autistic traits, not Asperger syndrome
0.4%

Asperger syndrome
0.3%

Data from Gillberg, 1983, Gillberg & Gillberg, 1989
Gillberg Clinical Child Neuropsychiatry

15/17 original ‘clumsy’ children from Henderson & Hall 1982:

Harter’s Self Perception Profile

<table>
<thead>
<tr>
<th></th>
<th>Clumsy'</th>
<th>Control</th>
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<tr>
<td>Cog svc</td>
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<tr>
<td>Soc</td>
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<tr>
<td>Gen</td>
<td></td>
<td></td>
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<tr>
<td>Overall</td>
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1991
Losse, Henderson, Elliman, Hall, Knight, Jongmans

Clumsiness in children-Do they grow out of it? A 10 year follow-up study

Dev Med Child Neurol, 33, 55-68

1994
Hellgren, Gillberg, Bagenholm, Gillberg

Children with deficits in attention, motor control and perception (DAMP) almost grown up: Psychiatric and Personality Disorders at Age 16

JCPP, 35, 1255-1271

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Children with deficits in attention, motor control and perception (DAMP) almost grown up: Psychiatric and Personality Disorders at Age 16

JCPP, 35, 1255-1271
1994: Shoemaker, Kalverboer: Special Issue of APAQ, 11, 130-140. Social and Affective Problems of Children Who Are Clumsy! How early do they begin?


2001: Hill: IJLD, 36, 149-171 Non-specific nature of specific language impairment: a review of the literature with regard to concomitant motor impairments

2003: Jongmans, Smits-Engelsman, Shoemaker: JLD 528-527 Consequences of Comorbidity of DCD and LD for severity & pattern of perceptual-motor dysfunction

2005: Cummins, Piek, Dyck DMCN, 47, 437-442 Motor coordination, empathy & social behaviour in school aged-children

1998

Kaplan, Wilson, Dewey, Crawford

DCD may not be a discrete disorder

Human Movement Science, 17, 471-490

2002

Green, Baird, Barnett, Huber, Henderson

The severity and nature of motor impairment in Asperger’s Syndrome: a comparison with Specific Developmental Disorder of Motor Function

JCPP, 43, 1-14

Social Behaviour Scale (Green 1998)

- Physicality
  - Gestures, Gazes, Distances, Turns, Postures, Touches
- Social Reciprocity
  - Initiates, Involves, Respects, Collaborates, Welcomes
- Communication
  - Asks, Answers, Focuses, Clarifies, Thanks/Apologises, Concludes
- Timing Skills
  - Timing Response, Speaks Fluently, Takes Turns, Times Duration, Completes
2006
Green
A quantitative and qualitative study of the nature of Developmental Coordination Disorder
Unpublished PhD thesis, University of Leeds
A pilot study of psychopathology in Developmental Coordination Disorder

Child: Care, Health and Development, 32 (6) 741-750

Strengths and Difficulties Questionnaire

Overlap of emotional and behaviour disorders in children with DCD n=47

SDQ scores DCD children compared to CAMHS referrals

Green, Sugden & Baird (2006)
DCD+ Change in the degree of motor deficit from pre- to post-intervention by association with social and emotional difficulties on SDQ (n=42)

<table>
<thead>
<tr>
<th></th>
<th>1 Activity++</th>
<th>2 Emotional++</th>
<th>3 Peer ++</th>
<th>4 Few problems</th>
<th>Total</th>
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<tr>
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<td>3</td>
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<td>6</td>
<td>3</td>
<td>14</td>
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<tr>
<td>Progress</td>
<td>9</td>
<td>6</td>
<td>7</td>
<td>6</td>
<td>28</td>
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<td>12</td>
<td>8</td>
<td>13</td>
<td>9</td>
<td>42</td>
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</tbody>
</table>

Chi² / Fisher's Exact df (3) = 1.587 p>0.05

**Multiple Primary Deficits in DCD**

**Aetiological Factors (acting singly or together)**

- Environmental / Experiential  
- Genetic  
- Specific sorts of early-acquired brain insults

**Characteristic neurological deficit**

- Abnormalities of M1/SMA, Parietal & Occipital lobes  
- Abnormalities of brainstem and diencephalon  
- Abnormalities of basal ganglia & frontal striatal areas  
- Loss of thalamo-striato-cortical and thalamo-cortical connections  
- Inefficiency of cerebellar and frontal cerebellar links

**Characteristic functional deficit**

- Motor and Visual spatial difficulties  
- Perceptual/sensory abnormalities/sense regulation  
- Poor planning and behaviour organisation  
- Learning difficulties and poor bimanual control  
- Timing & sequencing deficits

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**The end of the beginning**

**Acknowledgement**

I would like to thank Dr Sheila Henderson for having set a high standard for research in the field of movement disorders and especially for having provided the encouragement and support for my initial research in this area.