The Value of Single Case Studies: What Real Life Examples Can Add to Our Knowledge of DCD

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Methodology

Group studies

- Predominate publications
- Identify features common to specific cohort - data pooled
- Individual characteristics lost/obscured
- Potentially significant 'outliers' usually excluded
- Generalisability reliant on rigorous sampling, validity & reliability

Single case studies

- Few reach peer-reviewed publication
- Extract information difficult/impossible via group designs
- Focus on individual variation
- Often longitudinal data at time points over several years
- Not generalisable: can help formulate hypothesis, identify new syndrome

'The Clumsy Child Syndrome' Single Case Studies (Walton et al., 1962)

Case 1: Orthopaedic referral - nocturnal limb pains; Muscular dystrophy and mental handicap queried. VIQ (WISC) 137. Inattentive, clumsy

Case 2: Gestation (43 weeks) - 5 day labour, forceps delivery. Walked 2 yrs. Articulation difficulty. IQ 113. Age 14 virtually incapable of physical training, gardening, woodwork, art. Muscle action slow and ill-directed

Case 3: Gestation (36 weeks) (eclampsia). Phrases at 15 mo. Tonsillitis at 18 mo. Did not speak again easily until 4 years. VIQ 99. Clumsy, poor imitation, handwriting crude

Case 4: Premature (8 weeks), born cyanosed. VIQ 105. Only single words by age 2 years. Upper limb & oral dysfunction.

Case 5: Whooping cough 12 weeks; pneumonia 12 and 15 mo. Walked 3 yrs. Age 8 unable to hop, jump or read. Pseudoathetosis & abnormal signs in left arm and leg. VIQ 87 PIQ 44

All five cases would meet DSM-IV Criteria A, B & D. What about C?

Diagnostic Criteria for DCD (APA 2000 p 58)

"**Criterion 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, sitting), dropping things, 'clumsiness', poor performance in sports or poor hand-writing.

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

Criterion C: The disturbance is not due to a general medical condition (e.g. cerebral palsy, hemiplegia or muscular dystrophy) and does not meet the criteria for a pervasive developmental disorder.

Criterion D: If mental retardation is present, the motor difficulties are in excess of those usually associated with it."

Cohort Study + Single Case Study - Triangulation

Cohort Study (n=17) (Losse et al., 1991)
Group data: experimental and matched controls over 10 year period

PLUS

Single Case Study (n=1) from same sample (Henderson et al., 1991)
Individual record: one participant over same10 year period

↓

Robust, rich data: variable, often pervasive long term outcome of DCD

Selection of Single Case Studies from Doctoral Thesis (Peters, 2006)

Aim

- Illustrate current theoretical & practical issues pertinent to DCD

Method

- Single longitudinal case studies

Participants

- Selection from true records of real school children of average IQ
- All referred to physiotherapy for assessment of 'clumsiness'/DCD
- Only child's name altered (to maintain anonymity)

Acknowledgement to

Professor Sheila E. Henderson

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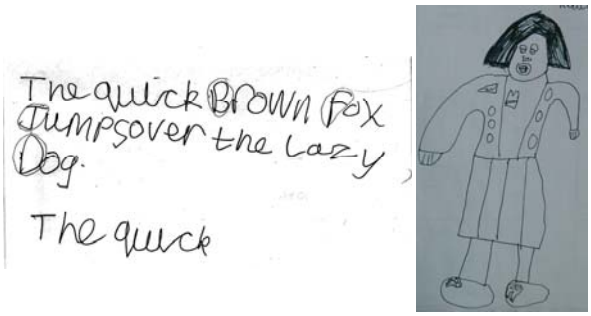
DCD: Pure Cases Do Exist
Case Study 'Annie': data from birth to 21 years

Early history, diagnostic process
- Emergency LSCS (foetal distress) at 37 weeks gestation
- Mildly delayed motor milestones. Language on time
- Frequent falls. Labels given: 'clumsy'; 'sensory integrative disorder'; 'motor learning difficulty'; 'developmental dyspraxia'

Formal assessments (Criteria A, C and D)
- Physiotherapist: (10 yrs) M-ABC = 30.5 (< 1st centile)
- Visual Motor Integration (VMI): 8th percentile. DAP asymmetry
- Clinical observation: hand writing poor, hands shaky when shifting pegs, pouring drinks; runs as if wearing heavy boots, effortful and tires quickly
- Neurologist: normal reflexes, mild truncal ataxia, rapid manipulation poor, no evidence of medical condition or pervasive developmental disorder
- Cognitive: Verbal IQ (111); Performance IQ (77)

Handwriting Difficulty Common in DCD
Drawing and Writing Samples by 'Annie' at Age 10 Years



Criterion B: "...Significantly Interferes with Academic Achievement or Activities of Daily Living.." (DSM-IV-TR, 2000)
Impact of movement difficulty for 'Annie' (Criterion B)

Primary School
- Climbed play structures and froze unable to get down
- Began to avoid parks and fairground rides
- By age 5 years reluctant to use a pencil
- Writing problem - increasingly less enthusiastic re school
- Unable to do shoe laces or tie
- Needed help with bathing, hair wash, wiping after toilet
- Annie felt dependent; lacked confidence

Secondary School
- Carrying bag to different class rooms: tiring and lost her way
- Never learnt to ride a bicycle but enjoyed horse riding (RDA)
- Age 16 years: balance remained poor, help with telling time; kitchen safety (burned herself); judging traffic speed & negotiating roads

Ecological Approach:
'Annie' 12 yrs. Typing sample & success through Riding for Disabled Group

I hope you had a good year in 1999. I loved horse riding even more in 1999 and hope to carry on into the new millennium with my favourite horse Roger. (See picture.) I managed to get a certificate as proof that I jumped a jump.

At school I have been doing very well in every subject, including Maths.

"Involve Child's Wishes as Key Parts of the Intervention Process"
(Sugden, 2006 p8)

15\1\Y2K.

Dear Judith.

Here are my six targets:

1. I will get into a canter on Roger without panicking.
2. I will walk the dog every Sunday.
3. I will try to practice touch typing almost every day
4. I will help out at horse riding more often (If possible.)
5. I will go ice skating, bowling or swimming once a month.
6. I will set the table every day.

Happy New Year / Millennium.

I hope you enjoyed the Y2K fireworks display.

Yours sincerely,

Damaging Labels; Strategies for Success
Need to Support Family - Life-lines;

- Parent comment: "Being initially labeled 'clumsy' did untold damage. ...Physiotherapy has been a life-line... One to one attention to specific problems has been invaluable…It would be wonderful to have some sort of drop-in centre or club to obtain expert information and where the (DCD/dyspraxic) children could socialise"
- 'Annie' at 21 years: Types and uses a computer; Reads a lot and writes plays and stories. Enjoys drama "Even if rubbish, people love you just for trying"; Falls occasionally but learnt to fall in drama so no longer a problem. Stopped riding at age 16 years (entered college). Helped in the stables for work experience. Certificate in travel & tourism and IT. Confident and plans for independent future.

Thank you 'Annie' for consenting to the use of this case study & photos for teaching/educational purposes

CP/DCD Continuum? Labels Can be Positive Help;
Case study "Kevin"

Early history, diagnostic process

- Second twin. 6 weeks premature. History of toe walk & scuffed shoes. Orthopaedic assessment. No diagnosic label until age 11 years when Neurologist writes *"more likely to be dyspraxic than anything else"*. Refers to Physiotherapist

Formal Assessment (Criteria A, C D)

- Age 11: M-ABC 24.5 VMI 16th percentile
- Age 15: M-ABC 10.5 VMI 88th percentile
- Mildly tight leg muscles, finger sequences difficult, handwriting awkward, articulation tends to dribble, no unusual behaviours, IQ 120

Impact of Motor Difficulties (Criterion B)

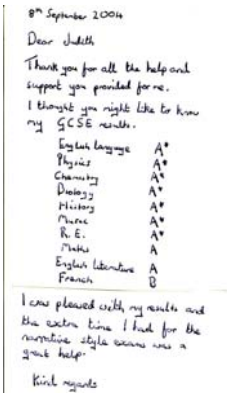
- Problems: cutlery, food texture, writing, asymmetrical swim, cycling
- Teachers called him lazy. Kevin felt a failure compared to brother
- Label DCD provided 'an answer' & empowered family and teachers

Keyboarding + Extra Time Allowed in Exams Gave Kevin Opportunity to Show His Potential

He remains less co-ordinate than his twin brother (especially right in-hand manipulation & balance)

Age 15 yrs: Mum says right leg 'flails' when walking slowly

Takes part in music & sport and is academically confident, socially quiet


8th September 2004

Dear Judith

Thank you for all the help and support you provided for me.

I thought you might like to know my GCSE results.

English Language	A*
Physics	A*
Chemistry	A*
Biology	A*
History	A*
Music	A*
R.E.	A*
Maths	A
English Literature	A
French	B

I am pleased with my results and the extra time I had for the narrative style exams was a great help.

Kind regards

DCD & Joint Hypermobility Syndrome (JHS) Labels Muddle
Case study 'Adam'

Early history, diagnostic process

- At 3 months weak muscles (tests normal)
- Crawled 'like a maggot', Walked 24 mo.
- Fell over ++, Communication normal
- At age 5 yrs: "dyspraxia" "ADHD"; "Gifted" (!)

Formal Assessment (Criteria A, C, D)

- M-ABC: 24.5 VMI: 77%ile IQ: >average
- Beighton 9/9 → diagnosed Ehlers Danlos

Impact of Motor Difficulties (Criterion B)

- Needed buggy - felt like baby; aching limbs compromised play with friends and sleep
- Lacked grip control for writing; buttons
- Specific progressive resisted exercises

Dealing with co-occurring diagnoses: ASD Need to Screen Non-Motor Domains
Case study 'Elizabeth'

Early history, diagnostic process

- Normal birth history, walked 14mo. Never crawled. Language on time. Parents noted: 'different', fussy re sensations/textures/foods, obsessive interests

Formal Assessment (Criteria A, C and D)

- M-ABC: <1st %ile (Manual Dexterity good; Ball Skills and Balance poor)
- VMI: 14th %ile ASSQ: ASD range VIQ: 147

Impact of Motor Difficulties (Criterion B)

- Buttons, laces, ties a difficult chore every day
- No interest in sport/PE
- Lack of motor skill + sensory constraints + solitary interests = isolation

Application of Criterion A: Handwriting?
'Gerald' (isolated dysgraphia) & 'Stephen' (DCD + dysgraphia/dyslexia)

Gerald:

- Referred via psychologist as 'dyspraxic"; average IQ
- At age 7 years difficulty forming letters or numbers (50% reversed)
- Average VMI and M-ABC score (directional confusion on tasks) Does he meet Criterion A?

Stephen

- 9 years referred via orthopaedics (leg pains).
- General motor incoordination (M-ABC <5th%ile)
- 'Non-sporty' family unconcerned. Physiotherapy assessment led to educational assessments and help in school for dyslexia

Medical Conditions Importance of Health Screening: Red Flags

Mary

- Gross motor difficulty; poor at PE; physiotherapy ++ Labeled DCD
- Age 10 yrs. Diagnosed NF1 (axillary freckling, macules)

Brian

- Never able to hop; seen by paediatricians; teased/bullied
- Age 10 years, teacher noted poor PE & stair climbing - health& safety
- Physiotherapist observed calf m. pseudohypertrophy; weakness
- Blood test - Duchenne Muscular Dystrophy confirmed

Peter

- Handwriting, buttoning: joint pain & stiffness especially mornings
- Subsequently found to have Idiopathic Juvenile Arthritis (JIA)

Michael

- Typical DCD history; Age 9 headaches benign cerebral tumour:

Summary 1

- Single Case Studies important: complement group/cohort methodology
- Differential diagnosis for ‘motor difficulty’ by health professional essential
- Evidence: standardised norm-referenced motor test + valid reliable screen for associated problems & co-occurring conditions
- Environment: intervention appropriate to diagnosis and family context

Summary 2

- Need to be aware of both DSM-IV (Medical)+ ICF (Functional) models
- Health and Education ‘red flags’ to inform across disciplines
- Labels (pros and cons): need for clarity, communication & avoid jargon

Hydrangeas: Single Case Study

Heterogeneous group of garden shrubs
Many individual varieties
Differ in form, functional use
Environmental influence

Hydrangea: Hanobi ‘Fireworks’