

**DEVELOPMENTAL COORDINATION DISORDER (DYSPRAXIA)**

**What helps, what hinders in the school years for later achievement and  
wellbeing?**

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## **ABSTRACT**

**Background.** Developmental Coordination Disorder (DCD) is a condition impacting physical coordination and organisation of movement. Poor central executive skills (planning, organising and prioritising) are also evident. The rate of anxiety and depression amongst pupils, young adults and adults experiencing DCD is greater than would be expected.

### **Aims.**

1. To evaluate the evidence for social, emotional and educational difficulties associated with DCD during the school years.
2. To relate pupil experiences during key stages 4 and 5 with their wellbeing as young adults and with academic attainments.

### **Literature review.**

Twenty three research papers were identified which addressed (i) the evidence which associates the physical manifestations of DCD with additional social, emotional, educational and cognitive difficulties, (ii) the theoretical perspectives put forward to account for these associated difficulties and (iii) interventions reported with consideration of their impact and useability.

### **Sample.**

The study participants were 26 young adults (aged 20 to 36) previously identified through the author's private practice as experiencing possible dyspraxia together with their parents.

### **Methods**

The study addressed two key questions and employed a mixed method exploratory design combining cross-sectional and predictive information (due to the availability of historical data). The participants completed online questionnaires. The young adult questionnaire covered school experiences, educational attainment, their current situation and reflections on their school experience. The parent questionnaire covered similar topics.

### **Results.**

A strong link was found between the young adults' current wellbeing and their perceptions of the level of recognition and understanding of DCD shown by their teachers in school. Academic achievement was positively correlated with verbal ability; qualitative data indicates the benefit of parental support.

### **Conclusions.**

The identification of DCD amongst the school aged population is essential if later negative consequences are to be avoided. Teachers need input which will enable them to 1) recognise behaviours indicative of DCD and 2) provide a supportive learning and social environment. The evidence suggests that this would enable such pupils to thrive emotionally, achieve academically and minimise later mental health issues.

## **THESIS IMPACT.**

The aim of this research project, in its widest sense, has been to consider which aspects of home and school life might help or hinder pupils in relation to their academic achievement and their long term wellbeing.

This study has provided evidence that recognition, understanding and support for the difficulties experienced by teenage pupils with DCD can make a long-term difference to how well they cope emotionally as they emerge as working young adults. It is important to disseminate this information to schools, teachers and parents as well as pupils and young adults. The outcome of the research indicates a need to ‘educate’ schools about the identifying features of DCD (particularly in undiagnosed teenagers) and the ways in which school staff can contribute to the success and happiness of such pupils with the impact lasting well beyond the school years. Material gathered from participants was rich and informative.

The platforms available to this author, who is not attached to a school or educational psychology practice, are largely through writing and presentations. The material lends itself to an academic article for an educational psychology journal such as Educational Psychology in Practice or The British Journal of Educational Psychology; additionally, an article for the Dyspraxia Foundation or the TES (Times Educational Supplement) with a focus on the interest of teachers. A linked-in blog would find a wide audience (the author has over 1,000 connections). The author will also contact Jessica Kingsley Publishers (by whom she is already published) to suggest a book aimed at teachers, parents and

pupils or alternatively all three. Application could be made to the local TEDx Stroud organisation (who have already approached her) which organises talks. With regard to organisations such as schools and charities (particularly with which the author has long standing links), there are also potential opportunities to share information in one form or another (i.e., blog/presentations/talks). The research project has provided a considerable amount of rich and detailed information through the thematic analysis which could be informative for teachers, encouraging for parents and motivational for teenage pupils experiencing DCD.

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## **PART 1: INTRODUCTION**

### **What is dyspraxia?**

Dyspraxia, also known as Developmental Coordination Disorder (DCD) is an area of specific learning difficulty (SpLD) affecting motor coordination. It is characterised by significant difficulty in both acquiring and performing a range of fine and/or gross motor activities. It affects everyday life skills and participation in a range of situations from home through school and other social settings. It is associated with reduced educational attainment (Harrowell et al., 2018). It continues to impact during secondary education, higher education and into employment (Kirby et al., 2011). Missiuna et al. (2007) provide a clear and well documented review linking the poor physical coordination of young children experiencing DCD to poor mental health (depression, stress and anxiety) at a later stage. There is mounting evidence that DCD persists into adulthood (Hill & Brown, 2013; Kirby et al., 2011 and that amongst the group affected there is a greater than usual incident of anxiety and symptoms of depression (Omer et al., 2018).

Despite an estimated prevalence rate of between 4-6% (European Academy of Childhood Disability 2019), DCD has received less attention and research than other areas of specific learning difficulty such as Attention Deficit Hyperactivity Disorder (ADHD), Dyslexia, and/or Autism Spectrum Disorder (ASD). There is also a general lack of awareness in schools regarding the condition and the impact which it has on academic performance and the wellbeing of pupils affected (Wilson et al., 2012). A survey carried out by the Dyspraxia Foundation in 2017 indicated that dyspraxia ‘really is the poor relation in terms of teacher training and awareness’. Nearly half the schools surveyed had



no clear process for identifying students with dyspraxia and 69% of teachers had not received any specific training.

### **Rationale for the thesis and professional relevance to the author**

The author's interest in this topic and the observations which have shaped her understanding of the problem stems from clinical work and observations made during a 15-year period in which she ran and worked as part of an independent educational psychologist (EP) practice. Clients (generally parents) were typically referred by headteachers, special educational needs coordinators (SENCOs), other professionals such as occupational therapists, speech and language therapists, physiotherapists, psychotherapists, doctors and other parents. Over the period that the practice was operating the researcher, and other members of the team, assessed a large number of pupils, a proportion of whom were experiencing difficulties indicative of dyspraxia. It was often the case that these pupils, particularly those of secondary school age, reported experiencing criticism from teachers for exhibiting the behaviours which are part and parcel of their particular disability. Feedback from school staff indicated that it was not unusual for these pupils to be perceived as being lazy, sloppy or as though they are making no effort. This was confirmed by parents who were particularly concerned that their child was 'misunderstood'.

Members of the team who carried out assessments noted that pupils who had already been identified with DCD (generally through a medical route) were those who, as teenagers, also experienced a range of difficulties including slow and poorly formed handwriting, poor planning and organizational skills, difficulty in carrying out a sequence of activities such as a science experiment and completing work on time. They typically did not enjoy team sports. Parents often reported the need to provide an unusual amount of support and

encouragement. This pattern of difficulties occurred sufficiently often to alert the assessor to the possibility that the pupil undergoing assessment might experience dyspraxia (in those not already identified), particularly if there was also a developmental history of poor fine and gross motor coordination. The underlying condition associated with these difficulties is not readily visible and to the average observer these, often verbally able, pupils can appear to be making little effort. In the absence of any officially recognised checklist or descriptions of the issues facing the teenage pupil with DCD, it is perhaps not surprising that many had gone unrecognised and unsupported in school, particularly if they had not had the benefit of alert parents and an OT assessment at an earlier stage.

### **Supportive interventions for pupils**

The evidence base for what interventions (in addition to physical therapy) work best for pupils experiencing DCD is limited (Harrowell et al., 2018). In a scoping review, Gagnon-Roy et al. (2016) state they were unable to find a single empirical study which evaluated the impact of interventions.

Observations and feedback made to practitioners working with the author suggest there are ways in which pupils experiencing dyspraxia can be effectively helped. For example, pupils report the benefits of good study skills training, social skills training, the opportunity to learn to touch type, counselling, and a sympathetic approach in school and opportunities to engage in physical activities in which they had skills. Activities in which they reported success included javelin throwing, riding and sailing. These are sports which do not require ball skills or team participation, but nevertheless provide exercise, skills development, and a contribution to growing confidence.

Pupils and parents have reported, in discussion, that anxiety and distress can be relieved when school staff are helped to view the child differently and to provide a more positive and supportive environment. Supportive teaching certainly appeared to make a positive difference.

### **Rationale for the literature review**

While this topic has recently received more academic attention and has been subject of an increasing number of studies, questions remain: what accounts for the observed pathway from poor coordination to anxiety and depression, what are the interventions that might interrupt this observed pathway, what is the extent of the impact of dyspraxia on academic attainment and what type of interventions might support learning.

Green and Payne (2018) (page 39) conclude that ‘we need to consider and address non-motor factors if interventions are to be effective in improving personal, academic, emotional and social outcomes for people with DCD’; they go on to suggest that examination of motor, organisational/executive functioning, contextual and social factors will help us understand differences in the performance and participation of individuals with DCD in real-life situations and develop interventions that improve the quality of life and life satisfaction of people with DCD.

### **The empirical study**

In the light of the findings from the literature review the following research questions were proposed:

- Is there a relationship between the way in which the pupil with DCD experienced school and his or her later wellbeing? And
- Did the interventions provided by the school/home impact academic attainment and wellbeing?

The aim of the study was to consider which aspects of the school and home environment were viewed by participants as positive and helpful and which may have been viewed as detrimental to the young adult participants' progress, happiness and academic success.

The researcher has considered what associations may be found between the participants' reported experiences and the longer-term outcomes relating to academic achievement and reported wellbeing. The study also investigates what specific interventions can be found and whether they influence both educational and emotional outcomes.

The 26 young adult participants (and 18 of their parents) are those who, at the time that they were in school, underwent an educational assessment and who were identified as experiencing difficulties indicative of dyspraxia. Their parents are secondary participants. Information has been gathered through online questionnaires.**Epistemological position adopted**

The methodological approach adopted in this study has been the use of quantitative and qualitative measures to evaluate the experiences of a group of young adults (and their parents) in relation to their time in secondary school (with the main emphasis on key stages four and five.) The researcher has approached this with the stance of a critical realist. Participant experiences are considered in the light of their subsequent wellbeing and in relation to their academic attainment. Academic attainment is a measurable quantity resulting from quantifiable data. School experiences and wellbeing are, in

contrast, subjective. The critical realist differentiates the social and material worlds but considers both to be real. The critical realist seeks objectivity within the subjective world of experiences, thoughts, ideas, attitudes and feelings thereby imbuing thoughts, emotions and the internal ways in which people experience events as having a reality which can be measured, evaluated and used as evidence. This view validates the ‘measurement’ of experience to provide data for quantitative analysis while the views and thoughts of participants can also be thematically analysed and accepted as having a reality from which generalisation may be concluded.

### **Description of the thesis structure**

Part 2 starts with an introduction to the topic of DCD, its definition, co-morbidity, epidemiology and assessment. This is followed by a review of the literature which relates to the three review questions. These three review questions are addressed through the in depth scrutiny of 23 papers. Seven of which are review papers, ten report quantitative research, three cover qualitative studies, one is mixed method and one is an opinion piece. Also included is the International clinical practice recommendations of the European Academy of Childhood Disability (2019). Information gathered through this review process forms the basis for the empirical study.

Part 3, the Empirical Report, summarises the literature review findings which leads into the two research questions which are:

- Is there a relationship between the way in which the pupil with DCD experienced school and his or her later wellbeing?
- Did the interventions provided by the school/home impact academic attainment?

These questions are addressed through the administration of the Adult Dyspraxia Checklist (ADC) (Kirby & Rosenblum, 2008; Kirby et al., 2010) and an online questionnaire completed by 26 young adults experiencing suspected DCD. In addition the administration of a further questionnaire to 18 of the participants' parents. Questions relate to the time that the participants were in school and to the present time. The responses to the single response questions are analysed quantitatively with application of SPSS. Thematic analysis is used to explore the responses to the open ended question.

Part 4, the Critical appraisal, covers the strengths and weaknesses of the research design and implementation. The epistemological stance and researcher biases are discussed as are the implications for the understanding and knowledge of the topic and for the practice of educational psychology. The distinctive contribution to the area of study and for future research are also considered.

The purpose of the literature review which follows in Section 2 was:

- To evaluate research studies which link poor coordination indicative of DCD with the range of social, emotional and educational difficulties mentioned above.
- To consider what theories may have been put forward to explain the link between poor coordination and the subsequent education, social and emotional difficulties reported in the above studies and to consider whether this might provide a theoretical underpinning for developing appropriate interventions.
- To seek studies relating to the efficacy of any interventions delivered in the school and home setting on educational attainment, physical and social wellbeing.

## **PART 2: LITERATURE REVIEW**

The literature review which follows starts with consideration of background information relating to the terminology, definitions, co-morbidity, epidemiology and assessment of Developmental Coordination Disorder. The review then covers the identification and analysis of research papers relevant to the review questions (i.e., papers relating to the wider difficulties associated with DCD, theoretical underpinnings and associated research followed by interventions).

### **2.1 Background information**

#### **2.1.1 Terminology**

Dyspraxia, which was initially referred to as ‘clumsy child syndrome’ is also known as Developmental Coordination Disorder (DCD). The term dyspraxia is favoured by many in the UK (for example, the national charity the Dyspraxia Foundation and by other support groups and practitioners). For that reason, the term dyspraxia will generally be used in relation to all aspects of the research described in this paper. However, for the purpose of the literature review, it will be referred to as DCD (Developmental Coordination Disorder) in accordance with the International Classification of Functioning, Disability and Health (ICF) and the Diagnostic and Statistical Manual of Mental Disorder, Fifth Edition (DSM-5). The two terms are often used interchangeably and, importantly, both capture the notion of ‘organisation of movement’ which involves the process of forming ideas, motor planning and movement execution, (Green & Payne, 2018).

### **2.1.2 Definitions**

DCD is described in the DSM-5 as a chronic condition which cannot be ‘fixed’ and will persist into adulthood. This motor skill disorder is deemed to be present when:

1. Motor performance is substantially below expected levels given the child’s chronological age and appropriate opportunities for skill acquisition.
2. The disturbance in criterion 1 significantly interferes with activities of daily living or academic achievement.
3. The onset of symptoms is in the early developmental period.
4. An impairment of motor coordination is not solely explained by intellectual or visual impairment and is not attributable to a neurological condition affecting movement (e.g., cerebral palsy, hemiplegia, or muscular dystrophy). The disturbance cannot be explained by any congenital or acquired neurological disorder or any severe psychosocial problem.

Whilst the DSM-5 recognises the pervasiveness of DCD across the lifespan, it falls short of describing the non-motoric symptomology such as the deficits of executive function, social, emotional and psychiatric difficulties commonly reported in adults. Purcell et al. (2015) point out that the primary self-reported concerns of undiagnosed adults coming forward for clinical assessment rarely involve gross motor skills. These undiagnosed adults do, however, express concerns about deficits in executive functioning, for instance planning and organising (Zwicker et al., 2012). They also express concerns about social interaction, distractibility and changes in routine.



### **2.1.3 Co-morbidity**

In relation to co-morbidity, the European Academy of Childhood Disability (EACD) (2019) report states that co-existing areas of difficulty commonly include attention deficit hyperactivity disorder (ADHD), specific language impairment (SLI), autistic spectrum disorder (ASD), and developmental dyslexia or reading disorder (RD). This is consistent with other studies which suggest a high level of overlap between DCD and ADHD (Kadesjo & Gillberg, 1998; Lingam et al., 2012).

### **2.1.4 Epidemiology**

The EACD (2019) report estimates prevalence for DCD within the range 5-6% as being the most frequently quoted percentage in the literature. Kadesjo and Gillberg (1998) found a prevalence rate of 4.9% for severe DCD and of 8.6% for moderate DCD in a population of seven-year-old children in Sweden. The Avon Longitudinal Study of Parents and Children (Lingam et al., 2012) found 1.8% with severe DCD and a further 3% defined as having probable DCD with consequences for everyday life, also amongst seven-year-olds.

### **2.1.5 Assessment**

The EACD (2011) report recommends that assessment of children should be completed by a professional who is qualified to examine specific criteria and recognise that this may require a multidisciplinary approach. DCD is identified through assessment of physical coordination, visual perceptual testing, ability to perceive and translate into a physical form. These guidelines recognised DCD as a unique and separate neurodevelopment

disability even though it can, and often does, co-exist with one or more other neurodevelopmental and/or neurobehavioral disorders. As with the Diagnostic and statistical manual of mental disorders (5<sup>th</sup> ed), (DSM-5) a limitation to this pan-European report (and relevant to this study) relates to the exclusive focus on children. This has subsequently been updated and the 2019 paper includes a separate section relating to adolescents and adults. The authors note that there is an emerging but limited literature on DCD in adolescents and adults. They suggest that assessment closely follow the DSM-5, but note that identification may initially be due to difficulties in the educational or employment setting. In addition to motor difficulties associated cognitive and psychosocial difficulties continue to affect everyday life, but are not put forward as identifying features of the condition. There remain, therefore, no official guidelines for educational psychologists, teachers, (or others engaged with secondary aged pupils), to make an identification

## **2.2 The literature search process**

The purpose of the literature review was:

- To evaluate research studies which link poor coordination indicative of DCD with the range of social, emotional and educational difficulties mentioned above.
- To consider what theories may have been put forward to explain the link between poor coordination and the subsequent education, social and emotional difficulties reported in the above studies and to consider whether this might provide a theoretical underpinning for developing appropriate interventions.
- To seek studies relating to the efficacy of any interventions delivered in the school and home setting on educational attainment, physical and social wellbeing.

In order to address these review questions literature searches were undertaken at two time points. The first was during spring 2018 and the second in June 2021. Between these two searches the researcher received emails from the Elsevier notification centre alerting her to potentially relevant research papers based on her Mendeley library and Science Direct activity. Electronic searches were also supplemented by ancestral searches, i.e., searching the references of included studies for any other relevant articles.

The process used to complete the literature review was as follows:

1. Formulation of the search terms for the selection of specific papers.
2. Inclusion/exclusion criteria drawn up (see table 1 below).
3. Search strategy implemented. This comprised screening four data bases and seeking appropriate titles followed by reading the abstracts of the titles generated as a result of the search terms applied. Where the abstract appeared relevant the next step was to obtain and read the full text of the selected studies.
- 4 The inclusion/exclusion criteria were used in order to screen out or select the full texts for potential inclusion in the review.
- 5 The application of the Gough's weight of evidence process to evaluate the quality and relevance of particular studies in relation to selected criteria.

Inclusion	Exclusion	Rationale
Studies between 2005 and 2018 (the time at which first search was completed).	Studies prior to 2005.	Published studies since 2005 have increased significantly resulting in greater theoretical and practical understanding of DCD.
Studies between 2018 to June 2021 (at the time of the second search).		As above
Studies in which the main focus related to social, emotional, educational and cognitive aspects of DCD.	Studies relating only to the coordination difficulties associated with DCD.  Studies where the focus of the research was mainly neurological and which did not include some link to cognitive, social, emotional and educational aspects of DCD.	To keep the focus on research relative to the application of educational psychology within an educational setting.
Studies relating to educational, social and emotional interventions.	Studies relating to motor skills development or physical interventions and training i.e., occupational therapy interventions	As above.
Including participants from age 5 years up to the age of 25 years.	Studies where participants are either exclusively pre-schoolers or 'adult'.	The focus of review is on the impact of DCD during the school years with particular reference to key stages 4 and 5.
Studies in English.	Non English language	
Peer reviewed papers.	Unpublished doctoral dissertations	To maintain certainty regarding the quality of the research.

*Table 1. Inclusion and exclusion criteria for the selection of studies for the literature review.*

### **2.2.1 The search strategy**

The databases referred to throughout were Web of Science, ERIC, Scopus and ProQuest.

The initial search process carried out in Spring 2018 used the following search terms:

‘dyspraxia’ AND/OR ‘developmental coordination disability’ AND/OR ‘DCD’ AND

variously: ‘interventions’, ‘sports’ ‘higher education’, ‘adolescence’, ‘young adults’,

‘spatial skills’, ‘mental health’, ‘anxiety’, ‘depression’, ‘stress’, ‘central executive function’, ‘academic attainment’, ‘cognition’, ‘confidence’, ‘social skills’, ‘social participation’.

<b>Database/source</b>	<b>Initial screening</b>	<b>Abstracts read</b>	<b>Full text considered.</b>
Web of Science	757	67	34
ERIC	1,656	40	8
Scopus	103	57	10
Proquest	230	34 Total 139 after removal of 59 duplicates.	3 Total 55

*Table 2 The results of the screening process, spring 2018.*

The initial screening involved scanning all of the titles. This reduced the number of publications from 2746 to 139. Titles rejected, apart from duplicates, clearly fell outside the scope of the review questions. This was followed by reading the abstracts of the 139. which resulted in the exclusion of a further 84 articles. More detailed scrutiny was then applied to the remaining 55 which resulted in the selection of 22 studies. Studies rejected at this point included, for example,

‘Awareness and knowledge of developmental co-ordination disorder among physicians, teachers and parents’, (Wilson et al., 2012), which was rejected on the grounds that it was insufficiently relevant to the review questions. The 22 studies which remained were read again in detail and the selection criteria applied. Seventeen were selected and five were rejected. Studies rejected included, for example, ‘Examining the cognitive profile of the child with Developmental Coordination Disorder’, (Sumner et al., 2016) on the grounds that it did not relate to the social and emotional impact of DCD.

Gough’s weight of evidence process (Gough, 2007) was applied to assess the strengths and weaknesses of these 17 studies in relation to how well they were executed, the appropriateness of the method used and how well they addressed the questions posed in this assignment. The process provided the opportunity to quantify each study using comparable criteria. The results indicated that all studies received a medium or high rating and none were removed from the subsequent critical review. Full details of the process are shown in Appendix 2. An abbreviated version is shown below in table 4.

The second search was carried out in June 2021. The search terms used were ‘Dyspraxia’ or ‘Developmental Coordination Disorder’ or ‘DCD’. The search terms were left wide because the period covered, 2018 to June 2021, was short and it was anticipated that the number of studies which came up would be small enough to screen without difficulty.

The results were as follows:

<b>Database/source</b>	<b>Initial screening</b>	<b>Abstracts read</b>	<b>Full text obtained</b>
Web of Science	127	12	11
ERIC	263	18	0
Scopus	62	7 (3 overlapping with the above)	4
ProQuest	112	11 (all overlapped with the above)	
Elsevier	24	7	4
			Total 19

*Table 3 Results of the second screening process*

Nineteen further studies were identified as a result of this search following the same process as before. As previously the inclusion/exclusion were applied and six met the criteria for inclusion. The inclusion/exclusion criteria were more stringent than previously due to the fact that these studies were added after the research process had already taken place and therefore, only those which added to the existing body of

knowledge were considered to be of sufficient importance to be included i.e. those studies which (i) had focused on mediating factors which might link poor coordination with the other emergent difficulties with central executive and with social/emotional issues and (ii) which related this to a theoretical position. There were no studies which considered educational intervention.

The quality and relevance of the six selected studies were rated as per the Gough weight of evidence framework. No studies were rejected as a result.

Details and a description of the 23 papers resulting from the combination of the two searches can be found in Appendix 1 and full details of the application and outcomes from the application of the Gough weight of evidence framework are shown in Appendix 2. Table 4 below shows a summary version of the results.

Each of the studies included received numerical ratings against three sets of criteria. These scores were rated as High, Medium or Low. In the Table 4 below Column A relates to general quality, Column B to appropriateness of that form of evidence for answering the review question, Column C to the relevance of the topic to the review question and Column D provides the overall rating resulting from the combination of A,B and C.

Qualitative studies

Author	A	B	C	D
Missiuna et al 2009	HIGH	HIGH	HIGH	HIGH
Lingam et al 2017	HIGH	HIGH	HIGH	HIGH
Payne et al. 2013	MEDIUM	HIGH	HIGH	MEDIUM/HIGH

Quantitative studies

Crane & Hill 2017	HIGH	HIGH	MEDIUM	MEDIUM
Lingam et al. 2012	HIGH	HIGH	MEDIUM	HIGH
Schmidt et al 2017	MEDIUM	HIGH	HIGH	HIGH
Tal-Saban et al. 2012	HIGH	HIGH	HIGH	HIGH
Harrowell et al. 2018	HIGH	HIGH	HIGH	HIGH
Hill et al. 2011	MEDIUM	MEDIUM	HIGH	MEDIUM

Li et al. 2019	HIGH	HIGH	HIGH	HIGH
Gill et al. 2020	MEDIUM	MEDIUM	HIGH	MEDIUM
Schott et al. 2016	MEDIUM	HIGH	HIGH	HIGH
Engel-Yerger 2020	HIGH	HIGH	HIGH	HIGH

Mixed method

Kirby et al 2011	MEDIUM	HIGH	HIGH	HIGH
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Reviews

Lodal & Bond 2016	HIGH	HIGH	HIGH	HIGH
Green & Payne 2018	HIGH	HIGH	HIGH	HIGH
Omer et al. 2019	HIGH	HIGH	HIGH	HIGH
Gagnon-Roy 2016	HIGH	HIGH	HIGH	HIGH
Cairney et al, 2013	HIGH	MEDIUM	HIGH	HIGH
Missiuna & Campbell, 2014	HIGH	HIGH	HIGH	HIGH
Mancini et al. 2019	HIGH	HIGH	HIGH	HIGH

Report

The European Academy of Childhood disorders. Blank et al. 2019	n/a	n/a	HIGH	HIGH
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Opinion

Edmonds, C., 2013	n/a	n/a	HIGH	HIGH
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*Table 4 Summary of the Gough's weight of evidence scores.*

Table 5 below provides details of the 23 studies which were included. They are shown in the order in which they are discussed in the review.



Author and date	Title	Publication
1. Missiuna, C., Moll, S., King, S., King, G., Law, M., 2009	A Trajectory of Troubles: Parents' impressions of the impact of DCD	Physical and Occupational Therapy in Paediatrics, Vol 27(1) (2009)
2. Crane L., Sumner, E., Hill, E. L., 2017	Emotional and behavioural problems in children with DCD: exploring parent and teacher reports.	Research in Developmental Disabilities 70 (2017) 76-74
3. Lingam, R.P. Novak, C., Emond, A., & Coad, J.E., 2013	The importance of identity and empowerment of teenagers with developmental co-ordination disorder	Child: care, health and development, 40,3, 309-318 (2013)
4. Lingam, R., Jongmans, M.J., Ellis, M., Hunt, L.P., Golding, J., Edmond, A., 2012	Mental Health difficulties in children with developmental coordination disorder.	Paediatrics. Owned by the American Academy of Paediatrics. (2012)
5. Schmidt, M., Egger, F., Benzing, V., Jager, K., Conzelmann, C.M., Pesce, C., 2017	Disentangling the relationship between children's motor ability, executive function and academic achievement.	PLOS ONE. Motor ability and academic achievement. (2017)
6. Tal-Saban, M., Zarka, S., Grotto, I., Ornoy, A., & Parush, S., 2012	The functional profile of young adults with suspected Developmental Coordination Disorder (DCD)	Research in Developmental Disabilities 33 (2012) 2198-2202
7. Kirby, A., Edwards, L., Sugden, D., 2011	Emerging adulthood in developmental coordination disorder: Parent and young adult perspectives	Research in developmental disabilities 32 (2011) 135-1360
8. Harrowell, I., Hollen, L., Lingam, R., Edmond, A., 2018	The impact of developmental coordination disorder on educational achievement in secondary school.	Research in Developmental Disabilities 72, 13-22 (2018)
9. Lodal, K. & Bond, C., 2011	The relationship between motor skills difficulties and self-esteem in children and adolescents: a systematic literature review.	Educational Psychology in Practice. Vol. 32, No. 4 410-423 2016
10. Hill, E., Brown, D., Sorgardt, K., 2011	A preliminary investigation of Quality of Life Satisfaction Reports in Emerging Adults with and without Developmental Coordination Disorder.	Journal of Adult Development (2011) 18:130-134
11. Payne, S., Turner, A., Ward, G.E. Taylor, C., Bark, C., 2013	The social impact of living with developmental coordination disorder as a 13 year old.	British Journal of Occupational Therapy, 76(8), 362-369 2013
12. Green, D., Payne, S., 2018	Understanding Organisational Ability and Self-Regulation in Children with Developmental Coordination Disorder.	Current Developmental Disorders Reports (2018)
13. Omer, S., Jijon, A.M., Leonard, H., 2019	Research Review: Internalising symptoms in developmental coordination disorder: a systematic review and meta-analysis	The journal of Child Psychology and Psychiatry. 60:6 (2019) pp 606-621
14. Gagnon-Roy, M., Jasmin, E. & Camden, C., 2016	Social participation of teenagers and young adults with developmental co-ordination disorder and strategies that could help them; results from a scoping review.	Child: Care, Health and Development., 42, 6. 840-851 (2016)
15. Cairney, J., Rigoli, D., Piek, J.,	Developmental coordination disorder and internalization	Developmental Review, 33 (2013) 224-238

2013	problems in children: The environmental stress hypothesis elaborated.	
16. Missiuna, C. & Campbell, W, N., 2014	Psychological aspects of DCD: Can we establish causality?	Current Developmental Disorders Reports (2014) 1:125-131
17. Mancini C., Rigoli, D., Roberts, L, Pick, J., 2019	Motor skills and internalizing problems throughout development: An integrative research review and update of the environmental stress hypothesis research.	Research in Developmental Disabilities 84 (2019) 96-111
18. Li, Y-C., Kwan, M., Cairney, J., 2019	Motor coordination problems and psychological distress in young adults: A test of the Environmental Stress Hypotheses	Developmental Disabilities 84 (2019) 112-121
19. Gill, A., Brigstocke, S., Goody, A. , 2020.	An exploratory study of the association between self-esteem levels in adults and retrospective reports of their peer relations and motor skills in childhood.	Journal for ReAttach Therapy and Developmental Diversities. July 2020; 3(1) 24-33
20. Schott, N., El-Rajab, I., Klotzbier, T., 2016	Cognitive-motor interference during fine and gross motor tasks in children with Developmental Coordination Disorder (DCD)	Research in Developmental Disabilities. Vol. 57, October 2016 pages 136-148.
21. Engel-Yerger, B., 2020	The role of poor motor coordination in predicting adults' health related quality of life.	Research in Developmental Disabilities 103 2020
22. Edmonds, C., 2013	Why teachers need to hear the voice and experience of the child with dyspraxia.	Research in teacher education, 2013
23. The European Academy of Childhood Disability. Blank, R. et al., 2019	International clinical practice recommendations on the definition, diagnosis, assessment, intervention, and psychosocial aspects of developmental coordination disorder	Developmental medicine and child neurology.

*Table 5 Full list of the studies selected for consideration in the literature review.*

## 2.3 Review of selected research papers

The 23 studies selected for the literature review are now considered from three perspectives. (A number of studies are relevant to more than one perspective):

1. Studies which consider the evidence which associates the physical manifestations of DCD with additional social, emotional, educational and cognitive difficulties.
2. The theoretical perspectives put forward to account for these associated social, emotional and educational difficulties including relevant studies which build on one or more of these theories.

3. Interventions. Evaluation of any interventions reported with consideration of their impact and useability.

Studies relevant to each of these three perspectives are described and evaluated. Each of the three sections are summarised. The overall implications are discussed with particular reference to the relevance to school and other educational/social settings. This review of selected studies concludes with implications for future research and the rationale for this empirical study.

### **2.3.1 Studies which consider the evidence which associates the physical manifestations of DCD with additional social, emotional, educational and cognitive difficulties.**

2.3.1.1 These studies will be considered in age order of the participants, in order to track the apparent trajectory of evolving difficulties as pupils progress through school and into adulthood. Table 6 gives a breakdown of these studies in relation to the difficulties identified.

Study	Age	Physical skills Sports	Social skills	Self-esteem, emotional, behavioural.	Educational	Organisational Cognition, Exec Function	Quality of life
Missiuna et al. 2007	6-14	x	x	x	x		
Crane, 2017	7-10		x	x			
Lingam, 2013	11-16	x	x		x	x	
Lingam, 2012	9/10y			x			
Schmidt, 2017	10-12					x	
Tal-Saban, 2012	19-25y	x		x	x		
Kirby, 2011	17-25y		x		x	x	
Harrowell et al. 2018	16y		x		x		
Lodal & Bond, 2016	7-18y			x			
Kirby, 2011	adult			x		x	
Hill, 2011	adult						x
Payne, 2015	Teenage				x	x	
Green & Payne, 2018	10-14y		x	x		x	
Omer et al. 2019	Varied			x			
Gagnon-Roy et al. 2016	15-25	x	x	x	x	x	x

*Table 6 A summary of the studies linking the physical difficulties associated with DCD with other areas of difficulty.*

Missiuna et al.'s (2007) study of 13 pupils aged six to fourteen, which is entitled 'A trajectory of troubles', illustrates this manifestation of evolving difficulties. In this study, the children's parents completed two in-depth interviews and a set of questionnaires. The initial interview explored the parents' perspectives regarding their children and insights that they gained over time. Parents were given a transcript of the first interview so they could check it for accuracy and reflect on whether they had points to add. The second interview was scheduled to follow-up on information which emerged from the first. Information collected was coded to provide evidence of themes. Over time, the differences that parents noted went from delays in motor skills (catching, throwing, riding a bike), problems with self-help (feeding, dressing, teeth cleaning) to academic challenges on school entry (use of scissors, drawing, writing). Along the way parents noted that their

children were rather sedentary in play, preferring to be passive. Participation in team sports was limited. Socialisation was a problem with many parents reporting bullying and teasing. Parents noted a mismatch between their child's cognitive ability and their academic performance where academic performance did not reflect perceived ability. Six of the 13 participants were in Grade 5 (age 10-11yrs) or beyond and this is when concerns regarding emotional health appear. The two eldest pupils had been diagnosed with a major mental illness featuring anxiety and depression. Among the rest anxiety and frustration about school was reported and the way that this spilled over into family life. The authors suggest that the accumulation of negative experiences in school and on the playground, resulting from poor coordination, could lead to secondary consequences for the child's emotional health. This is a small study with limited participants. The parents involved were highly educated Caucasian mothers, thus caution needs to be exerted over generalisations to a wider cross section of pupils. It was very thoroughly carried out and information from participants was checked for accuracy. There was no mention of co-occurring difficulties. This study rated high when Gough Weight of Evidence criteria were applied.

Lingam et al. (2012) explored the associations between probable DCD at age seven years and mental health difficulties at age nine and 10. This is a large quantitative study for which data was taken from the Avon longitudinal study of Parents and Children (ALSPAC). The ALSPAC included 14,062 children born between 1991 and 1992. Of these, 6,902 attended a research clinic for motor testing at seven/eight years. From this group a cohort of 346 children with probable DCD was identified using DSM criteria. At age 10 the children who had attended the motor testing were asked to complete a 13 item Short Mood and Feelings Questionnaire (SMFQ), which has been shown to have high levels of reliability and validity. The assumed latent trait underlying the SMFQ is

depression. Parents of the 6,902 were asked to complete the Strengths and Difficulties Questionnaire (SDQ) for their child at 9.5 years.

These children with probable DCD were found to have an increased risk of mental health difficulties that were, in part, mediated through associated developmental difficulties such as low verbal IQ, poor self-esteem and bullying. Confounding factors were gender, age when the SDQ or SMFQ were performed, and extremely stressful events in the child's life. This study provides robust epidemiological data suggesting that children with DCD have an increased risk of mental health difficulties. A strength of the study is that this is across a non-selective section of the population as a whole. This study also demonstrated that the impact can be influenced by life events and personal features (age, gender which are unchangeable). This was given a high Gough Weight of evidence score.

Emotional and behavioural issues are explored by Crane et al. (2017) in a study of pupils aged seven to 10. This study relies on data obtained from parents and teachers who completed the Strengths and Difficulties Questionnaire (SDQ) for 30 children with DCD, 35 children matched for chronological age and 29 younger children matched for motor ability. The DCD children showed higher rates of emotional and behavioural difficulties than either of the other groups. The comparison of the DCD group, with a group matched for motor maturity, indicates that these difficulties are not merely due to motor immaturity and provide support for concluding that problems with acquiring proficient fine and gross motor skills has consequences for the development of other aspects of functioning in relation to social and emotional development. It is possible, if not likely, that the expectations for how the older DCD children should manage was greater than for the motor maturity matched but younger children thereby setting up some emotional

pressure. There is no analysis regarding the impact of age in relation to the five scales (emotional symptoms, conduct problems, hyperactivity, peer problems and prosocial behaviour) on which the participants were measured. This study was rated Medium on the Gough weight of evidence scale.

It is also worth noting that consideration of the subscales within the SDQ also indicated a high level of 'hyperactivity' for the DCD group, despite the fact that during the selection process of participants, care was taken to exclude children with known co-occurring difficulties. This is consistent with other studies which suggest a high level of overlap between DCD and ADHD (Kadesjo & Gillberg, 1998; Lingam et al., 2012).

There was some inconsistency in the responses given by parents versus those of the teachers. The differences may reflect different behaviours at home and school or simply the different vantage point of parents and teacher with the latter having a comparison group. Whatever the reason, the authors suggest that it is important to gather data from several sources. It is not, however unusual for inconsistency to be found between home and school responses to the SDQ. Cheng et al. (2018) report a low to moderate correlation in their study of 4,984 children across Europe. There was no input from the children themselves.

Lingam et al. (2013) considered the experiences and aspirations of 11 young people (11 – 16 years) with a prior diagnosis of DCD. These participants were recruited from child health records of two participating National Health Service (NHS) trusts. Interviews were carried out to gain a 'spontaneous account of the thoughts of participants using open-ended questions.' Data was analysed using a phenomenological hermeneutic

method for researching lived experience (Colaizzi, 1973; Lindseth & Norberg, 2004). The initial themes were shared with the young people interviewed during group discussions, to ensure agreement with the analytical structure. One aspect of the study which provides insights into the participants' lived experience concerned the 'Things which I find hard'. All participants reported difficulties in school; academically, socially and in sports. In relation to learning difficulties they highlighted difficulties with concentration, reading, memory and organisation together with specific motor coordination difficulties such as handwriting. This suggests that as children get older and the demands of school change, they begin to be aware of difficulties which might be categorised as cognitive. Several participants commented that they found lessons hard to understand and eight out of 11 were in the lowest set for most of their subjects. All participants experienced difficulty in sports specifically if it involved throwing, catching and running. A number of participants experienced difficulty with daily activities such as getting ready for school, tying a tie and climbing into a bunk bed. Nine out of the 11 young people mentioned bullying. A strength of this study is that the information gathered came directly from the young people themselves. The study was rated as High on the Gough Scale.

The Avon longitudinal study (Harrowell et al., 2018) followed 329 children identified with DCD at an early stage. Those followed up showed a significant impact on educational achievement and therefore on life chances. Even after adjustment for gender, socio-economic status and IQ those with DCD were much less likely to achieve 5 or more GCSEs compared to controls. Co-occurring difficulties with reading, social communication and ADHD are common and contribute to educational difficulties. One third of those experiencing DCD were not identified as needing additional support. Those



with co-occurring difficulties account for some of the under-achievement at GCSE. The authors conclude that pupils experiencing DCD need recognition and support, however, the evidence base for what interventions work is limited. They suggest that more research on interventions needed. The study was rated High on the Gough scale.

Schmidt et al. (2017) provides further evidence of the association between DCD and academic achievement. This study in which participants are 236 children aged 10 to 12 years is discussed in greater detail in the following section. The study examines the mediating role of executive function in the relationship between motor ability and academic achievement and considers evidence for the underlying mechanisms which might account for this observed association. Within this study, measures of academic achievement are mathematics, reading and spelling. The study was rated High on the Gough Scale.

Lodal and Bond (2016) consider the relationship between motor skills difficulties and self-esteem in children and adolescents aged seven to 18. In a systematic literature review, covering the period January 2000 to July 2015, they selected eight quantitative studies in which participants had a diagnosis of DCD and in which measures of global and domain specific self-esteem had been carried out. Their conclusion was that there is a relationship between DCD and self-esteem, however it is complex and likely to depend on age, gender and co-morbidity. Only one of the eight studies selected included participants aged up to 18 years. The strength of the overall study is that attention was given to co-existing difficulties. The study was rated High on the Gough Scale.

Omer et al. (2018) carried out a systematic review and meta-analysis exploring the impact of DCD with greater levels of internalising symptom (i.e., depression and anxiety).

Twenty studies were included. All but three focused on children under the age of 14. One considered participants in the age range 18-56 years and two included children up to age 16. The purpose of this study was to address the questions: 'Do individuals with DCD experience significantly greater levels of internalising symptoms than typically developing (TD) individuals and what is the magnitude of this difference?' The study suggested that children with probable DCD experience greater levels of internalising symptoms (anxiety and depression) compared to their TD peers. A moderate effect size was found, and it was concluded that this suggested that the motor impairments of DCD can expose an individual to a variety of secondary stressors, which over time can lead to poorer mental health. This study was rated High on the Gough Scale.

Difficulties relating to DCD are also demonstrated by Kirby et al. (2011). This study looks at the range and level of functioning difficulties in emerging adults (16-25) with DCD. In this study, which solicits information from parents as well as teenagers and young adults, the aims are to consider what problems persist and/or resolve and what new difficulties (if any) present at this time. Participants were selected from a database of those who had been identified with DCD at the Dyscovery Centre when younger. Twenty one out of 70 families who were invited to participate took part. The young participants completed the Adult Dyspraxia Checklist (ADC) which is a standardised questionnaire with 30 questions. Ten related to when the participants were younger and 20 to the present time. Comparisons were made with past/present. Parents completed a semi structured questionnaire which was analysed thematically. Analysis of the results suggested that over time many physical skills were improved with the exception of handwriting. It is suggested that the improvement in certain areas of physical activity is due to practice (for example, those activities which are frequently repeated such as

dressings and teeth cleaning). Executive functioning is deemed to have become a more significant problem and difficulties with social skills remain. Responses from parents highlight greatest concern regarding their child's organisational skills (68.4%), with 63% concerned that poor executive functioning skills are impacting in the school or work setting. This study rated as High on the Gough Scale.

The ADC mentioned above was constructed specifically by Kirby et al. (2011). It has subsequently been used in additional studies by other researchers because of the reported reliability and validity in terms of identifying adults with possible DCD. Also, there are few, if any, alternatives. See appendix 5 for full details.

Tal-Saban et al. (2012) assessed the academic and non-academic functioning of adolescents and young adults aged 19-25. Out of a random sample of 2,379 adolescents and young adults, 429 were selected and placed into one of three groups depending on their scores on the Adolescents and Adults Coordination Questionnaire. These groups were probable DCD, borderline DCD and controls. They conclude that motor coordination deficits continue into adulthood and have an effect on academic and non-academic function, as well as on the emotional state of the individual. The probable and borderline DCD groups showed no difference from the control group on tests of problem solving, but in other areas scored significantly less well. The measure of academic attainment was handwriting ability which seems to be a poor measure of academic ability/attainment, particularly as we have evidence from Kirby that it remains a problem for young adults. Many able pupils have poor handwriting, but are not disadvantaged when they are able to word process. This study was rated as High on the Gough Scale.

Hill et al. (2011) evaluated the impact of DCD on 'emerging adults' in order to provide information for adult support services in further and higher education and occupational settings. In this study, which involved 20 DCD participants aged 19-27 and 31 typically developing participants aged 18-27, all participants completed the Quality of Life, Enjoyment and Satisfaction with Life Questionnaire. This covered a broad range of topics such as health, feelings, leisure activities and social relationships. The DCD group reported significantly lower satisfaction with life than the TD group and this was the case on all of the eight scales. This was one of the first studies to find statistical evidence of the possibility that DCD continues to impact on adults as well as children. The study was rated Medium on the Gough Scale.

Gagnon-Roy et al. (2016) carried out a scoping review which included several of the above studies. The aim of the review was to consider the ways in which difficulties associated with DCD changed or improved as the participants (aged 15 to 25) aged and moved from education to employment. Their results indicate that all life habits were reported to be affected for teenagers and young adults with DCD, with education and interpersonal relationships being the most frequently discussed. During adolescence and adulthood new tasks and subsequent difficulties emerge, such as driving. Mental health difficulties emerged as a key theme. Few strategies and interventions were described to support social participation of youths with DCD.

Their findings are summarised under the following headings.

*Educational difficulties* include - handwriting and executive functioning difficulties (e.g., organisation and planning, prioritizing, problem solving and multi-tasking).

*Social difficulties* (e.g., marginalization, bullying and isolation).

*Recreation.* Riding a bike, ball sports leading to less likelihood of participating in sports activities or doing dancing.

*Employment.* Similar to education, executive functioning and working memory difficulties reported to affect youth's performance of their job.

*Mobility.* Difficulty driving.

*Personal care* improves with automization, as does using cutlery, but meal preparation and completing household chores become problematic.

*Responsibilities.* Challenges at home with organising and finding things, operating and using electrical equipment such as washing machines and doing household chores, thus more likely to live at home with parents longer than their peers.

*Quality of life and mental health.* Researchers suggest that secondary emotional problems associated with DC may have more impact on the quality of life of youth with DCD than the primary motor difficulties (Hill et al., 2011).

*Interventions.* Five types recommended. Compensatory strategies, development of coping strategies, information, addressing comorbidities and secondary consequences and practice and development of functional abilities. This study was rated High on the Gough Scale.

### **2.3.1.2 Summary of research relating to the association of DCD with social, emotional, educational and cognitive difficulties.**

It is evident from these studies that DCD is a condition with a range of secondary impacts which go beyond physical clumsiness. The difficulties elicited in the studies described

include anxiety, depression, social and emotional deficits, poor self-esteem and poorer than expected quality of life. As well as emotional factors, concentration, memory, organisation, executive function and educational achievement have been found to be more likely to be areas of difficulty for the child experiencing DCD. The main studies considered so far have focused on the ‘within’ child (or adult)’ difficulties associated with poor motor control rather than environmental factors, with the exception of ‘bullying’.

While research studies such as these provide clear evidence that children with DCD are likely to experience difficulties which go well beyond poor coordination, they do not provide evidence as to whether the poor coordination is the underlying cause of the additional difficulties. It is possible that difficulty in executing many everyday activities both in school, on the playing fields and in social interactions may give rise to increased anxiety and mental health issues. It is also possible while some difficulties result directly from poor coordination others appear to be secondary. For example, the student with DCD may avoid sports and as a consequence be less fit and have fewer social interactions. It also seems probable that the stress engendered by difficulty with planning and organising, as well as the ongoing criticism experienced by many pupils experiencing dyspraxia might trigger depression and anxiety.

With regard to the impact on educational attainment the evidence is insufficient to draw any general conclusions. Six of the studies considered, specifically include consideration of educational factors, though two of these are in reference to participants who are over the age of 17 and come therefore into the category of young adults, and one relates to basic skills.

Missiuna et al. (2007) report parental concerns for their young children with regard to school activities including use of scissors, drawing and writing. Lingam et al. (2013) report feedback from the young participants in their study who expressed difficulty with concentration, reading, memory, organisation and handwriting; they also report being in lower sets. These descriptive studies capture the type of difficulty that young pupils with DCD may experience, but do not provide a measure of how they may compare with their peer group.

Harrowell et al. (2018) suggest that DCD has a significant impact on educational achievement and therefore on life chances. Those with co-occurring difficulties account for some of the under-achievement at GCSE. The implication here is that identification of the condition needs to be followed by improved interventions. The evidence base for what interventions work is limited.

Participants in the Kirby et al. (2011) study expressed concerned that poor executive function skills were impacting in the educational or work setting of their child. Parents reported that students were helped by private tutor, note takers, summer school to prepare for university, occupational therapy and use of computers for exams. The study did not link or measure the benefits of support with any aspect of subsequent attainment.

The pupils in the Harrowell et al. (2018) study were representative of the general population. Data for GCSE results for some of the more able pupils was unavailable. Kirby's (2011) population were families who had sought out (and paid for) educational assessment for their DCD child and may have had better resources to ensure appropriate help. We might conclude from these two particular studies that DCD can impede

academic progress and attainment, but that appropriate support may positively impact academic outcomes, but no measures were recorded.

From the evidence considered so far, it would follow that the kind of environment in which the pupil with DCD finds him or herself during the school years, may very well exacerbate or ameliorate educational as well as broader issues. This leads to the question of how aspects of the school environment might be modified to support the 4-6% of the population who are experiencing DCD. These two questions are now considered.

### **2.3.2 The theoretical perspectives put forward to account for these associated social, emotional and educational difficulties incorporating relevant studies which build on one or more of these models and theories.**

Table 7 gives a summary of the theoretical positions suggested to provide a framework in which to understand the association between poor motor skills and (i) social issues and (ii) academic/outcome activities and (iii) cognitive/neural processes. The theoretical positions described remain tentative and are not mutually exclusive.



<b>Author</b>	<b>Type of study</b>	<b>Hypothesis/models</b>
Payne, 2013	Qualitative	Social impact model
Green and Payne, 2018	Review	Transactional model.
Cairney, 2013	Review	Environmental stress hypothesis
Missiuna, 2014	Review	Environmental stress hypothesis
Mancini, 2019	Review	Environmental stress hypothesis
Li, 2019	Experimental Quantitative	Environmental stress hypothesis
Gill, 2020	Experimental Quantitative	Environmental stress hypothesis
Engel Yerger, 2020	Experimental Quantitative	No social or environmental model is discussed.
Schott, 2016	Experimental Quantitative	Automization Deficit Hypothesis
Schmidt, 2017	Quantitative	Cognitive stimulation hypotheses

*Table 7. Summary of the theoretical positions suggested to provide a framework in which to understand the association between poor motor skills and (i) social issues and (ii) academic/outcome activities.*

### **2.3.2.1 Social impact model**

Payne et al. (2013) investigated the social impact of living with DCD as a young adolescent. In semi-structured interviews six participants, aged between 13 and 15 years, were asked to engage in dialogue about their experience of living with DCD. All participants felt that the visible and hidden aspect of their condition had an impact on their relationships with peers and family members. Payne, therefore, suggests that the relationship between the person (their self-perception), the activity and the environment (physical, social, attitudinal or virtual) is fundamental to our understanding of the

mechanisms underpinning the whole package of difficulties presenting in young people with DCD. This study was rated High on the Gough Scale.

### **2.3.2.2 Transactional model.**

Green and Payne (2018) consider the transactional relationship between motor and nonmotor/executive dysfunction in children with DCD and its impact on psychosocial function. The purpose of this review paper is to integrate the subjective reported experiences of young people with DCD with objective measurements and findings from neuroimaging studies. It is evident from a review of recent research (Wilson et al., 2017) that there is under-activation across a number of key neural networks involved in motor control and movement execution.

The conclusions drawn by the authors are that:

- The organisational difficulties experienced by individuals with DCD, (planning, organising, and executing activities) cannot be explained solely by the degree of motor impairment.
- The severity of motor impairment may be less important for a person's wellbeing and participation than the individual experience and perceptions of these deficits.
- Consideration of the transactional relationship between the person, the activity and the environment is fundamental to our understanding of the mechanisms underpinning the organisational and emotional issues presenting in DCD.

Green and Payne (2018) p.39 put forward the view that 'we need to consider and address non-motor factors if interventions are to be effective in improving personal, academic, emotional and social outcomes for people with DCD'; they go on to suggest that examination of motor, organisational/executive functioning, contextual and social factors

will help us understand differences in the performance and participation of individuals with DCD in real-life situations and develop interventions that improve the quality of life and life satisfaction of people with DCD. This study was rated High on the Gough Scale.

### **2.3.2.3 Environmental stress hypothesis (ESH)**

Cairney et al. (2013) elaborate on the environmental stress hypothesis (proposed by Cairney et al., 2010). In this review paper they consider environmental stressors as the possible explanation for the increase in mood disorders among children with DCD, with secondary psychosocial consequences of the primary motor disorder leading to a cumulative negative impact on self-esteem and mental health. A key question is what aspect or aspects of the environment mediate the evident relationship between poor motor coordination and the subsequent emergence of social and emotional issues? Are poor motor skills directly responsible for anxiety and depression or are there alternative pathways. Cairney (2013) suggests that environmental factors relate to the context in which activities take place and considers the contribution of reduced physical activity and the tendency to obesity evident in children with DCD as a possible mediating factor linking negative self-concept which in turn lead to increased risk of anxiety or depression. He further discusses the negative impact of peer victimisation identified by Bejerot and Humble 2013 as well as Kalverboer et al. 1990. He argues that these are not necessarily linked to severity of the child's motor impairments, but may also be influenced by teacher skill and knowledge in relation to DCD. This study rated High on the Gough Scale.

Edmonds (2013) highlighted the negative impact that interactions with teachers had for some adults with dyspraxia reflecting back on their childhoods in school.

Edmonds (p.8) draws attention to the ‘correlation between peer rejection and higher rates of delinquency, arrest, violent behaviour and substance abuse’ identified by Kupersmidt & Cole, 1990.

Missiuna and Campbell (2014) emphasize the importance of establishing which factors (internal or external) might be the secondary stressors leading to psychological distress and conclude that the environmental stress model proposed by Cairney et al. (2013) p.129 provides an ideal framework from which to ‘explore not only the relationships among the array of factors that place children with DCD at risk for psychological problems in the first place, but also the extent to which specific interventions can alter the trajectory that is currently observed from motor coordination difficulties to mental health problems’.

This study rated High on the Gough Scale.

Mancini et al. (2019) concur that the ESH provides a conceptual framework detailing the complex relationship between poor motor skills and internalising problems (where internalising refers to anxiety and depression). In their systematic review they aimed to synthesize studies which have evaluated the complex pathway posited in the framework. They identify 12 studies spanning early childhood to adulthood. They compared intrapersonal factors, such as self-esteem and perceived competence, with interpersonal factors, such as social support or peer problems, to see which type of difficulty was more strongly and consistently found to mediate the relationship between motor skills and internalizing problems. They found that the interpersonal factors were more important. This is significant in that it points towards the importance of the environment in which children operate as being influential and the impact that this can have on emotional outcomes. This study rated High on the Gough Scale.

Li et al. (2019) also ‘test’ the ESH in their study where the aim is to examine the potential mediators in relation to poor motor coordination and psychological distress in emerging adults. The mediating factors which are examined are physical activity, body mass index (BMI), and psychosocial factors. Using structural equation modelling, they conclude that poor motor coordination was related to higher psychological distress, higher general stress, poorer global relationships, lower perceived social support and negative self-concept. Physical activity and BMI were not significantly correlated (thereby negating Cairney’s earlier proposition that reduced physical activity and the tendency to obesity evident in children with DCD might be a mediating factor linking negative self-concept leading to increased risk of anxiety or depression). As a result, they suggest that interventions should target psychosocial wellbeing in addition to motor coordination.

Gill et al. (2020) also utilise the ESH as a basis for investigating two potential social-environmental stressors. These are remembered experiences of social inclusion and remembered experiences of bullying. This is a retrospective design in which 217 adult participants complete online questionnaires which asked about motor skills in childhood, and also recollections regarding peer relationships and their current level of self-esteem. Participants complete the ADC to elicit which of them are possibly DCD. The DCD and TD group scores are then compared. Poor motor skills were significantly associated with current self-esteem and partly mediated by feelings of lower social inclusion. Those who felt socially excluded were likely to have lower self-esteem in adulthood. There was no association between low adult self-esteem and bullying. This study rated Medium on the Gough Scale.

Finally, although not specifically mentioning the environmental stress hypothesis the study by Engel-Yeger (2020) also focuses on which experiences might be found to mediate the link between suspected DCD and health related quality of life. In his study 200 healthy individuals, aged 20-46 years of age, 18 with suspected DCD (according to the ADC) and 182 TD participants completed a sociodemographic/health questionnaire and the World Health Organisation quality of life questionnaire (short version) (WHQOL-BREF) which measures physical, psychological, social and environmental health related quality of life. The results indicate that the group with suspected DCD had significantly lower health related quality of life (HRQOL) and that their current feelings about their performance as children predicted all HRQOL domains. The measures taken to identify DCD (on the ADC) are also used as measures of ‘their memories of their childhood performance’, suggesting that they are not an independent variable or mediator impacting current quality of life measures. Additionally, the ADC covers a range of difficulties and do not point specifically to one particular aspect of childhood experience which might mediate the link with the lower HRQOL. This study rated High on the Gough Scale.

#### **2.3.2.4 The automatization deficit hypothesis**

Schott et al. (2016) proposes the automatization deficit hypothesis. In this study, Schott tested cognitive-motor interference during fine and gross motor tasks in children with DCD. Twenty children identified with DCD were age matched with 39 typically developing children. Measurements were taken of their body composition and total physical activity per week. The purpose of this quantitative study was (1) to examine the effect of a concurrent cognitive task on fine and gross motor tasks in children with DCD

and (2) to determine whether the effect varied with different difficulty levels of the concurrent task. Participants were required to complete two key tasks each of which combined the need for an element of cognitive engagement as well as physical (fine and gross) coordination. The participants walked along a fixed pathway, following a prescribed path, delineated by target markers of (1) increasing sequential numbers, and (2) increasing sequential numbers and letters. The motor and cognitive dual-task effects (DTE) were calculated for each task.

Results indicated that as the cognitive demands became more complex the physical tasks were completed slower. This motor interference was least for the simplest task and greatest for the more complex conditions and was more pronounced in children with DCD. The authors conclude that children with DCD show a different approach to allocation of cognitive resources and have difficulties making motor skills automatic. This, they suggest, is consistent with the ‘automization deficit hypothesis’ and suggests that any deficit in the automatization process will appear if the conscious monitoring of the motor skill is made more difficult by integrating another task requiring attentional resources. This study illustrates the link between motor and cognitive activities and the impact of one upon the other. This study rated High on the Gough Scale.

#### **2.3.2.5 Cognitive stimulation hypotheses**

Schmidt et al. (2017) consider the relationship between the physical manifestations of DCD with the executive dysfunction and with academic achievement. The purpose of this study is to examine the mediating role of executive function in the relationship between motor ability and academic achievement and also to investigate the individual contribution of specific motor abilities and academic achievement. The participants in

this quantitative study were 236 children with an age range of 10-12 years. Measures of three different aspects of motor ability were taken: aerobic endurance, motor coordination, and muscular strength. Measures of executive function were also taken, updating, inhibition and shifting. The participants' academic achievement was assessed through math performance, reading and spelling. The results of factor analysis and structural equation modelling indicated that all three motor activities were positively related to the children's academic achievement. However, only in the case of the children's motor coordination, the mediation by executive function accounted for a significant percentage of variance of academic achievement data. The authors suggest that these results support the view that executive function is the mechanism which explains this link. If this is the case then, they suggest, there should be advocacy for quality physical activity not merely focused on health-related physical fitness outcomes, but also on motor skill development and learning.

#### **2.3.2.6 Summary of theoretical positions proposed**

The environmental stress hypothesis has been used as a model in six of the studies discussed, four of which have been published in the past three years. The benefit of this model is that if specific factors can be found which mediate poor physical coordination and poor mental health then (although causality cannot be assumed) an intervention relating to that mediator should help to reduce the extent of the mental health issues. The area of research appears to be where current understanding is focused, but there is as yet a lack of clarity. One particular difficulty is that sometimes a study uses a measure (for example, low self-esteem) as a mediator while other studies may use the same measure as representing an aspect of 'mental health' or endpoint. None of the research appears to be



clearly related to specific environmental situations, though it does begin to pinpoint which aspects of children's lived experiences might need to be modified if they are to minimise the possibility of experiencing anxiety and depression. Mancini et al. (2019) provide valuable evidence that the interpersonal factors were more important than intrapersonal factors. This is significant in that it points towards the importance of the environment in which children operate as being influential and emphasizes the impact that this can have on emotional outcomes.

Overall, the body of available research relating to environmental stress remains limited and is related to a wide age range. It is possible that the experiences of teenagers are sufficiently different from that of primary school children (expectations regarding what they are capable of are growing, the range of work they are required to do is expanding, they are expected to have greater independence and autonomy) to make it difficult to deduce any general principles or environmental impacts that relate equally to both age groups.

The Automization Deficit Hypothesis and the Cognitive stimulation hypothesis

Schmidt et al. (2017) and Schott et al. (2016) seek to explore the relationship between motor coordination and cognition/central executive. In Schmidt's case a connection between motor coordination and the level of cognitive load on ensuing motor activities is established. In Schott's case the relationship between motor coordination and academic outcomes is shown to be mediated by central executive skills. Both studies are able to demonstrate the involvement of central executive function as the intermediary between motor coordination and performance outcome.

### **2.3.3 Interventions: Evaluation of any interventions reported with consideration of their impact and useability.**

Now that it is well established that DCD extends beyond poor physical coordination the next important question is how can the pathway of difficulties which continue through childhood into adulthood either be halted or made less evident? Gagnon-Roy et al. (2016) indicate that there is no published evidence to support clinical service managers and therapists wishing to implement interventions to help youth with DCD. Whilst there are some ‘good websites’ and books which provide practical information and resource, the effectiveness of these resources has not been documented.

It remains true today that it is hard to find research studies which evaluate the impact of specific interventions on the educational, social, emotional and behavioural outcomes for those with DCD. The 2019 EACD report and recommendations also state that they were unable to find intervention studies.

Edmonds (2013) commented on the way in which studies have focused on symptomology, health, and parental and professional views. The literature on education has been sparse. This review paper considers why teachers need to hear the voice and experience of the child with DCD and argues of the need for the child’s voice to inform teachers who can then provide a more supportive environment.

Whilst the evaluation of specific forms of intervention is sparse the opinions and views of pupils and young adults who either are, or have been, in school provide some guidance on to what they consider has been of benefit to them during their time in school.

Lingam et al. (2013) provide evidence of how young people (11-16) experience their DCD in general and within the school setting. The difficulties identified by participants have been considered in the previous section. The approaches which they found to be of benefit were as follows; practising skills, using computer packages to help with literacy difficulties; choosing subjects and activities that they were more likely to succeed at; classroom support, parental help with homework and positive friendships were also beneficial. Teacher understanding was important. These pupils recognised their difficulties, but these were considered by them to be a challenge that needed to be overcome. They had developed their own strategies for coping. Of utmost importance was the attitude of the school to difference; the presence of bullying, the accepting nature of the class, teachers and peers was vitally important. This is a qualitative study with just 11 participants and where no link is made to outcomes.

Green and Payne (2018) (p 51) conclude that ‘We need to consider and address non-motor factors if interventions are to be effective in improving personal, academic, emotional and social outcomes for people with DCD’. They go on to suggest that examination of motor, organisational/executive functioning, contextual and social factors will help us understand differences in the performance and participation of individuals with DCD in real-life situations and develop interventions that improve the quality of life and life satisfaction of people with DCD.

Lodal and Bond (2016) report some improvement in the social skills, confidence and use of meta-cognitive strategies of four Key stage 2 pupils following motor skills interventions. Kirby et al. (2011) suggest that practice might account for improved physical skills such as teeth cleaning.

Missiuna and Campbell (2014) look at causes and protective factors. They suggest that longitudinal studies are needed, but highlight the difficulty of running intervention studies which could 'interrupt' the trajectory from DCD to poor mental health.

Gagnon-Roy et al. (2016) consider five different types of strategies, recommendations and interventions which might be used to support youth with DCD: (i) compensatory strategies; (ii) development of coping strategies; (iii) information; (iv) addressing co-morbidities and secondary consequences; and (v) practice and development of functional abilities. Compensatory related to provision of materials or methods which will facilitate the process. For example, provision of a laptop for the poor writer; use of check lists and or breaking down tasks into easier component parts.

A summary of interventions (which do not include the motor skills training typically applied by occupational therapists) which have been shown empirically to be beneficial is simple – there are none. While there is no quantitative support for any area of intervention, there is plenty of speculation.

### **2.3.4 Summary of the issues relating to DCD and the relevance to school and other educational/social settings**

DCD incorporates significant difficulty with fine and gross physical coordination. This goes beyond the purely physical and is associated with difficulties in mental planning and organising.

1. DCD impacts fine and gross motor skills with significant ramifications within a learning environment, the most obvious being the use of a pen and the impact on handwriting. Poor gross motor skills have been linked to reluctance to participate in sports – particularly team sports which involve a ball. There is a view that this impacts fitness and health generally, as well as removing an area of social cooperation.
2. DCD is linked with poor handwriting and poor central executive skills e.g., organisation and planning, prioritising and multi-tasking, (Kirby et al., 2011; Tal-Saban et al., 2012; Lingam et al., 2014).
3. Schmidt et al. (2017) provide evidence of a link between children's physical coordination and academic achievement mediated by central executive ability.
4. The trajectory of troubles described by Missiuna et al. (2007) includes poor social skills and the greater than to be expected tendency to anxiety and depression. Some of these issues may well be secondary and may well result from the stress engendered by having to cope with the external environment. Whatever the underlying cause of difficulty for these pupils, the question posed here is how can they be supported?
5. Empirical evidence for what constitutes effective intervention is limited though as can be seen from the studies discussed above there is more knowledge now

regarding what aspects of social, emotional and educational experience that DCD pupils find hard and thus where support might be targeted.

While it is evident that the prevalence of DCD is thought to be relatively high (4-6%) and research has clearly shown that the impact can be significant and affects many aspects of a pupil's life as he or she progresses through school and into higher education not a great deal has been reliably established about the factors which mediate poor coordination with subsequent emotional, social and educational difficulties.

### **2.3.6 Implications for future research**

There is a need for further investigation and evaluation of environmental issues relating to DCD, both in terms of mental health outcomes and educational attainment. The smaller qualitative studies completed by Payne et al. (2013) Edmonds (2013) and Lingam et al. (2013) point the way to seeking relevant information from pupils themselves, but fall short of providing any quantitative data which might 'measure' or quantify the reflections of the pupil participants which might then be linked to outcomes.

Research published since this project was initially planned and implemented has, however, tested out a range of mediating factors. The questions posed by these studies and relating to experiences are not specific to school experiences and rely on off the shelf 'questionnaires' which may not incorporate a particularly comprehensive range of questions. Two of the studies reviewed look back at childhood experiences and then related them to current mental state. Gill et al. (2020) considered the experience of childhood social inclusion and bullying and related them (quantitatively) with adult self-esteem. Engel-Yeger (2020) related the reported childhood difficulties (as measured on the ADC) with HRQL as adults.

From the child perspective what generalisations can be made about how DCD affects the way in which he or she copes with the school environment (social, physical and educational)? The fact of being clumsy, having poor coordination, struggling to copy notes, not being picked to be on the sports team must all have an impact on the day to day experiences of the pupil with DCD. The impact will be felt both in the classroom as well as across the wider school environment. All these areas of potential struggle will influence the thoughts and reactions of others as well as the child's self-perception and feelings of confidence and value. The external factors which need consideration range from the practical support and help which might be provided to the responses of peers and adults (or the perceived responses of others).

There is a need for analyses of the environment experienced by pupils in school and at home which can be linked to educational outcome. In relation to learning, it is important to evaluate the type of interventions which pupils and parents have suggested are of value, for example touch typing and study skills. To date there appear to be no studies which link interventions with outcomes.

Considering the many, daily, challenges faced by secondary school pupils with DCD and which we are now aware can impact their mental health, social participation and educational outcomes, there is a need for more research which aims to:

- (1) establish the mechanisms at play in relation to the association between secondary school experiences and later wellbeing, and
- (2) to develop and to evaluate appropriate interventions for this population.

## **PART 3 EMPIRICAL REPORT**

### **3.1 Introduction**

Developmental Coordination Disorder (DCD) also known as dyspraxia is an area of specific learning difficulty which is primarily associated with poor coordination and difficulties with the planning and organisation of movement. The first section of this empirical paper provides a summary of the background knowledge and current understanding of the difficulties associated with DCD through childhood, adolescence and into early adulthood and highlights the lack of evidence-based strategies and interventions to mitigate such difficulties.

Dyspraxia has typically been identified during early childhood as the result of examination by an occupational therapist. The focus has been on poor motor coordination and difficulty with the planning and organising of motor movements. There is, however, growing evidence that DCD does not just impact the young child. Over the past twenty years or so, research studies have produced convincing evidence that pupils experiencing dyspraxia not only have difficulty with skills such as dressing, eating, writing, catching and throwing a ball, but are also very likely to develop further problems as they progress through school and into adulthood. These additional difficulties encompass social, emotional and academic challenges (Lingam et al., 2013; Missiuna et al., 2007; Payne et al., 2013), as well as specific difficulty with tasks involving information processing and central executive skills (Kirby et al., 2011).

Missiuna et al.'s (2007) study of pupils aged six to 14 illustrates these evolving difficulties. A delay in motor skills evolved to encompass academic challenges, socialisation issues such as bullying and teasing and, in some cases, mental health concerns. Lingam et al. (2013) demonstrate how their 11–16-year-old participants have



similar difficulties and as the demands of school increased, reported additional concerns such as difficulty understanding lessons with many of the participants in the lowest set for most of their subjects. Harrowell et al. (2018) report the negative impact of DCD on academic attainment. Kirby et al. (2011) report the difficulties in executive function experienced by emerging adults (16–25-year-olds).

These difficulties which are referred to above can impact on every aspect of a pupil's life in school. Stress and anxiety may curtail a child's availability for full participation in all areas of school life from the social to the physical to the academic. Efficient central executive skills are needed for higher order thinking and planning. Central executive skills are a combination of mental and physical processes that enable people to perform a task. Poor central executive skills can, for example, impact planning and executing written work, carrying out a sequence of steps in a science experiment, finding the way around a new place, learning to drive or planning a revision timetable.

These associated difficulties are of significance and can affect life chances and wellbeing of those impacted. Although it is now well established that dyspraxia includes this range of social, emotional, educational and cognitive challenges it is not yet clear what the underlying causes might be or how the difficulties might be ameliorated and managed. The theories put forward to 'explain' these difficulties fall into two key areas. One approach takes a psycho/social impact perspective and the other considers physiological/cognitive/neurological explanations. These are not necessarily mutually exclusive.

Social impact theory (Payne et al., 2013) suggests an interaction between the person (their self-perception), the activity, and their environment (physical, social, attitudinal or virtual). To illustrate this, we could envisage a fourteen-year-old with slow and laboured handwriting. He is in class and must take notes from the whiteboard. His teacher is in a hurry and removes the information before he has finished. This scenario could play out in several ways. The pupil's reactions/feelings about the situation may depend on his confidence, previous experiences, attitude to the teacher. The teacher's response may depend on his/her knowledge of the student and his difficulties. How the teacher responds will shape and reinforce the way in which the student perceives himself or the situation or his skills. Payne concludes that we need to understand not only the pupil's difficulties, but also the context and the social factors.

The environmental stress hypothesis (Cairney et al., 2013; Missiuna & Campbell, 2014) also suggests that poor coordination may be the initial problem, but independent of how poor it is, they suggest that it is the environment within which the child with DCD functions that will impact mood and can lead to mood disorder. Other explanations which consider the physical, cognitive and neurological aspects of dyspraxia are examined by Schott et al. (2016) who illustrate how when a child experiencing dyspraxia is required to complete a task involving both cognitive and gross or fine motor skills, he/she becomes slower to manage the physical element as the cognitive element becomes more complex. This would clearly have major implications for the secondary school pupil or student who is mentally engaged with, for example, a science experiment, a maths calculation or completing a cognitively challenging written assignment. With mental focus on the thinking elements, the fine motor control of laboratory equipment or

handwriting would be likely to suffer. Physical actions might be slow, clumsy or untidy. Schott refers to this as the Automization Deficit Theory.

These two approaches are not mutually exclusive. Whilst the impact of cognitive load on physical speed and accuracy may be part and parcel of dyspraxia, the difficulties which these skills deficits will cause for the individual will be significantly determined by the immediate social and learning context and will have a greater or lesser impact on his or her levels of stress, anxiety and general wellbeing. Both theories need to be included when appropriate interventions are considered.

Whilst there is an emerging but limited literature on the kind of difficulties typically experienced by the teenager and young adult experiencing dyspraxia, there is a dearth of peer reviewed research into effective interventions. Gagnon-Roy et al. (2016) report that, at that time, there was no published evidence to support clinical service managers and therapists wishing to implement interventions to help youth with DCD. The authors of the European Academy of Childhood Disability (EADC) report published in 2019 also conclude that there is a lack of research on interventions for adolescents and adults with DCD. They state that no specific work on interventions was found in their scoping review, though some individual coping strategies (such as use of a keyboard instead of handwriting) were identified from some studies.

The research, which is now needed in order to gather greater understanding about how to alleviate difficulties and support school aged pupils experiencing DCD, can be viewed from the perspective of the social interaction theory and environmental stress hypothesis; it can also be considered in the light of the automization theory.

From the perspective of the social/environmental theories, it is relevant to ask what experiences (social, emotional and educational) might be contributing to the poor mental health and wellbeing of pupils experiencing DCD? If this is established the question which follows is whether these experiences can be changed in a way which might alleviate difficulties or prevent further escalation

From the perspective of the automatization theory it is relevant to ask whether practice and practical aids would lead to the increased speed and accuracy of activities involving motor skills. If relevant motor skills can be automatized, the theory suggests that there would be less load on central executive functions and an improvement in academic performance should follow.

In the light of the literature review findings regarding the trajectory of difficulties which are typical for children experiencing dyspraxia through school and into young adulthood and beyond and given the potential theoretical frameworks with which to consider the findings this research study poses two research questions.

- Is there a relationship between the way in which the pupil with DCD experienced school and his or her later wellbeing?
- Did the interventions provided by the school/home impact academic attainment?

In order to find answers to these questions, it is necessary to establish how the pupils identifies with DCD experience their time in school in relation to the areas which research and experience suggests are problematic, and to explore the ways in which they were supported. It is also necessary to build an understanding of how the participants are functioning now. Do they still experience difficulties and have these changed? Are they

resilient and how strong is their wellbeing? Are they coping with work? What do we know about the help given during their time in school? What interventions may have been applied? How well have they achieved academically?

## **3.2 Method**

### **3.2.1 Research design**

The research questions dictated that a non-experimental design be adopted. Information gathered was both cross-sectional and predictive (due to the availability of historical data) and the data was both qualitative and quantitative.

Data was gathered from 26 young adults (thought to experience DCD) and 18 of their parents (See 3.2.3 below) who were invited to:

- Reflect back on their experience of school (during key stages 4 and 5) and of the way they experienced their social/emotional, physical and academic environment.
- Provide information about their academic attainment in school and in higher education.
- Respond to questions about their current situation and their current wellbeing.

Measures of academic attainment and current wellbeing were evaluated in the light of the way they experienced their social/emotional, physical and academic environment during their time in key stages 4 and 5, the interventions implemented and their verbal ability.

### **3.2.2 Data sources**

The data collected for the study was cross sectional and predictive.

#### **Cross sectional data**

Cross sectional data was gathered through:

1. The administration of two online questionnaires (one for young adult participants with DCD and one for parents). (Appendices 3 and 4)
2. The administration of the Adult Dyspraxia Checklist (ADC). (Appendix 5)

Both quantitative and qualitative data was collected through the questionnaires. It was reasoned that the collection of both quantitative and qualitative data would provide a fuller understanding of the research questions than could be obtained from the use of a single approach. Quantitative data can provide evidence of a statistical relationships between variables (for example, is there a correlation between a quantitative assessment of the participants experience of school and later wellbeing?), whilst the qualitative data can provide a richer and wider picture of that relationship. Neither set of data would carry such weight on their own as in combination. The two types of data can provide more comprehensive and convincing evidence (Creswell & Piano Clark, 2007; Guest et al. 2012, p.189).

### **Predictive data.**

Predictive data was derived from the historical records relating to the young adult participants with whom the researcher had worked in the past. The design was influenced by the availability/accessibility of data and the most pragmatic method of collection. The researcher had access to a data base of potential participants each of whom underwent educational assessment at one or more points between 1997 and 2010. Quantitative data regarding their strengths, difficulties and test profile were recorded at that time. Further historical data on subsequent academic attainment was collected at the time of participant engagement. This comprised:

- Retrospective reporting of home and school experiences. (Quantitative and qualitative)
- Young adults' current wellbeing and attitude to DCD. (Quantitative and qualitative)

The level of detail provided by this data enabled the researcher to consider whether the support which pupils receive from home and/or school could be seen to impact academic outcomes, and whether the social and emotional environment which the participants experienced in school related to their long-term wellbeing.

### **3.2.3 Participants: Selection and recruitment process**

3.2.3.1. For the study, the researcher sought a number of young adults, aged 20 years and over, who had been identified as experiencing dyspraxia during the time that they were in school. Parents of these young adults were also invited to participate. At the time of recruitment, no target was set for the number of volunteers. The researcher aimed to find a minimum of 29 young adults (power analysis indicated this was the number required for a medium effect with a 0.05 level of significance) and hoped to have more in order to add weight to any statistical findings. This number of 29 is based on Cohen (1992) whose guidelines suggest that for a standard probability level of .05 and for the recommended power of .8, then it is necessary to have 29 participants to detect a medium effect size ( $r = 0.5$ ).

Potential participants were drawn from a data base, held by the researcher, which was recorded in two files. The first file contained details of children and young people assessed during the period 1997 to May 2005 and the second covered the period June

2005 to December 2010. During this time the researcher was director of an independent educational psychology consultancy based in central London. The number of educational psychologists associated with the consultancy ranged from two to six at any given time over this period. Practitioners within the practice completed over 2,000 educational assessments of children and young people aged between three and 21 years of age. The confidential educational psychology reports written following individual assessments were held on a password protected personal computer administered by the practice manager. Parents were aware that these full reports were retained, but that they would not be released or shared with anyone other than themselves without permission. Specific data from the reports was recorded and entered into either the first or second file comprising the total data base.

Details recorded in the first file were name, date of birth, school, date of assessment, scores achieved on the Wechsler Intelligence Scales for children- Third Edition (WISC-III, David Weschler 1991) and the Wechsler Objective Reading Dimensions (WORD, The Psychological Corporation, 1992) Details kept on the second file were similar but included the Wechsler Intelligence Scales for children- Fourth UK edition (WISC-IV, David Wechsler 2004) which had replaced the WISC-111 and Weschler individual Achievement Test – Second Edition (WIAT-II, David Wechsler 2004) which had replaced the WORD. In addition, a simple coding system was used to indicate whether any type of specific learning difficulty had been identified. A full report for all those assessed was also stored on a computer and these remain available.

The selection criteria for selecting young adults as potential participants were:



that their presenting difficulties at the time of their assessment had been identified as being indicative of dyspraxia and that they were now aged 20 years and over. Their age at the time of their initial assessment or assessments has not been factored into this research as a variable though it has been recorded. Whether they were five, 10 or 16 if the identification of dyspraxia was valid the underlying difficulties would not have 'disappeared' either when they were in key stages 4 and 5 or at the present time.

### **3.2.3.2 Criteria for defining a young person as experiencing dyspraxia**

A detailed description of the criteria used by the researcher for considering whether a young person might experience dyspraxia, at the time of assessment is presented in the critical review section of this paper. Of relevance here is that over time it was noted that pupils who met the overall criteria for dyspraxia frequently showed particular strengths and weaknesses relating to their performance on the WISC-III or IV. (This is pertinent here because a discrepancy between the verbal and performance test scores was used to select out possible participants from the first file where no record had been kept regarding the nature of any difficulties). Scores on the Coding and Symbol Search tests (both of which sample speed of visual information processing as well as hand eye coordination) were frequently significantly lower than scores on test of verbal reasoning (vocabulary and comprehension). Whilst the testees' performance on tests of perceptual reasoning was generally strong, it was noted that difficulties might also be experienced on the Block Design test which sampled the ability to mentally manipulate 3-D images. These observations (which fed into the overall criteria used for identifying dyspraxic difficulties) are in line with previous research completed by Wilson and McKenzie (1998) whose findings support the notion that perceptual problems, particularly in the visual modality, are associated with difficulties in motor coordination. They are also in line with

Portwood (2000) who reports significantly lower scores on the Block Design and Coding tests frequently leading to a discrepancy between the Verbal and Performance Scale IQ scores. She does however stress that this, on its own, is not sufficient to warrant a 'diagnosis' of dyspraxia.

Due to the lack of information indicating the area of difficulty/concern recorded on the first file of the data base it was necessary to adopt some method of finding those for whom dyspraxia had been thought to be relevant. The task of reading over 1,000 reports was not practical therefore an alternative method was needed to create a "long list" of potential participants, who could be scrutinised in more detail through the reports written at the time of the assessment. All psychometric test results had been recorded on an Excel spread sheet and it was therefore feasible to check these with relative ease. The researcher selected out all those which she could find where the testee's Verbal Scale IQ score was 15 points or more above his or her Performance Scale score. This was a simple first way of screening for potential participants. It is not a foolproof method and may have resulted in false positives (the discrepancy does not automatically indicate dyspraxia) and false negatives i.e., the exclusion of participants experiencing DCD who did not demonstrate such a discrepancy. It provided, however, an initial list of possible candidates whose reports were then scrutinised in considerable detail. Discussion regarding the justification for this method of initial screening can be found in the Critical Appraisal section.

The researcher searched the second data base file of 871 pupils and selected those where a note had been made at the time of the assessment that the assessor considered the pupil might experience DCD. Those with co-occurring difficulties were also included.

Together these two searches produced 167 individuals who were potentially appropriate for the study and who were now aged 20 years or more.

This was followed by scrutiny of all 167 relevant reports written by the researcher and colleagues. Each of these was read carefully to identify those where there was clear evidence that the pupil might have experienced dyspraxia. The criteria for inclusion are summarised in table 8 below. With selection criteria and ethical issues applied, 36 potential participants were removed leaving 131 young people (and their parents) who could be invited to participate.

Inclusion criteria – all necessary	Exclusion criteria
The background information section of the report included evidence (appropriate to the age of the child) that he or she had had some difficulty with activities involving gross motor skills (i.e., catching and throwing a ball, riding a bike). Difficulty with fine motor skills, dressing, buttons, handwriting, feeding. Poor organisation.	There was little or no history of coordination difficulties typical of dyspraxia in early childhood or evident as the child progressed through school.
The possibility that the pupil might experience dyspraxia had been raised with the parents either during the parent interview and or in the psychologist's report.	The issue of dyspraxia had not been mentioned to the parents and where no recommendations relevant to dyspraxia had been made in person or in writing.
The report included recommendations relevant to pupils experiencing dyspraxia.	The relevant recommendations had not been made.
That an assessment (if not already done) by an occupational therapist was recommended.	That OT involvement was not mentioned during interview or within the report.
The young adult participant was now over the age of 20 years.	The possible participant was still under the age of 20 years.
That, in the researcher's clinical judgement, additional difficulties did not appear to be of greater significance than dyspraxia.	Where an overlapping difficulty was clearly evident and appeared to be the key area of difficulty.
There were no apparent ethical issues which might make it inappropriate to invite the individual to participate.	If it was judged that either the parents or the young adult might have reason to feel that an invitation to participate was an intrusion into their privacy or to distress them in anyway.
The family contact details were known.	Where the address for the family was known to be incorrect but where no further information was available.

*Table 8. The criteria used to identify possible participants.*

### **3.2.4 Procedure**

The following steps were taken to recruit participants.

First, all the written communication (such as invitation to participate) to be sent out to parents and young people was ‘tested’ for friendliness, for ease of understanding and for whether the wording could be a cause of offence. Two young adults and their parents (all of whom later participated) read, commented and made suggestions where they considered changes would be beneficial.

The only contact details available for the potential participants – both young adults and their parents – were the family address at the time of the assessment, some of which dated back as much as 20 years previously. It was therefore necessary to contact the young adults via their parents. For ethical reasons it was not possible to ask parents to provide any form of direct contact detail (phone number or email address) for their child. For administrative reasons it was decided to include all information for parents and young adult in a single mailing and to request the parents to pass or send it on to their young adult child. This was thought easier than asking parents to ask their child if they were happy or willing to provide their contact details which would have resulted in double handling and a second batch of mailing.

A letter was written to all parents, explaining the research project, and requesting them to send the enclosed information on to their young adult child. (Stamped envelopes were included).

Information sent to parents comprised:

- a letter of explanation (with a request to forward on the enclosed information to their child) (appendix 6)
- an information sheet. (appendix 7)
- a consent form (appendix 8)
- a stamped addressed envelope to return the consent form.

Information for the young adult participants included:

- a letter of explanation inviting their participation (appendix 9)
- an information sheet (appendix 10)
- a reply form
- a consent form (appendix 11)
- the Adult Developmental Coordination Disorder/Dyspraxia Checklist (ADC) (appendix 5)
- a stamped addressed envelope for returning the necessary forms and a completed ADC.

The invitations to participate were sent out to parents (with enclosures for the young adults) over a five-month period, June to September 2019. Eighteen of these letters to parents were returned unopened, marked 'unknown at this address' or otherwise indicating that the recipient had moved away. Between June and December 2019, 20 parents returned signed consent forms expressing their willingness to participate as and when the researcher received written consent from their young adult child. Consent was given for 19 of these parents and was withheld by one young adult participant. They were then emailed with a link to the online Parent Questionnaire. Eighteen parents completed the questionnaire.

During the same period 27 young adults returned signed consent forms along with completed ADC checklists. They were then emailed with a link to the online Young Adult Questionnaire for completion. Twenty-six online forms were completed.

Out of the letters that might be assumed to have reached the intended recipient 26 young adults (23%) participated as did 18 (16%) of the parents. All the parents who participated were parent to a young adult participant. Young adult participation was not contingent upon the participation of their parent(s).

The known characteristics of the young adult participants are presented below.

Characteristics		<i>n</i>	%
Gender	Female	12	46.2
	Male	14	53.8
Age at time of initial assessment	Below eight	6	23.07
	Nine to 12 yrs	14	53.84
	13-18 yrs	5	19.2
	19 yrs	1	3.84
Age now	20-24	13	50.0
	25-29	5	19.2
	25-29	6	23.1
	35-40	2	7.7
Type of school attended	Comprehensive	5	19.2
	Grammar	1	3.8
	Independent day	13	50.0
	Independent boarding	7	26.9
Verbal IQ score	over 140	8	30.7
	130-139	2	7.7
	120-129	10	38.5
	110-119	3	11.5
	100-109	2	7.7
	90-99	1	3.8
Performance IQ score or Processing Speed score. (Depending on whether the WISC-III or IV had been completed).	Over 120	1	3.84
	110-129	4	15.38
	100-109	5	19.23
	90-99	12	46.15
	80-89	4	15.38

*Table 9 Known characteristics of the 26 participants. Note: n = sample size; % = percent.*

In addition to these known characteristics further demographic information elicited from the questionnaires is shown in Table 7 in the Results section. It should also be noted that the client base from which these participants were drawn is not representative of the general population. The parents who requested assessment for their child were self-selecting which implies interest and concern in their child's progress as well as the ability to pay for assessment and any subsequent support provided. Whilst no records have been kept, they were likely to be those with an above average annual income and to have had a university education. As the chart above shows twenty out of the twenty-six participants had attended fee paying schools. In addition, they are of above average ability as measured by one or other version of the WISC at the time of their assessment. The average Verbal IQ was 128.2 at the time of the initial assessment but the average Performance or Processing speed (depending upon which version of the WISC they completed) was 100.3. There is further discussion regarding the validity of using such a specific population in the Critical appraisal section.

### **3.2.5 Choice and development of the questionnaires**

The young adults completed both the Adult Dyspraxia Checklist (Kirby & Rosenblum, 2008) (appendix 5) and an online questionnaire specific to this study. (appendix 1). The parents completed an online questionnaire also specific to this study (appendix 2).

#### **3.2.5.1 The Adult Dyspraxia Checklist (ADC) (Kirby et al., 2010).**

The ADC is a 30-question form (taking 10-15 minutes to complete) which has two parts. The first comprises 10 questions relating to the participants' childhood. The questions were derived from criterion B in the DSM-IV. The second part comprises 20 questions relating to current functioning. These are similar to childhood difficulties, but have also



been garnered from clinical practitioners and occupational therapists working with adults. Participants rated their level of difficulty with the activities included on a four-point scale which measured: never, sometimes, frequently, always. The scoring system produced a single numerical result which indicated whether the participant could be categorised as: ‘at risk’, possibly or not dyspraxic. The purpose for using this checklist was to obtain an independent measure of the degree to which these particular participants rated themselves as having difficulties commensurate with dyspraxia. While the authors of this report state that it is not a diagnostic tool its use as a screening tool has been widely utilised. (Full details are in appendix 5).

### **3.2.5.2 General considerations relating to the online questionnaires.**

The online questionnaires were developed using Opinio UCL. Both the young adult and parent questionnaires include questions which require a range of responses. These included:

- personal details,
- yes/no responses,
- 5-point Likert scales. (It is a hard choice as to whether to use a scale with 5, 7 or 9 points.) The advantage of 5 is that it is easily understood and requires less decision making. In addition, the 5- and 7-point scores have been found to produce the same mean scores once rescaled (Dawes, J. 2012).
- open ended questions (where the responder was requested to give a personal response). For example, ‘Please comment on what made you feel you were a valued member of the school community’.
- semi-open-ended questions where the researcher provided space for a full response, but which asked about to specific items. For example, ‘Did your parents

give you help with the following? 1. homework, 2. Revision, 3. Personal organisation, 4. Study skills.

The aim of the young adults' questionnaire was to gather information about their experiences during the time they were in key stages 4 and 5, the difficulties which they experienced, the interventions/support provided, their academic attainments and their current wellbeing. Key stages 4 and 5 cover the ages 14 to 18 years. This age range was considered by the researcher to be of particular relevance. This is a period when there is an increase in the academic demands of the curriculum, and it is also a time when pupils typically become more independent and self-reliant. Pupils need to plan and organise their time. There is an expectation that they will take personal responsibility for time management and activities such as homework. Difficulties associated with dyspraxia can make it difficult for the individual pupil to cope successfully with these areas of personal development. This is an important time in school, not least because it covers the period in which GCSE and 'A' levels are taken. Success or failure to thrive will be likely to impact life chances. Educational performance in adolescents with DCD has also been discovered to be lower when compared to peers (Harrowell et al., 2018; Losse et al., 1991) also the emotional impact of DCD has been found to have more relevance than the primary motor difficulties and psychosocial issues become more prevalent (Hill et al., 2011).

The aim of the parents' questionnaire was, similarly, to gather information about the parents' thoughts regarding their child's experiences of school with particular reference to the difficulties encountered by their child, the level of support which was needed by their child, the application and efficacy of interventions and special provision, the current

wellbeing and resilience of their child. A further aim was to elicit the parents' feelings and thoughts about their own relationship with school staff.

The construction and rationale behind the specific questions included in the questionnaires was influenced by the researcher's work experience and by the various research studies discussed in the literature review and in the introduction to this section. Whilst at the time that the questionnaire was constructed there was no official guidance regarding the identification of teenagers experiencing dyspraxia, there was well documented research providing evidence of the type of difficulties which they experience during secondary school. For example, poor social engagement, difficulty with planning and organisation, handwriting and copying and so forth. The questionnaire reflects these.

In the absence of previous research on intervention, the researcher has drawn on her personal experience of assessing and supporting pupils experiencing dyspraxic difficulties to construct appropriate questions in this area. These questions reflect the researcher's understanding of the type of support and intervention which has appeared to be helpful to the pupil experiencing dyspraxia during the latter part of secondary school i.e., key stages 4 and 5.

Suggestions regularly made at the time of assessment regarding 'how to help' the pupil experiencing dyspraxia related to:

- access to a laptop and the opportunity to learn to touch type
- the use of a laptop for public exams and additional time (if the criteria set by the exam boards was met)
- study skills help/tuition

- training on computer software programmes which support the organisation of mental planning and organising
- help to develop strategies to aid organisational challenges (remembering equipment, getting notes and files sorted)
- counselling or therapy (as indicated)
- a key member of school staff to liaise with, particularly if the pupil ran into any problems or difficulties

These suggestions are pragmatic and applied.

### **3.2.6 Final questionnaire structure**

#### 3.2.6.1. The structure of the young adult questionnaire.

There are a total of 71 questions in two sections.

Section 1 considers the participants' experiences at the time that they were in school.

Questions covered:

- Personal items related to gender, age, type of secondary school. (4 factual questions)
- Social engagement, participation and ease (6 Likert scales)
- Participation and enjoyment of sports (4 Likert scales)
- Academic difficulties and frustrations (7 Likert scale questions)
- Specific areas of intervention/support (10)
- Motivation and application (2)
- Support from school staff (4)
- Support from home (2)

Section 2 considers the participants' current situation.

- Factual information re academic attainment and current status as student, employee or other (7)
- Social engagement and ease (2)
- Physical activity (2)
- Wellbeing (7)
- Attitude to and impact of dyspraxia (8)
- What has helped most (1)
- Advice for a 14- or 15-year-old experiencing dyspraxia (1)

3.2.6.2 The structure of the parent questionnaire.

The parent questionnaire comprises 32 questions.

- Factual information (past and present) such as age of child when first assessed. Has he/she had occupational therapy? (10)
- Parental response to the identification (diagnosis) of difficulties indicative of dyspraxia. (2)
- Child's strengths and any additional areas of specific difficulty. (2)
- Difficulties experienced by the child in school (2)
- Interventions/support. What was provided and what was thought to be of particular value? (3)
- Impact of DCD on child's motivation and happiness (1)
- Parental help/support given to child (2)
- Parents' relationship with school staff (3)
- Parent view of young adults' current needs (5)
- Looking back and advice to other parents. (2)

### **3.2.7 Considerations regarding piloting, validity and reliability of the two questionnaires.**

3.2.7.1 Content and construct validity were considered by the researcher while the two questionnaires were under construction. The questionnaires for both the young adults and the parents cover a wide range of topics; however, the researcher wanted to ensure that all necessary questions were included in a single questionnaire and that the questionnaires were as short and as 'user friendly' as possible with the aim of encouraging participation and completion. A decision was therefore made not to use a number of different existing, tried and tested questionnaires covering areas of relevance to this study. The challenge was to ensure both content and construct validity as well as user-friendliness.

3.2.7.2 Piloting. Both questionnaires were piloted before they were finalised. The young adult questionnaire was initially piloted by a young adult (aged 28) who experienced DCD and who was subsequently included as a study participant. She provided general feedback regarding user-friendliness, the time taken to complete the questionnaire and her general views on whether it was suitable. She also made useful proof-reading corrections. The adult questionnaire was also piloted by a subsequent participant. She completed and returned a questionnaire and provided similar feedback. Amendments were made where appropriate.

3.2.7.3 Reliability and validity of the young adult questionnaire. The young adult questionnaire was completed by two young adults (both female and both aged 24), who were not participants and who have not experienced any areas of specific learning difficulty. Their scores on the Likert measures of difficulty in school (where a score of

7/35 indicated no difficulties) were 9 and 7 respectively. Their scores on the Likert scales of social ease (where 30/30 indicated a high level of ease and participation) were 30 and 21 respectively. The scores differentiated these two individuals one from another, but also suggest that neither experienced any academic or social difficulties which is what we might expect. Their responses also indicate positive content and construct validity. Both young adults were consistent in their replies to the seven questions relating to academic difficulty and to the six questions relating to participation and social engagement. The number of questions within each category was designed to ensure content validity. Construct validity was assumed by the overall consistency of their replies and their contrast to the responses made by the individual who completed the pilot study.

With regard to reliability both of these volunteers were retested after a period of 6 months (they were unaware that they would be asked to do this twice). The questionnaire comprised 72 questions. Sixteen of these were factual data such as name and age. Eleven were not applicable to a person who did not experience dyspraxia. Seven were open ended and required a longer written answer (included in the thematic analysis), the volunteers were not required to respond to these seven questions. The remaining 38 questions involved a Likert scale. The volunteers' scores on these 38 questions were scrutinized for reliability. Volunteer 1 gave identical responses to 33 of the questions and was just one Likert point different on the remaining five question. Volunteer 2 gave identical responses to 31 of the questions and was one point different on the remaining seven questions.

The volunteers reported that the questionnaire was user friendly and not too time consuming to complete.

3.2.7.4 The rationale, reliability and validity of the questions relating to wellbeing. In relation to the rationale and selection of questions relating to wellbeing the researcher has regarded the terms ‘mental health’ and ‘wellbeing’ as synonymous. Both relate to and are concerned with emotional health. Mental health, however, is a term which has been used with increasing frequency by the population in general and the researcher considered that for many it may carry more negative connotations. The words ‘mental health’ are often viewed as indicative of difficulties which go beyond anxiety and depression and may be understood as incorporating mental illness such as schizophrenia or bi-polar disease. Wellbeing presents as more positive or neutral and does not appear to have such negative connotations. For this reason the researcher chose to use the term ‘wellbeing’.

The questions which have been amalgamated to form the construct ‘wellbeing’ relate to whether the young adult participants experience anxiety, stress, and /or depression. These areas of difficulty have been reported by young adults and adults experiencing DCD, (Hill et al., 2011; Hill & Brown, 2013; Kirby et al., 2011). Other research, previously reviewed, has shown compelling evidence that children and young people thought to experience DCD show measurable indicators of psychological distress. Omer (2019), for example, concludes that individuals with DCD experience greater internalising issues where internalising refers to Anxiety and depression.

This study has sought to measure the extent to which such difficulties are currently experienced by the young adult participants and to look for mediating factors relating to their earlier experiences of secondary school. It was reasoned therefore that the questions regarding wellbeing/mental health had, logically, to include anxiety, stress and depression. The questionnaire included six questions specifically relating to wellbeing/mental health. Three questions related to the participants’ experience (or lack



of experience) of stress, anxiety and depression. Responses were given on a Likert scale ranging from (1) rarely to (5) often. There were further yes/no questions relating to the used of medication, counselling and/or therapy. Participants were also invited (Q52 ) for further comments on their health and happiness.

The decision to include these particular questions in the different formats was influenced by the consideration of a range of tests for both wellbeing and mental health. Tests perused were the Health related quality of life (HRQL), the Recent Emotional State (REST), the Strengths and Difficulties Questionnaire (SDQ), the Child Behaviour Checklist (CBC), the General Health Questionnaire (GHQ-12) and the Kessler Psychological Distress Scale (K6+). It was noted that self-reported measures of anxiety and depression were the most frequently appearing questions in all questionnaires referred to. For example the 6 item Kessler which measures non-specific psychological distress and refers to internalising problems which include psychological distress represented by depression and anxiety. None of these tests were a perfect 'fit' (though the GHQ-12 and the K-6 came nearest and included relevant questions). Consideration was also given to the fact that an additional test would have been an added burden for the participants thus it was decided to incorporate the questions mentioned above. These were deemed to have construct validity given the earlier research findings and reliability had been assessed by the young adult volunteers who had run through the questionnaire on two occasions.

3.2.7.5 The reliability of the parent questionnaire. One parent (who was subsequently a participant) completed the test on two occasions. Her responses to the scaled questions as well as those with a yes/no reply were consistent; responses to the open-ended questions

were expressed in different words, but the sentiment behind the text lead to similar codes. This was taken as providing evidence of test reliability.

With reference to construct validity, the questions are factual or are tightly aligned to what is known (from previous research as well as practitioner experience) about the topic. For example, the questions about difficulties in school relate directly to the specific areas of difficulty which are known to be an issue (i.e., what the questionnaire is measuring could be seen and observed. For example, ‘did you find it hard to copy off the whiteboard?’ This has been understood by the researcher to provide construct validity.

### **3.2.8 Validity and reliability of the questionnaires in relation to the qualitative data**

3.2.8.1 Validity. The open-ended questions in both young adult and parent questionnaires underwent thematic analysis. The validity of this system is dependent upon the quality and focus of the questions asked and also on the integrity of the researcher. The study is theory driven which has guided the focus of the questions. Positives are that all the responses were analysed by a single person (thus there should be no inconsistency in approach), and the codes were applied consistently.

3.2.8.2 Reliability. The responses to two questions were read and analysed for themes by the researcher’s previous office manager. She was given clear instruction and reading material to familiarise her with the thematic analysis process elaborated by Braun and Clarke (2006) and used by the researcher (see results section). Following this process, she and the researcher discussed and compared their two processes, their initial codes and main themes. Whilst the actual words used differed slightly there was agreement between the researcher and office manager regarding the meaning of the codes and themes. This

process provided a check on the researcher bias and enabled discussion relating to code definitions.

### **3.2.9 Ethical considerations**

It was important that participants were treated respectfully and that the possibility that they might be sensitive about any difficulties they experienced in school or in more recent times was kept in mind during all stages of designing and implementing the study. These considerations impacted the tone and wording of the questionnaires. Very personal questions were avoided as were references to mental health.

The young adults who were to be invited to participate in this research were those who were identified as experiencing difficulties commensurate with developmental coordination disorder at some time during their time in primary or secondary school. Engagement with this research project required them to think back to their experiences of secondary school and to comment on their difficulties both then and now. The researcher was sensitive to the fact that (1) some participants may find this distressing or (2) they may feel that they have been wrongly identified.

To manage the first concern, participants were offered the opportunity to call the researcher if there were any issues about which they were concerned or if they were experiencing difficulties now in relation to DCD. To overcome the second concern the researcher made it clear (in the introductory letter and the information sheet) that the process used to identify potential participants was tentative and that there was no expectation that all those contacted would, at this point in their life, consider that they experience any areas of difficulty associated with dyspraxia or that such a label would be

an accurate or appropriate description of them. The researcher would, nevertheless, welcome their participation.

In order to contact the young adults, it was necessary to contact them through their parent's home address recorded at the time at which they were assessed. It was not considered appropriate or ethical to contact parents and to ask for their child's contact email address. It would have been possible to have asked the parents to provide contact details having obtained their child's permission, but it would not have been possible to have verified if this had taken place and secondly, for purely administrative reasons, it was easier to send out all the paperwork for parent and young adult together and at one time. Parents were therefore asked to pass on a confidential letter to their child containing all the relevant information and asking for their participation. Parents were also asked if they would be willing to participate. -However, in order to respect the young adult's privacy and autonomy, parental involvement was contingent upon the written consent of the young adult.

The information sheet sent to all young adults was explicit regarding the personal details held by the researcher and which would, given their consent, be included (anonymously) in the research data. i.e., their Full scale, Verbal and Visual perceptual IQ scores attained at the time of their initial assessment. It also indicated other personal details which they would be asked to supply. i.e. subsequent educational attainment, employment status and history, self-reported wellbeing and social and physical engagement. All participants were asked whether they wished to receive feedback from the research project as and when it was available.

A full proposal for this study was submitted to the UCL data protection and ethics committee in summer 2018. Approval (Appendix 12) was received on 29.10.18 from the Chair of the UCL Research Ethic Committee (REC) for Project/Title: 13993/001 ‘Dyspraxia – what helps what hinders: A survey of young adults and parents regarding their experiences of secondary education.’

### **3.3 Data treatment and analysis.**

#### **3.3.1 Treatment of data**

3.3.1.1 The completed Adult Dyspraxia Checklist questionnaires were returned by post and were scored manually; scores were noted as well as the category into which the participant fell, i.e. possibly, at risk or unlikely.

3.3.1.2 The ‘What helps – what hinders?’ questionnaires for both the young adults and parents were accessed through Opinio. Participants were ordered alphabetically and given a reference number 1 through 26. The parent participants were similarly referenced as per their child i.e., the parent of participant 1 was given the reference 1.1. All participants’ names were removed from here on.

Both the young adult and parent questionnaires included questions which either needed to be recorded for statistical analysis or for thematic analysis. The questions which elicited a yes/no response or where there was a Likert scaled score contributed to the quantitative analysis. The responses to the open ended question provided the data for thematic analysis. Treatment of the responses which contributed to the statistical analysis are reported first (paragraphs 3.3.1.3 and 3.3.1.4) followed by the results of the statistical

analysis (3.4). This is followed by the treatment (3.5.1), procedure (3.5.2) and outcomes (3.5.3) for the data collated for thematic analysis. The combined results (outcomes) from both these processes are analysed in the Discussion section (3.6).

### 3.3.1.3 Preparation for statistical analysis.

A code book (appendix 14) was drawn up. The code book provided a summary of the instructions to be used to convert the information obtained from each participant (young adults and parents) into a format that could be understood by SPSS. The process followed was that described in the SPSS Survival Manual 6<sup>th</sup> edition (Pallant, 2016). The code book comprised five columns. Column 1 was alphabetic and ran A-Z, then AA-AQ. Column 2 recorded the (SPSS or excel) name to be used to represent the variable. Column 3 was the variable, for example, participant identification number, sports participation, difficulties experienced in school. Column four was 'code instructions' and column five was the measurement scale (whether the question was scaled, nominal or ordinal).

After the code book was drawn up the scores from each of the 26 young adult and 18 parent participants were first recorded on individual forms (one form for each young adult participant and one for each parent – where applicable). Each form had two columns and forty-two rows. Column one listed the variables and the column two was the score obtained for each of the forty-two variables. Using the code instructions for each entry the appropriate score was entered into column two. The individual score for each variable was entered by hand. Scores were then copied over from the forty-four individual forms onto an excel spread sheet. This twostep process was followed to reduce the possibility of making an error when entering data onto the excel spread sheet. The

spread sheet comprised 26 rows (one for each young adult participant – with or without parent – and 42 columns representing the different variables. With a total of 1,092 cells (26 x 42) to fill it needed a clear system which could be checked easily. This process has meant that it has been easy to check back and ensure that scores have been recorded accurately. Scores entered into excel were transferred over to SPSS for the statistical analysis.

Academic attainment was measured using information provided by the participants regarding their GCSE, 'A' level and participation in further education. Points were given for the number of GCSE passes, the number and grade of 'A' level and for further education. These categories were weighted. In consideration of the high ability levels of these participants the researcher gave greatest weight to the participants' 'A' Level results. This was to achieve greatest discrimination between participants.

Scoring was as follows: GCSE results: 1-3 passes = score of 1, 4-6 passes =score of 2, 7-9 passes =score of 3, 10+ passes =score of 4

A level results: an A grade =5, a B grade =4, a C grade =3, a D grade =2.

Higher education. 2 points for apprenticeships/training. 4 points for a degree either completed or in progress.

#### 3.3.1.4 Statistical analysis

Once the data was imported it was analysed using SPSS version 23 for Windows (IBM Corp., Armonk, NY). Frequency tables were used to summarize characteristics of the participants. As the data were not all normally distributed, non-parametric analysis (Spearman's rank correlation coefficients and the Mann-Whitney U test), were applied when appropriate (Field, 2013). For any tests, a p-value less than 0.05 indicated

significance. All p-values were two-tailed due to the fact that no hypothesis was made relating to the direction of any relationship between the variables.

Due to the number of relationships considered in the two Spearman’s rank correlations (nine in one and seven in the other) there is an increased possibility that significance is achieved through chance factors. To correct for this the Benjamini-Hochberg Procedure was applied. The researcher selected false discovery rates of 5% and 10%. This has been applied post hoc with the intention of controlling the inflation in likelihood of type 1 error due to multiple testing, with less sacrifice of power than alternative corrections, (e.g., Bonferroni).

### 3.4 Results

#### 3.4.1 Characteristics of participants

The previously known characteristics of the 26 participants are shown in Table 9. Table 10 below, shows further information regarding their views on the appropriateness of a DCD label, their responses to the ADC (administered as part of the data gathering process), their academic achievements and their current status as student, employee, trainee or other

Characteristics	Categories/measurements	<i>n.</i>	%
Current view regarding the degree and appropriateness of a DCD label - young adults’ view	1 = Not at all	4	15.4
	2	3	11.5
	3	5	19.2
	4	7	26.9
	5=very much	7	26.9
Current view of the degree and appropriateness of a DCD label for their child – parents’ view	1 = Not at all	0	0
	2	2	0
	3	3	11.11
	4	13	16.66
	5=very much	11	72.22



Current view held by young adult participants regarding whether they have difficulties in addition to DCD.	No difficulties	11	42.3
	Dyslexia	8	30.8
	Dyslexia and ADHD	3	11.5
	ADHD	4	15.4
Scores on the ADC administered as part of the research process	probable	8	30.76
	at risk	8	30.76
	below criterion for DCD	10	38.46
Current situation in relation to whether still in education, undertaking training, in employment or none of the above.	Student,	5	19.23
	In training	5	19.23
	In employment	16	61.53
	Neither in education nor in employment.	0	0
Academic achievement. Scores derived from number and level of GCSE, 'A' level and further education.	0-9	1	3.84
	10-14	4	15.38
	15-19	6	23.07
	20-24	9	34.61
	25 plus	6	23.07

*Table 10 Characteristics of participants elicited from the questionnaire. Note: n = sample size; % = percent.*

### **3.4.2 The relationship between academic attainment and the research question variables.**

The relationships between academic attainment (a continuous variable) and a series of variables driven by the research questions (7 continuous variables and 5 categorical variables) were examined using Spearman's rank correlation coefficients (for continuous variables) and Mann-Whitney U tests (for categorical variables with two levels). A multiple correlation was not undertaken because only the specific relationship between academic attainment and the seven independent variables were being investigated.

The seven continuous variables of interest were

1. Verbal ability
2. Level of academic difficulty reported during school (Scores ranged from 1 to 5, with higher scores indicating higher levels of academic difficulty reported during

school)

3. Level of support from adults at school (Scores ranged from 1 to 5, with higher scores indicating higher levels of understanding of strengths, weaknesses and needs).
4. Level of support provided at home (Scores ranged from 1 to 5, with higher scores indicating higher levels of support provided at home)
5. Participants' reported motivation and engagement with work (Scores ranged from 1 to 5, with higher scores indicating higher levels of motivation and engagement with work).
6. Scores on the ADC
7. Impact (reported by parents) of DCD on pupils' confidence during the school years (Scores ranged from 0 to 18, with higher scores indicating higher levels of impact). This variable was derived from the total scores on 6 sub-questions each with four possible responses 0,1,2,3. i.e., with a possibility of a maximum score of 18. Unlike the scores on the previous variables the scores on this variable were not averaged.

The results are presented in the Table 11 below; the two columns on the right give the adjusted probability scores following the application of the Benjamini-Hochberg formula. (The formula is  $l/m$  multiplied by  $q$ . Where  $l$ =the individual p value rank,  $m$ =the total number of tests (in this case 7) and  $q$  = false discovery rate. In this case 0.05 and 0.1.). The numbers highlighted in yellow (in both tables) show when the result is statistically significance at either a 5 or 10% level following the application of the Benjamini-Hochberg formula.

Variables	n	r <sub>s</sub>	p	(l/m)0.05	(l/m)0.1
1.Verbal ability	26	0.534	0.005**	0.007*	0.014
2.Level of academic difficulty reported during school	26	0.250	0.219		
3.Level of support from adults at school	26	0.241	0.236		
4.Level of support provided at home	26	0.291	0.149		
5.Reported motivation and engagement with work	26	0.448	0.022*	0.01	0.028
6. Scores on the ADC	26	0.060	0.771		
7.The impact of DCD during the school years	19	0.171	0.484		

Table 11. Spearman's rank correlation coefficients between academic attainment and the continuous variables of interest.

Note: n = sample size; r<sub>s</sub> = Spearman's rank correlation coefficient; p = p-value.

\*indicates significance at the 0.05 level.

Variables	p	(l/m)0.05	(l/m)0.1
1	0.005**	0.007*	0.014
5	0.022*	0.01	0.028
4	0.149	0.02	0.04
2	0.219	0.02	0.05
3	0.236	0.03	0.07
7	0.484	0.04	0.08
6	0.771	0.05	0.1

Table 12. The values of significance following application of the Benjamini-Hochberg Procedure also shown in Table 11.

Table 12 above shows the values of significance following the application of the Benjamini-Hochberg Procedure. The test with the largest p-value that is less than its Benjamini-Hochberg critical value (where  $q$  is 5%) is variable 1, verbal ability. The test with the largest p-value that is less than its Benjamini-Hochberg critical value (where  $q$  is 10%) is variable 5, indicating that it and all tests with a smaller p-value will be considered significant at this level.

Following the uncorrected analysis there was a statistically significant positive relationship between academic attainment and verbal ability ( $r_s = 0.534, p = 0.005$ ), indicating participants with better verbal ability would have better academic attainment. Following the correction this relationship remains significant at  $p=0.007$ . A correlation of 0.534 indicated a moderate effect size.

Following the uncorrected analysis there was also a statistically significant positive relationship between academic attainment and self-reported motivation and engagement with work ( $r_s = 0.448, p = 0.022$ ), indicating participants with higher levels of motivation and engagement with work tended to have better academic attainment. Following the correction this relationship is significant only at a 10% chance of being a false positive. The effect size is again moderate.

There was no statistically significant relationship between academic attainment and level of academic difficulty reported during school ( $r_s = -0.250, p = 0.219$ ), level of support from adults at school ( $r_s = 0.241, p = 0.236$ ), level of support provided at home ( $r_s = 0.291, p = 0.149$ ), scores on the ADC ( $r_s = 0.060, p = 0.771$ ), and the impact of DCD during the school years ( $r_s = 0.171, p = 0.484$ ),

The 2 categorical variables were

1. Use of laptop (a categorical variable with 2 options: yes vs. no)
2. Exam concessions (a categorical variable with 2 options: yes vs. no)

Table 13 presents the results of the Mann-Whitney U tests for relationship between academic attainment and the categorical variables. There was a statistically significant relationship between academic attainment and use of laptop ( $U = 60.50$ ,  $z = 2.097$ ,  $p = 0.032$ ,  $r = 0.411$ ). Those without the use of a laptop achieved significantly better results than those who had laptop use. There was no statistically significant relationship between academic attainment and exam concessions ( $U = 63.50$ ,  $z = 1.392$ ,  $p = 0.172$ ,  $r = 0.273$ ).

Variable		<i>n</i>	Median (Range)	<i>U</i>	<i>z</i>	<i>p</i>	<i>r</i>
Use of laptop	Yes	23	20 (26)	60.50	2.097	0.032*	0.411
	No	3	25 (1)				
Exam concessions	Yes	22	20 (26)	63.50	1.392	0.172	0.273
	No	4	24.5 (12)				

*Table 13. Results of Mann-Whitney U tests for relationships between academic attainment and the categorical variables*

Note: *n* = sample size; *U* = Mann-Whitney U test statistic; *z* = standardized test statistic; *p* = p-value. *r* = effect size, computed as  $z/\sqrt{N}$ , where *z* is the standardized test statistic and *N* is the number of total observations (Tomczak & Tomczak, 2014). \*indicates significance at the 0.05 level.

### **3.4.3 The relationship between wellbeing now and a series of variables of interest.**

In this section, the relationships between the participants' current sense of wellbeing (a continuous variable) and a series of dependent continuous variables were examined using

Spearman's rank correlation. The nine continuous variables comprised eight which were responses relating to historic events and one which reflected a current state; seven were reported by the young adult participants and two by parents. Three of the variables were those tested for correlation with academic attainment. They are marked here with a \*.

The nine variables were as follows:

1. Social ease at school (Scores ranged from 1 to 5, with higher scores indicating higher levels of social ease)
2. \* Academic difficulties in school (Scores ranged from 1 to 5, with higher scores indicating more academic difficulties experienced in school)
3. Engagement with sports (Scores ranged from 1 to 5, with higher scores indicating higher levels of engagement with sports)
4. \* Support from school (Scores ranged from 1 to 5, with higher scores indicating higher levels of support and understanding of school staff)
5. \* Support from home (Scores ranged from 1 to 5, with higher scores indicating higher levels of emotional support from home)
6. Social engagement (Scores ranged from 1 to 5, with higher scores indicating higher levels of social engagement)
7. Attitude to DCD (Scores ranged from 1 to 5, with higher scores indicating more positive attitude towards DCD)
8. Impact of DCD on pupil confidence (reported by parents) during the school years (Scores ranged from 0 to 18, with higher scores indicating higher levels of impact)
9. Young Adult resilience now (as reported by parents) (Scores ranged from 1 to 5, with higher scores indicating better ability to cope with life)

	<i>n</i>	<i>r<sub>s</sub></i>	<i>p</i>	(1/ <i>m</i> )0.05	(1/ <i>m</i> )0.1
1.Social ease at school	25	0.422	0.036*		
2.Academic difficulties in school	25	- 0.230	0.270		
3.Engagement with sports	25	0.181	0.386		
4. Support from school	25	0.509	0.009**	0.005	0.01
5.Support from home	25	0.300	0.145		
6.Social engagement at school	25	0.097	0.646		
7.The participants' attitude to DCD	25	0.098	0.642		
8.Impact of DCD on pupils' confidence during the school years – as reported by parents.	18	0.250	0.317		
9.Young Adult resilience now as reported by parents.	18	0.473	0.047*		

Table 14. Spearman's rank correlation coefficients between wellbeing and the continuous variables

Note: *n* = sample size; *r<sub>s</sub>* = Spearman's rank correlation coefficient; *p* = p-value. \* indicates significance at the 0.05 level. \*\* indicates significance at the 0.005 \*\* level prior to the Benjamini-Hochberg corrections.

Variable	p-value	Rank	(1/m)0.05	(1/m)0.1
4	0.009**	1	0.005	0.01
1	0.036*	2	0.011	0.02
9	0.047*	3	0.016	0.03
5	0.145	4	0.022	0.04
2	0.270	5	0.027	0.05
8	0.317	6	0.033	0.06
3	0.386	7	0.038	0.07
7	0.642	8	0.044	0.08
6	0.646	9	0.05	0.1

*Table 15. results following the application of the Benjamini-Hochberg Procedure shown in the two right hand columns.*

There is no test for which the p-value is less than its Benjamini-Hochberg critical value where  $q$  is 5%. The test with the largest p-value that is less than its Benjamini-Hochberg critical value (where  $q$  is 10%) is variable 4, indicating that it will be considered significant with a 10% false positive rate.

The uncorrected analysis indicates there was a statistically significantly positive relationship between current wellbeing and support from school ( $r_s = 0.509$ ,  $p = 0.009$ ), indicating participants with more support from school would have better wellbeing. The correction indicates a 10% chance that this is a false positive. This can be termed a ‘trend-level’ which suggests further investigation could be worthwhile.

The uncorrected analysis indicates a statistically significantly positive relationship between wellbeing now and social ease at school ( $r_s = 0.422$ ,  $p = 0.036$ ), indicating



participants with higher levels of social ease at school would have better wellbeing as adults. The corrections indicate there is a greater than 10% chance this is a false positive. The relevance of these statistical results is considered in the Discussion section 3.3.9.

### **3.5 Thematic analysis. Rationale, treatment and results (emergent themes).**

#### **3.5.1. The aim, rationale and procedure for thematic analysis.**

The aim of this study is to build upon the existing knowledge regarding the needs of pupils (in key stages 4 and 5) experiencing difficulties indicative of DCD with particular reference to the two central questions which this study poses. The aim of the thematic analysis process is therefore to explore, from the young adult and parents' perspectives how they experienced school and their current situation. This data, when combined with the quantitative results helps to increase the explanatory power and to generate a more thorough picture of the overall topic.

The design and content of the questionnaires is theory driven. The questions asked are based on knowledge from previous research as well as practitioner knowledge and experience. The themes that emerge do not therefore emerge from nowhere and the way in which the data has been analysed relates to the objectives of the research design (Guest et al., 2012). The perspective behind this research is that of critical realism with the underlying assumption that the responses of both the young adult participants and the parent participants reflect a subjective ontology and have a reality and validity which can inform future planning, policy and practice.

The particular questions considered suitable for thematic analysis were those which were open ended. Questions where specific options or examples were provided were analysed through use of frequency counts the results of which were incorporated into the thematic analysis.

### **3.5.2 Procedure**

This section starts with a description of the procedure used to complete the frequency counts and is followed by a description of the steps taken in the thematic analysis of the open ended questions.

#### **3.5.2.1. Steps taken and the rationale for frequency counts.**

Frequency counts were applied to questions 14 and 17 of the parent questionnaire. Both questions provided examples (e.g. Question 14 What were the main areas of difficulty which you consider that your child experienced during secondary school? For example, did he or she have difficulty with regard to self-organisation, social interactions, fine or gross motor coordination, reading, writing, homework or other areas of the curriculum). These two questions were based on an existing assumptions and were not, therefore, inductive.

Whilst the inclusion of this type of data within a qualitative study may be controversial the justification for including it comes from the positivist view that counting and quantification of qualitative data ‘can serve to enhance the validity and persuasiveness of qualitative data (Miles & Huberman, 1994; Silverman, 2000)’ in Guest 2006 p 132.

Guest, 2006 p 132 also writes that ‘Our view is that both qualitative and quantitative

analytic techniques can be brought to bear on qualitative data so long as the research questions are aligned with the analytic technique’.

The method used to complete the frequency count was as follows: the frequency with which particular concerns were expressed in relation to each of the examples was measured as a percentage of the total number of responses to all the examples. This demonstrated the relative weight of the particular concerns. Both these questions were followed by an invitation/opportunity for the participant to provide a longer open ended written answer in which they could expand on the original question. The questions were then subject to the thematic analysis process (in which the researcher took note of the results of the frequency counts). (See Appendix 15, Part 4. questions 14 page 269 and question 17 page 271) and the development of the 43 main themes.

#### 3.5.2.2 Steps taken to complete the thematic analysis.

The researcher followed the ‘Step-by-step guide’ described and discussed by Braun and Clarke (2006). The guide starts when the analyst begins to notice, and look for, patterns of meaning and issues of potential interest in the data. ‘The endpoint is the reporting of the content and meaning of patterns (themes) in the data’, (p15). Between the two points the process involves ‘a constant moving back and forward between the entire data set, the coded extracts of data that you are analysing, and the analysis of the data that you are producing’. Braun and Clarke describe six phases and within each phase they provide guidance on good practice. Table 16 below shows the steps taken in this study.

Phases	Action
Phase 1. The initial task was to collate the participants' responses.	Working question by question, all responses provided by participants in relation to individual questions on the relevant questionnaire were copied and pasted over to separate documents. The researcher then had individual documents each relating to a specific question and containing all the responses to that question. This resulted in 11 documents relating to the young adult responses and six documents relating to parent responses.
Phase 2. Establishing codes  (See Table 17 Phase 2 code generation)  Appendix 14.	The data for each question was read and reread. The researcher attached colour codes to features of the data which were of relevance and interest, for example, 'loneliness', 'personal organisation', 'prefer my own company', 'struggle to make friends'. These were the smallest units of data which could be analysed in a meaningful way, and this was the first step in organising the data into larger meaningful groups. (See appendix 14)
Phase 3. Establishing sub-themes.  (See table 17 Phase 3 searching for sub-themes)	The colour coded features of the data were collated into groups with a common theme. For example, 'Low self-worth', 'I am insecure from the school years', 'I have concern about my capability' were grouped into a subtheme which the researcher labelled 'poor self-esteem'. This process was completed individually for each of the 11 questions to which the young adults had replied and the six questions to which the parents had responded.
Phase 4 Establishing main themes  (See Table 17 Phase 4 Refinement of themes leading to main themes)  Appendix 15	This stage involved the refinement of the sub-themes which had been established. This was once again completed question by question. Sub-themes were eliminated where there was insufficient data to sustain a theme (except where the researcher considered it to be of particular relevance) and some themes were collapsed into other themes where, on reflection, they might fit as a single theme. The principles followed were that the full texts (represented by a particular code) which were grouped as a theme should be coherent as a group. The themes were also considered as to whether they captured a concept or idea which could stand alone. A total of 44 themes were evident. (See appendix 15)
Phase 5 Cross referencing across the whole data set to establish major themes.  Appendix 16	This detailed review of these 44 themes involved revisiting original transcripts. A process similar to that of Phase 4 was carried out. i.e., each of the 44 themes were either eliminated (if insufficiently representative) or grouped together, where coherence was evident, as a major theme. Four major themes emerged. (See appendix 16)

Table 16. The thematic analysis procedure carried out.

Table 17 below illustrates part of the thematic procedure deriving from Question 52. Phase 2 small units of raw data were colour coded and were grouped together into sub-themes. (The numbers written in front of each unit of raw data indicates which participant had made the comment). Phase 3 involves the collation of the codes generated in phase 2 in order to generate sub-themes. Phase 4 is establishing main themes out of the sub-themes. The fourth column provides illustrative comments which form the basis of the analysis.

Phase 2 Code generation	Phase 3 Searching for sub-themes	Phase 4. Refinement of themes leading to main themes.	Illustrative comments from the original text.
<p>Question 52. Further comments relating to your health and happiness if you have any. (The number beside each code indicates which participant made the comment.)</p> <p><b>Codes</b></p> <p>26 Socially awkward, can socialise when needed.</p> <p>26 Loneliness</p> <p>26 Struggle to make friendship</p> <p>2 prefer my own company but can socialise when needed</p> <p>24 Worried by same things as all young women</p>	<p><b>Sub Themes</b></p> <p>a <u>Social skills and friendship.</u></p> <p>Comment: Three of these are from the same individual. Not enough for a main theme but might cross reference to other questions.</p> <p>b <u>no issues</u></p> <p>comment: just one response which is not echoed anywhere. Of interest it is the eldest participant – may be time helps?</p> <p>c <u>Mental health issues</u></p>	<p><b>Main themes</b></p> <p>c <b>MENTAL HEALTH ISSUES</b></p>	<p><u>Mental health issues.</u></p> <p>18 Sadly depression has lingered on since the school days and the anxiety with it.</p> <p>14 I have been taking medication for anxiety related difficulties since the age of 14</p> <p>10 Currently in my second programme of CBT for a panic and anxiety disorder.</p> <p>7. I have struggled with these problems (anxiety and stress) for a long time and they have greatly impacted my life.</p> <p><u>Insecurity and lack of self-belief.</u></p>

<p>22 Anxiety, 10 CBT for depression and anxiety disorder, 18 depression has lingered since school also anxiety 15 depression post school and at university lots of stress around academic performance 14 medication for anxiety 8 Mental health issues through life 7 Have struggled with anxiety and depression all my life 7 Do better at my own pace. History of anxiety and panic attacks. 3 history of anxiety and panic attacks. I can get depressive. 12 Stress can lead to depression in work</p> <p>20 Low self-worth still struggle to know what I am good at. Insecure about ability. I am insecure from the school years Concerned about capability at work</p>	<p><u>stress, depression, anxiety.</u></p> <p>comment: these are all self explanatory and fit into a single theme</p> <p>d, <u>poor self esteem</u></p> <p>e <u>concerns about work performance.</u> This is not very prevalent but might be relevant in combination with other questions.</p> <p>f <u>organisation and time management.</u></p>	<p><b>FEELINGS OF INSECURITY AND LACK OF SELF BELIEF</b></p> <p>items from d and e can combined to form this theme which encompasses a lack of confidence and feelings of inadequacy.</p> <p><b>f POOR PERSONAL ORGANISATION</b></p> <p><b>g PROTECTIVE FACTORS</b></p>	<p>20 I have low self-worth and am quite insecure about my ability/ capabilities at work.</p> <p>18 I'm hugely insecure from the school years and the humiliation i suffered in one school/from students and teachers.</p> <p>18 I still to this day struggle to know what I'm good at or to use my strengths</p> <p>15 I had lots of stress around academic performance.</p> <p><u>Poor personal organisation.</u></p> <p>20 I really hate how disorganised and chaotic I am.</p> <p>18 Work can at times be hugely stressful and juggling/organising my life makes this even harder.</p> <p><u>Protective factors.</u></p> <p>20 I believe my grit and determination have been protective and helped me to get good grades and a good job</p> <p>7. I have found when I left alone to learn and go at my own pace, I do much better. Especially when something</p>
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<p>18 I am hugely insecure from the school years</p> <p>20 concerned about capability at work</p> <p>12 Stress can lead to depression in work</p> <p>20 Dislikes being disorganised and chaotic</p> <p>18 Juggling and organising my life increases stress</p> <p>15 struggle to keep time and organise life.</p> <p>20 I am more accepting of myself now.</p> <p>20 My determination has been protective</p> <p>20 Good friends are a support</p> <p>20 Feels happy and lucky</p> <p>3. Yoga good help</p> <p>7 Do better at my own pace</p> <p>10 CBT</p>	<p><u>g recognition that some thoughts and activities can help</u></p>		<p>is given a practical application.</p> <p>21. I really enjoy walking...for relaxation.</p>
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Table 17. shows the process of phase 2,3 and 4 applied to question 52.

### **3.5.3 Major themes to emerge from the thematic analysis.**

Analysis of all young adult and parent responses to the individual question posed resulted in the emergence of 44 main themes. Figures 1 and 2 show a schematic representation of the questions and responses. The ovals highlighted in blue refer to the broad area covered. The boxes highlighted in yellow show the question posed and the round edged oblongs which are not highlighted show the themes to emerge. Full details of the reduction of 44 themes (from young adults and parents) to 4 major themes can be found in appendix 16.



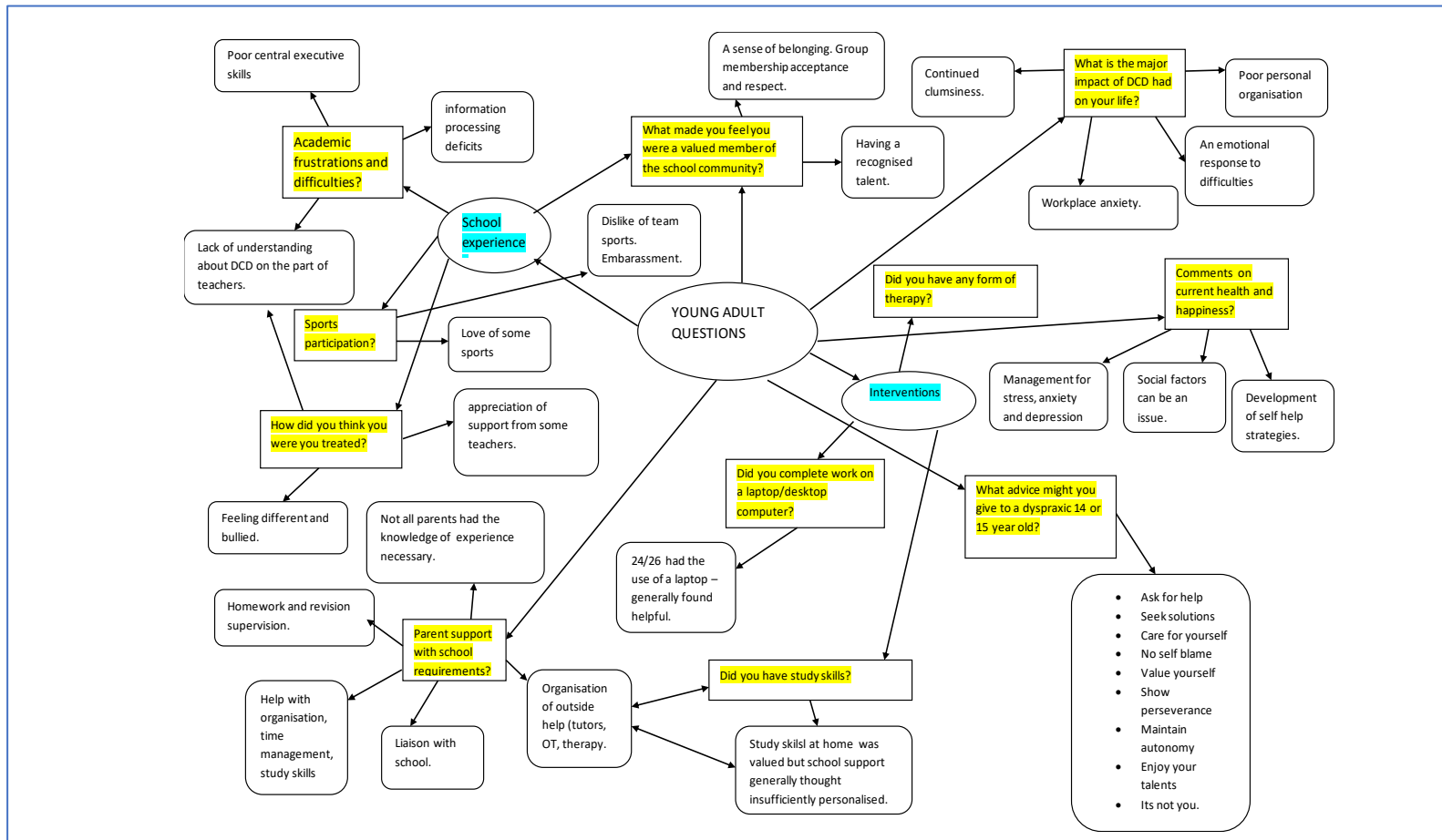


Figure 1. Young Adult thematic analysis. Themes emerging from the responses of young adults to the open ended questions in the questionnaire.

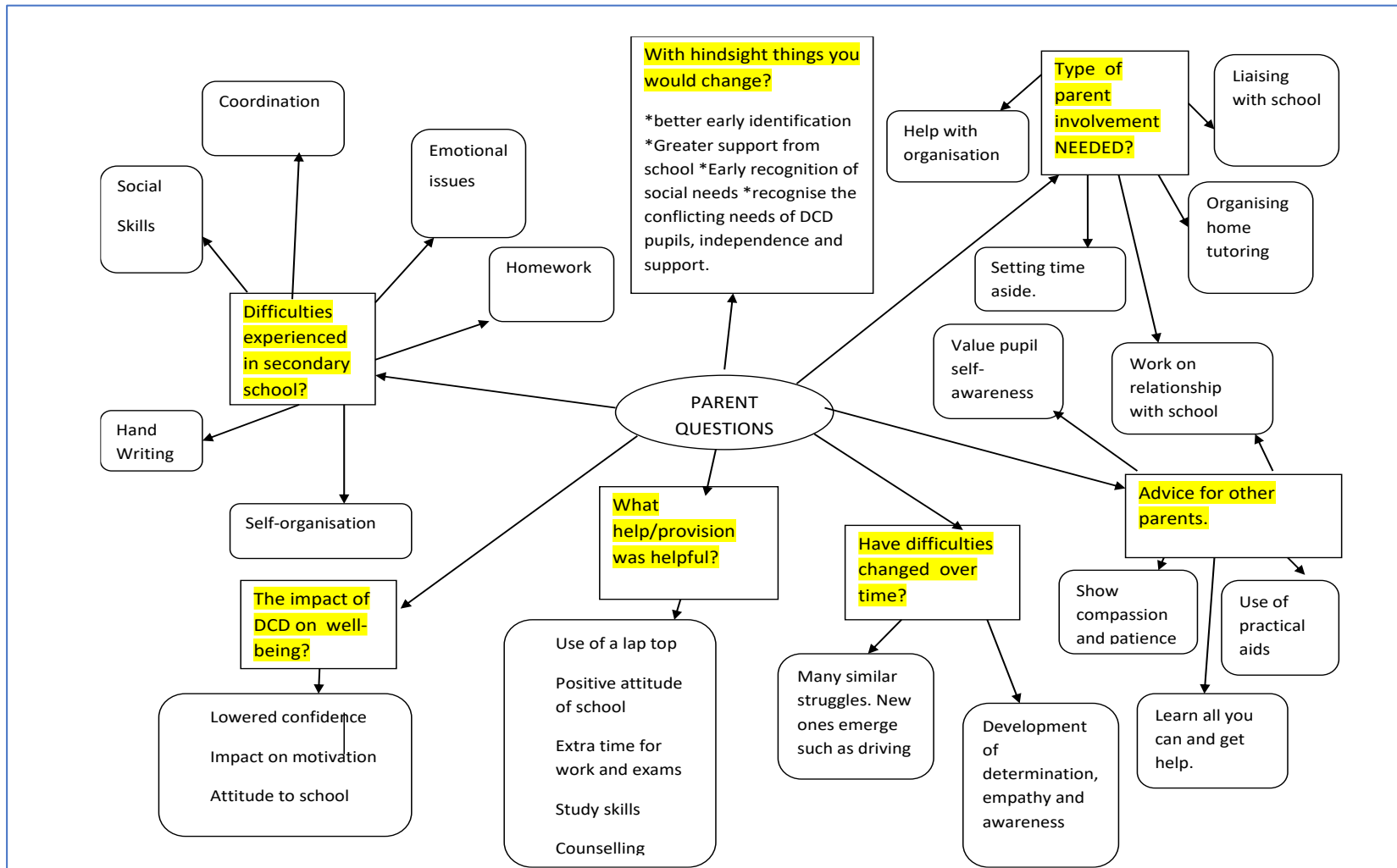


Figure 2. Parent thematic analysis. Themes emerging from responses to the questions included in the parent questionnaire.

As described in stage 5 of the thematic analysis process when the 44 themes were cross referenced four major themes emerged. These will now be described and discussed.

The four major themes to emerge from the thematic analysis were

- **Issues relating to central executive skills, mental planning and organising; organising and sequencing physical actions.**
- **Other people's knowledge, empathy and understanding of pupil difficulties**
- **The pupils' sense of belonging and of being valued within school**
- **Wellbeing and resilience**

These themes relate to the time that participants were in school and continue into the present time. There is a connection and flow between and across the four themes as well as across time. The young adult participants are those who experience DCD. The difficulties which they typically experience and experienced relate to their capacity for physical, organisational and mental planning (Theme 1). This in turn has an impact on their experience of school (Theme 2) in relation to how they are perceived by those who teach them: to what degree their teachers make accommodation for the areas in which they may struggle and to what degree they are empathetic to the pupil concerned. Participant experiences of school also relate to their sense of belonging and of being of value within the school community (Theme 3) and finally there is a theme running through relating to wellbeing and resilience (Theme 4).

### **Theme 1. Issues relating to central executive skills, mental planning and organising, Organising and sequencing physical actions.**

This theme relates to the problems associated with central executive skills. In addition to the topics mentioned below it should be noted that the majority of these pupils also experienced difficulty with handwriting, copying off the whiteboard, taking notes and structuring written work as indicated by their responses to the questionnaire questions which were treated quantitatively.

### In school

- *I found it really hard to keep pace with teaching on a topic and so would not fully understand all the information at the time and would struggle to go straight to a worksheet in class and apply this new knowledge in the same way my peers could.*
- *Always forgot PE kit or to take in homework.*
- *Definitely self-organisation was a huge problem.*

### Young adults continue to have difficulties now

- *I find now that the biggest challenges I have relate to how I sequence and organise myself, my thoughts and my actions at work and home.*
- *I feel like I make a lot of silly mistakes at work when I'm organising things (booking flights, meetings etc.). I get in some trouble for this as I'm assistant to the companies managing directors and booking things, when they're going to conferences, is a large part of my job at particular times of year.*
- *I would love to be more coordinated. Being able to go for a kick about or a game of tennis/golf and compete at an okay level would be transformative. Not being able to dance is also pretty annoying.*
- *Basically, being called clumsy. One creates and identifies as a destructive tornado or something along those lines as a joke to hide the fact that they struggle*

### Parents report on difficulties in school and at the present time.

- *She has to make copious lists and teach herself how to do things such as packing a suitcase or tidying a desk drawer.*
- *She struggles with filing, correspondence and keeping appointments.*
- *Problems to organise his day. Forgot violin lessons, did not turn up for choir.*
- *She is active but still has some clumsiness – spilling food, bumping into things.*
- *She has to make copious lists and teach herself how to do things such as packing a suitcase or tidying a desk drawer. She struggles with filing, correspondence and keeping appointments.*
- *My daughter has been told she will never pass her driving test. She has had over 65 lessons. She struggles to ride a bike. Coordination remains 'dicey'.*

### Parents also advocate strategies for self-help

- *It is valuable for your child to learn their strengths and weaknesses compared to their peers and to learn coping strategies for the weaknesses or situations to avoid.*
- *Help them gently to become self-aware*
- *It is invaluable for our child to learn their strengths and weaknesses.*

**Theme 2. Knowledge, empathy and understanding.** This theme encompasses the perceived level of knowledge demonstrated by teachers regarding DCD and the support, empathy and understanding which participants experienced in school. This

was a theme of importance to both students and parents. While some participants were grateful to teachers for understanding their needs and difficulties an equal number felt that teachers lacked knowledge about DCD and that their individual needs were overlooked.

#### Young adult participants comments

- *(It was frustrating) Knowing more than I could put into words or on paper. Now seeing that I was better than the box I was put into.*
- *Teachers didn't really understand my educational needs and didn't offer proper support in classes or in exams. If I didn't understand something, teachers just left me to figure it out. Some teachers didn't believe my dyslexia or dyspraxia was a real thing*
- *little to no understanding was given to my struggles working. where my strengths were and how to use the strengths and combat the weaknesses. i would often languish behind due to being late, getting work wrong, not knowing what to revise and generally falling behind. no mentor or advice was given and left school with no idea who i was or how to ascertain myself or work around my difficulties.*
- *The teachers would tease me about it (lack of focus in class) and my inability to do homework and it became a kind of running joke within the school. In turn, this made me want to work even less. This situation made it harder for my teachers to notice that I was struggling.*
- *I remember also always being frustrated by a lack of understanding around dyspraxia and comments I used to get along the lines of 'you can't be dyspraxic because you're at this (very academic) school'.*
- *I felt the majority of the teachers were supportive and recognised my potential.*
- *Teachers who were able to react and empathise based on emotional intelligence and their ability to understand students through personal interactions were able to understand me far better.*

#### Parents report

- *I don't think teachers have any real knowledge of additional needs unless the child is disruptive.*
- *The effect of being treated consistently as either stupid or lazy gradually wore down her confidence over her school years.*
- *They (the pupils with DCD) are different, but this is generally seen as a complete negative by the school and sometime their peers too.*
- *He wanted to be treated like everyone else – absolutely hated to be taken out of lessons for Special Needs.*
- *More support would have made a difference at primary school level.*
- *Parents also commented on the lack of teacher knowledge relating to DCD but emphasised the need for parents and school to 'work as a team'.*

**Theme 3. The sense of belonging and of being a valued member of the school community.** Responses to the Likert scale questions indicate that levels of participation relating to home and school activities (outside the classroom) were high and 46% of participants felt that they were valued as members of the school community. Forty three percent of responders reported frequent bullying and 57% admitted to feeling isolated.

Young adult participant's comment

- *Felt left out. Almost all of my year was made prefects, except me. Very cliquey year. Teachers had definite favourites*
- *I always saw my value in comparison to their (other students) levels of achievement and so I think always felt conscious of being different to them and in that way less valuable.*
- *Student run societies etc made it possible to become a visible figure within the school without it having to centre on sport. School gave us time to pursue big projects if we wanted and worked hard.*
- *In terms of relationships with my peers, I was bullied up until Year 10, when I stopped trying to please people who would never want to be my friends, and instead spent my time with the few people who I got along with.*
- *I got bullied a lot and really struggled with secondary school. I dreaded going to school each day.*
- *I always felt part of the school community as I had friends and had a good relationship with my teachers.*
- *However, I did not feel very motivated to me part of teams or clubs*
- *.I felt part of a friendship group and involved in curricular & extra-curricular life*
- *I always had friends and got on fairly well with staff however I did not join any societies or clubs and did not feel particularly motivated to do so.*

Even now some participants continue to have difficulty feeling that they 'belong'

- *I am somewhat socially awkward, and it's led to me being quite lonely in some ways which is not the worst thing in the world however i do think that that comes from struggling to make a large friend group in school*
- *Prefer my own company but can socialise when needed*

Parents report

- *I would like to have understood the social difficulties that she would face in the context of her dyspraxia. I would have paid more attention to her mental health.*

**Theme 4. Mood, wellbeing and resilience.** The responses to the Likert questions suggest that the participants were evenly matched between those who experienced anxiety, stress and depression compared to those who did not. The longer replies from parents show concerns during the school years but considerable pride in the level of independence and resilience which their child has achieved. The response to the question asking what advice the young adult participants would give to a teenage pupil experiencing DCD elicited the fullest and longest responses. The strategies suggested (see below) do suggest a high level of self-reflection and self-care.

Parent's comment on their child's mood during school

- *When his marks slipped it unsettled him and the school who kept telling us he was lazy and not trying enough.*
- *She would experience sudden high anxiety and generally very low self-esteem.*
- *being different chipped away at confidence*
- *She still suffers from crippling low self-esteem and has no self-confidence.*
- *The effect of being treated consistently as either stupid or lazy gradually wore down her confidence over her school years.*
- *I would like to have understood the social difficulties that she would face in the context of her dyspraxia. I would have paid more attention to her mental health.*
- *'Earlier understanding of her needs might have prevented the downwards spiral of confidence that was so difficult to reverse.'*
- *Although, I wanted to help him all the time - he was desperate for independence and not to be treated differently from his brother or the other kids.*

Young adult's comment on their 'mental health' now

- *I have been taking medication for anxiety related difficulties since the age of 14, when I was diagnosed with Obsessive Compulsive Disorder. Since then, with the help of Cognitive Behavioural Therapy, I have been more able to control my moods and emotions.*
- *Currently in my second programme of CBT for a panic and anxiety disorder. Also, tried hypnotherapy which didn't seem to have an effect*
- *I am somewhat socially awkward, and it's led to me being quite lonely in some ways which is not the worst thing in the world however i do think that that comes from struggling to make a large friend group in school*
- *Prefer my own company but can socialise when needed.*

Parents also noted that the importance of understanding what their child is experiencing.

- *'I wish I had known. She has managed brilliantly but my chats about her strengths, guiding her through her meltdowns and discussing time management would have been much more structured, and perhaps she would have had better methods for dealing with the loss of control days'.*

#### Parent's comment on their child's resilience now

- *She has developed this acute sense of her own limitations and, being the determined personality that she is she as developed this arsenal of tools that helps her to overcome her difficulties.*
- *She has developed ways of working to compensate for lowered processing skills.*
- *Is exceptionally kind, caring and empathetic – her past difficulties have definitely awakened an awareness of when others are experiencing difficulties.*

Strategies for self-help. Young adult's comment on what they have learnt and what advice they would give to a teenager experiencing DCD

- *Ask for help and communicate your needs.*
- *Seek solutions.*
- *Care for yourself and keep self-respect.*
- *No self-blame*
- *Value yourself*
- *Show perseverance*
- *Maintain autonomy, stay resilient and be patient.*
- *Enjoy your talents*
- *It's not you.*

### **3.6 Discussion.**

In this section the researcher discusses the information gathered and analysed both statistically and thematically. This will be considered in relation to:

- the two specific questions posed by the study i.e., Is there a relationship between the way in which the pupil with DCD experienced school and his or her later wellbeing? 2. Did the interventions provided by school and home/school impact academic attainment?
- the more general implication of the information gathered i.e., 'what helps and what hinders'
- how the results of this study relate to the results of previous research
- how the results of this study relate to the theories discussed in the introduction.



### **3.6.1. Is there a relationship between the way in which the pupil with DCD experienced school and his or her later wellbeing?**

School experience was separated into:

- support - where support refers to the level of understanding from teachers in relation to (i) the needs of pupils with DCD and (ii) the topic of DCD in general.
- social experiences and
- sports engagement/enjoyment.

Statistical analysis - no significant correlations were found between later wellbeing and either social experiences or sports engagement.

3.6.1.1 Wellbeing and school support i.e., the level of understanding regarding DCD and the needs of individual pupils as demonstrated by teachers.

The statistical analysis of the relationship between support provided in school and wellbeing does suggest a connection or ‘trend’ indicating the better the support the better the outcome relating to wellbeing. This is an areas worth further investigation though the Benjamini-Hochberg correction reduces the probability that this is not a false positive to the 10% level it is relevant to note that the effect size is medium ( $r=0.509$ ).

Thematic analysis of the participants impressions of school suggest that many of the young adult participants did not consider that their personal needs and difficulties were ‘understood’ and that there was a general lack of teacher understanding about

DCD. This was not universal, and appreciation was expressed for the understanding demonstrated by certain teachers while some teachers were described as kind even if they had little understanding of DCD. Whether the link between levels of support in school and later wellbeing is causal is a matter of conjecture but warrants further investigation into whether a lack of understanding in school regarding the nature of DCD and the impact that it has on pupil experience may have a longer term impact on the wellbeing of pupils experiencing dyspraxia.

While there was no statistical evidence of a correlation between later wellbeing and other aspects of school experience thematic analysis provides a richer picture regarding their social experiences in school, their enjoyment and participation in sports, and their level of academic difficulties. This data feeds into the general understanding of what ‘helps or hinders’ pupils who experience dyspraxia and is discussed below.

#### 3.6.1.2 Wellbeing and social ease in school.

A correlation ( $r=0.422$ ,  $p=0.036$ ) was originally shown between social ease at school and later wellbeing. This was no longer significant following the application of the B-HP. Questions about social ease in school related to whether participants found it easy to make and keep friends, whether they were bullied or teased, whether there were times when they felt isolated and whether they felt they were a valued member of the school community. Participants who found social interactions hard were more likely to experience lower levels of wellbeing as young adults. Participants provided insightful comments about what made them feel that they were valued members of the school community, and these were to do with belonging and feeling

that they were able to make a contribution to the life of school. The link between social ease in school and later wellbeing does not imply a causal relationship and it is possible that those participants who had poor social skills in school still have poor social skills and that this may impact wellbeing. A case might be made suggesting that if difficulties with social interactions had been addressed in school the outcomes might have been more positive for the pupils. It could also be argued that the experience of not coping well socially might have a long term impact on wellbeing.

### 3.6.1.3 Wellbeing and sports.

Statistical analysis shows no correlation between the participant's engagement with sports and their later wellbeing. Thematic analysis does however show the way in which participants clearly enjoy exercise and the opportunity to engage in competitive sports at an individual level – or even a team level provided that there was little opportunity to drop a ball or let down teammates. Sports and exercise are relevant because earlier work has indicated a link between dyspraxia and a tendency to being overweight (Cairney et al., 2013). The participants in this study are more likely to have had the chance to take up a sport of their choice outside school. There are implications for the type of physical sports provision which is available for pupils who are less privileged. The opportunity to participate enjoyably in team sports can offer an opportunity for the participants to feel that they can make a contribution and to feel that they are valued. Both these points will be further addressed in the Critical Analysis section.

#### 3.6.1.4 Wellbeing and young adult resilience (as reported by parents).

A significant correlation ( $r=0.473$ ,  $p=0.047$ ) was found between the parental reporting of the young adults' resilience and the young adults' responses to their current wellbeing. Resilience (in this instance) refers to the parents' views of the young adults' current ability to cope on a day to day basis, the level of support which they continue to provide, whether they consider he/she is emotionally resilient and whether they considered that he/she had developed coping strategies for daily life. This positive correlation suggests a degree of concordance between parents and young adults about the reality of how they are coping with ongoing difficulties associated with DCD. Parents acknowledged that difficulties are still evident (some clumsiness) and that new ones have emerged such as difficulty in learning to drive. They noted however, the determination, empathy, and self-awareness that the young adult participants have developed. No correction is required in this because, unlike the previous correlations between wellbeing and a range of variables this correlation is not looking for potentially 'causal' factors from an earlier time but is interested in finding whether what the young adults' views about their wellbeing are in line with their parents' view of their resilience.

#### 3.6.1.5 A summary of the impact of school experience and the relationship with later wellbeing.

The level of correlation between support in school and later wellbeing found in this exploratory research points towards the possibility that the way in which pupils experiencing dyspraxia are understood and supported in school has a long term impact on their later wellbeing and aspects of their mental health. Support in school referred to 'whether the participants considered that school staff had an

understanding of their strengths and difficulties and if they felt that teachers were sympathetic to their needs'. Parental responses as to whether dyspraxic difficulties in school had impacted their child's – confidence, motivation, attitude to school/teachers and happiness resulted in three key themes. Firstly, concern about the erosion of self-confidence, then stress and depression, followed by the children's dislike of being singled out. Thematic analysis also suggests that this might be widened to include greater attention to the social needs of pupils experiencing DCD as well as to their participation in sports and other group activities. The importance of pupils feeling valued and that they can make a positive contribution to the life of school needs consideration. It is relevant to mention here that Gill et al. (2020) were able to demonstrate that social inclusion had a significant mediating role in the relationship between childhood motor ability and adulthood self-esteem but bullying and adulthood motor ability did not.

### **3.6.2 The influences on academic attainment.**

#### **3.6.2.1 Academic attainment and the provision of practical support from school.**

The questions relating to practical support encompassed whether participants had the use of a laptop at school, at home and for exams, whether they had been given exam concessions (extra time, use of laptop, amanuensis, etc), if they had been taught study skills, if they had self-awareness/self-management input. These were yes/no answers with the opportunity to expand.

All but three participants had had use of a laptop in all situations, and all but four had had exam concessions. Two of these participants had neither. Although the quantitative data indicates a medium correlation ( $r=0.41$ .  $p=0.032$ ) between academic

attainment and laptop use where participants who did not use a laptop had significantly better academic attainment than those who did these results cannot be regarded as valid given the fact that the numbers in each group (23 and 3) were so unevenly distributed. Even were it a valid statistical exercise there are possible explanations for this result which have nothing to do with doing better in exams so long as you do not have a laptop. First, two of these three participants had the highest verbal IQ scores out of those in the study; their exam success may have been due to ability rather than lack of a computer. Second, they may not have had use of a computer because it may not have been thought that they needed one. The result is certainly counter to expectation, and it is unlikely that all participants would have done better if denied the use of a laptop for completing their exams.

The questions about practical support, in relation to use of a computer and exam concessions, elicited few in depth responses. The researcher speculates that for most of the participants these areas of practical support were taken as given with little thought to or awareness of the benefits. Although the responses are limited several young adults and a few parents have commented on the essential nature of being able to touch type. Parents were more likely than young adults to recognise and comment on the value of the use of a laptop and of being able to touch type. In their advice to other parents, they strongly recommend the use of a laptop to complete schoolwork.

Young adult participants were more vocal when it came to be commenting on study skills. Seven of the participants had had no study skills input. The remaining 19 had received a broad range of study skills training in school and the main consensus was that it was insufficiently targeted to have met their specific needs. Topics mentioned

included note taking, essay planning, revision techniques, spider diagrams and Greek memory techniques and mind mapping. Where an opinion was given on the benefit of these sessions there was some consensus that they were not specific enough for these participants. They did not find whole year or group input helpful and would rather that it had been ‘tailored to the individual’. Support from parents was, however, recognised and valued. This by definition was one to one and will have targeted the individual needs of the participant. Evidently support is very much needed but was not seen to be of great benefit when provided in a general way within the school setting.

#### 3.6.2.2 Academic attainment and support from home.

The lack of a quantitative correlation between academic attainment and parent support could well reflect a lack of variation in the parental support metric. There was certainly a high level of parent support given in relation to academic outcomes and it is unlikely it was normally distributed. As mentioned before this was a selective group where parents had been ready and able to provide assistance.

Although the quantitative scores produced by the Likert scales showed no significant correlation between support from home and academic attainment the thematic analysis told a different story. Themes to emerge indicated a high degree of support from home (and it should also be noted that these parents had all sought out the advice and support of an educational psychologist demonstrating interest, care and attention).

Three main themes emerged. These were:

- help with organisation, such as study skills, time management and managing deficits in executive function.
- Support with revision and homework.
- Organising outside specialist help for areas such as learning, coordination, counselling and therapy.

The volume of responses to these questions and some of the comments did paint a picture of very engaged parents and of appreciation from the recipients of the support. *‘I cannot thank my family enough for all the work they put in for me over the years’.*

Parental responses to the question ‘how involved did you feel that you needed to be?’ indicated that they considered that almost constant help was needed to ensure that their child could cope with the demands of school life. The main theme to come through has been given the title ‘Keeping the show on the road’. The three sub-themes were the need for help with organisation, making home tutoring available and the need to liaise with school. Some parents had given up, or taken time off, work in order to help with academic work and extracurricular demands.

Not all parents were able to provide effective help. Two participants refer to their parents’ lack of knowledge as a barrier to providing help. This point will be picked up again later in this section and in the Critical Appraisal section.

### 3.6.2.3 Academic achievement and Verbal ability.

The participant’s verbal ability scores show a significant correlation with academic attainment which remains evident after the Benjamini-Hochberg corrections.

### 3.6.2.4 Academic achievement and academic difficulties.



It was evident from the responses to all questions regarding academic difficulties that the participants had considerable difficulty with handwriting, copying, note taking, revision, homework and organisation. Parents also indicated a high level of concern regarding their child's organisation, handwriting and homework. The two key themes which emerged from the young adults' responses to open ended questions about academic difficulty emphasize both their struggle with information processing and with tasks reliant on central executive as well as frustrations with the lack of understanding about DCD on the part of school staff. It is despite a high level of difficulty in these areas of academic endeavour that the participants have achieved well academically. High verbal ability is evidently contributory factor, but success may also be due to the support and help provided and that they were well motivated. Neither the level of academic difficulties experienced by participants, nor the presence of additional specific learning difficulties showed a significant relationship with academic outcomes.

#### 3.6.2.5 Academic difficulties and support from school.

There was a negative correlation (  $-0.456$ ,  $p=0.019$ ) between the participants' academic difficulty in school and the level of support from school (where support in school related to whether the participants considered that school staff had an understanding of their strengths and difficulties and if they felt that teachers were sympathetic to their needs). This is strongly reflected in the open-ended questions where one theme to emerge related to a lack of understanding (on the part of teachers). *'The teachers would tease me about it (lack of focus) and my inability to do homework and it became a kind of running joke with the school. in turn, this made me want to work even less. This situation made it harder for my teachers to*

*notice that I was struggling.*) This suggests that a negative feedback loop can arise due perhaps to lack of understanding on the part of teachers and which may lead to greater difficulty for the pupil thereby gaining even less support.

#### 3.6.2.6 Summary of the influences on academic achievement.

The participants are intellectually able, they attend 'good' schools. Their academic attainments have been high despite the fact that they experience considerable difficulty with many educational/academic skills. The participants' high achievements are also despite the fact that a number of them have largely felt 'unsupported' by school staff whom, they have reported, often tend not to know about dyspraxia and not to recognise their problems or the areas in which they struggle. This was by no means universal, and a number of participants spoke well of the support which they had received. It was noted that the greater the pupils' level of difficulty the less support they felt that they had from school. Motivation to work was also negatively correlated with the level of difficulty experienced suggesting that the greater the difficulty the less motivation the pupil felt.

The participants' academic achievements correlate with their verbal ability, but it would seem likely that the support provided by parents has also influenced outcomes. It is also probable that the use of computers which enabled participants to type their work, as well as the provision of exam concessions, may have also played a part. This must remain speculative as neither the quantitative nor qualitative data provide clear evidence. Neither has it been possible to tease out the value of study skills, help with self-organisation or any of the forms of therapy which participants received. This will be discussed within the critical appraisal.

There are lessons to be learnt from this about the needs of pupils who experience dyspraxia and who: maybe less able, may have parents who have less opportunity and knowledge to support their child, may not have the chance of completing work on a laptop or may not have had an exam concession report (ECR).

### **3.7 The more general implication from the information gathered.**

Several themes emerged which are relevant to the overall investigation into what helps and what hinders pupils with dyspraxia in their journey through school and into adult life. Young adult participants were asked -

#### **3.7.1 What is the major impact that this difficulty has had on the lives of the participants; what have been the major challenges?**

Participants continue to have difficulty with their personal organisation. This might encompass making ‘silly’ mistakes to difficulty in packing a suitcase. They may often respond emotionally to difficulties feeling ‘stupid,’ becoming anxious and fearful of challenges. Poor coordination and continued clumsiness is evidently still a major issue for some and can mean that participants avoid, with regret, social activities such as dancing or playing team games (even tennis). Participants may turn to humour to hide their discomfort. Parents confirm that difficulties remain evident as their children grow up and echo the concerns around clumsiness mentioning spilling food and bumping into things. They also mention problems with self-organisation, filing, correspondence and appointments. Driving is a challenge. Parents also emphasised the ways in which their child has developed grit and determination to cope and succeed as well as empathy and caring for others.

### **3.7.2 What advice might the participants give to a 14 or 15 year old in secondary school?**

The response to this question was lengthy and gave the feeling that the participants were very engaged in the process of responding. The responses related to communication, self-management/care and self-perception. The participants urged the younger person to: ask for help and to communicate their needs, to value and to care for themselves, to show perseverance, to maintain autonomy, to believe in themselves and to remember - 'it not you'. 'Dyspraxia does not mean that you are stupid; it only means that your brain runs a little differently.' The tenor of these responses did also suggest that the participants did not anticipate that the school environment would look kindly upon pupils experiencing dyspraxia and that they would need to develop survival strategies for themselves. There seems to be a very clear message here that pupils experiencing dyspraxia really do need to be better understood by those who are responsible for them within an educational setting and that pupils would benefit from help to develop self-knowledge and strategies to manage concerns and anxieties.

### **3.7.3 Parent reflections.**

Parents would like to have had early identification of their child's dyspraxia in order to get help in place early on. They would like to have had greater support from school and greater knowledge about school systems. They comment on the value of pupils gaining insight into their strengths and difficulties as well as the use of learning aids and strategies. Perhaps the two most significant themes to emerge related to

- The need for compassion and patience, the importance of providing ongoing love and support and of recognising that difficulties for the pupil with dyspraxia continue day on day.
- The need to be aware of the child's social and emotional needs, as well as the tension between the child's conflicting needs for independence and for understanding and support.

### **3.7.4 Overall summary of discussion.**

Within this study these intellectually able participants excelled academically with the support of their parents and with some interventions (typing and exam concessions) in place. Additional support was organised for many of these pupils, but it has not been possible to quantify it. The participants largely attended independent schools where, we can probably assume, the quality of education was good. Amongst the participants there were those who did not consider that their individual needs and difficulties were adequately recognised or addressed. Despite this they have done well academically, and it is their verbal ability which has been shown to have the strongest correlation with academic achievement.

The level of empathy and understanding provided by the teachers in conjunction with the teachers' knowledge regarding DCD shows a potential connection with the participants' current level of wellbeing. It suggests that the school environment may have a long term influence on wellbeing.

Implications. There are implications from the results of this study in relation to the skills and knowledge needed by teachers if schools are to be able to provide an

educational and social environment in which pupils experiencing dyspraxia can thrive academically and emotionally.

### **3.8 How do the results of this study relate to previous research.**

There is general concordance between this study and those previously reviewed in relation to issues pertaining to social and emotional factors as well as physical and central executive deficits. Less research has focussed on academic attainment.

#### **3.8.1 Academic attainment.**

There is just one study which has looked at academic outcomes in terms of academic achievement. Harrowell et al. (2018) suggest that pupils with DCD were 22% less likely to achieve 5 or more GCSE's than controls. It is acknowledged that one third had not been identified as needing additional support and that co-occurring difficulties were frequent. This current study has demonstrated that, with adequate support, pupils with DCD (even those with co-occurring difficulties) can achieve well. Poor academic outcome is not a necessary result of DCD though clearly, as demonstrated in this study, considerable support must come from somewhere.

Kirby et al. (2011) considered the current functioning of young adults identified previously with DCD and found that participants had been helped by private tutors, note takers, summer school to prep for university and the use of computers for exams. There was however no testing or views taken to see the impact of DCD on academic achievement. As with this study a major concern was related to poor self-organisation.

Edmond's (2013) paper emphasizes the need for the child's voice to inform teachers who can then provide a more supportive environment. Edmonds stresses the need for teachers to recognise these difficulties and to modify the school/learning environment in order to support them. This study also emphasises the need for teacher understanding.

### **3.8.2 Social and emotional factors and wellbeing.**

The link between childhood DCD and wellbeing as a young adult (or adult) has been well established (Hill et al., 2011; Kirby et al., 2011; Gagnon-Roy et al., 2016). The question which is outstanding is what the mediating factors are. Seen from framework of the environmental stress hypothesis the question is what aspects of the environment might be linked to later experiences of stress and depression. Within this study a convincing association has been found between the young adult participants' wellbeing and the understanding and support that they recall having had from their teachers while in Key stages 4 and 5 (suggesting that this may be a mediating factor between poor coordination and later wellbeing). What of other similar studies? Li et al. (2019) have evidence that self-concept relates to wellbeing. Gill et al. (2020) have linked low social inclusion in school with adult self-esteem, Mancini et al. (2019) find that interpersonal factors (e.g., social support/peer problems) were found to consistently mediate the relationship between motor skills and later internalising problems. In the 2020 study by Engel-Yeger, the group with suspected DCD had lower HRQL which was predicted by their current perception of performance and difficulties experienced as a child. There are similarities in approach and outcomes.

### **3.8.3 How do the results of this study relate to the theories discussed previously?**

The theoretical perspectives put forward to account for the associated social, emotional and educational difficulties outlined in Section 2 were:

- the Social impact study, (Payne et al., 2013)
- the Transactional model, (Green & Payne, 2018)
- the Environmental stress hypothesis, (Cairney et al., 2013; Missiuna & Campbell 2014; Mancini et al., 2019; Li et al., 2018; Li et al., 2019; Gill et al., 2020)
- the Automization deficit hypothesis (Schott et al., 2016) and
- the Cognitive stimulation hypothesis (Schmidt et al., 2017)

Discussion regarding the ways in which the results of this study might relate of these five theories are now discussed.

#### **3.8.3.1. The Transactional model.**

This model integrates the subjective experiences of young people experiencing DCD with objective findings from neuroimaging. While the conclusions drawn from the review are highly pertinent to the understanding of the relationship between the degree of motor impairment and subsequent wellbeing this study has not considered the measurement of neural activity and cannot therefore add to the discussion.

#### **3.8.3.2 Social impact theory and Environmental stress hypothesis.**

Social impact theory and the Environmental stress hypothesis have much in common. A central issue relating to this research is the understanding that the original physical difficulties associated with DCD are linked to later psychological issues and a tendency to poor mental health (Missiuna & Campbell, 2014). The question has been asked as to whether subsequent poor mental health is co-morbid or secondary. Social impact theory and the environmental stress hypothesis would suggest that mental health issues are secondary and are likely to result from the way in which the individual with DCD relates to their educational setting. Social impact theory suggests that the relationship between the person, the activity and the



environment (physical, social, attitudinal or virtual) provides the mechanisms which underpin the raft of difficulties present in young people experiencing DCD. The environmental stress hypothesis suggests that poor coordination may be the initial problem but, independent of how poor it is, they suggest that it is the environment within which the child experiencing DCD functions that will impact mood and can lead to mood disorder. This framework has been scrutinized in six of the studies included in the literature review and the researcher considers it a useful model against which to consider the results of this study.

This study shows nine areas which are potentially ‘stressful’ during the school years and it has also shown the link (suggested in the current findings) between teacher understanding and support in school with later wellbeing. This study supports both the social impact and the environmental stress hypothesis and can also point to aspects of the environment which cause difficulties and where interventions could be employed to help the pupil. The schematic Figure 3 below fits information gathered from this research and has imposed it onto the theoretical model proposed by the environmental stress hypothesis.

3.8.3.3 The common ground between the Automization deficit hypothesis deficit and the Cognitive stimulation hypothesis is the linkages made between motor skills, cognition/central executive skills and output (academic attainment). Both illustrate a link between motor skills and outputs which involves central executive/cognitive activities. Schmidt et al (2017) suggest that motor activities are linked to academic outcomes and that this is mediated by executive function. They conclude that the development of good motor skills is important for learning. The Automization Deficit Theory put forward by Schott et al (2016) suggests that when a child experiencing DCD is required to complete a task involving both cognitive and gross or fine motor skills he/she becomes slower to manage the physical element as the cognitive element becomes more complex. Figure 4 (below) shows the physical skills known, and shown in this study, to be difficult for the pupil experiencing DCD and schematically links these to the cognitive tasks also known, and shown in this study, to cause difficulty illustrating the potential link between poor coordination and the potential for academic underachievement. Schmidt et al (2017) argue that the central executive plays a mediating role between physical doing and academic

outcomes. They argue that motor skill development should be a focus for attention; their study participants were aged 10-12 years. Figure 4 also illustrates the importance of supporting participants to develop good mental processes. i.e. practice with planning and organising. Evidence gathered for this study is compatible with both theories but provides no specific evidence which might support or refute either. This is in part because this study failed to find any links between interventions and wellbeing or academic outcomes. Failure to do so was related to the study design and does not indicate that there is no connections. This is an area for further research.

3.8.3.4 To summarise it is the Automization Deficit Theory and the two theories relating to the environment i.e. the Environmental stress hypothesis and the Social impact theory which are the best fit with this research study. The Automization Deficit Theory provides a plausible explanation for why difficulties associated with DCD may be evident and prevalent during key stages 4 and 5 and is relatable to the difficulties highlighted by all participants. The environmental stress hypothesis and social impact theory both provides a useful framework within which to understand the outcomes of this study i.e. the connection between the way in which the pupil with DCD experienced school and his/her later wellbeing.

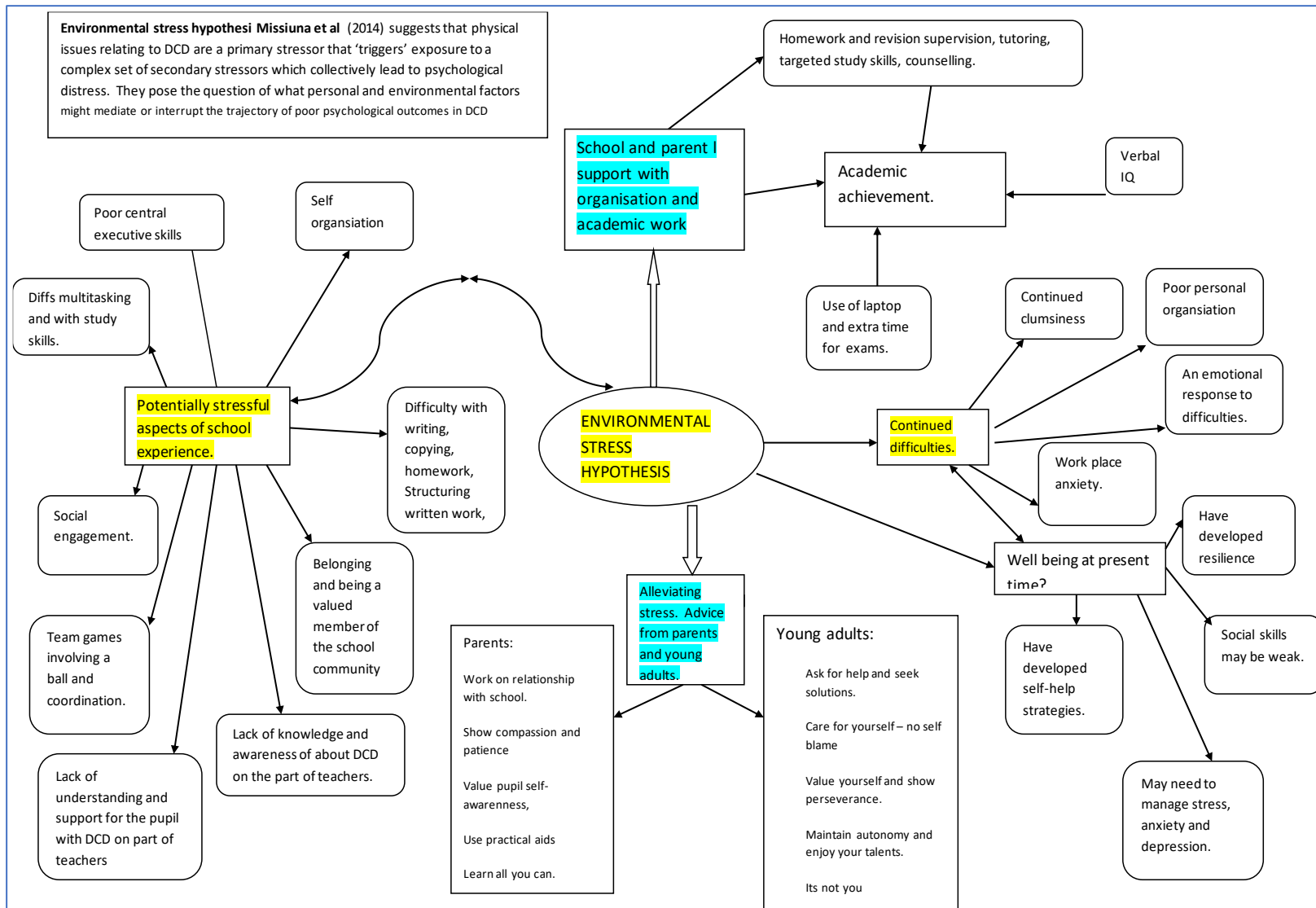


Figure 3. Schematic illustration of environmental stress hypothesis.

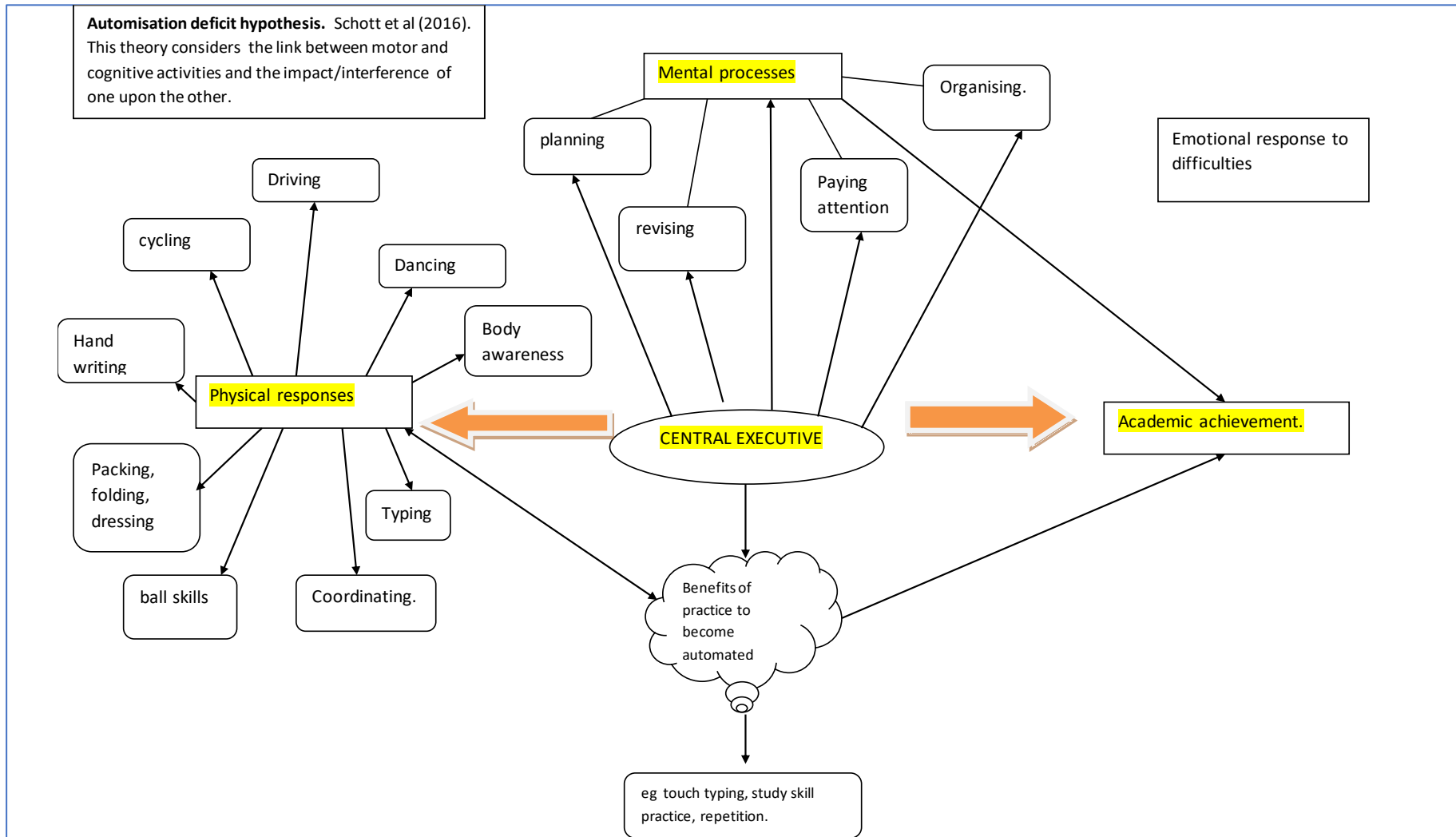


Figure 4 Schematic illustration showing possible contributors to the automization deficit hypothesis

### **3.9 Study critique, problems and limitations.**

#### **3.9.1 Study strengths.**

This study builds on existing research and adds to the body of knowledge seeking to find which factors mediate the experience of childhood DCD with later wellbeing. The study design which incorporates quantitative and qualitative data is valuable. Quantitative data provides evidence of potential correlations between different aspects of childhood experience and later wellbeing. The qualitative data give richness and real life examples of just what the experiences were like both now and then. No study included in the literature review included both approaches. The addition of parent views and comments is a strength.

#### **3.9.2. Study weaknesses.**

The key areas of weakness relate to: the participants, aspects of the questionnaires and potential researcher bias. These are fully discussed in Part 4 but are summarised here. Participants. The lower than optimum number of participants (26 where 29 would have been better) meant that the study was underpowered. The significance of the findings would have had more impact had there been 29 or more participants in which case (assuming the correlation levels remained the same) the probability would have been stronger. These participants cannot be regarded as representative of the general population and findings might not therefore be generalisable. With regard to whether these participants were correctly identified as dyspraxia there is a query. Although the screening for suitable participants, was very thorough they were also asked to complete the Adult Dyspraxia Test after they had 'signed up'. Results of the ADC did not produce

scores to indicate that all were ‘probably’ experiencing difficulties indicative of dyspraxia. This point is taken up and elaborated in Part 4.

The questionnaire. The questionnaires had many strengths but could have been more fully trialled. Both validity and reliability might have been more firmly established.

Researcher bias. The researcher’s keen awareness of her involvement from initial assessment of the participants to analysis of the qualitative data (and at every stage between) will hopefully have helped to avoid any distortion of the conclusions drawn but if the process was to be run over again more checks and balances could be built in and more outside sources consulted.

### **3.9.3 Further research.**

Further research is more fully discussed in Part 4 but below is a summary of areas for consideration. The results of this exploratory study strongly indicate the potential value of carrying out further investigation into the factors which have been found to be associated with DCD and later wellbeing and to evaluate educational interventions.

Longitudinal or retrospective studies with a greater number of participants, identified with DCD and who represent a cross section of the general population might also include:

- Experimental research to evaluate the benefit of a range of interventions such as particular skills training and environment modification.
- Qualitative research to evaluate the benefits of pastoral care and/or counselling which might alleviate stress experienced by pupils with DCD within school.

- Measurement of the impact of modification of teaching style and classroom factors relating to the areas of difficulty which pupils with DCD have described.
  
- Creation, evaluation and validation of a checklist/questionnaire, similar to the ADC, but developed to screen for the presence of DCD amongst secondary aged school pupils. Given the lack of guidelines for identifying teenage pupils with DCD a screening tool based on the difficulties now established to be associated with DCD above and beyond poor coordination could be of value.

## **PART 4. CRITICAL APPRAISAL**

### **4.1 Introduction**

Two key questions have been addressed by this study –

- Is there a relationship between the way in which the pupil with DCD experienced school and his or her later wellbeing?
- Did the interventions provided by school/home impact academic attainment?

In seeking answers to these questions, the wider aim of the study has been to add to the body of knowledge of what is understood about the impact and trajectory of DCD during secondary school and to evaluate the impact/benefits of any interventions/support given.

This section considers how successfully this may have been achieved.

Consideration is given to:

- The epistemological stance taken by the researcher and the influence of the researcher's knowledge and experience
- The challenges faced and the strengths and weakness of the study in relation to: the research design, the selection of participants, the construction of the questionnaires, the analysis of the data.
- The implications of the study for the understanding and knowledge of the topic in psychology. The implications for professional practice in educational psychology, schools and services for children. The implications for future directions for research.
- The distinctive contribution made by this research in relation to the subject and the originality of the design.
- Personal reflections.



## **4.2 Epistemology and the influence of the researcher**

### **4.2.1 Epistemology**

Research studies are carried out in the pursuit of knowledge, new knowledge or knowledge which may confirm or challenge existing beliefs. Epistemology is the theory of knowledge. How do we come to believe or know what is true and real? (Crotty, 1998, p.8). This is important in relation to the design, methodology, data analysis and reporting of any research study which is concerned with the thoughts, feelings, views and behaviours of participants.

The approach taken by researchers who are concerned with thoughts, feelings and views is perhaps more challenging than that of the physical scientist who measures and experiments with physical elements which exist irrespective of whether they are observed or discussed or thought about. This approach represents a realism which posits a real world independent of observers (Bhaskar, 1975). In contrast within psychology our understanding of the world and events are socially defined whether or not there is an external reality. The social sciences are challenged to elicit a truth or meaning from this 'messier' world of human thoughts, feelings and attitudes. Proposed "truths" coming from social/psychological research should be interpreted from a rational and defensible position particularly if they are to bring relevance to, or provide more confidence in a theory or model lying behind thinking.

The decision about the best theoretical perspective to adopt in a research study is made through consideration of both ontology (the study of being, or what things can be known)

and epistemology. Ontology argues two positions. Realism which says that there is a world that is independent of the researcher, i.e., there are universal laws of nature, and irrealism which says there is not a world independent of the researcher and where the researcher may seek to find meaning. Epistemology relates to how we know what we think we know. What assumptions are behind a proposition that something is true? Epistemology can hold the position of objectivism which suggests we can observe the world and produce truth or on the other hand it can take a subjectivism position which says we cannot just observe the world and produce knowledge; knowledge is theory-dependent or theory determined.

The combination of one or other of the ontological approaches with one or other of the epistemological positions gives rise to a choice of theoretical positions. The position best suited to this study was considered to be that of critical realism which maintains ontological realism (there is a world independent of the observer) while accepting epistemological relativism (acknowledgement that ‘what we think we know’ is culturally and experientially biased) and judgemental rationality. What does this imply? The critical realist differentiates the social and material worlds but considers both to be real. The critical realist seeks to develop theory out of the subjective world of experiences, thoughts, ideas, attitudes and feelings.

The psychological and social entities which generate the data collected in this research are regarded as “real”. The knowledge derived is relative in the sense that it relates to a particular group of participants and can potentially be open to more than a single interpretation. The interpretation presented here is based upon the judgemental rationality of the researcher and is open to the rational judgements of others. The reflexive

interpretation of the researcher will be imperfect and open to revision. This critical realist perspective has provided an effective framework for planning and implementing the current research and for analysing and interpreting the results.

The researcher has started the planning and implementing of this research process with a theoretical framework (gained from experience and from existing research) which suggests events in the real world can impact the thoughts and feelings of those who experience that particular real world. Furthermore, the lived experience of aspects of the real world (school) can also take on a causal role and can influence later feelings and perceptions of the reality of their young adult experiences.

The aim of this mixed method study has been to consider whether the participants' experiences of school (did they find aspects of the classroom hard, did they engage well with sport, did they participate socially, how well did they feel they were valued, did teachers understand their needs and so forth) have influenced their 'wellbeing' and resilience as adults and whether their learning experiences have impacted their academic achievements. The stance of the critical realist supports the view that the participants' responses to the questions posed in the questionnaire regarding school/home experiences are measurable and represent a reality. Questions range from those which could have been answered by an observer such as 'did you have difficulty with the legibility or speed of your handwriting?' through to those which were related specifically to the participants (unobservable) personal experience such as 'were there times when you felt isolated?' or 'what made you feel you were a valued member of the school community?' Likert rating scales were used to measure the participants' responses to many of the questions.

Participants also completed questions relating to their current wellbeing. Here too the

questionnaire contained questions requiring participants to provide a scaled score. These scores form the basis for the quantitative analysis.

There are many ways in which ‘data’ can be understood, interpreted or constructed either to generate new ideas or to test a hypothesis or theory. The validity and consistency of meaning will depend on several factors. How reliable and consistent are the memories of those who participated? How have these memories been elicited – were they influenced? Were the questions asked valid? Were the participants appropriate for the study? How has data been interpreted and what assumptions may have been made at the outset? What does the researcher contribute to the process? These issues will be considered within this section starting with consideration of the influences of the researcher.

#### **4.2.2 The influence of the researcher.**

The beliefs, experiences and knowledge of the researcher shapes all aspects of the research process. The researcher’s background and position affects what they choose to investigate, the angle of investigation and the methods judged adequate for the purpose and the findings considered most appropriate as well as the framing and communication of conclusions (Malterud, 2001). This may be both positive and/or negative but underpins the importance of reflexivity. Reflexivity is the conscious attempt to avoid bias in all steps of the research process and refers to the researcher’s awareness of similarities and differences between the self and the participants. In relation to qualitative research Berger (2015) suggests that the articulation of these similarities and differences increases the credibility of the findings. In this case the researcher shares many experiences with the clients on the data base from which the parent participants were selected. The researcher is a white middle class mother with personal, as well as professional,

experience of the state and private education sectors. The researcher has parented one child through school with significant dyslexic difficulties for which the child in question had a statement of special educational need. From this perspective the researcher has shared many of the experiences of parents who are concerned about their child, understands the impact that this can have on family life, on relations with the child's school and of the desire to understand what the key issues are and how to support the child and of longer term concern about life chances for the child. Similarities such as these can bring insight but there is also a danger that the researcher can be blinkered to issues which do not fit within her self-constructed mindset or 'use it as the lens to view and understand participants' experience (Lietz et al., 2006).

Reflexivity requires the researcher to be aware of her position within the research process. In addition to the researcher's parenting experience her views and thoughts about the topic have been shaped by personal work experience as an educational psychologist which has provided insights and understanding not available to the majority of the population. The researcher is therefore in a unique position to design a study such as this however it is important that every effort is made to ensure that the results of such an investigation are relevant and 'true' and that biases are made as minimal as possible (Guest et al., 2012). It has been argued that rather than attempting to eliminate the source of 'bias' researcher, subjectivity can enrich the process of research and so should be embraced (Gough & Madill, 2012). It is, however, vital that the researcher keeps sight throughout all aspects of the research process of the need for self-awareness and of the potential biases which may have been brought in due to personal beliefs and experiences. The questions included in the questionnaire have been influenced by professional experience and as such reflect many years of work and the gathering of insights into the

strengths and difficulties for pupils with DCD. With regard to the qualitative aspects of the research the fact that information has been gathered through a questionnaire reduces some of the opportunity for bias. There are no follow up questions which might be leading, and which may be fuelled by researcher bias. The opportunity for bias really comes in the process followed for the thematic analysis of the open ended questions. The researcher has been aware and conscious of the need to look for and give credence to responses which might not accord with any preconceived expectations.

The researcher's work experience has influenced not only her perspective regarding the difficulties that pupils with DCD are likely to experience but also her thoughts about the areas in which interventions and support are most likely to be helpful. The researcher's work and parenting experience has left her sensitive to the participants' school experiences. These were, in a number of instances, negative and in some cases the lack of empathy shown to the pupil experiencing DCD (and to their parents) was unkind. The researcher is aware that her own feelings of frustration and vexation (particularly when engagement with school did not bring about a change in attitude) could have influenced her approach to the analysis of the qualitative data. She was aware of the potential pitfall of being overly sensitive to instances of pupil or parent frustration or distress. To balance this, it should also be noted that there were also many instances where schools, when made aware of pupils' difficulties, were highly responsive in a positive way.

At the outset of this research project the researcher was informed by her own experiences. but once the literature search was underway it became evident that the professional observations which she had made regarding the range of difficulties experienced by teenage pupils experiencing DCD had been confirmed in numerous studies. Not only

were her observations regarding their difficulty with academic tasks, social unease, lack of enjoyment of team and ball games, difficulty with organisation and so forth been confirmed in a range of studies but these difficulties were found to demonstrate a trajectory of difficulties often resulting in stress and depression and continuing into adult life.

There were two key reasons for choosing to centre this research project on issues relating to DCD. Firstly, pupils experiencing DCD appear to be a group whose educational and personal needs can go unrecognised and unacknowledged within school. Secondly, these pupils, even if their difficulties had been identified and reported were not always supported and, worse case scenario, continued to be regarded by those who taught them as lazy and disorganised. Pupils experiencing dyspraxia do not exhibit any obvious visible difficulty and consequently it is easy to understand why their behaviours may be misinterpreted and why they may be seen as a difficult pupil rather than a pupil with difficulty. Information regarding the identification of DCD and appropriate interventions have been slow in coming. Thus, it seemed an area where research could add to general understanding and which could possibly lead to positive changes.

At the start of the project the researcher was motivated by two key factors. First, the challenge of accumulating evidence regarding the type, range and impact of difficulties experienced by teenage pupils with DCD; the impact that these difficulties might have on pupil outcomes and how pupils with DCD might be supported in school. Second, the hopes that evidence might emerge which would add to existing research findings and, most importantly, from the researcher's perspective, lead to change. A change of attitude

towards pupils with DCD, a greater recognition of their difficulties and a change in school practice.

The knowledge and enthusiasms of the researcher are a plus and a minus. She brings knowledge, but there is the danger of bias. Findings from this research have confirmed rather than challenged the professional views regarding DCD with which she set out on this research programme.

### **4.3 Challenges, strengths and weaknesses of the research design.**

#### **4.3.1 The research design:**

One factor in the choice of design and method was pragmatic. The author is fully independent. Her work in local authority work ended 25 years ago and she handed on her independent practice where she had worked with a team of independent educational psychologists several years back. She did not therefore have ready access to an educational psychology service and to the schools which they serve. She did, however, have access to a large data base of potential participants dating back to 1996. The data base contained the details of the children and young people assessed by her and colleagues from 1996 to 2012. This lends itself to a study seeking retrospective information/data.

A further influence in the decision to use this data base was because at the time that she was initially thinking about a research topic and methodology she met the mother of a (now) young man whom she had assess 20 years previously. She did not remember and had not seen the mother since the occasion of the assessment, but it would not have been



possible to stop this mother from talking. The researcher was a captive (and interested) audience who had assessed the son and had been involved in supporting them at a time of considerable worry. What was forcefully evident was what a massive impact the son's particular difficulties had had on this mother's parenting experience. Happily, now aged 29, the son was doing well. The researcher returned home reminded that the parents of pupils with any area of specific difficulty and who have had a struggle to support their child through school are an extraordinarily rich source of information. However long ago their child's schooling the memories remain clear and accessible. Perhaps it would be possible to include parents within a research design.

The study is a mixed method exploratory design. It combines quantitative and qualitative data from two time periods. It builds on previous studies (see the literature review) which have established that the impact of DCD goes beyond poor physical coordination and also impacts educational, social and emotional experiences. The study has therefore not needed to compare the DCD group with a control group of typically developing pupils. It has also been established that DCD continues past childhood and impacts into adult life and can have a long term impact on mental health. The study is designed to find whether there are potentially causal relationships between the participants' experiences at the time they were pupils in key stages 4 and 5 with their ongoing educational attainments and their wellbeing as young adults. This search for mediating factors is a relatively new area of investigation. Since the study was conceived and data was gathered there has been additional research which has focused, like this study, on what might mediate poor coordination in childhood and depression in adulthood.

The dual nature of the design has benefits. The quantitative aspect provides some firm ground relating to the various correlations found between measures taken regarding the time pupils were in school with measures taken at the current time. The qualitative aspect gives some greater understanding of what the participant actually experienced and how they are coping today. It gives colour and meaning to the quantitative data. Correlations are not causal, but the results indicate where further research could focus. The stance of critical realist allows the researcher to view the data provided by participants as representing a reality which could be quantified, measured and used to test theory.

#### **4.3.2. The participants.**

An important question regarding the participants in this study is whether they were accurately identified as experiencing DCD. Participants have been through four ‘screening’ processes which are reported below.

- The participants had each, at some time in the past, undergone an educational psychology assessment.
- The participants completed the Adult Dyspraxia Checklist.
- Question 54 asks the young adults ‘Do you agree that you experience difficulties which are typically dyspraxic?’ This is followed by a 5 point Likert scale going from ‘not at all’ to ‘very much so’.
- Question 5 of the parent questionnaire asks, ‘Was your child identified as experiencing dyspraxia at any time?’ and Question 7 ‘Do you think that this ‘diagnosis’ of dyspraxia was appropriate for your child?’ the latter is also followed by a 5 point Likert scale.

#### 4.3.2.1 The initial assessment.

In the absence of any guidelines to support educational psychologists in the identification of DCD, the following steps were those generally taken by the assessing EP (in the author's educational psychology practice) taking account of the pupil's age. This is not a definitive list, but provides a guide to the kind of criteria which were considered appropriate if/when the assessing psychologist suspected that 'dyspraxia' might account for the presenting difficulties. It was not EP practice to 'diagnose' dyspraxia/DCD, but if the EP suspected that it was a likely cause of the presenting problems, then the situation was explained to parents who were advised to seek an OT assessment for a definitive outcome.

- Background information was always obtained prior to working with the child and family. This included questions relating to developmental history. For example, were developmental landmarks passed within the normal range? Was he/she late to sit, crawl, walk? How was coordination as a younger child? Did he/she learn to ride a bike, to catch and kick a ball, swim etc as and when expected? (DSM-5)
- Were self-help skills acquired at the appropriate time? Could he do zips, buttons, shoelaces? Use scissors, hold a pencil or paintbrush? These queries are in line with the official information from the DSM-5.
- Observations of current functioning were made during the assessment. For example, how does he/she walk, stand, sit, hold a pen? What is the speed and quality of handwriting? A simple motor skills screening test (Portwood, 2000, p.76) could be used (adapted for age) in situations where further investigation of the organisation of movement was considered to be important.
- Observe schoolbooks. Are they organised, torn, is work completed? What are

teachers reporting.

- Ask parents, teachers and pupil about executive function skills and personal organisation (Kirby et al., 2011).
- Testing for visual-spatial perceptual skills. Consideration was given to the pupil's response to the Coding and Block Design elements of the WIPPSI , WISC or WAIS. Are these in line with other areas of cognitive ability? Wilson and McKenzie (1998), Sumner et al. (2016) provide evidence of visual/perceptual differences in the functioning of pupils with DCD. Portwood (2000) provides evidence of differences in the psychometric profile (on the WAIS and WISC) in which those with DCD score significantly less well on tests of coding and block design compared with language based tasks. (Pupils were never identified with DCD purely through their cognitive profile.)
- Consider test results for tests that sample executive function. For example, working memory, speed of visual processing. Are these in line with verbal skills (Schmidt et al., 2017; Sumner et al., 2016).

#### 4.3.2.2 The Adult Dyspraxia Checklist (ADC)

The ADC scores indicated that 16 participants had difficulties which were probably or possibly indicative of dyspraxia while the scores for 10 participants suggested not.

4.3.2.3. Participants' views. Six of these 10 participants indicated that they did not think that they 'experienced difficulties which were typically dyspraxic'.

4.3.2.4 The parents' views. The parents of four of these six participants also took part and all four gave an affirmative reply to the question asking whether they regarded the

childhood diagnosis of dyspraxia was accurate. The parents of the fifth and sixth participant did not participate.

Overall, there was an indication that, in addition to the original assessment, 24 out of the 26 participants were at some point experiencing difficulties which were considered to be indicative of dyspraxia. The wording of the question for the young adults regarding whether they thought they experienced dyspraxia that is rather ambiguous. The question asks, 'Do you agree that you experience difficulties which are typically dyspraxic?' It was not clear if the question referred to when they were in school or to the current time. This may have influenced the responses. It is also possible that participants with additional difficulties may have thought that they were better described by the additional difficulty. The participants were aware when they agreed to take part that it was a survey regarding dyspraxia.

The ADC which comprises 30 Likert scaled questions is valid as a screening tool but, was not designed, and does not claim to, provide a 'diagnosis'. When administered by the researcher to two adults who both consider themselves to experience undiagnosed dyspraxia, neither scored high enough to get into the possible category let alone probable. It has however been used extensively in research in the past three years suggesting that it may be the best screening tool available at the present time for identifying adults who may experience DCD.

The evidence is not sufficiently clear cut to claim that all the young adult participants were correctly identified as experiencing dyspraxia. It should, however, be remembered that all participants had undergone an initial assessment and that, at that time, their

parents had been given advice regarding dyspraxia and the best ways to support their child at home. Advice for school support and intervention had also been given and on some occasions this was followed by discussion with school staff. It is possible that interventions suggested initially may have been implemented and provided a protective impact.

### **4.3.3 Co-morbidity**

Fifteen of the participants reported experiencing additional difficulties. It was the original intention to avoid inclusion of those with additional difficulties however the response to the initial invitations to participate which were sent out in June and early July did not produce sufficient numbers. A second batch of invitations was sent out in early September and these included those who might have had co-occurring difficulties (for example dyslexia and/or ADHD). No analysis has been done between those with and without additional difficulties. Co-morbidity is estimated to be around 4-6%. If that is the case within the general population then any results from this study would be more widely applicable than to a purely DCD group.

### **4.3.4 Participants numbers**

More participants in almost all studies are desirable and this is no exception. Twenty six participants was below the recommended number. The results of a calculation for  $r=.5$  at  $p=.05$  and  $0.8$  arrives at the need for a sample of 29. The involvement of 18 parents helped to make up for the small number of young adult participants and was a bonus in that they provided additional evidence as well as adding to the richness of the data suitable for thematic analysis.

An observation worth noting is that the second batch of invitations sent out in September had a higher response rate. One participant who received her invitation in June explained that it had been difficult to give it attention because it had come during a period of exams. With hindsight I would have waited and sent them all out at the start of September. It is a time when many people have had a holiday and are ready and focused on the coming year.

#### **4.3.5 Did these participants represent a typical cross section of the general population?**

The 26 young adult participants are not representative of the general population. These participants have gone through two filters. First, they have all had a (private) educational assessment which suggests a strong degree of parental concern and motivation to ensure that any difficulties were identified and addressed. Second, they were sufficiently interested to volunteer to take part (as were the parents involved). Although no data was collected about the family SES, nationality or ethnicity, it is reasonable to assume that they were a relatively homogenous group and are a socially and financially privileged group. In addition, they had unusually high IQ scores. Their average verbal IQ score fell between 120 and 130 (nearing two standard deviations above the mean).

Despite all the advantages evident for this group of participants, the results of the research do suggest a link (worth pursuing) between their experiences in school and their later wellbeing. If school experiences have had a lasting impact on their wellbeing, it would be difficult to argue that this might not hold true, or be more evident, for a group of young adults who were representative of a cross section of the general population particularly

those who had neither been identified with DCD and who may have lacked parental support.

#### **4.3.6 The construction of the questionnaires.**

In planning the content of the questionnaire, the researcher carried out discussion with three of the parents who ultimately took part and with two of the young adults who also took part. From a practical point of view, gathering data through the use of online questionnaires was considered to be the best approach. The use of a questionnaire rather than interview avoided researcher influence/interference on questions and possible follow up questions. Online was preferable to paper and pencil, particularly due to the potential participants' difficulties with handwriting.

In the early stages of planning, it was suggested to the researcher, during a review meeting with her tutor and external advisor that not only might it be difficult to get a sufficient number of participants, but that they would be unlikely to answer a 'long' questionnaire. With this in mind, the researcher was anxious not to overwhelm the participants with too much form filling and therefore made the decision to try and construct just one questionnaire to cover all areas of information to be collected rather than, for example, using an additional existing questionnaire (already tested for reliability and validity) to cover the mental health/aspects involved. This decision was made after consideration of a range of tests for both wellbeing and mental health. Tests and their terminology were varied. They covered a range of measures for example the HRQL (health related quality of life sort version), the REST (recent emotional states), the SDQ



(strengths and difficulties questionnaire, the CBCL (child behaviour checklist). The test deemed most usable would have been the GHQ-12 (the General Health Questionnaire, Goldberg, 1972) which comprised 12 questions and which measured the frequency that participants feel unhappy and depressed. The scale suggests that it detects mild psychiatric disturbance in clinical and non-clinical populations. Scaled scores indicate a yes/no answer to whether the participant experiences psychiatric disturbance. It would have been possible to incorporate the twelve questions into the questionnaire and it would have provided reliability and validity scores. Ultimately, however, it was thought by the researcher that, in order to maintain the tone and flow of the questionnaire using simple questions relating to stress, depression and anxiety would generate data as useful as the questionnaires perused and considered.

#### **4.3.7 Were the questions appropriate for the task?**

An important element of this research was to try to understand what the participants found to be helpful or otherwise while they were, or their child was, in school. It was reasoned that if it were possible to build a picture of what they describe as exacerbating their difficulties associated with dyspraxia or helping them to succeed, it would be reasonable to debate what alternative experiences might have served them better. The participant responses to the questions posed – both those that contributed to the qualitative as well as the quantitative aspect of the research – provided some excellent data which, when analysed, contributed directly to the research questions posed. From that perspective they were a strength.

The questions included in the questionnaire for the young adults reflect the researcher's beliefs about the areas in which dyspraxic difficulties are manifested. Although little

previous research has related to educational psychology there have been small case studies in which participants have responded to questions relating to their experiences of their learning environment, their social engagement and their experiences of physical activities in and out of school. These are very much in line with the observations of the researcher. Questions about learning interventions reflect only the views of the researcher, as no experimental studies were to be found.

The parent questionnaire also reflects knowledge drawn from existing research studies and the researcher's experience. Parental views were sought regarding their child's experiences of school, their child's current situation and resilience, as well as the impact that their child's DCD difficulties had made on their lives. The fact that the questionnaires were 'tailor made' is a great strength. It meant that the specific areas in which the researcher was interested could be targeted. What the questionnaire gained by this may have been offset by less proof of validity and reliability than if a tried and tested questionnaire had been used.

The number of questions in different categories reflects the need to gain a full and accurate picture and to ensure that the scores obtained are valid. For example, in Part 1 of the young adult questionnaire there are six questions relating to social engagement and seven questions relating to academic difficulties. Questions about social engagement included 'did you find it easy to make and keep friends?', 'were you bullied or teased?' and 'did you feel you were a valued member of the school community?'. Questions relating to academic difficulty included 'Did you find it hard to copy from the board or other texts?'. 'Did you have difficulty in structuring your written work? For example, organising information into a logical order?'. 'Did you find revision difficult?'. These are

areas which, from experience, the author has found to be challenging for the pupil with DCD.

Neither the questionnaire for the young adults or for parents asked whether the young adult participants had specifically received ‘school-based motor intervention’ during key stages 4 and 5. A decision had been made during the planning of the research and the implementation of the literature search not to include research relating to occupational or physical therapy. The emphasis of the research was on the social, emotional, educational and cognitive aspects of DCD. Parents were, however, asked if occupational therapy had been put in place at any time and a yes/no answer was required. Three parents responded ‘yes’ and the remaining 15 responded ‘no’. This data was not included in any statistical analysis. The questions posed for the young adult participants included a section with questions relating to sports and physical activities but did not include a focussed question relating to motor interventions. The inclusion of such a question accompanied by an open ended question asking about the benefits of motor interventions, if it had been provided, might have yielded interesting information. The lack of such a question was influenced by the researcher’s clinical practice and the view, shaped by experience, that teenage pupils would benefit most from interventions, help or practice focussed directly on the specific areas in which, at this stage of their education were posing greatest concern.

In Section 2 of the young adult questionnaire there are seven questions which together provide a score for ‘wellbeing’. These include ‘Do you get stressed easily?’, ‘Do you experience panic attacks?’, ‘Do you, or have you in the past 18 months felt depressed?’. As already mentioned, in view of the length of this questionnaire, it was not considered appropriate to use an already validated questionnaire to elicit wellbeing. As previously

mentioned, the author looked through a number of questionnaires and was aware of the type of questions generally found under the mental health/wellbeing category.

As can be seen in the literature review the emotional impact of DCD has been established in several studies (Crane et al., 2017; Green & Payne, 2018). Qualitative studies have provided descriptions of the participants concerns. Others have provided a measure of emotional health. These descriptions and measures have not been related to outcomes. This study which relates the experiences of the participants at two time points (as pupils and as young adults) has used quantitative data to seek a correlation between then and now and has used qualitative data to bring ‘meaning’ and ‘colour’ to the links which have been found to exist. A purely descriptive study would not have been able to highlight links between events and outcomes (Guest et al., 2012).

The second question asked by the study related to whether intervention had influenced academic attainment. Again, quantitative data was needed to measure interventions and relate these to outcomes. Qualitative data elaborated on the perceived benefits of the interventions in question. There is almost no evidence from research studies as to what kind of interventions might support the teenage dyspraxia pupil either practically, academically or emotionally. The questions relating to practical intervention reflect the author’s experience as a practitioner working with pupils experiencing dyspraxia. The author has gained insights into what has appeared to be helpful for these pupils.

Suggestions (included in Section 3) regularly made at the time of assessment regarding ‘how to help’ the pupil experiencing dyspraxia related to:

- access to a laptop and the opportunity to learn to touch type.

- the use of a laptop for public exams and additional time (if the criteria set by the exam boards was met).
- study skills help/tuition.
- training on computer software programmes which support the organisation of mental planning and organising.
- help to develop strategies to aid organisational challenges (remembering equipment, getting notes and files sorted) .
- counselling or therapy (as indicated).
- a key member of school staff to liaise with, particularly if the pupil ran into any problems or difficulties).

The question implicit in this research design is (1) whether these and/or other interventions which might have been applied appear to influence academic attainment both in school and in further education and (2) whether such interventions can be seen to ameliorate the impact of DCD as the pupil ages and becomes adult.

This aspect of the research process was the least successful. The participant responses provided inadequate quantitative and qualitative data. Questions about whether they had exam concessions or could use a laptop in class only required a 'yes' or 'no' response which was inadequate for statistical analysis of any meaning. It was only in relation to whether they had had study skills input that more detailed responses were made. This element of the research would have benefitted from an experimental and a control group both containing pupils with DCD and of similar ability. However, as Harrowell (2018) pointed out, it would hardly be ethical to provide one group of pupils with interventions and not the other. Similarly, the responses to whether the participants had had or were having any form of therapy or counselling did not produce sufficient or detailed enough

information to be able to draw conclusions particularly as the type of input was very varied.

Interventions, both practical and psychological could have been a research project on its own and would probably have yielded better results if data had been gathered through interview where the interviewer could have elicited more information through follow up questions. It is totally possible that the participants took any practical interventions for granted and were not cognisant of the benefits that they might have given.

#### **4.3.8 Were they sufficiently trialled?**

The questionnaires could have been more fully trialled before being finalised for use.

They were trialled by three young adults and two adults. One young adult gave feedback in the initial stages and two also provided evidence of reliability and validity. The adults provided feedback in the initial stages.

#### **4.3.9 Questionnaire**

With hindsight it is possible to speculate that the questionnaires could have been more focused. The range of questions almost seem to cover every eventuality and may have resulted in more information that could usefully be used. More questions about a smaller range of topics might have produced clearer results. A pilot study in which a small number of participants were interviewed could have provided sufficient information to have excluded some questions. However, this was an exploratory study and the results obtained are sufficiently interesting to inform future research.

#### **4.3.10 The Likert scales.**

There were two issues relating to the measurements of the variables for which a Likert scaled response was required. The Likert scale responses ranging from 1-5 with 3 as the midpoint. With hindsight a scale of 1-7 would have allowed a slightly more nuanced reply. The second issues related to what the scores actually meant in relation to the wider public. For example, on the questions relating to difficulties experienced in the classroom the participants replied to 7 individual questions. Scores for the 7 questions were added up and divided by 7 so that the final score was 'in line' with all other scores. The majority of participants had high scores (i.e., 4/5 indicating a high level of difficulty) for this item but how would this compare to a random population? Can we assume that most pupils would have an average score of 3? The two young women who completed the questionnaire twice (for reliability purposes), neither of whom had any areas of learning difficulty, scored an average mark of 1.2/5 and 1/5 where 1 was 'never' and 5 was 'very much so'.

#### **4.3.11 The analysis of the data**

##### 4.3.11.1 Validity of responses

An initial question is whether these findings are valid. It is possible to measure or estimate the reliability of the numbers by using the statistical concept of power to provide a percentage likelihood that the finding was not just chance. This study is slightly underpowered. The researcher had aimed to find a minimum of 29 young adults (power analysis indicated this was the number required for a medium effect with a 0.05 level of significance) and hoped to have more in order to add weight to any statistical findings. This number of 29 is based on Cohen (1992) whose guidelines suggest that for a standard

probability level of .05 and for the recommended power of .8, then it is necessary to have 29 participants to detect a medium effect size ( $r = 0.5$ ).

#### 4.3.11.2 Impact on interpretation of findings

The critical theorist position provides a framework and validity (via the rationality of the researcher) to the interpretation of thoughts and feelings as representing a reality which can be linked to a theoretical framework. This validates the measurement through use of Likert scales of the participants responses to questions relating to their experiences. Any biases will be due to the specific questions which have been included (and those unasked). The thematic analysis of the open ended questions is more obviously impacted by the inevitable biases of the researcher but once again the position of the critical theorist recognises common experiences as having weight and meaning which tells us a truth about the world as they experience it.

While the interpretation of the qualitative data is personal and is likely to reflect the knowledge and biases of the researcher it can nevertheless be argued that it provides the best attempt to understand the 'reality' of the experiences of the participants and to understand the underlying mechanisms which have given rise not only to the participants experiences but also to the longer term outcomes. The focus is on the social, emotional and educational experiences and outcomes. This approach acknowledges that the perspective of the researcher will almost inevitably impact her analysis, but this has been carried out with reflective self-awareness and the thoughtful attitude to the weighting given to responses.



With the numerical data that emerged it was possible to look for a link (correlation) between aspects of school experiences and later wellbeing. It is of note that there is a statistically interesting relationship between aspects of school experience and later wellbeing, but it leaves two questions. The author has used thematic analysis of the open ended questions included in the questionnaire to consider whether the themes which emerged might give greater understanding of what aspects of the school experience might have influenced later wellbeing. The thematic analysis of the data provides a richer and interesting view of the links between the items in question.

#### **4.4 Strengths and weaknesses of the study**

The strengths and weaknesses of this study have been considered/discussed throughout the section. They are summarised for easy reference in Table 15 below.

Strengths	Weaknesses
<p>Sources of information. Information came from three sources. From the young adults, their parents and from the earlier assessment records.</p>	<p>No teacher views or opinions.</p>
<p>Questionnaire. Data collection through questionnaire meant that responses were not biased by researcher/participant relationship. The questionnaire was specific to the study. Only one form to complete and deal with. The questions covered were inclusive of the areas known to be of relevance to pupils with DCD. Personal questions avoided. The questionnaires were tested for validity and reliability on two young adults (without difficulties) and one parent.</p>	<p>The questionnaire was not tried and tested on a wider population prior to the study. Responses restricted to the questions asked. More information would have come from follow up interviews and specific topics could have been probed in greater depth. Questions relating to school experiences and to current wellbeing all reflective of the researcher's knowledge and beliefs. The questions relating to interventions during school (i.e., use of laptop, extra time etc) did not elicit sufficient information for statistical analysis of results. Likert scale</p>
<p>Participants The sample size was larger than other qualitative studies. The number of participants in the studies described in the information was available from the participants' earlier educational assessment reports. (Test profile and IQ scores were available). The participants were known to the researcher which may account for the number and enthusiasm of parents willing to take part.</p>	<p>The sample size was just below the number needed for power.  The researcher was involved in every stage: from the participants' initial assessment, diagnosis and recommendations made, through to the design of the study, writing the questionnaire and carrying out the thematic analysis of the open ended questions. This opens the possibility for bias. It was necessary to access participants through their parents making the parents gatekeeper to contact. No control group. Norms of all measures not available.</p>
<p>Ethical issues. Ethical approval was sought and given. Care was given as to how they should be approached initially. The introduction letters and information sheets were checked out by a young adult experiencing DCD who was able to make constructive comments on how easily they could be understood and on their friendliness. The participants were offered support should they want it or if they had any specific and personal questions or issues. Feedback regarding the study was offered. This was taken up by the majority of the participants.</p>	<p>It is not possible to tell if the individuals who received invitations to participate, but who did not respond, may have felt discomfort that the invitation raised the issue of dyspraxia.</p>
<p>Data analysis.</p>	<p>Not all participants were old enough to have taken a master's degree. Five were still studying.</p>
<p>Thematic analysis. The researcher's reflexive approach implies a consistency and reliability to the outcomes.</p>	<p>The data used for thematic analysis could have been interpreted from a biased perspective</p>

Table 18. Strengths and weaknesses of the study.

#### **4.4.1 Did the study do what it set out to do?**

Starting out to look for a potentially causal link between events in the past and events (or emotions) in the present is never going to produce conclusive results. Many alternative variables might be involved and even finding a positive correlation is a long way from establishing cause. Despite this the findings concur with similar research around the same topic and have in fact gone a step further than any of the studies described by producing both quantitative and qualitative data. With regard to academic attainment the study has shown clearly that pupils with DCD are able to achieve academically. Pupils need appropriate support, and this is where the next challenge must lie.

#### **4.5 The implications of study**

##### **4.5.1 For the understanding and knowledge of the topic in psychology**

Research relating to DCD is happening on physical, neurological and psychological fronts. Investigation is happening regarding the relationship between (1) poor physical coordination (and the closely related difficulty with motor organisation) (2) the contribution or mediating impact of cognitive/neurological factors (3) speed and efficiency of output (for example writing). While this study does not provide any information which would contribute to such research it does highlight the need for any further research on ‘interventions’ to take account of the neurological research and to consider how such information might feed into suggested interventions (see below).

Much of the current body of research which has recently become available is focused on the psychological impact of DCD. The results of this study suggest that there is a connection between aspects of school experience – notably the impact of perceived

treatment in school – and wellbeing as young adults. This could be a good foundation on which further research might build. The research process described in this paper is replicable and could focus effectively on a narrower aspect of school experience.

#### **4.5.2 For the professional practice of educational psychology**

There are implications from this study which could impact pupils experiencing DCD and which could inform the practice of EP's, teachers and parents. Not only is there an urgent need to identify pupils experiencing DCD there is a need to educate teachers and the wider public about the condition. Wilson et al. (2012) reveal that just 21% of teachers were familiar with DCD and less than half were even aware of it.

A first hurdle is to improve identification. Guidelines for the identification of (older) pupils with DCD would aid EP assessment practice in relation to this population. The difficulties which pupils experience above and beyond poor coordination could form the basis of an identification check list. There is sufficient evidence of these additional difficulties to draw up a check list. Not only would this be of value to EPs, but it could also be made available to teachers. A formal identification must be made by an OT or physio who can administer the visual/perceptual/motor tests which are needed for a formal 'diagnosis'.

Once identified pupils need appropriate support. Whilst this study has not found evidence of effective educational interventions there is sufficient information to suggest that a practical approach could be taken to make life easier for the affected pupils. Removing barriers to achievement and providing materials (such as printed notes) which alleviate the need to complete tasks which are known to be difficult and to cause stress.

This study, like others before it, has highlighted the distress experienced by pupils with DCD. It is on the psychological front with pupils' wellbeing in mind that EPs might make the biggest impact through their work in schools. The results of this study indicate that the ways in which pupils feel that teachers relate to them is of crucial importance to their wellbeing. Working with individual teachers, groups of teachers or the whole school, EPs have the opportunity to share what is known about the impact of the interaction between adult members of the school body and individual pupils. These pupils need to feel that they are not being judged only on the things which they find hard; they need to feel secure within the school community and that they can access appropriate interventions. Teachers need information about these pupils who are such chameleons though many do not manage to disappear into the background but are regarded as pupils who are not making no effort. The disabilities experienced by those with DCD are largely invisible and it is only too easy to dismiss pupil behaviour as carelessness, laziness, wilful lack of effort and so forth. An initial hurdle is to present the case for the pupil with DCD in a way which convinces the teaching profession that there is a problem. This is not always easily achieved. It would be possible to look at specific issues such as bullying or to take note of the major themes such as the emotional vulnerability of DCD pupils, or their need to feel valued and to belong. Guidelines for ways in which to provide practical and emotional support can be developed. Maybe the most telling responses that we can draw upon when planning how to help pupils with DCD are the replies by young adults and parents regarding what advice they would give.

### 4.5.3 For future research

Looking first at academic achievement, research is needed on academic interventions within a considerably more heterogeneous population including those who do not have the benefit of attentive and supportive parents. This study has indicated that with support pupils can achieve academically according to their ability. It does however seem that they need considerable support in relation to organisation.

Theoretical approaches to understanding the physical, cognitive and neurological aspects of dyspraxia and how these impact academic achievement include that of Schott et al. (2016) and Schmidt et al. (2017). Schott demonstrates that when a task involves both cognitive and motor elements the pupil with DCD will become slower to complete the motor tasks in relation to the increasing complexity of the cognitive element of the task. The focus of Schmidt 'study is to examine the mediating role of executive function in the relationship between motor ability and academic achievement. This provides a rationale for thinking that interventions which either improve/facilitate the physical element will 'free up' more thinking space to enable the participant to focus on the cognitive element of the task. There are three possible approaches: practice to make the physical task more automatic, the application of an alternative (easier) method (i.e., typing rather than handwriting) or eliminating the task entirely for example providing notes rather than asking the pupil to copy from one source to another. The application of good study skills which can provide a scaffolding for the organisation and implementation of work should support the pupils 'planning and organising' (known to be weak) could be reasoned to be a benefit. An approach to testing the efficacy of such interventions would be an experimental design in which different groups with and without DCD were given a range of interventions or conditions where the interventions either helped with the automization

of physical tasks so that any cognitive interference was less evident and/or where the pupil was supported, or alternative solutions found. For example, not having to rely on his/her own handwritten notes.

Given the personal, familial and economic cost of mental health difficulties, this aspect of DCD is a vital area for research and further investigation. To assess the benefits of social and emotional support, it might be feasible to contrast matched groups of pupils from within 2 or 3 schools who receive different levels of pastoral care.

#### **4.6 The distinctive contribution of this research study**

The gaps in the research at the time that this project was planned were twofold. First, there was an absence of research assessing the benefits of academic interventions for pupils experiencing DCD. Second, there were few studies which attempted to understand the causal mechanism operating between (1) poor motor coordination and outcomes requiring central executive function and (2) poor motor coordination and later mental health/wellbeing factors. This study has aimed to address both topics. The study has failed to provide any statistical data to support the benefits of specific interventions in relation to either academic attainment or social/emotional wellbeing. The qualitative data does however provide information which could guide further future research. With regard to causal mechanisms this study has found a link between the ways in which pupils perceive that their difficulties were understood and supported in school and their wellbeing as young adults.

The study cannot claim causality, but the statistical findings should not be disregarded.

Coupled with the participants articulate and information rich responses to the open ended

questions there are clear pointers as to a) the importance of the participants experiences of school in relation to their happiness and attainment then and now and b) the areas in which schools might make changes and educate themselves about the needs of pupils with DCD. The fact that this might have a long term impact on pupils with DCD should be kept in mind.

What this study does that has not been done previously is to link school experiences, in terms of social experience AND academic difficulties, with later outcomes, namely wellbeing and academic attainment and to involve both young adults and parents.

#### **4.7 Personal reflections**

The process of completing this total DEdPsy programme has been hugely enjoyable and at times a highly frustrating process. Frustrations have been largely practical and clerical. It has been necessary to learn a considerable range of new skills from the academic through to the purely practical such as carrying out certain computing processes. From making tables, flow charts and following the instructions for how to present academic work correctly it has forced me to slow down and pay attention to details. These new skills are not, initially, required sufficiently often to make them automatic and it has been necessary to go back to square one and work how to do them each time as if from scratch. A particularly time consuming activity has been completing literature searches. Each research engine seems to have a different protocol for saving what has been found and it was not unusual to have screened 100 studies and then lost the record; other challenges included finding the correct method to check for plagiarism; learning how to get rid of track changes and so on.



At times there has seemed to be an overwhelming amount to complete from the mundane to the mentally stretching. The best coping strategy has been to see the whole process as a series of steps leading hopefully to the final completion. It has been encouraging to itemise and tick off each step of the way from getting ethical approval, through recruiting participants, sending out invitations to take part (a particularly expensive and time consuming activity), recording results and starting to write up the various sections. Even so, I have had middle of the night panics that I would never finish.

The personal plus has to be that throughout the process of carrying out the programme, I have become more analytic and more interested in the methodology and analysis of results. Thereby becoming more critical of other people's research studies, as well as becoming more critical of my own research skill and just generally taking a more critically analytic look at much of the information with which we are exposed from day to day from media sources. I think too that I have developed a greater tolerance for having to sift and record details. There is research (which I could not find) which suggests that our view of ourselves today is always rosier than our view of ourselves in the past, so it may not be empirically true that I am a new, more thoughtful, analytic and patient person at all! Perhaps time will tell.

Have I learnt the skills and knowledge which I had hoped for?

In June 2016 I was delighted when Jessica Kingsley published a book which I had written entitled 'The parents' guide to specific learning difficulties'. As the author of this book, it was the work of an experienced practitioner and reflected that which I had learnt during my 30 years as an educational psychologist. I had, for several years, wanted to crystallise and share this information in order that parents of pupils with specific learning

difficulties could refer to it as and when needed. The impetus to complete this book was a desire to share the key things, which I had learnt through practice, were important. The stimulus to get it done had come from interactions with pupils (and students) and from discussion with parents. The book had a glossary; it indicated relevant legislation; it suggested further reading in relation to each of the 24 chapters and it provided information about useful resources, organisations and websites. But it did not have academic references. Looking back at the book now, I do not believe that it contains any facts which could not be referenced, but I did not have the knowledge or skill to set about such a task.

At the book launch an educational psychologist friend and one-time colleague who was then midway through her doctorate said ‘so, did you just write this out of your head?’ I noted the comment with a degree of irritation probably because she had a point. She had noted the fact that in reality, however well steeped the contents of the book were in day to day hands on experience, it did lack academic rigour and an academic underpinning. At that time, I hoped that I would write more and that I could manage something which would obviously stand up to academic scrutiny and which the educational psychology journals would welcome for review. There is no doubt that completion of this DEdPsy programme has more than equipped me to achieve this goal.

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Appendices.



Appendix 1 Table summarizing details of the research studies included in the literature review.

These are listed in the order in which they appear in Table 5, Part 2.

Author, date and country	Title	Study design	method, age, gender	publication	Aim	Outcome	Strengths and weaknesses. General comments.
1. Missiuna, C., Moll. , S., King, S., King, G., Law, M. 2009  Centre of childhood disability Research affiliated with McMaster University, Canada and the Thames Valley Children's centre London, Canada.	A Trajectory of Troubles: Parents' impressions of the impact of DCD	A phenomenological approach was used to explore the meaning of developmental experiences for children with DCD and their families.	The parents of 13 children aged, 6-14, were recruited through purposeful sampling. They completed in-depth interviews and a set of questionnaires. These were systematically coded to identify emergent themes.	Physical and Occupational Therapy in Paediatrics, Vol 27(1) (2009)	To explore parent perspectives regarding the early experiences of their children with DCD.	Central themes emerged as the children matured that suggested a developmental trajectory, from motor and play concerns in the early years, through self-care, academic and peer problems in middle childhood, to challenges with self-concept and emotional health in later childhood.	S. Children concerned were of different ages thus researchers had a good view of issues to emerge at different stages of child's development.  W. Small sample size and participants Caucasian from 2 parent families with highly educated mothers. A longitudinal rather than cross-sectional design would strengthen credibility of the proposed developmental trajectory.
2  Crane L. Sumner, E., Hill.  2017 UK	Emotional and behavioural problems in children with DCD: exploring parent and teacher reports.	Three matched groups. Tested for IQ and MABS2 (movement battery). The SDQ (Strengths and difficulties questionnaire).was completed by parents and teachers.	30 children with DCD aged 7-10 years. two comparison groups. 35 of similar age CA and 29 of similar motor skills (aged 4-7) MM	Research in Developmental Disabilities 70 (2017) 76-74	To explore emotional and behavioural difficulties of DCD pupils using the SDQ. Also, to collect data on level of agreement between parents and teachers report on SDQ ratings.	A large proportion of children with DCD present with problems with ADHD and to a lesser extent had a raised profile of emotional problems and difficulties with peers. This highlights the importance of exploring the ADHD issues of the DCD population. There were inconsistencies between the parent and teacher feedback which suggests	This study provides good background information for understanding the trajectory or development over time of the difficulties experienced by pupils with DCD but is less relevant overall.

						that it is important to get info from multiple sources.	
3 Lingam, R.P. Novak, C., Emond, A., and Coad, J.E. 2013  London School of Hygiene and Tropical Medicine, UK., University of Bristol, K, University of the West of England, Bristol, UK and Coventry University, UK>	The importance of identity and empowerment of teenagers with developmental co-ordination disorder	In depth interviews were recorded and analysed using phenomenological hermeneutic method for researching lived experiences. This aimed to understand the meaning of phenomena from the perspective of the individual. An interpretive approach. Individual interviews were followed by group interviews. The initial spontaneous thoughts of the subjects were grouped into areas which were thought to be of importance and were expanded during the group interviews.	11 pupils aged 11-16 (7 boys, 4 girls) participated in in-depth, semi-structured interviews both individual and group sessions. Participants were identified through the local OT services and met the DSM V1-TR criteria for DCD. 10 participants were white and one of dual heritage.	Child: care, health and development, 40,3, 309-318 (2013)	To gain an understanding of the experiences and aspirations of young people living with DCD in their own words.	A central theme of 'we're all different' described how the young person saw themselves and encompassed the formation of identity. Sub themes related to: 'how I see my life', 'things I find hard', 'making my life easier,' how others see me' and 'how I see my future'. mostly emphasised what they could do, not what they could not do. Things I find hard covered academic, social and sports activities in school. all had diffs with handwriting and organising themselves. also, sport and throwing and catching. . 9 mentioned bullying. Help came from practising skills, computer packages, success with chosen activities, good learning support assistants, therapy, intervention groups. Parental help with homework and practical day to day activities. Friendship groups important. Key messages: <ul style="list-style-type: none"> <li>. limited research of this kind.</li> <li>. identity formation central to themes that emerged.</li> <li>. emphasis on what they could do not what they could not do</li> <li>. school-based strats needed that enhance self-esteem, resilience and ed coping strats rather than just attempting to improve motor skills.</li> </ul>	.  S. pupils met criteria for DCD. Analysis very thorough. Initial themes 'played back' to participants. Very relevant to this thesis though the age range is not an exact match.  W. small, self-selected group with limited ethnic representation. No links to any academic or social outcomes. No references to co-occurring difficulties. e.g., dyslexia, ADHD
4. Lingam, R., Jongmans, M.J., Ellis, M., Hunt, L.P., Golding, J., Edmond, A.  2012	Mental Health difficulties in children with developmental coordination disorder.	Data from the Avon Longitudinal study of parents and children was used to carry out this study. The ALSPAC included 4,4062 children born between 1991 and 1992	data available for 5475 children. of these 346 children had probable DCD. logistical regression models were used to assess the associations	Paediatrics. Owned by the American Academy of Paediatrics. (2012)	To explore the associations between probable DCD at 7 years and mental health difficulties at age 9 to 10 years.	Children with probable DCD had an increased risk of mental health difficulties, that, in part, were mediated through associated developmental difficulties, low verbal IQ, poor self-esteem and bullying.	S. an early study to investigate the experience of young people with DCD in their own words. The authors validated the results of the first interviews and follow this with additional exploration of themes with the group.

UK		Children were identified with DCD at age 7-8 years using DSM criteria. Mental health was measured by using the child-reported Short Moods and Feelings Questionnaire and the parent-reported Strengths and Difficulties Questionnaire.	between the exposure variable, probable DCD and the indicators of mental health.				W a lack of ethnic diversity amongst participants. Small numbers also make generalisation across the population unreliable.
5. Schmidt, M., Egger, F., Benzing, V., Jager, K., Conzelmann, C.,M., Pesce, C.  2017 Switzerland and Italy	Disentangling the relationship between children's motor ability, executive function and academic achievement.	236 children ranging from 10 to 12 years. measures of 3 aspects of motor ability were taken. Energetically-determined (aerobic endurance) information orientated (motor coordination) and an intermediate motor ability dimension (muscular strength). Measures of EF were taken. Updating, inhibition and shifting. Academic achievement was assessed through math performance, reading and spelling. This was repeated over time.	confirmatory factor analysis and structural equation modelling were realized.	PLOS ONE. Motor ability and academic achievement. (2017)	To examine the mediating role of executive function in the relationship between motor ability and academic achievement, also investigating the individual contribution of specific motor abilities and academic achievement.	motor activities (all three) were positively related to children's academic achievement. The evidence supports the view that EF is a mechanism explaining this link. This strengthens the view that there should be advocacy for quality physical activity not merely focused on health-related physical fitness outcomes but also on motor skill development and learning.	S. Attempted to provide a good theoretical framework in search for mediating mechanisms. The longitudinal approach strengthens the mediational path found in cross-sectional studies.  W. Both tests of EF were assessed by means of the same task.  Also, each of the three motor skills tests was measured by one single test. Several tests would have been better.
6  M. Tal-Saban, S. Sarka., I. Grotto., A Ornoy, S. Parush  2012 Israel	The functional profile of young adults with suspected Developmental Coordination Disorder (DCD)	429 subjects selected to represent three groups who then completed five questionnaires measuring 1. Motor coordination deficits. 2. Daily life functions. 3. Recent emotional state. 4. Internal factors attributed to success and 5. Problem solving questionnaire.	A random sample of 2379 adolescents and young adults aged 19-25 were used to identify three groups. Probable DCD, borderline DCD and controls. This was based on response to	Research in Developmental Disabilities 33 (2012) 219802202	To consider the impact of DCD on non-academic and academic functioning of young adults with DCD and to investigate the emotional influences and the role of strategy use within this population	Deficits in motor control continue into adulthood and impact function as well as emotional and perceptual state of the individual suffering the deficits. Negative emotion towards themselves and less internal control. EF strategies can help to ameliorate.	Handwriting used as a measure of academic achievement which is not sufficiently robust a measure to have validity.

7 A. Kirby, L. Edwards, D Sugden. 2011	Emerging adulthood in developmental coordination disorder: Parent and young adult perspectives	Participants completed a standardised questionnaire and parents completed a semi-structured questionnaire. The first was analysed for individual comparison of past/present issues. Parent information was looked at thematically. The Adult Dyspraxia Checklist (ADC, Kirby et al 2010) was used.	21/70 families engaged. All had been identified with DCD at the Discovery Centre when younger. Now aged between 17-25	Research in developmental disabilities 32 (2011) 135-1360	To gain an understanding of the current functioning of young adults who were diagnose with DCD in childhood and to consider how symptoms of DCD persist and resolve and what new difficulties (if any) present at this time.	Physical skills better (cld be practice, e.g., teeth cleaning) except handwriting. EF and social skills are the key concerns for parents Some parents concerned with functioning and motor skills. the biggest 68.4% concerned with organisational skills. 63% concerned that EF skills impacting in the educational or work setting. helped by private tutor, note takers, summer school to prep for uni, OT and use of computers for exams,	S. Links childhood DCD with adult difficulties. First to do so.  W. No current testing thus no idea of extent of current impact of DCD surmised from ADC. Just 21/70 participants. No controls to see what concerns normally experienced by young adult and parents. Self-selected in that they had all been assessed at the Discovery Centre.
8. Harrowell, I., Hollen, L., Lingam, R., Edmond, A. 2018  University of Bristol and University of Newcastle, UK,	The impact of developmental coordination disorder on educational achievement in secondary school.	Data from the Avon Longitudinal study of parents and children was used to carry out this study. The ALSPAC included 4,4062 children born between 1991 and 1992 Children were identified with DCD at age 7-8 years using DSM criteria. Difficulties with daily living, IQ and academic achievement were also assessed.  Data for academic achievement was gathered from GCSE results. Also, data regarding SEN contributed.	329 children met the criteria for DCD. Their academic achievement was measured through GCSE results obtained from the National Pupil Database. The level of SEN help provided over time was also considered and the levels given classified into 4 groups. No help. School action, school action plus, and statement of SEN.	Research in Developmental Disabilities 72, 13-22 (2018)	1 - to assess the impact of DCD on ed achievement in secondary school.  2- to assess the presence of co-occurring diffs in reading ability, social communication problems and hyperactivity/inattention and whether these impacted on ed achievement in DCD.  3 - to determine how many of those meeting the criteria for DCD were identified for formal additional ed support in school, and whether provision of support was related to ed achievement.	DCD has a significant impact on ed achievement and therefore on life chances. Those with DCD were 22% less likely to achieve 5 or more GCSE's than controls.  Co-occurring diffs with reading, social communication and ADHD are common and contribute to ed diffs.  One third of those with DCD not identified as needing additional support. Those with co-occurring diffs account for some of the under-achievement at GCSE. Implications – condition needs to be followed by improved interventions. Evidence base for what interventions work is limit. More research on interventions needed.	S. large population based sample broadly representative of the UK and avoiding the biases of a clinical sample. Clear identification of DCD.  W. rates of attrition. Those lost come from lower socio-economic backgrounds etc No GCSE data available for some of the more able pupils. No measure of motor competence in adolescence.
9 Lodal, K. and Bond, C. 2016  University of Manchester, UK	The relationship between motor skills difficulties and self-esteem in children and adolescents: a systematic literature review.  REVIEW	This systematic lit review focuses on the effect of poor motor skills on global and/or domain specific self-esteem covering the period January 2000 and July 2015 26 studies were found and were reduced to eight which met the inclusion criteria. le empirical investigations	8 empirical studies covering children and adolescents aged 7 to 18 with a diagnosis of DCD as measured with a standardised motor skills assessment. these studies also included a measure	Educational Psychology in Practice. Vol. 32, No. 4 410-423 , 2016	to consider the evidence for a link between DCD and self-esteem.	There is a relationship between DCD and self-esteem however it is complex and likely to depend on age, gender and co-morbidity. (self-esteem viewed as a general evaluation of one's worth as a person)	S. is cognisant of whether studies considered take account of co-existing difficulties.  W. only one study included goes up to age 16 years.

		evaluating the relationship between motor skills and self-esteem in children and adolescents from seven to 18 with a diagnosis of DCD.	of self-esteem and were published in English. Self-esteem covered both global and or domain specific.				
10 Hill, E., Brown, D., Sorgardt, K. Goldsmiths, University of London. 2011	A preliminary investigation of Quality of Life Satisfaction Reports in Emerging Adults with and without Developmental Coordination Disorder.	A comparison was made between a group with DCD (diagnosed according to the DSM-IV criteria) and a TD group relating to their scores on the quality of life Enjoyment and Satisfaction Questionnaire (Q-LES-Q; Endicott et al 1993) this covers a broad range of topics, health, feelings leisure activities, social relations etc) A Mann-Whitney U test was completed to compare the two groups.	20 DCD participants age range 19-27. 31 TD participants with an age range of 18-27.all completed the quality of Life Enjoyment and Satisfaction Questionnaire. A 93 item test covering physical health, subjective feelings, leisure time activities, social relationships, general activities, social relationships, and general activities.	Journal of Adult Development (2011) 18:130-134	To evaluate the impact of DCD on 'emerging adults' in order to provide information for adult support services in further/higher education and in occupational settings.	The DCD group reported significantly lower satisfaction with life than the TD group. This was true on all the 8 scales.	An early study which was one of the first to establish a link between DCD and continued (but changing) difficulties in adulthood.
11 Payne, S., Turner, A., Ward, G.E. Taylor, C., Bark, C. Bournemouth University and Coventry University. 2013 UK	The social impact of living with developmental coordination disorder as a 13 year old.	Semi-structured interviews enabling the researcher and participant to engage in a dialogue where relevant. Emergent themes recorded. A reference groups was used	6 participants aged between 13 and 15 years.	British Journal of Occupational Therapy, 76(8), 362-369 2013	To investigate the experience of teenagers living with DCD from their own perspective.	All participants felt that the visible and hidden effects of their condition had an impact on their relationships with peers and family members. Three sub-themes emerged: 1. Relationship with peers; 2. Relationships with parents and 3 relationships with siblings. With peers was positively impacted when activities were shared. Lack of sports participation could be made up for by other activities. The environment mattered. The relationship with parents was impacted. with mothers playing a large role.	S provides insights into social challenges experienced by teenagers from their perspective.  W. The study is too small for generalisations to claim to be universal.  The paper highlights areas where OTs (teachers and parents) could usefully be aware of pupil needs.

12	<p>Green, D., Payne, S., 2018 UK</p> <p>School of health and welfare, Jonkoping University, Sweden</p> <p>Heart of England Foundation NHS Trust, Birmingham, UK</p>	<p>Understanding Organisational Ability and Self-Regulation in Children with Developmental Coordination Disorder.</p>	<p>Review paper. Relates to 'young people' but does not mention ages.</p> <p>REVIEW</p>		<p>Current Developmental Disorders Reports (2018)</p>	<p>to consider the transactional relationship between motor and non-motor/executive dysfunction in children with DCD and its impact on psychosocial function</p>	<p>Provides an argument, evidence and theories to support the idea that the relationship between the person (their self-perception) the activity and the environment (physical, social, attitudinal or virtual) is fundamental to our understanding of the mechanisms underpinning the whole package of difficulties presenting= in young people with DCD.</p> <p>They indicate that it is evident from a review of recent research (Wilson, P et al (2017) that there is under-activation across a number of key neural networks involved in motor control and movement execution.</p> <p>Weaknesses in cognitive processing in DCD a consistent with neural accounts for the deficits occurring in DCD when utilising advanced MRI, EEG or transcranial ultrasound.</p>	<p>S. starts to provide possible pathways to link poor motor skills of those with DCD to poor mental health etc. (not noted in those with other physical difficulties). Content good but writing not so clear.</p>
13	<p>Omer, S., Jijon, A.M., Leonard, H.</p> <p>School of Psychology, University of Surrey.</p> <p>2019</p>	<p>Research Review: Internalising symptoms in developmental coordination disorder: a systematic review and meta-analysis</p>	<p>A systematic review and meta-analysis exploring the impact of DCD with greater levels of internalising symptom (i.e., depression and anxiety).</p>	<p>20 studies included. All but 3 focussed on children under the age of 14. One considered age range 18-56 years, two included children up to age 16</p>	<p>The journal of Child Psychology and Psychiatry.60:6 (2019) pp 606-621</p>	<p>To answer the questions: do individuals with DCD experience significantly greater levels of internalising symptoms than TD individuals and what is the magnitude of this difference.</p>	<p>Children with probably DCD experience greater levels of internalising symptoms compared to their TD peers. A moderate effect size. It suggests that the motor impairments of DCD can expose an individual to a variety of secondary stressors, which over time can lead to poorer mental health.</p>	<p>Highly relevant to current research and robustly screened studies included.</p>

14	Gagnon-Roy, M., Jasmin, E., Camden, c.  University of Sherbrooke, Canada. 2016	Social participation of teenagers and young adults with developmental co-ordination disorder and strategies that could help them, results from a coping review.	A scoping review was carried out. 28 studies were included which The review question was 'what are the social participation challenges faced by youth (15-25) living with DCD?' Sub question – 'What are the recommended or trialled interventions to support participation for youth with DCD?'	Scoping review. Participants in studies aged 15-25.  Chosen articles were synthesized in relation to review questions.	Child: care, health and development., 42, 6. 840-851 (2016)	The article aims to synthesize current knowledge on social participation, which is the performance of an individual in realizing his or her daily activities and social roles within their life environment. Strategies and interventions to support youths with DCD were also synthesized.	All life habits were reported to be affected for teenagers and young adults with DCD, with education and interpersonal relationships being the most frequently discussed. During adolescence and adulthood new tasks and subsequent difficulties emerge, such as driving. Mental health difficulties emerged as a key theme. Few strategies and interventions were described to support social participation of youths with DCD.	Clear inclusion/exclusion criteria described.  This has extensively covered the relevant research.
15	Cairney, J., Rigoli, D., Piek, J.  McMaster University, Canada, Curtin University, Western Australia.  2013	Developmental coordination disorder and internalization problems in children: The environmental stress hypothesis elaborated.	A position piece which incorporates other research to contribute to the overall argument for the ESH. This is an elaboration of the environmental stress hypothesis. It sets out an argument for the ESH to provide a framework for understanding (and testing) the hypothesis that negative exposure to personal and interpersonal stressors (i.e., environmental factors) might play in accounting for higher rates of internalizing symptoms in children with DCD. The article also reviews the literature to see if there is evidence supporting specific components (pathways) of the model.	In this model 'stress' is defined both temporally, in relation to duration and intensity, related to the potential psychological impact. Stress may come from multiple sources, but protective factors may mediate and moderate the impact. Protective factors are internal (personal resources), or interpersonal (personal support and feelings of interconnectedness)	Developmental Review, 33 (2013) 224-238	To set out the ESH and to argue that this provides a framework for both understanding and testing out the various environmental factors which might contribute to the later anxiety and depression evident for many pupils experiencing DCD  Points of interest.	Authors conclude that: Environmental risk factors of importance are; physical inactivity, obesity, psychosocial resources and social support, perceived competence The moderated ESH provides a framework from which to explore mediating and moderating influences on the link from DCD to the areas of vulnerability now well documented.	A thorough and useful review. See notes
16	Missiuni, C., Campbell, WN. 2014 Canada	Psychological aspects of DCD: Can we establish causality?	Temporal causation. What factors give rise to psychological problems in children with DCD. Review of studies which consider the link between DCD and poor mental health. What are the	the studies considered age range from 4.5 years to late teens.	Curr Dev Disorder Rep (2014) 1:125-131	To review the literature which establishes a link between a range of psychological issues and DCD and to consider if these social and emotional problems are co-morbid or if	Longitudinal studies needed but should not be run as interventions should be given. The authors suggest investigating interventions that have the potential to 'interrupt' the trajectory from DCD to mental health issues.	clear and well written summary with many useful references.

		causal factors and what are protective factors. primary and secondary stressors.			are they secondary consequences of DCE	there is without a doubt a link between DCD and poor mental health what is needed in good intervention studies.		
17	Mancini C., Rigoli, D., Roberts, L, Pick, J.  Curtin University, Perth, Australia. 2019	Motor skills and internalizing problems throughout development: An integrative research review and update of the environmental stress hypothesis research.  (Where internalising problems refer to anxiety and depression).	An integrative research review of 12 articles that have tested various complex relationships between motor skills and internalizing problems that are posited in the Environmental Stress Hypothesis. Studies included all post 2010.  Studies relating to cognitive function excluded. Only those studies which related to motor skills and mental health included. – the psychological, social and emotional dimensions of mental health included.	The review includes studies with age range	Research in Developmental Disabilities 84 (2019) 96-111	The aim of the research was to bring together individual studies in a single area of research to develop a comprehensive understanding of the current evidence base for the complex pathways contained within the Environmental Stress Hypothesis. Too few studies available for a meta-analysis and the studies are heterogeneous.	The study provided support for the relationships posited in the framework in samples spanning early childhood to adulthood. Compared to intrapersonal factors (e.g., self-esteem/perceived competence), interpersonal factors (e.g., social support/peer problems) were found to more strongly and consistently mediate the relationship between motor skills and internalising problems. The effect size of the relationship between motor skills and internalizing problems were small to moderately sized. The second finding was that the association appeared to vary between study populations.	Inclusion/exclusion criteria clearly described. Study ratings were transparent.
18	Li, Y-C., Kwan, M., Cairney, J.  McMaster University, National Health research Institute, Taiwan. University of Toronto. 2019	Motor coordination problems and psychological distress in young adults: A test of the Environmental Stress Hypotheses	A quantitative study using structural equation modelling to examine mediating pathways and overall model fit. Participants completed a survey of motor coordination, physical activity, secondary stressors, perceived social support, self-concept, and psychological distress.	225 young adults aged 17-23 years completed a survey of motor coordination, physical activity, secondary stressors, perceived social support, self-concept, and psychological distress.	Developmental Disabilities 84 (2019) 112-121	To examine the association between motor coordination and psychological distress among emerging adults and examine potential mediators to this relationship based on the Environmental Stress Hypothesis.	The study highlights the effect of poor motor coordination on psychological distress in young adults, and suggests that interventions should target psychosocial well-being, in addition to motor coordination, to prevent psychological distress. Poor motor coordination and psychological distress was mediated by secondary stressors, perceived social support and self-concept	Clear selection process. Good statistical analysis. tests used valid. Multiple pathways investigated reliable results.



19 Gill, A., Brigstocke, S., Goody, A. University of York and Durham University 2020.	An exploratory study of the association between self-esteem levels in adults and retrospective reports of their peer relations and motor skills in childhood.	A retrospective design in which the participants looked back to childhood difficulties and also answered questions relating to present.  The questionnaires used were the ADC but they removed some questions (unrelated to coordination) and also used the Childhood motor ability questionnaire designed for parents, but they amended so respondents answered for themselves. Also, the adulthood self-esteem Scale (Rosenberg) which had 10 items.  Path analysis used to examine the possible utility of the environmental stress hypotheses as an explanation for enhanced internalisation problems in individual with DC (Li et al, 2018).	217 adults reflected back on their childhood recollections of peer relationships in primary school and current levels of self-esteem. Data collected through online questionnaire. Participants recruited through social media and student mailing list.	Journal for ReAttach Therapy and Developmental Diversities. July 2020; 3(1) 24-33 The statistical modelling was thorough.	The aim of the study was to provide a preliminary investigation of the associations between childhood motor difficulties and adulthood self-esteem. Utilising the Environmental stress hypothesis as a basis for investigating how potential social-environmental stressors; remembered experiences of social inclusion and remembered experiences of bully victimisation. To determine if the association was related to motor difficulties rather than secondary characteristics of DCD such as problems with organisation and time management etc.).	Analysis of the indirect effects in both models revealed that social inclusion had a significant mediating role in the relationship between childhood motor ability and adulthood self-esteem but bullying and adulthood motor ability did not.	Just because they did not ask about secondary difficulties does not mean they were not involved in outcomes.  They changed two of the questionnaires and did not refer then to possible changes in reliability or validity.  Very thorough statistics.
20 Schott, N., El-Rajab, I., Klotzbier, T. 2016	Cognitive-motor interference during fine and gross motor tasks in children with Developmental Coordination Disorder (DCD)	59 children 20 with and 39 without a DCD diagnosis recruited through primary school and a rehabilitation clinic. Completed dual task activities in which the interaction of motor performance and cognitive complexity were tested.	Age 7-10 years,	Research in Developmental Disabilities. Vol. 57, October 2016 pages 136-148.	To assess the automatic deficit hypothesis by implementing dual tasks with various cognitive loads. To examine cognitive-motor interference in children using the Trail-Making-Test and the Trail-walking test.	Researchers conclude that dual-tasks effects in motor speed vary, dependent on the complexity of the cognitive task. Further that The automatization Deficit Hypothesis may be a useful model if monitoring of the motor skill is made difficult by an additional task. An increase in cognitive load during the implementation of a physical activity will interfere with the speed and accuracy of the physical task.	Good number of participants. Thorough statistical analysis. Good and useable evidence which can be extrapolated from in relation to considering interventions.
21. Engel-Yerger, B	The role of poor motor coordination in predicting adults'	A quantitative study which compared a DCD group with a control group of TD	200 healthy individuals (20 – 46 years of age) 18 with suspected DCD	Research in Developmental Disabilities 103 2020	To explore how individuals with suspected DCD experience DCD impacts as children and as adults and	The group with suspected DCD had lower HRQL. Among the study group HRQL was predicted by current	Strengths: Control group, Mixed socioeconomic backgrounds.

University of Haifa, Israel.  2020	health related quality of life.	participants in relation to their HRQL	and 182 with normal motor performance (according to the ADC) completed a sociodemographic/health questionnaire, the ADC and the WHOQOL-BREF which measures physical psychological, social and environmental HRQL		how these experiences predict their HRQL	perception of performance and difficulties experienced as a child	Statistically robust and highly relevant to the current study.
22  Edmonds, C., 2013,  University of East London, UK	Why teachers need to hear the voice and experience of the child with dyspraxia.	Review paper, emphasising the need for and importance of hearing the child's voice and views.  REVIEW		Research in teacher education, 2013	literature has largely been medicalisation of the disorder focussed on symptomology, health, parental and professional views. Literature in relation to education has been sparse. They argue the need for the child's voice to inform teachers who can then provide a more supportive environment.	Overall stressed the importance of teachers having a better idea of the specific difficulties experienced by pupils with DCD and of the need for teachers to recognise these difficulties and to modify the school/learning environment in order to support them.	short article providing some useful refs and thoughts about the importance of getting a better understanding of the ways in which those with DCD experience their time in school.
23  The European Academy of Childhood Disability.  Blank, R. et al.  2019	International clinical practice recommendations on the definition, diagnosis, assessment, intervention, and psychosocial aspects of developmental coordination disorder	These guidelines have been assimilated by 11 experts in the field representing Europe, Canada, Sweden, Israel, S Africa and Australia. (Three are from the UK). The paper covers: mechanisms, assessments, interventions, psychosocial issues, adolescents and adults.	Full age range.	Developmental medicine and child neurology.	Aim to provide clinical practice recommendations. Valid until 2022. This is an update from the 2013 paper which did not include recommendations relating adolescents and adults.	A comprehensive paper which provides 'state of the art' understanding of the way in which researchers and practitioners have move forwards in understanding the difficulties and needs of those with DCD (across the full age range).	A comprehensive update on what is known, researched and agreed about DVD. Still not giving guidance on identification within an educational setting.

Appendix 2 Weight of evidence: the appraisal of the quality and relevance of evidence presented in the studies reviewed.

**The process followed.**

The guidelines discussed and advocated in Gough’s 2006 paper ‘Weight of evidence: a framework for the appraisal of the quality and relevance’ the following questions were considered in relation to the studies included in the literature review. Additional questions were also applied which were taken from Gibby-Leversuch et al (2019) who had modified them from The Critical Appraisal Skills Programme (CASP) and from the Downs and Black Checklist (Downs and Black 1998).

**Column A**

This is a non-review specific judgement about the coherence and integrity of the evidence on its own terms. It is the generally accepted criteria for evaluating the quality of this type of evidence by those who generally use and produce it.

Generic questions	Questions for qualitative papers	Questions for quantitative papers	Questions for systemic reviews
<ul style="list-style-type: none"> <li>• Is the study well executed? (Transparency, accuracy, accessibility).</li> <li>• The researchers consideration of the quality and clarity of writing.</li> <li>• Was there enough information to replicate?</li> <li>• Did the argument follow through?</li> <li>• Were assertions well referenced?</li> </ul>	<ul style="list-style-type: none"> <li>• Is the interview schedule made clear?</li> <li>• Is the relationship between the interviewer and participant made clear?</li> <li>• Is the terminology used (ie. self-esteem, self-worth) adequately defined?</li> </ul>	<ul style="list-style-type: none"> <li>• Was there a control group?</li> </ul>	<ul style="list-style-type: none"> <li>• Are the inclusion and exclusion criteria described?</li> </ul>

**Column B.**

This is a review specific judgement about the appropriateness of that form of evidence for answering the review question(s).

Generic questions	Questions for qualitative papers	Questions for quantitative papers	Questions for systemic reviews.
<ul style="list-style-type: none"><li>• were the participants appropriate?</li><li>• were their educational needs appropriate to the focus of the study?</li><li>• are recruitment processes described?</li><li>• is the study replicable?</li></ul>	<ul style="list-style-type: none"><li>• is there a clear description of the data analysis?</li></ul>	No additional questions	No additional questions

**Column C**

This is a review specific judgement relating to the focus/approach of the study to the review questions– (utility and propriety). Attention was given to the relevance of the studies in relation to each of the three review questions/goals. In addition to relevance the studies selected should, ideally, have provided a balance so that each question considered was addressed by at least two studies.

**Column D**

Weight of evidence D provides an overall judgement of the quality and relevance. The scores of A, B and C have been combined and then averaged.

**Scoring.**

Each study was given a score based on the judgement of the researcher relating to the criteria set out above. Possible scores ranged through 0-15 with 0-4.9 being LOW, 5-9.9 being MEDIUM and 10-15 being HIGH.

**The three review questions.**

1. To evaluate research studies which link poor coordination indicative of DCD with the range of social, emotional and educational difficulties mentioned above.
2. To consider what theories may have been put forward to explain the link between poor coordination and the subsequent education, social and emotional difficulties reported in the above studies and to consider whether this might provide a theoretical underpinning for developing appropriate interventions.
3. To seek studies relating to the efficacy of any interventions delivered in the school and home setting on educational attainment, physical and social wellbeing.

**Review and evaluation of the qualitative studies..**

Author and date.	Column A 0-4.9, low 5-9.9, medium10-15 high	Column B 0-4.9, low 5-9.9, medium10-15 high	Column C 0-4.9, low 5-9.9, medium10-15 high	Column D Total score for columns A,B and C divided by three. 0-4.9, low 5-9.9, medium10-15 high
Missiuna et al 2009	Very clear interview schedule. relationship with participants clear. Well written.  Score 12 High	Recruitment process clear. data analysis explained. participants were limited in number and also in spread of ethnicity. A Caucasian sample of mothers within two parent marriages. Could be replicated Score 12 High	Relevance and contribution to one or more of the review questions. Relevant to question 1  Score 11 High	Score 11.66 High

Lingam et al 2017	The process is made very clear. and the study is really well articulated. Recruitment process fair and clear.  Score 12	The analysis is clear. definitely fit for purpose.  Score 12	Relevant to question 1 and in a tangential way to question 3  Score 12	Score 12 High
Payne et al. 2013	Clarity of writing? Semi structured interview with prompts. participants involved in the development of themes. richness of comments trumped frequency.  Score 9	Recruitment process clear? Recruitment through advert in dyspraxia foundation website.  Fit for purpose  Score 10	Relevance and contribution to one or more of the review questions. Relevant to question 1.  Score 11	Score 10 Medium/high

### Review and evaluation of the quantitative studies.

Author	Column A	Column B	Column C	Column D
Crane & Hill 2017	Clear recruitment process. well balanced control groups . Reasonably clearly written  Score 11	Outcome measures made clear but lack of agreement between parents and teachers.  Score 10	Study relates to question 1 but is not so relevant as other studies.  Score 8	Score 9.6 Medium

Lingam et al. 2012	A large study with control group. complex study which is not easy to read. It is a longitudinal study.  Score 12	A well designed study which ticked all the boxes for B.  Score 12	Clear evidence that children with probably DCD at 7 years have a 2 fold increased risk of self-reported depression and a 4 fold increased risk of parent-reported mental health and behaviour difficulties at 9 or 10 years. Relevance to question 1.  Score 9	Score 12 High.
Schmidt et al 2017	There were a large number of participants some of whom were experiencing DCD and some who were not. not a precise control group. not easy to follow.  Score 9	All good.  Score 12	Makes a valuable contribution to the second question. it puts forward facts which illuminate understand of the link between poor coordination and academic attainment. Score 13	Score 11.33 High
Tal-Saban et al. 2012	Three groups, controls, probably DCD and borderline DCD. tested for homogeneity. Good numbers averaging around 130 in each group. The DCD groups were self-informant and no physical tests were used. clear writing.  Score 13	Participants were representative of the general population. Clear recruitment processes. Data analysis clear. appropriate participants. Is replicable. . The 5 tests given are all available.  + Score 13	Question 1. Very relevant particularly because of the age range of participants who were all YAs.  Score 13	Score 13 High.

Harrowell et al. 2018	Was there a control group Yes.  Quality of writing. good. hard to replicate without access to the type of data base at ALCS.  Score 11	Positive in relation to all queries. Outcome measures accurate, valid and reliable.  Score 11	Looks at educational attainment of a large cohort of pupils with DCD and additional difficulties. As one of the only ones it scores well.  Score. 13	Score 11.6 High
Hill et al. 2011	There was a control group The writing is clear. Small numbers of participants. would suggest more exploratory than conclusive.  Score 8	Recruitment clear and replicable. Data analysis clear. Recruitment process clear. Limited explanation of statistical analysis. no visuals. Score 9	Relevance and contribution to one or more of the review questions. Contributes well to the overall picture. question 1.  Score 11	Score 9.3 Medium.
Li et al. 2019	Cross sectional study with students from Canadian university. No control but all participants completed the dyspraxia checklist which will have given a score for analysis alongside other variables. Complex but written clearly Score 13	Recruitment clear. Well- designed study. outcome measures explicit  Score 12	Relevance and contribution to one or more of the review questions.  Relevant mainly to question 2.  Score 13	Score 12.6 High



<p>Gill et al. 2020</p>	<p>They controlled for DCD by using the ADC. (which was also used as the measure of their level of difficulty in relation to social inclusion. the 217 participants were thus a combination of those with DCD and those without. Concise and clear but no explanation given regarding distinction between n those with and without DCD.</p> <p>Score 8</p>	<p>Recruitment process clear? recruitment is clear but the analysis of the ADC is not given. The data analysis is clear. should be replicable. Outcome measures look valid and reliable. not convinced by cutting up and selective use of items on the ADC.</p> <p>Score 8</p>	<p>Question 1 taken as read but re-established. Question 2 highly relevant and contributes to the environmental stress hypothesis. the outcome measured was current self-esteem.</p> <p>Score 13</p>	<p>Score 9.6 Medium.</p>
<p>Schott et al. 2016</p>	<p>Was there a control group? 20 participants with DCD and 20 ND took part. Writing complex. studies were complex to describe. writing could have been clearer.</p> <p>Score 9</p>	<p>Recruitment clear and appropriate. Numbers good. Data analysis explained but needed rereading on multiple occasions. Study replicable. valid and reliable as far as one can tell. it is not a field of psychology and related to movement, physical activity, neurology.</p> <p>Score 10</p>	<p>Relevance and contribution to one or more of the review questions. Not relevant to question 1. very relevant to question 2 and the study provides evidence which could be used and extrapolated from for interventions but it does not 'test' the impact of specific interventions.</p> <p>Score 13</p>	<p>Score 10.6 High.</p>

Engel-Yerger 2020	A control group of 18 with suspected DCD and a control group of 182 with 'normal' motor coordination. The ADC used to discriminate participants. writing quality ok.  Score. 11	No explanation of where the adult and young adult participants had come from but good socioeconomic mix.  Could be replicated.  Score 10	Relevance and contribution to one or more of the review questions. Totally relevant to question 1. Did not address theory of interventions.  Score 10	Score 10.3 High

### Review and evaluation of mixed study.

Author	Column A	Column B	Column C	Column D
Kirby et al 2011	The interview schedule was clear. Parent interview schedule is Past clients at the discovery centre. Terminology clear. Good writing Was there a control group? no Were there sufficient numbers? Small cohort of 19 young adults and 19 parents.	Recruitment is transparent. and the participants were appropriate? Did it address the review question appropriately? Appeared so, they were screened on the ADC Replicable? Theoretically but would need access to a data base or some alternative approach Fit for purpose? The study gains clear and	Q1. It is relevant. but focusses more on the central executive and organisational deficits rather than emotional and social. It covers educational aspects. Q2 not at all Q3. the study draws out approaches and activities which might, through deduction, be appropriate interventions but these are	

	Score 9	useful perspectives. Score 11	not 'tested'. Score 11	Score 10. High.
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### Evaluation of the review papers.

Author	Column A	Column B	Column C	Column D
Lodal & Bond 2016	6 quantitative studies included. 2 qualitative studies. Very precise search terms. selected studies relevant to the review question. clear communication.  Score 11	Positive to all Queries.  Score 10	Relevance and contribution to one or more of the review questions. Relevant to question 1. Age range overlapped with own study. Only self-esteem investigated  Score 11	Score 10.6 High.
Green & Payne 2018	Well written and well argued. moves the discussion forwards.  Score 10	Yes, addressed the review question.  Score 10	This paper brings in research from neuroimaging and starts to build a link between DCD and cognitive mechanisms. It is pertinent to question 1 and 2  Score 13	Score 11 High
Omer et al. 2019	Highly rigorous methods	Y	Addressed question 1 relating to 'internalising symptoms' ie depression and anxiety.	

	Score 11	Score 11	Score 11	Score 11 High
Gagnon-Roy 2016	Inclusion and exclusion criteria very clear as is the screening process. A good round up of available evidence.	yes	Social participation relates to question 1. The age range is of particular interest. It covers question 1 and 3	Score 13 High.
Cairney et al, 2013	Rrferenced. Clear line of discussion/argument Conclusions well founded  Score 12	Did it address the review question appropriately? It did so thoroughly but no reference to how the various studies quoted were selected.  Score 11	Relevant to the trajectory of difficulties observed in pupils with poor coordination as they progress through school. Relevant to question 2 in the discussion re environmental stress hypothesis. Thoroughly good overview of the topic. Score 13	Score 12 High
Missiuna & Campbell, 2014	Quality of writing. excellent Quality and quantity of studies referenced. To the point and useful Clear line of discussion/argument? Has a specific view point Conclusions well founded? Yes. suggestions re further research and need to	Did it address the review question appropriately? It asks can we establish causality in relation to the psychological aspects of DCD. It only considers the environmental stress hypothesis. but does this well.	Q1 Good review of studies which show the range of difficulties s associated with poor coordination. Q2 also good but limited exploration of causal factors. General help/inspiration. Excellent.	

	intervene. Score 10	Score 10	Score 13	Score 11 High
Mancini et al. 2019	Reviews 8 studies which are testing the environmental stress hypothesis. Clear path described for selecting studies to include.  Score 13	Did it address the review question appropriately? Yes  Score 12	Sets out to examine environmental stress hypothesis. thus relevant to question 2. in so doing looks at evidence which relate to question Score 12	Score 12.3 High
The European Academy of Childhood disorders. Blank et al. 2019	N/A	N/A	Relevant to all aspects of the study. 14	High

Opinion piece.

Edmonds 2013	N/A	N/A	N/A	N/A
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## Appendix 3 Questionnaire for Young Adults.

### **Dyspraxia - what helps, what hinders? Young Adult survey.**

*This questionnaire has six sections. It is not difficult to complete the questions in one sitting; however, if you need to stop or take a break you can click on the save button at the end of the section which you are working on and return to it later. You are also able to go back and change any of your responses while you are working on the questionnaire. To do this go to the end of the relevant section and click on the back button.*

#### **PERSONAL DETAILS**

**Q1: Name. Please note that your name will be removed before the thesis is completed and you will be fully anonymous when the research is disseminated.**

**Q2: Gender**

male     female     other

**Q3: Age. Please tick the correct boxes.**

age 20 - 24                       age 25 - 29                       age 30 - 34                       age 35-  
40 or over

**Q4: What type of secondary school did you attend?**

- |                       |                                  |                       |                                       |
|-----------------------|----------------------------------|-----------------------|---------------------------------------|
| <input type="radio"/> | State comprehensive school       | <input type="radio"/> | Grammar school                        |
| <input type="radio"/> | Independent (private) day school | <input type="radio"/> | Independent (private) boarding school |
| <input type="radio"/> | Specialist day school            | <input type="radio"/> |                                       |
| <input type="radio"/> | Specialist boarding school       |                       | Specialist boarding school            |
|                       | Other                            |                       |                                       |

*FRIENDSHIPS AND SOCIAL INTERACTIONS*

*The following questions relate to the time that you were completing Key stages 4 and 5 in secondary school, ie when you were taking GCSE and 'A' levels or the equivalent. Please see if you can remember back to that time.*

**Q5: Did you find it easy make and keep friends?**

- 1 (not  at all)    
 2     
 3     
 4     
 5 (always )
- N/A



**Q6: Did you take part in group activities such as drama, orchestra or choir.**

- 1 (rarely)     2     3     4
- 5 (frequently) N/A

**Q7: Were you bullied or teased?**

- 1 (not at all)     2     3     4     5 (frequently)
- N/A

**Q8: Were there times when you felt isolated:**

- 1 (not at all)     2     3     4     5 (frequently)
- N/A

**Q9: Did you take part in any out of school clubs or activities? For example, drama group, debating society, scouts, guides, orchestras?**

- 1 (never)     2     3     4
- 5 (frequently) N/A

**Q10: Did you feel that you were a valued member of the school community?**

- 1 (not at all)     2     3     4
- 5 (very much so) N/A

**Q11: If you are able to do so please comment on what made you feel that you were a valued member of the school community?**

**When you have completed this question press START to continue on the next section.**

## **SPORTS AND PHYSICAL ACTIVITIES**

**Q12: Did you participate in team sports either in or out of school?**

- 1 (never)     
  2     
  3     
  4     
  5 (frequently)  
 N/A

Could you comment in the text box on whether you enjoyed these activities.

**Q13: Did you participate in individual sports/physical activities?**

	never				frequentl
tenni	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
sailing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
horse riding	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
skiing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
gymnastics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
boxing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
swimming	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
athletic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
yoga	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
othe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

if relevant please comment on what you enjoyed and why.

**Q14: Did you avoid physical activities which required co-ordination?**

- 1 (rarely)   
  2   
  3   
  4   
  5 (often)   
  N/A

**Q15: Did you regard yourself as physically fit?**

- 1 (not at all)       2       3       4       5 (very much so)

## **DIFFICULTIES EXPERIENCED IN SCHOOL**

**Q16: Did you have any difficulty with the legibility or speed of your handwriting?**

- 1 (not at all)       2       3       4       5 (very much so)  
 N/A

**Q17: Did you find it hard to copy from the board or other text.**

- 1 (not at all)       2       3       4  
 5 (very much so)       N/A

**Q18: Did you find it hard to take notes?**

- 1 (not at all)       2       3       4       5 (very much so)  
 N/A

**Q19: Did you have difficulty in structuring your written work? For example, organising information into a logical order?**

- 1 (Not at all)       2       3       4       5 (Very much so)  
 N/A

**Q20: Did you find revision difficult?**

- 1 (not at all)       2       3       4       5 (very much so)  
 N/A

**Q21: Was homework a problem? If so please comment on what you found most difficult. For example getting started, taking too long, losing things required.**

- 1 (not at all)       2       3       4       5 (very much so)  
 N/A

**Q22: Did you find it hard to keep organised?**

- 1 (not at all)       2       3       4       5 (very much so)  
 N/A

**Q23: Were there any other areas which you found particularly difficult or frustrating? If so please comment.**

## AREAS OF SUPPORT AND HELP

**Q24: Did you complete your work in, or out, of school on a laptop/desktop computer?**

- 1 (never)       2       3       4       5 (always)       N/A

**Q25: Did you use a computer in any of these settings?**

- in the classroom       for exams       for homework in the home setting

**Q26: Were you given special concessions/consideration for public exams? Were you allowed the following -**

- additional time?       amanuensis - ie did you have a scribe?  
 complete your written work on a computer?       anything else?

**Q27: Were you given support or training in how to store electronic information and how to file your work?**

- 1 (not at all)       2       3       4       5 (regularly)       N/A

**Q28: Were you encouraged to make use of any other assistive technology? If you were could you comment on anything which you found particularly useful.**

Yes  No

**Q29: Were you given any training in study skills either in or out of school? For example on note taking, memory strategies, essay planning, revision techniques and so forth?**

Yes  No

Please elaborate

**Q30: If you received study skills training how useful did you find it?**

1 (not at all)       2       3       4       5 (very much so)  
 N/A

**Q31: Were you given any training AT HOME OR IN SCHOOL in relation to self-awareness/self-management?**

yes  no

If the answer is yes please elaborate

**Q32: HELP AT HOME. Did your parents give you help with the following? If they did please comment on how helpful you found this.**

- homework                       revision                       personal organisation                       time  
 management study skills

**Q33: Were you motivated to do well academically?**

- 1 (not at all)                       2                       3                       4                       5 (very much so)  
 N/A

**Q34: Did you work hard to achieve your best?**

- 1 (not at all)                       2                       3                       4                       5 (very much so)  
 N/A

**Q35: In school did you have a mentor or particular member of staff whom you felt that you could talk to if you were stressed or needed specific support?**

- 1 (not at all)                       2                       3  
 4                       5 (available throughout this time)                       N/A

**Q36: Do you consider that school staff had an understanding of your strengths and difficulties?**

- 1 (not at all)                       2                       3                       4                       5 (very much so)  
 N/A

**Q37: Did you think that your teachers were sympathetic to your needs?**

- 1 (not at all)                       2                       3                       4                       5 (very much so)  
 N/A

**Q38: Did your parents understand you difficulties?**

- 1 (not at all)       2       3       4       5 (very much so)  
 N/A

**Q39: Were your siblings supportive?**

- 1 (not at all)       2       3       4       5 (very much so)  
 N/A

Any further comments?

**Q40: Did you have any form of therapy or counselling either in school or out of school? If yes please comment in the box on how helpful this was.**

- yes     no

**Q41: What is your overall impression of the way you were treated in school during key stages three and four?**

**HOW ARE THINGS NOW?**



**Q42: Are you comfortable in a group?**

- 1 (not at all)     2     3     4     5 (very much so)  
 N/A

**Q43: Do you enjoy social occasions?**

- 1 (not at all)     2     3     4     5 (very much so)  
 N/A

**Q44: Do you take regular exercise?**

- yes     no

**Q45: How fit would you say that you are?**

- 1 (not at all)     2     3     4     5 (very much so)  
 N/A

**Q46: Do you get stressed easily For example do you feel stressed at the thought of driving, planning a journey, organising a project or finding your way from A to B?**

- 1 (not at all)     2     3     4     5 (very much so)  
 N/A

Comment if you wish

**Q47: Do you experience panic attacks?**

- 1 (never)     2     3     4     5 (frequently)  
 N/A

**Q48: Do you participate in any activities which help to reduce stress and anxiety? For example do you go to yoga class, meditate, use or pursue any other relaxation techniques?**

- 1 (rarely)    2    3    4    5 (often)    N/A

**Q49: Do you, or have you in the past 18 months felt depressed.**

- 1 (not at all)    2    3    4    5 (frequently)    N/A

**Q50: Are you currently, or have you been, on medication for depression?**

- yes    no

**Q51: Have you or are you currently having any form of counselling or therapy?**

- yes    no

**Q52: Further comments relating to your health and happiness if you have any.**

**Q53: Do you experience any other areas of specific learning difficulty? For example:**

- |   |  |
|---|--|
| <input type="checkbox"/> dyslexia                         | <input type="checkbox"/> ADHD (attention deficit hyperactivity disorder) |
| <input type="checkbox"/> ASD (autistic spectrum disorder) | <input type="checkbox"/> dyscalculia                                     |
| <input type="checkbox"/> other                            | <input type="checkbox"/> no  |

**Q54: Do you agree that you experience difficulties which are typically dyspraxic? If you do not agree please mark the N/A or not applicable boxes up to question 64.If you do agree do you think that it is an appropriate label?**

- 1 (not at all)    2    3    4    5 (very much so)  
 N/A

**Q55: Do you regard dyspraxia as a disadvantage?**

- 1 (not at all)       2       3       4       5 (very much so)  
 N/A

**Q56: Is dyspraxia something which you can manage/change/overcome?**

- 1 (not at all)       2       3       4       5 (very much so)  
 N/A

**Q57: Do you tell others about your dyspraxia? for example friends, tutors, employers?**

- yes       no       sometimes       not applicable

**Q58: Has the condition impacted on your dreams and ambitions for the future?**

- 1 (not at all)       2       3       4       5 (very much so)  
 N/A

**Q59: Do you regard dyspraxia as a difference or a disability?**

- difference       disability  
 a bit of both       neither - it is something which I get on with.  
 not applicable

**Q60: Did it impact your choice of study at GCSE and 'A' level?**

- yes       no       somewhat       not applicable

**Q61: Did it impact your choice of career or employment?**

- yes       no       somewhat       not applicable

**Q62: What is the major impact that this difficulty has on your life now and in the past? What have been the major challenges so far?**

**Q63: What or who has helped you most?**

**Q64: What advice might you give to a (dyspraxic) 14 or 15 year old pupil in secondary school about how to cope most successfully with life generally?**

**Q65: Are you currently**

- studying                       training                       employed  
 completing an apprenticeship       none of the above

**Q66: Please indicate the number of GCSE exams passed with a grade A-C**

- None       1-3       4-6       7-9       10 or more

**Q67: If you took 'A' levels please indicate how many you passed at grades**

	one pass	two passes	three or more passes
Grade A	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grade B	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grade C	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grade D or below	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Q68: Are you taking or do you have any higher education qualifications?**

- |  |  |
|--|--|
| <input type="radio"/> I am currently studying for a degree | <input type="radio"/> I have an undergraduate degree |
| <input type="radio"/> A masters degree                     | <input type="radio"/> A doctorate                    |
| <input type="radio"/> Not applicable                       |  |

**Q69: Are you undertaking or have you successfully completed any vocational training?**

- I am in training                   I have completed training                   Not applicable

**Q70: Are you undertaking or do you have any professional qualifications and training?**

- yes    no

If yes, please indicate what field this is in.

**Q71: If you are in employment would you be willing to provide some details about what you are doing? Would you also be able to comment on whether you see this as part of a career path? Do you enjoy it? Do you think that you are disadvantaged by dyspraxia?**

THE QUESTIONNAIRE IS NOW COMPLETE.

THANK YOU FOR YOUR PARTICIPATION WHICH IS HUGELY APPRECIATED.

**Q72: IF YOU WOULD LIKE TO DISCUSS ANYTHING WITH THE RESEARCHER PLEASE INDICATE BELOW AND PROVIDE CONTACT DETAILS.**

## Appendix 4 What helps – what hinders? Questionnaire for parents.

### Dyspraxia - Parent questionnaire.

#### DYSPRAXIA - WHAT HELPS, WHAT HINDERS?

The questions below are largely self-explanatory. Some require you to tick the most appropriate box or boxes and others are open ended.

In relation to the open ended questions you are not obliged to write anything unless you have something which you are happy/willing to share. Please provide as much additional information as you wish.

It is not difficult to complete the questions in one sitting however, if you need to stop or take a break you can click on the save button at the end of the questionnaire and return to it later. You are also able to go back and change any of your responses while you are working on the questionnaire.

**Q1: Name of parent (s) completing this form.**

**Q2: Name of YOUNG ADULT to whom it applies. Please note that all names will be deleted once the data has been collated and prior to the point when the study is made public.**

**Q3: What age was your child when you were first concerned that he or she was experiencing difficulties?**

- 2-5     6-9     10--13     14-18     other

**Q4: What age was your child when you first sought professional advice/assessment?**

- 2-5     6-9     10-13     14-18



**Q5: Was your child identified as experiencing dyspraxia (also known as Developmental Coordination Disorder - DCD) at any time?**

- Yes     No     Maybe

**Q6: At what age was this identification made?**

- 2-5     6-9     10-13     14-18     not relevant

**Q7: Do you think that this 'diagnosis' of dyspraxia was appropriate for your child?**

- 1 (not at all)     2     3     4     5 (very much so)  
 N/A

**Q8: Did/does your child experience any additional areas of specific learning difficulty?**

- No     Dyslexia     Dyscalculia  
 Attention Deficit Disorder     Autistic Spectrum Disorder     Other

**Q9: What was your response to the suggestion that he/she might have an area of specific learning difficulty? For example, relief, disbelief, anxiety?**

**Q10: Has he/she had any occupational therapy?**

- yes     no

How helpful did you consider this to be?

**Q11: What were the main difficulties that your child experienced during primary school?**

**Q12: What kinds of intervention/strategies were put in place her him/her during the primary school years? For example did he/she receive the following?**

	yes
use of a laptop computer	<input type="radio"/>
touch typing training	<input type="radio"/>
use of other assistive technology	<input type="radio"/>
social skills training	<input type="radio"/>
psychotherapy of other type of therapy	<input type="radio"/>
othe	<input type="radio"/>
non	<input type="radio"/>

How helpful did you consider these interventions to be?

**Q13: What were the areas in which he or she excelled? Please can you expand.**

**Q14: What were the main areas of difficulty which you consider that your child experienced during secondary school? For example, did he or she have difficulty with regard to self-organisation, social interactions, fine or gross motor coordination, reading, writing, homework or other areas of the curriculum?**

**Q15: Do you consider that he/she needed more parental help than most pupils of his or her age in order to cope with the demands of school life during key stage 3 and 4? For example help to remember equipment, help to stay organised.**

**Q16: How involved did you feel that you needed to be? For example, did you have to take time off from work or make any other alterations to your day to day life?**

**Q17: Did difficulties have an impact on his/her**

	never			frequentl
Confidence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Motivation to work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attitude to school. Did he/she enjoy and take part?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attitude to teachers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Happiness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Family life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Q18: Where you have indicated frequently please can you make further comments.**

**Q19: What interventions or support did you and/or the school put in place during these secondary school years? For example did he/she receive any of the following?**

	yes	no
use of a laptop computer	<input type="radio"/>	<input type="radio"/>
use of other assistive technology	<input type="radio"/>	<input type="radio"/>
touch typing training	<input type="radio"/>	<input type="radio"/>
occupational therapy	<input type="radio"/>	<input type="radio"/>
social skills training	<input type="radio"/>	<input type="radio"/>
psychotherapy of other type of therapy	<input type="radio"/>	<input type="radio"/>
study skills training/coaching	<input type="radio"/>	<input type="radio"/>
othe	<input type="radio"/>	<input type="radio"/>

**Q20: Which areas of special provision/help did you consider to have been particularly helpful?**

**Q21: How well did school staff understand your child's strengths and difficulties?**

- 1 (not at all)     2     3     4     5 (very well)     N/A

*The following questions relate to the present time.*

**Q22: Did you feel personally supported and understood by school staff?**

- 1 (not at all)     2     3     4     5 (very much so)  
 N/A

**Q23: Were you able to work together to consider difficulties and solutions?**

- 1 (not at all)     2     3     4     5 (very much so)  
 N/A

**Q24: Is he or she currently in**

- education     employment     neither

**Q25: Is he/she living:**

- at home     independently

**Q26: Do you have concerns about his/her ability to manage and to cope on a day to day basis?**

- 1 (not at all)     2     3     4     5 (a great deal)  
 N/A

**Q27: Have his/her difficulties changed over time? For example physical coordination may have improved but he/she may be struggling to learn to drive**

**Q28: Do you continue to provide him/her with a level of support which you think is unusual for a young person of his or her age?**

- 1 (not at all)       2       3       4       5 (very much so)  
 N/A

**Q29: In your view do you consider that he/she is emotionally resilient?**

- 1 (not at all)       2       3       4       5 (very much so)  
 N/A

**Q30: Do you consider that he/she has developed coping strategies for daily life?**

- 1 (not at all)       2       3       4       5 (very much so)  
 N/A

**Q31: What advice would you give other parents of children (experiencing DCD) in secondary school?**

**Q32: With hindsight is there anything which you wish you could have changed?**

*THANK YOU! THE QUESTIONNAIRE IS NOW COMPLETE.*

*YOUR SUPPORT AND HELP WITH THIS PROJECT IS HUGELY APPRECIATED.*

Appendix 5

**The Adult Developmental Coordination Disorder/ Dyspraxia  
Checklist (ADC) for Further and Higher Education  
(Kirby and Rosenblum, 2008)**

Please complete the following questionnaire giving as much information as you can.

Please tick boxes as appropriate. It will take you about 10-15 minutes to complete this.  
All information given is dealt with in the strictest confidence.

Name:	Date of Birth:
Completed by:	Date completed:
Address:	
Post Code:	
Tel no. or mobile phone no:	
E-mail:	
Name of School/College/University/workplace:	

Course being studied/place of employment:

.....

Year of study (e.g. first year)

.....

Are you a:    Part-time student?                       Full-time student?

Are you in receipt of:

Disability Student Allowance?                       Disability Living Allowance?

Have you been diagnosed with any of the following?

- 
- Dyspraxia, Developmental Co-ordination Disorder, Clumsy Child Syndrome Dyslexia
- 
- 
- 
-



**Attention Deficit Hyperactivity Disorder (ADHD), or ADD  
Asperger's Syndrome, Autism Spectrum Disorder Learning  
Difficulties, Disabilities  
Other**

**Who diagnosed you?..... Don't know**

**When were you diagnosed?.....**

### Section 1: As a child, did you:

	Never	Sometimes	Frequently	Always
1. Have difficulties with self-care tasks, such as tying shoelaces, fastening buttons and zips?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Have difficulty eating without getting dirty?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Have difficulty learning to ride a bike compared to your peers?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Have difficulties with playing team games, such as football, volleyball, catching or throwing balls accurately?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Have difficulty writing neatly (so others could read it)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Have difficulty writing as fast as your peers?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Bump into objects or people, trip over things more than others?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Have difficulty playing a musical instrument (e.g. violin, recorder)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Have difficulties with organising/finding things in your room?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Have others comment about your lack of coordination or call you clumsy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Total</b>				

<b>Section 2: Do you <u>currently</u> have difficulties with the following items:</b>				
	<b>Never</b>	<b>Sometimes</b>	<b>Frequently</b>	<b>Always</b>
<b>1.</b> Self-care tasks such as shaving or make up?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>2.</b> Eating with a knife and fork/spoon?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.</b> Hobbies that require good coordination?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>4.</b> Writing neatly when having to write fast?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>5.</b> Writing as fast as your peers?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>6.</b> Reading your own writing?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>7.</b> Copying things down without making mistakes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>8.</b> Organising/finding things in your room?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>9.</b> Finding your way around new buildings or places?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>10.</b> Have others called you disorganised?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>11.</b> Do you have difficulties sitting still or appearing fidgety?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>12.</b> Do you lose or leave behind possessions?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>13.</b> Would you say that you bump into things, spill or break things?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>14.</b> Are you slower than others getting up on the morning and getting to work or college?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>15.</b> Did it take you longer than others to learn to drive? (if you do not drive, please indicate on the paper and describe why you chose not to drive)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>16.</b> Do others find it difficult to read your writing?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>17.</b> Do you avoid hobbies that require good coordination?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>18.</b> Do you choose to spend your leisure time more on your own than with others?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>19.</b> Do you avoid team games/sports?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>20.</b> If you do a sport, is it more likely to be on your own, e.g. going to the gym, than with others?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Never	Sometimes	Frequently	Always
21. Do you/did you in your teens/twenties avoid going to clubs/dancing?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. If you are a driver, do you have difficulty parking a car?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Do you have difficulty preparing a meal from scratch?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Do you have difficulty packing a suitcase to go away?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Do you have difficulty folding clothes to put them away neatly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Do you have difficulty managing money?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Do you have difficulties with performing two things at the same time (e.g. driving and listening or taking a telephone message)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Do you have difficulties with distance estimation (e.g. with regard to parking, passing through objects)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Do you have difficulty planning ahead?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Do you feel you are losing attention in certain situations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Section two total</b>				
<b>Section one total</b>				
<b>Questionnaire total [section one + section two]</b>				

**Can you describe any compensatory strategies or approaches that you have developed over the years in order to deal with coordination difficulties in your everyday life?**

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The Dyscovery Centre often conducts research with adults.  
Please let us know if you would like to take part in future projects.

Prof Amanda Kirby The  
Dyscovery Centre  
University of Wales, Newport

Allt-yr-yfn Campus

The Adult DCD/Dyspraxia Checklist (ADC) Instructions for use (Kirby & Rosenblum, 2008) Revision of scoring (2011) About DCD in adults

The ADC is a useful tool to help identify Developmental Co-ordination Disorder/ Dyspraxia/ movement difficulties in adulthood. There are currently many DCD/Dyspraxia checklists for children but few have been extended to DCD/Dyspraxia in adulthood. The ADC questionnaire has been trialled with over 100 students and young adults in both the U.K. and Israel and has been shown to effectively identify DCD/Dyspraxia type difficulties in adults. The ADC is divided into three parts. The aim of the first part of the questionnaire is to gather background and contact information. Information regarding other/past diagnoses is useful as it allows an understanding of other areas of difficulty that may impact on the individual such as attention or reading difficulties.

**Section 1: Childhood history** In order to meet criterion B of the DSM-IV (i.e. having difficulties interfering with activities of daily living and education since childhood), ten questions relate specifically to past motor difficulties in childhood.

**Section 2: Current functioning** Section 2 contains items about current functioning. These questions look at areas that have been associated with DCD in childhood such as daily living skills, self organisation, learning new skills, sporting behaviour, leisure behaviour and handwriting. These questions were selected from information gathered from clinical practice working with adults with DCD and with discussion with occupational therapists working with adults with DCD.

**Who can use the ADC?** The ADC can be completed by any adult over 16 years of age. Employers or Higher/Further Education staff may wish employees or students to complete the ADC in order to identify areas of strengths, weakness and areas that need further support. Additional information from other sources such as parent, teacher or employer may be useful also to gain a more complete picture and to corroborate information and /or difficulties.

How do I complete the ADC? The ADC should take 10-15 minutes to complete. The checklist is simple to complete and contains instructions throughout. Once complete, the checklist can be scored using the attached scoring sheet. It is not a diagnostic tool but can be useful in highlighting areas of difficulty and identifying the need for further diagnosis, assessment or support.

Scoring and interpretation of the ADC. In order to get a joint score the adult needs to complete Section 1 (as a child) and Section 2 (current functioning) Each question is allocated a score as follows:

Never = 0 Sometimes = 1 Frequently = 2 Always = 3

Add Section 1 and Section 2 to give an overall total. The individual requires a score of at least 17 in Section 1 in order to meet the criteria of having past difficulties in childhood.

If this is the case then the combined score can be calculated. A score of: 56+ = DCD at risk, 65+ = Probable.

## Appendix 6 Letter of explanation to parents

**UCL EDUCATIONAL PSYCHOLOGY GROUP**  
RESEARCH DEPARTMENT OF CLINICAL, EDUCATIONAL  
& HEALTH PSYCHOLOGY



Dear Name,

You will remember that some years back you brought (name of son or daughter) to see me, Veronica Bidwell, at VB Associates, for an educational assessment.

I am getting in touch now to see if you and name might be willing to take part in a research project which I am undertaking at UCL (University College, London). I attach an information sheet which explains the nature and purpose of the research.

Why have I got in touch with you? Well, at the time of *name's* assessment he/she was clearly bright and able but was also experiencing some difficulties indicative of dyspraxia (also known as developmental coordination disorder – DCD). Signs of dyspraxia are, typically, poor handwriting and poor physical coordination. Many pupils experiencing dyspraxia have difficulty with personal organisation, with essay writing and with the planning and execution of tasks which include a sequence of actions. Together these areas of difficulty can, at times, make life in school something of a struggle.

There is relatively little research into what support and interventions are most helpful for such pupils or how school staff and parents can make a positive difference for them during the secondary school years – particularly during GCSE and 'A' levels.

This is what I am looking into and I would really like to hear about your experiences as a parent and your thoughts concerning this period of your child's education. It is a retrospective study and the young adults whom I am inviting to participate, along with their parents, are all now in their twenties and thirties.

I hope that you will consider participating in this study. It would involve you in completing a single online questionnaire which will take approximately 30 minutes (or less). The UCL ethics protocol requires that I have written consent from name for your involvement.

So, the first important step is for me to get in touch with Name. **I would be very grateful if you could pass on or forward the enclosed letter.**

It is entirely possible that I have identified name in error. If so I apologise. Nevertheless, it would be very helpful to hear back from you.

With many thanks and very best wishes,

Veronica Bidwell  
Educational Psychologist



## Appendix 7 Parent participation information sheet

**UCL EDUCATIONAL PSYCHOLOGY GROUP**  
RESEARCH DEPARTMENT OF CLINICAL, EDUCATIONAL &  
HEALTH PSYCHOLOGY



### **Parent Participant Information Sheet**

UCL Research Ethics Committee Approval ID Number: 13993/001

**PLEASE KEEP THIS COPY OF THE INFORMATION SHEET**

#### **Title of Study:**

**Dyspraxia – what helps and what hinders?** A survey of young adults and parents regarding their experience of secondary education.

**Department:** Educational Psychology Group, 26, Bedford way, London, WC1 H0AP

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#### **Name and Contact Details of the Researcher(s):**

Researcher: Veronica Bidwell, VB Consulting Group Woodchester Park House, Nympsfield, GL10 3UN

tel [REDACTED] [veronica.bidwell16@ucl.ac.uk](mailto:veronica.bidwell16@ucl.ac.uk)

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**Name and Contact Details of the Principal Researcher:** Principal Researcher: Dr. Roger Booker,

Research Tutor. Department of Educational Psychology, 26, Bedford Way, London.

[r.booker@ucl.ac.uk](mailto:r.booker@ucl.ac.uk)

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## **1. Invitation Paragraph**

You are invited to take part in a PhD research project but before you decide whether to go ahead it is important for you to understand why the research is being done and what your participation will involve. Please take time to read the following information and perhaps discuss it with others. Ask us if there is anything that is not clear or if you would like more information. Thank you for reading this.

## **2. What is the project's purpose?**

This is a retrospective study and the key aim is to ascertain what interventions and strategies were thought to have been of most benefit to pupils experiencing difficulties generally associated with dyspraxia during their time in secondary school.

What do we mean by dyspraxic difficulties? Dyspraxia (also known as developmental co-ordination difficulty (DCD)) is a common disorder affecting fine and/or gross motor coordination in children and adults. It is thought to be a lifelong condition. Researchers have, however, begun to look beyond the purely physical and to consider the impact of dyspraxia on other areas of life.

It has been noted that as pupils progress through secondary school to young adulthood poor physical skills become less of an issue and difficulty with central executive function and social skills become more evident. Central executive skills are a combination of mental and physical processes that enable people to perform a task. Poor central executive skills can, for example, impact planning and executing written work, carrying out a sequence of steps in a science experiment, finding the way around a new place, learning to drive or planning a revision timetable. Social interactions can also be tiring. In combination these difficulties can lead to stress and anxiety.

There is a growing body of research looking at the problems faced by the pupil experiencing dyspraxia who is taking GCSE and 'A' Levels either in relation physical difficulties or higher order tasks requiring

good central executive skills. There are almost no papers which consider best practice/interventions for these pupils or the impact of good practice on their ongoing academic attainment and achievement.

**This research project aims to gather a picture of effective best practice which can be disseminated and which will be of value in the future to teenage pupils, their parents and teachers.**

In order to achieve this goal the researcher is aiming to :

- Gather information from two key sources of information. The primary participants are a group of young adults (see below) and the secondary participants are the parent/s of these young adults.
- Information will be sought from all participants about what interventions, skills training, emotional support and environmental conditions the young adults may have experienced while they were in secondary school. Views will be sought about which experiences were helpful (or not) and which were thought were of greatest value during this time.
- Consider whether interventions reported to be helpful have had a long-term impact and have supported/helped the young adults as they progressed through higher education and into employment.
- Consider the contribution of the young adult's cognitive ability and personal attributes to educational as well as social and emotional outcomes.

### **3. Why have I been chosen?**

You are the parent/s of one of the 170 young adults aged between 20 and 38 who have been selected from a database of individuals who were assessed at VBAAssociates (an independent educational psychology practice) between 1998 and 2010. You have been selected because information gathered at the time of your child's assessment suggested that he/she had areas of difficulty that are generally associated with dyspraxia. He or she may never have had a 'diagnosis' and the researcher is aware that the selection process leading to his or her inclusion in the 170 young adults is not full proof. Your inclusion in the study would however, be much appreciated even if you think that he or she might have been wrongly identified as dyspraxic.

### **4. Do I have to take part?**

Participation in this project is entirely voluntary and even if you agree to take part and then at any stage change your mind you are free to withdraw your consent without prejudice. If data has already been collected, you will be asked if you wish it to be removed from the study. There is no penalty if you do not wish to participate or if, having agreed to take part, you change your mind. If you do decide to take part you will be given this information sheet to keep and you will be asked to sign a consent form.

## **5. What will happen to me if I take part?**

First you will need to read, sign and return the enclosed consent form. If you decide to take part you will then be requested to complete an online questionnaire. This includes questions about your memory of your child's difficulties as well as the help he or she received while in school. In addition you will be asked about your experience as a parent; for example what were the things which may have concerned you and what you're your views about the level of support and engagement which your child had with school staff. Completing the questionnaire should take approximately 20—30 minutes.

Your participation and that of your 'young adult' are independent. Neither your participation nor theirs depends upon the other agreeing to participate. Your engagement would be of great value even if he or she decides not to be involved. However, before you are able to complete the questionnaire the researcher must have obtained the consent of your young adult offspring for your involvement.

Data will be collected from you between April and August 2019.

## **6. What are the possible disadvantages and risks of taking part?**

You will be required to reflect back on earlier experiences of your child's time in school. If this was a difficult time for your child or yourselves it may raise personal concerns. If this is the case and you would like any form of support or information you may contact the researcher (by email or phone). Your concerns will be treated confidentially and totally independently of the research project. If requested the researcher will suggest other sources of help as and where appropriate.

## **7. What are the possible benefits of taking part?**

There are no immediate benefits for those people who kindly decide to participate in the research. Any outcomes will, hopefully, be of benefit to a younger generation. There is very little research which has attempted to ascertain what strategies and support is really beneficial for teenage pupils experiencing difficulties associated with dyspraxia. Participation would be an altruistic act but hopefully an interesting one. Participants will receive a summary of the outcomes. This will include information about which experiences, interventions and strategies provided during the secondary school years appear to have enhanced/supported (or had a negative impact on) the participants subsequent educational attainment, social engagement and emotional resilience.

## **8. What if something goes wrong.**

If you, as a participant, have any concerns or complaints about how the project is conducted, about the way in which you have been involved or other issue you should, in the first instance, contact the Principal Researcher (details on the front sheet). If the issues are not resolved to your satisfaction then you may contact the Chair of the UCL Research Ethics Committee – [ethics@ucl.ac.uk](mailto:ethics@ucl.ac.uk)

## **9. Will my taking part in this project be kept confidential?**

The completed online questionnaires will be automatically returned to the researcher. Any hard copy may be posted, to the researcher. The researcher will need, in the first instance, to access your

information in order to match it to your child's earlier assessment. During this stage of the project your data will be kept safely and securely. Personal data will be kept on a password protected personal computer encrypted by Microsoft's Bitlocker software which provides full-disc encryption. Any hard copy will be locked in a filing cabinet. For the next stage of the project any information which you provide will be fully anonymous. It will be entered into an SPSS data analysis programme which is to be used to identify any significant relationships between experience and outcomes. Participants will be anonymous in any subsequent reporting of the project.

## **10. Limits to confidentiality**

Confidentiality will be respected unless there are compelling and legitimate reasons for this to be breached. If this was the case we would inform you of any decision that might limit your confidentiality.

## **11. Use of Deception**

Research designs sometimes require that the full intent of the study not be explained prior to participation. This is not the case in this study and the full intent of the study is explained in this document.

## **12. What will happen to the results of the research project?**

The research will be written up for a PhD thesis, (with a target date of January 2021). Participants will be given the opportunity to access the thesis should they wish to. All participants will be anonymous.

## **13. Data Protection Privacy Notice**

**Notice:** : The data controller for this project will be University College London (UCL). The UCL Data Protection Office provides oversight of UCL activities involving the processing of personal data, and can be contacted at [data-protection@ucl.ac.uk](mailto:data-protection@ucl.ac.uk).

Further information on how UCL uses participant information can be found here: [www.ucl.ac.uk/legal-services/privacy/participants-health-and-care-research-privacy-notice](http://www.ucl.ac.uk/legal-services/privacy/participants-health-and-care-research-privacy-notice)

Parent participants will not be required to provide any personal data. The personal data sought with regard to the young adult participants will be used for the purposes outlined in this notice. The categories of personal data used will be as follows:

- Age,
- Gender,
- Description of specific learning difficulty – if applicable – at the time of the initial assessment and currently.
- Full scale, Verbal and Visual perceptual IQ scores attained at initial assessment
- Subsequent educational attainment
- Employment status and history
- Self reported wellbeing, social and physical engagement.

The legal basis that would be used to process their personal data will be performance of a task in the public interest.

Personal data will be kept so long as it is required for the research project. It will be held anonymously as soon as the parent and young adult questionnaires have been linked together and with the initial assessment data.

Participants have certain rights under data protection legislation in relation to the personal information that we hold about you. These rights apply only in particular circumstances and are subject to certain exemptions such as public interest (for example the prevention of crime). They include:

- The right to access your personal information;
- The right to rectification of your personal information;
- The right to erasure of your personal data;
- The right to restrict or object to the processing of your personal data;
- The right to object to the use of your data for direct marketing purposes;
- The right to data portability;
- Where the justification for processing is based on your consent, the right to withdraw such consent at any time; and
- The right to complain to the Information Commissioner's Office (ICO) about the use of your personal data.

If you are concerned about how your personal data is being processed, or if you would like to contact us about your rights, please contact UCL in the first instance at [data-protection@ucl.ac.uk](mailto:data-protection@ucl.ac.uk).

If you remain unsatisfied, you may wish to contact the ICO. Contact details, and further details of data subject rights, are available on the ICO website at: <https://ico.org.uk/for-organisations/data-protection-reform/overview-of-the-gdpr/individuals-rights/>

#### **14. Who is organising and funding the research?**

The organisation and funding of this research is the responsibility of the researcher with the support of the Department of Clinical, Educational and Health Psychology, UCL. There are no third parties involved in the organization and/or funding of the project.

#### **15. Contact for further information**

For further information please contact:

The Researcher, Veronica Bidwell,

Address: Woodchester Park House, Nympsfield, GL10 3UN

Mobile phone: [REDACTED]

email: [veronica.bidwell16@ucl.ac.uk](mailto:veronica.bidwell16@ucl.ac.uk)

Or Principal Researcher, Dr Roger Booker, Research Tutor.

Phone: [REDACTED] email: [r.booker@ucl.ac.uk](mailto:r.booker@ucl.ac.uk)

All participants will be given a copy of this information sheet and a signed consent form to keep.

**Thank you for reading through this document and for considering taking part in the research study. Your involvement would be very much appreciated.**

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## Appendix 8 Parent consent form

**UCL EDUCATIONAL PSYCHOLOGY GROUP**  
RESEARCH DEPARTMENT OF CLINICAL, EDUCATIONAL &  
HEALTH PSYCHOLOGY



### CONSENT FORM FOR 'PARENT' PARTICIPANTS IN THE RESEARCH STUDY.

**Please complete this form after you have read the Information Sheet and/or listened to an explanation about the research.**

**Title of Study:** Dyspraxia – what helps and what hinders? A survey of young adults and their parents regarding their experience of secondary education.

**Department:** Educational Psychology Group

**Name and Contact Details of the Researcher(s):** Veronica Bidwell, VB Consulting Group, Woodchester Park House, Nympsfield, GL10 3UN Mobile: [REDACTED] [veronica.bidwel16@ucl.ac.uk](mailto:veronica.bidwel16@ucl.ac.uk)

**Name and Contact Details of the Principal Researcher:** Dr. Roger Booker, Research Tutor. Department of Educational Psychology, 26, Bedford Way, London. WC1H 0AP Phone: [REDACTED] [r.booker@ucl.ac.uk](mailto:r.booker@ucl.ac.uk)

**Name and Contact Details of the UCL Data Protection Officer:** UCL Data Protection Officer: [data-protection@ucl.ac.uk](mailto:data-protection@ucl.ac.uk)

**This study has been approved by the UCL Research Ethics Committee: Project ID number:** 13993/001

Thank you for considering taking part in this research. The person organising the research must explain the project to you before you agree to take part. If you have any questions arising from the Information Sheet or explanation already given to you, please ask the researcher before you decide whether to join in. You will be given a copy of this Consent Form to keep and refer to at any time.

**I confirm that I understand that by ticking/initialling each box below I am consenting to this element of the study. I understand that it will be assumed that unticked/initialled boxes means that I DO NOT consent to that part of the study. I understand that by not giving consent for any one element that I may be deemed ineligible for the study.**



		Tick Box
1.	<p>*I confirm that I have read and understood the Information Sheet for the above study. I have had an opportunity to consider the information and what will be expected of me. I have also had the opportunity to ask questions which have been answered to my satisfaction.</p> <p>I would like to take part by completing online questionnaires.</p>	
2.	<p>*I understand that I will be able to withdraw any data which I provide up to up to three months after the dates on which I have provided personal data. I will not be required to give an explanation.</p>	
3.	<p>*I consent to the processing of the information which I provide with regard to the assessment, interventions and support which my (now) young adult child received while in secondary school. I understand that such information will be handled in accordance with all applicable data protection legislation. <b><u>Please note</u></b> that this information will only be sought with the written consent of the young adult.</p>	
4.	<p><b>Use of the information for this project only</b></p> <p>*I understand that all personal information relating to both myself and my family will remain confidential and that all efforts will be made to ensure I cannot be identified.</p> <p>I understand that confidentiality will be respected subject to legal constraints and professional guidelines</p> <p>I understand that my data gathered in this study will be stored anonymously and securely. It will not be possible to identify me in any publications.</p>	
5.	<p>*I understand that my information may be subject to review by responsible individuals from the University for monitoring and audit purposes.</p>	
6.	<p>*I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason, I understand that if I decide to withdraw, any personal data I have provided up to that point will be deleted unless I agree otherwise.</p>	
7.	<p>I understand the potential risks of participating and I understand that I may contact the researcher if I have any concerns or queries about my participation in this research.</p>	
8.	<p>I understand that no promises or guarantee of benefits have been made to encourage me to participate.</p>	
9.	<p>I understand that the data will not be made available to any commercial organisations but is solely the responsibility of the researchers undertaking this study.</p>	
10.	<p>I understand that I will not benefit financially from this study or from any possible outcome it may result in in the future.</p>	24

11.	I understand that I will not be compensated for the portion of time spent in the study or fully compensated if I choose to withdraw.	
12.	I understand that data provided by me will not be used by others for future research.	
13.	I understand that the information I have submitted will be published as a report and I wish to receive a copy of it. Yes/No	
14.	I hereby confirm that I understand the inclusion criteria as detailed in the Information Sheet and explained to me by the researcher.	
15.	I hereby confirm that:  (a) I understand the exclusion criteria as detailed in the Information Sheet and explained to me by the researcher; and  (b) I do not fall under the exclusion criteria.	
16.	I have informed the researcher of any other research in which I am currently involved or have been involved in during the past 12 months.	
17.	I am aware of who I should contact if I wish to lodge a complaint.	
18.	I voluntarily agree to take part in this study.	
19.	Use of information for this project and beyond  I agree that the data which I provide can be archived at the offices of the researcher in a locked cabinet or on an encrypted and password protected computer.  I understand that my anonymised data will not be shared with other researchers	
20.	<b>Overseas Transfer of Data</b>  I understand that my personal data will not be transferred.	

If you would like your contact details to be retained so that you can be contacted in the future by UCL researchers who would like to invite you to participate in follow up studies to this project, or in future studies of a similar nature, please tick the appropriate box below.

<input type="checkbox"/>	Yes, I would be happy to be contacted in this way	
<input type="checkbox"/>	No, I would not like to be contacted	

## Appendix 9 Letter of explanation to young adults

**UCL EDUCATIONAL PSYCHOLOGY GROUP**  
RESEARCH DEPARTMENT OF CLINICAL,  
EDUCATIONAL & HEALTH PSYCHOLOGY



Hi there,

I am not sure if you will remember me but you came to see me for an educational assessment some years back. I do hope it was a good and useful experience!

I am making contact now to ask if you will please consider taking part in a research project which I am undertaking at University College, London. Participation will involve completing two questionnaires. The first is a paper and pencil test which should take no more than 10 minutes. The second is an online questionnaire and will take a little longer.

Why you? Well, at the time of your assessment you were clearly bright and able but you were also experiencing some difficulties indicative of dyspraxia (also known as developmental coordination disorder – DCD). Signs of dyspraxia are, typically, poor handwriting and poor physical coordination. In secondary school pupils who are dyspraxic may find it hard to organise their thoughts into written form, they may find it difficult to sequence and carry out laboratory experiments or handle science equipment; they may experience difficulty with day to day organisation. Together these areas of difficulty can make life in school something of a struggle.

There is relatively little research into what support and interventions are most helpful for pupils with these difficulties or how school staff and parents can make a positive difference for them during the secondary school years – particularly during GCSE and ‘A’ levels.

This is what I am looking into and I would like to ask you about your experiences at this time. Were you, for example, allowed to use a laptop in class, did you have good study skills training, were your teachers positive about your work or did you feel criticised even when you had put in much effort?

This is a retrospective study; you and the other young adults whom I am inviting to participate are all now in your twenties and thirties. I would also like to hear about how you have got on since school and to have your permission to ask your parents a few questions.

The difficulties which I described above may or may not resonate with you. I apologise if I have identified you in error (which is entirely possible) but either way it would be fantastic if you agreed to take part in this project. Any information which you give me will be treated confidentially and you will be completely anonymous in any reports or other follow up publications

Please read through the information sheet which is attached and if you are happy to participate take a look at the consent form, sign it and return it to me in the enclosed sae.

With thanks and best wishes,  
Veronica Bidwell  
Educational Psychologist.

## Appendix 10 Young adult information sheet

**UCL EDUCATIONAL PSYCHOLOGY GROUP**  
RESEARCH DEPARTMENT OF CLINICAL, EDUCATIONAL & HEALTH PSYCHOLOG



### Young Adult Information Sheet

UCL Research Ethics Committee Approval ID Number: 1399/001

**PLEASE KEEP THIS COPY OF THE INFORMATION SHEET**

#### **Title of Study:**

**Dyspraxia – what helps and what hinders?** A survey of young adults and parents regarding their experience of secondary education.

**Department:** Educational Psychology Group, 26, Bedford way, London, WC1 H0AP

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#### **Name and Contact Details of the Researcher(s):**

Researcher: Veronica Bidwell, VB Consulting Group Woodchester Park House, , Nympsfield, GL10 3UN tel [REDACTED]

[veronica.bidwell16@ucl.ac.uk](mailto:veronica.bidwell16@ucl.ac.uk)

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**Name and Contact Details of the Principal Researcher:** Principal Researcher: Dr. Roger Booker, Research Tutor. Department of

Educational Psychology, 26, Bedford Way, London. [r.booker@ucl.ac.uk](mailto:r.booker@ucl.ac.uk)

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#### **16. Invitation Paragraph**

You are invited to take part in a PhD research project but before you decide whether to go ahead it is important for you to understand why the research is being done and what your participation will involve. Please take time to read the following information and perhaps discuss it with others. Ask us if there is anything that is not clear or if you would like more information. Thank you for reading this.

#### **17. What is the project's purpose?**

This is a retrospective study and the key aim is to ascertain what interventions and strategies were thought to have been of most benefit to pupils experiencing difficulties generally associated with dyspraxia during their time in secondary school.

What do we mean by dyspraxic difficulties? Dyspraxia (also known as developmental co-ordination difficulty (DCD) is a common disorder affecting fine and/or gross motor coordination in children and adults. It is thought to be a lifelong condition. Researchers have, however, begun to look beyond the purely physical and to consider the impact of dyspraxia on other areas of life.

It has been noted that as progress through secondary school to young adulthood poor physical skills become less of an issue and difficulty with central executive function and social skills become more evident. Central executive skills are a combination of mental and physical processes that enable people to perform a task. Poor central executive skills can, for example, impact planning and executing written work, carrying out a sequence of steps in a science experiment, finding the way around a new place, learning to drive or planning a revision timetable. Social interactions can also be tiring. In combination these difficulties can lead to stress and anxiety.

There has been very little research looking at the problems faced by the dyspraxic pupil taking GCSE and 'A' Levels either in relation to physical difficulties or higher order tasks requiring good central executive skills. There are no papers which consider best practice/interventions for these pupils or the impact of good practice on their ongoing academic attainment and achievement.

**This research project aims to gather a picture of effective best practice which can be disseminated and which will be of value in the future to teenage pupils, their parents and teachers.**

In order to achieve this goal the researcher is aiming to :

- Gather information from two key sources of information. The primary participants are a group of young adults (see below) and the secondary participants are the parent/s of these young adults.
- Information will be sought from all participants about what interventions, skills training, emotional support and environmental conditions the young adults may have experienced while they were in secondary school. Views will be sought about which experiences were helpful (or not) and which were thought were of greatest value during this time.
- Consider whether interventions reported to be helpful have had a long-term impact and have supported/helped the young adults as they progressed through higher education and into employment.
- Consider the contribution of the young adult's cognitive ability and personal attributes to educational as well as social and emotional outcomes.

#### **18. Why have I been chosen?**

You are one of 170 young adults aged between 20 and 38 who have been selected from a database of individuals who were assessed at VBAssociates (an independent educational psychology practice) between 1998 and 2010. You have been picked out because information gathered at the time of your assessment suggested that you had areas of difficulty that are generally associated with dyspraxia. You may never have had a 'diagnosis' and the researcher is aware that the selection process leading to your inclusion in the 170 young adults is not full proof. Your inclusion in the study would however, be much appreciated even if you think that you might have been wrongly identified as experiencing dyspraxia.

#### **19. Do I have to take part?**

Participation in this project is entirely voluntary and even if you agree to take part and then at any stage change your mind you are free to withdraw your consent without prejudice. If data has already been collected, you will be asked if you wish it to be removed from the study. There is no penalty if you do not wish to participate or if, having agreed to take part, you change your mind. If you do decide to take part you will be given this information sheet to keep and you will be asked to sign a consent form.

#### **20. What will happen to me if I take part?**

First you will need to read, sign and return the enclosed consent form. This form includes a request for your consent to retrieve information included in your childhood assessment report. This will be treated in strict confidence and will only be used anonymously.

It also requests your consent for the researcher to ask your parent/s if they will also participate. With your permission the researcher will ask them a number of factual questions regarding your initial assessment and about your time in school and, in addition, about their own experiences up to the point at which you left school. For example, helpfulness of school staff, provision of any additional support which they may have put in place. Your participation and your parent/s participation are independent. Neither your participation nor theirs depends upon the other agreeing to participate

If, and when, you have returned your consent form you will be asked to complete two online questionnaires. The first questionnaire is called the Adult Dyspraxia/DCD Checklist (ADC, Kirby et al, 2010). Responses to this questionnaire will indicate whether you can be categorized as 'probable DCD', 'at risk for DCD' or 'not DCD'. It also requests information about your level of educational attainment to date, your status as a student and/or your employment history. It takes about 10 – 15 minutes to complete.

Examples of questions are: 'did you have difficulty with writing neatly?' or 'did you have difficulty learning to ride a bike compared to your peers? Are you slower than others getting up in the morning and getting to work or college?' Ten questions relate to the past and 30 to the present. Responses are either 'yes' / 'no' or 'never', 'sometimes', frequently, 'always'.

The second questionnaire has been devised specifically for this study and also asks questions about the past and the present. This will take 15-20 minutes to complete.

Data will be collected from you between May and August 2019.

### **21. What are the possible disadvantages and risks of taking part?**

You will be required to reflect back on earlier experiences of your time in school. For some participants this may bring up unhappy or distressing memories and completion of the relevant questionnaire may not be entirely comfortable. If this is the case and you would like any form of support, counselling or information you may contact the researcher (by email or phone). Your concerns will be treated confidentially and totally independently of the research project. If requested the researcher will suggest other sources of help as and where appropriate.

### **22. What are the possible benefits of taking part?**

There are no immediate benefits for those people who kindly decide to participate in the research. Any outcomes will, hopefully, be of benefit to a younger generation. There is very little research which has attempted to ascertain what strategies and support is really beneficial for teenage pupils experiencing difficulties associated with dyspraxia. Participation would be an altruistic act but hopefully an interesting one. Participants will receive a summary of the outcomes. This will include information about which experiences, interventions and strategies provided during the secondary school years appear to have enhanced/supported (or had a negative impact on) the participants subsequent educational attainment, social engagement and emotional resilience.

### **23. What if something goes wrong.**

If you, as a participant, have any concerns or complaints about how the project is conducted, about the way in which you have been involved or other issue you should, in the first instance, contact the Principal Researcher (details on the front sheet). If the issues are not resolved to your satisfaction then you may contact the Chair of the UCL Research Ethics Committee – [ethics@ucl.ac.uk](mailto:ethics@ucl.ac.uk)

### **24. Will my taking part in this project be kept confidential?**

The completed questionnaires can be emailed, or hard copies posted, to the researcher. The researcher will need, in the first instance, to access your information in order to match it to your earlier assessment. During this stage of the project your data will be kept safely and securely. Personal data will be kept on a password protected personal computer encrypted by Microsoft's Bitlocker software which provides full-disc encryption. Any hard copy will be locked in a filing cabinet. For the next stage of the project your data will be fully anonymous. It will be entered into an SPSS data analysis programme which is to be used to identify any significant relationships between experience and outcomes. Participants will be anonymous in any subsequent reporting of the project.

### **25. Limits to confidentiality.**

Confidentiality will be respected unless there are compelling and legitimate reasons for this to be breached. If this was the case we would inform you of any decision that might limit your confidentiality.

### **26. Use of Deception**

Research designs sometimes require that the full intent of the study not be explained prior to participation. This is not the case in this study and the full intent of the study is explained in this document.

### **27. What will happen to the results of the research project?**

The research will be written up for a PhD thesis, (with a target date of January 2021). Participants will be given the opportunity to access the thesis should they wish to. All participants will be anonymous.

### **28. Data Protection Privacy Notice**

**Notice :** The data controller for this project will be University College London (UCL). The UCL Data Protection Office provides oversight of UCL activities involving the processing of personal data, and can be contacted at [data-protection@ucl.ac.uk](mailto:data-protection@ucl.ac.uk).

Further information on how UCL uses participant information can be found here: [www.ucl.ac.uk/legal-services/privacy/participants-health-and-care-research-privacy-notice](http://www.ucl.ac.uk/legal-services/privacy/participants-health-and-care-research-privacy-notice)

Your personal data will be used for the purposes outlined in this notice. The categories of personal data used will be as follows:

- Age,
- Gender,
- Description of specific learning difficulty – if applicable – at the time of the initial assessment and currently.
- Full scale, Verbal and Visual perceptual IQ scores attained at initial assessment
- Subsequent educational attainment
- Employment status and history
- Self reported wellbeing, social and physical engagement.

The legal basis that would be used to process your personal data will be performance of a task in the public interest.

Your personal data will be kept so long as it is required for the research project. It will be held anonymously as soon as the parent and young adult questionnaires have been linked together and with the initial assessment data.

You have certain rights under data protection legislation in relation to the personal information that we hold about you. These rights apply only in particular circumstances and are subject to certain exemptions such as public interest (for example the prevention of crime). They include:

- The right to access your personal information;
- The right to rectification of your personal information;
- The right to erasure of your personal data;
- The right to restrict or object to the processing of your personal data;
- The right to object to the use of your data for direct marketing purposes;
- The right to data portability;
- Where the justification for processing is based on your consent, the right to withdraw such consent at any time; and
- The right to complain to the Information Commissioner's Office (ICO) about the use of your personal data.

If you are concerned about how your personal data is being processed, or if you would like to contact us about your rights, please contact UCL in the first instance at [data-protection@ucl.ac.uk](mailto:data-protection@ucl.ac.uk).

If you remain unsatisfied, you may wish to contact the ICO. Contact details, and further details of data subject rights, are available on the ICO website at: <https://ico.org.uk/for-organisations/data-protection-reform/overview-of-the-gdpr/individuals-rights/>

### 29. Who is organising and funding the research?

The organisation and funding of this research is the responsibility of the researcher with the support of the Department of Clinical, Educational and Health Psychology, UCL. There are no third parties involved in the organization and/or funding of the project.

### 30. Contact for further information

For further information please contact:

The Researcher, Veronica Bidwell,  
Address: Woodchester Park House, Nympsfield, GL10 3UN  
Mobile phone: [REDACTED]  
email: [veronica.bidwell16@ucl.ac.uk](mailto:veronica.bidwell16@ucl.ac.uk)

Or Principal Researcher, Dr. Roger Booker, Research Tutor.  
Educational Psychology, 26, Bedford Way, London, WC1H 0A  
email: [r.booker@ucl.ac.uk](mailto:r.booker@ucl.ac.uk)

Address: Department of

Phone: [REDACTED]

All participants will be given a copy of this information sheet and a signed consent form to keep.

**Thank you for reading through this document and for considering taking part in the research study. Your involvement would be very much appreciated.**

## Appendix 11 Young adult consent form

### UCL Educational psychology group

RESEARCH DEPARTMENT OF CLINICAL, EDUCATIONAL &  
HEALTH PSYCHOLOGY



#### CONSENT FORM FOR THE YOUNG ADULT PARTICIPANTS IN THE RESEARCH STUDY.

Please complete this form after you have read the Information Sheet and/or listened to an explanation about the research.

**Title of Study: \_Dyspraxia – what helps and what hinders?** A survey of young adults and parents regarding their experience of secondary education.

**Department:** Educational Psychology Group

**Name and Contact Details of the Researcher(s):** Veronica Bidwell, VB Consulting Group, Woodchester Park House, Nympsfield, GL10 3UN Mobile: [REDACTED] [veronica.bidwell16@ucl.ac.uk](mailto:veronica.bidwell16@ucl.ac.uk)

**Name and Contact Details of the Principal Researcher:** Dr. Roger Booker, Research Tutor. Department of Educational Psychology, 26, Bedford Way, London. WC1H 0AP Phone: [REDACTED] [r.booker@ucl.ac.uk](mailto:r.booker@ucl.ac.uk)

**Name and Contact Details of the UCL Data Protection Officer:** UCL Data Protection Officer: [data-protection@ucl.ac.uk](mailto:data-protection@ucl.ac.uk)

**This study has been approved by the UCL Research Ethics Committee: Project ID number: \_\_13993/001\_\_\_\_\_**

Thank you for considering taking part in this research. The person organising the research must explain the project to you before you agree to take part. If you have any questions arising from the Information Sheet or explanation already given to you, please ask the researcher before you decide whether to join in. You will be given a copy of this Consent Form to keep and refer to at any time.

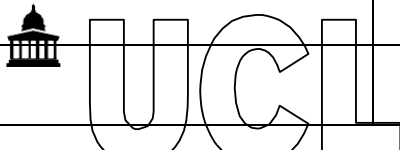
**I confirm that I understand that by ticking/initialling each box below I am consenting to this element of the study. I understand that it will be assumed that unticked/initialled boxes means that I DO NOT consent to that part of the study. I understand that by not giving consent for any one element that I may be deemed ineligible for the study.**

		Tick Box
1.	*I confirm that I have read and understood the Information Sheet for the above study. I have had an opportunity to consider the information and what will be expected of me. I have also had the opportunity to ask questions which have been answered to my satisfaction.  I would like to take part by completing online questionnaires.	
2.	*I understand that I will be able to withdraw my data up to up to three months after the dates on which I have provided personal data. I will not be required to give an explanation.	
3.	*I consent to the processing of my personal information with regard to interventions and support in secondary school as well as information about my current status as a student and/or as an employee for the purposes explained to me. I understand that such information will be handled in accordance with all applicable data protection legislation.	25



4.	*I consent to the use of information recorded at the time of my childhood assessment. This will also be handled in accordance with all applicable data protection legislation.	
5.	<p>*I understand that the researcher wishes to include my parents in this research. I give my consent for my parent/s to respond to questions relating to the following</p> <p>a) Factual questions regarding my initial assessment and any areas of difficulty which were identified at that time and during the time that I was in school. YES/NO</p> <p>b) Questions about their own experiences up to the point at which I left school. For example, helpfulness of school staff, provision of any additional support which they may have put in place. YES/NO</p> <p>c) Their feelings/views on my progress since leaving school. YES/NO</p> <p>d) I wish to see the parent questionnaire prior to giving consent. YES/NO</p>	
6.	<p><b>Use of the information for this project only</b></p> <p>*I understand that all personal information will remain confidential and that all efforts will be made to ensure I cannot be identified.</p> <p>I understand that confidentiality will be respected subject to legal constraints and professional guidelines</p> <p>I understand that my data gathered in this study will be stored anonymously and securely. It will not be possible to identify me in any publications.</p>	
7.	*I understand that my information may be subject to review by responsible individuals from the University for monitoring and audit purposes.	
8.	*I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason, I understand that if I decide to withdraw, any personal data I have provided up to that point will be deleted unless I agree otherwise.	
9.	I understand the potential risks of participating and the support that will be available to me should I become distressed during the course of the research.	
10.	I understand that no promises or guarantee of benefits have been made to encourage me to participate.	
11.	I understand that the data will not be made available to any commercial organisations but is solely the responsibility of the researchers undertaking this study.	
12.	I understand that I will not benefit financially from this study or from any possible outcome it may result in in the future.	
13.	I understand that I will not be compensated for the portion of time spent in the study or fully compensated if I choose to withdraw.	
14.	I understand that data provided by me will not be used by others for future research.	
15.	I understand that the information I have submitted will be published as a report and I wish to receive a copy of it. Yes/No	
16.	I hereby confirm that I understand the inclusion criteria as detailed in the Information Sheet and explained to me by the researcher.	
17.	<p>I hereby confirm that:</p> <p>(a) I understand the exclusion criteria as detailed in the Information Sheet and explained to me by the researcher; and</p> <p>(b) I do not fall under the exclusion criteria.</p>	
18.	I agree that my GP may be contacted if any unexpected results are found in relation to my health.	
19.	I have informed the researcher of any other research in which I am currently involved or have been involved in during the past 12 months.	
20.	I am aware of who I should contact if I wish to lodge a complaint.	
21.	I voluntarily agree to take part in this study.	
22.	<p>Use of information for this project and beyond</p> <p>I agree that the data which I provide can be archived at the offices of the researcher in a locked cabinet or on an encrypted and password protected computer.</p> <p>I understand that my anonymised data will not be shared with other researchers</p>	
23.	<p><b>Overseas Transfer of Data</b></p> <p>I understand that my personal data will not be transferred.</p>	

If you would like your contact details to be retained so that you can be contacted in the future by UCL researchers who would like to invite you to participate in follow up studies to this project, or in future studies of a similar nature, please tick the appropriate box below.

	Yes, I would be happy to be contacted in this way	
	No, I would not like to be contacted	

Name of participant	Date	Signature

## Appendix 12 Letter of approval from the Research Ethics Committee chairman

### UCL RESEARCH ETHICS COMMITTEE

### OFFICE FOR THE VICE PROVOST RESEARCH

29<sup>th</sup> November 2018

**Dr Roger Booker**  
 Research Department of Clinical, Educational and Health Psychology  
 UCL

Dear Dr Booker

#### Notification of Ethics Approval with Provisos

**Project ID/Title: 13993/001: Dyspraxia – what helps, what hinders? A survey of young adults and parents regarding their experience of secondary education**

**I am pleased to confirm in my capacity as Chair of the UCL Research Ethics Committee (REC) that your re-submitted application has been ethically approved by the UCL REC until 29th November 2019.**

Ethical approval is subject to the following conditions:

**Notification of Amendments to the Research**

You must seek Chair's approval for proposed amendments (to include extensions to the duration of the project) to the research for which this approval has been given. Each research project is reviewed separately and if there are significant changes to the research protocol you should seek confirmation of continued ethical approval by completing an 'Amendment Approval Request Form' <http://ethics.grad.ucl.ac.uk/responsibilities.php>

## **Adverse Event Reporting – Serious and Non-Serious**

It is your responsibility to report to the Committee any unanticipated problems or adverse events involving risks to participants or others. The Ethics Committee should be notified of all serious adverse events via the Ethics Committee Administrator ([ethics@ucl.ac.uk](mailto:ethics@ucl.ac.uk)) immediately the incident occurs. Where the adverse incident is unexpected and serious, the Joint Chairs will decide whether the study should be terminated pending the opinion of an independent expert. For non-serious adverse events the Joint Chairs of the Ethics Committee should again be notified via the Ethics Committee Administrator within ten days of the incident occurring and provide a full written report that should include any amendments to the participant information sheet and study protocol. The Joint Chairs will confirm that the incident is non-serious and report to the Committee at the next meeting. The final view of the Committee will be communicated to you.

## **Final Report**

At the end of the data collection element of your research we ask that you submit a very brief report (1-2 paragraphs will suffice) which includes in particular issues relating to the ethical implications of the research i.e. issues obtaining consent, participants withdrawing from the research, confidentiality, protection of participants from physical and mental harm etc.

Office of the Vice Provost Research, 2 Taviton Street

University College London

Tel: +44 (0)20 7679 8717

Email: [ethics@ucl.ac.uk](mailto:ethics@ucl.ac.uk)

<http://ethics.grad.ucl.ac.uk/>

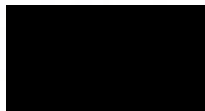
### **In addition, please:**

- ensure that you follow all relevant guidance as laid out in UCL's Code of Conduct for Research: <http://www.ucl.ac.uk/srs/governance-and-committees/resgov/code-of-conduct-research>
- note that you are required to adhere to all research data/records management and storage procedures agreed as part of your application. This will be expected even after completion of the study.

With best wishes

for the research.

Yours sincerely



**Dr Lynn Ang**

**Joint Chair, UCL Research Ethics Committee**

**Cc: Veronica Bidwell**

## Appendix 13 Code book

### CODEBOOK

COLUMN	SPSS NAME	VARIABLE	CODE INSTRUCTIONS	MEASUREMENT SCALE.
A,	ID No	Identification number	number assigned to each participant.	Scale
B,	Parent	parent or no parent	1=yes 19=no	Nominal
C,	Gender	Gender	1=male 2=female 3=other	Nominal
D,	age now	age group now	1=20-24 2=25-29 3=30-34 4=35-40	Ordinal
E,	Age ass	Age at time of assessment	1=8 or less 2=9-12 years 3=13-18 years 4=19 plus years	Ordinal
F,	Test	WISC 111 or WISC 1V	1=Wisc III 2=Wisc IV	nominal
G	VS score	Verbal scale score	Actual score	Scale
H	PS score	Processing score or Performance scale. score	Actual score	Scale
I	ADC ch	ADC scores in childhood	1=16 and below 2=17 and above	Ordinal
J	act score	ADC score as total number	Total score as number	Scale
K	ADC cat	ADC category	1=probable 2=possible 3=not	Ordinal
L	YA diag	Young Adult view of diagnosis.	Question 54  1= not at all and 5=very much so	Scale
M	Pt diag	Parent view of diagnosis	Question 7 1 = not at all and 5= very much so. 19=no parent	Scale
N	Typ sch	type of secondary school	1=comprehensive 2=grammar 3=independent day 4. independent boarding	Nominal
O	oth diffs	Did this participant experience additional difficulties.	0=no difficulties 1=dyslexia 2=dyslexia + ADHD 3=dyslexia + ASD 4=dys, ASD + ADHD 5=ADHD 6=ADHD+ASD 7=ASD	Nominal

P	pt other	Did parent think that the YA experienced additional difficulties?	0=no difficulties 1=dyslexia 2=dyslexia + ADHD 3=dyslexia + ASD 4=dys, ASD + ADHD 5=ADHD 6=ADHD+ASD 7=ASD 19=no parent	Nominal
Q	OT	Parent response to whether their child received OT	1=yes 2=no 19=NA (no parent)	nominal
R	Soc ease	social ease	Question 5,7,8 and 10 1= not at ease 5=very much so REVERSE SCORES 7 AND 8.	Scaled
S	Social part	social participation	Question 6 and 9. Scaled score 1=never 5=frequently.	scaled
T	Spor part	Sports participation. Team sports AND avoidance of activities requiring coordination.	question 12 and 14 scale scores 1=never 5=frequently REVERSE QUESTION 14	scaled
U	Sch diffs	difficulties experienced in school.	questions 16, 17, 18, 19, 20, 21, 22 1= no difficulties 5=very much so	Scaled
V	impt pt	impact of DCD on pupils confidence etc.	question 17 0=no impact through 18 where significant problem. 19= no parent response.	scaled
W	laptop	use of laptop in school, at home and for exams	Question 24 (parent q 12) 1=yes 2=no	nominal
X	ex con	exam concessions. Extra time, use of laptop.	Question 26. 1=yes 2=no	nominal
Y	st skills	study skills input benefit of same	Question 29 1=yes 2=No	nominal
Z	self aware	self-awareness/self-management	Question 31 1=yes 2=no	nominal

AA	Intv pts	Help at home and parent understanding.	questions 32,38 1=not at all 5=very much so	Scale
AB	Motiv	motivation and work levels	questions 33,34 1=not at all 5 =very much so	Scale
AC	ya sup sch	support and understanding of staff	questions 36, 37 1 not at all 5 very much so.	Scale
AD	pt sup sch	parent perception of support from school.	Pt question 21,22,23 scaled scores. 1 =not at all. 5= very much	Scale
AE	sup hom	Emotional support from home	questions 32, 38, 39 Scaled scores 1 = not at all 5=very much so.	Scale
AF	therapy	Therapy or counselling during school years.	question 40 1=yes 2=no	nominal
AG	status	work stats; student, employed, neither etc	question 65 and parents 24  1-studying 2=employed 3=training 4=apprenticeship 5=none	nominal
AH	Soc ease	social engagement now	questions 42, 43 scaled scores 1 not at all 5 very much so	Scale
AI	Exercise	Exercise	question 44 do you take reg exercise. 1=yes 2-no	ordinal
AJ	Stress red	participation in activities to reduce stress.	question 48 scaled score 1 never 5 often.	scale
AK	well be	well being	question 46, 47 and 49. do you stress easily. so you get depressed do you have panic attacks 1 not at all 5 very much so. scale 1-5.	Scale
AL	Medication	use of medication for stress and anxiety	question 50 1 yes 2 no	nominal
AM	impact	impact on life	question 58, 1=no impact 5=very much so.	scale
AN	resil pts	Parents view of YA resilience	question 26,28,29,30 PQ 1=not at all resilient	Scale

			5= very resilient. 19=no parent  SCORES FOR 26 AND 28N NEED TO BE REVERSED.	
AO	att to dcd	attitude to DCD . negative or positive (can do)	question 55 56 scaled scores where 1=it's a disadvantage and can't be managed. 5=not at all SCORE FOR 55 NEEDS TO BE REVERSED.	Scale
AP	Ac ach	academic achievement GCSE, A level and degree results combined .	Score derived from number and level of GCSE, A level and degree where:  GCSE results 1-3 = score of 1 4-6 =score of 2 7-9 =score of 3 10+ =score of 4  A level A grade =5 B grade =4 C grade=3 D grade =2  Higher ed degree=4 masters=6	ordinal 1-24
AQ	therapy	Counselling or therapy now	question 51 1=Yes 2=no	nominal

Appendix 14 Phase 2 of the thematic analysis process. An illustration of 'finding the smallest units of data which could be analysed in a meaningful way.

**52. Further comments relating to health and happiness if you have any.**

26

i am somewhat socially awkward, and it's led to me being quite lonely in some ways which is not the worst thing in the world however i do think that that comes from struggling to make a large friend group in school

25 no comment

24 I'd like to think I have a fairly even keel as regards temperament and stress. I do not have depressive episodes, anxiety attacks etc. If there are things that weigh on me they are the same as for many other women of my age, e.g. likelihood of marriage, children, the state of the world, minor job worries etc. I am reasonably healthy, take part in yoga, Pilates etc, but more to maintain my figure rather than because they serve to de-stress me, though that is a nice side effect!

23 no comment

22 I have anxiety

**21. Really enjoy walking both as a physical activity and for relaxation.**

20 I have low self worth and am quite insecure about my ability/ capabilities at work. I really really hate how disorganised and chaotic I am and I believe that the way I felt quite inadequate at school has contributed to some of this. But I have sought support for this and am becoming more accepting of how I am as I have gotten older. I believe my grit and determination have been protective and helped me to get good grades and a good job, etc. And when I'm beating myself out I turn to my network of friends and colleagues to get their perspective, which always really helps to ground me and get a reality check. Happiness wise I am relatively happy and count myself as very fortunate. And health wise I am well, for which I'm grateful.

19 no comment



18 Sadly depression has lingered on since the school days and the anxiety with it. Work can at times be hugely stressful and juggling/organising my life makes this even harder. I'm hugely insecure from the school years and the humiliation i suffered in one school/from students and teachers. I still to this day struggle to know what i'm good at or to use my strengths. I still also struggle to organise/time keep and structure my life.

17 no reply

16. nothing

15 Post school/beginning of university I had lots of stress around academic performance. This led into depression and changing university.

14 I have been taking medication for anxiety related difficulties since the age of 14, when I was diagnosed with Obsessive Compulsive Disorder. Since then, with the help of Cognitive Behavioural Therapy, I have been more able to control my moods and emotions.

13. nothing

12. Being an actor in TV/Film the pressure and stress of the job can leave me feeling deeply depressed. I firmly believe that is the system I'm operating in rather than my genetic disposition. Having two small children and getting very little sleep also adds to the pressure.

11. nothing

10 Currently in my second programme of CBT for a panic and anxiety disorder. Also, tried hypnotherapy which didn't seem to have an effect.

9 nothing

8. I have dealt with a few different mental health issues throughout my life though I am in a far better position now than I ever have been, everything is very much on the mend.

7. I have **struggled with these problems** for a long time and they have greatly impacted my life. I have found when I left alone to learn and **go at my own pace I do much better**. Especially when something is given a practical application.

6 and 5 nothing

4. nothing

**3. I have a history of anxiety and panic attacks. I mediate this with yoga** and trying to manage my workload. I would generally say I am a happy person who has a tendency to get too fixated on work during term time (I am a teacher.)

2. **Prefer my own company but can socialise when needed**

1. Can get depressive but am getting better at dealing with that. I shouldn't be happy with where I'm at anyway, because I haven't got there yet – 'there' being that serious job and that successful adult life.

## Appendix 15 Thematic analysis showing phase 4 of the thematic analysis

process.

This stage involved the refinement of the sub-themes which had been established. This was once again completed question by question. Sub-themes were eliminated where there was insufficient data to sustain a theme (except where the researcher considered it to be of particular relevance) and some themes were collapsed into other themes where, on reflection, they might fit as a single theme. The principles followed were that the full texts (represented by a particular code) which were grouped as a theme should be coherent as a group. The themes were also considered as to whether they captured a concept or idea which could stand alone.

The themes to emerge will now be described in six parts.

Part 1. In this section consideration is given to the young adults' experiences, whilst in school, in relation to academic skills, social engagement, sports participation and support/help/interventions provided.

Part 2. The young adult participants provide a picture of their current situation in relation to the ways in which DCD continues to impact their day to day lives (as students, as employees and in general) in relation to their social ease and wellbeing. They comment on their wellbeing and attitude to the disability.

Part 3. The participants reflect on the quality and value of the support provided by school, home and outside agencies.

Part 4. Parents give their view on the main areas of difficulty which their child experienced during secondary school. They consider the level and effectiveness of the support required the level of involvement which they felt they needed to provide and the impact which difficulties may have had on their child's general demeanour.

Part 5. Parents consider how the difficulties experienced by their now adult child have changed over time.

Part 6. Parental reflections. With the benefit of hindsight, what advice they might give to other parents and what they wish they could have changed.

### Part 1

**Question 23. Were there other areas (of academic difficulty) which you found particularly difficult or frustrating? If so please comment.**

(Participants had already indicated on the Likert scale whether they had difficulty with handwriting, coping from the board, note taking, revision and structuring written work).

Two main themes emerged:

- **Difficulty with activities involving Information processing and executive function skills.**
- **Lack of understanding within the school community about DCD and the consequent emotional impact on participants.**

**Information processing and executive function.** Information processing incorporates the ability to process and retain information effectively and at speed and to follow instruction and process verbal information whilst ‘doing’ a physical action. For example;

- *I found it really hard to keep pace with teaching on a topic and so would not fully understand all the information at the time and would struggle to go straight to a worksheet in class and apply this new knowledge in the same way my peers could.*
- *I always found it hard to listen and write notes at the same time as I couldn't concentrate on both. I also remember having trouble concentrating for the whole duration of lessons - especially in a subject I found harder*
- *I could not copy off the board fast enough and the teacher would wipe off the information before I could process it and copy it down.*

It also incorporated activities relating to learning new skills and how to carry out work assignments. It covers ‘how’ to learn and operate rather than what to learn.

For example:

- *Essay writing was difficult as they wanted them written in a very particular way.*
- *I found and still find that the way I structure stuff when I take or need to present is not very logical/ aesthetically appealing which makes it harder to follow or understand.*
- *Once I learned how to revise effectively that ceased to be an issue. taking notes, structuring work was fine once I learned to touch type and could use a computer for school and exams.*

**Lack of understanding about DCD and the consequent emotional impact on participants.**

- *I remember also always being frustrated by a lack of understanding around dyspraxia and comments I used to get along the lines of 'you can't be dyspraxic because you're at this (very academic) school'.*
- *The teachers would tease me about it (lack of focus in class) and my inability to do homework and it became a kind of running joke within the school. In turn, this made me want to work even less. This situation made it harder for my teachers to notice that I was struggling.*
- *(It was frustrating) Knowing more than I could put into words or on paper. Now seeing that I was better than the box I was put into.*

**Question 11 what made you feel you were a valued member of your school community?**

This question brought out two themes.

- **Belonging. Group membership – acceptance and respect.**
- **Issues around special talents.**

The first theme related to the value and importance of belonging to a group – any group – so long as member ship brought with it acceptance and respect. Responses were both

positive and negative. Some participants described their positive experiences of being group members:

- *I managed to find an output that made me feel valued. Though not academically gifted, by acting on stage and becoming head of house/prefect I felt invested in “the system”.*
- *I was involved in a sports team, was a sixth form prefect and a member of a Peer Support team for younger years.*
- *Student run societies etc made it possible to become a visible figure within the school without it having to centre on sport. School gave us time to pursue big projects if we wanted and worked hard*

Not all participants found it easy to belong:

- *I didn't really get involved in extracurricular activities, so I did not feel a valued member of the school community. I did not feel welcomed by students or teachers as I did not have the same interests.*
- *Felt left out. Almost all of my year was made prefects, except me. Very cliquey year. Teachers had definite favourites*
- *I always saw my value in comparison to their (other students) levels of achievement and so I think always felt conscious of being different to them and in that way less valuable.*

The second theme related to the kudos associated with having a gift or talent but also mentions the tenuous nature of this situation.

**Special talents.** A special gift or talent brought several participants a sense of kudos, but they felt that their value within school related only to the strength and ability to demonstrate the talent.

- *‘The only thing I was ever acknowledged for at School was my singing’. Another report that*
- *‘I was admitted on a drama scholarship, so I had a lot of opportunity and was encouraged to get involved in school events’.*

Participants who mentioned how their particular talents with music and drama had brought them into the limelight also indicated the tenuous nature of this situation. For example

- *‘once I stopped (singing) in my final year of Sixth Form I was no longer relevant or of value.*
- *‘This (my singing ability) looked good for the School at important/prestigious events however, I always consistently felt (and was told on several occasions as were my parents) that this ability was my ‘saving grace’.*

**Questions 12 and 13. Did you participate in team sports either in or out of school? Comment on whether you enjoyed these activities. Did you participate in individual sports/physical activities? What did you enjoy and why?**

The thirty-seven responses to these two questions were amalgamated and two themes were identified. Responses were counted.

- **Enjoyment of physical activities. Most frequently non team sports 41.%**
- **Dislike of team sports, embarrassment and letting down the team. 59%**

The first theme relates to the enjoyment of physical activities but only three out of 15 comments involve team sports and the rest relate to individual endeavours. For example:

- *Enjoyed fencing at international level*
- *Focussed on long distance running and swimming*
- *Loved dance and swimming*

The second theme related to discomfort with team sports and with specific situations. 59%

- *Couldn't hit a ball with accuracy*
- *Hated team sports*
- *Didn't like it when other team members relied on me.*

#### **Question 41. What is your overall impression of the way you were treated in school during key stages three and four?**

Three key themes emerged:

- **An appreciation of support demonstrated by some teachers.**
- **A lack of understanding on the part of some teachers.**
- **Feeling different and being bullied**

#### **Appreciation of support demonstrated by some teachers.**

- *I felt the majority of the teachers were supportive and recognised my potential.*
- *Teachers who were able to react and empathise based on emotional intelligence and their ability to understand students through personal interactions were able to understand me far better.*
- *My impression is that most of the men and women who taught me were kind and conscientious people, even if they did not always understand my problems.*

#### **Lack of understanding on the part of some teachers.**

- *My teachers were frustrated with me and I was frustrated with my teachers. It was generally quite difficult, and I was made to feel like I was a problem to be dealt with rather than just another student trying to get through my exams.*
- *Teachers didn't really understand my educational needs and didn't offer proper support in classes or in exams. If I didn't understand something, teachers just left me to figure it out. Some teachers didn't believe my dyslexia or dyspraxia was a real thing*
- *- little to no understanding was given to my struggles working. where my strengths were and how to use the strengths and combat the weaknesses. i would often languish behind due to being late, getting work wrong, not knowing what to revise and generally falling behind. no mentor or advice was given and left school with no idea who i was or how to ascertain myself or work around my difficulties.*

#### **Feeling different and being bullied**

- *In terms of relationships with my peers, I was bullied up until Year 10, when I stopped trying to please people who would never want to be my friends, and instead spent my time with the few people who I got along with.*
- *I got bullied a lot and really struggled with secondary school. I dreaded going to school each day.*

## **Part 2.**

**Question 32. Did your parents give you help with the following (homework, personal organisation, study skills, revision, time management) ? If they did please comment on how helpful you found this.**

Three main themes emerged relating to the value of and part played by parental input in relation to:

- **Organisation, structures, time management. (study skills/executive function)**
- **Revision and homework**
- **Parents sourcing support from other sources.**

Not all participants had knowledgeable or supportive parents and a fourth theme relates to:

- **Lack of skills and knowledge to provide help.**

### **Organisation, structures, time management. (study skills/executive function)**

- *They tried to help me to focus by doing all work and revision at the kitchen table so I wouldn't get distracted.*
- *Personal organisation and time management.*
- *My parents were very active in supporting me and helping me to create structures with which to organise my life the whole way through school, particularly during exam periods.*

### **Revision and Homework**

- *When I was revising my mum would help*
- *And they would motivate us to revise for exams.*
- *I found support with revision particularly helpful around public exams as I got older as my mum was really able to help me organise my work/revision timetable and ensure I was getting through all the subjects in an organised way and prioritising work tasks which I would not have been able to manage myself.*

### **The organisation of outside specialist help for learning, coordination, counselling, therapy and also for liaising with school.**

- *I cannot thank my Family enough for all the work they put in for me over the years. And the way they had a dialogue with the school to ensure I got the best system of support possible.*
- *My parents took me to see therapists helping me with co-ordination and behavioural problems between the ages of 5-11.*

- *From a very young age to my late teens, I often saw specialists in learning development, From physio to academic organisation, I received a lot of help at home*

### **Lack of ability to help**

- *My parents were not traditionally educated people*
- *Both my parents found it difficult to understand that I was struggling with school at all. They knew about my dyspraxia diagnosis, but I don't think they had any idea of the extent to which it affected me as dyspraxia isn't as obvious or visible as other learning disabilities. Most of the time asking for help resulted in an argument as both of Parental support 32*

Themes one and two provide the bulk of the responses. The help appears to have been appreciated which suggests that the participants were aware of their difficulties with personal organisation, structuring work and managing time. They also appreciated support with homework and revision. A small number mention the additional specialist support provided from other specialists.

Just two of the participants refer to their parents' lack of knowledge as a barrier to providing help. The participants in this study are a very particular group who have educated, engaged and supportive parents. This is not the case universally therefore the comments about the difficulties which ensue for pupils with parents who lack knowledge about DCD and are not able to provide support is of great relevance for most pupils in schools today.

The following quote really sums up the spirit of responses. *'I don't think I would have passed any exam without my mum helping me!'*

### **Question 40. Did you have any form of therapy or counselling either in school or out of school? if yes please comment in the box on how helpful this was.**

Responses were given by a minority of participants. Responses were diverse; they were generally positive but there were insufficient replies to find an emerging theme.

- *'I was in therapy and counselling for different reasons from the age of ten to the present. I have found therapy to be extremely helpful in helping me to organise my brain and to not become overwhelmed'*
- *'Some therapy was very helpful others not so much – still to this day I feel unresolved with the topics discussed'*
- *'Therapy was not for my schooling issues – more to do with bullying etc. but I did find it helpful to deal with my issues'*

One participant mentions that therapy was set up for her 'cripplingly low self-esteem.

### **Question 24. Did you complete your work in, or out, of school on a laptop/desktop computer**

Whilst all participants had the use of a word processor for work at home and in school few elaborated on the value and usefulness of this facility. Where they have commented it appears that typing school work and exams was considered to be of benefit.

- *I learnt to touch type and used a computer in all my written exams. Touch typing really helped me as it allowed me to write as fast as I thought.*



- *I remember one teacher who refused to grade my work with any acknowledgement of my difficulties and would mark me down. The following year when I started to use a computer for exams and lessons, I think that made a difference.*

**Question 30. If you received study skills how useful did you find it?**

All but four participants received study skills training in a group situation. Topics mentioned included note taking, essay planning, revision techniques, spider diagrams and Greek memory techniques and mind mapping. Where an opinion was given on the benefit of these sessions there was some consensus that they were not specific enough for these participants. They did not find whole year or group input helpful and would rather that it had been ‘tailored to the individual’

- *‘The special needs lead met with me a couple of times and talked through how to use notecards etc but this was not really helpful and did not support me with the specific difficulties I was having.*

Thoughts. Support from parents was recognised and valued. This by definition was one to one and will have targeted the individual needs of the participant. Evidently support is very much needed but was not seen to be of great benefit when provided in a general way within the school setting.

**41 What is your overall impression of the way you were treated in school during key stages three and four?**

Three key themes emerged. The first two both incorporate the pupils’ interactions with individual teachers.

- **A sense of not having their personal needs and difficulties ‘understood’ and a general lack of teacher understanding.**
- **Appreciation of the support and understanding demonstrated by certain teachers.**
- **Feeling different and being bullied.**
- *My teachers were frustrated with me and I was frustrated with my teachers. It was generally quite difficult, and I was made to feel like I was a problem to be dealt with rather than just another student trying to get through my exams.*
- *I think more could have been done to help me find ways of working that improved my management of my difficulties, rather than just having to figure them out for myself.*
- *Teachers didn't really understand my educational needs and didn't offer proper support in classes or in exams. If I didn't understand something, teachers just left me to figure it out. Some teachers didn't believe my dyslexia or dyspraxia was a real thing*

**Appreciation of the support and understanding demonstrated by certain teachers.  
For example**

- *I felt the majority of the teachers were supportive and recognised my potential.*
- *Teachers who were able to react and empathise based on emotional intelligence and their ability to understand students through personal interactions were able to understand me far better.*
- *My impression is that most of the men and women who taught me were kind and conscientious people, even if they did not always understand my problems.*

**A final theme related to feeling different and being bullied.**

- *In terms of relationships with my peers, I was bullied up until Year 10, when I stopped trying to please people who would never want to be my friends, and instead spent my time with the few people who I got along with.*
- *I got bullied a lot and really struggled with secondary school. I dreaded going to school each day.*

**Part 3.**

**Question 52 Further comments relating to your health and happiness if you have any.**

This invitation to comment on health and happiness followed on from six (Likert scaled) questions requiring the participant to indicate their level and experience of stress, panic, depression, medication, counselling and/or therapy.

Thematic analysis of responses suggests three key themes and one outlier.

- **Mental health issues - stress, anxiety and depression.**
- **Social factors**
- **The development of strategies for self-help.**
- **No issues**

**Mental health issues.**

- *I have been taking medication for anxiety related difficulties since the age of 14, when I was diagnosed with Obsessive Compulsive Disorder. Since then, with the help of Cognitive Behavioural Therapy, I have been more able to control my moods and emotions.*
- *Currently in my second programme of CBT for a panic and anxiety disorder. Also, tried hypnotherapy which didn't seem to have an effect*

**Social factors**

- *I am somewhat socially awkward, and it's led to me being quite lonely in some ways which is not the worst thing in the world however i do think that that comes from struggling to make a large friend group in school*
- *Prefer my own company but can socialise when needed.*

**Strategies for self-help**

- *Really enjoy walking both as a physical activity and for relaxation.*
- *when I'm beating myself out I turn to my network of friends and colleagues to get their perspective, which always really helps to ground me and get a reality check. Ha*

- *With Cognitive Behavioural Therapy, I have been more able to control my moods and emotions.*
- 

### **No issues**

- *I'd like to think I have a fairly even keel as regards temperament and stress. I do not have depressive episodes, anxiety attacks etc. If there are things that weigh on me they are the same as for many other women of my age, e.g. likelihood of marriage, children, the state of the world, minor job worries etc. I am reasonably healthy, take part in yoga, pilates etc, but more to maintain my figure rather than because they serve to de-stress me, though that is a nice side effect!*

### **Question 62. What is the major impact that this difficulty has had on your life now and in the past? What have been the major challenges so far?**

Four themes emerged:

- **personal organisation,**
- **emotional response to difficulties**
- **Continued clumsiness**
- **workplace**

### **Personal organisation**

The key theme relates to completing activities which rely on organisational ability and activities dependent upon central executive skills. The impact is wide ranging. For example;

- *I find now that the biggest challenges I have relate to how I sequence and organise myself, my thoughts and my actions at work and home.*
- *I feel like I make a lot of silly mistakes at work when I'm organising things (booking flights, meetings etc.). I get in some trouble for this as I'm assistant to the companies managing directors and booking things, when they're going to conferences, is a large part of my job at particular times of year.*
- *One of the most important parts of being a musician is being able to sight read music. I have always struggled with this, the combination of reading notes, rhythms and words whilst also singing them is an almost impossible task for me.*

### **The participants emotional response to ongoing difficulties.**

- *I feel a bit stupid compared to some of my colleagues who are more organised and logical than I am.*
- *And I get very anxious when needing to catch a flight as this feels like a high stakes situation*
- *It has also made me more neurotic and fearful of challenges. I believe that this in turn has blunted great ambitions that I might have had.*

### **Continues clumsiness**

- *Basically being called clumsy. One creates and identifies as a destructive tornado or something along those lines as a joke to hide the fact that they struggle.*
- *I would love to be more coordinated. Being able to go for a kick about or a game of tennis/golf and compete at an okay level would be transformative. Not being able to dance is also pretty annoying.*

- *I am very clumsy. I knock into things a lot and often have bruises. I am also extremely fidgety and find it very hard to sit still. Colleagues and friends always comment on this. This gets much worse when I'm tired.*

The comment about wanting to be able to play a game of tennis/golf suggests that poor coordination can have a knock-on impact on easy social inclusion in sports activities. Writing is also mentioned in relation to coordination but was mentioned just twice. It is possible that the ability to word process has removed handwriting as a major problem for most participants.

- *Originally it was not being able to write. As soon as I could touch type the doors opened and writing is now the thing I love doing most.*

Overall, this question was one which the participants seemed to answer with gusto and enthusiasm; it seems that it really meant something to them.

#### **Question 64. What advice might you give to a (dyspraxic) 14 or 15 year old pupil in secondary school about how to cope most successfully with life generally?**

Nine themes emerged. Each one is important in its own right and have therefore been listed but these could be amalgamated two main themes: **self-help and self-belief.**

- **Ask for help and communicate your needs.**
- **Seek solutions.**
- **Care for yourself and keep self-respect.**
- **No self-blame**
- **Value yourself**
- **Show perseverance**
- **Maintain autonomy, stay resilient and be patient.**
- **Enjoy your talents**
- **It's not you.**

##### **Ask for help**

- *Ask for help. Speak to your teacher, explain your difficulties*
- *Use support networks (parents and teachers)*
- *Getting support for my dyspraxia was vital to my later academic success. .*

##### **Seek solutions**

- *Experiment with techniques Don't be afraid to copy others*
- *Learn ways that help you in school,*
- *Find techniques which help deal with the specific difficulties resulting from dyspraxia*

##### **Care for yourself.**

- *Make sure you sleep enough*
- *Take it easy on yourself*

- *You need patience and accept that not everything will work all the time. Realising this isn't the end of everything really helps*

#### **No self-blame.**

- *Don't compare yourself with others.*
- *Do not be hard on yourself.*
- *Don't worry about struggling socially, life is long and you will find people...who are like you/are more interesting to spend time with.*

#### **Value yourself.**

- *You can't be good at everything and I like to think of DCD qualities as endearing and very human/relatable.*
- *You have lots of strengths and qualities*
- *enjoy the way your brain works.*

#### **Show perseverance.**

- *life gets better*
- *Be organised and if one method isn't working try another until you find one that works.*
- *You need patience and to accept that not everything will work all the time. Realising that this isn't the end of everything really helps.*

#### **Communicate about DCD**

- *Don't be afraid to tell people about dyspraxia – there are so many misconceptions about it (people thinking it's just about not being able to catch). Lack of understanding from teachers or peers makes it hard not to see yourself as different which can then have a much wider negative impact.*
- *Sometimes it's useful to tell a select few of your friends about your dyspraxia and make them aware of the things that are commonly known for being problematic for someone with dyspraxia. They may feel more obliged to help you whenever you may be struggling with something.*

#### **Follow what you love**

- *Learn to follow what you love. Try as best you can to find subjects/teachers that inspire you, and use that as motivation.*

#### **Maintain autonomy**

- *Know when to fight for what you think you're good at – my school wanted me to take IT and Geography at GCSE instead of History because they thought that they were subjects I would be "better" at as they required less essay writing. I refuse and managed just fine with not only History at GCSE but three essay subjects at A-Level and essay heavy subjects at Uniiversity*
- *Don't always follow what teachers say if not helpful.*
- *I suppose the best thing a 14/15 year old could have is a sense of heir own autonomy. To try and find ways of feeling like they are meeting their academic requirements on their own terms.*

**Enjoy your talents, differences, find your strengths and celebrate success.**

- *Celebrate when you do well and have others join in with you*
- *You will find something that you love and it doesn't hold you back.*
- *Keep going and push through*

#### **It's not you**

- *Dyspraxia does not mean you are stupid; it only means that your brain runs a little differently.*
- *This is something which makes you see and engage slightly differently.*
- *Remember that this does not define you. Every person has their strengths and weaknesses*

#### **Part 4. Parent perceptions of their child's difficulties and needs during secondary school.**

**Question 14. What were the main areas of difficulty which you consider that your child experienced during secondary school? For example, did he or she have difficulty with regard to self-organisation, social interactions, fine or gross motor coordination reading, writing, homework or other areas of the curriculum?**

The question about area of difficulty had already made assumption about the kind of difficulties which these 'children' might have experienced. The parental responses suggest that the questions were apposite. 46 responses relating to these difficulties were recorded and ranked in relation to frequency of the concern.

The most frequent concerns mentioned were self organisation and writing with 19.5 % each.

#### **Concern about self-organisation 19.5%**

- *Always forgot PE kit or to take in homework.*
- *Definitely self-organisation was a huge problem*
- *Problems to organise his day. Forgot violin lessons, did not turn up for choir.*

#### **Concern about writing 19.5%**

- *Handwriting was also very bad and routine school tasks like note-taking was a constant struggle*
- *Handwriting illegible.*
- *He found doing written work extremely difficult. His exercise books would often have pages of half completed work.*

#### **Concerns about social skills/engagement ranked third 17.39% .**

- *Was bullied, victimised and marginalised throughout school.*
- *He wanted to be friends with the sporty boys who had no interest in him, and he got on well with the teachers, which was not cool.*
- *Terrible social difficulties and found it very hard to make friends.*

#### **Emotional issues ranked fourth with 15.21%**

- *When his marks slipped it unsettled him and the school who kept telling us he was lazy and not trying enough.*
- *She would experience sudden high anxiety and generally very low self-esteem.*

- *Poor writing lead to frustrations*

**Coordination problems relating to fine and gross motor skills ranked fifth with 13.04%**

- *Problems with fine and in particular gross motor coordination.*
- *Not into contact sports netball, hockey, tennis etc but did well in swimming and gymnastics.*
- *Terrible difficulty with science practicals where instructions needed to be followed quickly and where fine motor skills required.*

**Home work was ranked sixth with 8.69%**

- *Homework was painful and time consuming.*
- *Late delivery of work.*
- *Homework was never completed on the night*

Reading was evidently not regarded as a big problem and was mentioned specifically on just three occasions but without elaboration. It is likely that difficulties with reading were experienced by the few participants who experienced dyslexia in addition to dyspraxia.

**Question 16. How involved did you feel that you needed to be? For example did you have to take time off work or make any other alterations to your day to day life?**

**Analysis**

Sixteen parents responded to this question. Taken together these 22 responses could be grouped as one major theme which could be entitled ‘Keeping it together’ of ‘keeping the show on the road’.

**Keeping it together.**

Responses to this particular question reflect the time and effort which parents invested in their teenage child in order to keep them on track and in school, happy and achieving. Responses can be subdivided into our key areas. Organisational help, home tutoring, liaison with school and time.

**Specific help with organisation, such as taking forgotten possessions into school.**

- *regularly had to take homework up to school during the school day as she forgot to put it in her bag or forgot her trainers, or her books, or her calculator ...*
- *I needed to remind her about taking the right equipment to school sometimes I had to drop off a book she forgot to take to school.*
- *He needed continued support at boarding school for his organisational skills.*

**Organising home tutoring**

- *Nearly three quarters of every weekend was spent with our home tutoring sessions.*
- *Part of supporting him was investing in private tutors to support areas he felt concerned about during GCSE and A levels.*
- *Getting tutors in also helped me worry less and I kept pretty much out of the way.*

**Liaising with school**

- *Once we had a diagnosis we had to be involved frequently with the (boarding) school to ensure that all of the strategies needed were being implemented.*
- *I needed to be more involved to keep him in the school system.*
- *I spent a lot of time going to the school because he was not happy*

**Time taken off from work to support the pupil.**

- *I always had to take time off work and have had to give up work at many stages to help her with academic work and extracurricular demands. I took months off work for each set of public exams such as GCSE and A level.*
- *Yes I took a great deal of time off work. I did a great deal of research and tried to make a difference.*
- *My husband found it difficult to re-enter the workplace as a result of her needs.*

**Question 17. Did difficulties have an impact on his/her: confidence, motivation, attitude to school/teachers, happiness, family life.** Responders were invited to reply in relation to each of these five measures by indicating if this was: never, 1,2, frequently.

Comments were invited where the parent response had been frequently. The responses related to self-confidence, stress and depression, and dislike of being singled out.

**Self-confidence. 55.5%**

- *being different chipped away at confidence*
- *She still suffers from crippling low self esteem and has no self confidence.*
- *The effect of being treated consistently as either stupid or lazy gradually wore down her confidence over her school years.*

**F and G stress and depression 33.3%**

- *Happiness was affected by stress*
- *Periods of depression in 6<sup>th</sup> form.*
- *She has suffered from depression.*

**B dislike of being singled out. 11.11%**

- *He wanted to be treated like everyone else – absolutely hated to be taken out of lessons for Special Needs.*
- *Issues with being different at school*

**Part 5. Parents perceptions of how their child's difficulties may have changed over time.**

**27 Have his/her difficulties changed over time? For example physical coordination may have improved but he/she may be struggling to learn to drive.**

Eighteen parent participants responded. Two themes emerge.



- **Their child still had areas of difficulty and ‘struggle’,**
- **He or she had developed considerable grit and determination to cope and succeed.**

#### **Continued difficulty**

- *She is active but still has some clumsiness – spilling food, bumping into things.*
- *She has to make copious lists and teach herself how to do things such as packing a suitcase or tidying a desk drawer. She struggles with filing, correspondence and keeping appointments.*
- *My daughter has been told she will never pass her driving test. . She has had over 65 lessons. She struggles to ride a bike. Coordination remains ‘dicey’.*

This range of difficulties remains similar to those reported first in primary and then in secondary school. Difficulty in learning to drive has emerged.

#### **Despite difficulties parents noted the determination, empathy, and self awareness that the young adult participants have developed.**

- *She has developed this acute sense of her own limitations and, being the determined personality that she is she has developed this arsenal of tools that helps her to overcome her difficulties.*
- *She has developed ways of working to compensate for lowered processing skills.*
- *Is exceptionally kind, caring and empathetic – her past difficulties have definitely awakened an awareness of when others are experiencing difficulties.*

#### **Part 6 Parental reflections.**

##### **Question 31 What advice would you give other parents of children (experiencing DCD) in secondary school?**

This question revealed five broad themes regarding the advice which they might give to other parents.

- **The parents’ relationship with school staff. 15**
- **The need to show compassion and patience 15**
- **The value of pupil self-awareness. 6**
- **Use of aids 4**
- **Learn all you can and get help 9**

...  
**Comments regarding the relationship with school included the need to work with the school as well as comments (perhaps a warning) about a lack of understanding from some school staff.**

- *Parents, school and therapists have to work as team and take a holistic approach.*
- *Speak to school and ask for help*

- *Try to work with the school in partnership to help your child.*

Parents were concerned by a lack of understanding on the part of the teachers.

- *I don't think teachers have any real knowledge of additional needs unless the child is disruptive.*
- *They (the pupils with DCD) are different but this is generally seen as a complete negative by the school and sometime their peers too.*

### **Compassion and patience. 15/44 comments selected.**

The need and importance of recognising their child's difficulties drew the most comments. The following samples illustrate this concern'

- *A great deal of love and support will be needed.*
- *Do not underestimate how difficult it is on a daily basis so allow child time off if needs be.*
- *Never give up on your child. Move heaven and earth if you have to, but just always be there for them. Even just discussing their problems or difficulties is already a help*

**The value of pupils gaining insight into their strengths and difficulties. Although not a big theme in terms of numbers of comments it was clearly of importance to some parents.**

- *It is valuable for your child to learn their strengths and weaknesses compared to their peers and to learn coping strategies for the weaknesses or situations to avoid.*
- *Help them gently to become self-aware*
- *It is invaluable for our child to learn their strengths and weaknesses.*

### **Use of aids.**

Strategies for supporting their learning and academic performance. Just four suggestions were included in this theme. They are included because they seem to the researcher to be of great value and yet they are not seen as important as emotional support. Suggestions were as follows.

- *Always have a laptop for their full time use. Find out about extra time and short breaks for exams.*
- *Touch typing.*
- *Organisational skills help*

### **Learning all you can and getting help (not dependent on school)**

The final theme related to the importance of parents finding out all they could about the condition and finding appropriate help for their child. These were quite diverse. For example:

- *Do not be afraid of getting your child to see an Ed Psych or of the subsequent label.*

- *Use learning support.*
- *Learn as much as you can by reading about difficulties experienced and ways to help overcome these.*

### **32 With hindsight is there anything which you wish you could have changed?**

The four main themes here are the desire for:

- **early identification,**
- **greater support from schools along with greater knowledge of the school system and how to engage effectively.**
- **Their own early recognition of the likely social and emotional as well as educational needs that their child might experience and**
- **recognition of the conflicting needs of the DCD pupil for support and recognition of their difficulties alongside their need for independence , an education appropriate to their ability.**

#### **Desire for an early diagnosis.**

The wish for an early diagnosis was mentioned more than any other issue. The responses suggest that parents felt that had they had an early diagnosis they could have prepared themselves better in relation to supporting their child's education as well as social and emotional needs.

- *Getting the diagnosis at 6 was unbelievably helpful and gave us the insight we needed to make good choices around education etc.*
- *Much earlier diagnosis - might have prevented the downwards spiral of confidence that was so difficult to reverse.*
- *I would have sought professional help much earlier and not worried about her being labelled as she would have had better coping skills.*

#### **Greater support from school and other teachers. Greater knowledge of the school system.**

The wish that there had been more knowledge of and support for pupils with DCD within school was also almost universal as was the wish that they (the parents) had been better equipped to 'take on' the school when things were not going well.

- *More support would have made a difference at primary school level.*
- *I would have pushed the schools harder to help her and not criticise her constantly.*
- *Understanding the education system fully not having to work whilst children were growing up to give more support and time to fight the system that would not show flexibility in the way it taught the children in its care*

### **Tension between help and independence/self-esteem. Tension between ability and application.**

Parents comments reflect the recognition that their bright child experiencing DCD had conflicting needs for independence and for understanding and appropriate support.

- *Although, I wanted to help him all the time - he was desperate for independence and not to be treated differently from his brother or the other kids.*
- *I would probably have chosen a less competitive school and one that nurtured her more, but then I am not sure that she would have necessarily had the academic success she has had now!*
- *I wish he hadn't gone to Oxford. It was just too much pressure.*

### **Emotional needs**

Parent responses reflected an awareness of child's emotional needs as expressed in a desire to have known more about the impact that DCD can have on their child's happiness and wellbeing and the wish to have known more ahead.

- *'I wish I had known. She has managed brilliantly but my chats about her strengths, guiding her through her meltdowns and discussing time management would have been much more structured, and perhaps she would have had better methods for dealing with the loss of control days.'*
- *'I would like to have understood the social difficulties that she would face in the context of her dyspraxia. I would have paid more attention to her mental health.'*
- *'Earlier understanding of her needs might have prevented the downwards spiral of confidence that was so difficult to reverse.'*

## Appendix 16 Showing Phase 5 of the thematic analysis process.

The main themes already established (see appendix 15) were cross referenced across the whole data set to establish major themes. This detailed review of the main themes involved revisiting original transcripts. A process similar to that of Phase 4 was carried out. i.e. each of the main themes were either eliminated (if insufficiently representative) or grouped together, where coherence was evident, as a major theme and are described below. The numbered items show the themes previously described in Appendix 15 where specific examples can be seen. There are four major themes followed by the themes which were not included. The researcher was influenced during this process by the underlying theories which have been considered.

### **Major theme 1. Academic and organisational (central executive) issues.**

Difficulty with activities involving Information processing and executive function skills.

Organisation, structures, time management. (study skills/executive function)

Revision and homework

Parents sourcing support from other sources

Management. (study skills/executive function)

The organisation of outside specialist help for learning, coordination, counselling, therapy and also for liaising with school.

Lack of ability to help - on part of some parents.

Poor personal organisation,

Parents concern about all school relating to org etc.

Parents keeping it together.

Use of aids

Recognition of the conflicting needs of the DCD pupil for support and recognition of their difficulties alongside their need for independence , an education appropriate to their ability.

### **Major Theme 2. Other people's knowledge, empathy and understanding of pupil difficulties**

Lack of understanding within the school community about DCD and the consequent emotional impact on participants.

An appreciation of support demonstrated by some teachers

Feeling different and being bullied

A lack of understanding on the part of some teachers.

A sense of not having their personal needs and difficulties 'understood' and a general lack of teacher understanding.

The parents' relationship with school staff

Greater support from schools along with greater knowledge of the school system and how to engage effectively (parents).

### **Major Theme 3. The pupils' sense of belonging and of being valued within school**

Belonging. Group membership – acceptance and respect.

Issues around special talents.

Enjoyment of physical activities. Most frequently non team sports 41.0%

Dislike of team sports, embarrassment and letting down the team. 59%

Feeling different and being bullied.

Social factors

feelings of insecurity and lack of self-belief.

**Major theme 4. Wellbeing and resilience.** This theme covered the views of both young adults and parents. As confirmed in other studies many participants were emotionally vulnerable. Despite this parents reported determination and the young adults had clearly developed an ability to stand back and to look at their strengths and weaknesses objectively despite ongoing anxiety regarding certain situations encountered in the work place.

The organisation of outside specialist help for, counselling, therapy and also for liaising with school.

Mental health issues - stress, anxiety and depression.

Feeling different and being bullied.

feelings of insecurity and lack of self-belief.

The development of self-belief and self-help.

emotional response to difficulties

Despite difficulties parents noted the determination, empathy, and self-awareness that the young adult participants have developed.

The need to show compassion and patience (parents).

The value of pupil self-awareness. (parents)

recognition of the conflicting needs of the DCD pupil for support and recognition of their difficulties alongside their need for independence , an education appropriate to their ability (parents)

**No specific category.**

Continued clumsiness

Learn all you can and get help

early identification,

Their own early recognition of the likely social and emotional as well as educational needs that their child might experience.