THE ROLE OF PARENTAL ADVOCACY IN THE EDUCATION OF CHILDREN WITH

DEVELOPMENTAL COORDINATION DISORDER AND A SPEECH OR LANGUAGE

IMPAIRMENT IN THE INCLUSIVE CLASSROOM: A META-SYNTHESIS OF LITERATURE

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**Table of Contents**

**Abstract**

This meta-synthesis of literature discusses the need for parental advocacy in the education of children diagnosed with Developmental Coordination Disorder (DCD), a motor disability that can cause Speech or Language Impairment (SLI). The literature studied outlines the limited understanding of this neuro-diversity due to its infrequency, and suggests that parents, educators, occupational therapists, and speech language pathologists must collaborate to facilitate the best learning opportunities for children with this diagnosis.

Key Words:

Developmental Coordination Disorder, Speech Language Impairment, parental advocacy

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To my family I owe perhaps the most thanks.  To my parents and parents in law, for gently calling me to task by asking me if I was finished, my children, for putting up with a mom that seems to live in school mode, and to my husband for patiently putting up with a teacher wife whose brain never seems to stop wondering why. I love you.

**Chapter One: Introduction**

**Introduction, Background and Problem Statement**

Being the "different" child in the inclusive classroom can be a difficult path to forge for any child.  Being "different" is especially difficult if the difference, or neurodiversity, is misunderstood due to its infrequency. In my experience, children with poor fine or gross motor skills are often those who have a larger, all-encompassing diagnosis as the result of significant trauma, such as cerebral palsy. Children, such as those with cerebral palsy, are expected to have motor delays and, as a result, they receive occupational and/or physiotherapy to help alleviate muscle contractures (Ketelaar et al, 2001).  Students with cerebral palsy receive special pencil grips, adapted scissors, modified physical education exercises and/or different expectations because their diagnosis suggests that they require the extra, much needed intervention.

Children with a lisp or an articulation problem are assumed to have a mild speech delay or a familial tendency towards awkward speech (Mclaughlin, 2011).  They may receive some speech or language intervention in their early years, with the assumption that these tendencies will remediate themselves.  Children often receive a speech and language screen when entering Kindergarten.  If their schools are able, speech and language services are provided for the students with the most severe speech or language impediments.  Often, Speech Language Pathologist (SLP) services are provided to them up to and including grade 7, or until the remediation is deemed no longer necessary or not successful.

Being diagnosed with both Developmental Coordination Disorder (DCD) and a Speech and Language Impairment (SLI) creates a relatively unique disability. Few students in an inclusive classroom have a diagnosis of DCD, let alone DCD co-morbid with an articulation disfunction.  Because this combined disability or neurodiversity is often understood (when it is

understood) as a physical problem, not an academic problem (Missiuna, 2012), the roles are often blurred as to who provides supports for the child.

It is postulated that as a low-incidence neurodiversity, children with DCD and SLI need the collaboration of parents, teachers and outside professionals to assist in their daily functioning in the inclusive classroom (Sugden et al., 2008). I propose that it is best if the classroom teacher receives guidance on how to assist the child with the motor skill demands of school as well as professional advice on how to help the child articulate in an understandable way. Therefore, because the physicality of the neurodiversity impacts education, it is reasonable to expect that parents become responsible for advocating for the assessments which can potentially lead to the requisite diagnoses for special education designation from the BC Ministry of Education. Then teachers, with the support of Occupational Therapists and Speech and Language Pathologists, can follow through with best practice interventions in the inclusive classroom.

**Research Question**

The purpose of this analysis of the current research and publications is to determine whether parental advocacy is, in fact, necessary for children diagnosed with DCD co-morbid with a Speech or Language Impairment to receive an education equitable to their neurotypical peers. The questions which will guide the meta-analysis of the literature are:

1. What role do parents have in the recognition, diagnoses and service provision of support by teachers for students diagnosed with Developmental Coordination Disorder comorbid with a speech language disorder?

2. How prepared are medical professionals, such as speech language pathologists and occupational therapists to advocate for children with this diagnosis, in the school system?

3. Are teachers equipped with enough knowledge of this low-incidence neurodiversity to provide for the academic and mental well-being of students with diagnosis, in the inclusive classroom?

The following figure gives a picture of the components involved in this research project.

Figure 1.1
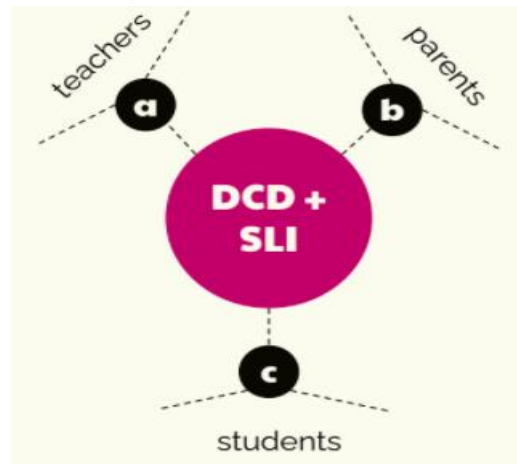


Before conducting research to attempt to elucidate answers to these questions, it is necessary to define the terms described in this study.

**Definition of Terms**

Below follows some terms that will be used throughout this paper.

**Developmental Coordination Disorder**

DCD is considered a neurodiversity or disability and is pragmatically defined within the DSM-V (American Psychiatric Association, 2013), as a motor disorder. Their definition is as follows:

**Developmental Coordination Disorder – Diagnostic Criteria**

A. The acquisition and execution of coordinated motor skills is substantially below that expected given the individual's chronological age and opportunity for skill learning and use. Difficulties are manifested as clumsiness (eg. dropping or bumping into

objects) as well as slowness and inaccuracy of performance of motor skills (eg. catching an object, using scissors or cutlery, handwriting, riding a bike, or participating in sports).

B. The motor skills deficit in Criterion A significantly and persistently interferes with activities of daily living appropriate to chronological age (eg. self-care and self-maintenance) and impacts academic/school productivity, precoitional and vocational activities, leisure and play.

C. Onset of symptoms is in the early developmental period.

D. The motor skills deficits are not better explained by intellectual disability (intellectual developmental disorder) or visual impairment and are not attributable to a neurological condition affecting movement (eg. cerebral palsy, muscular dystrophy, degenerative disorder).

**Comorbidity**

Disorders that commonly co-occur with developmental coordination disorder include speech and language disorder; specific learning disorder (especially reading and writing); problems of inattention, including ADHD (the most frequent coexisting condition, with about 50% co-occurrence); autism spectrum disorder; disruptive and emotional behaviour problems; and joint hypermobility syndrome. Different clusters of co-occurrence may be present (eg. a cluster with severe reading disorders, fine motor problems, and handwriting problems; another cluster with impaired movement control and motor planning). Presence of other disorders does not exclude developmental coordination disorder but may make testing more difficult and may independently interfere with the execution of activities of daily living, thus requiring examiner judgment in ascribing impairment to motor skills.

**Speech and Language Impairments and Disorders**

By common definition, an impairment is a physical problem that requires a formal diagnosis, and a disorder is a medical term signifying diagnosis (Kasten, 2014). However, in regards to speech and language research, impairments and disorders are terms often used interchangeably. In fact, it can be argued that a speech and language impairment (SLI) differs from a speech disorder as a disorder suggests an articulation problem or stutter while an impairment suggests a language deficit, where both expressive and receptive language are affected. Speech and language disorders are carefully defined by the Canadian Association of Speech-Language Pathologists and Audiologists (CASLPA, 2005) as follows:

**Types of Speech and Language Disorders**

A. **Articulation Disorders**: occur when a person cannot correctly pronounce one or more sounds. This may occur as a result of delayed development, poor muscle control, cleft lip/palate, hearing impairment or learning disabilities. Errors of many sounds that form patterns are called **phonological disorders.** Articulation disorders caused as a result of neurological damage such as stroke or head injury are termed **motor speech disorder.**

B. **Voice disorders**: include inappropriate pitch, loudness, quality (hoarseness) or total voice loss. May result from damage to the vocal cords due to surgery, misuse of the voice, (overuse, yelling or singing) disease (cancer of the larynx), or other conditions (cleft palate, cerebral palsy or hearing impairment).

C. **Fluency disorders**: (stuttering) a disruption in the normal flow of rhythm of speech. Characteristics may include repetition of sounds, syllables, words or phrases, hesitations, prolongations or interjections. Behaviours can vary from person to person.

**Parental Advocacy**

Parental advocacy is the parental ability to communicate his/her child's needs to the professionals involved in the child's care, in this case, the teacher.  Parents are expected to be the experts in their child's growth and development and are the most versed in their child's needs and wants. This becomes more apparent with children who have neuro-diversities.  In my experience, parents often understand what effective strategies look like and can give suggestions to the educators involved in their child's education. As the BC CASE (2008) document suggests regarding parental consultation with teachers, "when done well, parents feel that the school team is listening to them and that their experience, knowledge and ideas have been taken into consideration" (Supporting Meaningful Consultation with Parents, 4). Parents, once made aware by outside professionals, may assume that their child has access to special programs or therapeutic services within the school day, especially government funded professional programs proven to help children with specific disabilities or neuro-diversities.

**Theoretical Framework**

This study will provide a qualitative meta-synthesis of research to understand childhood experience with and the derived meaning children and parents attach to their perceptions of living with DCD and SLI (Nye et al., 2016).   As van Manen (1990) suggests, researching lived experience, as an educator, allows for action sensitive pedagogy.  Seeming to challenge the "educator" reader, Farrell (2020) introduces her research on using lived experience as a theoretical framework, with a quote by Douglas Adams which states: "Human beings who are almost unique in having the ability to learn from the experience of others, are also remarkable for their apparent disinclination to do so." Finding research that focuses on students' lived experience with DCD and SLI in the inclusive classroom is limited, but for the purpose of this study, such research becomes the basis or framework to answer the research question.

**Overview of Research Methodology**

**Research Design**

This project will review academic research in a qualitative meta-synthesis (Erwin et al, 2011).  The data collected will focus on key themes related to the neurodiversity presented, specifically examining the presence of a developmental motor delay and a speech or language impairment in school aged children and how this impacts their education from the perspective of both educators and parents.

**Sample**

A comprehensive sampling of the research available will be utilized in this project.  As McGregor (2018) explains, "when a number of units is very small, researchers include every unit in their sample".  In this case, all applicable research located will be used, with preference given to most recent North American data.

**Data Collection, Processing and Analysis**

Data for review was collected through scholarly journals, primarily published as documents online.  The process for analysis was as follows: 1) locating and identifying sources as relevant to the study; 2) verifying content as applicable to view through an educational/teaching practice lens; 3) examining reference sections for additional research materials; 4) looking for patterns of research to ensure a breadth of research was examined and 5) clearly annotating a working bibliography.

**Trustworthiness, Validity, and Reliability**

 Following McGregor's (2018) criteria to ensure high-quality qualitative research, this project uses a triangulation strategy with multiple sources of data woven together.  The triangulation is comprised of experts from their respected fields of speech/language pathology,

occupational therapy, and education.  These sources have been researched for the truth to be verified.  Transferability is achieved through the literature review process – results from studies are compared and synthesised throughout this project.

**Possible Limitations**

There are many limitations possible in this literature review.  First, data specific to the topic and its influence on educational practice was difficult to locate.  Second, this study is largely limited to research that was published online or made available through the DCD clinic at BC Children's Hospital.

**Ethical Considerations**

The author recognizes that having a personal contact diagnosed with the described neurodiversity presents a more than average curiosity in the topic.  All sources of data used in this study are acknowledged.

**Conclusion**

This chapter has briefly described or outlined the purpose for and structure of this research project.  The research query was outlined with a clear definition of terms given.  Research methodology, process and summary were given as well as known limitations and ethical considerations.  A brief demarcation of this study will follow.

**Demarcation of This Study**

This research study is comprised in five chapters with appendices and bibliography to follow.  Chapter One gives an overview of the project.  Chapter Two provides the methodology of the literature review.  Chapter Three presents the data as a meta-synthesis, in a qualitative review.  Chapter Four discusses the results and provides implications for education. Chapter

Five suggests gaps present in the data available that I consulted in this study and concludes the study.

**Chapter Two: Methodology**

**Introduction**

The purpose of this study is to determine how parental advocacy, derived from a meta-synthesis of researched literature, influences the quality of education provided for children diagnosed with Developmental Coordination Disorder co-morbid with a speech and/or language disorder. As a literature study, the chosen research forms the raw data to be analyzed or studied.  The purpose of this chapter is to explain the methodology of the research synthesis, namely how the gathered research was grouped and analyzed.  The resulting synopsis of the data will follow in Chapter Three.

Fig. 2.1
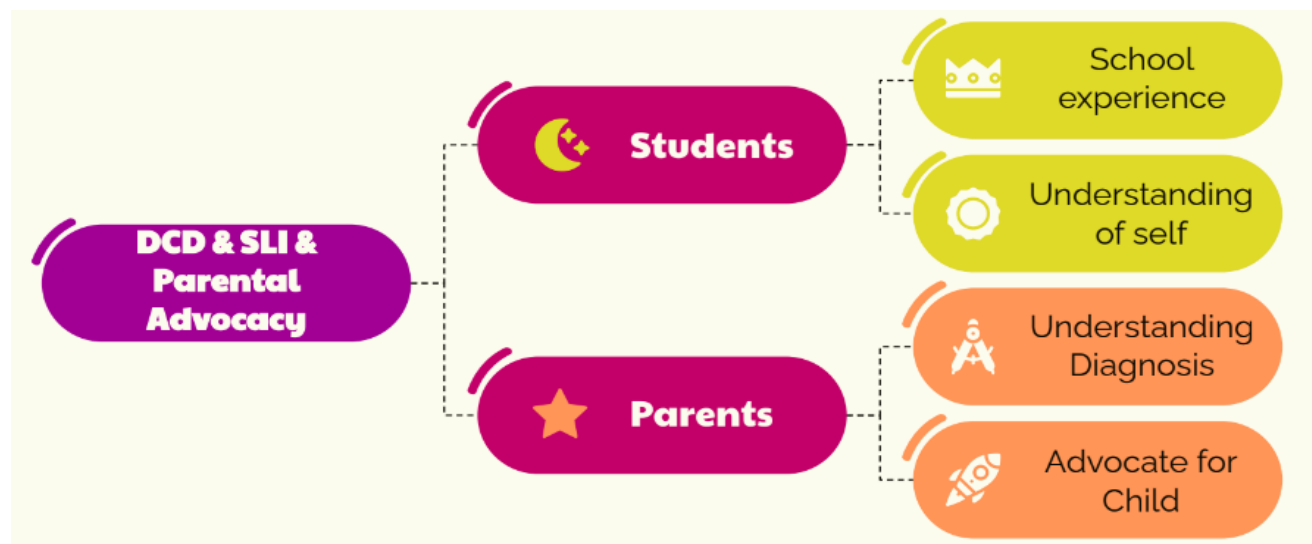


This chapter outlines the research method: how the research was gathered, organized and analyzed.  It concludes with a brief discussion of ethics and validity.

**Research Design**

This study comprises of a qualitative meta-synthesis.  A meta-synthesis "uses rigorous qualitative methods to synthesize existing qualitative studies to construct greater meaning

through an interpretive process" (Erwin et al., 2011). Or, as Nye, Melendez-Torres and Bonell (2016) state, qualitative meta-synthesis "involves the systematic review and additional level of interpretation of primary qualitative research studies". Meta, meaning across, (McGregor, 2018) allows for specific pieces of information to be brought together into one cohesive study. Hence, a meta-analysis is a synthesis. In the case of this research, Developmental Coordination Disorder co-morbid with Speech Articulation and Language Disorders will be studied in relationship with parental advocacy and student education in the inclusive classroom. Through the careful discussion in a variety of research articles, these seemingly separate strands of information will be woven together into one research unit. Gaps in the research will be identified, and further implications, as they involve classroom practice, will be noted. Similar to the American Psychological Association (APA) definition of the goals of a meta-analysis, this meta-synthesis will attempt to determine the progress research has made in clarifying the conundrum of DCD, SLI and student success in the inclusive classroom.

The literature reviewed in this study is largely comprised of peer-reviewed research articles. It does have more of a medical focus than an educational focus, seeing as the neurodiversity discussed is physical in nature and little research can be found to discuss implications in the classroom. Much of the research considered comes from either the Speech/Language Pathology, Occupational Therapy or Medical professions with the most current research having preference in this meta-synthesis.

**Sample**

Most of the research articles used for this study were procured using Google Scholar, ERIC (https://eric.ed.gov) and general Google searches. Materials were also gleaned by considering the reference sections of subject appropriate articles, to gain more specific data. The Developmental Coordination Disorder Clinic at BC Children's Hospital was a valuable source for three articles used in this study. While Developmental Coordination Disorder (DCD)

is a common enough research topic, the specifics of Speech and Language Impairments related to a DCD are less prevalent, which makes finding the appropriate research more difficult. Descriptive terms and keywords used for researching were the key topics of this study, namely *developmental coordination disorder* and *youth*, *speech and language impairment*, *developmental motor disabilities* and *articulation issues in children*. This data search resulted in articles that were qualitative, mixed methods and quantitative. The specific information gleaned became the topic for discussion in Chapter Three of this project.

The selection criteria used to narrow down the research materials for this study were as follows. First, it was important to ensure that youth, specifically children of age to be in the school system, were the focus of the DCD research. As DCD is a life-long disability, articles dealing with adults were available but not relevant to this study. Secondly, as DCD is often co-morbid with other disabilities, it was essential to this project that the other co-morbidities could not be the focus of the research. The motor disability had to have primary focus of the article, not the learning disabilities, social idiosyncrasies or behaviours that accompanied some diagnoses of DCD. Essentially, research that mentioned speech or language deficits in relationship with a DCD diagnosis were primary sources of consideration. Thirdly, current research, preferably conducted within the last fifteen years, had preference in this study. And fourthly, literature that had context within Canada had highest preference. This last criterion was difficult to meet, and therefore much of the research used is not limited to Canadian participant data.

**Organization and Analysis of Data**

While reading the research articles, areas of pertinent interest were highlighted. When these themes re-occurred, they were noted, and patterns were established. In the working drafts of this research document, a chart similar to Figure 2.2 was colour coded to delineate which research corroborated similar findings. The colour groupings then became summary headings

to place kernels of information as they were gathered from various sources. In a quasi-

phenomenological fashion, these established patterns or cohesive themes formed the data to

be analyzed in this meta-synthesis. Figure 2.2 illustrates the initial matrix used to determine the

cohesive themes to analyze.  More data sources (as the reference section refers to) were

considered as further research was done, however, these twenty sources provided the thematic

back bone from which further research was consulted.

**FIGURE 2.2**

| Authors | Motor impairment | Speech impairment/ Articulation Disorder | Parental involvement | Sensory Integration Dysfunction | Efficacy of Speech Therapy | Social Impact/Vulnerability | Child's Perspective/ Lived Experience | Family Group with shared diagnosis | Teachers or School | Need for Advocacy |
|---|---|---|---|---|---|---|---|---|---|---|
| Adams (2017) | | | * | | | * | * | | * | * |
| Ahern (2002) | * | | * | | | * | * | | | * |
| Archibald & Alloway (2007) | * | * | | | * | | | | | |
| Daniel & McLeod (2017) | | * | * | | | * | * | | * | * |
| De Waal et al. (2018) | * | | | | | | | | * | |
| Deroche (2014) | | | * | | | * | * | | | * |
| Duchow et al. (2019) | * | * | | | * | | | | | * |
| Elbasen et al. (2012) | * | | | * | | * | * | | | * |
| Flapper & Schoemaker (2012) | * | * | * | | | * | | | * | |
| Gaines et al. (2008) | * | * | * | | * | | * | * | | |
| Ho & Wilmut (2010) | * | * | | | | | | | | |
| Missiuna et al. (2012) | * | * | * | | | | * | | * | * |
| Novak (2011) | | | * | | | | | | * | * |
| O'Dea et al. (2019) | * | | | | | * | * | | | * |
| Payne et al. (2012) | * | * | * | | | * | * | | | * |
| Sanjeevan et al. (2015) | * | * | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Saroj et al. (2019) | * | * | | | | * | | | * | |
| Tung et al. (2013) | | * | | * | * | | | | | |
| Van den Heuvel et al. (2016) | * | | | | | * | | | * | |
| Zwicker et al. (2008) | * | * | | | | | | * | * | |

Fifteen out of twenty researched sources mentioned motor impairment. Twelve articles researched speech impairment or an articulation disorder as a focus of study. Nine of these studies researched a combination of motor disability and speech dysfluency. (Note, these nine were rated of high importance to this literature review as they synthesized two of the three main research foci). Ten out of twenty considered the child's perspective or lived experience. Ten articles outlined the need for advocacy; the understanding that children with this neurodiversity need a public, heard voice and ten considered social impacts and child vulnerability. Nine referred to parental involvement. Nine articles also considered teacher perspectives within the school system.   Four considered the efficacy of speech therapy. Two articles suggested the presence of sensory integration dysfunction, a topic not further considered within the scope of this research study due to its limited frequency in research related to DCD, SLI and parental advocacy for education.  One article mentioned the presence of a shared diagnosis within a family grouping, hinting at a possible genetic component to this neurodiversity.  Again, the topic of a possible genetic component to this neurodiversity has a limited factor in my research due to its infrequency in the research considered.

As depicted in the following diagram, six key themes were identified as intersecting in this meta-synthesis.

Figure 2.3

In order to parse the data into a reasonable structure, the six themes were grouped into three data sets, namely: motor impairment, speech impairment and advocacy in the school setting. It can be argued that advocacy as a data set is vague. It is understood, however, from the preface of this research document, that the purpose of this meta-synthesis is to view parental advocacy as a possible influence on teacher led education. Therefore, teacher awareness, family involvement and child's lived experience (phenomenology) are grouped together as one data set, labeled advocacy.

### Ethics and Validity

As stated in Chapter One, having a close contact diagnosed with this exact neurodiversity makes one extremely curious as a researcher. However, any personal biases will be expressly stated, and any inferences made with the data will be based on a lived experience model. All research is accurately acknowledged and cited throughout this project. As Ramrathan et. al (2017) emphasize, educational research must be trustworthy, based on evidence, and have justifiable arguments. The purpose of the research is to present the data in a systematic manner. The validity of the research was determined by how successful the researcher was in weaving the strands of this meta-synthesis together. Again, consider Ramrathan et al. (2017), who stipulate that for research to be valid, all the components of the project must align correctly; topic, purpose, question, participants and data collection.

### Conclusion

This chapter detailed the research design of this knowledge translation project. It clearly suggests how a meta-synthesis of the data will follow, shows the research sample and explains the ethics and validity necessary to make this project feasible. It forms the framework of the research purpose, namely, to study how a motor impairment affects speech and language in the

school setting and how parental involvement affects quality of education for children with this neurodiversity. Chapter Three will delve deeply into the literature studied.

**Chapter Three: Literature Review**

**Introduction: An explanation of the data and how it was analyzed**

Chapter Three provides the literature review of this study. It is largely divided into the three main topics of this research study, namely DCD, SLI and parental advocacy for education. Within these three topics, there are six subtopics to be discussed, namely: motor impairment, speech impairment, efficacy of speech therapy, child's lived experience, family history and involvement in the diagnosis and teacher awareness.  The parameters for the literature to be discussed in this chapter are visually depicted in Fig. 2.2 in Chapter Two (pg. 19-20).  While, for the purpose of this study, it was attempted to neatly divide the research into separate data sets, it must be understood that the nature of this project, in fact its sole purpose, is to understand the correlation of the three main topics.  As such, there is a less clear division of the data and at times, a repeated reference to specific research as it is applicable to subtopics within the research studied.  As this chapter unfolds, it becomes apparent that the two main topics, DCD and SLI are easily separated as data sets, and then the defining subtopics must be considered for the third large topic, parental advocacy in education, to be understood and become its own data set.

The researched literature on Developmental Coordination Disorder (DCD) essentially forms the first data set of the review and is noted on a table containing a summarized review of the literature findings (see Appendix A, table A1).  The second set of data, and thus the second section of this chapter, considers researched literature on speech and language impairments (SLI).  This data is also summarized in a table of research findings (see Appendix A, table A2). The next section of Chapter Three includes three subtopics applicable to understanding and interpreting the main data sets, namely the efficacy of speech therapy, child's lived experience (and within this, social vulnerability) and teacher awareness. They form another section of data (see Appendix A, table A3.1, A3.2 and A3.3) for this review, and provide additional research that

works into the last large portion of this chapter and data set, namely parental advocacy, noted on its own summary table (see Appendix A, table A4). This fourth, larger data set is further delineated into parental involvement in the diagnosis of the neurodiversity and then the resulting necessity of parental advocacy in education.

### Developmental Coordination Disorder (DCD)

Developmental Coordination Disorder, as defined by the DSM-V, is largely a motor disability or, stated more carefully, a significant and pervasive (Gaines et al. 2008) neurodiversity that impacts motor development and therefore coordination. Patients with DCD can have both fine and gross motor skill delays, most noticeable in physical movement.  Infants may struggle to roll over or sit at the same rate as their same age peers.  Toddlers may struggle with grasping both large and small objects, walking with accurate balance or developing intelligible speech.  Youngsters may have difficulty with balance (think of hopping on one foot, riding a bike or scooter), personal care (think of eating with utensils, dressing or brushing teeth) or more advanced hand or foot skills (think skipping, running, correct pencil grasp, scissor use, printing, colouring, shoelace tying, gymnastics or ball handling). These gross and fine motor delays become most apparent as the child ages, becomes closer to school age and more age appropriate expectations or comparisons with neurotypical peers are made. The gold standard assessments used to diagnose DCD are the Bruiniks Osteretsky Test of Motor Proficiency (BOTMP-sf) or the Movement Assessment Battery for Children (Movement ABC).  Scores at or below the tenth percentile provide enough data for clinicians to make a definitive DCD diagnosis.  Some research does recognize the 15th percentile as being the diagnostic cusp. Zwicker et al. (2009) suggest the neurological cause for DCD involves the cerebellum and its network of connections.  DCD affects a small percentage of people and is not related to intelligence, motivation, or education (Gaines et al., 2008).

Although DCD is a motor disability, it has influence in more domains of development. DCD has a detrimental impact on the perception of self. Clumsy children inherently have difficulty looking and feeling neurotypical. As Zwicker et al. (2009) state, "secondary psychosocial issues, including difficulty with social and peer relationships, lower self-worth and self-esteem, anxiety and depression and emotional/behaviour disorders" become apparent as a result of having DCD.

### Speech and Language Impairments (SLI)

The Speech and Language Impairments specifically considered in this meta-synthesis are articulation and fluency impairments. As Skelton & Richard (2016) explain using Benthal, Banson, and Flipsen (2013), "articulation disorders are speech sound disorders effecting one or a few speech sounds, in contrast to phonological disorders or childhood apraxia of speech, which effect large numbers of speech sounds". In Canada, young children routinely receive speech/articulation screens from public health professionals when they receive childhood vaccines, hearing, or vision screens. If a significant delay or impairment is noted, children are generally offered speech or language therapy services from public health. Once children reach school age, SLP service is obtained in the school system, or parents must employ private practitioners in order for their children to receive therapy. In this study, childhood SLI as it relates to motor inability, is of especial interest.

Sanjeevan et al. (2015) reviewed various studies based on motor impairments and SLI to determine the influences co-morbid impairments have on SLI. They argued that as the complexity of speech increases, children with SLI experience motor planning difficulties. Therefore, therapies that target working with procedural memory skills may help children with these deficits. Their study suggests that one third of children with SLI also present with DCD. Therefore, their study acts as bridge between SLI and DCD.

**The Connectedness of DCD and SLI**

In 2006, Webster et al. used typical IQ, motor and language assessments to determine whether children with language impairments were at a greater risk of also having motor disabilities. Their study of 23 children ranging in age from 7 years to 13 years proved that motor impairment was 70 percent more common in children with developmental language impairment. Zwicker et al. (2009), in their research to understand definitive neurological correlates of DCD, noticed that the areas of the cerebellum affected in this motor disability involve verbal fluency, word retrieval, syntax and metalinguistic abilities. In 2007, Archibald and Packham compared the diagnoses of specific language impairment and DCD. Their study comprised of both standard and non-standardized assessments of vocabulary, non-word repetition, sentence recall, story retelling and articulation. They conclude that language impairment is a common comorbidity for children diagnosed with DCD but in comparison, children with DCD had a bit better articulation rate than children with a specific language impairment. In their research, Duchow et al. (2019) specifically studied children diagnosed with DCD and childhood apraxia of speech, querying whether DCD was more prevalent in children already diagnosed with apraxia of speech. While seeking a biological cause for both neuro-diversities in the function of the cerebellum, Duchow et al. argue that speech disorders, as compared to language disorders are more strongly correlated with poor motor skills. Therefore, they advocate a need for children diagnosed with apraxia of speech to also be screened for DCD.

Supporting this need for cross-discipline assessment is the research of Gaines et al. (2008). In this interesting Canadian study of one family, five children and their mother share a DCD diagnosis and speech articulation issues. Besides using this family to prove that DCD is highly comorbid with speech impairment, Gaines et al. suggest that siblings of children diagnosed with DCD should also be screened for both motor delays and articulation issues.

Ho and Wilmut (2010) began a pilot study to research the speech and oro-motor function in children with DCD living in Britain.  Using equal numbers of children with DCD and those without, the authors studied children's lip movements while speaking.  They concluded their study with the findings that children with DCD have inferior motor control for complex speech gestures.  Therefore, motor deficits related to DCD do generalize to also affect the speech motor system.  This study proves that articulation issues or apraxia of speech are not separate issues or disabilities in addition to DCD.  Rather, having a DCD diagnosis means the high potential of also having oro-motor disfunction. Flapper and Schoemaker (2012) argue that one third of children with a speech or language Impairment can also be diagnosed with DCD. It can be argued, therefore, that the motor impairment of DCD is no longer co-morbid with a speech or language impairment, but the cause of it. A child diagnosed with DCD, presenting with a speech articulation issue has the speech disability due to the lack of motor skill ability. Hodgson and Hudson (2017), cement the notion that DCD and SLI are inextricably linked in the left hemisphere of the brain.  They state that motor and speech functions are so closely related in hemispheric control that the function of the one is directly associated with the "cortical representation of the other".  The same neural network is shared between speech and production and motor sequencing.  Harris, Mickelson, and Zwicker (2015) explain that children with DCD often experience difficulties with typical oral motor coordination, like closing the lips to blow bubbles or blowing out candles.

**Efficacy of Speech Therapy**

A Canadian study by Duchow et al. (2019), demonstrates the necessity for Speech-Language practitioners to engage in a multidisciplinary practice to assist their patients with DCD and articulation issues.  Occupational Therapy goals need to be set with Speech-Language goals for best practice to continue. Understanding that as DCD is a motor issue and formation of word sounds is oral-motor dependant, motor therapy as well as speech therapy need to twin up

to be most effective. This marrying of two seemingly separate disciplines, namely occupational therapy and speech therapy, is not a new or novel idea. Missiuna, Gaines, and Pollock (2007) clearly explain that SLPs have the advantage of being one of the first professionals to interact with young children, often at a public health office as a result of an early intervention program or after a routine "young child" check up provides a referral for a speech assessment.  They argue that at least half of these referrals are children who will later be diagnosed as having DCD, and SLPs have the inherent responsibility to refer these children to pediatric occupational therapists or pediatricians for further assessment. Missiuna et al (2007), citing the work of Hill (2001), explain that children with identified speech-language disorders often have co-morbid motor coordination difficulties.

### Children's Lived Experience

O'Dea et al. (2019), conducted a qualitative meta-ethnography to analyze child's lived experience with DCD.  Their study suggests that interventions used to treat DCD do not have clearly proven efficacy.  O'Dea et al. (2019) stress that the child's voice has rarely been heard in research regarding DCD and that parental perception of motor competence and strategies to help with motor competence are quite different than that of the children's perceptions of both their limitations and effective interventions. They also suggest that knowledge and awareness of DCD is limited for parents, teachers and physicians.

Payne et al. (2012), studied the lived experience of six British teens diagnosed with DCD, aged 13 years.  They used an interpretive phenomenological approach, interviewed the teens and compiled their data into three themes, namely: relationships with peers, relationships with parents and relationships with siblings.  All six of the participants stated that their mothers informed them of their condition and facilitated their support, while their fathers were less understanding of their diagnosis.  Payne et al. (2012), used the research of Jaspers et al.

(2012), to emphasize that teens with motor issues are not actively disliked by their peers, just often ignored.

### Social Impact/Vulnerability

Daniel and McLeod (2017) researched the challenges children with speech sound disorders face while in school. This research is important to this meta-synthesis because of the researchers' areas of expertise.  One is a teacher of young children, the other a speech-language pathologist.  There is little current research like this, that marries the two disciplines together. Their study comprised of 34 participants, some being children with diagnosed speech/sound disorders, the others being family, friends or teachers involved in their care. Their research solidified the notion that without professional services provided to school aged children, children struggle with both lack of confidence and participation at school because of their inability to communicate effectively with their age peers and teachers.

Elbasan et al. (2012), state that children diagnosed with DCD, because of their motor problems, demonstrate "poor perceived competence, social isolation, low self-worth, anxiety and depressive symptoms" (p. 5). Cacola (2016), echoes these sentiments and states that frustration due to poor motor coordination and low self-worth leads to a chronic sense of failure and a growth in despondency and depression. Pratt and Hill (2011), surveyed parents who identified that children with DCD have elevated anxiety levels in comparison to their age peers. Their study showed that children with DCD have low levels of emotional well-being and their present anxiety was significant enough for parental concern.  These issues create vulnerability in the classroom, making student/teacher relationship and peer involvement more difficult. A study completed by Lingam et al. (2013), in the United Kingdom, suggests that schools must also focus on "educational coping strategies rather than simply attempting to improve motor skills" (p. 40) in children diagnosed with DCD.

**Teacher Awareness**

As stated earlier, O'Dea et al. (2019), argue that awareness of DCD is limited for teachers. To be fair, only a small percent (research varies from 3-6 percent) of students in the inclusive classroom would have a diagnosis of DCD. Also, not all children with DCD have significant speech or language problems. Daniel and McLeod (2017) produced a qualitative research study in Australia, where Speech and Language Pathology/Therapy services were not available through the school system. Teachers, made aware of the disability by parents, felt unable to adequately assist these children with their speech or motor concerns, in the inclusive classroom.

In British Columbia, children with Developmental Coordination Disorder do not receive additional government funds to assist with extra services such as speech or occupational therapy. Referring to the *Developmental Coordination Disorder (DCD) Understanding Level of Complexity and Support Services* handout, (Appendix B.2) it is evident that teachers cannot expect their students to receive funded therapy. At best, some learning support services would be the only extra service the school could provide. This means that unless parents are able to actively lobby for or privately procure therapy for their children, these students will not have therapeutic intervention at school.

**Parental Involvement in Diagnosis**

Children diagnosed with DCD generally receive their diagnosis because of their parent's frustration that their child is not developing normally or from a school referral to a pediatrician, due to noted motor delays. Alonso et al.(2015) explain that most parents notice their child's struggles with motor control at an early age, but a formal diagnosis is often received after the child has entered the school system. Camden, et al. (2013), cite the research of Rodger and Mandich (2005) and Maciver et al. (2011), when they explain that knowing where to refer

children to and how to obtain a diagnosis of DCD is also problematic for parents. Novak et al. (2011) state that limited professional (read doctors and teachers) knowledge of DCD and the lack of information and support services for parents of children with DCD prove a source of parental frustration.  Camden et al. (2013), echo this sentiment of parental frustration as physicians and health care professions lack knowledge of DCD.  Parents feel they need to fight the "system" to get help for their children. In their research survey of parental experiences after receiving a DCD diagnosis, Alonso Soriano et al. (2015) conclude that parents identify a lack of knowledge and awareness of DCD among professionals, and therefore timely recognition and referrals are lacking. They also state that parents identified a definitive gap of information and support within both the medical and educational systems after the diagnosis was made. Hill et al. (2015) suggest that after parents reach out for medical advice, they wait an average of two and a half years before their child receives a formal diagnosis or adequate professional support. Camden et al. (2013) suggest a need to organize services to meet the needs of children with DCD, and their families.

A key piece of research in this meta-synthesis of literature is a work completed by Licari et al., (2021).  In their article, titled *The Unmet Clinical Needs of Children with Developmental Coordination* Disorder, the authors argue that the reason so many parents wait far too long for a correct diagnosis and professional support for their child is because there is no direct diagnostic pathway available.  Some children are wrongfully diagnosed as having dyspraxia. Others do not have exposure to medical professionals that follow extensive implementation of DSM-V guidelines.  There is still a gaping hole on the medical side of the equation that needs bridging through collaboration of professional practice, before children receive the supports they need at school.

McMaster University's School of Rehabilitation Service has an online publication for medical providers, parents and educators called CanChild (2022). Within the CanChild website,

DCD has its own research platform and a printed flyer that is often given to parents of children recently diagnosed with DCD. The CanChild flyer quotes a parent of a child with DCD stating "once you put – if you want to call it a label or a diagnosis or something – to what it is, the help is there. I mean you still must fight for it but now you have something concrete to fight with." But why the need to fight or advocate?

### Parental Advocacy and Education

Deroche (2014) considers labelling theory and how it stigmatizes children with DCD in the school system.  She states in her research that while "providing a formal label expanded the potential for educational success by offering an IEP, it could not be determined whether social opportunities were expanded with the label". She argues that there are power issues involved in having children diagnosed with DCD.  Parents who can successfully advocate have more power, and therefore, their children tend to receive access to better service.  Her research follows a transformative paradigm by deliberately seeking an underrepresented population (Mertens, 2020) in that DCD is a low incidence neurodiversity and successful intervention seems to depend on parental advocacy.

As Daniel and McLeod (2017) noted in their research, parents of children diagnosed with speech sound disorders felt frustrated due to failed advocacy. Adams (2017), citing the work of Dunka et al., 2010 and Ardelt & Eccles, 2001, suggests that parental self-efficacy is needed to influence the school, provide for positive child adaptation and behaviour and higher academic achievement. Novak et al. (2011) echo this sentiment as they suggest that parents must become, by default, the experts in the field, the knowledgeable ones to provide counsel for school service and outside service.  If student success is dependant on parental involvement, children with DCD need parents well equipped with knowledge of what extra services the school can provide, or parents willing to lobby their government to procure funds for more therapeutic service.

With the scarcity of speech and language and occupational therapy support in the school system, many school districts have prioritized service for students who meet the designation for extra funding.  As such, children who have a lesser known neurodiversity, such as DCD comorbid with speech and language impairment, receive little to no extra support in the inclusive classroom.

**Summary**

In summary, this qualitative meta-synthesis of a variety of research has shown that the speech and language disorders present in children already diagnosed with Developmental Coordination Disorder are a result of their motor skill developmental delay. To assist with these delays, children need access to formal occupational and speech therapy in the school environment.  Parents, teachers, physicians, and therapists must work together in a team approach to facilitate the child's acceptance of the neurodiversity and positive educational development at school. Children who are not supported well are at risk of a reduced quality of mental health and a negative school experience.

**CHAPTER FOUR: RESULTS AND DISCUSSION**

**Introduction**

This section of the study will synthesize the results suggested by the literature studied. Points requiring further discussion will be identified and conclusions drawn as the research allows.

**Results**

As Zwicker et al. (2018) explain, it is recognized that DCD is more than a motor problem. Children diagnosed with this neurodiversity have resilient coping strategies, but their quality of life is diminished by the effort it takes to cope, every day.  Parents, therapists, and educators have the important roles of trying to mitigate the exhausting task this coping entails.  As this study has shown, children that have a speech or language impairment as one of the motor implications of DCD, have additional hurdles to overcome, especially at school. Teachers are reliant on parental knowledge of DCD and their advocacy for support to ensure a more positive result for their child's education.

**Implications for Inclusive Classrooms**

DCD is a neurodiversity.  It can be queried by speech therapists, is often identified by occupational therapists, and needs to be diagnosed by a medical professional, typically a pediatrician. Teachers are tasked with taking this medical diagnosis and making sense of it within the classroom.  Medical professionals provide suggestions, assumed prognostics and clarifications, but do not deal with patients on a day-to-day basis, as do teachers with their students. Educators are figuratively called to take students with DCD in hand and guide them through the hurdles of the regular education system, without misunderstanding or misrepresenting the medical diagnosis or frustrating the child (Lingam et al., 2013).  Missiuna et al. (2012) suggest a need for professionals to partner to produce the change needed to properly

serve the needs of children with DCD, at school.  As they state in their research abstract, "DCD is a common, chronic health condition that is poorly recognized and understood in school settings."  (While it can be argued that a neurodiversity cannot be considered a chronic health condition, perhaps if DCD is more often considered as chronic health condition, more weight would be given to its diagnosis). While DCD is considered a low incidence neurodiversity, it is readily apparent that recognition of DCD, and therefore, an understanding of the ways that it manifests in children, is important for teachers (Campbell et al., 2015).  Teacher training programs need to inform new teachers and professional development seminars need to supply a voice for students with DCD.  To properly advocate for their children, parents need to have researched literature to share with teachers.  Teachers need to have a listening ear and a willingness to learn about their students (Camden et al., 2015). DCD needs to have a louder, professional voice for it to be more readily accepted and understood.

Missiuna et al (2012) state that DCD is a chronic health condition. Not only young children need educators' continual advocacy (see Appendix B.2-3) and support but also teens with DCD are also at risk in the inclusive classroom environment. Good motor skills are necessary to successfully navigate average school hallways.  Think of crowded locker areas, stairwells, computer stations and book cabinets that pose a problem for students lacking coordination.  Think of the ball skills necessary for participation in physical education classes.  Or the precision and hand dexterity needed to mix chemicals in a science lab. Think of the fine motor skills needed for a sewing class.  Using pins or a needle and thread can be very challenging for a child with DCD.  Or consider the fine motor skills necessary to solder a robotics project or replace intricate parts in a mechanics class.  Consider the chore a basic math lesson presents when completed with pencil and graph paper. Consider typing or keyboarding, a much easier method to express ideas than cursive writing, but still a demanding motor task. These classroom considerations only view the motor skill deficit common to students diagnosed

with DCD.  When a speech/articulation disorder compounds the motor skill inability, the student is now also unable to clearly articulate personal needs to get further assistance (Daniel and Macleod, 2017).  When trying to clearly articulate something, the student takes the risk of being misunderstood or publicly embarrassed. Public speaking, leadership positions or advocating for self and others become difficult when speech articulation is not well understood. DCD with a speech/articulation impairment is chronic and this chronic piece must be understood well, should parents, therapists and educators hope to advocate for these children's support and educational success.

Missiuna et al. (2012), when considering the occupational therapy needs of children with DCD, state that therapy "needs to shift from remediation of impairment to chronic disease management".  Could speech therapy shift in the same manner? If children were diagnosed with DCD earlier, their speech and or language goals would change.  As the Speech Sound Development chart attached in Appendix B.1 shows, there is a hierarchy of typical sound development.  A typical child working through a speech impediment would slowly gain ability to perfect all the sounds.  Not so with a student diagnosed with a speech language impairment comorbid with DCD. Working on student strengths instead of stretches, Speech and Language Pathologists could choose to practice the sounds children with DCD have some success with and perfect those. Armstrong (2012), suggests that a strengths-based approach to education shows that teachers understand each child is unique and has positive strengths or abilities.  If speech pathologists giving speech therapy followed a similar model, the strengths would be honed before the stretches were attempted. Some sounds may never be clear and focussing on them can cause intense frustration and feelings of personal failure.

Another speech method could involve more of a life skill approach to therapy.  Children could be asked, for example, to state their name, address, and phone number, place a fast-food order with a list of sandwich ingredients, or state a sequence of steps to complete a daily task.

Emphasis would be placed on practicing speech clarity for practical articulation; being understood and having personal needs/wants met. Therapy, especially for older students, would have an understood purpose and perhaps receive a better effort from the child (Smits-Engelsman et al. 2012).

Another strategy in assisting these students in school, particularly when they have a better understanding of their own diagnosis, is to actively involve school counsellors to ensure these children are feeling safe at school and have a way to articulate strengths, vent frustrations and formulate personal goals (Saroj et al. 2019). A safe person or place, especially in the middle and high school years can be very valuable to children with this diagnosis.

If speech and language pathologists were able to refer their students for OT screens as soon as possible, and children with DCD were more quickly recognized, their ability to have success at school, theoretically, should increase (Camden et al. 2015, Campbell et al. 2015)). The question that arises is if DCD were more understood within the education system, would speech impairments be less of an impairment and more of an individual difference? Would teachers then become the advocates for intervention, acceptance, or remediation instead of being reliant on parents to educate the adults involved, and thereby, intervene? If DCD, as a chronic disability, was understood better, children with speech impairments would automatically be given alternate ways to communicate in the classroom. And, instead of assuming that children with DCD will outgrow their deficits, their differences would be acknowledged, and their strengths applauded. These questions provide challenges that school professionals need to consider, especially those trying to provide a well rounded, inclusive education to all students.

## CHAPTER 5: CONCLUSIONS AND SUMMARY REMARKS

### Summary of Project

This meta-synthesis of literature suggests that while there may be some understanding of the presence of DCD in the inclusive classroom, children exhibiting a Speech Language Impairment because of DCD often lack timely, appropriate intervention.  It is still incumbent on parents to provide researched literature for classroom teachers to become educated.  Parents are often required to procure therapeutic services for their children outside of school and be the necessary advocate to make their children's strengths and stretches known to educators to ensure their children receive support at school.

### Notation of Gaps in Literature

As noted earlier, DCD is largely a medical diagnosis, so much of the researched literature is health related.  There is little current research specific to educational strategy, incorporation of speech/language, occupational or physical therapy goals in the classroom, or adaptations to current curriculum to allow for students with DCD and SLI to have a better measure of success at school.  Typical behaviours of children with this neurodiversity are not often noted in educational journals.  Strategies for best educational practice are not acknowledged.  There seems to be a definitive lack in material available for educators to use as a support for their students struggling with DCD and SLI.  Further to this thought is the need for an educational development trajectory.  Suggestions for primary, elementary, middle and secondary school need to become the norm, so these children can expect to receive service just like children with more common neuro-diversities.

### Concluding Remarks

This meta-synthesis of literature has shown the need for educators to have more professional awareness of DCD and SLI.  Parents should not be the most current source of information for a neurodiversity common enough to be recognized in the DSM-5.  Both the

health and education sectors must come together as a team, to promote a greater

understanding of this neurodiversity for the betterment of our students.

**Appendices**

**Appendix A. Summarized Literature Review**

**Table A 1**

Data Set 1:

Summary of the Characteristics, Signs and Symptoms of DCD in children and implications for

the classroom

| Characteristics | Signs and Symptoms | Classroom Implications |
|---|---|---|
| • Limited acquisition and development of coordinated motor skills | • Clumsiness, dropping, bumping into or tripping over common objects<br>• Slower pace of motor development – skills are obviously delayed<br>• Impaired movement control | • Poor printing, typing, colouring or scissor skills<br>• Difficulty navigating small spaces<br>• Difficulty keeping area tidy<br>• Difficulty participating in balancing activities or sports |
| • Deficient motor skills persistently interfere with daily life | • Failure to perform basic tasks at same rate as age peers | • Reliance on teacher or peers for assistance with daily tasks eg. zipping a backpack, tying shoes (Cacola, 2016), opening lunch containers<br>• Delays academic productivity |
| • Often comorbid with other neuro-diversities, one being speech and language disorder | • Inability to formulate all speech sounds intelligibly | • Referral to SLP<br>• Pull-out for speech therapy = loss of class time<br>• Peers may become student's voice |

| | | • Child refuses to participate in public speaking |
|---|---|---|

**Table A 2**

Data Set 2:

Summary of the Characteristics of SLI in children and implications for the classroom

| Characteristics | Classroom Implications |
|---|---|
| Articulation disorders: incorrect pronunciation of one or more sounds | • SLP involved depending on severity |
| Voice disorders: Inappropriate pitch, volume or voice quality | • SLP involved depending on severity |
| Fluency disorders: disfluency – commonly called stuttering | • SLP involved depending on severity<br>• All speech disorders may cause student refusal to publicly speak at school:<br>  a) Lack of confidence = poor self-image/mental health concerns<br>  b) Refusal to speak out of comfort groups – individual voice, choice or participation not able to naturally develop<br>• Not being understood – judged or easily dismissed as having less intelligence or capability<br>• Not able to make personal needs, never mind wants, clearly understood – puts student at risk of marginalization or at a risk of personal safety. |

Data Set 3:

Summary of Three Correlating Subtopics: Efficacy of Speech Therapy, Child's Lived

Experience/Social Vulnerability and Teacher Awareness of the Neurodiversity.

**Table A 3.1**

| Efficacy of Speech Therapy | Implications for School |
|---|---|
| • Early intervention has most success of making noticeable improvements<br>• Practitioners need to implement multi-disciplinary practice to assist children with DCD and SLI (Elbasan et al. 2012).<br>• Oro-motor therapy (occupational therapists need to consult with speech/language pathologists)<br>• Parents need to be aware of SLP assistance and SLP needs to be readily available and affordable<br>• Speech therapy must recognize diagnosis as a motor delay or inability, not a common childhood delay that is quickly overcome<br>• Speech therapy is most effective when a baseline of sounds is established and those sounds perfected before more sounds are attempted<br>• Speech therapy must become pro-active: using practical, life skill strategies to aid the child in vocalizing personal interests, needs and wants | • SLP and teachers to work together to develop speech goals, try to understand child's true ability and mitigate frustration to avoid shut-down<br>• Therapy must be scheduled so child does not miss key instructional time at school<br>• Child must not be made to feel like a project – a seamless integration of speech goals into the classroom is key<br>• Speech/Articulation problems should be acknowledged as a difference, not a disability<br>• Child's strengths must be celebrated so the stretches do not define the child |

**Table A 3.2**

| Child's Lived Experience | Social Vulnerability |
|---|---|
| • Limited interventions with proven efficacy, to treat DCD<br><br>• Child's voice is rarely heard in medical or educational research regarding DCD<br><br>• Parental view of motor competence versus the child's view of motor competence are often quite different – capability is not understood (Lingam et al. 2013).<br><br>• Knowledge and awareness, and therefore, advocacy, is limited for parents, teachers and physicians (Novak et al. 2011). | • Inability to effectively communicate with teachers and peers makes children vulnerable<br><br>• Children lack confidence due to their vulnerability, and feel less worthy than school peers (O'Dea et al. 2019)<br><br>• Less likely to take social risks to involve self in groups or pursue personal interests<br><br>• Feelings of inadequacy, low self-worth, anxiety and depression<br><br>• Lack positive coping strategies to navigate regular negative social experiences (Zwicker et al. 2018). |

**Table A 3.3**

| Teacher Awareness | Classroom Implications |
|---|---|
| • Many teachers unaware of the existence of DCD or DCD with SLI due to it being a low-frequency neurodiversity<br><br>• Teachers rely on parents and outside professionals to adequately inform them of student abilities, needs, strengths and stretches (Camden et al. 2013).<br><br>• Lack of prior professional knowledge or experience put teachers on a defensive rather than pro-active stance when attempting to educate such children in the inclusive classroom. | • Limited supports available<br><br>• Occupational or speech/language therapy is generally not funded at the school level<br><br>• EA assistance is not granted unless other comorbidities allow for funded assistance<br><br>• Student is reliant on teacher ability to provide additional support or advocacy (Missiuna et al. 2012) |

**Table A 4**

Data Set 4: Summary Examples of Parental Involvement in Diagnosis and Corresponding

Parental Advocacy in Education

| Parental Involvement in Diagnosis | Parental Advocacy in Education |
|---|---|
| • Parents are the first to be informed of official diagnosis – sometimes because child is showing extreme motor delay (physician/pediatrician will suggest motor testing) or because parents compare child to siblings and notice delays/frustrations <br><br> • Schools may refer child for motor assessment if parents have not noted areas of concern or have been unable to procure medical assistance previously (Missiuna et al. 2012). <br><br> • Parents experience frustration with diagnostic journey due to the lack of professional knowledge surrounding this neurodiversity (Alonso Soriano et al. 2015, Licari et al. 2021) | • Parents note failed advocacy <br><br> • Parental self-efficacy is needed to influence the school, provide for positive child adaptation and behavior and resulting higher academic achievement <br><br> • Parents must become the experts of understanding their child's needs and wants to procure service at school or provide counsel for outside service <br><br> • Parents have to lobby for government funding to provide for their children at school |

**Appendix B**

**Supporting Documentation**

**B.1**

# Speech Sound Development

Speech Sound Norms taken from the
Goldman Fristoe Test of Articulation-2 from 2000.

| Age | Initial Sound | Medial Sound | Final Sound |
|---|---|---|---|
| 2 years | /b/ /d/ /h/ /m/ /n/ /p/ | /b/ /m/ /n/ | /m/ /p/ |
| 3 years | /f/ /g/ /k/ /t/ /w/ | /f/ /g/ /k/ ng /p/ /t/ | /b/ /d/ /g/ /k/ /n/ /t/ |
| 4 years | /kw/ | /d/ | /f/ |
| 5 years | ch j /l/ /s/ sh y /bl/ | ch j /l/ /s/ sh /z/ | /l/ ng ch j /s/ sh /r/ /v/ /z/ |
| 6 years | /r/ /v/ /br/ /dr/ /fl/ /fr/ /gl/ /gr/ /kl/ /kr/ /pl/ /st/ /tr/ | /r/ /v/ | |
| 7 years | /z/ /sl/ /sp/ /sw/ th | th | th |

This table is the age at which 85% of the GFTA-2 Standardization Sample
correctly produced the consonant and consonant cluster sounds.

**B.2**

# Developmental Coordination Disorder (DCD)
# Understanding Level of Complexity and Support Services

**NOTE:** This is a sample chart of DCD diagnostic complexity and levels of support that may possibly lead to special education categorical designation. This is **NOT** a Ministry of Education document and is for the purposes of providing a *guideline*. All required documentation must be in place to claim a student with a combination of DCD and other complex diagnoses in the Chronic Health category.

| Diagnosis of DCD | Diagnosis by: | Complexity: diagnoses in addition to DCD | Example amount of SEA support | Possible SE Funding |
|---|---|---|---|---|
| DCD | CDBC | **FASD** **Static Encephalopathy** (Areas effected: motor skills, adaptive functioning, impulsivity, behaviour, attention, executive functioning) | Approximately 12.5 hour/wk (2.5 hrs/day) | Possibly |
| DCD | CDBC | **Speech problems** **Social Behaviour** **Social-Emotional problems** **Communication** (Areas effected: language & physical functioning) | Approximately 12.5 hour/wk (2.5 hrs/day) | Possibly |
| DCD | BCAAN | **Anxiety Disorder** **Tourettes** | Approximately 60-70 minutes daily | Possibly |
| DCD | Children's Hospital | **ADHD** **Oppositional Defiance (ODD)** **Borderline intelligence** | Approximately 25 hour/wk | Possibly |
| DCD | FHAN | **Multi-system developmental delays** (social, sensory, attention, behaviour, motor output) | Approximately 4 hours/day | Possibly |
| DCD | Physician, Psychologist & OT | **Motor Coordination** **Self-regulation** **Behaviour** **Visual motor skills** **Sensory processing disorder** **Central Auditory Processing disorder (CAPD)** | Approximately 25 hours/wk | Possibly |
| DCD | BC Children's Hospital Team (paediatrician, OT, neuro-psychologist) | **Tourette's** **ADHD** **LD** **Significant language disorder** **Anxiety Disorder** | Approximately 25 hours/wk | Possibly |

| Diagnosis of DCD | Diagnosis by: | Complexity: diagnoses in addition to DCD usually not fundable | Example of Support Services | Possible SE Funding |
|---|---|---|---|---|
| DCD | Physician | **Oral Dyspraxia** **Dysgraphia** | SEA Support 20 min/day; 3x/week | No |
| DCD | Physician | **LD** **Speech difficulties** | Learning Assistance Support | No |
| DCD | Physician & Psychologist | **Poor working memory** | Learning Assistance Support | No |
| DCD | Physician & OT | **Only LD; Not complex** | Approx.1 hr daily OT consultation | No |
| DCD | Physician | **Dyspraxia** | SEA support in learning block | No |

**Assessment team Acronyms:**

**BCAAN**      BC Autism Assessment Network

**CDBC**      Complex Developmental & Behaviour Conditions Assessment Network

**FHAN**      Fraser Health Assessment Network

FISA - Special Education Audit Presentation (2014)

**B. 3**

# Developmental Coordination Disorder

*Developmental coordination disorder (DCD)* is a motor skills disorder that is fairly prevalent, but can frequently go unrecognized. Research suggests a range of between 5 to 10 percent of school-age children are affected by this condition. This disorder interferes with a student being able to perform common, everyday tasks. Frequently described as "clumsy" or "awkward" by their parents and teachers, students with this disorder often have difficulty mastering simple motor activities, such as tying shoes or going down stairs, and are unable to perform age-appropriate academic and self-care tasks. Students with DCD may avoid tasks that require fine and/or gross motor coordination and this can lead to frustration and/or under achievement.

## Implications for Planning and Awareness

- ☐ Meet with the student and parents early in the school year to discuss how the school can support this student's needs related to coordination. This could include finding out about:
  - the student's strengths, interests and areas of need
  - successful strategies used at home or in the community
  - activities that the student enjoys and is successful with.
- ☐ Learn as much as you can about how developmental coordination may affect learning and social and emotional well-being. Reading, asking questions and talking to qualified professionals will build your understanding and help you make informed decisions to better support the student's success at school.
- ☐ Develop a system for sharing information with relevant staff members about the student's coordination difficulties and successful strategies.

> Your awareness needs to begin with conversations with the student's parents.

## Implications for Instruction

- ☐ Consider alternate forms of written output and/or demonstration of comprehension. Investigate how technology can be leveraged to increase the student's capacity to produce and share written work.
- ☐ When teaching a new motor skill, break it down into components. Each component is practised several times until it becomes more automatic and fluid before adding a new component. Make activities in physical education classes as successful and enjoyable as possible. Focus on being active and having fun. Have quick ways for students to find partners and form teams that ensure everyone is included and no one student feels like the "last one picked."

- Use consistent verbal descriptions and visual demonstrations of the movement patterns as you "talk" the student through new patterns (e.g., "up, down, around"). Perform them slowly and exaggerated so the student can adjust and follow.

- In the very early stages of learning a new movement task, the student may also need physical guidance to "learn the feel of the movement." Use this strategy as needed and then fade back to the verbal descriptions of the movement.

- Besides breaking the new motor skill down into components, also break it down according to body parts. Have the student focus on learning movement in only one body part at a time (e.g., this is what you do with your arm).

- Use visual cues for correct body part placement (e.g., footprint on floor to encourage step forward when throwing ball).

- Give the student lots of rehearsal time to learn new movement patterns. As well, make sure to allow extra time to complete tasks that are difficult or require more physical effort.

- Focus on the purpose of the learning activities (e.g., ignore messy writing if the purpose is to create a story, ignore awkward dance movements if the goal is to be active to music).

- When needed, allow the student extra time for self-care activities (e.g., getting ready for recess, dressing for gym, assembling supplies for project work).

- Encourage students to develop personalized organizational systems by having scheduled times each week to clean up their locker or desk. Provide an organizational system (e.g., colour-coded binders/folders, checklists).

## Implications for Social and Emotional Well-being

- Engage the student and parents in planning for transitions between grade levels and different schools to ensure strategies and supports that benefit this student continue to be available across grade levels and from school-to-school.

- Since activities requiring gross motor and fine motor coordination are more difficult for the student, teach the student how to use positive self-talk to reduce frustration and/or to increase motivation to try physical activities he or she finds challenging.

- Partner the student with supportive peers so he or she does not feel left out during recess, gym or other school activities. Try to find alternative ways to promote involvement; the student will be more successful with motor activities that he or she is familiar with and has had practice doing.

Parents know their children well and can offer insights on how to support their social and emotional well-being. There is strength in collaborating on strategies that could be used at home, at school and in the community.

As you consider the implications for this condition, think about the following questions:

1. Do I need further conversations with the parents to better understand this student's strengths and needs? ☐ Yes ☐ No

2. Do I need targeted professional learning? ☐ Yes ☐ No
   If yes, what specific topics and strategies would I explore?

3. Is consultation with jurisdictional staff required? ☐ Yes ☐ No
   If yes, what issues and questions would we explore?

4. Is consultation with external service providers required (e.g., Regional Educational Consulting Services, Student Health Partnership, Alberta Children's Hospital, Glenrose Hospital)? ☐ Yes ☐ No
   If yes, what issues and questions would we explore?

5. Are further assessments required to assist with planning for this student? ☐ Yes ☐ No
   If yes, what questions do I need answered?

6. Is service to the student from an external provider required? ☐ Yes ☐ No
   If yes, what outcomes would be anticipated?

Links for further information:

CanChild Centre for Childhood Disability Research: Overview of DCD
http://dcd.canchild.ca/en/AboutDCD/overview.asp

CanChild Centre for Childhood Disability Research: Educational materials
https://canchild.ca/en/diagnoses/developmental-coordination-disorder/dcd-educational-materials-for-home-school-physicians-and-other-health-professionals

LDAO Learning Disabilities Association of Ontario
http://www.ldao.ca/introduction-to-ldsadhd/articles/about-parenting/developmental-coordination-disorder-dcd/

Medical/Disability Information | Developmental Coordination Disorder

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