Helping Parents, Teachers and Speech-Language Pathologists Understand the FACTS about Developmental Language Disorders

By

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This manuscript was prepared over an 18-month period (2021-2022) which involved an extensive review of the published research evidence. The purpose of the review is to provide parents, teachers, and speech-language pathologists a summary of the literature on DLD. The references for each section have been removed for easier reading and consumption. References are available on request from Dr Carl Parsons (carl.parsons@shine.org.au).

There is a shortened version of this document on the SHINE website under the "heading" of FACT SHEETS for DLD. These FACT SHEETS provide only the summary of each area. The explanatory text is omitted. The original document is also on the SHINE website at www.shine.org.au

This work is being sent to you as an individual who has an interest in Developmental Language Disorders. Please distribute to others to assist in understanding children with Developmental Language Disorders. This work is sent to you by the Andrew Dean Fildes Foundation (www.shine.org.au)

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Introduction

Developmental Language Disorder (DLD) is the currently accepted term for individuals who do not have a known medical condition (normal hearing, normal vision, no known neurological conditions, and intelligence in the normal range) but have language difficulties that are delayed or severe enough to create lifelong functional impacts. Children with DLD are at risk for learning difficulties in school. It is known that some children may resolve some basic language skills but DLD is likely to persist into school-age years and, it is known to impact academic outcomes, as well as the quality of life in adulthood.

It is well documented that educational instruction relies heavily on language skills and adequate learning of academic skills rely heavily on language. Thus, language is learning and learning is language.

Research has shown that children with DLD have long term problems in childhood that affect learning and outcomes throughout their lives. These problems place a child with DLD at increased risk for adverse long-term outcomes across educational, social, vocational, mental health, and life-style domains. Therefore, it is important to identify these children and the associated difficulties as soon as possible so evidenced-based interventions can be utilised before negative consequences occur.

Although not every child with DLD will show all the problems or exactly the same profile it is important for teachers, professionals, families and those providing funding for these children to understand the myriad of difficulties that can be found. Current funding practices in Australia indicate that many professionals do not fully appreciate the life-long difficulties associated with DLD.

Recently Thordardottir, Topbas and the Working Group 3 of COST Action ISI 406 (2021) indicated that the public's knowledge of the existence, characteristics and causes of language impairment were very low. Bishop (2017), Norbury and Sonuga-Barke (2017), and Leonard (2020) have called for work to be done to increase public awareness.

Although many scholarly publications identify the range of features and factors associated with the full range of language disorders, most of these provide in-depth research details about specific problems and may be difficult for the public to understand all the concepts and issues involved in research-based publications. However, public based publications and the internet usually give only a brief overview or summary statement of the problems identified or the long-term outcomes. For example, the Raising Awareness of Developmental Language Disorders website (https://radld.org) provides some excellent articles and provides a useful four-page summary. While these are useful, they do not always help parents and teachers understand the exact nature and range of specific problems that can be found in children with suspected of (or diagnosed with) having DLD.

The problem of insufficient awareness and knowledge about DLD was recognised globally in the early 2000s and some concrete solutions have been offered through publications, international projects, public awareness surveys, and public awareness activities all aimed at attracting the attention of the public and improving their knowledge.

Parents, teachers, special educators and administrators need to have more information about the type of problems that may be encountered or observed and the long-term implications of these problems. This document was written expressly for them.

Currently there are no studies on ideal ways to disseminate evidenced-based findings about DLD to the general public. It is known that parents, teachers and the general public do not always have access to the journals, the media and web-based sources. Indeed, some of the published research may be difficult for parents to understand or interpret. There is also a wide range of research, so the job of a parent is compounded by the volumes of research available.

In this document, we have attempted to provide a summary of the problems that have been reported in the research literature. We highlight difficulties that are believed to affect the child's ability to access the curriculum, the skills that are affected, and the life-long problems associated with DLD. Our strategy for dissemination is to get this document out to our database of over 10,000 families, their teachers, and speech-language pathologists, and Department of Education and Training staff. The materials will be sent individual in a pdf and will be provided in a series of FACT Sheets on the www.shine.org.au website.

Methodology

We have used the research evidence that identifies children, adolescents, and adults who have DLD. We used the EBSCO, Proquest, and Google Scholar databases to search for scientific literature. We included research that that refers to language delay, language impairment, language disorder, specific language impairment, and pragmatic language impairment. We have excluded research evidence that explicitly identifies language problems associated with a known biomedical etiology (genetic conditions, neurological conditions, severe autism spectrum disorders associated with other severe co-morbidities), physical impairment (brain damage, hearing loss, vision loss, motor impairments), and those with well documented cognitive impairments (intellectual disabilities, head injury, trauma). However, it must be recognised that the concept of Developmental Language Disorders is a continuum and many of the symptoms and difficulties likely overlap with other disabilities. For example, reading delay, reading impairment, reading disorders and dyslexia would be part of this continuum for at least some children. It is well documented that children with DLD are at risk for learning difficulties in school. It is precisely these problems with learning and the effect on academic outcomes and the long-term problems that persist into adolescence and adulthood that the public and teachers need to be aware of. Articles published between 1970 through 2021 were included. To be included, texts had to be original articles. Opinion pieces, letters to the editor, commentary, and clinical forums were not included. Using this method we identified 1,252 refereed published works that met our criteria. These articles were obtained and categorised into the major skills areas and topics we used in the tables created below. We then reviewed them to ascertain that they had clear statements about the results, findings, and conclusions. We also wanted to ensure these findings would be useful to parents, teachers, and professionals who work with people with DLD.

Each article was reviewed in the various categories with a view that we would provide a few summary statements from the entire articles reviewed in each category. It should be noted that there are a different number of statements made in the various depending on the results, conclusions, and the amount of research available. It should also be noted that essentially, we decided that the term "children" would be used for preschools and primary aged school children (ages 2 to 12 years), that the word "adolescents" would be used when research referred to pre-adolescents and adolescents (13 to 18 years of age, and "adults" for those over 18 years. In a number of circumstances where the research evidence covered multiple years, we used the term "people".

We have provided a series of tables below which we believe highlight the major issues for children with DLD. We have placed a title about the content or skill area in the table. Next to that is a number of articles that were used to make the statements. It should also be noted that some areas have more evidence than others. We made the statements based on the consensus findings in the research. We have provided some brief clarifying or explanatory statements (outside the tables) if we felt they would help potential readers understand some of the concepts involved in the skill areas identified. We also provided a Summary statement and Implications of the areas so that readers would not always need to infer this.

Our findings are below and are based on the categorisation of articles into themes or skills.

Labels and Terminology: The labels used over the years have changed. They have included some of the following: developmental aphasia, congenital aphasia, developmental dysphasia, language deficit, language delay, language impaired, language disordered, minimal brain damage, learning disabilities,

language-learning disabilities, specific language impairment (SLI), semantic-pragmatic disorder, pragmatic language impairment (PLI) and social communication disorders.

Labels & Terminology (based on 67 articles)
Developmental or Congenital Aphasia & Dysphasia; Minimal Brain Damage
Language Deficit, Language Delay, Language Impairment, Language Disorder, Developmental Language Disorder, Receptive Language Disorder, Expressive Language Disorder and Mixed Language Disorder
Specific Language Impairment
Semantic Pragmatic Impairment / Disorders
Pragmatic Language Impairment
Social Communication Disorder
Language-Learning Disability or Learning Disability or Specific Learning Disability
Developmental Language Disorder
SUMMARY: There are multiple terms that have been used to identify children with language disorders. The term DLD has been accepted as the current term that includes all of the above but excludes those children with clearly identified severe intellectual disabilities, and those with severe forms of autism. It is recognised that some symptoms and behaviours may overlap with these other disorders and there may be co-morbid conditions such as Attention Deficit Hyperactive Disorder (ADHD), Autism Spectrum Disorder (ASD), Speech Sound Disorders, Specific Learning Disabilities (SLD) (e.g. Reading Impairments / Dyslexia, Writing Disorders, Maths Disorders) that add to the profile. DLD is on a continuum or spectrum of severity.
IMPLICATIONS: If you have a child with suspected language learning, literacy, pragmatics / social skills problems or has any of these labels, you should investigate the exact nature of these problems. An experienced Certified Speech-Language Pathologist may be able to assist you in getting an appropriate assessment and diagnosis and appropriate evidenced-based treatment. If a problem is identified an evidenced-based treatment should be implemented based on the areas of need—regardless of the label.

Subgroups & Profiles: Various subgroups and profiles have been proposed in the research literature. Subgroups refer to those individuals who have some common differential quality, features, symptoms or skills. Profiles suggest that various subgroups may have unique patterns of development or features that help us understand the cause, trajectory of the development of skills, and outcomes for the individuals with a particular profile. At this stage, there is no consistency in the research to help explicitly identify subgroups or profiles, potential problems, or outcomes. That is because most studies do not differentiate the profiles of their participants. Generally, it is agreed that we need to differentiate profiles and that we need to differentiate those with impaired grammar from those with additional or separate pragmatic difficulties. Those with additional speech problems may also show a different profile. DLD is a heterogeneous group (that means they can be very different in their presentation of profile or skills) in terms of language profiles and may be impacted differentially. There is a continuum of severity and the profile for each individual can be very different. Not every child will have the same profile or problems. However, many will have a combination of these difficulties. Recent research is also extending profiles to include literacy. Thus, each individual with suspected DLD must be assessed carefully and programs individualised. Children with Autism Spectrum Disorders (ASD) show some forms of similar symptoms or overlap but also may present quite differently as with Attention Deficit Hyperactive Disorder (ADHD), Specific Learning Disabilities (SLD), (e.g., Dyslexia, Writing Disorders, etc.). It is likely that there are multiple co-morbidities in these populations. Technically this document would allow readers to identify what "profile" a person with DLD might have.

Trajectories: Many researchers have proposed that individuals with DLD follow similar patterns of development as typically developing children but at slowed rate. Growth models of developmental language disorders. Others believe that the stability of the language profile changes over time or that profiles can be predictive of outcomes later in life. Profiles or patterns of language and communication can change over-time, and these are called "trajectories". Some trajectories show that the problem can

resolve, emerge, persist, or even get worse; some children not identified early with language disorders may show problems that develop later like literacy skills. The table below shows some of the potential trajectories that have been identified.

Trajectories (based on 8 articles)
Problems emerge before school begins and persist.
Problems identified before school begins but resolved early without treatment.
Problems emerge in school and persist during primary, middle school, and ongoing into secondary (adolescents) and adulthood.
Problems emerge and recognised, but no diagnosis or treatment is provided.
Problems with language early in life are predictive of later problems with reading / literacy.
Persistent problems into adulthood; long term outcomes affecting quality of life.
SUMMARY: There are a range of proposed trajectories. Some children have problems that resolve early, but the majority of problems are observed in childhood, where the profile and specific problems can change as one gets older. However, a large number of children with DLD have persistent problems into adulthood.
IMPLICATIONS: Each child with DLD may have a different trajectory. It is important to have a proper assessment and evidenced-based intervention should be implemented. The goal of intervention should be to reduce or eliminate any problems to ensure the best possible outcome for any child to prevent long term problems into adulthood.

Prevalence: Prevalence is the number of cases found out of the total population in a specific population at a particular time point. The current accepted prevalence figure is between 3%-12%. However, much of the literature indicates that many children are often not identified. At school entry, approximately two to three children in every class of 30 pupils will experience a DLD severe enough to hinder academic progress. However, we need to also be aware that there is extensive variability in the prevalence research because of use of different terms, use of different definitions of terms, and the tests used to identify DLD.

Causes: No single theory can account for all the problems that have been found in people with DLD. Due to multitude and complexities of these theories—they are not reviewed extensively in this document.

Nature and nurture appear to play a role in the development of some DLDs. There is evidence that DLD runs in some families and some genes have been implicated but no specific gene or genes have been shown to be the cause of all DLDs. There are also high concentrations of children with DLD in lower socioeconomic families. Economically disadvantaged families suffer higher stress levels, higher intra-familial conflict and may have less resources (e.g., time, leisure, finances) to devote to child rearing activities. Some research has suggested that this places constraints upon the amount and quality of the early language learning environment. However, the research evidence does not support this for every child with DLD. There are many children who come from low SES families who do not have DLDs.

The cause(s) of DLD also remain unknown, but several theoretical reports have attempted to explain the aetiology and relate it to the profiles of these children. Some of these approaches are grounded in hypotheses of minimal neurological and structural deficits (i.e., cerebral asymmetry or minimal brain dysfunction; while others focus more on genetics (i.e., linking its heritable nature to the FOXP2 gene. The two largest groups of theoretical accounts focus on cognitive and linguistic deficits. The former claim that DLD is caused by processing deficits that affect language development while the latter claim that DLD is caused by deficits in linguistic representation. These areas are outlined in the table below.

The complex nature, multifactorial aetiology (including effects of prenatal environments like the effects of maternal consumption of alcohol or drugs, prematurity, and postnatal causes like otitis media, maltreatment and trauma) are not fully understood. The associated comorbidities for individual children are rarely fully explored. For example, many children with DLD may have other associated problems

like ADHD, anxiety, sleep disturbances, etc. that may affect language development. Finally, there is a lack of comprehensive and appropriate diagnostic tools that can help to identify and document these comorbidities. This may be the reason why DLD is prone to misunderstandings and false beliefs since discrepancies regarding terminology, assessment, and legislative aspects exist within the research community.

There are a number of myths associated with DLD. Some suggest that children will "outgrow" their language problems and catch up with their peers (a so-called "wait and see" approach), that their level of intelligence is lower than that of other children, that DLD is caused by poor parenting or bilingualism, or that it is strictly restricted to childhood. There is also a lack of clear understanding of what a disorder of language actually implies. The public very often confuses language disorders for speech-related problems, and in some cases even for dyslexia or autism spectrum disorder (ASD).

Inheritability, Genes & Genetics in DLD: Although there has been considerable research to investigate the inheritability of DLD and the genes that may be causing DLD, there is no consistent evidence that DLD is caused by genetics, neurobiology or environmental factors.

Inheritability, Genes & Genetics in DLD (based on 20 articles)
Family history suggests DLD is inherited; Twin studies suggest DLD is inherited.
Some research suggests that genetics cause or influence DLD.
Some research suggests that specific genes or gene loci may cause or contribute to DLD; however, the findings are often inconsistent.
Multiple studies have indicated that genetics do NOT cause DLD and there are inconsistent findings for the following genes: ATP2C2, CNTNAP2, FOXP2, SPCH1 region of 7q31, and 13q and 14q.
SUMMARY: Research evidence suggests that there are consistently high heritability estimates. The research suggests that there may be a genetic link in about 23% to 65% of cases. However, research on specific genes and genetic loci has not been able to identify specific genes that cause the majority of DLDs. Many DLDs may not have a genetic cause.
IMPLICATIONS: Many clinicians will ask about other family members who may also have had a history of language difficulties or ask to see genetic data. Currently, evidence of heritability or a genetic link does not alter treatments. If a specific gene were to be identified, genetic based treatments may help to alleviate language problems.

Brain Differences in DLD: In the search for a possible cause of DLD, many researchers have attempted to identify unique brain structures that may contribute to problems. The table below highlights some of the findings from this research.

Brain Differences in DLD (based on 12 articles)
There is some evidence of physical differences in brains of people with DLD, however these findings do not consistently translate to individuals or the specific types of language / literacy impairments.
SUMMARY: Limited evidence exists for specific regional brain anomalies for individuals with DLD—further work is required.
IMPLICATIONS: This work is often aimed at determining cause-effect relationships that currently have not been substantiated for the population of people with DLD. The idea behind this research is to find a common factor that affects brain development that in the future could be altered by specific brain altering treatments.

It is believed that nature and nurture may interact in the development of DLD. Although environmental factors are thought to correlate with many problems in DLDs, they are not believed to be the cause of the problems. Thus, parental style and environment are not reviewed here.

Intelligence Testing & Cognitive Referencing: Intelligence quotients in themselves are controversial. IQ data has often been used to confirm or support a diagnosis or to assist with making decisions about eligibility for a service. The relationship between IQ and language is a difficult one. There is a long-

standing view that as IQ decreases the lower the language skills. However, there is not a strong relationship between IQ and language. We also cannot assume there is a causal relationship between language and IQ or learning ability. Many children with IQs in the 40s and 50s have intact language skills. Many children with average to high IQ can have DLDs. In children with high IQs the profile of impairment may be less obvious. Critically we need to understand that IQ tests are all based on a theory of intelligence. We should also note that a score on a test does not explain a child's ability or inability. A score on a test doesn't represent the entire individual. IQ tests were never developed to measure language. Currently the WISC is the most frequently used test for school-aged children. The WISC places a great emphasis on verbal and nonverbal skills. Thus, a child who has a language impairment may have difficulty with many of the tasks or subtests (as they all require some degree of language comprehension) and many require expressive language skills. The problem then is that a child who has DLD is immediately rated as lower on overall IQ due to problems with their language skills. Many individual researchers over the years have indicated that using an IQ test with a verbal component disadvantages people with DLD. Thus, IQ may misrepresent cognitive function if Verbal IQ and Nonverbal IQ (NVIQ) are significantly different. Many practitioners began to examine the discrepancy scores on the WISC—that is, they compared Verbal IQ with NVIQ and then looked for a discrepancy.

The ICD-10 criteria for Language Disorder specifies severe language disorders as 1.0 standard deviation to 2.0 standard deviations or more in the context of average NVIQ, yielding a significant discrepancy between verbal and nonverbal abilities. Thus, if nonverbal and verbal skills are low, these children may be excluded from services.

The DSM5 removed reference to NVIQ in the criteria for DLD, provided children do NOT meet criteria for Intellectual Disability which usually means a score of 69 or below on an IQ test.

Recently Reilly, Bishop and Tomblin, (IJLCD, 2014) indicated that there is no evidence children with low-average NVIQ cannot benefit from clinical interventions.

The original idea was that children who had an average NVIQ were more likely to have a better outcome with intervention. Cognitive referencing theorizes that language is a cognitive skill that cannot surpass the child's cognitive ability or that your language skills cannot be higher than your IQ. The idea is that if you have no discrepancy in scores-you are functioning at your highest level possible (there is no gap between Verbal IQ & NVIQ performance) and thus you wouldn't benefit from intervention. Cognitive referencing-is the practice of comparing IQ and language scores for the purpose of eligibility decisions for language intervention. However, research results in recent years have demonstrated that cognitive skills are neither sufficient nor even necessary for language to emerge. Many funding bodies, organisations and countries do not require a discrepancy between intellectual ability and achievement for a child to be found eligible for SLP services.

In 1981, Stark and Tallal, (JSHD) proposed that children with DLD should have a performance or nonverbal IQ of at least 85 to be considered as having DLD and the ability to benefit from therapy services. Leonard (1998) concluded that children with DLD often scored within the normal limits of tests of non-verbal cognition. However, we should also be aware that numerous inconsistencies have been demonstrated across nonverbal IQ tasks.

Plante (JSLHR, 1998) indicated that Stark and Tallal (JSHD, 1981) made a fundamental error when they suggested that only children with a nonverbal IQ of 85 or more should be considered as DLD and eligible for services. Dockrell and Lindsay (2004 p 408) stated "The exclusion of children with scores within the range typically educated in mainstream school may run the risk of excluding children who would benefit from a more detailed analysis of their language needs and may result in their difficulties being subsumed under other categories of learning difficulty." Be aware that historically in the State of Victoria, in order to get funded for a language disorder, the child needed to have an IQ of 85 or above. Recently that criteria has been adjusted slightly in Victoria. The criteria now requires an NVIQ in the average range (85 or above) and 15 points above their VIQ, but the overall IQ does not have to be in the average range.

Unfortunately, many research reports have used various IQ assessment tools, reported a range of scores, or excluded children who had IQs of 69 or below and those who did not have a NVIQ of at least 85. So currently, most children in the research literature with DLD will have an IQ of 70 or above and a NVIQ of 85 or above, but there are notable exceptions.

In addition, the standard is that if you have an IQ of 69 or below, you are considered to have an intellectual disability and therefore not considered to have a DLD. In some instances it has been suggested that people with intellectual disability would not benefit from speech-language therapy services.

From our perspective, it is more useful to understand that IQ taps into human physiology (e.g., the brain, neurology, synaptic cell structures, neurotransmitters, hearing / auditory system, vision, motor skills) and cognitive abilities of attention, memory, processing skills and processing speed, and problem solving and learning abilities. Thus, physiology and underlying cognitive skills drive all learning. Below we have attempted to summarise the research evidence that indicates cognitive problem areas in DLD.

The two largest groups of theoretical accounts focus on cognitive and linguistic deficits. An extensive amount of research has examined the cognitive processing skills that may be involved in language development.

Auditory Skills & Speech Perception in DLD: There has been extensive research done to identify problems with auditory skills that may affect comprehension or learning abilities. The table below provides a list of "conclusions" from the research about the auditory skills of children with DLD.

Auditory Skills and Speech Perception in DLD (based on 62 articles)
Children with DLD can pass traditional hearing tests but may have problems with auditory processing skills; but treatments for auditory processing skills are controversial.
Many children (but not all) with DLD have had a history of otitis media; some may have had grommets inserted.
Children with DLD may have problems discriminating between sounds whose acoustic properties are similar.
Children with DLD may have problems adjusting to and processing speech that is "rapid".
Children with DLD may have problems perceiving stimuli that contain rapid acoustic changes.
Children with DLD may have problems identifying / discriminating unfamiliar speakers or those with "accents".
Children with DLD may have problems when listening in noise.
Children with DLD may have deficits in the processing and use of prosodic information to learn aspects of language.
Children with DLD may have problems perceiving rhythmic sequences.
Children with DLD have trouble learning grammatical morphemes that use less stress which is an acoustic property (so they omit unstressed syllables from phrases & these are usually grammatical morphemes).
SUMMARY: Although research has shown that auditory skills and speech perception play a role in language development, there are inconsistencies in the findings for all individuals with DLD. The results may be confounded by the type of task demands and stimulus properties not perceptual deficits. The role of auditory processing / Central Auditory Processing Disorders in DLD is ambiguous at best.
IMPLICATIONS: All children who are suspected of having DLD should have a hearing assessment to rule out hearing problems. Many children with suspected or diagnosed DLD have had assessments for Central Auditory Processing Disorders. Although there is some controversy, there is very little evidence that working on auditory skills has a major impact on the language or pragmatic skills of children with DLD. Sometimes recommendations about reducing background noise are made.

Vision, Visual Impairments & Visual Processing in DLD: The role of vision is important for learning. Many children with visual impairments have difficulties learning some aspects of language. Vision difficulties can also affect reading and development of academic skills. Of course, we need to be aware that vision can be affected by working memory, simultaneous processing (cognitive load), executive functioning, and / or attention control. We also need to be aware that many people who are vision impaired or blind can learn language.

Vision, Visual Skills, Visual Impairments & Visual Processing in DLD (based on 23 articles)
Children with DLD can have visual impairments affecting their learning.
Children with DLD benefit from visual cues that help with processing load and thus can aid comprehension.
Children with DLD can show a reduced or absent shape bias which can affect development of vocabulary.
Some children with DLD may have problems identifying visual regularities.
SUMMARY: Some children with DLD may have vision problems affecting their learning. However, more research needs to be completed.
IMPLICATIONS: Children with DLD should have their vision assessed. However, traditional vision tests often don't identify the specific vision problems that may be affecting learning.

Sensory Processing in DLD: Extensive research has been completed on children with autism spectrum disorders and it is recognised that sensory processing problems can lead to a series of unusual behaviours, self-stimulation, avoidance of activities. However, the research on sensory processing in children with DLD is limited.

Sensory Processing in DLD (based on 5 articles)
Children with DLD may have co-morbid sensory integration dysfunction; children with DLD can have sensory processing problems.
The limited research has suggested that DLD children showed the following percentage and types of sensory problems: 63.8% auditory processing problems; 52.6% touch processing problems; 51.7% vestibular processing problems 46.0% oral processing impairments; and 43.1% visual processing problems. This was based on 116 children with DLD; children with DLD and sensory processing impairments may process information differently and this in turn may affect learning (Simpson, Paynter, Ziegenfusz & Westerveld, IJDD&E, 2022).
One study has suggested that children with DLD may increase spontaneous use of verbal language after vestibular stimulation.
SUMMARY: Not all children with DLD will have sensory processing impairments.
IMPLICATIONS: Research is limited in this area, more research needs to be completed.

Motor Skills in DLD: Motor skills have been shown to be more common in some children with DLD. However, many children with DLD have no problems and indeed can be very good at some artistic skills and sporting activities. Motor skills can also be compromised by visual-motor integration and procedural learning. Children with DLD who have motor difficulties may also demonstrate co-occurring problems with use of gestures and speech sound disorders.

Motor Skills in DLD (based on 21articles)
Some children with DLD show generalised problems with slowed and under-developed gross and fine motor abilities. Some may have a Developmental Coordination Disorder. These children show problems with: clumsiness, fingers and limb movements, tracing figures, copying, throwing, running, hopping, line walking, peg moving, bead threading, ball rolling, tapping and handwriting fluency.
Children with DLD can show more problems with sequencing of motor tasks.
Some children with DLD may have more problems with oral volitional movements.

Some children with DLD show more articulation variability across multiple productions of a sentence.
Some children with DLD can perform articulation tasks better when using imitation, but this may pose problems when they need to use spontaneous speech as they may make more speech sound errors.
Children with DLD can improve with practice and training, however gains in speed may result in a decrease in accuracy.
SUMMARY: Not all children with DLD will show motor skills difficulties.
IMPLICATIONS: Children with DLD should be assessed for gross and fine motor difficulties especially those related to articulation and writing difficulties. Motor skills, articulation and writing can be improved by understanding the issues related to task demands and generalisation of skills to new untrained contexts.

Use of Gestures in DLD: The use of gestures is an aspect of motor skills. Gestures and joint attention are important as they are believed to be an important precursor to language learning. Gestures are useful in supporting communication development and are often used as a tool to support the development of early language skills. Of course, motor skills, visual skills, attention, and memory skills may affect the use of gestures.

Use of Gestures in DLD (based on 7 articles)
Children with DLD may have no difficulties producing symbolic or communicative gestures.
Children with DLD may rely more on gestures to aid their understanding (comprehension) (however, the research shows mixed results).
Some research shows that children with DLD do not use more frequent gestures than peers but use gestures to replace words (thus the research in this area is complex).
SUMMARY: The use and understanding of gestures is important as gestures can aid communication development.
IMPLICATIONS: More research needs to be done on the use of gestures.

Attention Skills in DLD: Extensive research has been conducted to examine the attentional abilities of children with DLD. The table below shows some of the findings from this work. There is potential for overlap with ADHD. This is not always made clear in many of the studies.

Attention Skills in DLD (based on 22 articles)
Children with DLD can have poor attentional capacity or ability to sustain attention.
Children with DLD can have deficits in shifting attention.
Children with DLD can have more problems with attention to auditory tasks, speech, complex sentences & complex tasks.
There is a relationship ADHD to DLD. Research suggests there is an 8% to 90% comorbidity between ADHD and DLD. Children with ADHD may show a delay in onset of talking but often don't show traditional grammar problems associated with DLD, but they may have word finding problems. The research evidence is not entirely clear on this point.
SUMMARY: Research suggests that many children with DLD, but not all, appear to have attention difficulties. Additional research needs to be completed.
IMPLICATIONS: Individualised assessments should examine possible attention difficulties. Often assessment reports comment on attention, but it is rarely assessed formally by SLPs. Many interventions include strategies to get the child with DLD to "attend" to particular aspects of language or pragmatics / social skills to assist in learning.

Memory & Working Memory in DLD: There is extensive evidence that some children with DLD have working memory deficits. Working memory is the amount of information that can be held in memory and used in the execution of cognitive tasks. Working memory allows the individual to hold new information in place so the brain can work with it briefly and connect it with other information. For example, in math class, working memory lets kids "see" in their head the numbers the teacher is

saying. It holds new information in place so the brain can work with it briefly and connect it with other information. Poor working memory affects approximately 15% of children. It is characterized by inattentive, distractible behaviour that is accompanied by failures to complete everyday activities that require focused or sustained attention.

Declarative memory refers to the capacity to remember the facts and events of everyday life and is the kind of memory that is meant when the term "memory" is used in ordinary language. Declarative or explicit memory is devoted to processing of names, dates, places, facts, events, and so forth. These are entities that are thought of as being encoded symbolically and that thus can be described with language. In terms of function, declarative memory is specialized for fast processing and learning. Explicit memory is also known as declarative memory since you can consciously recall and explain the information.

Procedural memory is a part of the long-term memory that is responsible for knowing how to do things, like motor skills. As the name implies, procedural memory stores information on how to perform certain procedures, such as walking, talking, and riding a bike. Delving into something in your procedural memory does not involve conscious thought. Procedural memory is a subset of implicit memory, sometimes referred to as unconscious memory or automatic memory. Implicit memory uses past experiences to remember things without thinking about them. It differs from declarative memory, or explicit memory, which consists of facts and events that can be explicitly stored and consciously recalled or "declared." Procedural memory is also important in language development, as it allows a person to talk without having to give much thought to proper grammar and syntax. Playing piano, skiing, ice skating, playing baseball, swimming, driving a car, riding a bike, climbing stairs are all examples of procedural memory tasks. One example of the differences between procedural and declarative memory is that procedural memory allows you to remember how to ride a bike even if you haven't done so in years, while you need to rely on declarative memory to recall the route to a nearby park and back home. While a declarative memory can be explained, it is difficult for most people to verbalize a procedural memory. Giving someone directions to the store, which involves declarative memory, is easier to communicate than the task of driving. Examples of declarative memory include: Knowing your address, recalling that the Australian Capital Territory is the capital of Australia, and remembering your mother's phone number.

Memory skills in DLD have been studied extensively. The table below highlights some of the findings from the research.

Memory Skills in DLD (based on 37 articles)
Children with DLD can have poor or reduced memory for verbal storage (they may not encode information efficiently).
Children with DLD can have long term memory formation but do not stabilize or maintain memories as well as typically developing children.
Children with DLD are more likely to have Working Memory difficulties and Phonological Working Memory Deficits.
Children with DLD can show problems with both verbal & visuospatial Working Memory when processing load is high.
Children with DLD may have declarative memory impairments.
Children with DLD may have more problems with procedural memory (affecting skill learning and retention).
Children with DLD may have more problems repeating / recalling sentences.
SUMMARY: Memory skills are implicated in DLD. However, their exact nature and extent of contribution to problems in DLD are not fully understood and vary across individuals.
IMPLICATIONS: Almost all tests for language involve components of memory. The CELF-5 has the Spoken Paragraphs subtest that requires large amounts of recall of details presented aurally. IQ tests assess some aspects of memory. Certainly, memory skills are involved in learning language. However, memory skills vary across individuals and how memory is

> **involved is not fully understood. Treatment of memory skills has not shown consistent outcomes across individuals with DLD.**

Processing Information & Processing Speed in DLD: Processing speed is a measure of the time required to perceive, make sense or comprehend a task, formulate a response, and respond to the information or task. Processing speed is often measured by IQ tests. Processing speed can also be affected by simultaneous processing requirements, that is, the ability to process two or more unrelated information bits and put them together to comprehend a task. Successive processing represents a mental process where stimuli occur in a set serial order and show a progression—like in learning of the alphabet, digits, multiplication tables or learning the ordering of words in sentences. Processing speed problems suggest that children with DLD may require more time to process information and make decisions or act when requested. If they respond too quickly without understanding the request, they may show incorrect responses. Children with DLD have processing speed and simultaneous processing skills that are affected. The table below summarises the research.

Processing Information & Processing Speed in DLD (based on 13 articles)
Children with DLD can have poor or reduced processing speed.
Children with DLD can have problems with processing more than one information bit at a time or simultaneous processing.
Children with DLD can have difficulty with processing information when there are distractors or complex information.
Children with DLD may do better at tasks that use successive processing.
SUMMARY: Research suggests that many children with DLD may have reduced processing speed, and problems with simultaneous processing, and they may do better with tasks that involve successive processing, however, the results are variable across individuals.
IMPLICATIONS: Many clinicians suggest that when speaking to children with DLD we should reduce our rate of speaking and give the person with DLD extra time to respond. Many clinicians understand that reducing the amount of information to be processed at one time can be useful, reducing external distractors, and using tasks that use successive processing may be beneficial to improve performance. More work needs to be done to consider cognitive load. Processing also is involved in 'comprehension' reviewed below (see pages 16 & 17).

Rapid Automatic Naming (RAN): RAN tasks are essentially tasks to assess processing speed. The tasks get more complicated as the child is asked to identify pictures, words, etc that have more than one attribute—colour, size, shape etc. Many children with DLD have problems with RAN tasks. Typically, RAN digits task results have been shown to be in the low average range but significantly higher than RAN letters tasks. Thus, as a group, children with DLD perform better on tasks that ask them to identify numbers and more poorly on tasks that ask them to identify letters or sounds.

Cognitive Load is related to processing speed and considered to be a factor in learning. Cognitive load refers to the amount of information that working memory can hold at one time. Trying to process multiple bits of information at one time may make tasks difficult and lead to failure. Since working memory has limited capacity, instructional methods should avoid overloading it. The interaction of tasks and limitation in auditory skills, memory and working memory, and processing speed may pose problems for children with DLD. Clinicians often attempt to reduce cognitive load by linking information the child knows or understands to new information, use of routines, focusing on only one task at a time, provide visuals, provide time, and avoid use of ambiguous terminology or vocabulary. Cognitive load can be affected by the complexity of the subject matter being covered. For example, calculus and writing have increased cognitive loads.

Cognitive Fatigue is a multidimensional construct that can be described as a mood, a feeling of tiredness, exhaustion, or a lack of energy. It is associated with sustained mental effort and results in diminished focused, reduced attention, reduced alertness, loss of mental energy, and poor efficiency in

tasks. It is well documented that children with cognitive fatigue often have academic problems, reduced quality of life and may develop a sense of failure in learning or interacting with others.

Problem Solving in DLD: It has been proposed that children with DLD have difficulties with problem solving.

Problem-solving helps children understand relationships and implement the changes and improvements needed to compete and survive in a continually changing environment. Problem-solving enables children to identify and exploit opportunities in the environment and exert (some level of) control over the future.

Problem-solving skills, include the ability to handle difficult or unexpected situations in the home, in school, the workplace as well as complex business challenges. Problem solving skills are highly useful in other areas of life like relationship building and day-to-day decision making.
Problem-solving skills help children determine the source of a problem and find an effective solution. Although problem-solving is often identified as its own separate skill, there are other related skills that contribute to this ability. Some key problem-solving skills include: Active listening, analysis of a situation, creativity, etc.

A number of types of problem solving and learning have been investigated. Some of the research suggests that children with DLD have deficient problem solving and problems with learning.

Analogical reasoning is an important component of children's higher order cognitive development. Analogy is a conceptual strategy enabling children to make inferences about novel phenomena, to transfer learning across contexts, and to extract relevant information. Analogical reasoning is an important component of children's higher order cognitive. development.

Deductive reasoning is a type of deduction used in science and in life. It is demonstrated when you take two true statements, or premises, to form a conclusion. For example, A is equal to B. B is also equal to C. Given those two statements, you can conclude A is equal to C using deductive reasoning.

The table below shows a summary of the research findings on problem solving in children with DLD.

Problem Solving in DLD (based on 11 articles)
Children with DLD can have reduced problem solving abilities.
Children with DLD can have impaired analogical reasoning abilities.
Children with DLD can have reduced deductive reasoning when compared to peers.
SUMMARY: While many studies have suggested that children with DLD have difficulties with problem solving; the exact nature and our understanding how these areas affect language is not fully understood. Not all individuals with DLD show problem solving difficulties.
IMPLICATIONS: Very few clinicians consider problems solving. It is not known how to improve these skills. More research may need to be done to understand problem solving abilities.

Learning in DLD: Since many children with DLD show problems with learning aspects of language (reviewed below) and academic skills (reviewed below), some research has been conducted to identify deficits in learning that might be inherent in the population of DLD. Of course, many intervention programs, techniques and strategies have to account for the different types of learning that a person with DLD might achieve their best outcomes.

Learning in DLD (based on 14 articles)
Children with DLD can have impaired implicit and statistical learning.
For children with DLD, statistical learning can be enhanced by making the structures "stand out" and should be considered in intervention.

Children with DLD can show difficulties with declarative / procedural learning.
Children with DLD can have problems learning sequences / sequence learning tasks (procedural learning).
Children with DLD can have inefficient explicit learning.
Children with DLD can have impaired fast mapping.
Children with DLD can have problems learning and they may learn to "give up" due to all their problems and experiences with not learning even though they make reasonable attempts. Over time they may become discouraged and may give up or come to believe they are "stupid" or incapable of learning and give up on tasks.
As gaps in learning increase children with DLD fall further and further behind their peers.
SUMMARY: Many children with DLD have problems with aspects of learning. Explicit learning is not always efficient and implicit learning is impaired.
IMPLICATIONS: Research needs to identify additional strategies that can be used to improve learning for children with DLD. Historically, many clinicians have used explicit learning to teach children with DLD, however, we need to know more about using "implicit" learning.

Statistical / Implicit Learning: Learning without trying is called implicit "statistical" learning. It is typically defined as the "acquisition of knowledge about the underlying structure of a complex stimulus environment by a process which takes place naturally, simply without conscious operation". It is a process in which learners extract regularities from the world around them without conscious intent or effort. Implicit learning is typically done in the absence of conscious awareness. Implicit knowledge is typically acquired over many different episodes. Recent research suggests that children with DLD actually can learn from implicit learning activities whereas most clinicians have historically relied on explicit teacher / learning.

Explicit Learning: Explicit learning is characterised by a "more conscious operation where the individual makes and tests hypotheses in a search for a structure". Explicit learning is the intentional learning of information. This is often done via drill and practice methods. For example, memorizing a list of word pairs would be an example of explicit learning. Historically, speech-language pathologists have placed an emphasis on explicit learning for children with DLD.

Declarative Learning: Declarative learning involves learning events, facts and rules. Learning "that" rather than learning "how". Declarative learning is typically contrasted with "procedural learning" or "knowing how". In humans declarative learning is, roughly, learning that we can describe (declare) in language. Declarative learning is often subdivided into the learning of semantic information, facts, and the learning of episodic, autobiographical experiences. In declarative learning, fact acquisition can occur very quickly, even upon single exposure to an event, but procedural learning usually requires repetition of an activity, and associated learning is demonstrated through improved task performance. Declarative learning and memory lend themselves to explicit, conscious recollection. Declarative knowledge is conscious; it can often be verbalized.

Procedural Learning: Procedural knowledge involves knowing HOW to do something, like ride a bike, for example. We may not be able to explain how we do it. Procedural learning refers to the acquisition of motor skills and habits, and certain types of cognitive skills. Unlike declarative learning and memory, procedural memory is typically inaccessible to conscious recollection. While factual information is consciously recalled in declarative or explicit memory, in procedural learning, acquisition and memory are demonstrated through task performance. Procedural learning and memory are implicit; the actual learning is inferred from an individual's improvement in performing the task.

Individual Learning Styles: Although there is a recognition that each child with DLD may show individual variation and preferences for styles of learning, no research has been conducted that systematically identifies and supports these individual styles for children with DLD. For example, there is some suggestion in the research about children who are auditory learners, visual learners, and those who prefer and may benefit from tactile learning. Gardner proposed a theory of multiple intelligences

including verbal-linguistic, logical-mathematical, visual-spatial, bodily-kinaesthetic, musical-rhythmic, interpersonal, intrapersonal, and naturalistic intelligence. This theory suggests that all learners may have preferred styles of learning. This is an area that needs to be investigated carefully for children with DLD. We need to identify how the individual child with DLD learns best as we can use their natural learning style to conduct appropriate interventions. There is some anecdotal evidence that some children with DLD may have special interests or abilities in the arts, dance, drama, music, singing, sports, theatre, etc. In the UK and USA individuals with language-learning disabilities who have performed at high levels of success are often identified and celebrated. This has not occurred so much in Australia.

Non-word Repetition Tasks: Originally Non-Word Repetition tasks were suggested as a marker for Language Impairment; some children with DLD repeat non words less accurately than peers; errors types are similar for both groups; nonword repetition tasks correlate highly with vocabulary acquisition; children who repeat nonwords more accurately also tend to score higher on standardised measures of receptive vocabulary; nonword repetition is sensitive to a wide variety of language disorders with lower levels of accuracy in children with lower level language. The non-word repetition task is used in a number of language assessment tools because it taps a number of lower level skills-speech perception, phonological encoding, phonological memory, phonological assembly, motor planning and articulation. Finally, nonword repetition tasks minimize dialectical and cultural biases because it relies on language processing rather than language knowledge, it does not over-identify children from nonstandard language backgrounds. Some researchers have argued that non-word repetition tasks tap long-term language knowledge due to complexity of phonological patterns, thus, many researchers have examined the types of errors that are made by DLD and typically developing children.

Phases of Intervention Related to Learning: One of the areas in intervention research that is overlooked is what is known as the Phases of Intervention. These phases are the Establishment Phase—Stabilization Phase—Generalization Phase—Maintenance Phase. When researchers write about treatment effects, they often forget to comment on the phase of intervention that is being targeted.

Children with DLD may learn well in clinic sessions in terms of speed and accuracy; but to retain skills they need more frequent sessions over a longer period of time for enhancing stabilization and reducing between session forgetting. A longer time period of practice is required before improvements are shown. Initial performance on a task may not reflect the child's true ability.

Children with DLD exhibit poor generalization in clinical contexts; even when multiple sessions of explicit instruction are provided. Thus, clinicians and teachers need to understand this limitation. A child's inability to learn even with repeated practice can lead to lowered self-esteem and a feeling of failure. Thus, over time the child may not want to "have a go" or take a risk in sessions.

Executive Functioning in DLD: Executive functions are a set of cognitive processes that are necessary for the cognitive control of behaviour: selecting and successfully monitoring behaviours that facilitate the attainment of chosen goals. Executive function and self-regulation skills are the mental processes that enable individuals to plan, focus attention, remember instructions, and juggle multiple tasks successfully. The brain needs this skill set to filter distractions, prioritize tasks, set and achieve goals, and control impulses. Executive function and self-regulation skills depend on three types of brain function: working memory, mental flexibility, and self-control. These functions are highly interrelated, and the successful application of executive function skills requires them to operate in coordination with each other. Each type of executive functioning skill draws on elements of the others. Working memory governs our ability to retain and manipulate distinct pieces of information over short periods of time. Mental flexibility helps us to sustain or shift attention in response to different demands or to apply different rules in different settings. Self-control enables us to set priorities and resist impulsive actions or responses. People with executive function issues may have the following symptoms: trouble controlling emotions or impulses; problems with starting, organizing, planning, or completing tasks; trouble listening or paying attention; short-term memory issues; inability to multitask or balance tasks;

and / or socially inappropriate behaviour. The research on children and adults with DLD is summarised in the table below.

Executive Functioning in DLD (based on 18 articles)
Individuals with DLD may have impaired executive functioning.
Some individuals with DLD can have problems with being organised, persistence, adaptable and working independently.
Some individuals with DLD have more problems initiating activities and goal directed behaviour; they have decreased ability to inhibit some behaviours but this may improve over time.
SUMMARY: Many, but not all, individuals with DLD may have problems with aspects of executive functioning that can affect them as children but also into adulthood.
IMPLICATIONS: More research needs to be completed to assist in understanding the Executive Functioning problems of children and adults with DLD and how best to remediate these problems.

Semantic, Lexical, and Vocabulary Skills in DLD: A hallmark of language impairment is delayed vocabulary acquisition and use. Children with DLD have problems learning and using new vocabulary words. This problem can continue into teens and adulthood.

One of the more remarkable developmental feats is the ease by which typically developing children appear to learn new words after the second year of life. Children's ability to readily map words to referents in the world and retain these mappings over time, with only minimal exposure, is commonly called fast mapping. Many children with DLD have problems with **fast mapping** or learning new words.

Semantic, Lexical, & Vocabulary Skills in DLD (based on 36 articles)
Children with DLD have problems learning new words [they do not learn new words incidentally (or just by hearing them), via fast mapping, or through bootstrapping] (This relates to their implicit versus explicit learning as well).
Children with DLD learn less overall number of vocabulary words.
Children with DLD may have delays in retrieval of words (word finding) and using first words and in learning new words.
Children with DLD often have less precise word definitions (so they may misunderstand or misuse words). sometimes they make up unusual "words".
Children with DLD have increased use of word /semantic substitutions & overuse of nonspecific words like "this", "that", "these" "those", "them", "it", "You know".
Children with DLD have problems learning new words (vocabulary) even with training; they need more exposure to words over several days and may need additional help in linking words to meaning.
Children with DLD have more difficulty learning adjectives than their peers.
SUMMARY: Many children with DLD have problems learning new vocabulary words.
IMPLICATIONS: A range of interventions have been identified to assist in the development and learning of vocabulary words. Learning vocabulary is useful for language comprehension, language use, and development of literacy skills.

Comprehension Skills in DLD: Comprehension of language is often associated with DLD and may be one of the basic problems identified early in a child's development. The table below shows the comprehension problems that are often identified in children with DLD. Comprehension problems can also be associated with attention, memory, processing speed, vocabulary, and a number of other factors.

Comprehension Skills in DLD (based on 33 articles)
Children with DLD show more difficulties with comprehension of sentences and discourse.
Children with DLD have more difficulty comprehending longer and more complex sentences.
Children with DLD have reduced abilities in oral inferencing (literal comprehension).

Children with DLD have problems interpreting and using figurative expressions (idioms, proverbs, metaphors, similes, humour, and slang).
SUMMARY: Many children with DLD have problems comprehending aspects of language.
IMPLICATIONS: All tests that provide verbal instructions to the child are essentially examining "language comprehension". SLPs use a number of language tests that examine a client's ability to understand language or "comprehension". There are many evidenced-based intervention programs to increase various types of comprehension problems.

Syntactic and Morphologic Skills in DLD: Historically, grammatical errors were noted in children with delayed or impaired language. Early attempts at identifying these grammatical errors and an extended period of looking for the Grammatical Markers that would help to diagnose children with language impairments were conducted. Much of this work began to differentiate these children using the term SLI or specific language impairment. The table below outlines the problems related to using grammar syntax and morphology.

For some children with DLD, these grammatical problems may gradually be less apparent, but ongoing more subtle difficulties may persist into adolescence and adulthood. More complex tasks may also reveal these errors. There are major differences across individuals. The table below highlights the major problem areas using grammar, morphology and syntax that have been found to occur frequently.

Syntactic and Morphologic Skills in DLD (based on 183 articles)
Children with DLD make more syntax and morphosyntax (morpheme) errors (e.g., problems with verb tenses, plurals, articles, copulas, auxiliaries).
Children with DLD DO NOT use syntactic cues in sentences to figure out meanings of novel words.
Children with DLD generally use shorter utterances, but length alone should not be used to diagnose DLD.
Children with DLD are often delayed in acquisition of grammar but follow similar patterns of development, they may take longer to acquire grammatical forms and may use forms less often than typically developing peers.
Children with DLD have difficulty learning and using complex sentences.
Children with DLD make more grammatical errors as complexity increases.
Children with DLD avoid using complex grammatical structures.
Children with DLD omit subject arguments when formulating sentences.
Children with DLD have more problems with compound word formation and make fewer attempts at making these and make more errors with word order (e.g., horse barn rather barn horse).
Children with DLD have a slower rate of learning grammar and are less likely to use articles "a" and "the" in obligatory contexts; they will either omit or substitute these forms.
Verbs in DLD (based on 56 articles)
Children with DLD use fewer verbs than their typically developing peers.
Children with DLD have increased difficulty and delays in learning and using verbs.
Children with DLD use more general all-purpose verbs ("make", "go", "do", "put") instead of more specific verbs (like "build", "walk", "wash", "hang", "jump") to describe actions.
Children with DLD tend to use verbs which require fewer obligatory arguments and omit more optional arguments.
Children with DLD have problems with verb particles (verb paired with adverb or preposition) (e.g., eat 'up', cut 'back', chew 'out', come 'over').
Children with DLD use fewer complex resultative verb phrases (e.g., "kick the shoes under the chair") omitting the optional argument which appears in the prepositional phrase.
Children with DLD omit more obligatory arguments for verbs.
Children with DLD use less auxiliary or helping verbs (e.g., "be", "do", "have").
Children with DLD use less present ("-ing") and past tense ("-ed") verbs.
Children with DLD make errors on irregular past tense verbs (e.g., "eated", "wented", "drived", "falled").

Children with DLD omit more modal verbs (e.g., "can", "could", "will", "should," "would", "must", "might").
Children with DLD tend to omit inflectional morphemes marking tense (e.g., regular past tense -ed) or agreement (e.g., third person singular -s) as well as auxiliary and copula Be forms.
All these verb forms relate to the Period of Extended Optional Infinitives (Rice, Wexler & Cleave, JSLHR, 1995): Children with DLD often omit inflectional morphemes related to tense, agreement, and auxiliary and copula BE forms; They omit auxiliary "do" verbs in finite-required contexts but used lexical verbs "do" and elliptical Do forms correctly; They often omit BE verb forms associated with finiteness (but not the -ing) in answers to wh-questions.
Wh-Questions in DLD (based on 6 articles)
Children with DLD have more problems comprehending wh-questions (who, what, when, where, & why).
Children with DLD have more difficulty with using wh-questions than typically developing peers.
Clauses in DLD (based on 26 articles)
Children with DLD have more problems with learning and using (use less) clauses (relative clauses, complement clauses, subordinate clauses, adverbial clauses).
Children with DLD have more problems combining clauses and embedding because they lack use of coordinators like "for", "and", "nor", "but", "or", "yet" & "so".
There are some suggestions in the research literature about children with DLD having problems with pronouns, passive sentences, and a few other grammatical forms—but there is no consistent data.
Metalinguistic Skills in DLD (based on 6 articles)
It is believed that children with DLD have metalinguistic deficits making it difficult to judge accuracy of grammatical formulations.
Children with DLD have problems identifying if a grammatical form is correct or incorrect; thus, they often do not self-correct.
SUMMARY: Some children with DLD show problems with using a range of grammatical structures. This is particularly true of individuals historically classified with SLI.
IMPLICATIONS: SLPs should examine the language skills of children at various stages of their development. Each individual child may show a different profile of errors. The CELF alone is not adequate for identifying the exact nature of a child's language needs. Appropriately collected and analysed language samples should help to uncover any difficulties with grammatical structures. There is extensive evidenced-based research on how to assist in improving grammatical structure use in conversational, narrative, and written communication.

Articulation, Speech Sound Errors & Intelligibility in DLD: Articulation is the way sounds are formed and put together in sequences to make words. A child has an articulation problem when he / she produces sounds, syllables or words incorrectly so that listeners do not understand what is being said. The errors are characterised by substituting one sound for another ('wabbit' for 'rabbit'), omitting a sound (saying 'top' instead of 'stop' or "for" for "fork"), or distorting a sound that makes it sound unusual. Children can have single sound errors or multiple sound errors. Multiple errors make it very difficult for the child to be understood. Speech sound errors can affect literacy skills especially reading. Speech sound errors can have a severe social impact on a child's perception of him / herself as well as the views of peers and teachers. Children with speech sound errors often report bullying and problems making friends.

Articulation, Speech Sound Errors & Intelligibility in DLD (based on 14 articles)
Many children with DLD have difficulty processing sound-based information. Thus, children with DLD are at increased risk for co-occurring problems with articulation.
The exact number of children with DLD who have articulation errors and their severity is not well documented (some may have only one sound error, while others may have multiple sound errors).
Children with DLD show more variable articulation across multiple productions of a sentence.

Children with DLD perform articulation tasks better when using imitation tasks, but this work may inhibit generalisation to real life articulation skills.
Speech-language pathologists have a good record in remediating speech sound errors.
The advice about whether treatment priority should be given to language skills or articulation in children with DLD is not clear.
SUMMARY: Children with DLD may show problems with articulation that may affect morphology and aspects of learning. When you combine the language impairments and articulation difficulties, these children often have greater problems than children with DLD but no articulation errors. Speech sound errors can have social and quality of life consequences.
IMPLICATIONS: SLPs should examine the articulation skills of children with DLD and think carefully about which areas are treated as a priority or simultaneously

Pragmatics, Conversational Skills, & Social Communication Impairments in DLD: The development of pragmatics, conversational skills, and social communication impairments in children with DLD is heterogenous (that means it can be very different for each child) in terms of language and social adjustment. No one explanation can account for all manifestations of DLD and its concomitants. Pragmatics / social skills appear to be a key to identifying a subgroup of children with DLD. Pragmatic, conversational skills, and social communication impairments have a huge overlap with people with ASD and ADHD and on some levels, it can be difficult to separate these skills from the various subgroups. However, pragmatic problems in early childhood are not always identified in the literature since such a great emphasis has been placed on grammar and other skills. Adolescents with DLD pragmatic / social skills problems may encounter demands that exceed their capacity. They are more likely to have difficulty processing input about feelings and emotional management which can lead to feelings of frustration, worry, and fearfulness. Thus, when students with DLD are asked to explain or provide details about some activity or problem that arose in school, it would be difficult for the student because of all of the language, memory, and processing difficulties combined with the emotional components involved.

The section below is complicated. It deals with the area of pragmatics. Pragmatics stems from many areas and uses many different terms and concepts. Some of these concepts include: functional or intentional pragmatics, conversational and interactional pragmatics, contextual or situational pragmatics, nonverbal behaviours, and social skills. We have attempted to list the various problems based on the behaviours identified in the research.

Many children with DLD have pragmatic / social skills difficulties. Pragmatic / social skills competence is more often associated with more difficulties with peers and peer interactions.

Those children with DLD with pragmatic problems are often referred to as having a Pragmatic Language Impairment. However, sometimes they have a conversational skill problem, a social communication impairment, or social skills difficulties.

"Pragmatics", Conversational Skills, & Social Communication Impairment in DLD (based on 106 articles)
Children with DLD may have problems (perspective taking and / or making presupposition) affecting their ability to make appropriate inferences regarding actions, beliefs, and intentions of others and to adapt based on those inferences.
Children with DLD use a range of pragmatic functions (may have problems with requests for action and requests for information) but their attempts are not always used effectively. However, Rom & Bliss, JCD, 1981 felt that children with DLD did not have / use a full range of pragmatic functions.
Children with DLD use a reduced range of request forms (grammatically and strategically); use less persuasive forms to achieve goals (obtain objects, actions, information or permissions); did not use higher level politeness strategies.
Conversational skills for children with DLD are different than typically developing children.
Pragmatic Conversational Responsiveness in DLD

Children with DLD frequently ignore or are non-responsive to initiations of p"eers; initiations by children with DLD are also ignored by peers.
Children with DLD use more "back channel" responses (like 'Yes', 'uh huh', 'okay','humm', 'oh', 'oh yea', 'mmm hum', 'boy', 'right', 'good', 'I know', 'really', 'wow', 'nodding head' and looking at their communication partner) and communication devices-verbal & nonverbal efforts by listener to indicate to a speaker the degree to which messages are being understood; these "back channel" responses enable children with DLD to appear to participate in conversations showing understanding while avoiding the use of topic initiations and topic elaborations.
Children with DLD are more likely to prefer adults as conversational partners.
Children with DLD may rely on others to initiate conversations (even though they want to communicate with others).
Some children with DLD may have problems accessing or entering ongoing social interactions (especially boys).
Children with DLD may have difficulty initiating and maintaining social interactions.
Pragmatic Conversational Relationship in DLD (Damico, 2018)
Children with DLD have more problems with staying on topic during conversations.
Children with DLD may have problems with turn taking (not knowing rules for initiating turns or interrupting others).
Children with DLD may have more problems using cohesion in conversations.
Children with DLD may have problems using correct deictic terms ("I" vs "you"; "a" vs "the"), spatial relationships ("here" vs "there"; "this" vs "that") and temporal relationships ("before" vs "after"; "now" vs "then").
Children with DLD may often fail to provide specific or the correct amount or correct type of information to a listener.
Children with DLD may overuse non-specific vocabulary (use of non-specific terms like "this", "that", "these", "those", "there", "it", "him", "her") when more specific vocabulary is required.
Children with DLD may make fewer requests for clarification; they are less likely to request clarification of an inadequate message.
Children with DLD may have a tendency to blame speakers when a message is not understood (rather than attribute responsibility to themselves); however, some research suggests that some children with DLD will usually attribute responsibility to themselves when the listener does understand a message.
Children with DLD may have problems with requests for clarification; they either don't ask for clarifications or recognise that a clarification is needed but use inefficient correction strategies.
Children with DLD may have more problems with request response sequences or question answer sequences than their peers.
Children with DLD may have more problems changing topics of conversation and terminating conversations appropriately; some time they will just abruptly walk away from the conversation.
Children with DLD may have more communication failures and lack the ability to repair conversations.
Children with DLD may have poor negotiation skills with peers (at times they believe they receive unfair punishment, rules are broken, or they are being excluded unfairly).
Children with DLD may provide significantly less tactful messages.
Hesitation Phenomenon & Fluency in DLD
There is a subgroup of children with DLD who show fluency difficulties. (Typically developing children exhibit a period of disfluent speech consistent with emergence of longer and more complex language; a subgroup of children with DLD evidence more disfluencies than typically developing peers).
In one study, 78% of the children with DLD showed some form of disfluency but at low rates; showed more part-word and whole word repetitions; none showed traditional prolongations of sounds or words or "struggle behaviours" associated with stuttering.
Children with DLD may show more speech disruptions (silent pauses) before phrases but not before sentences, clauses or words.

Hesitation phenomenon (silent pauses or filled pauses with "uhm", "er", "ahh) can be a normal response for holding a turn; signalling to the listener that one is still planning to speak and that additional time is needed to complete the planning. Many children with DLD show hesitation phenomenon that is not stuttering.
Many children who are "stutterers" show increased difficulties with language.
SUMMARY: Many children with DLD show some difficulties with pragmatic /conversational behaviours. Many children with DLD who have primarily pragmatic / conversational difficulties will have some of the problems identified in the list above.
IMPLICATIONS: SLPs should be examining children for suspected problems with pragmatics / social skills and conversational skills. Children with pragmatic / social skills / conversational problems should receive an evidenced-based intervention program to improve their skills. Research evidence has demonstrated that many pragmatic / social skills / conversational difficulties can be improved.

Nonverbal Behaviours Supporting Communication in DLD: Nonverbal behaviours are useful to support comprehension. We know that children with DLD can show a very different profile from children with Autism Spectrum Disorders (ASD). For example, the literature suggests that many children with ASD do not show joint referencing, fleeting or no eye contact, additional over or under registration of sensory information (sensory processing disorders). We need to more fully understand the use of nonverbal behaviours to support comprehension and learning of language skills.

Nonverbal Behaviours Supporting Communication in DLD (based on 8 articles)
Children with DLD seem to show the same levels of physical contact, vocalizations, looking and smiling as typically developing peers. (However, this may be different from children with ASD.)
Children with DLD may gesture more frequently to reinforce messages.
There appear to be multiple patterns of growth of nonverbal skills from childhood to adolescence.
SUMMARY: Clearly nonverbal communication is used to support oral language to aid comprehension.
IMPLICATIONS: The research findings are complex. We need more research to understand the role of nonverbal behaviours in supporting communication. We need to understand how children with DLD use their nonverbal skills to increase their communication. We know that many clinicians aid communication by using verbal plus nonverbal (gestures and visuals, etc) to support comprehension.

Many of the pragmatic / conversational difficulties relate to abilities to interact appropriately. These interaction problems appear to be more common in many children with DLD. Those with pragmatic / conversational problems often have more difficulties with peers. So are these problems associated with the range of problems identified above or is this more a social cognition problem affecting peer relations? Theory of Mind is often associated with these difficulties.

Theory of Mind: Theory of mind and social cognition play a role in play and friendships. Language ability is associated with Theory of Mind (ToM) which requires the ability to take the perspective of others. Effective and appropriate social communication / pragmatic language skills require a communicator to have ToM abilities. ToM is the ability to impute mental states to oneself and others. Many DLD have problems with ToM. A type of DLD (semantic pragmatic subtype) may be affected by ToM. Some of the children with the semantic-pragmatic subtype appear to perform similar to children with ASD. Adolescents with DLD are at greater risk of social emotional problems; this may be related to ToM deficits or Executive Functioning Deficits.

Play & Interaction with Peers in DLD: The section below expands on the problems identified in children with DLD related to pragmatics / social skills and social interaction.

Play & Interaction with Peers in DLD (based on 16 articles)
Children with DLD may have less frequent and lower quality of 'symbolic play' or pretend play. Children with DLD spend less time in pretend play with peers.
Play is less sophisticated and more atypical, however, there are individual differences and some children with DLD do develop adequate play skills.
Children with DLD have more isolated play than peers. Children with DLD spent 54% of their time interacting on the playground whereas typically developing spent 80% of time interacting with others on the playground. Children with DLD spend less time interacting with peers and spend more time in withdrawn behaviour. Children with DLD spent 42% of time withdrawing; Typical developing children spent 17% of their time withdrawing. Children with DLD showed more reticence behaviours like watching others and in unoccupied behaviour. Children with DLD showed more withdrawn behaviour of solitary-active type (withdrawn because they were actively excluded by peers). DLD showed more behaviours characterised by repeated sensorimotor action with or without objects. Children with DLD moved from play group to play group, walked or stood alone, doing little or nothing.
Children with DLD spend less time on playground with rough & tumble play; some children who engage in rough & tumble play have difficulties in shifting from "play" fighting to "real" fighting.
Children with DLD have more problems with dealing with conflict and problems with negotiating with peers. Children with DLD use lower-level negotiation strategies than peers.
Boys with DLD have more conflicts than other typically developing boys. When conflicts occur the DLD group are less likely to show reconciliatory behaviours and reconcile fewer conflicts.
Children with DLD have problems participating in cooperative work groups; they are less active participants in groups; they can be disruptive in groups; they are not able to use their nonverbal skills to solve problems.
Children with DLD forced to participate in a cooperative work context requiring close interaction with other children may demonstrate higher levels of aggression than usually observed.
Children with DLD have problems integrating into peer social play.
Children with DLD are less competent in social play than peers.
Children with DLD do not generally show aggression on playground.
Children with DLD seem to struggle with rules for even non-verbal games.
Children with DLD who have most appropriate play skills at age 7 have less externalizing (conduct problems, bullying, violence, rule breaking) problems at age 17.
There are high rates of variability on the playground and school tasks with some DLD being involved / accepted more than others. Some children with DLD are valued and not excluded from play and peer interactions depending on social skills. There are many individual differences and some children with DLD have adequate play skills.
Some children with DLD lack the social competence to take advantage of playground activities and recess (and thus these situations become a context for exclusion).
The withdrawal of interaction can lead to higher levels of negative social outcomes including affecting friendships
SUMMARY: Many children with DLD have problems with play, initiating play and maintaining appropriate play routines. When they have trouble on the playground children with DLD do not have the language and / or pragmatic / conversational or negotiating skills to work through these problems. These problems likely add to future difficulties.
IMPLICATIONS: Much research has been aimed at identifying children with DLD early so that basic play skills can be worked on at a young age. A number of evidenced-based programs have been able to demonstrate improvement in play skills. What is not known is the long-term outcome of changing play behaviours.

Prosocial Behaviours & Peer Relationships in DLD: Although the research above highlights the many problems children with DLD may evidence during play, it needs to be recognised that some children with DLD show prosocial behaviours and respond positively to others' needs and welfare. Children with DLD who are prosocial are helpful and sharing, show kindness and consideration,

cooperate with others, and express empathy and sympathy. Prosocial behaviours can change over time depending on experiences and social skills.

Prosocial Behaviours & Peer Relationships in DLD (based on 13 articles)
Some research has shown that children with DLD in primary school, rated by teachers, are rated less prosocial than peers.
Children with DLD may be less skilful and less successful in social skills; but some children improve in social skills in later childhood.
Some children with DLD appear to be within the normal or average range in prosocial behaviours; over time these prosocial behaviours can be a relative strength. Children with DLD can be empathetic, sharing, kind, and helpful.
Children / adults with DLD aged 11 to 24 years-perceived themselves to be prosocial (though lower than aged, matched peers); well within normal range and remained so from 11 to 24 years; 2 trajectories were identified-1) 71% had positive prosocial trajectory while remainder 2) had moderate prosocial trajectory-improved somewhat; prosociality is relative strength for some children with DLD. Children with prosocial behaviours had better peer relationships. This is in contrast to those children with DLD who have problems with conduct problems, emotional problems, and problems with peer relations. We know that although they are prosocial they can still have problems with peers and peer relations.
Prosocial (positive social interactions) behaviours are best predictors of positive peer relationships. Adolescents who are more prosocial have less internalizing and externalizing problems.
Peers & Peer Interactions in DLD (based on 5 articles)
Children with DLD are more likely to have problems interacting with peers.
Children with DLD can follow different pathways. 1) 22% had low level or no peer problems; 2) 12% had problems that started in childhood and then resolved or were eliminated across time; 3) 39% had childhood onset problems that persisted into adolescence, and 4) 26% had adolescent onset difficulties in peer relations.
Reticence & Shyness in DLD (based on 2 articles)
Children with DLD are often hesitant to initiate conversation even though they have a desire to engage with others.
SUMMARY: Some children with DLD show prosocial skills. Prosocial skills lead to better outcomes for children with DLD.
IMPLICATIONS: Additional research is needed to determine how best to increase prosocial skills in children with DLD and to examine if long term outcomes can be improved.

Children who are more prosocial are more likely to have positive friendships.

Social and emotional problems are interrelated. It remains unclear if children with DLD problems with social interaction are related to social tasks that require language skills or if DLD children have deficits in social competence. Poor language ability might single out an individual as being "different" and this might result in social rejection or past rejections and failures might affect child with DLD.

Emotional regulation is the ability to monitor, evaluate and modify emotions that arise in different situations. Emotional regulation affects social outcomes-reflect popularity and social competence. Children who do not have ability to excite or arouse emotion to appropriate level for conversations may be seen as "more shy "and may be able to engage with peers on equal footing.

Shyness and reticence are traits associated with tension, discomfort and inhibition in the presence of other people. Shyness inhibits interpersonal communication, social acceptance, and the development of interpersonal relationships. Shyness is often associated with lowered self-esteem. Sometimes shyness is associated with receiving more negative ratings from other people. People who are shy are often aware of themselves. Reticence behaviour is a type of withdrawal characterised by fearful and anxious behaviour in social situations in spite of the child being motivated to interact. Shyness is NOT simply low sociability.

Wadman, Durkin, & Conti-Ramsden, JSLHR, 2008) reported on 54 adolescents with DLD aged 16 and 17 years old. 62% of these adolescents were rated as shy. Self-esteem scores were in the expected normal range (48% in SLI group had scores in lower levels whereas only 11% in typically developing group. Adolescents with SLI had significantly higher scores on shyness. 60% showed shyness whereas only 20% of the typically developing adolescents showed shyness. This is consistent with higher incidence of social phobia which is a type of anxiety disorder where the individual is fearful of being scrutinized, judged, or criticized while performing some tasks in public. People with social phobia can experience extreme and persistent anxiety associated with social or performance situations and avoid those specific situations. This is consistent with a tendency towards internalizing difficulties such as withdrawn and reticent behaviour. Shyness appears to mediate the relationship between language impairment and self-esteem. Low sociability is not associated with DLD.

Young adults with DLD can have social phobia related to speaking with others, public speak & social interaction.

Individuals with DLD tend to be more reticent (wary or even fearful of joining social groups), less likely to initiate interaction, and poorer at maintaining conversations. In adolescents, individuals with DLD tend to be significantly shyer than peers.

With the exception of very early childhood, between the ages of 4 and 7 years, longitudinal studies have found higher levels of emotional difficulties in DLD NOT ONLY across childhood but into young adulthood; some authors have found longitudinal increases, others have found resolution or reductions of problems whereas some have found a decrease followed by an increase. Mok et al. (2014) identified three groups: one group experienced problems with peers from childhood through to adolescence (persistent); another group experienced peer difficulties in childhood that appeared to resolve in adolescence; a third group experienced an increase in peer problems from early adolescence (adolescence onset); some children experienced low or no peer difficulties.

Peer Problems, Bullying & Victimization, and Emotional Regulation are Related to Behaviour Problems and Mental Health in DLD: In looking for causality, the following have been considered: peer problems, bullying, victimization, and maladaptive emotional regulation strategies are all associated with higher levels of internalizing problems in young people with DLD. Emotional and peer problems tend to develop concurrently.

However, the research suggests that nearly a third of children and adolescents with DLD had very few or no externalizing problems and 10% of this group had very few or no internalizing problems. What predicts individual differences in psychopathology in young people and adolescents with DLD remains unclear.

Bullying and Victimization in DLD: Children with DLD may be more vulnerable to bullying. Victims are those children who are physically or psychologically weaker are exposed to aggressive behaviour, repeated over time. Bullying can take the form of physical aggression (hitting, pushing over), verbal aggression (name calling, inappropriate remarks), relational harassment involving social manipulation and exclusion, and the spreading of unpleasant rumours. Victims of chronic bullying or teasing (physical, verbal assaults) have been found to be at risk for undesirable social, emotional and academic outcomes including anxiety, depression, impaired concentration, somatic symptoms, reduced self-esteem, absenteeism, academic achievement and suicidal ideation. Some children with DLD may be misreading situations about bullying. The table below summarizes some of the research findings.

Bullying and Victimization in DLD (based on 7 articles)
Children with DLD report higher rates of bullying and victimization than typically developing peers; 35-40% of children and adolescents with DLD self-reported being bullied by their peers. Children with DLD appear to be at increased risk of being victimized. Some children with DLD may be misreading situations about bullying.

Adolescents with DLD are more likely (than peers) to be subject of victimization & bullying.
Victimization by peers is linked to emotional difficulties in DLD.
SUMMARY: The research indicates that children with DLD are bullied more often than peers without DLD and that bullying can lead to emotional difficulties that last a lifetime.
IMPLICATIONS: Every attempt to reduce bullying and the effects of bullying should be made to improve the lives of children with DLD. Professionals need to be very aware of the risks to people with DLD.

Mental Health-Emotions & Emotional Regulation, Stress, Anxiety, Self-Esteem and Behaviour Problems in DLD: There is extensive research about the mental health issues and behaviour problems related to children with DLD. There are likely to ne multiple reasons for mental health issues to arise. The table below summarises some of this work.

Mental Health-Emotions & Emotional Regulation, Stress, Anxiety, Depression & Self-Esteem and Behaviour Problems in DLD (based on 92 articles)
Children (especially 8 to 12 years of age) and adolescents with DLD are at increased risk for emotional, mental health and behaviour problems. These problems continue into later years.
Communication skills predict social emotional competencies.
People with DLD who had a better understanding of emotional regulation have lower levels of victimization.
Children and adolescents with DLD are more likely to have anxiety and / or depression.
Emotional and behaviour problems may be more apparent at home than in school; and behaviours may change over time and place; at school there is usually a decrease whereas home problems can increase over time. Also ratings from the child, teacher and parent can be very different—so it is unclear if variations reflect true, absolute differences. Peer problems usually remain into adolescents and adulthood.
There is considerable heterogeneity or differences across individuals with DLD: adverse outcomes are not inevitable; different trajectories may be part of a spectrum or range and highly individualised.
Many children with DLD who show early social and emotional problems continue to have problems as they get older (adolescence) and these problems can extend into adulthood.
Children, adolescents, and adults with DLD experience increased levels of emotional difficulties (and emotional dysregulation) such as stress, anxiety, depression, withdrawn behaviour and shyness. These problems can contribute to higher rates of peer rejection and lower self-esteem.
Preadolescents and adolescents with DLD show lower levels of self-esteem compared to peers.
Children and adolescents with DLD are more likely to have social anxiety and social phobia (avoid situation that might require communication).
Parents of adolescents with DLD but not adolescents themselves report higher peer and emotional problems compared to typically developing peers.
Youth Suicide (based on 5 articles)
There is a relationship between anxiety, depression, academic problems, loneliness, and lack of social supports. There is an increased risk for students with learning disabilities; possible Post Traumatic Stress Disorder; Increase susceptibility to self-harm including 1) initiated behaviour (self-cutting, jumping from heights, risk behaviour), 2) ingested substances, 3) ingested recreational or illicit drugs. 50% of teens under the age of 15 who completed suicide were diagnosed with an LD. 60% of youth suicide is related to depression.
Adolescents with a history of DLD and LD are 3 times more likely to attempt suicide. However, due to confidentiality restrictions in Australia it is difficult to determine exact figures.
SUMMARY: Many children with DLDs are more likely to have mental health issues and these problems exist into adulthood.
IMPLICATIONS: Parents, teachers, and professionals need to be aware of the increased risk in people with DLD for mental health problems. More work needs to be done to reduce and eliminate mental health issues from occurring. These problems need to be identified early and treatments provided.

Young people with DLD do not appear to be at risk for lower self-esteem in all domains-the risk is more specific-mostly it is related to academic capability. Risk is relative to peers and can change over time; Children with DLD aged 10 to 11 years, estimate their academic abilities and competence in peer relationships lower than typically developing peers; these ratings are persistent with evidence of continuities from 8 to 12 years. At age 15 to 17 years-post-secondary school they do not have lower self-esteem on all domains; risk is more specific; the level of risk when compared to typically developing peers is where differences show up. That is people with DLD can have generally positive self-esteem but have a tendency to rate themselves lower on scholastic competence and academic achievement. Lower levels of self-esteem are related to social relationships-but the evidence is mixed. Once adolescents with DLD leave school and move into a freer environment their academic self-esteem improves; a move away from a strong academic focus to more personalised and vocational experience can lead to improved self-esteem.

Self-Perception is highly related to self-esteem, self-image and self-concept. Academic self-perception, hard work and willingness to have a "go" are influenced by learning strategies and success. The meaning that children assign to their disability (or label) may influence their perception of their performance. Students often compare themselves with peers in their environment. Consistent poor achievement and stigma associated with their label or DLD and perceptions of others are important factors that contribute to a negative self-concept. Children and adolescents with DLD may experience repeated failures and their self-image is at risk. Although global self-concept can be high in students with DLD it can be low in academic self-concept.

Helplessness that students experience after multiple / repeated experiences of failure adds to negative self-concepts about oneself. They can also learn to be helpless or have a sense of failure. Academic self-concept and academic achievement are predictors of future achievement. Student engagement in school is a measure of one's attitude towards learning and being taught. Student engagement is centred around motivation. Willingness of the student to co-operate in the learning procedures and school tasks is an important factor in student wellbeing. Feeling inadequate or experiencing failure will lead to more failure and a lack of willingness to "give it a go" or try something that is unfamiliar or new. Children and adolescents with DLD then do not want to invest time or energy in trying if they have repeatedly experienced failure. This attitude makes the person with DLD vulnerable to emotional issues, school problems, and an increased belief that they can't achieve. This can lead to lower self-esteem, maladaptive behaviours, learned helplessness, lower academic expectations and increased negativity towards self, school, and life. Of course, the attitude and support in the school and home environment can make a big difference. True inclusion (that is real acceptance and participation as an equal member in the school or community), acceptance of problems by the child and others, and school / home support play an important role. Some children with DLD will internalize their difficulties in the form of loneliness, anxiety, stress and depression. Some may externalize their feelings that lead to aggression, risk taking behaviours, and delinquency. The greater the number of difficulties in language, communication, social interactions-the more likely these problems will be evidenced and persist.

There is a complex picture; by age 17 major changes can occur. Adolescents with DLD are more likely to show shyness and lower self-esteem; lower self-esteem in areas scholastic and social competence; and self-perception of their abilities. Outcomes are affected by the measures used and the research indicates that global measures should not be used as they are not sensitive to the issues. The move from schooling from an academic focus to a post-16 experience of vocational and more personalised curriculum appears to be associated with enhanced self-esteem regarding themselves as a learner.

Behaviour Problems, Delinquent Behaviour & the Justice System for People with DLD: Recent research has highlighted the complex nature between having a DLD and behaviour problems that can affect delinquency and lead to involvement in the justice system. Below is a summary of the research evidence.

Behaviour Problems, Delinquent Behaviour & the Justice System for People with DLD (based on 32 articles)
There is an increased incidence of delinquent and aggressive behaviour in DLD.
There is an increased prevalence of behaviour problems in DLD. There is a 50-70% of co-occurrence language problems and behaviour problems. Generally, these problems persist over time BUT not always; children with DLD have increased risk for behaviour problems. Behaviour problems show great variability. 3 factors affecting behaviour: 1) Influence of environment (engendering, maintaining or amending behaviour in context); 2) changes over time; and 3) individual's strengths & weaknesses.
About 50% of children / adolescents with DLD had "behaviour problems"; there are no large differences between boys & girls. Many problems were internalizing problems: withdrawn / depressed and rule breaking behaviour (50-65%). Externalizing problems were found in 57%. (Some children showed 3 types of problems: 1) withdrawn + 2) emotionally reactive + 3) attention problems. Many others showed aggressive behaviour.
There is no consensus about the predominance of internalizing (anxiety & depression and social withdrawal) versus externalizing (conduct problems, bullying, violence, rule breaking) problems in DLD. Some differences in outcomes are due to assessments used and reports from parents vs teachers vs professional observations.
Children and adolescents (especially males) with DLD are overrepresented in the youth justice system for delinquency and arrest rates; however heightened risk is not evident in later adulthood—after age 19 to 24 years.
Many children in youth justice system have high rates of compromised language skills. [Estimates range from 46% to 67% of language impairment in incarcerated youths (mean age 17 years)]. Common problems are violence and offences against property.
Boys with DLD are more likely than girls to engage in delinquent behaviour.
People with DLD are more likely to re-offend (recidivism); more than twice as likely to reoffend.
People with DLD have reduced capabilities in interviews with police about maltreatment (abuse or neglect) or youth offending. People with DLD have difficulty understanding their Miranda rights or have problems understanding what the "cautions" that are read to them about their rights actually mean.
There was no difference between DLD and typically developing children at age 19 to 24; being stopped by police, rule breaking behaviours and arrest rates. At age 19-24 people with DLD were less likely than peers to have trouble with the police.
SUMMARY: Children with DLD show more problem behaviours than peers. These problems can be those of external problems (poor behaviour) or internal (emotional problems). Adolescents and adults are overrepresented in the youth justice system.
IMPLICATIONS: More work needs to be done to reduce the behaviour difficulties and arrest rates.

Friendships and Children / Adolescents & Adults with DLD: Thus, problems with play, emotional difficulties and behaviour problems can lead to problems developing friendships.

Friendships and Children with DLD (based on 9 articles)
Many young adults with DLD have difficulties in developing and maintaining friendships; they have fewer friends and poorer quality relationships; this may be related to social confidence or shyness.
People with DLD rate themselves as being more lonely at school than typically developing children.
Children and adolescents with DLD are often not selected by peers to be friends; they are viewed as less desirable playmates.
People with DLD are more likely to experience high rates of rejection and have fewer positive peers contacts.
People with DLD have fewer friends and less good quality friendships-but some are more fortunate; Durkin & Conti-Ramsden (2007) found that approximately 60% of adolescents with DLD reported good quality friendships. Those who had good quality friendships have more favourable long-term outcomes.

In Victoria, the Department of Education and Training now places Mental Health "on par" with "academics" in terms of the Framework for Improving Student Outcomes 2.0.
Friendships in Adolescents & Adults with DLD (based on 5 articles)
People with DLD have 5 distinct trajectories-50% had problems with peers and pragmatic competence and social skills were associated more with difficulties with peers; however, many children overcame these problems as they got older; some adolescents and adults with DLD show normal friendships.
SUMMARY: Many individuals with DLD have problems forming appropriate friendships. However, many can develop normal friendships. This is highly variable.
IMPLICATIONS: Additional work needs to be done to develop appropriate friendships for children with DLD. Developing these skills may reduce other mental health issues that arise.

There is still lack of clarity about whether children with language impairments are the same, overlapping, or separate populations to those with literacy difficulties. Relationships between DLD and literacy skills (Learning Difficulties & Learning Disabilities) is not straight forward. DLD is closely associated with literacy problems, but the interaction is complex; there may be two-way interaction; thus, not all children are the same in profile or intervention needs. Some children with DLD may not show later reading problems BUT current / recent research shows increased rates of literacy problems especially children with dyslexia show oral language problems.

Due to the nature of their many difficulties many children with DLD cannot access the curriculum. Without additional support they will fall behind their peers (Dockrell & Lindsay, CLTT, 1998).

DLD children have problems learning and they may also learn to "give up". Due to all their problems and their experience with not learning even though they make reasonable attempts, over time they become discouraged and may give up or come to believe they are stupid and can't learn (Harrison, McLeod, Berthelsen & Walker, IJSLP, 2009).

As gaps in skill levels increase children with DLD fall further behind their peers (Catts, Bridges, Little & Tomblin, JSLHR, 2008; McCormick, Harrison, McLeod & McAllister, JSLHR, 2011; McLeod, Harrison & Wang, Early Childhood Res Q., 2019).

Literacy & Academic Skills in DLD: Problems with academic skills may affect future abilities. There is great continuity between adolescent to adulthood challenges with the challenges seen in adolescents / teenage years continued into adulthood. DLD in adulthood continues to affect a range of diverse areas like education, employment and independent living. DLD are more likely to experience difficulties in multiple areas of their life. However, the group is highly heterogeneous or diverse in a number of factors and there are significant differences in background, age, severity of DLD, socio-economic status, values, education and experiences across studies and individuals (Dockrell, Lindsay & Palikara, CLTT, 2011).

Adolescents with DLD have continued difficulty throughout secondary school with 75% being involved in some form of special education program support in a variety of settings; 88% satisfied with educational outcomes; 91% remained in education post-16. Young people with DLD in 2000 (and beyond) appear to have more opportunities to remain in education post16 than they did in the 1990's (Conti-Ramsden, Durkin, Simkin, & Knox, IJLCD, 2009).

Children with DLD fall behind their peers in educational attainment. They perform poorer in core subjects. Their performance is often lowest in English. Research has shown they can have relative strengths in Science and to lesser extent Mathematics. Language skills are significant predictors of performance in all core subjects. Performance IQ has been the strongest predictor for Maths. For Science Performance IQ and early language skills and language skills at age 7 were best predictors. Science may be best due to less reliance on verbal processing. Many children with DLD have potential

to reach or exceed educational targets that are set for typically developing children. Below is a summary of what is known about academic skills.

Literacy and Academic Skills & DLD
Children with DLD often experience more academic difficulties (then non-DLD children) during primary education.
Academic results often get worse towards end of primary education.
Children with DLD often fail grades more frequently than non-DLD peers (grade repetition is 25%).
Adolescents with DLD have more school problems; more problems with social skills and leadership.
Many children with DLD have more problems in curriculum requiring language skills, moderate difficulty in sciences & society, minor problems in arts, and often no differences in physical education.
Adolescents with DLD have a greater risk of dropping out of school.
Adolescents with DLD show increased concerns about academic achievements as they progress in school.
Although many children with DLD achieve lower levels of education or educational success, this can be highly variable.
Listening Skills in DLD (based on 10 articles)
See the section above in the table about Attention (page 10), and Comprehension (pages 16 & 17). Listening skills affect comprehension and learning.
Adults at age of 34 with DLD report problems in receiving information in conversation and this affects well-being.
Oral Narratives Skills in DLD (based on 14 articles)
People with DLD show ongoing problems in comprehension & production of narratives.
People with DLD show problems with oral narratives including: fewer story grammar elements and episodes, less lexical diversity (how many different words appear in the narrative), stories have fewer words (thus they are shorter) and sentences, they show more grammatical errors, and use less complex sentences, have fewer and less cohesive ties.
Problems with narratives continue to be apparent as they get older and are less likely to resolve over time without treatment.
Phonological Awareness-Reading-Continuum to Dyslexia (based on 107 articles)
Phonological Awareness is a central predictor in literacy development; Many children with DLD often show difficulties with Phonological Awareness (Additional deficit model).
Many children with DLD are likely to have problems learning to read (these problems don't always show up early). (Many children with reading problems and dyslexia may have language impairments).
Children with DLD have problems with: Print awareness, rime & rhymes, identifying initial or final sounds in words, identifying the grapheme to phoneme, sounding out (grapheme phoneme match) real words and nonsense words, dividing (segmenting) words into syllables or counting syllables, blending phonemes, and reading comprehension. Some children with DLD and reading problems have a tendency to look at the first letters in a word and guess rather than sound out the word.
Children with DLD often have limited vocabulary knowledge. Limited vocabulary can affect reading as it restricts the range of sight words that can be "identified" or recalled when trying to read. Limited vocabulary and problems with inferencing can cause problems with reading comprehension.
Reading comprehension is affected by overall difficulties with language comprehension. Reading comprehension will be affected by working memory difficulties, vocabulary limitations, problems with Phonological Awareness.
Reading rate is often slower due to difficulties sounding out, refusals to read, or difficulty with rapid automatic naming skills (RAN).
There is a strong relationship between DLD and dyslexia. They may be on a continuum. The Co-Morbidity Model suggests 2 distinct disorders with distinct origins; DLD caused by a phonological processing deficit & DLD caused by other cognitive deficits (e.g., attention memory etc.) but it is possible that some children with DLD have both deficits.

Some children with DLD have typical reading abilities. Many children with DLD who may have shown early language difficulties may resolve their basic vocabulary or grammatic problems, but their difficulties with reading may persist. There is a small group of children with DLD who can identify words or sound them out but do not comprehend what they read; this is called hyperlexia. Children with DLD in kindergarten are at high risk for reading problems in Grade 2 and Grade 4; children who improved in their vocabulary, grammar, and Phonological Awareness skills by Grade 4 had better reading outcomes; Only children with primarily grammatic impairments had a better outcome; those children with non-specific language impairment (nonverbal deficits + language deficits) had poorer outcomes.

Writing Skills in DLD (based on 33 articles)

6.9-14.7% of children with DLD have a Written Language Disorder. Boys are 2 to 3 times more likely to be affected than girls. These problems persist into adulthood.

People with DLD can have handwriting that is often slow and uneven. Written work of people with DLD is often less legible than peers; formation of letters is problematic. 47.8% of preschool children with DLD were unable to represent even one recognisable letter for their name.

Children with DLD often show more problems "getting started" on writing tasks. Children with DLD can show more problems generating ideas and deciding what to write about. Children with DLD do not always understand what might be of interest to the reader (presupposition). Children with DLD often do NOT plan their writing. They take time to get the first sentence on paper but then quickly keep writing without thinking about the narrative story line or cohesion factors.

Children with DLD may have problems with knowledge of genre structures and discourse regulation.

Children with DLD may have limitations in production of written text. They show less total words, less lexical diversity, less content, incomplete and poorly organised stories (poor structure) that lacks an appropriate narrative sequence and cohesion. Children with DLD may show problems with lexical cohesion created through use of synonyms, antonyms, hyponyms, repetition & collaboration. Children with DLD often have problems using words with multiple meanings in written work. Children with DLD may have difficulty with using personification, illusion, and symbolism in written work. Children with DLD may add more irrelevant information (off topic and lacking cohesion) than their peers. Children with DLD often have trouble with organization and maintenance of a story. Children with DLD often have problems with paraphrasing to simplify information, repeating an idea for emphasis, and elaborating on an idea.

People with DLD show more grammatical errors in their writing: they show grammar errors like omitting the auxiliary and copula (e.g., is, are, were); omission of inflectional morphemes (e.g., past tense and plural noun errors) and large numbers of subject noun omissions.

People with DLD make more capitalisation and punctuation omissions or errors than peers.

People with DLD are less likely to review or revise their written work, and when they do this-they often do not detect problems and do not know how to make corrections.

Spelling in DLD (based on 3 articles)

People with DLD have more problems with learning to spell and make more spelling errors.

Numeracy & Maths in DLD (based on 17 articles)

Many children with DLD are more likely to have delayed development in number skills; 4 times more likely to have problems with numeracy & maths.

Children with DLD may require more time to do basic math skills. Children with DLD perform better on some maths tasks when there is no time limit.

Children with DLD may have difficulty in manipulating the counting sequence by counting on from a given number or counting backwards. Children with DLD may have difficulty remembering count sequences and rote counting.

Children with DLD may have problems (transcoding) naming written numbers, writing spoken numbers, and matching spoken and written numbers. Children with DLD read and write numbers 1-9 accurately but have problems with numbers from 10-100.

Children with DLD often have comparable understanding of 1:1 equivalence like typically developing. Children with DLD appear to have intact skills in making symbolic and non-symbolic approximate number skills that help make approximate arithmetic-e.g., they can indicate if items are more or less approximate.

Children with DLD may have problems understanding and applying (using) mathematical symbols / notation and this can lead to errors in computation.
People with DLD often have difficulties on math tasks that require exact calculations; They make more calculation errors (including basic addition and subtraction); they often use immature calculation strategies (e.g., finger counting); errors often due to procedural errors.
Children with DLD may have problems in using math fact retrieval strategies.
Children with DLD do poorly on math story problem tasks.
Strategies that reduce linguistic load in maths activities can help children with DLD.
Children with DLD who show early counting difficulties have continuing difficulties as they get older.
Adults (24 years of age) with DLD struggle with finances; financial literacy skills are reduced.

Curriculum Strengths & Weaknesses in DLD (based on 3 articles)

Due to the nature of their many difficulties, many children with DLD cannot access the curriculum. Without additional appropriate, targeted, and evidenced-based intervention they will fall behind their peers (Dockrell & Lindsay, CLTT, 1998).
Science is a relative strength for many people with DLD.
Maths is an intermediate strength for some people with DLD.
English is often the weakest area of curriculum for most people with DLD.

Foreign Language Learning in DLD (based on 12 articles)

Children with DLD are often exempted from studying foreign languages due to the fact that they need additional work on English or to complete homework or attend special remedial or therapy sessions. However, this strategy is not based on research. There is some evidence that indicates learning a second language can improve one's awareness of their own language, improve critical thinking, and improve executive functioning.
Some children with DLD taught a second language have shown improvements in English, processing speed and attention.

Technology Use in Adolescents with DLD (based on 8 articles)

Adolescents with history DLD experience more computer anxiety when using home computers for educational purposes.
A majority of adolescents with DLD use computer-mediated communication.
Many adolescents with DLD own and use a cell phone.
Many people with DLD exchanged text messages less often than peers. Adolescents with DLD are less likely to respond to text messages.
Adolescents with DLD composed shorter text and used less text language. Adolescents with DLD who send text messages make more spelling errors than their peers.
People who receive text messages from adolescents with DLD rate them to be of poor standard.

Educational Outcomes in DLD (based on 23 articles)

As gaps in skills levels increase, people with DLD fall further behind peers in educational attainment.
Children with DLD have problems learning and they may learn to "give up". Due to all their problems and their experiences with not learning even though they make reasonable attempts, over time they become discouraged and come to believe they can't learn.
Children and adolescents with DLD show higher levels of concerns about transition than their typically developing peers. Most of their concerns were about scholastic competence.
Adolescents with DLD have a greater risk of dropping out of school.
Young adults with DLD often can obtain vocational qualifications although a small number complete secondary school and some complete under-graduate university degrees (These numbers appear to be increasing).
College students with DLD report have more difficulty learning from lectures.
Only about 1% of Uni students identify that they have DLD.
At an individual level there is considerable variation with some showing good educational and employment outcome.

SUMMARY: Children with DLD are likely to have problems accessing the curriculum. Children with DLD are likely to have a range of academic problems that will require extra support. These problems may affect them in the future.
IMPLICATIONS: Academic skills need to be monitored and assessed. Additional work may be required to help children with problems overcome these difficulties.

Post School Training, Jobs, Work & Employment in DLD: While many people with DLD have shown problems with learning during their primary and secondary school training, the important detail is what effects these difficulties may have on their life after school. School doesn't last forever and school exists to provide basic skills for the individual later in life. The following section explores the research on what occurs after secondary school.

Post School Training, Jobs, Work & Employment in DLD (based on 10 articles)
44% of adults with DLD obtained at least one qualification after post school education. This work suggested better outcomes than in previous decades. Language skills affect academic attainments.
Large numbers of people with DLD report having poor quality work experiences in school.
Many people with DLD are less well prepared for job seeking.
People with DLD make job choices that are influenced by literacy skills. Their employment experiences are mixed depending on the severity of impairment and environmental opportunities. For those with more severe and persistent problems-outcomes are less favourable; often there is failure to find or maintain paid employment. Many are under-employed. DLD affects employment outcome, but other factors may affect the outcome.
Young people with DLD are more reliant on personal contacts, family or friends to get a job.
More adults with DLD occupy part-time jobs when compared to peers (under-employed).
Adults with DLD who do not have jobs or are unemployed report having less trust in their chance of securing a job in the next 12 months.
People with DLD are at significantly increased the risk of experiencing long-term unemployment, under employment, or long periods without work. Adults with DLD are at significantly increased the risk of experiencing long-term (more than 1 year) unemployment.
Once a person with DLD gets a full-time job, their employment experience is similar to others in terms of job satisfaction, salary, number of hours, and job security.
People with DLD often are involved in the following types of jobs: sales, food (taking orders, preparation, and delivery), chef, catering, cleaning, laundry, childcare, fitness & swimming instructor, trades, construction, mechanical services, clerical & secretarial, low skills occupations, and delivery assistant.
In Australia there is an emphasis on helping people with disabilities "get a job". Unfortunately, people with DLD are often not recognised by NDIS or skills providers for getting the programs that will help them.
SUMMARY: Although highly individualistic, DLD affects one's ability to get a job.
IMPLICATIONS: Overcoming some of the difficulties with language and literacy skills in school may lead to be job opportunities in the future. Are we failing people with DLD in this area? Governments need to become more aware of the needs to support people with DLD in getting jobs.

Having a secure, suitably paying, and satisfying job can lead to independence and a happier more satisfying life as one grows older. This is all related to one's Quality of Life.

Quality of Life and Independence in DLD: Recent research has highlighted the complex interaction between quality of life and long-term outcomes. Below is a summary of the research on this are for people with DLD.

Quality of Life & Independence in DLD (based on 24 articles)
Adolescents with DLD are less independent than peers.
Learning to Drive with DLD (based on 3 articles)
Fewer adults with DLD had a driver's license at age 24 years (43% vs 75% with DLD vs peers). Differences were found on the written "theory driving test"-when they took the test adolescents with DLD had lower pass rates; many chose not to take the written (theory) test.
No differences have been found between DLD and peers in traffic violations, accident rates, driving confidence or road test success rates.
Living Arrangements in DLD (based on 4 articles)
People with DLD have an increased dependency on families / decreased independence (increased chance of living with parents or living alone with no partner).
Although there are inconsistent findings, some studies reported fewer adults with DLD lived away from home or a partner whereas other reports showed no difference. However, this may be a trend with even typically developing children living at home for longer periods of time.
Marriage & Children in DLD (based on 4 articles)
Many adults with DLD are married at similar rates to non DLD peers.
Adolescent pregnancy was more frequent in the DLD population than non-DLD peers.
Young adults with DLD were also more frequent parents at age 24 compared to non-DLD peers. However, once adults with DLD reached age 30 the rates were the same.
Financial Independence in DLD (based on 3 articles)
Financial independence is a challenge for people with DLD; milder DLD fare better.
Community Involvement & Leisure Activities in DLD (based on 3 articles)
The research is unclear about social and community involvement for people with DLD. More specific measures showed people with DLD were less integrated into their community. Adults with DLD appeared to need more support from others and they received more support than others.
Adolescents and adults with DLD DO NOT appear to have alcohol or substance abuse problems more than in typically developing peers; this may be related to peer interactions being reduced.
There is a lack of research evidence about leisure activities for children, adolescents, and adults with DLD.
SUMMARY: Individuals with DLD may not be as independent as non-DLD peers but more research needs to be done.
IMPLICATIONS: Additional work needs to be done to understand the quality-of-life after school. More work needs to be done on understanding the benefits of treatments and the quality of life.

SUMMARY

The reviews and tables in this manuscript are presented for families and teachers who have children with DLD. Historically, there has been an emphasis on the issues related to delayed development of language and the slow progression of grammar skills. The research has shown us that many children with DLD may have long term outcomes that negatively affect them and their potential.

It is believed that the issues identified and the summaries presented will guide families and teachers in identifying the multitude of ongoing and lifelong problems children with DLD may have. These areas may all need some additional interventions targeted at improving skills. By understanding the complex issues surrounding DLD and improving skills we may be able to reduce the many co-morbid problems and the quality-of-life issues that are associated with DLD. In addition, treatments may lead to better school outcomes, reduced mental health issues, and improved quality of life experiences for people with DLD. However, parents, teachers, and specialists in DLD will need to work together to achieve better outcomes for these children.

Another important detail is the lack of information about girls and women with DLD. A special emphasis on research in this area needs to be completed.

Researchers also need to become more proficient at providing specific details about how children are diagnosed, if they fall into particular subgroups, the severity of the DLD, and the characteristics of those children with DLD in order to understand what places a child at greater risk.

A major problem in the research is that although many statements are made about the problems with children with DLD, it is clear that these problems are NOT universal, that is not all children show all of these problems. We need to get a better idea of the exact profile and trajectory for each individual and a better understanding of how many children with DLD have these characteristics that affect their learning and life outcomes.

More research needs to be completed on what interventions and intervention strategies lead to the best outcomes for children with DLD on the various issues identified here.

Part 2 of this document will be about Assessment and Intervention for people with DLD: What parents, teachers, SLPs should know. If you are interested in receiving this document, please email carl.parsons@shine.org.au

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