School of Occupational Therapy, Social Work, and Speech Pathology

Mental Health Outcomes for Adolescents with a History of Developmental Language Disorder: An Exploration of Risk Factors

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This thesis is presented for the Degree of
Master of Philosophy
of
Curtin University

April 2020

Declaration

To the best of my knowledge and belief, this thesis contains no material previously published by any other person except where due acknowledgement has been made.

This thesis contains no material that has been accepted for the award of any other degree or diploma in any university.

The research presented and reported in this thesis was conducted in accordance with the National Health and Medical Research Council National Statement on Ethical Conduct in Human Research (2007) – updated March 2014. The proposed research study received human research ethics approval from the Curtin University Human Research Ethics Committee (Approval Number HRE2016-0134) and from the Western Australian Department of Education (reference number D16/0599573).

Signature: *Tina Kilpatrick*

Date: 10/04/2020

Acknowledgement

I am very grateful for the wealth of encouragement and support I have received from many individuals over the course of this research.

First, I would like to thank my academic team:
Primary Supervisor: Associate Professor Suze Leitão. Suze, you have been endlessly enthusiastic about my project and I am hugely grateful to have been able to share this experience with you. Thank you so much for problem-solving, guiding, counselling, cracking jokes, and painstakingly minimising my bloviation over the years (luckily, no holds are barred on this section of my thesis)! You have been an endless source of inspiration, and your in-depth knowledge of speech pathology research and practice has been invaluable to the project. The time and care you give every one of your students is remarkable, and I am extraordinarily lucky to have been one of them. You have nurtured a real appreciation for research in me that I will carry forward into the next chapter of my career. Thank you, for everything.

Co-Supervisor: Doctor Mark Boyes. Mark, I could never have envisioned that I would feel excited about numbers and somehow, you inspired that excitement in me. Thank you for being endlessly patient with all my statistics questions, for the one-on-one syntax tutorials, and for your excellent data analysis soundtrack recommendations. Your depth of knowledge about mental health and research practice in psychology is incredible and has been invaluable for shaping the project. Thank you so much for always taking the time to touch base and have a chat whenever I needed it. You have taught me so much, and I am so fortunate to have been able to work alongside you.

Associate Supervisor: Rosemary Simpson. Rosemary, thank you for all your encouragement and support in the early stages of my project. You were instrumental in building momentum for the research, and your passion for evidence-based practice in education for students with DLD has been an inspiration throughout. Thank you.

I would also like to thank Professor Peter McEvoy for providing support and counselling to those participants who needed it. Pete, it was wonderful to know that

our participants had your care and expertise, and I really appreciate the time you took to answer my questions and problem-solve with me.

I would like to acknowledge the contribution of an Australian Government Research Training Program Scholarship in support of this project. I would also like to thank Adele Wallis for generously sharing her discourse elicitation protocol with me in the early stages of the project. This resource was integral to the research.

A huge thanks to my friends in the research hub at Curtin University for constantly inspiring excitement in me. I would especially like to thank Elizabeth Hill and Samuel Calder for reviewing parts of my data, and for their ongoing support and advice about grammar and discourse. I will never look at a sentence in quite the same way again.

Thank you to everyone who participated in this research, and for welcoming me into your homes. I would also like to say a special thank you to everyone who spread the word to facilitate recruitment. Your genuine interest in the success of the project has been overwhelming. I am endlessly grateful for your contributions.

Finally, to my family, Bruce, Louise and Philippe, thank you for your unwavering patience and love, and for teaching me to always persist. I am so fortunate to have had you cheering me along in all my endeavours, and especially, in this one. And to Ben, thank you for being endlessly understanding, for the many evenings spent cooking for me while I transcribed discourse samples, and for your boundless loving encouragement. I will always be grateful for your support and belief in me.

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Abstract

Individuals with language disorders, including Developmental Language Disorder (DLD), are at increased risk of poor mental health outcomes; however, why this is the case is unclear. Bullying victimisation and low self-esteem are two factors that are consistently associated with language disorder, and these are also negatively associated with child and adolescent mental health more generally. The aims of this programme of research were, firstly, to examine the language profiles of adolescents with a history of DLD as compared to a group of typically developing peers. Secondly, we aimed to test whether there were any associations between history of DLD and/or discourse language skills, and self-esteem, bullying victimisation, and both internalising and externalising symptoms in a sample of adolescents.

Adolescents with a history of DLD (n = 20, 10-16 years, 10% female, 90% male) were compared to a group of typically developing (TD) peers (n = 22, 10-16 years, 36.4% female, 63.6% male). Participants with a history of DLD were recruited via Language Development Centres (LDCs) in Perth, Western Australia. These centres provide early, intensive language intervention for children with DLD between Kindergarten and Year 2, through a school placement. Inclusion criteria required participants with a history of DLD to have attended an LDC for a minimum of one year. The TD comparison group, with no history of neurodevelopmental or biomedical disorder, was recruited by word of mouth. Receptive and expressive language, internalising and externalising symptoms, bullying victimisation, and self-esteem were assessed with well-validated measures. Additionally, participants' discourse language skills were examined using language sample analysis.

In line with our expectations (Aim 1), the results of the language profiling study revealed significant group differences in word- and sentence-level language skills on standardised measures. While the mean group scores for adolescents with a history of DLD fell just within the average range, their Core, Receptive and Expressive language scores were significantly lower than those in the TD group. A similar pattern of differences in discourse language skills was also evident. Overall, participants with a history of DLD continued to present with poorer language skills across all levels of language as compared to TD peers, even after receiving at least one year of early and intensive language intervention in childhood. This is consistent with the persistent nature of DLD. These findings add further evidence that DLD is likely to continue to affect communication throughout adolescence, although scores

on standardised assessments may fall within the average range. This reinforces the importance of conducting functional language assessment alongside standardised assessments.

Findings for Aim 2 were more complicated. Contrary to our predictions, a history of DLD was not directly associated with internalising or externalising symptoms. However, in terms of internalising symptoms, there was a significant interaction between a history of DLD and bullying victimisation. Specifically, there was a significant association between a history of DLD and internalising symptoms at high levels of bullying victimisation but not at low levels of bullying victimisation. Bullying victimisation therefore appears to increase the risk of internalising symptoms in adolescents with a history of DLD. However, no clear pattern of associations was evident between discourse language skills and mental health, bullying victimisation, or self-esteem.

The findings of this programme of research may aid clinicians in developing their understanding of DLD and reinforces the importance of holistic client management in speech-language therapy. DLD is likely to continue to affect communication throughout adolescence and future research should examine the impact of intensive early language intervention on mental health for individuals with DLD, and examine whether anti-bullying interventions can help prevent the development of internalising problems among adolescents with DLD.

Publication Included as Part of the Hybrid Thesis

The following publication is included as part of this thesis.

The results of Research Aim 2b (Chapter 6) of this thesis has been published:

Kilpatrick, T., Leitão, S., & Boyes, M. (2020). Mental health in adolescents with a history of developmental language disorder: The moderating effect of bullying victimisation. *Autism & Developmental Language Impairments*, *4*. https://doi.org/10.1177/2396941519893313

Author	Contribution	I acknowledge that these represent my contributions to the above research output Signed:
Tina Kilpatrick	Development of research questions, participant recruitment, data collection, data management, data analysis, interpretation of results, and manuscript preparation	*Tina Kilpatrick* 10/04/2020
Associate Professor Suze Leitão	Assisted with development of research question, recruitment, inter-rater reliability, data analysis, interpretation of results, and manuscript preparation	*Suze Leitão* 09/04/2020
Doctor Mark Boyes	Assisted with development of research question, recruitment, data analysis, interpretation of results, and manuscript preparation	*Mark Boyes* 09/04/2020

Copyright Statement

Statement from Primary Supervisor

Mental Health Outcomes for Adolescents with a History of Developmental Language Disorder: An Exploration of Risk Factors

I have discussed the Turnitin Report for the above MPhil thesis with Tina Kilpatrick.

We note that the majority of the similarity index in each section is the result of the inclusion of the word document version of the published paper as Chapter 6; and matching to the online publication of the article, which is a SAGE journals publication.

Kilpatrick, T., Leitão, S., & Boyes, M. (2019). Mental health in adolescents with a history of developmental language disorder: The moderating effect of bullying victimisation. *Autism & Developmental Language Impairments*, *4*, 2396941519893313.

Associate Professor Suze Leitão
Primary Supervisor
10/04/2020

Chapter 1: Thesis Overview

Background

Language is arguably the most critical facet of meaningful interaction and social participation (Gong, Shuai & Comrie, 2014). While single words and sentences are important elements of communication, in order to express our thoughts and experiences successfully, we combine these elements to create discourse. Discourse describes language beyond the sentence level and is comprised of a range of genres linked to the purpose of the discourse. These stories, recounts of events, descriptions and explanations form the basis of meaningful conversation. These are the kinds of interactions that allow us to establish social relationships. The capacity to generate discourse that is linguistically correct, well-organised, and relevant to the context, continues to develop throughout the lifespan (Nippold, 2007). However, adolescence is a particularly important developmental period with regard to discourse, due to the increased demands of a range of genres across social and academic contexts. Examining a person's discourse-level language provides insight into their language and communication skills, as well as into some aspects of social and emotional wellbeing (Joffe, 2018).

Some individuals experience persistent difficulty acquiring word-, sentence-, and discourse-level language skills with no known differentiating condition such as brain injury or autism (Bishop et al., 2017). This is known as Developmental Language Disorder (DLD). It is estimated that DLD affects approximately 7% of the population (Norbury et al., 2016). The profile of language strengths and weaknesses associated with DLD is heterogeneous. However, part of what differentiates DLD from other disorders involving language difficulties is a demonstrated and significant functional impact of the person's language weaknesses on their day-to-day interactions; this includes, but is not limited to, difficulty expressing thoughts and experiences through discourse (Bishop et al., 2017). Furthermore, DLD is an enduring condition that is likely to continue affecting an individual throughout their life. The effect of experiencing ongoing language difficulties in adolescence, as a period of developmental vulnerability, is hypothesised to be significant (Clegg, 2018). However, clear outcome patterns have not yet been established (Conti-Ramsden et al., 2019).

In addition to difficulties with functional communication for individuals with DLD, there is a robust association between language disorder and poor mental health

outcomes. This includes internalising (e.g. anxiety, depression) and externalising symptoms (e.g. conduct problems, attention difficulties; Conti-Ramsden, Mok, Pickles, & Durkin, 2013; Snowling, Bishop, Stothard, Chipchase, & Kaplan, 2006). However, why language disorder is linked with poor mental health outcomes is unclear. A growing body of research has identified factors relevant to mental health in individuals with DLD, including bullying victimization (van den Bedem et al., 2018) and low self-esteem (Wadman, Durkin & Conti-Ramsden, 2008). These factors have also been identified as risk factors for mental health difficulties in the broader child psychology literature (Sowislo & Orth, 2013). However, the influence of language skills on mental health is also a crucial consideration. Existing research indicates varied results, and exploration of discourse language skills and mental health outcomes in the DLD population is lacking (Im-Bolter & Cohen, 2007). Given the demand on discourse-level language skills for establishing meaningful social relationships, examination of this is imperative.

Research Aims

This programme of research aimed to examine factors affecting mental health for adolescents with and without a history of DLD. The first aim was to examine the language profiles of adolescents with a history of DLD as compared to a group of typically developing peers. Word-, sentence-, and discourse-level language skills were evaluated using a combination of standardised measures and language sample analysis. This was important to establish, given the enduring nature of DLD, and our participants' access to early and intensive oral language intervention in childhood.

The second aim of the research was to test whether (a) a history of DLD and/or (b) current discourse language skills were associated with measures of mental health, self-esteem and/or bullying victimisation. Such investigation is crucial to understanding the impact of DLD, and for the continued development of a responsive and holistic approach to client management for allied health professionals.

It is well-recognised that the impact of life stressors may vary with age (Gupta, 2016; Martel, 2013). Adolescence is widely acknowledged to be a period of risk for the development of mental health problems (Clegg, 2018). In addition, adolescence is associated with establishing strong and pivotal peer relationships that bolster the development of self-concept and self-esteem (Taylor, 2018). The capacity to establish such relationships relies heavily on language and communication skills. As such, children aged between 10- and 16-years were recruited for this programme

of research, to better understand mental health and communication for the DLD population in this period of vulnerability.

Overview of Thesis Chapters

This section will briefly outline the content of the remaining thesis chapters.

Chapter 2 describes and critiques the literature pertaining to language development (and disorder) that underpins the research. Language at the word-, sentence- and discourse-level is discussed from a functional perspective, and DLD in childhood and adolescence is examined.

Chapter 3 synthesises the literature surrounding mental health and language disorders (including DLD), and reviews existing research pertaining to bullying victimisation and self-esteem in the DLD population. In addition, discourse-level language in the context of mental health is discussed.

Chapter 4 provides a broad overview of the method used to obtain the data, including recruitment, assessment tools, and the process for discourse sample analysis.

Chapter 5 outlines the results of the profiling study (Aim 1), which examines the expressive and receptive language skills of both participant groups. This chapter details participants' language skills assessed using standardised measures, as well as discourse-level language skills analysed using the principles of language sample analysis.

Participants' mental health, self-esteem, and bullying victimisation experiences are examined in Chapter 6 (Aim 2a). This study sought to examine the relationship between having a history of DLD and internalising and externalising symptoms in adolescence. Possible associations between mental health outcomes, bullying victimisation and self-esteem are also explored, to determine whether these factors moderate the association between a history of DLD and psychological symptoms.

Chapter 7 briefly outlines the results of correlation analyses examining discourse-language skills and mental health, self-esteem, and bullying victimisation measures (Aim 2b). This chapter seeks to clarify whether specific discourse-level language skills may be relevant factors in psychosocial wellbeing for adolescents with and without a history of DLD.

In Chapter 8, the results of the programme of research are examined in a general discussion that contextualises the findings within the current literature. In

addition, limitations of the current research, theoretical and clinical implications, and directions for future research are discussed.

Chapter 2: Literature Review - Language and Discourse

Language Development in Adolescence

The acquisition of language is a highly complex process long debated by researchers. The critical period hypothesis (Lenneberg, 1967) argues that, biologically, the optimal period for language acquisition is between two and twelve years of age. Reductions in neural plasticity in puberty result in limited linguistic development from this period onwards (Nippold, 2007). However, subsequent research has revealed gradual, ongoing language development through adolescence and adulthood in terms of metalinguistic awareness (one's ability to reflect on language), the ability to analyse and refer to abstract concepts, social perspective-taking, as well as a myriad of micro-level skill developments at the level of discourse (Paul, Norbury & Gosse, 2018; Spencer, 2018). As adolescents learn about new ways to organise ideas in speaking and writing (e.g. through the use of expository texts and instructional lectures), these are supported by developments in syntax, semantics, and morphology (Paul et al., 2018). In particular, the increased use of subordinating and coordinating conjunctions allows not only the efficient expression of ideas, but also an improved ability to relate clauses and explain linked events (Paul et al., 2018). Developments in literate vocabulary, including metalinguistic verbs (e.g. interrogate), abstract nouns (e.g. liberalism), and adverbial conjuncts (e.g. similarly), also contribute to the more precise and efficient use of language, supporting the expression of formal operational thought. Adolescence is a key period in the development of language to reason, draw inferences and conclusions, and think beyond the immediate and concrete (Paul et al., 2018). These abilities are crucial to accessing the school curriculum, as well as meaningful social interaction and comprehension of world events. Thus, language development in adolescence is fundamental to understanding and explaining the nuance and complexity of the events that occur around us.

In the early years, children acquire language through oral means; that is, language is acquired through mapping new phonological forms and semantic attributes of words through interactions with adults and teachers (Jackson, 2019; Nation, 2014; Romeo et al., 2018). However, as literacy skills develop beyond learning *to* read (that is, around the age of eight or nine years in Western schooling), the primary context for language learning becomes *through* reading (Paul et al., 2018). Reading provides a platform for adolescents to extend their lexicon through

direct instruction, contextual abstraction (inferring the meaning of a new word based on the surrounding linguistic cues), and morphological analysis (Paul et al., 2018). Given that fiction and non-fiction texts increasingly expose children to a more formal, literate style of language, it is during the upper primary and high school years that students begin to learn complex vocabulary, sophisticated syntax structures, and the purposeful use of linguistic devices for effect (e.g. figurative language; Nippold, 2007). These features of language allow us to understand the implicit features of an interaction or event and express our thoughts with increased precision. These are crucial to academic and social outcomes.

Developmental Language Disorder

Some individuals experience ongoing and persistent difficulties acquiring language in the absence of a biomedical or neurological diagnosis (Leonard, 2014). The terminology used to describe such language difficulties has varied throughout history, and includes "primary language impairment", "Specific Language Impairment", and "language disorder". More recently, a panel of experts developed specific criteria for the diagnosis of "language disorder" and "Developmental Language Disorder". The term "language disorder" describes significant and persistent language difficulties, which have a demonstrated functional impact on day-to-day living (Bishop et al., 2017). Language disorder may be associated with a neurodevelopmental (e.g. autism), sensorineural (e.g. hearing loss) or biomedical condition (e.g. brain injury) (Bishop et al., 2017), while Developmental Language Disorder (DLD) describes language disorder with no differentiating condition. DLD can, however, co-occur with attention, reading, social, behavioural and/or motor skills difficulties (Bishop et al., 2017)[1]. Figure 1 contextualises DLD within a broader range of speech, language and communication needs.

[1] Given the variable terminology used to describe language difficulties, at times the precise nature of the language profiles of research populations in the subsequent literature review is unclear. Therefore, the generic term "language disorder" will be used to refer to unspecified language difficulties that may be associated with (a) Developmental Language Disorder (DLD), (b) a biomedical condition, or (c) where the previous diagnostic terminology, "Specific Language Impairment" has been used. Where it is explicitly stated that research samples align with the current diagnostic criteria for DLD, this terminology has been used.

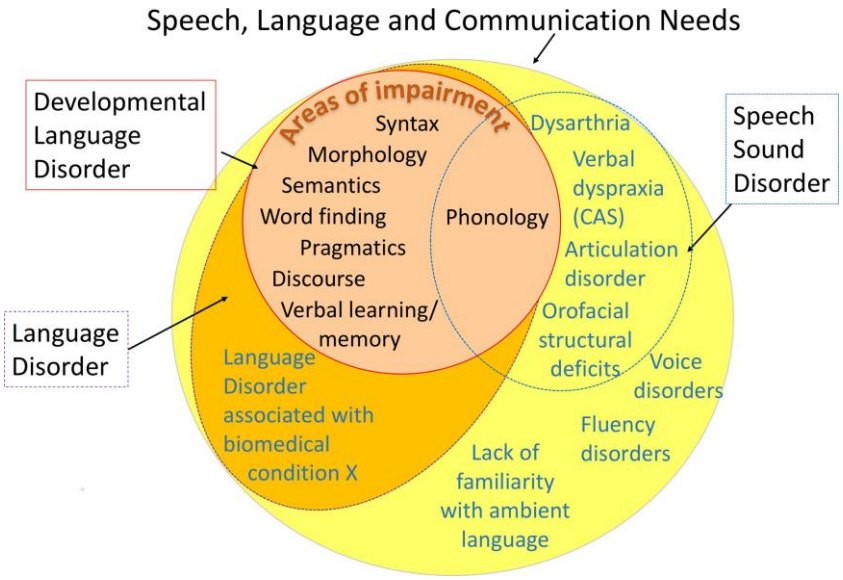


Figure 1 Venn diagram illustrating relationship between different diagnostic terms. DLD is nested within the broader SLCN category. Retrieved from "Phase 2 of CATALISE: a multinational and multidisciplinary Delphi consensus study of problems with language development: Terminology," by D. Bishop, M. J. Snowling, P. A. Thompson, T. Greenhalgh and the CATALISE-2 consortium, 2017, in *Journal of Child Psychology and Psychiatry, 58*(10). Retrieved from https://doi.org/10.1111/jcpp.12721.

Developmental Language Disorder in Adolescence

DLD may be diagnosed in early childhood and is typically most reliably diagnosed after the age of five years (Bishop, 2017). However, the heterogeneity of language profiles and associated difficulties means that DLD can go undiagnosed, or can be misdiagnosed as social, emotional and behavioural disorders or literacy weakness (Prelock, Hutchins & Glascoe, 2008). Nevertheless, previously unidentified DLD can be diagnosed in adolescence with sufficient evidence of language weaknesses in early childhood. The difficulties associated with DLD might look different in early or middle childhood compared to adolescence. At this later stage, the functional impact of language weaknesses is evident in difficulties progressing academically, comprehending reading material, explaining learning, and generating written texts (Spencer, 2018). Socially, adolescents with DLD are likely to experience difficulty interacting with peers, and therefore, establishing and maintaining friendships is effortful (Clegg, 2018). The functional impact of DLD is also evident in variable employment, social, and emotional outcomes in adulthood. Conti-Ramsden et al. (2018) found that, at the group level, a sample of adults with a

history of DLD obtained lower educational and occupational qualifications as compared to age-matched, typically developing adults. However, some individuals with a history of DLD were able to secure good educational and employment qualifications. This variability in outcomes is consistent with the heterogeneity of the disorder itself.

Domains and Levels of Language

Our ability to understand and produce language depends on a range of skills across different domains, including phonology, morphology, semantics, syntax, and pragmatics (Paul et al., 2018). To communicate effectively, skills within these domains of language must be accessed simultaneously. At times, everyone experiences a breakdown in their ability to apply one or more of these skills in oral or written communication. However, individuals with DLD experience these issues more frequently. To identify the source of the breakdown, speech pathologists can conceptualise language as a series of levels, as illustrated in Figure 2, below.

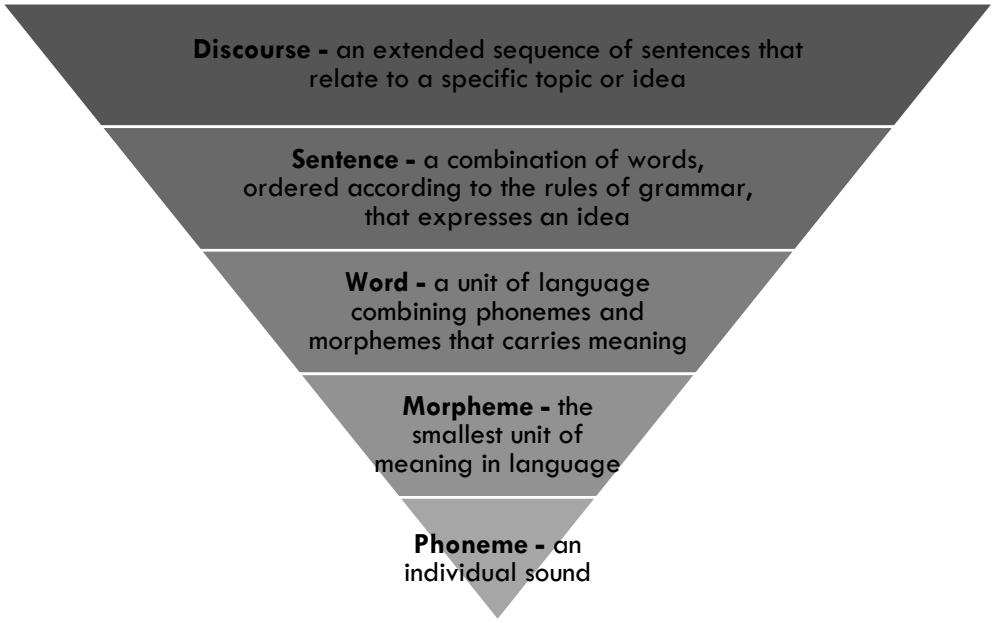


Figure 2 Conceptualisation of the levels of language

Sherratt's (2007) Adapted Model of Discourse

Language demands at the discourse level are particularly high, given the need to process and organise a series of ideas using linguistically accurate sentences. Discourse comprehension and production demands metalinguistic competence, alongside syntax, morphology, vocabulary, phonology and pragmatic skills. The

complexity of these demands is clearly depicted in a model of discourse proposed by Frederiksen, Bracewell, Bruleux & Renaud (1990), which was more recently adapted by Sherratt (2007). According to Sherrat's adapted discourse model, an input trigger (such as a question from a conversation partner, or a request for a recount of an event) initiates the conceptualisation of an organisational framework that structures the discourse. This is known as the macrostructure and is dependent on the purpose of the discourse.

For example, a request for a recount of an event would necessitate the systematic introduction of the people (characters), places and sequence of events. In contrast, the description of a person would detail a series of their attributes, linked with specific examples that demonstrate that the narrator's evaluation of the person's attributes is accurate. Following the conceptualisation of discourse macrostructure, the semantic details of the discourse are applied to the framework (such as key details and events), and integrated with information in the long-term memory, allowing the speaker to expand on important points (Sherratt, 2007). This information is then condensed according to the listener's existing knowledge, and the social or academic context. The speaker then establishes relationships between the ideas in the story (for example, identifying temporal or causal links). Finally, the discourse is linguistically encoded; the vocabulary, syntax and cohesive devices are applied for efficient and effective communication, and the discourse is articulated (Sherratt, 2007).

Production of discourse is evidently an extremely complex process, likely to be even more effortful for individuals with DLD (Bishop et al., 2017). However, developing competence in this process is crucial, as discourse comprises the majority of daily communication (Dipper & Pritchard, 2017).

Discourse Language Skills and Narrative

A number of genres exist, according to the purpose of the discourse, both expository or factual, and narrative. Everyday and academic discourse is comprised in large part of the narrative, or storytelling genre. A spoken narrative is any true or fictitious discourse. Narratives may serve a reference function, providing the listener with information about a topic, or an evaluative function, which allows the listener to understand what the topic/event means to the story-teller (Lyons & Roulstone, 2019). Each genre is comprised of a unique macrostructure (the organisation and inclusion of the broad elements) and microstructure (the vocabulary and grammar conventions

specific to that genre). A person's capacity to refer to and share their evaluation of an event through narrative discourse relies on both macro- and microstructure skills (Lyons & Roulstone, 2019).

Narrative abilities are integral to our conversations with others, expressing memories, making logical plans, and making sense of our thoughts and emotions (Joffe, 2018). To do so effectively requires the capacity to organise abstract thought and explain temporally and causally related events (Favot, Fey & Catts, 2019). The narrative genre is also firmly embedded in the Australian curriculum. As early as Pre-Primary in Western Australia (by the age of 5 years), children are expected to "create short texts to explore, record and report ideas and events using familiar words and beginning writing knowledge (ACELY1651)" (School Curriculum and Standards Authority, 2016). Western Australia is a unique context for many individuals with DLD, given the access to specialist early intervention and education settings for children identified between Kindergarten and Year 1 (see Chapter 4). Recognising the place of narrative in the Western Australian education context is crucial for supporting children with DLD to succeed in the classroom.

In addition, a link has been established between narrative ability and social connectedness (Cheshire, 2000). Evaluation of a child's narrative ability allows clinicians to examine a range of language and communication skills, obtain information about a student's cognitive abilities, and evaluate elements of social and emotional wellbeing (Joffe, 2018).

Narrative Language Skills in Adolescence

Narrative development commences in early childhood and continues throughout adolescence (Joffe, 2018). By the age of six, children are typically able to understand and retell stories including sufficient information for listener comprehension (Vandewalle, Boets, Boons, Ghesquiere, & Zink, 2012). Through the primary years, children develop the capacity to tell their own stories with considerable detail until they are able to generate stories with several problems and attempts to resolve them (Vandewalle et al., 2012). For typically developing adolescents, both fiction and non-fiction narratives demonstrate increasingly complex macrostructure and microstructure, including the following linguistic developments:

- Improved skills in summarisation;
- Inclusion of a greater number of complete episodes in spoken stories;

- The capacity to embed episodes within larger events (subplotting);
- The ability to tune into, reflect on, analyse, and use literate language features (that is, the more complex, formal language of story-telling as compared to colloquial conversation);
- Increased use of conjunctions and grammatical devices to create a sense of "flow"; and,
- Inclusion of detail around emotions, thoughts and ideas (Nippold, 2007; Applebee, 1978).

While the majority of the literature to date has focussed on fiction narratives, these align with the skills required for non-fiction discourse, including personal recounts, descriptions, and problem-resolution recounts (Joffe, 2018; Stein & Glenn, 1979). These developments in adolescence play an important role in maintaining conversation, evaluating and sharing experiences, and making sense of emotion surrounding an event. Additionally, the development of high-quality personal recounts, descriptions and problem-resolution recounts is crucial for participation in psychological assessment and intervention (Pearce, Johnson, Manly & Locke, 2014; Wallis, personal communication, 2018). This is because therapy addressing social and emotional difficulties is primarily delivered through interview and discussion with the client about pertinent life experiences. The difficulties in understanding and producing narratives associated with DLD are therefore likely to have a functional impact on social and academic progress, as well as the success of counselling and psychological interventions relying on discourse as the medium of delivery (Dipper & Pritchard, 2017). Given their importance for functional communication, evidence included in the review of the literature below focuses on personal, rather than fictional narrative genres.

Personal Narratives

A personal narrative is a true recount of a past experience, or a description of a real person or place, logically organised and sequenced either temporally and/or causally (Joffe, 2018; Naremore, Densmore & Harman,1995). Given this definition, personal narrative may be conceptualised as a broad non-fiction genre, which overarches a series of subgenres (e.g. personal recounts, descriptions, or problem-resolution recounts). Personal narratives develop earlier than other discourse genres and may emerge from two years of age (McCabe & Rollins, 1994). Importantly, personal narratives are a significant means of developing self-concept during

adolescence (McAdams & McLean, 2013; McLean, Pasupathi & Pals, 2007; Pals, 2006). Stories that are shared and heard about the self over time come together to create a life story, composed of self-defining memories that can be ordered temporally (Reese, Yan, Jack & Hayne, 2010). A number of key developments in adolescence support the generation of life stories, including increasing length, explicit inclusion of causal connections between past events and the narrator's personality, and explanation of how the story-teller's behaviour is linked with personal traits and attributes (biographical arguments) (Habermas and de Silveira, 2008). In developing these capabilities, individuals may learn to derive a positive outcome from life stressors, and therefore bolster psychological wellbeing (McAdams & McLean, 2013; Pals, 2006).

Developmental Language Disorder and Discourse

Children with language disorders often present with a range of weaknesses in fictional narrative discourse, including reduced sentence complexity, MLU and lexical diversity, grammatical errors, and variable skills in macrostructure (Vandewalle, 2012; Dipper & Pritchard, 2017). Similar difficulties have been identified in the production of personal narratives. In their review of the literature, Westby & Culatta (2016) report that children with language disorder are more likely to struggle to sequence personal narratives appropriately, producing stories that "leap-frog," omitting events and ordering events illogically. Interestingly, McCabe, Bliss, Barra and Bennett (2008) using high-point analysis (macrostructure analysis with a focus on the speaker's evaluation of events in the story), found that children with language disorder produced higher-quality personal narratives as compared to fictional narratives. However, when compared to typically developing peers, children with DLD included significantly fewer macrostructure elements in their personal narratives across several topics (Goldman, 2008). Similarly, participants with DLD presented with significant weaknesses in sentence construction using a standardised measure; a skill that is highly relevant to narrative generation (Goldman, 2008). Thus, while personal narratives may develop earlier than fiction narratives, children with DLD demonstrate deficits across both genres.

A key finding in the literature investigating fiction narrative is the increased difficulty shown by children with DLD in identifying and accurately describing the internal response of the characters in their stories (Norbury, 2014). This is in line with the alexithymia language hypothesis, which suggests that language disorder

may underlie increased difficulty perceiving and describing emotional responses (Brinton, Fujiki & Asai, 2019; Hobson, Brewer, Catmur & Bird, 2019). This suggests that discourse abilities in children with DLD may be affected by weaknesses in language in combination with difficulty referring to and explaining emotions. Given this hypothesis, it would be reasonable to assume that these same difficulties would permeate the non-fiction narratives of individuals with DLD, particularly where required to evaluate an experience or report the emotional response of others. However, to the best of the author's knowledge, this has not been investigated to date.

Functional Language Assessment

The literature surrounding DLD in adolescence indicates that formal assessment outcomes for language domains at the word and sentence level can, at times, fall within the low average to average range, while assessment of discourse-level language skills may uncover language difficulties and their functional impact (Karasinski, 2013). While formal assessment of fictional narratives is commonplace in paediatric speech pathology, evaluation of non-fiction genres, including personal narratives, is at times overlooked as a valuable measure of functional communication (McCabe et al., 2008).

Typically developing children are reportedly capable of generating well-organised, nuanced personal narratives by the time they reach Year 1 (Westby & Culatta, 2016). Interestingly, the literature has identified weaknesses in the skills required for personal narrative production in both individuals with language disorders, and individuals with psychosocial difficulties (Gupta, 2018; Hopkins, Clegg & Stackhouse, 2018; Lund, 2016; Vandewalle, 2012). In light of the identified narrative language weaknesses for these populations, and the importance of narrative skills for academic, social and psychological wellbeing, assessment at the discourse level is essential.

Components of Effective Discourse

Effective discourse should include all elements of macrostructure and microstructure specific to its structure and purpose, in addition to text-level coherence and cohesion. Coherence refers to the extent to which the discourse is organised and relevant to its overall theme or topic (Silva & Cain, 2019). Establishing coherence is crucial for listener comprehension and for adding relevant content to a conversation, contributing to the pragmatic appropriateness of the

discourse (Ulatowska & Olness, 2007). Additionally, coherence in personal narratives is associated with stronger autobiographical memory (Baker-Ward, Eaton & Banks, 2005), and broader psychological wellbeing (Adler, 2016). For example, Waters and Fivush (2015) reported that young adults who produced autobiographical narratives with poor coherence were more likely to present with lower measures of life-purpose and meaning than peers with highly coherent narratives. Two elements of coherence are identified: global and local (Ellis, Henderson, Wright & Rogalski, 2016). *Global* coherence refers to a narrator's ability to organise discourse that relates to a key theme or idea (Ellis et al., 2016; Bliss & McCabe, 2009). Children with language disorder reportedly struggle to structure discourse coherently across a range of genres; Bliss and McCabe (2009) found that children with language disorder presented with poor topic maintenance in both personal narratives and procedural discourse production, though the production of what were termed 'scripts' (descriptions of regular activities) was more comparable.

Maintaining relevance to a central theme through global coherence is crucial for effective communication of the narrator's message. However, the ability to relate each utterance to the one that precedes it is also important for listener understanding (Ellis, 2016). This is known as *local* coherence. For example, a child who is discussing a recent bike ride who says, *"I hit a rock and my whole bike flipped over. And it has red handles,"* has demonstrated poor local coherence. While both utterances link to the theme of bicycles, the description of the child's bike does not have clear relevance to the central idea of the story (the bike accident). Given the organisational weaknesses in the narratives of children with DLD (Gillam et al., 2018; Fey, Catts, Proctor-Williams, Tomblin & Zhang, 2004), local coherence may also be an area of difficulty. While some research exists investigating coherence for individuals with acquired communication deficits, there is little research that has explored this in detail for individuals with DLD (Hill, Claessen, Whitworth & Boyes, 2020).

Cohesion is another key element of effective discourse, and refers to the use of linguistic and grammatical devices to link ideas across sentences (Halliday & Hasan, 1976). Cohesive devices include the following; *referential* cohesion describes the correct use of noun phrases and pronouns to refer to individuals and objects in the story (e.g. in the sentence *"<u>He</u> bought a treat for <u>his</u> dog,"* the pronoun "he" and possessive pronoun "his" both refer to the same character) (Heilmann, Miller,

Nockerts & Dunaway, 2010). *Conjunctive* cohesion refers to the use of conjunctive words and phrases to connect ideas across a series of sentences (e.g. *"I had a nice weekend. In saying that, I had a fair bit of work to do."*) (Heilmann et al., 2010). Narrators may also link concepts across sentences through their choice of vocabulary; this is known as *lexical* cohesion (e.g. "*My dad bought a second-hand Audi R8 last year. He's absolutely infatuated with that car."*) (Heilmann et al., 2010).

Of particular interest is referential cohesion, for its importance in facilitating listener comprehension in discourse. Children with language disorder present with significant difficulty using complete or correct cohesive ties (that is, the use of an appropriate noun phrase or pronoun to refer to an existing character in discourse) (Fichman & Altman, 2019). Fichman & Altman (2019) report that the hypothesised origin of these difficulties lies in the interaction between weaknesses in participants' capacities to express story grammar elements, as well as weaknesses with the use of pronouns, because referential cohesion is predicated on morphosyntactic, semantic and pragmatic abilities. If a child fails to introduce the orientation macrostructure elements clearly (e.g. the characters), subsequent references to the characters using pronouns will be empty of meaning, even if the pronouns are correct (Fichman & Altman, 2019). This, too, is a possible factor contributing to communication breakdown at the discourse level across academic and social contexts.

Discourse Genres

This programme of research examined participants' personal recounts, descriptions, and problem-resolution recounts as sub-genres of personal narratives (Joffe, 2018). These sub-genres were investigated because of their roles in effective social communication and psychotherapeutic intervention (McAdams & McLean, 2013; McLean, Pasupathi & Pals, 2007; Pals, 2006**)**. A summary of the macrostructure and microstructure associated with each genre is outlined in Tables 1 and 2 (Whitworth, Leitão & Claessen & Webster, 2015; Stein & Glenn, 1979). Mapping these elements highlights that the linguistic complexity of each sub-genre varies, from simpler (personal recount) to higher-complexity (problem-resolution recount). It is expected that typically developing adolescents would be capable of producing stories including all of the macrostructure elements outlined below (based on Joffe, 2018; Stein & Glenn, 1979).

Table 1

Macrostructure of Personal Narrative Genres

Genre	Element and Explanation
Personal Recount	*Orientation* Statement orienting the listener to the critical details of the recount. May include details of who was present, where and when it occurred. It may not be necessary or appropriate for all three elements to be included in every recount. If appropriate, a child may orient the listener by rephrasing a question asked of them, e.g. *I would say a time I solved a problem was in something that we call D&T.* *Possible elements of an orientation* o Orientation to character o Orientation to time o Orientation to place o Orientation to topic (a more general orientation that restates the question, but does not identify specific character(s), place(s) or time(s)) *Events* Sequence of events in the story. *Possible events* o Initiating Event – The event that leads to the following events and actions in the story o First Event – The first event outlined in the story when there is no initiating event o Event – An event in the story that follows the first event *Evaluation* There may be an evaluation of the experience, e.g. *It was so much fun*. However, this is not a necessary element of all personal recounts. *Conclusion* A statement that brings the story to an end, indicates the final action, or ties the story together, e.g. *And then we went home*. *Possible conclusion elements* o Conclusion – As outlined above o End marker – A stereotypical statement included either additionally or in place of a concluding statement that indicates the end of the narrative, e.g. *"That's it."*

Description	*Orientation* Statement orienting the listener to the critical details of the description. *Possible elements of an orientation* o Orientation to character o Orientation to time o Orientation to place o Orientation to topic (a more general orientation that restates the question, but does not identify specific character(s), place(s) or time(s)) *Attributes* Features of the person, place or object are outlined. Not all attributes are necessary or appropriate for all descriptions. *Possible attributes* o Physical attributes o Personality traits o Location o Function *Event Examples* Specific experiences or examples demonstrating the validity of the appraised attributes may be included, e.g. *"He's really mean. He pushes kids into lockers for no reason."* *Evaluation* There may be an evaluation of the person, place or thing, e.g. "*It's such a beautiful place."* *Possible evaluations* o Evaluation – As outlined above o Internal Response – e.g. "*He makes me so angry."* *End Marker* A stereotypical statement included either additionally or in place of a concluding statement that indicates the end of the narrative.
Problem-Resolution Recount	*Orientation* Statement orienting the listener to the critical details of the problem-resolution recount. *Possible elements of an orientation* o Orientation to character o Orientation to time o Orientation to place o Orientation to topic (a more general orientation that restates the question, but does not identify specific character(s), place(s) or time(s))

Complete Episode
Sequence of events in the story.

Elements of a complete episode
- Initiating Event – The event that leads to the following events and actions in the story
- Internal Response – The protagonist's feelings about the initiating event (may not be included in colloquial setting)
- Plan – The protagonist's plan to fix the problem (may not be explicitly stated in colloquial setting)

Events
The actions or events that occur as a result of the initiating event, or attempts that the protagonist makes to fix the problem.

Possible events
- Event – An event in the story that follows the initiating event
- Complication – A complication that hinders the protagonist in solving the problem

Conclusion
Statement or series of statements that ties together the story

Possible conclusions
- Resolution – A final action is taken that fixes the problem
- Evaluation – Personal evaluation of the experience
- End marker – A stereotypical statement included either additionally or in place of a concluding statement that indicates the end of the narrative

At the linguistic level, the following microstructure features may appear in personal recounts, descriptions and problem-resolution recounts (Whitworth, Claessen, Leitão & Webster, 2015). The frequency with which the features occur is underpinned by the macrostructure framework of each genre (Sherratt, 2007). For example, causal conjunctions are likely to be a feature in a problem-resolution recount during the explanation of a complete episode (*"I felt upset because he took my game."*). These features are encoded in the final stage of Sherratt's model of discourse production, well after the macrostructural framework has been applied (Sherratt, 2007).

Table 2

Microstructure Features in Personal Narrative Genres

Language Area	Element	Examples
Morphosyntax	Temporal conjunctions	and, then, and then, next, when, now, until, while
	Causal conjunctions	because, so, as, since, therefore
	Adversative conjunctions	but, except, however, or, rather, then again, whereas
	Additive conjunctions	and (where it functions to add information, rather than temporally), also
	Conditional conjunctions	although, if, which, unless
	Subordinating conjunctions	since, though, unless, until, when, where, whereas, also, besides, then, however, still, that, therefore, wherever, whether, while, why, thus, after, although, as, as well as, because, if, rather
Vocabulary	Adjectives	blue, sweet, mean, hungry
	Cognitive verbs	thought, wanted, felt
	Linguistic verbs	said, shouted
	Adverbial of place	on the beach, around the corner
	Adverbial of time	in the afternoon, at 12 o'clock, later that day
	Adverbial of manner	suddenly, slowly, happily
	Adverbial of degree	really, very, extremely
	Adverbial of frequency	always, never, rarely

Language Sample Analysis

Language sample analysis is a method for examining and describing language production at the word (free and bound morphemes), sentence and discourse level (Miller, Andriacchi, Nockerts, Westerveld & Gillon, 2016). It is widely considered to be best practice for language assessment, for its versatility across context and purpose (to establish, for example, a baseline of skills and monitoring change) (Miller et al., 2016). Language sample analysis can give insight into functional communication skills, because samples may emulate naturalistic communication contexts. (Dipper & Pritchard, 2017; Miller et al., 2016; Calder et al. 2017). This is helpful for adolescents with a history of DLD, who can present within the low to average range on standardised language assessments, but report persistent communication difficulties, limitations in academic achievement and weaknesses in social interaction.

Language sample analysis can be used to analyse language across the lifespan and is considered appropriate for use with children who are culturally and linguistically diverse, in conjunction with norm-referenced tests (Calder et al., 2017; Pavelko & Owens, 2018). Language sample analysis is sensitive to change and may be repeated frequently with appropriate adaptation of elicitation materials (Calder, 2017; Miller, 2016). Pavelko & Owens (2018) found significant age-related changes in language sample analysis measures in a sample of three- to seven-year-old children. Language sample analysis is also sensitive to clinical markers for DLD (including errors in grammar and vocabulary, reduced sentence length; Charest & Skoczylas, 2019; Manolitsi & Botting, 2011; Pavelko & Owens, 2019) and can be used to evaluate broader elements of discourse coherence and cohesion. Analysis of both macrostructure and microstructure allows clinicians to examine discourse skills at every level of Sherratt's (2007) discourse production framework.

A number of tools exist for the systematic analysis of discourse samples. The two that are used in the present programme of research include the Systematic Analysis of Language Transcripts software (SALT; Miller, Gillon & Westerveld, 2015), and the Curtin University Discourse Protocol – Adolescent Version (CUDP-A; Hill, Claessen, Whitworth & Boyes, 2020).

Systematic Analysis of Language Transcripts (SALT) Software (Miller, Gillon & Westerveld, 2015).

SALT software allows the transcription and analysis of discourse samples. A series of codes are used to obtain various measures at the morpheme, word, and sentence level, including the mean length of utterance, number of different words, number of utterances, abandoned (unfinished) utterances, and utterances with mazes (for example, reformulations, false starts, and filler words). These measures can be compared to an age-matched sample within the SALT database for fiction, expository and persuasive narrative genres for the ages of 3 to 18 years of age (Miller, Andriacchi & Nockerts, 2016). Such measures are widely accepted to be clinically relevant in the diagnosis of language disorder, though no single language sample analysis measure is diagnostically accurate; rather, SALT measures should support standardised assessment data, observation and formal interview in the diagnosis of language disorder (Pezold, Imgrund & Storkel, 2019). Additionally, SALT software can be used to determine the frequency of user-defined codes. For example, in the present programme of research, a code was developed for referential cohesion to identify proper nouns and pronouns present in the discourse transcripts and used to determine the total percentage of complete referential ties.

Curtin University Discourse Protocol – Adolescent Version (CUDP-A; Hill et al., 2020).

While SALT software allows a range of useful measures to be collected across levels of language, information about discourse coherence and cohesion, as well as the quality of vocabulary used, is not directly available. The CUDP-A was developed to guide clinicians to elicit and analyse these nuanced elements of discourse across a range of genres (Hill et al., 2020). A scoring system is used to identify local and global coherence, referential cohesion, sentence complexity, and correct information units, alongside a series of codes that are attached to the transcript. SALT software can then be used to tally the frequency of each code and score. Alternatively, this can be conducted on spreadsheet software. In combination with standard SALT measures, the CUDP-A measures provide a comprehensive overview of linguistic competence at the discourse level. This research programme

represents a first attempt to use the CUDP-A to analyse discourse samples of adolescents with a history of DLD.

Using the SALT software in conjunction with the CUDP-A, the current research aimed to examine language profiles of adolescents with and without a history of DLD on both standardised and criterion-referenced measures, to determine possible associations between standardised and discourse-measures, and evaluate functional communication skills (Aim 1).

Concluding Remarks

Language continues to develop throughout the lifespan. Adolescence is a critical period for developing complex language skills that allow the understanding and expression of abstract thought. Discourse language skills also increase in complexity during this phase of development; these skills are critical for academic and social success. Language skills at the discourse level can be analysed using the principles of language sample analysis to pinpoint strengths and weaknesses in functional communication. Individuals with a history of DLD are likely to experience difficulty not only at the morpheme, word and sentence level of language, but also at the discourse level. In combination, these language weaknesses place adolescents with a history of DLD at risk of poorer education, employment, and social outcomes.

Chapter 3: Literature Review – Developmental Language Disorder and Mental Health

Psychosocial Outcomes in Adolescence

Adolescence is a period of increased risk for mental health disorders; research suggests that the onset of most mental health problems falls within this period (Merikangas et al., 2010; Thapar, Collishaw, Pine, & Thapar, 2012; van Harmelen et al., 2017). It is estimated that 4-5% of mid- to late-adolescents present with depression, which has been associated with increased risk of suicidal ideation, substance misuse, and poor social and educational outcomes (Fletcher, 2010; Thapar et al., 2012). Furthermore, during adolescence, the incidence of anxiety disorders, psychosis, personality, and eating disorders increases dramatically (Paus, Keshavan, & Giedd, 2008). A wealth of risk and protective factors at the individual and societal levels may affect psychosocial outcomes for adolescents, including peer interactions that may elicit stress (e.g. exposure to a range of substances, romantic relationships) (Crowell, Skidmore, Rau, & Williams, 2013), positive peer relationships (van Harmelen et al., 2017), positive adult relationships, individual personality traits (Luthar, Cicchetti, & Becker, 2000), neurobiological changes (Paus et al., 2008), being bullied, and bullying others (Sigurdson, Undheim, Wallander, Lydersen, & Sund, 2015). Moreover, the nature of mental health disorder experienced by adolescents may vary. Girls are reportedly at higher risk of experiencing internalising symptoms, such as anxiety (McLean, Asnaani, Litz, & Hofmann, 2011) and depression (Thapar et al., 2012). Traditionally, boys were reported to be at higher risk of externalising symptoms (Kessler et al., 1994). However, the general risk of mental health disorder is elevated across gender in adolescence.

A number of risk and protective factors can affect mental health in the general population. Whether these factors help to explain mental health outcomes for adolescents with DLD is unclear. However, looking to the theoretical and empirical literature provides some direction. This will be examined below.

Comorbid Language and Mental Health Disorders: Theoretical Underpinnings

The prevalence of co-occurring language and mental health disorders is high; Blankenstijn and Scheper (2003) report comorbidity rates up to 89%. The directionality of the relationship is unclear from both a theoretical and empirical standpoint. Several studies have reported internalising and externalising symptoms in language-disordered populations (Conti-Ramsden & Botting, 2008; Lindsay &

Dockrell, 2012; Mackie & Law, 2010; Snowling et al., 2006; Voci, Beitchman, Brownlie, & Wilson, 2005). Conversely, many researchers have identified increased language difficulties and the presence of language disorders in individuals with emotional and behavioural disturbances. Hollo, Wehby & Oliver (2014) conducted a meta-analysis of 22 studies examining language skills in populations with mental health disorders, which reported that over 80% of participants presented with language skills below the average range on standardised measures. Furthermore, 46.5% of the participants presented with language skills 2 or more standard deviations below the normative sample mean, consistent with a moderate (-2 SD) to severe (>-2 SD) language disorder. However, a clear explanation for the comorbidity effect remains elusive. In 2003, Blankensteijn and Scheper sought to clarify the nature of this relationship by examining a series of psycholinguistic and developmental theories, including constructivist theory (Piaget 1959; 1971), social interactionist theory (Vygotsky, 1976; 1986), interpretations of theory of mind (Kormaz, 2011) and executive function theory (Barkley, 1997; Rogers-Adkinson & Griffith, 1999). Blankensteijn and Scheper (2003) proposed three possible explanations; (a) mental health disorder (MHD) underlies and exacerbates language disorder (LD; MHD ⇨ LD), (b) language disorder underlies and exacerbates mental health disorder (LD ⇨ MHD), and (c) language disorder and mental health disorder interact, each exacerbating the effects of the other in a "dependent comorbid existence" (LD ⇔ MHD). However, critical analysis of theory alone was not sufficient to identify which of these hypotheses best characterises the relationship between language disorder and mental health.

Developmental Language Disorder and Psychosocial Outcomes

Several studies have reported an association between language disorder and poor psychosocial outcomes throughout the lifespan (Beitchman & Brownlie, 2005; Conti-Ramsden & Botting, 2008; Lindsay & Dockrell, 2012; Mackie & Law, 2010; Snowling, Bishop, Stothard, Chipchase, & Kaplan, 2006). For example, an increased risk of internalising disorders (Curtis, Frey, Watson, Hampton, & Roberts, 2018), reticent behaviours, emotional regulation difficulties (Fujiki, Spackman, Brinton, & Hall, 2004), externalising symptoms (Conti-Ramsden, Mok, Pickles, & Durkin, 2013), low self-esteem (Wadman et al., 2008) and poor social relationships (Mok, Pickles, Durkin & Conti-Ramsden, 2014) have been identified in individuals with DLD. While numerous studies have investigated the prevalence and nature of

psychosocial outcomes in adolescents with DLD, explanation of the factors underlying the association, and the variability in psychosocial outcomes, have remained unclear.

The issue is mirrored in the heterogeneity of broader, developmental outcomes for adolescents with language disorder (Conti-Ramsden, 2008). The relationship between "pure language-disorder" and mental health disorder was reported as early as 1982 by Baker & Cantwell. These researchers examined mental health outcomes for 291 participants aged between 1 year, 11 months to 15 years, 11 months with a range of communication impairments. Baker and Cantwell (1982) identified that children with language disorder presented with a significantly higher risk of mental health disorder than children with speech disorder, or combined speech and language disorder. However, mental health disorders were present across all groups, ranging from 29% of children in the speech disordered group to 95% of the language disordered group (Baker & Cantwell, 1982). Given the heterogeneity of, and in, the participant groups, and the prevalence of varied mental health disorders across groups, the authors suggested that additional factors should be investigated that might explain the relationship between language impairment and mental health outcomes (Baker & Cantwell, 1982).

Snowling et al., (2006) set out to replicate these findings, examining the risk of mental health disorder in 71 adolescents (aged 15-16 years) with speech and language disorder. Despite finding a relatively low rate of mental health disorder across the sample, a significantly higher prevalence of attention and social difficulties was found for children whose language had not improved by 5 years and 5 months (5;5). Interestingly, these difficulties were associated with different linguistic profiles. Children with a mixed profile of expressive and receptive language difficulties were more likely to present with social impairments, while children with primarily expressive language difficulties were more likely to present with attention difficulties. The authors suggested that language difficulties and ADHD are associated with underlying neurodevelopmental immaturity, as originally hypothesised by Beitchman & Inglis (1991). However, the idea that the nature of psychosocial difficulty varies across language profiles cannot solely be explained by neurodevelopmental immaturity; the presence and nature of psychosocial difficulties are not consistent across individuals with DLD who share linguistic profiles. This

raises questions as to the other factors that may contribute to social and attention difficulties in this population.

Conti-Ramsden & Botting (2008) found adolescents with DLD to be at increased risk of internalising symptoms compared to typically developing peers, particularly depression and anxiety. However, the authors reported that these symptoms did not appear to be a direct result of poor communication experiences, indicating that the relationship may be affected by additional factors (Conti-Ramsden & Botting, 2008). Similarly, Helland, Helland and Heimann (2014) used the Strengths and Difficulties Questionnaire (SDQ) to determine whether children with ADHD and DLD could be differentiated on measures of language and mental health. They found that groups differed only on the measure of mental health, again suggesting that language impairment alone cannot explain poor psychosocial outcomes.

More recently, Botting, Toseeb, Pickles, Durking and Conti-Ramsden (2016) examined longitudinal patterns of anxiety and depression in individuals with language disorder in adolescence through adulthood. While significantly elevated prevalence of both anxiety and depression was evident in the language disordered group at initial and final time points, neither verbal and nonverbal skills, nor nonverbal IQ, were predictive (Botting, Toseeb, Pickles, Durkin, & Conti-Ramsden, 2016). However, the authors suggest that patterns of transition between school, college and employment were related to fluctuations in depressive symptoms (Botting, Toseeb, et al., 2016). In the context of the broader literature, Botting, Toseeb, et al. (2016) hypothesise that emotional health symptoms may interact with environmental factors to predict mental health for individuals with language disorder. Again, however, these findings raise questions as to *which* environmental and individual variables interact with DLD to predict psychosocial outcomes. Two factors that have received particular attention in recent research include self-esteem and bullying victimisation. A detailed review of the literature examining DLD, self-esteem and bullying victimisation can be found in Chapter 6. However, definitions of these areas and theoretical constructs will first be examined here.

Self-Esteem

Self-esteem was originally defined by James (1890) as positive feelings towards the self for meeting life goals, or exceeding expectations of one's own capacity. While academics and researchers have since rigorously debated the

definition, James' construct of self-esteem is still considered relevant (Zeigler-Hill, 2013). Generally, it reflects the value placed upon oneself through self-evaluation and internalising the perspectives of others (Wadman et al., 2008; Jerome et al., 2002). Self-esteem is an important factor affecting how individuals interpret events in the social environment and respond to these events, and is psychologically protective against adverse life experiences (Zeigler-Hill, 2013).

Several models of self-esteem have been proposed throughout history. Perhaps the most influential is that of Shavelson, Hubner and Stanton (1976) who proposed a multidimensional hierarchical model, whereby an individual evaluates their own behaviour across academic, emotional, social and physical situations, and their experiences across these domains form the basis of a hierarchy, with global self-worth at the apex. While subsequent studies have supported the notion of a multidimensional construct of self-esteem (Brunner et al., 2010; Rentzsch, Wenzler, & Schutz, 2016), the hierarchical aspect of the theory has proven controversial. Rentzsch, Wenzler & Shultz (2016) examined the factor structure of multidimensional self-esteem in adolescence and adults. While results indicated variability in self-esteem across domains, and so provided support for a multidimensional construct of self-esteem, there was limited support for the hierarchical aspect of Shavelson, Hubner and Stanton's (1976) model. Despite this, the majority of self-esteem measures used in clinical research include a global self-esteem score (Bracken, Bunch, Keith & Keith, 2000; Harter, 2012a & 2012b; Rosenberg, 1965).

Low self-esteem has been associated with psychopathology in the research investigating both the DLD and general populations to date, including internalising symptoms, eating disorders, alcohol misuse, obsessive compulsive disorder, schizophrenia and borderline personality disorder (Zeigler-Hill, 2013). However, the risk factors contributing to poor psychosocial outcomes for individuals with low self-esteem are diverse.

Age and gender differences in global self-esteem have been identified as possible factors. In childhood, self-esteem is reportedly high (Robins, Trzesniewski, Tracy, Gosling, & Potter, 2002). However, the majority of adolescents experience some reduction in self-esteem, before experiencing a steady increase throughout adulthood followed by a decline in old age (Robins et al., 2002). A gender difference in self-esteem has been reported in adolescence; during this period, boys are more

likely to score higher on self-esteem measures than girls (Zeigler-Hill, 2013). Furthermore, this discrepancy between male and female self-esteem is reported to continue until old age, when men are likely to experience a significant decline in self-worth (Robins et al., 2002).

Self-esteem has largely been examined with language disordered populations using a multidimensional framework, with varied results. While some researchers report lower social self-esteem in participants with language disorder as compared to TD peers (Marton, Abramoff & Rosenzweig, 2004), others report reduced self-evaluations of scholastic competence and behaviour conduct (Jerome et al., 2002). Interestingly, McArthur, Castles, Kohnen & Banales (2016) found language ability to be a key factor predicting self-esteem in poor readers. The authors found that poor readers with poor attention were at elevated risk of low academic self-esteem, while poor readers with weak language abilities were at increased risk of low academic and global self-esteem (McArthur, Castles, Kohnen, & Banales, 2016). Additionally, academic self-esteem was strongly associated with receptive vocabulary, and global self-esteem was strongly associated with expressive vocabulary. This suggests that language ability plays a key role in establishing and maintaining positive self-concept. However, the profile of self-esteem in the DLD population is unclear.

Given the psychological consequences associated with low self-esteem, coupled with the increased risk for (a) the DLD population and (b) adolescents, further investigation is crucial and is central to this thesis.

Peer Relationships & Bullying Victimisation

Establishing and maintaining positive peer relationships has been associated with a range of positive psychosocial outcomes. Roach (2018) conducted an integrative review of the literature, which provided evidence for peer relationships as a protective factor against internalizing symptoms, suicide risk and general stress for typically developing adolescents. Positive peer relationships were also associated with elevated self-esteem in the general population (Roach, 2018), and have been identified as a protective factor against bullying (Schwartz, Dodge, Pettit, & Bates, 2000). Such relationships are particularly important in adolescence, during a period of decreasing reliance on parental support (Keisjers & Poulin, 2013). However, the capacity to establish high quality friendships relies on a range of social, emotional, and communication skills. As outlined above, several developmental theories indicate the important role of language skills in establishing meaningful social

interactions and peer relationships. The expressive and receptive language difficulties characteristic of DLD are associated with challenges in maintaining such interactions (McCormack, Harrison, McLeod, & McAllister, 2011). Children with DLD are at risk of poor relationships in terms of their direct interactions with peers (Mok, Pickles, Durkin, & Conti-Ramsden, 2014) and are likely to present with limitations in emotional knowledge that might affect social problem-solving which underpins the development of such relationships (Brinton, Fujiki, & Asai, 2019).

Predicting the likelihood of emotional and peer problems for individuals with DLD is not straightforward. Conti-Ramsden et al. (2018) examined the longitudinal trajectories of emotional difficulties and peer problems for children with and without DLD, between the ages of 7 and 16 years. The findings provide further evidence of heterogeneous psychosocial outcomes for children with DLD; five patterns of development were identified for emotional and peer problems, identifying childhood-onset, persistent difficulties in emotional health and peer relationships in 26% of the overall sample. Additionally, 11% of the sample presented with low levels of emotional and peer problems in childhood and adolescence, 16% presented with adolescent-onset emotional and peer problems, 24% demonstrated childhood emotional problems which resolved in adolescence without peer problems, and 22% demonstrated increasing peer problems throughout childhood and adolescence without emotional problems (Conti-Ramsden et al., 2018).

However, there were no clear associations with expressive or receptive language abilities across any of the groups. In contrast, pragmatic language ability, or the social use of language, was associated with group membership. This suggests that regardless of the severity of expressive and receptive language difficulties, individuals with DLD are likely at increased risk of experiencing enduring emotional and peer-problems from childhood if they also present with difficulties in the social use of language (Conti-Ramsden et al., 2018). Thus, language disorder itself does not appear to be the sole “cause” of poor mental health outcomes for this population (Conti-Ramsden et al., 2018).

While positive peer relationships play a protective role against mental health disorder for adolescents with language disorder, experiencing repeated instances of aggression by peers, also termed bullying victimisation, can be extremely detrimental to social and emotional wellbeing (Arseneault, Bowes, & Shakoor, 2010; Klomek, Marrocco, Kleinman, Schonfeld, & Gould, 2007). Research indicates a significantly

higher prevalence of bullying victimisation for children with DLD than for typically developing peers (Conti-Ramsden & Botting, 2004; Knox & Conti-Ramsden, 2003; Redmond, 2011). Bullying victimisation has been associated with serious social and emotional consequences in the broader population, including increased risk of developing internalising symptoms, poor classroom attention, and suicidal ideation (Redmond, 2011). Given these consequences, a thorough understanding of the risk of bullying victimisation for adolescents with a history DLD is crucial. A synopsis of the current literature examining these risks can be found in Chapter 6.

In summary, there is a wealth of evidence indicating that DLD and mental health disorders frequently co-occur. While Blankenstein and Scheper (2003) offered some hypotheses based on psycholinguistic theories, there is limited empirical evidence to support that (a) mental health disorder underlies language disorder, (b) language disorder underlies mental health disorder, or (c) that language and mental health disorders share a dependent comorbid relationship. Rather, researchers are working to explore which additional factors might predict patterns of mental health difficulties for individuals with DLD. In addition to considering psychosocial risk factors, given the importance of communication and discourse-level language in building and maintaining relationships in adolescence, consideration of linguistic factors is also relevant.

The Role of Discourse in Mental Health

Sharing stories about oneself in adolescence is critical for developing a sense of identity, and developing positive feelings about that identity (Schickedanz, Schickedanz, Forsyth, & Forsyth, 2001). However, by their very nature, personal narratives also allow adolescents to explore and describe their emotional response to the events in their lives. In turn, adolescents can discern the social response from others to their stories, giving them valuable information about the inner workings of social interaction. Sharing experiences with others through narrative discourse allows us to explore our emotions about events, and therefore, determine the meaning of events to our lives (Lyons & Roulstone, 2019). As such, narratives are a platform for social and emotional development (Bohanek & Fivush, 2010). Narrative inquiry may be used to support clinicians to better understand client perspectives, and establish meaningful and functional intervention goals (Greenhalgh, 2016). Further, given the established comorbidity between language and mental health disorders and the linguistic demands of most psychotherapeutic interventions, examination of

discourse language skills in children and adolescents is crucial. The following literature review examines existing research addressing this area. The evidence considered here was that which focussed on discourse level skills, social, emotional and behavioural disorders, and language disorder in adolescent participants.

Particular attention has been paid to the discourse level skills of students with conduct problems and heightened aggression in the research. According to Salmon (2006), "students with EBD are characterised by an inability to build acceptable relationships in their home and school environment, inappropriate behaviour under normal circumstances, and/or a persistent mood of unhappiness" (p. 50). Adolescents with emotional behavioural disorders reportedly experience increased difficulty establishing peer relationships, in part, due to externalising and aggressive behaviours (Hinshaw & Lee, 2003). Recently, James, Munro, Togher and Cordier (2020) examined the narrative skills of adolescents with and without emotional behavioural disorders (EBD). In their sample, 33% of students with EBD presented with language skills at least one standard deviation below the normative sample across narrative, syntax, vocabulary, morphology, and social communication, a significantly greater proportion of students than the TD comparison group. A considerable proportion of the students with EBD presented with narrative comprehension weaknesses in the moderate to severe range, particularly when inference was required. While students in the EBD group generated longer narratives than typically developing peers, the level of detail, vocabulary and cohesion were reduced. This suggests that adolescents with EBD present with (a) difficulty comprehending at the discourse level and (b) difficulty using language efficiently and effectively to express thoughts and feelings in extended discourse (James, Munro, Togher, & Cordier, 2020).

Similarly, Snow & Powell (2005) examined the macrostructure of narratives generated by juvenile offenders as compared to a group of adolescents without a history of externalising difficulties. A range of converging developmental disorders and influences are at play for this population, including conduct disorders, attention disorders, substance use disorders, and poor social skills (Snow & Powell, 2005). Consistent with James et al. (2020), findings indicated particular difficulty with narrative cohesion. While both groups did not differ on the number of macrostructure elements included in their stories, the adolescents in the juvenile offenders group demonstrated significant difficulty including adequate detail regarding the

character's plan for resolving the problem, outlining consequences resulting from character action and detailing the overall resolution to the story.

In a sample of university students with and without impulsive aggression, Villemarette-Pittman, Standford and Greve (2003) found that participants scored similarly on tests of expressive and receptive vocabulary. However, participants with impulsive aggression scored significantly worse on measures of narrative cohesion and morphosyntax (Villemarette-Pittman, Stanford, & Greve, 2003). Thus, there is emerging evidence for weaknesses in narrative cohesion for individuals with externalising difficulties. Deficits in the microstructural linguistic features of discourse have also been identified in young offender populations. Hopkins, Clegg & Stackhouse (2018) found that young offenders presented with reduced syntactic complexity and more limited vocabulary in expository discourse compared to typically developing adolescents. Participants in the young offenders group tended to use coordinating rather than subordinating conjunctions to explain the rules of a game, which affected their capacity to explain complex information (Hopkins, Clegg, & Stackhouse, 2018).

There has been less investigation of narrative discourse for individuals with internalising symptoms. Vallance, Im & Cohen (1999) investigated narrative language in 7 to 12-year-old children with internalising (40% of the sample) and externalising (60% of the sample) symptoms as compared to age-matched peers with language disorder, comorbid mental health and language disorder, and TD children. Compared to the TD group, children with mental health disorder (both with and without comorbid language disorder) presented with significantly reduced complexity in vocabulary, grammar and referential cohesion (Vallance, Im, & Cohen, 1999). Participants with mental health disorder presented with poorer fluency (for example, more reformulations and false starts) than comparison groups, regardless of the presence of a language disorder. However, specific discourse deficits associated with various mental health diagnoses were not reported in this study. These results suggest that deficits in discourse are associated with both mental health and language disorders, but that individuals with comorbid language and mental health disorders are at the greatest risk of experiencing difficulty communicating their thoughts and ideas using discourse-level language.

Finally, Pearce, Johnson, Manly & Locke (2014) investigated narrative and language skills in a cohort of children referred for mental health services and also

found that while sample length was comparable to TD peers, syntactic complexity was reduced. Again, diagnosed psychiatric disorders were many and diverse in this sample. To the best of the author's knowledge, no other studies have examined discourse language and internalising symptoms. However, the existing literature would suggest that individuals with mental health disorders are at risk of deficits in discourse, particularly in cohesion, coherence, lexical diversity and syntactic complexity. This is a point of interest, considering the discourse deficits associated with DLD.

Summary

This review of the research suggests that DLD, internalising and externalising symptoms, and discourse-level language skills may be associated. Theoretical models suggest that the association between language disorder and mental health may be uni- or bi-directional. However, these hypotheses do not account for the variability in mental health outcomes for adolescents with DLD. Empirical evidence would suggest that the association is not simple, and that many factors may contribute to the prediction of psychosocial outcomes for individuals with and without DLD. Key factors include self-esteem and bullying victimisation. While discourse language deficits have been identified in language disordered and mental health disordered populations, the role of discourse language skills in the association between DLD and mental health disorders is unclear. Thus, the current research sought to clarify the role of bullying victimisation and self-esteem (Aim 2a), and/or discourse language skills (Aim 2b), in the relationship between DLD and mental health disorders.

Chapter 4: Method

Chapter 4 describes the overall method for the broader programme of research, the findings of which are then reported in Chapters 5, 6 and 7. This chapter includes details of recruitment, participant details and measurement. This thesis is presented as a hybrid thesis, which includes a peer-reviewed journal article published in the journal: Autism and Developmental Language Impairments. This paper is presented in its entirety as Chapter 6. As such, there is some unavoidable repetition of the information presented in this chapter, in Chapter 6.

Ethical Approval

The program of research received ethical approval from the Curtin University Human Research and Ethics Committee (approval number HRE2016-0134) and the Western Australian Department of Education (reference number D16/0599573).

Recruitment and Participants

In total, forty-two participants took part. Twenty participants with a history of DLD (aged 10-16 years; 10% female, 90% male) were recruited through four Language Development Centres (LDCs) across the Perth Metropolitan Region. The LDC service model is unique to Western Australia; the Centres provide intensive intervention for children in Kindergarten (aged 3-4 years) to Year 2 (aged 6-7 years) whose language profiles are consistent with that of DLD. LDCs offer up to three years of school placement with a focus on developing oral language skills. In order to participate in the current study, adolescents were required to have attended an LDC for a minimum of one year. Thus, all participants in the history of DLD group had received at least one, and a maximum of three years, of intensive intervention in a specialised education context, and were attending a mainstream school at the time of recruitment and data collection. While the parents of participants were asked whether their children had accessed speech pathology intervention after exiting the LDC, sufficient detail was not consistently provided to reliably report whether services were accessed, nor to comment on the nature of the intervention provided.

Referral to an LDC requires a comprehensive assessment: a thorough case history, assessment of the child's oral language skills using standardised, norm-referenced tests and language sample analysis, and a developmental assessment by a paediatrician or psychologist. Therefore, all participants in the history of DLD group had early language abilities significantly below the average range, with demonstrated

functional impact, and no other diagnosis that could better explain their language problems.

The researcher met with all interested LDC school principals to explain the nature of the project, answer questions, and define roles and responsibilities. Principals were provided with a consent form to indicate willingness to participate in recruitment. The role of the LDCs was to send information about the study via email to families of children who had exited the LDC, or advertise on their school website. Interested families with children who met criteria contacted the researcher directly for further details.

Additionally, twenty-two participants with no history of DLD or neurodevelopmental disorder (aged 10-16 years; 36.4% female, 63.6% male) were recruited through snowballing and social media advertising. All children and parents provided written consent prior to participating in the study and were given the opportunity to have questions answered by the researchers. It was made clear that participants could withdraw their consent at any time.

Measures

Internalising and Externalising

The Strength and Difficulties Questionnaire (SDQ) is a psychometrically sound, evidence-based self-report instrument used to identify internalising and externalising symptoms for children aged 4 to 16 years (α = .78-.85; Hawes & Dadds, 2004). While the SDQ has not yet been validated with a DLD population, there is preliminary evidence for its use (Conti-Ramsden et al., 2013; Helland, Helland, & Heimann, 2014). The questionnaire comprises five sub-scales, examining conduct problems, hyperactivity, peer problems, emotional symptoms, and prosocial behaviour. Each subscale has five items that ask the respondent to rate whether each item is (0) not true, (1) somewhat true or (2) certainly true for them (e.g. I worry a lot). The Internalising score is calculated by summing the emotional and peer problems scales, and the Externalising score by summing the conduct and hyperactivity scales. Both the Internalising and Externalising scores range from 0 to 20, and higher scores indicate increased symptoms. Within our own sample, the SDQ was found to be a reliable measure of Internalising (α = .74) and Externalising symptoms (α = .79).

Bullying Victimisation

The Social and Health Assessment Peer Victimisation Scale (SHAPV) is a nine-item self-report questionnaire that was used to measure bullying victimisation (Ruchkin, Schwab-Stone & Vermeiren, 2004). Though the scale has not yet been validated with adolescents with DLD, it has demonstrated strong reliability with an adolescent sample in the US (α = .82; Maynard & Joseph, 2000), as well as in our own sample (α = .87). Participants were asked to report whether they had experienced the peer victimisation behaviour outlined in each item (0) *never*, (1) *once*, (2) *two or three times*, or (3) *four or more times* in the past year (e.g. *During this year, has anyone called you names or sworn at you?*). All items were summed to generate a total score, ranging from 0 to 27. This score was standardised to reduce collinearity and ensure that the intercept was interpretable in subsequent analyses. Higher scores indicated increased bullying victimisation experiences.

Self-Esteem

Harter's Self-Perception scales (Harter, 2012a; 2012b) include the Self-Perception Profile for Adolescents (SPPA) and Self-Perception Profile for Children (SPPC), which are self-report instruments that elicit a Global Self-Worth score. This score represents the average of 6 items pertaining to global self-worth, and ranges from 1 to 4. Each survey item is scored between 1 and 4, where 4 represents the highest level of self-worth, and 1 represents the lowest. Items were designed to follow a "structured alternative format" (Harter, 1982), where respondents are required to identify to what extent they associate with either end of a scale of behaviour or pattern of thought (e.g. *Some kids often forget what they learn, but other kids can remember things easily*). This format is reported to counterbalance the tendency for children to respond in a socially desirable way, thereby increasing the reliability of the results (Harter, 2012a; 2012b). Because two versions of the assessment exist (one for ages 8 to 12 years, and one for ages 13 to 18 years) the Global Self-Worth score was standardised to ensure comparability between the age groups in the present study. Harter's scales have sound psychometric properties for community samples (SPPA: α = .80-.89; SPPC: α = .78-.87; Harter, 2012a, 2012b), and were found to be similarly reliable in our sample (SPPA: α = .76; SPPA α = .87). The scales have also been used to successfully measure self-esteem in a language-

disordered sample (Jerome et al., 2002; Lindsay, Dockrell, & Palikara, 2010; Tomblin, 2008).

Language

The Clinical Evaluation of Language Fundamentals–4 (CELF-4) (Semel, Wiig, Hannan & Secord, 2006) is a widely-used, Australian-normed language measure with sound validity and reliability (reliability coefficients ≥.90 across language indicators), and provides Receptive, Expressive and Core language scores (the Core Language score is an overall measure of language ability). Raw scores for each subtest are converted to scaled scores according to age norms, which are summed and converted to an overall standard score for the Core, Receptive and Expressive language scores. Scores that fell 1.5 to 2 standard deviations below the mean of the normative sample were classified as moderately low, and scores falling 2 or more standard deviations below the mean were classified as severely low, as per the test manual. In the present study, only the subtests that contributed to the Core, Receptive and Expressive language index scores were administered.

Discourse

Participants' discourse-level skills were measured using language sample analysis. Three personal narratives were elicited using a series of written prompts, which were also read aloud by the researcher. Sections of Wallis' (2016) discourse elicitation protocol were used to obtain one description, one personal recount, and one problem-resolution recount for each participant. The CUDP-A scoring system was then used to analyse the data. The prompts used for discourse elicitation are summarised in Table 3.

Table 3

Summary of Discourse Elicitation Protocol based on Wallis (2016)

Description	Tell me all about someone who you find really annoying; someone who is often annoying you or making life difficult.
Personal Recount	Tell me about a time when you felt worried or confused; perhaps a time when lots of things were happening and you didn't know what to do.
Problem-Resolution Recount	Tell me about a time when you had a problem and you had to fix it. Tell me all about what happened and what you had to do to fix it.

Wallis' protocol reflects the types of discourse likely to be elicited in psychotherapy (Wallis, personal communication, 2016). One of the key patient characteristics influencing psychotherapeutic outcomes is the ability to reflect on and express his or her experiences (Weiner & Bornstein, 2009). It is logical to assume, therefore, that the ability to share a personal experience, problem, or description of a person in a well-organised manner is likely to optimise the shared understanding between therapist and patient. Wallis' (2016) elicitation protocol allows analysis of a child's ability to describe such emotion-, social- and interaction-based events. The linguistic demands and information content associated with these samples are varied but are aligned with functional communication demands (Dipper & Pritchard, 2017). While the use of Wallis' (2016) protocol has not been examined in published research, it has clinical relevance in both speech pathology and psychotherapy for examining the functionality of adolescent language skills across social and therapeutic settings. It should be noted that Wallis' (2016) protocol is a tool for discourse elicitation and not discourse analysis. The Curtin University Discourse Protocol – Adolescent (CUPD-A; Hill et al., 2020) in conjunction with SALT software (Miller et al., 2016) were used to code and analyse the samples.

Personal narratives were audio recorded, transcribed by the researcher, and segmented into C-units according to the SALT guidelines for segmenting language samples. These guidelines can be accessed from http://www.saltsoftware.com/coursefiles/shared/Cunits.pdf. A C-unit is defined in this document as "an independent clause with its modifiers" (Miller et al., 2016, p. 209). This means that a C-unit cannot be further segmented without losing its core meaning. As such, subordinate clauses remained attached to the main clause for the purposes of segmentation; the subordinate clause is dependent on the main clause, and therefore cannot be segmented and retain its essential meaning. Each sample was then coded according to the SALT guidelines for coding samples (Miller et al., 2016) and the CUDP-A (Hill et al., 2020). General language sample analysis measures (including mean length of utterance, total number of utterances, number of different words and percentage of maze words) are reportedly reliable in samples as short as nine utterances (Owen & Leonard, 2002; Pavelko & Owens, 2017). The measures calculated within the SALT software (Miller et al., 2016) or the CUDP-A (Hill et al., 2020) are summarised in Table 4.

Table 4

Summary of discourse analysis measures

Measure		Rationale
Transcript length	Number of words* Number of utterances*	Children with language disorder are likely to produce shorter narrative samples than TD peers (Petersen, 2011).
Grammar and syntax	Mean Length of Utterance words (MLUw)* MLU morphemes (MLUm)* Syntactic Complexity (number of dependent clauses as a percentage of total clauses)^	MLU is a widely accepted measure of morphosyntactic complexity. The use of complex syntax is reported to increase well into adulthood (Nippold, Hesketh, Durthie, & Mansfield, 2005). Additionally, children with DLD present with reduced syntactic complexity (Fey, Catts, Proctor-Williams, Tomblin, & Zhang, 2004; Leonard, 2014). Furthermore, research suggests that individuals with poorer psychosocial outcomes differ on measures of syntactic complexity (Villemarette-Pittman, Stanford, & Greve, 2003).
Semantics	Number of Different Words (NDW)*	DLD is associated with reduced lexical diversity, which could restrict capacity to express ideas with clarity in discourse (Fey et al., 2004). While NDW is commonly used to measure lexical diversity, its interpretation is complicated due to the influence of sample size (Owen & Leonard, 2002). However, NDW is an effective measure for distinguishing TD children from those with language disorders (McGregor, 2017).
	TTR (ratio of number of different words to total number of words)*	TTR is a measure of lexical diversity that attempts to account for the effect of sample size on NDW (Owen & Leonard, 2002). However, the reliability and validity of TTR has been questioned in the literature. This is because TTR can underestimate true lexical diversity if the speaker produces lengthy discourse that remains on-topic and therefore, re-uses several key vocabulary terms relating to that topic (Fergadiotis, Wright, & West, 2013; Owen & Leonard, 2002). TTR was examined in the present study alongside

		NDW to further investigate its relevance with an adolescent sample.
	Percent Correct Information Units^	This measures the percentage of words that are intelligible in context, and accurate, relevant and informative in relation to the topic. Research indicates a difference in not only the number, but the quality of vocabulary terms known by children with DLD as compared to TD peers (Nation, 2014).
Errors	Abandoned utterances* Utterances with mazes* Percent maze words* Average words per maze* Utterances with error*	DLD is associated with errors in grammar and vocabulary (Leonard, 2014; Nation, 2014), and word-errors are likely to impact listener understanding. In addition, language disorder is associated with reformulations, which can affect the overall flow of a story (Thordardottir & Weismer, 2002).
Cohesion	Referential Cohesion (percentage of complete referent ties)^	A complete referential tie refers to the use of an appropriate pronoun or proper noun to refer to an individual or "character" in the discourse. Language disorder is associated with difficulty using complete referential ties in discourse, which can affect listener comprehension of agent action (Finestack, Fey, & Catts, 2006; Silva & Cain, 2019).
Coherence	Local Coherence^ Global Coherence^	Local Coherence measures the relevance of an utterance to the preceding utterance. Global coherence measures the relevance of an utterance to the overall topic of conversation. Creating coherence in oral narratives is crucial for listener comprehension (Silva & Cain, 2019). Children with DLD experience difficulty establishing coherence generally in oral narratives; it is suggested that this weakness is linked with poor organisation of narrative events (Goldman, 2008).

* SALT measure; ^ CUDP-A measure

Inter-Rater Reliability

Prior to the study, and based on the literature, the researchers reviewed the SALT guidelines for coding samples (Miler et al., 2016) and the CUPD-A (Hill et al.,

2020) and confirmed which discourse analysis measures were most relevant to the research questions in the present study, as detailed in Table 4, above. Three transcripts were coded using the measures outlined in Table 4 by the research team. Any questions regarding the procedure for coding were clarified in discussion. The primary researcher then undertook the coding of twenty transcripts, noting additional questions about the procedure for coding to be reviewed by the research team. Following discussion and clarification of any coding queries with the team, the primary researcher completed coding. The transcripts of five participants (over ten percent of the research population) were reviewed for inter-rater agreement. Any discrepancies were discussed and resolved (decisions are documented in Appendix 1). Following this, all samples were reviewed for accuracy based on these decisions.

Procedure

The present programme of research was submitted to the Curtin University Human Research Ethics Committee (approval number HRE2016-0134) and the Department of Education of Western Australia (reference number D16/0599573) and approved. The purpose, procedure and intended use of data was explained to all participants prior to commencing assessment. It was made clear to all participants that consent was completely voluntary, and adolescents were shown a visual schedule to support comprehension (see Appendix 2). Participants were interviewed by the researcher in a quiet room in their home. The CELF-4 was administered first, followed by Wallis' (2016) discourse elicitation protocol, the SDQ, SHAP-V, and the appropriate Harter's self-perception scale. Adolescents were provided a break whenever it was requested; if necessary, the administration of the assessments was conducted over two sessions, with the second session occurring as soon as possible after the first. In total, participants undertook approximately two hours of assessment with the researcher. Where participants had difficulty understanding the language in assessments, the researcher defined terms (as long as this did not compromise standardised protocols). At the end of the assessment, adolescent participants were provided with a movie voucher, and parents with a report outlining their child's language results. As per the ethically approved protocol, a registered psychologist on the research team contacted the parents of participants whose SDQ scores fell in the *High* or *Very High* range (n = 2) and whose full assessment battery results suggested the need for further assessment (n = 1). In this case, the participant's parent was

provided further information about accessing support from the team's registered psychologist.

Chapter 5: Results for Aim 1

The first aim of this programme of research was to examine the language profiles of adolescents with a history of DLD as compared to a group of typically developing peers, at both the word and sentence level using standardised language measures, and the discourse level of language using elicited language samples as described in Chapter 4 (Method). This aim is important for identifying the nature of language difficulties for adolescents with a history of DLD, and understanding how DLD persists through this stage of development.

It should be noted that generally, the analyses outlined in Chapters 5, 6 and 7 were not corrected due to the small sample size. Therefore, it is possible that Type 1 errors may be present in the results.

Missing Data

Problem-resolution recounts represent a more complex discourse generation task than description or personal recount genres. This is in part due to developmental effects; linguistically, the skills required to generate a problem-resolution recount (i.e. the use of subordinating and coordinating conjunctions to describe cause and effect relationships) tend to develop by approximately 6 years of age (Bliss & McCabe, 2008). However, the capacity to use temporal connectives to describe a sequence of events with accuracy (like in a personal recount) should be established by 5 years (Bliss & McCabe, 2008). The problem-resolution genre samples of four children in the history of DLD group were limited to statements such as, “I don’t know.” Therefore, these samples were not included in the final dataset for analyses (Participants 009, 034, 053 and 054). In addition, Participant 034 did not generate a description. No data for the standardised language measures were missing.

Data Analyses

Following narrative coding, SALT data were extracted using Rectangular Data Files. A detailed process for data extraction can be accessed in the SALT Research Reference Book (Miller et al., 2016). The SALT and CUDP-A variables outlined in Table 4, and the standardised language measures were collated for data analyses. Data were then analysed using SPSS 24 (IBM Corp, 2016). Skewness & Kurtosis statistics indicated non-normal distribution of data for several discourse variables across groups (outside of +/-1.96). Therefore, non-parametric tests were used to analyse these data. Standardised language measures met normality assumptions. Non-parametric correlations were calculated to examine potential

associations between discourse variables. Percent correct information units, local and global coherence were strongly correlated across all genres above .85. Therefore, they were standardised and a composite cohesion score was created. All other discourse scores were standardised for consistency. Mann-Whitney tests were then conducted to examine group differences on the standardised SALT and CUDP-A discourse measures. Where *U* was significant, effect size was calculated using Clark-Carter's (2009) formula ($r = z/\sqrt{N}$) and evaluated according to Cohen's (1998) rule of thumb (r = .1 could be considered a small effect, r = .3 could be considered a medium effect, and r = .5 could be considered a large effect). One-way ANOVAS were conducted to determine group differences on standardised language measures (the Core, Receptive and Expressive language indices of the CELF-4).

Between Groups Comparisons: Standardised Language Measures

Descriptive statistics and the results of the between groups comparisons can be seen in Table 5. One-way ANOVAs were used to compare the groups' scores on CELF-4 language indices. As expected, participants with a history of DLD scored significantly lower than participants with no history of DLD across Expressive, Receptive and Core language index scores. According to the CELF-4 classification banding, group scores in the history of DLD group fell just within the average range (+/- 1 standard deviation from the normative sample mean, or a standard score between 86 and 114; Semel, Wiig & Secord, 2006). The mean scores for the group without a history of DLD fell towards the upper end of the average range.

Between Groups Comparisons: Discourse Language

Descriptive statistics and the results of the between groups comparisons can be seen in Table 6. In terms of discourse, participant groups' scores were initially compared on standard SALT measures. A detailed overview of Mann-Whitney U test statistics can be found in Table 7. Overall, participants with a history of DLD produced discourse samples that were consistently shorter (total number of utterances, total number of words), using a more limited range of vocabulary (number of different words, type token ratio and moving type token ratio). All of these group differences were consistent with large effect sizes and were evident across all genres. Participants with a history of DLD also presented with a significantly greater number of mazes (percent utterances with mazes) in the description genre (i.e. tell me about someone who you think is annoying), and longer mazes (average words per maze) in the description and problem resolution recount

genres (i.e. tell me about a time when you had a problem and had to fix it); these group differences were consistent with a medium effect size. When groups were compared on CUDP-A measures of coherence and cohesion, participants with a history of DLD presented with significantly reduced coherence as compared to their peers without a history of DLD across all genres. These effects could be considered large. Additionally, in problem-resolution recounts, participants with a history of DLD produced fewer complex sentences (medium effect size). The groups demonstrated comparable skills in referential cohesion (that is, how well they were able to refer to people using names and pronouns like he, she, and they). A detailed summary of these group differences can be found in Table 8.

Table 5

Standardised Language Measures: Group Means, Standard Deviations and Between Groups Comparisons

	Standard Score Means (SDs)		**Between Groups Comparisons**
	History of DLD	***No History of DLD***	***p***
Core Language Index	91.00 (18.48)	111.32 (13.15)	< .001**
Receptive Language Index	90.85 (19.10)	109.95 (12.37)	< .001**
Expressive Language Index	90.50 (18.09)	111.66 (14.04)	< .001**

* Group difference is significant at the 0.05 level (2-tailed).

** Group difference is significant at the 0.01 level (2-tailed).

*** Group difference is significant at the 0.001 level (2-tailed).

Table 6

Discourse Language Measures: Group Means and Standard Deviations

		History of DLD		No History of DLD	
Genre	***Measure***	***Mean***	***Standard Deviation***	***Mean***	***Standard Deviation***
Personal Recount	Total Number of Utterances	9.35	7.61	17.50	9.04
	Total Number of Words	80.00	84.70	153.64	83.98
	Number of Different Words	38.10	21.23	68.77	27.25
	Mean Length of Utterance in Words	7.58	2.98	8.25	2.59
	Mean Length of Utterance in Morphemes	8.24	3.24	9.11	2.90
	Type Token Ratio	.73	.14	.58	.11
	Moving Type Token Ratio	.73	.13	.63	.08
	Percent Maze Words	.14	.09	.11	.07
	Percent Utterances with Mazes	.48	.29	.42	.18
	Average Words per Maze	1.71	1.41	2.11	1.00
	Abandoned Utterances	.75	1.48	.42	.67
	Percent Utterances with Errors	.17	.22	.07	.07
	Percent Correct Information Units	53.85	46.78	120.23	64.41
	Sentence Complexity	.15	.16	.16	.10
	Referential Cohesion	.42	.43	.65	.32
	Mean Local Coherence	4.21	4.53	9.90	5.30
	Mean Global Coherence	3.98	3.94	9.79	5.27
	Personal Recount Coherence Composite	-1.61	2.16	1.47	2.80

		History of DLD		No History of DLD	
Genre	***Measure***	***Mean***	***Standard Deviation***	***Mean***	***Standard Deviation***
Description	Total Number of Utterances	15.30	27.16	15.82	6.11
	Total Number of Words	121.75	220.21	123.82	54.05
	Number of Different Words	47.70	54.32	59.32	19.56
	Mean Length of Utterance in Words	6.35	3.12	7.39	3.64
	Mean Length of Utterance in Morphemes	7.10	3.36	8.26	3.73
	Type Token Ratio	0.68	0.22	0.62	0.11
	Moving Type Token Ratio	0.71	0.20	0.65	0.09
	Percent Maze Words	0.11	0.09	0.15	0.06
	Percent Utterances with Mazes	0.39	0.27	0.53	0.13
	Average Words per Maze	1.54	1.16	2.08	0.77
	Abandoned Utterances	0.70	1.49	0.45	0.86
	Percent Utterances with Errors	0.08	0.10	0.07	0.11
	Percent Correct Information Units	83.90	158.30	91.82	41.18
	Sentence Complexity	0.16	0.18	0.18	0.09
	Referential Cohesion	0.94	0.23	0.91	0.24
	Mean Local Coherence	7.62	17.76	8.35	4.74
	Mean Global Coherence	6.24	11.84	8.12	4.50
	Description Coherence Composite	-0.18	4.17	0.16	1.21

		History of DLD		No History of DLD	
Genre	***Measure***	***Mean***	***Standard Deviation***	***Mean***	***Standard Deviation***
Problem Resolution Recount	Total Number of Utterances	12.35	11.29	25.14	13.33
	Total Number of Words	106.80	111.02	209.77	138.72
	Number of Different Words	47.40	38.88	82.00	31.68
	Mean Length of Utterance in Words	5.98	3.52	7.63	1.60
	Mean Length of Utterance in Morphemes	6.46	3.82	8.31	1.71
	Type Token Ratio	0.52	0.29	0.53	0.13
	Moving Type Token Ratio	0.55	0.30	0.61	0.06
	Percent Maze Words	0.09	0.10	0.13	0.06
	Percent Utterances with Mazes	0.35	0.30	0.44	0.16
	Average Words per Maze	1.37	1.24	2.06	0.79
	Abandoned Utterances	0.90	1.25	0.50	0.80
	Percent Utterances with Errors	0.12	0.19	0.09	0.10
	Percent Correct Information Units	68.95	68.03	146.91	111.45
	Sentence Complexity	0.10	0.10	0.17	0.08
	Referential Cohesion	0.52	0.46	0.80	0.22
	Mean Local Coherence	5.86	6.78	14.46	8.92
	Mean Global Coherence	5.36	6.04	14.61	8.08
	Problem Resolution Coherence Composite	-1.48	2.11	1.34	2.95

Table 7

Mann-Whitney U Statistics for SALT Discourse Measures

Genre	***SALT Measure***	***Mann-Whitney U***	***Z***	***p***	***r (effect size)***
Personal Recount	Total Number of Utterances	89.5	-3.293	0.001***	-0.508 (large)
	Total Number of Words	77	-3.602	<0.001***	-0.556 (large)
	Number of Different Words	71.5	-3.741	<0.001***	-0.577 (large)
	Mean Length of Utterance (words)	180.5	-0.995	0.32	
	Mean Length of Utterance (morphemes)	176	-1.108	0.268	
	Type Token Ratio	86	-3.377	0.001***	-0.521 (large)
	Moving Type Token Ratio	98.5	-3.063	0.002**	-0.472 (large)
	Percent Maze Words	182	-0.957	0.338	
	Percent Utterances with Mazes	200.5	-0.491	0.623	
	Average Words per Maze	175	-1.138	0.255	
	Abandoned Utterances	207.5	-0.378	0.705	
	Utterances with Error	199.5	-0.529	0.597	

Genre	*SALT Measure*	*Mann-Whitney U*	*Z*	*p*	*r (effect size)*
Description	Total Number of Utterances	98	-3.081	0.002**	-0.47 (large)
	Total Number of Words	105.5	-2.884	0.004**	-0.445 (large)
	Number of Different Words	107.5	-2.834	0.005**	-0.437 (large)
	Mean Length of Utterance (words)	195	-0.63	0.529	
	Mean Length of Utterance (morphemes)	187	-0.831	0.406	
	Type Token Ratio	129	-2.294	0.022*	-0.354 (medium)
	Moving Type Token Ratio	117	-2.596	0.009**	-0.401 (med-large)
	Percent Maze Words	155	-1.64	0.101	
	Percent Utterances with Mazes	136	-2.117	0.034*	-0.327 (medium)
	Average Words per Maze	133.5	-2.184	0.029*	-0.337 (medium)
	Abandoned Utterances	219.5	-0.016	0.987	
	Utterances with Error	197.5	-0.613	0.54	

Genre	*SALT Measure*	*Mann-Whitney U*	*Z*	*p*	*r (effect size)*
Problem Resolution Recount	Total Number of Utterances	90	-3.278	0.001***	-0.506 (large)
	Total Number of Words	102	-2.973	0.003**	-0.459 (large)
	Number of Different Words	98	-3.074	0.002**	-0.474 (large)
	Mean Length of Utterance (words)	164.5	-1.398	0.162	
	Mean Length of Utterance (morphemes)	154.5	-1.65	0.099	
	Type Token Ratio	186.5	-0.845	0.398	
	Moving Type Token Ratio	184	-0.909	0.363	
	Percent Maze Words	149	-1.791	0.073	
	Percent Utterances with Mazes	178	-1.06	0.289	
	Average Words per Maze	125.5	-2.384	0.017*	-0.368 (medium)
	Abandoned Utterances	189	-0.887	0.375	
	Utterances with Error	212	-0.21	0.834	

* Group difference is significant at the 0.05 level (2-tailed).

** Group difference is significant at the 0.01 level (2-tailed).

*** Group difference is significant at the 0.001 level (2-tailed).

Table 8

Mann-Whitney U Statistics for CUDP-A Discourse Measures

Genre	***CUDP-A Measure***	***Mann-Whitney U***	***Z***	***p***	***r (effect size)***
Personal Recount	Sentence Complexity	203	-0.432	0.665	
	Referential Cohesion	159	-1.555	0.12	
	Coherence Composite	73	-3.702	<0.001***	-0.57 (large)
Description	Sentence Complexity	173.5	-1.183	0.237	
	Referential Cohesion	186	-1.147	0.252	
	Coherence Composite	88	-3.324	0.001***	-0.51 (large)
Problem Resolution Recount	Sentence Complexity	137	-2.106	0.035*	-0.33 (medium)
	Referential Cohesion	174	-1.174	0.241	
	Coherence Composite	73	-3.704	<0.001***	-0.57 (large)

* Group difference is significant at the 0.05 level (2-tailed).

** Group difference is significant at the 0.01 level (2-tailed).

*** Group difference is significant at the 0.001 level (2-tailed).

Chapter 6: Results for Research Aim 2a

The following is the accepted manuscript for a published article here presented in thesis format. The full reference for this article is:

Kilpatrick, T., Leitão, S., & Boyes, M. (2020). Mental health in adolescents with a history of developmental language disorder: The moderating effect of bullying victimisation. *Autism & Developmental Language Impairments*, *4*. https://doi.org/10.1177/2396941519893313 .

The published version of this article can be found in Appendix 3.

Abstract

Background: Children and adolescents with a history of Developmental Language Disorder (DLD) are at elevated risk of experiencing internalising and externalising symptoms. The existing literature suggests a link between DLD, bullying victimisation and low self-esteem, both of which are negatively associated with child and adolescent mental health more generally. **Aim:** We examined the relationship between having a history of DLD and internalising and externalising symptoms in adolescence. We also tested whether bullying victimisation and self-esteem were associated with mental health outcomes, and whether they moderated the association between a history of DLD and psychological symptoms. **Methods & Procedures:** Adolescents with a history of DLD (n = 20, 10-16 years, 10% female, 90% male) were compared to a group of typically developing (TD) peers (n = 22, 10-16 years, 36.4% female, 63.6% male). Receptive and expressive language, internalising and externalising symptoms, bullying victimisation, and self-esteem were assessed with well-validated measures. **Outcomes & Results:** Contrary to our predictions, a history of DLD was not directly associated with internalising or externalising symptoms. However, in terms of internalising symptoms, there was a significant interaction between a history of DLD and bullying victimisation (β = 1.01, p = .02). Specifically, there was a significant association between a history of DLD and internalising symptoms at high levels of bullying victimisation [$t(41) = 2.52$, p = .02] but not at low levels of bullying victimisation [$t(41) = -.67$, p = .51)]. **Conclusions & Implications:** Bullying victimisation appears to increase the risk of internalising symptoms in adolescents with a history of DLD. Future research should examine whether anti-bullying interventions can help prevent the development of internalising

problems for children with DLD. These findings may aid clinicians in developing their understanding of DLD and reinforces the importance of holistic client management in speech language therapy.

There is a robust association between language disorder[2] and poor psychosocial outcomes. This includes internalising (e.g. anxiety, depression) and externalising symptoms (e.g. conduct problems, attention difficulties) (Conti-Ramsden, Mok, Pickles, & Durkin, 2013; Snowling et al., 2006). However, why language disorder is linked with poor mental health outcomes is unclear. Consideration of factors known to influence mental health in the broader population can provide some insights. For example, it is well-recognised that the impact of life stressors may vary with age, and that males and females are vulnerable to different patterns of internalising and externalising symptoms (Gupta, 2016; Martel, 2013). However, a growing body of research has identified other factors relevant to mental health in individuals with DLD. van den Bedem et al. (2018) noted that depressive symptoms in children with DLD could not be solely explained by the severity of their language difficulties; rather, this association was mediated by the use of maladaptive emotional regulation strategies. Botting, Durkin, et al. (2016) found the association between language ability and emotional health in adults with a history of DLD was mediated by self-efficacy. In contrast, Forrest, Gibson, Halligan & St Clair (2018) found adolescents who had a reported history of language difficulties and peer problems at age 7 were more likely to present with poorer emotional health at ages 7 and 14. This range of findings highlights the need for further investigation of factors underlying mental health for individuals with language disorder.

To this end, there is increasing evidence linking language disorder with bullying victimisation (van den Bedem et al., 2018) and low self-esteem (Wadman et al., 2008), which have also been identified as risk factors for mental health difficulties in the broader child psychology literature (Sowislo & Orth, 2013). Furthermore, there is mounting evidence for a bi-directional association between

[2] The term "language disorder" is here used to refer to (a) impairment in language associated with Developmental Language Disorder, (b) a language disorder associated with a biomedical condition, and (c) the previous diagnostic terminology, "Specific Language Impairment." Within the literature review, where research populations have been described as presenting with "Specific Language Impairment," the term "language disorder" has been used. This terminology is used to differentiate it from "Developmental Language Disorder."

bullying victimisation and low self-esteem, wherein individuals develop low self-esteem linked with bullying victimisation experiences, and individuals with low self-esteem are at increased risk of being bullied (van Geel, Goemans, Zwaanswijk, Gini, & Vedder, 2018). However, it is unknown whether these risk factors can explain mental health in the context of DLD. To the best of our knowledge, no studies have examined language disorder, bullying victimisation, and self-esteem, and mental health in the same sample, which was the aim of the current study.

Mental Health in the Context of Developmental Language Disorder (DLD)

Difficulties with language have been variously described as "language disorder," "language impairment," "language difficulties," and "Specific Language Impairment" (SLI). More recently, the term "language disorder" has been proposed to describe children with significant language difficulties that are likely to persist, with functional impact on social interaction and educational progress, with "Developmental Language Disorder" (DLD) referring to language disorder with no known differentiating condition such as brain injury or autism (Bishop et al., 2017). It is estimated that DLD affects approximately 7% of the population (Norbury et al., 2016).

Individuals with DLD are reportedly at increased risk of experiencing poor social, emotional and mental health outcomes, though additional factors affecting these outcomes as well as the age of onset of mental health symptoms in individuals with DLD are unclear (Conti-Ramsden & Botting, 2008; Lindsay & Dockrell, 2012; Snowling et al., 2006). Adolescence is generally a period of increased risk for any cohort, with most mental health disorders surfacing in adolescence (Clements-Nolle & Rivera, 2013). However much of the research in DLD has explored mental health in younger age groups (Goh Kok Yew & O'Kearney, 2013, 2015; Levickis et al., 2018).

There is significant variability in the terminology used to describe mental health outcomes in general, as well as for the DLD population. This complicates the process of determining mental health prognoses. For example, several studies have reported an increased risk of internalising disorders (Snowling et al., 2006), emotional regulation difficulties (Fujiki, Spackman, Brinton, & Hall, 2004), poor emotional health (Forrest et al., 2018), externalising symptoms (Conti-Ramsden, Mok, Pickles, & Durkin, 2013), low self-esteem and poor social relationships (Wadman et al., 2011) for individuals with DLD. In the interest of clarity, the term

"mental health" in this paper aligns with the definition put forward by the World Health Organization (WHO), as "a state of well-being in which the individual realises his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community" (World Health Organization, 2004, p. 12). As such, "poor mental health outcomes" will be used to discuss symptomatology.

In their 2013 systematic review and meta-analysis, Goh Kok Yew and O'Kearney reported significantly increased prevalence and severity of emotional, behavioural and attention deficit hyperactivity problems for children and adolescents with language disorder compared to TD peers, and elevated risk of depression for children with language disorder. This is consistent with the findings of Conti-Ramsden and Botting (2008), and Botting, Toseeb et al. (2016), who also reported increased risk of depression and anxiety symptoms for adolescents with language disorder. However, this is in contrast to the findings of Levickis et al. (2017) who investigated social-emotional and behavioural difficulties in a longitudinal community-based study, following children with and without language disorder between the ages of 4 and 7. Participants with language disorder presented with greater total difficulties than matched peers on a measure of social and emotional functioning at 4, 5 and 7 years, but the nature of some difficulties changed over time. Hyperactivity and conduct problems were consistently higher across all time points for children with language disorder, while peer problems were not reported at 7 years, and emotional problems were not reported at all. Levickis et al. (2017) acknowledged that the severity of language disorder might not have been comparable with those in other studies, which may explain the lack of association. Additionally, the focus of this research was the psychosocial wellbeing of 4-7 year olds; not the social/emotional outcomes of participants in adolescence. Given what we know about the emergence of mental health symptoms for adolescents, these results may not be reflective of participants' lifelong mental health outcomes.

While the evidence for an association between language and mental health outcomes is robust, *why* the relationship exists is still unclear. Additionally, little research examines why some individuals with DLD present with internalising problems, others present with externalising problems, and others never present with poor mental health. Thus, consideration of other factors impacting individuals with

DLD that have been linked with mental health outcomes is necessary, to inform evidence-based assessment and intervention.

Risk Factors for Mental Health in the Context of Developmental Language Disorder

A number of risk factors for mental health have been examined in the DLD population. These include self-efficacy (Botting, Durkin et al., 2016), bullying victimisation (van den Bedem et al., 2018; Wadman et al., 2011), poor emotional knowledge (van den Bedem, et al., 2018), parenting style (Aarne, Almkvist, Mothander, & Tallberg, 2013) self-esteem (Jerome, Fujiki, Brinton, & James, 2002; Marton, Abramoff & Rosenzweig, 2004), and shyness (Durkin, Toseeb, Botting, Pickles, & Conti-Ramsden, 2017). While all are important considerations, self-esteem and bullying victimisation are two that have received particular attention.

Self-esteem refers to the value one places on oneself, based on self-evaluation and internalisation of others' perceptions (Wadman et al., 2008; Jerome et al., 2002). Low self-esteem has generally been linked to poor psychosocial outcomes, characterised by internalising and externalising symptoms, academic failure and/or dependence on welfare benefits (Jerome et al., 2002). In addition, research has established an increased risk of low self-esteem for children with various communication impairments (Capps, Sigman, & Yirmiya, 1995; Harter, Whitesell, & Junkin, 1998). The literature investigating self-esteem for children with DLD is less clear-cut. Jerome et al. (2002) investigated the self-esteem of children with DLD aged 6;0-13;0. Their findings indicated that the majority of the younger DLD sample (aged 6;0-9;0) scored within one standard deviation of TD peers. In contrast, those aged 10;0-13;0 scored significantly lower than their peers on measures of scholastic competence, social acceptance and behaviour conduct. This provides empirical support for the theory that mental health symptoms may arise and/or increase as individuals approach adolescence (Clements-Nolle & Rivera, 2013). Marton, Abramoff & Rosenzweig (2004) reported that children with DLD aged 7;0-10;0 displayed low social self-esteem compared to matched controls, while academic self-esteem was comparable. More recently, Wadman et al. (2008) and Durkin et al. (2017) reported a direct and significant association between adolescent language and global self-esteem in adulthood.

Another factor for consideration for adolescents with DLD is the nature of peer relationships and vulnerability to bullying victimisation (experiencing repeated,

deliberate aggressive acts by a peer/s). Supportive friendships are associated with positive social and emotional outcomes, and are a protective factor against bullying victimisation (Alvord & Grados, 2005; Schwartz, Dodge, Pettit, & Bates, 2000). However, children with DLD are at risk of limited or poor peer relationships (Mok, Pickles, Durkin & Conti-Ramsden, 2014), and of experiencing significantly more bullying victimisation than TD peers (van den Bedem et al., 2018; Conti-Ramsden & Botting, 2004; Redmond, 2011). Redmond (2011) reported significantly increased bullying victimisation experiences for participants with DLD, over and above those with ADHD (though prevalence in this group was still high). Bullying victimisation has been associated with serious psychological consequences, including increased risk of internalising symptoms, poor classroom attention, and suicidal ideation (Redmond, 2011). For participants with DLD identified as at risk of depression at 16 and/or 17 years, increased experiences of bullying victimisation was associated with an elevated risk of depression at 17 years (Wadman et al 2011). However, Wadman et al. (2011) asked a single question of participants regarding bullying victimisation, and highlighted the need for further investigation using a more detailed measure. To the best of our knowledge, these findings have not been examined further. Given the potential negative outcomes of experiencing bullying victimisation and the preliminary evidence for its association with DLD, further investigation is crucial.

The Current Study

The current study aimed to examine the impact of early language disorder on adolescent mental health. We anticipated that a history of DLD would be associated with internalising and externalising symptoms, self-esteem, and bullying victimisation. Specifically, we expected that adolescents with a history of DLD would report higher levels of internalising and externalising symptoms, lower self-esteem, and more experiences of bullying victimisation as compared to TD peers. In addition, we aimed to test whether bullying victimisation and self-esteem moderated the association between DLD and mental health outcomes. We expected the association to be strengthened at high levels of bullying victimisation and low levels of self-esteem.

Methods

Ethical Approval

The present study received ethical approval from the Curtin University Human Research and Ethics Committee (approval number HRE2016-0134).

Recruitment and Participants

In total, forty-two participants took part. Twenty participants with a history of DLD (aged 10-16 years; 10% female, 90% male) were recruited through four Language Development Centres (LDCs) across the North East Metropolitan Region. The LDC service model is unique to Western Australia; the Centres provide intensive intervention for children in Kindergarten (aged 3-4 years) to Year 2 (aged 6-7 years) whose language profiles are consistent with that of DLD. LDCs offer up to three years of school placement with a focus on developing oral language skills. In order to participate, adolescents were required to have attended a LDC for a minimum of one year. Thus, all participants in the History of DLD group had received at least one, and a maximum of three years, of intensive intervention in a specialised education context, and were attending a mainstream school at the time of recruitment and data collection.

Referral to an LDC requires a comprehensive assessment: a thorough case history, assessment of the child's oral language skills using standardised, norm-referenced tests and language sample analysis, and a developmental assessment by a paediatrician or psychologist. Therefore, all participants in the History of DLD group had early language abilities significantly below the average range, with demonstrated functional impact, and no other diagnosis that could better explain their language problems.

Recruitment took place through LDC mailing lists, and/or via the school website. Interested families with children who met criteria contacted the researcher directly for further details.

Additionally, twenty-two participants with no history of DLD or neurodevelopmental disorder (aged 10-16 years; 36.4% female, 63.6% male) were recruited through snowballing and social media advertising. All children and parents provided written consent prior to participating in the study, and were given opportunity to have questions answered by the researchers.

Measures

A series of self-report and standardised measures were used to examine participants' language skills, self-esteem, bullying victimisation experiences, and screen their mental health. Self-report measures were conducted through interviewing with participants across both groups, using visual supports with all participants to ensure comprehension of stimulus items.

Internalising and Externalising Measure. The Strength and Difficulties Questionnaire (SDQ) is a psychometrically sound, evidence-based self-report instrument used to identify internalising and externalising symptoms for children aged 4;0-16;0 (α = .78-.85; Hawes & Dadds, 2004). While the SDQ has not yet been validated with a DLD population, there is preliminary evidence for its use (Conti-Ramsden et al., 2013; Helland, Helland, & Heimann, 2014). The questionnaire comprises five sub-scales, examining conduct problems, hyperactivity, peer problems, emotional symptoms, and prosocial behaviour. Each subscale has five items that ask the respondent to rate whether each item is (0) not true, (1) somewhat true or (2) certainly true for them (e.g. I worry a lot). The Internalising score is calculated by summing the emotional and peer problems scales, and the Externalising score by summing the conduct and hyperactivity scales. Both the Internalising and Externalising scores range from 0-20, and higher scores indicate increased symptoms. The SDQ Total score ranges from 0-40, and is the sum of the Internalising and Externalising scores, measuring the overall risk of mental health symptoms. Both parent and child report versions of the DSQ are available (Hawes & Dadds, 2004). We used the self-report version of the SDQ, and it demonstrated adequate reliability for both internalising (α = .74) and externalising (α = .79) symptoms in our sample.

Bullying Victimisation Measure. The Social and Health Assessment Peer Victimisation Scale (SHAPV) is a nine-item self-report questionnaire that was used to measure bullying victimisation (Ruchkin, Schwab-Stone and Vermeiren, 2004). Though the scale has not yet been validated with adolescents with DLD, it has demonstrated strong reliability with an adolescent sample in the US (α = .82; Maynard & Joseph, 2000), as well as in our own sample (α = .87). Participants were asked to report whether they had experienced the peer victimisation behaviour outlined in each item (0) *never*, (1) *once*, (2) *two or three times*, or (3) *four or more times* in the past year (e.g. *During this year, has anyone called you names or sworn at you?*). All items were summed to generate a total score, ranging from 0 to 27. This score was standardised to ensure comparability between the age groups in the present study. Higher scores indicated increased bullying victimisation experiences.

Self-Esteem Measures. Harter's Self-Perception scales (Harter, 2012a, 2012b) include the Self-Perception Profile for Adolescents (SPPA) and Self-

Perception Profile for Children (SPPC) and are self-report instruments measuring a range of self-perception constructs that contribute to a Global Self-Worth score. This score represents the average of 6 items pertaining to global self-worth, and ranges from 1-4. Each survey item is scored between 1 and 4, where 4 represents the highest level of self-worth, and 1 represents the lowest. Items were designed to follow a "structured alternative format" (Harter, 1982), where respondents are required to identify to what extent they associate with either end of a scale of behaviour or pattern of thought (e.g. *Some kids often forget what they learn, but other kids can remember things easily*). This format is reported to counterbalance the tendency for children to respond in a socially desirable way, thereby increasing the reliability of the results (Harter, 2012a, 2012b). The Global Self-Worth score was standardised to ensure comparability between the age groups in the present study. Harter's scales have sound psychometric properties for community samples (SPPA: α = .80-.89; SPPC: α = .78-.87; Harter, 2012a, 2012b), and were found to be similarly reliable in our sample (SPPA: α = .76; SPPA α = .87). The scales have also been used to successfully measure self-esteem in a language-disordered sample (Jerome et al., 2002; Lindsay, Dockrell, & Palikara, 2010; Tomblin, 2008).

Language Measure. The Clinical Evaluation of Language Fundamentals–4 (CELF-4) (Semel, Wiig, Hannan & Secord, 2006) is a widely-used, Australian-normed language measure with sound validity and reliability (reliability coefficients ≥.90 across language indicators), and provides Receptive, Expressive and Core language scores (the Core Language score is an overall measure of language ability). Raw scores for each subtest are converted to scaled scores according to age norms, which are summed and converted to an overall standard score for the Core, Receptive and Expressive language scores. Scores that fell 1.5-2 standard deviations below the mean of the normative sample were classified as moderately low, and scores falling 2 or more standard deviations below the mean were classified as severely low, as per the test manual.

Procedure

Data was collected by a certified, practising speech pathologist with several years' experience administering assessments and intervention to children with DLD. Participants were interviewed by the researcher in a quiet room in their home. It was made clear to all participants that consent was completely voluntary, and adolescents

were shown a visual schedule to support comprehension. Participants in both groups undertook a formal assessment of their language skills using the CELF-4, as well as the aforementioned series of self-report measures to examine their self-esteem, bullying victimisation experiences, and mental health. Where participants had difficulty understanding the language in assessments, the researcher defined terms (as long as this did not compromise standardised protocols). At the end of the assessment, adolescent participants were provided with a movie voucher, and parents with a report outlining their child's language results. As per the ethically approved protocol, if participants' SDQ scores fell in the *High* or *Very High* range (n = 2), their parents were contacted by a registered psychologist on the research team who provided further information about accessing support.

Data Analyses

Data were analysed in three stages using SPSS 24 (IBM Corp, 2016). First, we examined the data for univariate and multivariate outliers, and a missing values analysis was conducted. One participant's data point was missing completely at random on the bullying victimisation measure (SHAPV) [$\chi^2(56) = 10.93$, $p > .99$]. Therefore, this single data point was imputed using expectation maximization. Second, the descriptive statistics were examined, disaggregated by DLD history, in order to ensure that the groups did not differ systematically on any sociodemographic variables. Correlations between DLD history, age, gender, language scores, internalising, externalising and total scores, bullying victimisation and self-esteem scores were also examined. Finally, associations between history of DLD, self-esteem, bullying victimisation, and both internalising and externalising symptoms were tested in two hierarchical multivariate linear regressions. The first regression examined the SDQ Internalising score as the dependent variable, and the second examined the SDQ Externalising score as the dependent variable. Within each regression, two models were tested. History of DLD, bullying victimisation and self-esteem were entered simultaneously in Step 1. We then tested the history of DLD*bullying victimisation and history of DLD*self-esteem interactions in simple regression models, including only the relevant predictors and interaction term. Where the interactions were significant in the simple models, they were included in the final multivariate model (Step 2). All predictor variables were standardised and significant interactions were probed using simple slopes analyses (Aiken & West, 1991).

Results

Bivariate Analyses

First, a series of bivariate correlation analyses were conducted. Participant data from both groups were compared on measures of language, mental health, bullying and self-esteem. Age and gender were also included, in order to determine whether they were potential confounders and needed to be adjusted. Descriptive statistics and correlations between the variables of interest are summarised in Tables 9 and 10 respectively. As expected, adolescents with a history of DLD scored significantly lower on the language assessments. The groups did not differ significantly in terms of age [$t(40) = .08$, $p = .934$]. However, there was a significantly greater proportion of females in the group with no history of DLD as compared to the history of DLD group [$\chi^2(1) = 4.01$, $p = .045$].

Overall, the correlations were in the expected directions (Table 10). Consistent with the notion that DLD is likely to endure, a history of DLD was associated with poorer expressive and receptive scores on the current language assessment. Bullying victimisation and internalising symptoms were strongly and positively correlated [$r(40) = 0.52$, $p = .001$], and self-esteem and mental health were negatively correlated [$r(40) = -.31$, $p = .045$]. Unexpectedly, a history of DLD was not associated with either internalising or externalising symptoms in between group comparisons. History of DLD was not significantly associated with self-esteem. Regression analyses were conducted in the interest of exploratory investigation, to determine how much a history of DLD, self-esteem and bullying predicted internalising and externalising symptoms.

Table 9

Age, Standardised Language Measures, and Mental Health Measures: Group Means and Standard Deviations

	Means (SDs)		**Between Groups Comparisons**
	History of DLD	***No History of DLD***	***p***
Age	12.45 (1.85)	12.5 (2.02)	.934
Core Language Index	91.00 (18.48)	111.32 (13.15)	**< .001**
Receptive Language Index	90.85 (19.10)	109.95 (12.37)	**< .001**
Expressive Language Index	90.50 (18.09)	111.66 (14.04)	**< .001**
SDQ Internalising	4.85 (3.48)	3.64 (2.50)	.199
SDQ Externalising	5.7 (3.31)	6.18 (3.69)	.659
SDQ Total	10.55 (5.31)	9.82 (4.48)	.631
SHAPV Total	5.00 (6.33)	4.18 (4.77)	.640
SPPC Global Self-Esteem (10-13 years)	3.40 (.59)	3.64 (.29)	.174
SPPA Global Self-Esteem (14-16 years)	3.60 (.42)	3.66 (.36)	.796

Note: All between group comparisons are one-way ANOVAS

Table 10

Correlations between Language Ability, Mental Health, Self-Esteem, Victimisation and Potential Confounders (Age and Gender)

	Age	*Gender*	*Group*	*CLI*	*RLI*	*ELI*	*Internalising Symptoms*	*Externalising Symptoms*	*Total Mental Health*	*Bullying Victimisation*	*Self-Esteem*
Age	--	**.332***	-.013	.051	.165	.010	.108	-.081	.010	-.181	-.022
Gender		--	**-.309***	.035	-.023	.056	.221	-.204	-.008	-.059	-.140
Group			--	**-.547*****	**-.523*****	**-.562*****	.202	-.070	.076	.075	-.204
CLI				--	**.925*****	**.975*****	**-.378***	.081	-.179	**-.418****	.289
RLI					--	**.868*****	**-.408****	.153	-.146	**-.418****	**.328***
ELI						--	**-.358***	.046	-.191	**-.388***	.208
Internalising Symptoms							--	.103	**.700*****	**.518****	-.278
Externalising Symptoms								--	**.782*****	.266	-.192
Total Mental Health									--	**.518****	**-.312***
Bullying Victimisation										--	-.037
Self-Esteem											--

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
*** Correlation is significant at the 0.001 level (2-tailed)

Multivariate Analyses

To test multivariate associations between history of DLD, bullying victimisation, and self-esteem, and both internalising and externalising symptoms, we conducted two hierarchical linear regressions[3].

Internalising symptoms

Step 1 accounted for a significant 35.5% of the variance in internalising symptoms [$F(3,37) = 6.79$, $p = .001$]. Neither history of DLD, nor self-esteem were significantly associated with internalising symptoms; however, bullying victimisation was positively associated with internalising symptoms. In simple regression models including only the relevant predictors and two-way interaction, the history of DLD*self-esteem interaction was not significant [$\beta = .48$, $p = .433$]. However, the history of DLD*bullying victimisation interaction was significant [$\beta = 1.01$, $p = .019$], and we therefore entered this into the full multivariate model to determine whether it remained significant. Step 2 accounted for a significant 38.7% of the variance in internalising symptoms [$F(1,36) = 7.31$, $p < 0.001$]. Bullying victimisation, as well as the interaction between history of DLD and bullying victimisation were both significant predictors in this model (see Table 11). Furthermore, given the difference in the proportion of boys and girls across the DLD and comparison groups, we re-ran the full multivariate model adjusting for gender; bullying victimisation and the interaction between history of DLD and bullying victimisation both remained significant (see Appendix 4). In order to probe the interaction between history of DLD and bullying victimisation, we conducted simple slopes tests (Aiken & West, 1991). Internalising scores for individuals with and without a history of DLD were plotted at low (-1SD) and high (+1SD) levels of bullying victimisation (Figure 3). DLD was not associated with internalising symptoms at low levels of bullying victimisation [$t(41) = -.67$, $p = .51$]. However, there was a significant association between history of DLD and internalising symptoms at high levels of bullying victimisation [$t(41) = 2.52$, $p = .02$].

[3] While small, the sample size was approximately ten participants per predictor in the models, indicating adequate power to detect moderate effects (Wilson VanVoorhis & Morgan, 2007).

Table 11

Summary of Hierarchical Linear Regression for Internalising Symptoms

	Model Summary			**Coefficients**			
	R^2	ΔR^2	Sig. FΔ	B(SE)	β	t	p
Step 1	.36	.30	**.001*** **				
Group				.73(.81)	.12	.89	.377
Bullying Victimisation				1.379(.36)	.51	3.83	**.000*** **
SE				-.74(.41)	-.24	-1.80	.080
Step 2	.45	.39	**.019***				
Group				.61(.76)	.10	.80	.431
Bullying Victimisation				-1.24(1.11)	-.46	-1.11	.273
SE				-.71(.39)	-.23	-1.84	.074
Group*Bullying Victimisation				1.67(.68)	1.01	2.46	**.019***

*p<.05, **p<.01, ***<.001

ΔR^2 = adjusted R^2

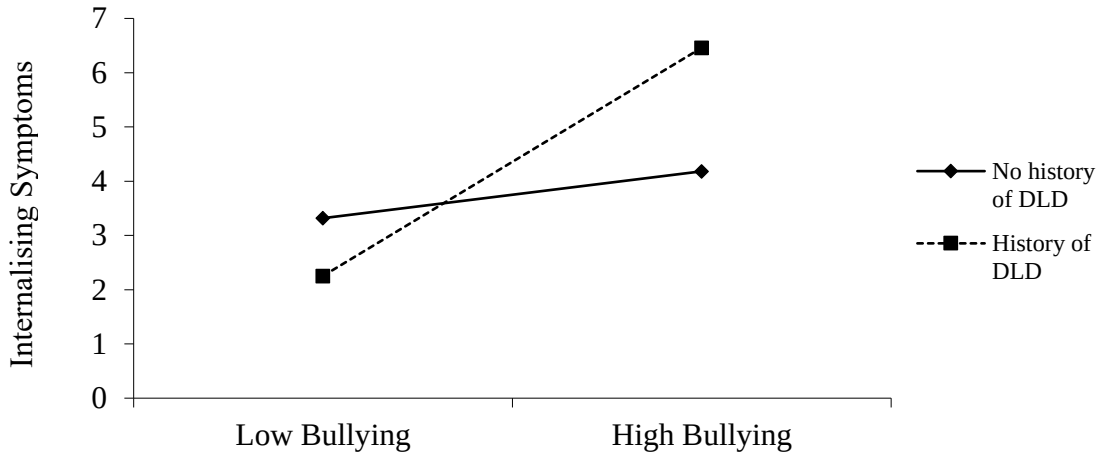
Sig. FΔ = significant F change

B(SE) = unstandardised regression coefficient (standard error)

β = standardised regression coefficient

Figure 3

Interactions between Bullying and Group with Regard to Internalising Symptoms



Externalising symptoms. The results of the regression analyses indicated no significant relationships between history of DLD, bullying victimisation, self-esteem and externalising symptoms (see Table 12). Neither the DLD*Self-Esteem or the DLD*Bullying Victimisation interactions were significantly associated with externalising symptoms.

Table 12

Summary of Hierarchical Linear Regression for Externalising Symptoms

	Model Summary			Coefficients			
	R^2	ΔR^2	Sig. FΔ	B(SE)	β	t	p
Step 1	.01	-.02	.664				
Group				-.48 (1.10)	-.07	-.44	.664
Step 2	.11	.04	.120				
Group				-.89 (1.09)	-.13	-.82	.420
Bullying Victimisation				.79(.48)	.25	1.63	.112
Self-Esteem				-.75 (.56)	-.21	-1.34	.187

*p<.05, **p<.01, *** p<.001

ΔR^2 = adjusted R^2

Sig. FΔ = significant F change

B(SE) = unstandardised regression coefficient (standard error)

β = standardised regression coefficient

Discussion

This study aimed to further explore the association between DLD and both internalising and externalising symptoms, and examine whether self-esteem and bullying victimisation moderated this association. Unexpectedly, having a history of DLD was not directly associated with bullying victimisation, self-esteem, or either internalising or externalising symptoms in our sample. However, bullying victimisation did interact with history of DLD in predicting internalising symptoms.

Specifically, history of DLD was associated with internalising symptoms, but only at high levels of bullying victimisation. These findings extend the research indicating higher prevalence of bullying victimisation for children with DLD than for TD peers (van den Bedem et al., 2018; Conti-Ramsden & Botting, 2004; Redmond, 2011). Our findings also align with those of Wadman et al. (2011), who reported that participants with DLD who were at increased risk of experiencing depression at 16 and/or 17 years, remained at risk if they had experienced bullying victimisation at 16 years. The present study builds on these findings by examining internalising symptoms across a broader age group for adolescents with and without DLD.

Our findings also reflect the view put forward by Conti-Ramsden & Botting (2008); that children with a history of language disorder experience increased risk of emotional health difficulties, but this does not appear to relate directly to poor communication experiences. Rather, it is likely that other factors are at play (Conti-Ramsden & Botting, 2008; Goh Kok Yew & O;Kearney, 2013), as discussed in a recent meta-analysis conducted by Curtis, Frey, Watson, Hampton & Roberts (2018) who also suggest that other "mechanisms" or factors are key in predicting mental health outcomes for the DLD population, in particular emotional regulation and executive functioning. Investigating the influence of such factors for individuals with DLD across the lifespan is key, to identify patterns within participant profiles. Conti-Ramsden et al. (2018) indicate that generally, development in children with DLD is varied, as is the development of emotional difficulties and peer problems. In their longitudinal study, five distinct patterns of development were identified; participants varied as to the prevalence, severity and age of onset of emotional and peer problems throughout childhood and adolescence (Conti-Ramsden et al., 2018). Variability in developmental trajectories reflected the influence of a range of factors.

Interestingly, a history of DLD and externalising symptoms were not associated in the present study. It is possible that additional factors linked with externalising symptoms (e.g. family problems, academic achievement) may not have been pervasive for our participants at this stage in their lives (Hser et al., 2015; Vaillancourt, Brittain, McDougall, & Duku, 2013). These factors were not investigated in the present study, and further research is necessary into whether they may mediate or moderate any association between language and externalising symptoms. Externalising symptoms also tend to decline over the course of development, while internalising symptoms typically emerge as children enter pre-

adolescence, which may help to explain the lack of association in the present study (Miner, 2008; Toumbourou, 2011). Another key consideration is the influence of early language intervention on mental health. Where research populations have been drawn from psychological service providers, the prevalence of unidentified language impairment has been consistently high, up to 89% (Benner, Nelson & Epsein, 2002; Hollo, Wehby & Oliver, 2014). In such populations, access to oral language interventions has likely been limited, or non-existent. Furthermore, the prevalence of mental health symptoms in individuals with identified DLD is also reportedly high; children with DLD are two times more likely to experience clinical levels of internalising and externalising symptoms (Goh Kok Yew & O'Kearney, 2013). Existing research has clearly established that evidence-informed early intervention is effective in improving language abilities for children with DLD (Spencer, 2018). However, there is very little literature examining mental health outcomes for children who have received early oral language intervention (Goldfeld et al., 2017). Our participants with a history of DLD were recruited from an early language intervention setting, and had all spent at between one and three years in a specialist classroom with highly structured and intensive oral language support. Comparison of internalising and externalising symptoms for individuals with DLD who have and have not attended an early intervention setting is recommended, as well as investigation of oral language and social skills intervention in early childhood as a protective factor for individuals with DLD.

As expected, lower self-esteem was associated with poorer mental health for the whole sample in correlation analyses. This is consistent with the literature (Jerome et al., 2002; Steiger, Allemand, Robins & Fend, 2014). However, in the present study, no significant associations between history of DLD, psychosocial outcomes and self-esteem were found. One possible explanation for this unexpected finding is the variability in how self-esteem is defined as a construct in the literature. Our study focussed on self-esteem as a global construct, which has been linked with mental health outcomes in psychology literature and DLD research (Durkin et al., 2017; Millings, Black, Montgomery, Spears, & Stallard, 2012). However, where other studies have been powered to do so, self-esteem has been considered a multi-dimensional construct. Lindsay, Dockrell & Palikara (2010) examined self-esteem in a sample of 54 adolescents with language disorder and identified vulnerability to lower academic self-esteem at 16 years across the cohort, and lower self-esteem in

social and physical appearance domains for female participants. A similar approach was taken by Jerome et al. (2002) to investigating scholastic, social and behavioural self-esteem for adolescents with language disorder. Considering self-esteem as a multi-dimensional construct in research and practice may allow the specific needs of adolescents with DLD to be represented more clearly. However, an alternative explanation for the results of the present study may lie in the age of our participants**.** Durkin et al. (2017) indicated that language ability in adolescence was associated with self-esteem at 24 years for individuals with a history of DLD, and suggest that language skills in middle-adolescence may be a key factor affecting social confidence. Furthermore, these patterns were not as apparent where language ability at 17 years was examined as a potential factor affecting self-esteem and social confidence at 24 years (Durkin et al., 2017). This would suggest that the effects of having DLD in adolescence may become increasingly evident as the individual enters adulthood. Given that our participants were aged between 10 and 16 years, the full effects of experiencing language deficits in early childhood and adolescence may not be evident.

Limitations

The present study was conducted with a relatively small sample of participants, which may have affected power. Future research should attempt replication with a larger sample. Participants were also recruited by responding to an advert, which may be associated with a self-selection bias. In addition, participants' mental health, self-esteem and experiences of bullying victimisation were measured using self-report tools, which, like all self-report measures, can be subjective. Replication with triangulation of the child's self-report measure with parent- and teacher-reports is also recommended. Finally, while we attempted to account for possible weaknesses in working- and short-term memory through the use of visual supports, participants' memory and processing skills were not assessed. This may be a relevant consideration in reviewing the results.

Implications for Clinical Practice

The findings of our study have a number of clinical implications. Speech language therapists have an important role to play in monitoring the psychosocial wellbeing of individuals with DLD. This responsibility has been recognised in the Speech Pathology Australia Scope of Practice (2015), and in the Speech Pathology Australia Mental Health Clinical Guideline (2018). Additionally, examining the

impact of anti-bullying interventions on mental health for children and adolescents with DLD is recommended. Finally, further investigation into early and intensive language intervention as a protective factor for adolescent mental health should be prioritised.

Summary

Internalising and externalising symptoms can significantly impact all facets of an individual's daily life. For adolescents with a history of DLD, the risk of experiencing internalising difficulties in adolescence was higher than for TD peers if they had also experienced more bullying victimisation. Given current focus on DLD theory and diagnostic criteria, a prime opportunity exists to promote awareness of the impact of early language impairment on social, emotional and mental health outcomes in adolescence. Speech language therapists have a crucial role to play in advocating for clients with DLD, monitoring their psychosocial wellbeing and encouraging further investigation into language and mental health.

Chapter 7: Results for Research Aim 2b

To address the final aim of the research: to determine whether measures of discourse were associated with mental health, self-esteem, or bullying victimisation, nonparametric correlation analyses were conducted. Additionally, standardised language measures were included in correlation analyses, to determine possible associations between these data and discourse-language measures. Detailed descriptive statistics and correlations between the variables are summarised in Tables 13 (whole dataset), 14 and 15 (disaggregated by group).

Data Analyses

Nonparametric correlation analyses were conducted using SPSS (IBM Corp., 2016) examining SALT and CUDP-A discourse measures, internalising and externalising scores, self-esteem, and bullying victimisation measures. Standardised scores for the whole dataset were examined initially, and then disaggregated by history of DLD. Age and gender were included in correlation analyses as potential confounding variables.

Non-Parametric Correlations: Whole Dataset

Where measures for the full sample were examined, Spearman's Rho indicated the presence of a strong correlation (p <.001) between group and coherence across all genres (see Table 13 for details). Participants with a history of DLD produced discourse samples with significantly lower coherence than TD peers (personal recount coherence composite: r_s = -.58, p = <.001; description coherence composite: r_s = -.52, p = <.001; problem-resolution recount coherence composite: r_s = -.58, p = <.001). The CELF-4 Core, Receptive and Expressive language indices were strongly and positively correlated with coherence across all genres (p ranged from <.001 to .004; see Table 13). Furthermore, the CELF-4 indices were moderately correlated with sentence complexity in the problem-resolution recount (CLI: r_s = .33, p = .031; RLI: r_s = .36, p = .021; ELI: r_s = .34, p = .028). Referential cohesion was correlated with the Core and Receptive language indices in the problem-resolution recount (CLI: r_s = .32, p = .040; RLI: r_s = .36, p = .018), but not to the Expressive language index.

Overall, discourse coherence appeared to be a relatively reliable measure in this language assessment battery, given its strong correlation to group and standardised language measures across genre. The same could not be said for sentence complexity and referential cohesion.

With regard to mental health variables, correlations were few and sporadic. There was a moderate, positive correlation between referential cohesion and bullying, but only in the description genre (r_s = .34, p = .031). Additionally, there was a moderate, positive correlation between coherence and self-esteem, but only in the problem-resolution genre (r_s = .41, p = .007).

Non-Parametric Correlations: Disaggregated by Group

Even fewer associations were evident when nonparametric correlations were conducted disaggregated by group. Interestingly, the CELF-4 language indices were associated with coherence in the description (CLI: r_s = .52, p = .019; RLI: r_s = .58, p = .008; ELI: r_s = .46, p = .040) and problem-resolution genres (CLI: r_s = .62, p = .003; RLI: r_s = .65, p = .002; ELI: r_s = .55, p = .012) for participants with a history of DLD, but not for TD peers (p ranged from .225 to .996; see Table 14). The CELF-4 language indices were also associated with sentence complexity for participants with a history of DLD, but only in the problem-resolution genre (CLI: r_s = .50, p = .024; RLI: r_s = .61, p = .004; ELI: r_s = .51, p = .021). Otherwise, no significant patterns of association between standardised language and discourse measures were evident in either group.

With regard to psychosocial measures, for TD participants, there was a moderate, positive association between coherence and self-esteem. However, this association was only evident in the problem-resolution recount genre (r_s = .54, p = .010). In the history of DLD group, there was a moderate, positive association between sentence complexity and internalising symptoms, but only in the personal recount genre (r_s = .52, p = .019). There was also a moderate, positive association between referential cohesion and externalising symptoms, but only in the description genre (r_s = .52, p = .020). This association also existed with the Total SDQ score (r_s = .49, p = .028).

Overall, discourse coherence measures were consistently associated with the standardised language measures for participants with a history of DLD. Apart from this, very few variables were associated in the present analyses. Given the infrequent nature of the associations, and the lack of consistency across discourse genres, there was not sufficient evidence to suggest a robust association between any discourse measures and mental health, self-esteem, or bullying victimisation in our sample.

Table 13

[4]Correlations between Discourse-Level Language, Standardised Language Measures, Mental Health, Self-Esteem, and Bullying Victimisation for Whole Dataset

										Personal Recount			Description			Problem-Resolution Recount		
	Group	**CLI**	**RLI**	**ELI**	**Internalising**	**Externalising**	**Mental Health**	**Bullying Victimisation**	**Self-Esteem**	**Coherence**	**Sentence Complexity**	**Referential Cohesion**	**Coherence**	**Sentence Complexity**	**Referential Cohesion**	**Coherence**	**Sentence Complexity**	**Referential Cohesion**
Group	--	-.585**	-.540**	-.581**	.167	-.101	.012	.029	-.115	-.578**	-.068	-.243	-.519**	-.185	.179	-.578**	-.329*	-.183
CLI		--	.917**	.965**	-.385*	.084	-.155	-.284	.171	.527**	-.077	.297	.558**	.041	-.123	.504**	.333*	.319*
RLI			--	.851**	-.453**	.216	-.061	-.235	.250	.487**	-.092	.241	.594**	.009	-.046	.509**	.356*	.363*
ELI				--	-.358*	.019	-.192	-.316*	.092	.476**	-.068	.251	.517**	.067	-.244	.433**	.340*	.284
Internalising					--	.076	.587**	.365*	-.289	-.199	.262	.004	-.037	.099	.066	-.150	.044	-.159
Externalising						--	.814**	.120	-.191	-.186	.077	.097	.173	-.293	.277	-.023	-.089	.120
Mental Health							--	.313*	-.233	-.261	.105	.021	.175	-.198	.239	-.057	-.016	.016
Bullying Victimisation								--	.142	-.086	.131	.069	.002	.016	.337*	.117	.082	-.258
Self-Esteem									--	.125	.234	-.245	.154	-.040	.228	.407**	.225	.174

Personal Recount	**Coherence**	--	.034	.354*	.603**	.151	-.113	.644**	.204	.210
	Sentence Complexity		--	.064	.045	.168	.158	.003	.107	-.074
	Referential Cohesion			--	.262	-.094	.139	.224	.088	.090
Description	**Coherence**				--	.080	-.088	.765**	.365*	.349*
	Sentence Complexity					--	-.165	.170	.374*	.055
	Referential Cohesion						--	.024	-.034	.103
Problem-Resolution Recount	**Coherence**							--	.459**	.353*
	Sentence Complexity								--	.168
	Referential Cohesion									--

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

*** Correlation is significant at the 0.001 level (2-tailed)

[4] Point biserial correlations were conducted to account for the binary Group variable

Table 14

Correlations between Discourse-Level Language, Standardised Language Measures, Mental health, Self-Esteem, and Bullying Victimisation for TD Group

										Personal Recount			Description			Problem-Resolution Recount		
		CLI	***RLI***	***ELI***	***Internalising***	***Externalising***	***Mental Health***	***Bullying Victimisation***	***Self-Esteem***	***Coherence***	***Sentence Complexity***	***Referential Cohesion***	***Coherence***	***Sentence Complexity***	***Referential Cohesion***	***Coherence***	***Sentence Complexity***	***Referential Cohesion***
Personal Recount	***CLI***	--	.821**	.965**	-.299	.094	-.138	-.255	.001	.027	-.018	.357	.001	-.307	-.022	-.179	-.137	.020
	RLI		--	.750**	-.461*	.320	.009	-.200	.250	-.156	.136	.282	.117	-.459*	.058	-.149	-.172	.081
	ELI			--	-.264	.099	-.100	-.279	.144	-.014	-.054	.334	-.048	-.341	-.144	-.270	-.145	.007
	Internalising				--	-.003	.483*	.197	-.286	.087	-.007	-.026	.051	.100	-.039	.079	.217	-.024
	Externalising					--	.828**	.162	-.195	.417	-.061	.027	.044	-.416	.169	-.052	.024	-.009
	Mental Health						--	.135	-.273	.313	-.023	-.055	.111	-.356	.025	.004	.123	-.085
	Bullying Victimisation							--	.199	.011	-.194	-.146	-.100	-.041	.288	.246	.060	-.074
	Self-Esteem								--	.301	.018	-.193	.257	.022	.227	.538**	.131	-.117
	Coherence									--	.241	.139	.380	.280	.163	.444*	-.032	.047
	Sentence Complexity										--	.193	.149	.049	.133	-.044	-.052	.161
	Referential Cohesion											--	.057	-.310	.186	-.293	.294	.205

Description	***Coherence***	--	-.057	-.050	.648**	.124	-.039
	Sentence Complexity		--	-.019	.127	-.070	.112
	Referential Cohesion			--	.173	.261	.211
Problem-Resolution Recount	***Coherence***				--	.162	.031
	Sentence Complexity					--	.021
	Referential Cohesion						--

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

*** Correlation is significant at the 0.001 level (2-tailed)

Table 15

Correlations between Discourse-Level Language, Standardised Language Measures, Mental Health, Self-Esteem, and Bullying Victimisation for History of DLD Group

												Personal Recount			Description			Problem-Resolution Recount		
		CLI	***RLI***	***ELI***	***Internalising***	***Externalising***	***Mental Health***	***Bullying Victimisation***	***Self-Esteem***	***Coherence***	***Sentence Complexity***	***Referential Cohesion***	***Coherence***	***Sentence Complexity***	***Referential Cohesion***	***Coherence***	***Sentence Complexity***	***Referential Cohesion***
Personal Recount	***CLI***	--	.904**	.903**	-.575**	-.184	-.417	-.424	.344	.299	-.270	-.091	.520*	.080	-.017	.624**	.503*	.489*
	RLI		--	.793**	-.541*	-.020	-.258	-.316	.327	.342	-.377	-.176	.578**	.150	.027	.649**	.613**	.496*
	ELI			--	-.514*	-.320	-.503*	-.446	.283	.254	-.217	-.110	.462*	.063	-.207	.551*	.510*	.435
	Internalising				--	.164	.688**	.592**	-.210	-.279	.518*	.121	.149	.183	.151	-.093	-.008	-.187
	Externalising					--	.795**	.145	-.195	-.282	-.185	.068	.046	-.224	.515*	-.111	-.259	.160
	Mental Health						--	.447	-.168	-.340	.182	.008	.161	-.075	.490*	-.085	-.149	.084
	Bullying Victimisation							--	.114	-.067	.338	.268	.231	.075	.427	.127	.080	-.359
	Self-Esteem								--	-.170	.311	-.426	.286	-.098	.266	.336	.246	.378
	Coherence									--	-.291	.317	.409	.151	-.242	.411	.149	.123
	Sentence Complexity										--	-.085	-.031	.248	.189	-.042	.107	-.169
	Referential Cohesion											--	.036	.035	.148	.358	-.082	-.110

Description	***Coherence***	--	.158	.073	.723**	.488*	.482*
	Sentence						
	Complexity		--	-.180	.264	.609**	.031
	Referential						
	Cohesion			--	.166	-.218	.073
Problem-Resolution Recount	***Coherence***				--	.659**	.587**
	Sentence						
	Complexity					--	.283
	Referential						
	Cohesion						--

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

*** Correlation is significant at the 0.001 level (2-tailed)

Chapter 8: Discussion

This programme of research had two broad aims. The first was to examine the language profiles of adolescents with a history of DLD as compared to a group of typically developing peers at the word, sentence, and discourse level. Additionally, the research aimed to test whether a history of DLD (Research Aim 2a) and/or current discourse language skills (Research Aim 2b) were associated with self-esteem, bullying victimisation, and mental health.

Research Aim 1: Profiling Study

Overall, participants with a history of DLD continued to demonstrate weaknesses in standardised and discourse language measures into late childhood and adolescence. Findings indicated significant group differences in the Core, Receptive and Expressive language index scores for the CELF-4 (Semel et al., 2006). While participants with a history of DLD scored in the low end of the average rage across index scores, this was significantly lower than for the group of TD peers. This pattern has been identified in previous research; in many cases, individuals with diagnosed language disorders score within the average range on standardised assessments (Spaulding, Plante, & Farinella, 2006; Spaulding, Swartwout Szulga, & Figueroa, 2012). Additionally, this finding is in line with the concept that DLD is persistent into adolescence and adulthood (Bishop et al., 2017). Research suggests that in terms of lexical diversity (Mawhood, Howlin, & Rutter, 2000; Rice & Hoffman, 2015) and syntax and grammar (Bishop & Leonard, 2014), individuals with DLD are likely to experience ongoing difficulties.

Similarly, students with a history of DLD performed more poorly on measures of discourse as compared to their TD peers. Participants with a history of DLD produced discourse samples that were consistently shorter, and contained more restricted vocabulary across all the genres. Additionally, in problem-resolution recounts, participants with a history of DLD presented with reduced syntactic complexity. These findings are in line with those of Hill, Claessen, Whitworth and Boyes (2020) in their examination of discourse in 12 to 15-year-old typically developing adolescents. Participants with stronger oral language skills as measured by standardised assessment (the CELF-4) presented with higher-quality discourse in terms of length, fluency, lexical diversity, cohesion and structural organisation (Hill et al., 2020).

The findings of the present programme of research are also consistent with the proposed diagnostic criteria for DLD, which suggest that individuals with DLD are likely to experience ongoing difficulties at the discourse level (American Psychological Association, 2013; Bishop et al., 2017). Furthermore, participants with a history of DLD presented with a greater number of, and longer, mazes than TD peers. These effects were not as strong as for the microstructure features and were not evident across all discourse genres. However, linguistic nonfluencies are characteristic of language disorder (Thordardottir & Weismer, 2002). Thus, our participants with a history of DLD presented with the expected error patterns in terms of standardised language measures, as well as discourse macrostructure and microstructure. This suggests that individuals with DLD are likely to experience difficulty conceptualising and expressing discourse at every stage of Sherratt's adapted model of discourse (Sherratt, 2007). Taken together, these findings contribute further evidence for ongoing difficulties across communication tasks for individuals with a history of DLD. These difficulties were not evident for the cohort of TD peers.

It is important to note that all participants with a history of DLD had received at least one year of intensive early oral language intervention in childhood through a school placement. This placement provided students with access to curriculum teaching with a focus on developing oral language skills, consultation with speech and language specialists, and direct intervention in a small group or one-on-one with the therapist. While these participants largely continued to present with language weaknesses, it is important to consider the extent to which current language profiles may have been affected by early intervention, particularly in light of the fact that many of these participants fell within the average range on standardised language assessment measures in adolescence. Clegg, Hollis, Mawhood & Rutter (2005) investigated longitudinal language and psychosocial outcomes for adults with a history of language disorder who had been recruited from specialist education settings in childhood. Findings demonstrated a gradual improvement in language skills throughout childhood and adolescence, and a peak in early adulthood (language skills equivalent to those expected at 11 years of age) (Clegg, Hollis, Mawhood, & Rutter, 2005). However, language skills did not continue to improve during the participants' twenties. Interestingly, this plateau appeared around the time that participants transitioned away from a specialist education context. While a

definitive basis for this effect was not identified in the study, the results raise speculation about the role of intervention for ongoing improvements in language skills for individuals for DLD. This is an important consideration for the participants in the present programme of research. It is not possible to distinguish the level of maintenance and generalisation of language skills targeted in participants' early intervention, and whether adolescents with a history of DLD who had not received this level of intervention would present with lower language skills. Replication of the programme of research with such participants is recommended to help determine the role of early intervention on later language skills for individuals with DLD.

Furthermore, CELF-4 language indices correlated strongly with coherence across all discourse genres, as well as with sentence complexity and referential cohesion in the problem-resolution recount genre. This is an important finding in light of the recent consensus on diagnostic criteria for DLD, which refers to persistent difficulty acquiring language with demonstrated functional impact and poor prognosis (Bishop et al., 2017). This criteria encourages clinicians to avoid diagnosing language disorder based purely on statistical cut-offs reported in standardised assessments (Bishop et al., 2017). According to Bishop et al. (2016), "multiple sources of information should be combined in assessment, including interview/questionnaires with parents or caregivers, direct observation of the child, and standardized age normed tests or criterion-based assessments. (11.) A low score on a language test should be interpreted in relation to information from observation and interview; functional impact as well as test performance needs to be taken into account when identifying the child's needs" (p. 11). However, the authors report that few valid measures of functional language ability exist.

Sherratt's adapted model of discourse (2007) highlights the linguistic complexity of discourse generation, and the opportunity it presents for applying a range of language skills simultaneously in a natural communication setting. The strong, positive correlations between the discourse language measures and the CELF-4 Core, Receptive and Expressive language indices in this study suggests that language sample analysis of problem-resolution recounts is a valid measure of language ability. This genre is likely to be particularly helpful for thorough language assessment in a naturalistic context. Language sample analysis provides opportunity for critical examination of oral language skill application at the discourse level, which represents a functional aspect of day-to-day communication. The CUDP-A

and SALT software may be used together to analyse problem-resolution recounts in clinical settings, as part of a broader assessment battery for the identification of DLD. Thus, these tools provide clinicians with an achievable means to undertake best practice in DLD assessment. Where access to SALT software is limited, discourse analysis may also be undertaken by hand (Miller et al., 2016).

In summary, participants with a history of DLD presented with poorer word- and sentence-level receptive and expressive language skills than TD peers, as measured by a standardised assessment. Additionally, at the discourse level, participants with a history of DLD demonstrated poorer coherence, more limited lexical diversity, fewer complex sentences, and shorter expressive language samples than their TD peers. Thus, language weaknesses persisted for our participants with a history of DLD.

Research Aim 2a: Developmental Language Disorder and Mental Health

As discussed in Chapter 6, a history of DLD was not directly associated with internalising or externalising symptoms, bullying victimisation, or self-esteem. However, history of DLD was associated with internalising symptoms at high levels of bullying victimisation. From a theoretical standpoint, these findings do not support the LD ⇨ MHD, MHD ⇨ LD, or the dependent comorbid (LD ⇔ MHD) hypotheses. That is, the association between group membership (participants with a history of DLD and TD peers) and mental health was not uni- or bidirectional in the present programme of research. Rather, the identification of bullying victimisation as a moderating variable provides further empirical evidence for the hypothesis that other factors are pertinent (Conti-Ramsden & Botting, 2008; Curtis et al., 2018; Goh Kok Yew & O;Kearney, 2013). This is important for moving towards a clear theoretical explanation for the association between language and mental health.

However, a range of additional factors have been identified as relevant to the association between DLD and mental health, including transition between school, further education and employment (Botting, Toseeb, et al., 2016), self-efficacy (Botting, Durkin, et al., 2016), poor emotional knowledge (van den Bedem, et al., 2018), peer relationships (Forrest et al., 2018), parenting style (Aarne et al., 2013), and shyness (Durkin et al., 2017). While the influence of bullying victimisation was significant in this study, again, the effect of attending an early intervention setting should be considered as another potential factor affecting both language and mental health outcomes. The influence of such a broad range of variables demonstrates the

complexity of the association between a history of DLD and mental health. While there is evidence for the "additional factors" hypothesis, predicting which patterns of association are likely to be relevant on an individual basis is yet to be clarified. Further research is necessary to delineate the unique influence of these factors on mental health for individuals with a history of DLD.

In addition to the individual and environmental factors that might affect mental health for individuals with DLD, the issue of psychosocial measurement is an important consideration for this population. Many mental health assessments are self-report measures, which require not only the understanding and use of abstract language, but adequate self-awareness. For example, self-esteem self-reports require the conceptualisation and expression of internal self-awareness (Zeigler-Hill, 2013). There is a lack of research about introspection in individuals with a history of DLD. However, examination of abstract word learning (that is, learning words with no physical referent) and lexical concepts can provide some direction about how well individuals with DLD are likely to understand and use psychosocial vocabulary (for example, words expressing psychological concepts and emotions).

For example, Ponari et al. (2018) found children with DLD aged between 8 and 13 did not demonstrate a more marked impairment in abstract word recognition as compared to concrete words. However, their capacity to define abstract targets was significantly lower than TD peers. This finding holds clinical relevance for the DLD population. Given these findings, individuals with DLD may be expected to demonstrate difficulty using specific vocabulary to refer to psychological constructs (e.g. thoughts, emotions, qualities) with accuracy. Moreover, Ponari, Norbury & Vigliocco (2017) found that emotion may bootstrap abstract word learning in typically developing 6 to 11-year-olds; abstract lexical targets with an emotional connection were learnt earlier than those without in this study. It is unclear how well children with DLD are able to use emotional connections to acquire and express abstract words and concepts; it is possible that capacity to do so is masked by expressive language difficulties (Ponari, Norbury, Rotaru, Lenci, & Vigliocco, 2018). Nevertheless, this raises questions about how well adolescents with DLD are able to learn and understand abstract concepts such as self-esteem, and therefore, about the reliability of self-report measures in psychological assessment for this population. This may have been a relevant factor for our participants, and may help to explain the lack of associations between history of DLD and self-esteem.

Research Aim 2b: Discourse, Developmental Language Disorder and Mental Health

Interestingly, no specific patterns of association were identified between discourse measures and mental health, self-esteem, or bullying victimisation measures, across genre or group. However, a small number of associations between some individual discourse measures and mental health measures were identified across the genres. For example, referential cohesion was moderately associated with bullying victimisation scores for the whole sample, but only in the description genre; coherence and self-esteem were also moderately associated, but only in the problem-resolution genre. One possible explanation for these results lies in Type 1 error; the number of analyses conducted might have increased risk of identifying a falsely positive result. However, given the evidence for discourse deficits in mental health disordered populations, Type 1 error may not completely explain the associations in the present research (Hopkins, Clegg & Stackhouse, 2018; James et al., 2020; Snow & Powell, 2005; Vallance, Im & Cohen, 1999; Villamarette-Pittman et al., 2002). Instead, the nature of the discourse elicited and the discourse measures themselves may be relevant.

Another consideration then, is the elicitation protocol used to obtain the discourse samples in this study. Wallis' discourse elicitation protocol was designed to reflect the type of discourse likely to be elicited in psychotherapy (Wallis, personal communication, 2016). This is helpful for analysing the impact of language disorder on generating emotion-, social- and interaction-based discourse. The significant group differences across syntactic, lexical and coherence measures identified in the present programme of research suggest that individuals with DLD are likely to have difficulty expressing their thoughts and experiences with clarity in psychotherapy. The considerable linguistic demands of engaging in a discourse-based intervention, in order for the therapist and patient to establish mutual understanding, require the patient (in this case, the adolescent) to discuss his or her experiences using accurate grammar, vocabulary and organisational structure. Given that participants with a history of DLD in the present study performed significantly more poorly than typically developing peers on measures of psychotherapeutic-style discourse, further investigation is necessary to minimise the impact of DLD on therapeutic success.

By nature of the chosen discourse elicitation protocol, the discourse samples in this research do not necessarily reflect typical peer-to-peer conversation for

adolescents. Rather, the protocol elicited monologic discourse. Moreover, the interaction between the researcher and participants reflected a one-to-one social context, whereas the majority of peer interactions in middle childhood through adolescence occur in groups (Rubin, Bukowski, Parker, Damon, & Eisenberg, 2006). Theoretically, it is at least plausible that measuring conversation skills in a peer group context would be (a) more representative of functional communication skills and (b) informative regarding psychosocial outcomes. While extremely limited, existing research would suggest that conversational content and behaviours may be associated with psychosocial outcomes. Tompkins, Hockett, Abraibesh & Witt (2011) found that co-rumination, or recurring problem-focused discussions, was associated with self-reported internalising and externalising symptoms, as well as reduced social acceptance in a sample of typically developing adolescents. However, to the best of the researcher's knowledge, no studies have examined the sociolinguistic features of conversation or the frequency of co-rumination in adolescents with DLD, and potential associations with mental health outcomes. This should be examined in future research.

An additional consideration lies in the focus on microstructure features of participants' personal narrative samples in the present research, as well as on general measures of coherence and cohesion. The research examining life stories would suggest that successful temporal sequencing, causal connections and biographical arguments may be helpful in deriving positive outcomes from adversity and bolstering psychosocial wellbeing (McAdams & McLean, 2013; Pals, 2006). These are elements of macrostructure that also contribute to listener comprehension. Students with DLD reportedly struggle to sequence and include sufficient macrostructure elements in non-fiction stories (Goldman, 2008; McCabe et al., 2008; Westby & Culatta, 2016), and experience difficulty explaining character feelings in fiction narratives (Mankinen et al., 2014). Thus, investigation into the macrostructure of life narratives and potential associations with mental health outcomes for adolescents with a history of DLD is recommended.

Overall, these findings provide further evidence against a simple uni- or bi-directional association between language disorder and mental health disorder, as suggested by Blankenstijn & Scheper (2003) (that is, the LD ⇨ MHD, MHD ⇨ LD, or the LD ⇔ MHD hypotheses). Instead, there is building empirical evidence that a myriad of other factors are likely to be relevant in predicting psychosocial outcomes

for individuals with DLD (Aarne et al., 2013; Botting, Durkin et al., 2016; Botting, Toseeb et al., 2016; Durkin et al., 2017; Forrest et al., 2018; van den Bedem, et al., 2018, Wadman et al., 2011).

To this end, the influence of other factors that were not measured in this research may be relevant. For example, children with DLD experience difficulty explaining character thoughts and emotions in fiction narratives, reportedly linked with not only linguistic weaknesses, but also deficits in social and emotional knowledge (Brinton, Fujiki, & Asai, 2019). Additionally, there is evidence that emotional awareness, and the conscious application of positive emotion to life stories, is effective in elevating cognitive-emotional outcomes for individuals with depression (Seo, Kang, Lee, & Chae, 2015). Emotional knowledge and awareness may be a relevant factor in predicting outcomes for individuals with comorbid language and mental health disorders, and it is recommended that this is investigated in future research.

Limitations

Aside from the limitations outlined in Chapter 6, some additional considerations should be taken into account regarding the present programme of research. As outlined above, the chosen discourse elicitation protocol did not allow for the collection of conversational discourse. Given preliminary evidence suggesting a link between co-rumination and internalising and externalising symptoms (Tompkins et al., 2011), replication of the present research analysing peer-to-peer conversation samples is recommended. As outlined at the beginning of Chapter 5, the small sample size precluded corrections in the statistical analyses conduced in Chapters 5, 6, and 7. Thus, there is a possibility that Type 1 errors may be present in the results. Replication of the program of research with a larger sample is recommended. Additionally, for participants with a history of DLD, more detailed information about the nature of speech pathology intervention accessed following exit from the LDC would have been beneficial. Similarly, specific information about which linguistic and social/emotional intervention programs were implemented at the LDC would be helpful for determining the protective potential of early and ongoing speech pathology intervention for mental health outcomes for individuals with DLD.

Conclusions and Implications for Clinical Practice

Individuals with a history of DLD are likely to continue experiencing language deficits through adolescence. These deficits are evident in standardised

language assessments and personal narrative discourse. Language sample analysis of problem-resolution recounts appears to be particularly helpful for determining functional language ability. Discourse skills in personal narrative generation alone do not appear to predict mental health outcomes. However, bullying victimisation appears to increase the risk of internalising symptoms for adolescents with DLD. These findings are helpful for speech pathologists in the field; the utility of discourse analysis for the purpose of DLD diagnosis cannot be understated. Language sample analysis of expository discourse, in particular, is highly clinically relevant (Westerveld & Moran, 2013). While useful from a linguistic perspective, personal narratives in and of themselves are unlikely to support psychotherapists to identify red flags for mental health difficulties for clients with DLD. However, speech pathologists and psychotherapists should remain vigilant for reports of bullying victimisation, and monitor internalising behaviours, to maximise positive life outcomes for individuals with DLD.

The findings of this program of research are highly relevant to the present clinical and research climate. There is currently a focus on maximising client emotional health and wellbeing across allied health professions (Eadie et al., 2018; Forrest et al., 2018; Morar et al., 2013) and the above findings provide a rationale for tactful discussion of events outside of the clinic room. For adolescents with a history of DLD, it is the responsibility of all stakeholders to monitor psychosocial wellbeing and vulnerability to bullying victimisation. The combination of language and psychosocial intervention is being recommended in the current literature; language intervention in isolation may not prevent later mental health difficulties (Newbury et al., 2019; Samson, van den Bedem, Dukes, & Rieffe, 2020).

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Appendix 1: Decisions from Inter-Rater Reliability Discussions Regarding Curtin University Discourse Protocol – Adolescent Version

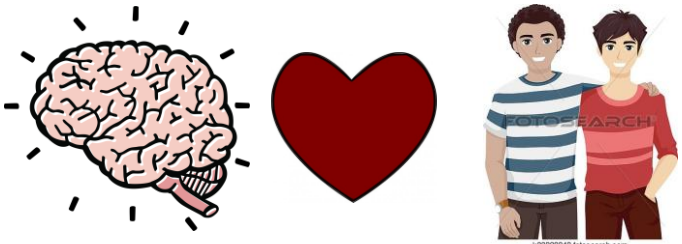
Measure	Clarification additional to CUPD-A
Syntactic complexity	Where the first utterance of a sample answered the stimulus question using a sentence fragment deemed appropriate for an oral style, it was coded as an independent clause [INDEP]. *E Tell me about a time when you felt excited or happy.* C (Um) the night before (um) we left to[EW:for] London [INDEP]. The word "to" was considered a subordinating conjunction if it was used in place of the phrase, "in order to." A clause beginning in this way was coded as a dependent clause [DEP]. C I went [INDEP] to make sure it was closed [DEP]. The words "which" and "that" are not subordinating conjunctions, and so attached phrases were not considered to be dependent clauses. C But it's also like it represents all of this hard work that we've put in too in our free time and spare time [INDEP]
Referential Cohesion	Where a referent was initially ambiguous, it was coded as an incomplete referential tie [ref1]. Subsequent referents clearly referring to the first referent were coded as a complete referential tie [ref2]. C We[ref1] went to the shops. C Later, we[ref2] went to the movies. Where a subject was repeated, it was not coded, rather, it was considered an extraneous word. C Uh I felt uh like annoyed in in a difficult situation in primary school cos many of the boy/s[ref1] in my class, (they) would always misbehave. Words such as "that" or "it" referring to a situation or inanimate referent were not coded for referential cohesion. C It was totally amazing.
Correct Information Units	Where participants used the first and last name of a person, that name was been replaced with the initials and counted as two correct information units.

Appendix 2: Visual Supports for Participants

VISUAL SCHEDULE – Session 1

1. LANGUAGE ACTIVITIES	2. TELLING STORIES –
	

VISUAL SCHEDULE – Session2

1. SURVEY – Thinking, feeling, making friends	2. SURVEY – School
	
4. SURVEY – Feelings about self	
	

SDQ

SURVEY – Thinking, feeling, making friends

Not True	Somewhat True	Certainly True
		

SDQ Impact Supplement

No	Yes – minor difficulties	Yes – definite difficulties	Yes – severe difficulties
			
Not at all	Only a little	Quite a lot	A great deal

Less than 1 month	1-5 months	6-12 months	Over 1 year
			

SPPC/SPPA
SURVEY – Feelings about yourself

Sort of True for Me	Really True for Me
	

Appendix 3: Publication Included as Part of Hybrid Thesis

The published version of the following paper can be found overleaf:

Kilpatrick, T., Leitão, S., & Boyes, M. (2020). Mental health in adolescents with a history of developmental language disorder: The moderating effect of bullying victimisation. *Autism & Developmental Language Impairments*, *4*. https://doi.org/10.1177/2396941519893313

Research Article

Autism & Developmental Language Impairments

Autism & Developmental Language Impairments
Volume 4: 1–12

DOI: 10.1177/2396941519893313
journals.sagepub.com/home/dli
SAGE

Mental health in adolescents with a history of developmental language disorder: The moderating effect of bullying victimisation

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Abstract

Background: Children and adolescents with a history of developmental language disorder are at elevated risk of experiencing internalising and externalising symptoms. The existing literature suggests a link between developmental language disorder, bullying victimisation and low self-esteem, both of which are negatively associated with child and adolescent mental health more generally.

Aim: We examined the relationship between having a history of developmental language disorder and internalising and externalising symptoms in adolescence. We also tested whether bullying victimisation and self-esteem were associated with mental health outcomes, and whether they moderated the association between a history of developmental language disorder and psychological symptoms.

Methods and procedures: Adolescents with a history of developmental language disorder ($n = 20$, 10–16 years, 10% female, 90% male) were compared to a group of typically developing peers ($n = 22$, 10–16 years, 36.4% female, 63.6% male). Receptive and expressive language, internalising and externalising symptoms, bullying victimisation and self-esteem were assessed with well-validated measures.

Outcomes and results: Contrary to our predictions, a history of developmental language disorder was not directly associated with internalising or externalising symptoms. However, in terms of internalising symptoms, there was a significant interaction between a history of developmental language disorder and bullying victimisation ($\beta = 1.01$, $p = .02$). Specifically, there was a significant association between a history of developmental language disorder and internalising symptoms at high levels of bullying victimisation [$t(41) = 2.52$, $p = .02$] but not at low levels of bullying victimisation [$t(41) = -.67$, $p = .51$).

Conclusions and implications: Bullying victimisation appears to increase the risk of internalising symptoms in adolescents with a history of developmental language disorder. Future research should examine whether anti-bullying interventions can help prevent the development of internalising problems for children with developmental language disorder. These findings may aid clinicians in developing their understanding of developmental language disorder and reinforces the importance of holistic client management in speech language therapy.

Keywords

Bullying victimisation, self-esteem, mental health, developmental language disorder, adolescents

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There is a robust association between language disorder[1] and poor psychosocial outcomes. This includes internalising (e.g. anxiety, depression) and externalising symptoms (e.g. conduct problems, attention difficulties) (Conti-Ramsden, Mok, Pickles, & Durkin, 2013; Snowling, Bishop, Stothard, Chipchase, & Kaplan, 2006). However, why language disorder is linked with poor mental health outcomes is unclear. Consideration of factors known to influence mental health in the broader population can provide some insights. For example, it is well recognised that the impact of life stressors may vary with age, and that males and females are vulnerable to different patterns of internalising and externalising symptoms (Gupta, 2016; Martel, 2013). However, a growing body of research has identified other factors relevant to mental health in individuals with developmental language disorder (DLD). van den Bedem, Dockrell, van Alphen, Kalicharan, and Rieffe (2016) noted that depressive symptoms in children with DLD could not be solely explained by the severity of their language difficulties; rather, this association was mediated by the use of maladaptive emotional regulation strategies. Botting, Durkin, Toseeb, Pickles, and Conti-Ramsden (2016) found that the association between language ability and emotional health in adults with a history of DLD was mediated by self-efficacy. In contrast, Forrest, Gibson, Halligan, and St Clair (2018) found adolescents who had a reported history of language difficulties and peer problems at age 7 were more likely to present with poorer emotional health at ages 7 and 14. This range of findings highlights the need for further investigation of factors underlying mental health for individuals with language disorder.

To this end, there is increasing evidence linking language disorder with bullying victimisation (van den Bedem et al., 2016) and low self-esteem (Botting et al., 2016), which have also been identified as risk factors for mental health difficulties in the broader child psychology literature (Sowislo & Orth, 2013). Furthermore, there is mounting evidence for a bi-directional association between bullying victimisation and low self-esteem, wherein individuals develop low self-esteem linked with bullying victimisation experiences, and individuals with low self-esteem are at increased risk of being bullied (van Geel, Goemans, Zwaanswijk, Gini, & Vedder, 2018). However, it is unknown whether these risk factors can explain mental health in the context of DLD. To the best of our knowledge, no studies have examined language disorder, bullying victimisation, self-esteem, and mental health in the same sample, which was the aim of the current study.

Mental health in the context of DLD

Difficulties with language have been variously described as "language disorder", "language impairment", "language difficulties" and "Specific Language Impairment" (SLI).

More recently, the term "language disorder" has been proposed to describe children with significant language difficulties that are likely to persist, with functional impact on social interaction and educational progress, while "developmental language disorder" (DLD) refers to language disorder with no known differentiating condition such as brain injury or autism (Bishop, Snowling, Thompson, & Greenhalgh, 2017). It is estimated that DLD affects approximately 7% of the population (Norbury et al., 2016).

Individuals with DLD are reportedly at increased risk of experiencing poor social, emotional and mental health outcomes, though additional factors affecting these outcomes as well as the age of onset of mental health symptoms in individuals with DLD are unclear (Conti-Ramsden & Botting, 2008; Lindsay & Dockrell, 2012; Snowling et al., 2006). Adolescence is generally a period of increased risk for any cohort, with most mental health disorders surfacing in adolescence (Clements-Nolle & Rivera, 2013). However, much of the research in DLD has explored mental health in younger age groups (Goh Kok Yew & O'Kearney, 2013, 2015; Levickis et al., 2018).

There is significant variability in the terminology used to describe mental health outcomes in general, as well as for the DLD population. This complicates the process of determining mental health prognoses. For example, several studies have reported an increased risk of internalising disorders (Snowling et al., 2006), emotional regulation difficulties (Fujiki, Spackman, Brinton, & Hall, 2004), poor emotional health (Forrest et al., 2018), externalising symptoms (Conti-Ramsden et al., 2013), low self-esteem and poor social relationships (Wadman, Botting, Durkin, & Conti-Ramsden, 2011) for individuals with DLD. In the interest of clarity, the term "mental health" in this paper aligns with the definition put forward by the World Health Organization (2004), as "a state of well-being in which the individual realises his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community". As such, "poor mental health outcomes" will be used to discuss symptomatology.

In their 2013 systematic review and meta-analysis, Goh Kok Yew and O'Kearney reported significantly increased prevalence and severity of emotional, behavioural and attention deficit hyperactivity problems for children and adolescents with language disorder

compared to typically developing (TD) peers, and elevated risk of depression for children with language disorder. This is consistent with the findings of Conti-Ramsden and Botting (2008), and Botting et al. (2016), who also reported increased risk of depression and anxiety symptoms for adolescents with DLD. However, this is in contrast to the findings of Levickis et al. (2018) who investigated social–emotional and behavioural difficulties in a longitudinal community-based study, following children with and without language disorder between the ages of 4 and 7. Participants with language disorder presented with greater total difficulties than matched peers on a measure of social and emotional functioning at 4, 5 and 7 years, but the nature of some difficulties changed over time. Hyperactivity and conduct problems were consistently higher across all time points for children with language disorder, while peer problems were not reported at 7 years, and emotional problems were not reported at all. Levickis et al. (2018) acknowledged that the severity of language disorder might not have been comparable with those in other studies, which may explain the lack of association. Additionally, the focus of this research was the psychosocial wellbeing of 4–7 year olds, not the social/emotional outcomes of participants in adolescence. Given what we know about the emergence of mental health symptoms for adolescents, these results may not be reflective of participants' lifelong mental health outcomes.

While the evidence for an association between language and mental health outcomes is robust, *why* the relationship exists is still unclear. Additionally, little research examines why some individuals with DLD present with internalising problems, others present with externalising problems, and others never present with poor mental health. Thus, consideration of other factors impacting individuals with DLD that have been linked with mental health outcomes is necessary to inform evidence-based assessment and intervention.

Risk factors for mental health in the context of DLD

A number of risk factors for mental health have been examined in the DLD population. These include self-efficacy (Botting et al., 2016), bullying victimisation (van den Bedem et al., 2016; Wadman et al., 2011), poor emotional knowledge (van den Bedem et al., 2016), parenting style (Aarne, Almkvist, Mothander, & Tallberg, 2013), self-esteem (Jerome, Fujiki, Brinton, & James, 2002; Marton, Abramoff, & Rosenzweig, 2004) and shyness (Durkin, Toseeb, Botting, Pickles, & Conti-Ramsden, 2017). While all are important considerations, self-esteem and bullying victimisation are two that have received particular attention.

Self-esteem refers to the value one places on oneself, based on self-evaluation and internalisation of others' perceptions (Botting et al., 2016; Jerome et al., 2002). Low self-esteem has generally been linked to poor psychosocial outcomes, characterised by internalising and externalising symptoms, academic failure and/or dependence on welfare benefits (Jerome et al., 2002). In addition, research has established an increased risk of low self-esteem for children with various communication impairments (Capps, Sigman, & Yirmiya, 1995; Harter, Whitesell, & Junkin, 1998). The literature investigating self-esteem for children with DLD is less clear-cut. Jerome et al. (2002) investigated the self-esteem of children with DLD aged 6–13 years. Their findings indicated that the majority of the younger DLD sample (aged 6–9 years) scored within one standard deviation of TD peers. In contrast, those aged 10–13 years scored significantly lower than their peers on measures of scholastic competence, social acceptance and behaviour conduct. This provides empirical support for the theory that mental health symptoms may arise and/or increase as individuals approach adolescence (Clements-Nolle & Rivera, 2013). Marton et al. (2004) reported that children with DLD aged 7–10 years displayed low social self-esteem compared to matched controls, while academic self-esteem was comparable. More recently, Botting et al. (2016) and Durkin et al. (2017) reported a direct and significant association between adolescent language and global self-esteem in adulthood.

Another factor for consideration for adolescents with DLD is the nature of peer relationships and vulnerability to bullying victimisation (experiencing repeated, deliberate aggressive acts by a peer/s). Supportive friendships are associated with positive social and emotional outcomes, and are a protective factor against bullying victimisation (Alvord & Grados, 2005; Schwartz, Dodge, Pettit, & Bates, 2000). However, children with DLD are at risk of limited or poor peer relationships (Mok, Pickles, Durkin, & Conti-Ramsden, 2014), and of experiencing significantly more bullying victimisation than TD peers (Conti-Ramsden & Botting, 2004; Redmond, 2011; van den Bedem et al., 2016). Redmond (2011) reported significantly increased bullying victimisation experiences for participants with DLD, over and above those with ADHD (though prevalence in this group was still high). Bullying victimisation has been associated with serious psychological consequences, including increased risk of internalising symptoms, poor classroom attention and suicidal ideation (Redmond, 2011). For participants with DLD identified as at risk of depression at 16 and/or 17 years, increased

experiences of bullying victimisation was associated with an elevated risk of depression at 17 years (Wadman et al., 2011). However, Wadman et al. (2011) asked a single question of participants regarding bullying victimisation and highlighted the need for further investigation using a more detailed measure. To the best of our knowledge, these findings have not been examined further. Given the potential negative outcomes of experiencing bullying victimisation and the preliminary evidence for its association with DLD, further investigation is crucial.

The current study

The current study aimed to examine the impact of early language disorder on adolescent mental health. We anticipated that a history of DLD would be associated with internalising and externalising symptoms, self-esteem and bullying victimisation. Specifically, we expected that adolescents with a history of DLD would report higher levels of internalising and externalising symptoms, lower self-esteem and more experiences of bullying victimisation as compared to TD peers. In addition, we aimed to test whether bullying victimisation and self-esteem moderated the association between DLD and mental health outcomes. We expected the association to be strengthened at high levels of bullying victimisation and low levels of self-esteem.

Methods

Ethical approval

The present study received ethical approval from the Curtin University Human Research and Ethics Committee (approval number HRE2016-0134).

Recruitment and participants

In total, 42 participants took part. Twenty participants with a history of DLD (aged 10–16 years; 10% female, 90% male) were recruited through four Language Development Centres (LDCs) across the North East Metropolitan Region. The LDC service model is unique to Western Australia; the Centres provide intensive intervention for children in Kindergarten (aged 3–4 years) to Year 2 (aged 6–7 years) whose language profiles are consistent with that of DLD. LDCs offer up to three years of school placement with a focus on developing oral language skills. In order to participate, adolescents were required to have attended an LDC for a minimum of one year. Thus, all participants in the history of DLD group had received at least one, and a maximum of three years, of intensive intervention in a specialised education context and were attending a mainstream school at the time of recruitment and data collection.

Referral to an LDC requires a comprehensive assessment: a thorough case history, assessment of the child's oral language skills using standardised, norm-referenced tests and language sample analysis, and a developmental assessment by a paediatrician or psychologist. Therefore, all participants in the history of DLD group had early language abilities significantly below the average range, with demonstrated functional impact, and no other diagnosis that could better explain their language problems.

Recruitment took place through LDC mailing lists and/or via the school website. Interested families with children who met the criteria contacted the researcher directly for further details.

Additionally, 22 participants with no history of DLD or neurodevelopmental disorder (aged 10–16 years; 36.4% female, 63.6% male) were recruited through snowballing and social media advertising. All children and parents provided written consent prior to participating in the study and were given opportunity to have questions answered by the researchers.

Measures

A series of self-report and standardised measures were used to examine participants' language skills, self-esteem, bullying victimisation experiences and screen their mental health. Self-report measures were conducted through interviewing with participants across both groups, using visual supports with all participants to ensure comprehension of stimulus items.

Internalising and externalising measure. The Strength and Difficulties Questionnaire (SDQ) is a psychometrically sound, evidence-based self-report instrument used to identify internalising and externalising symptoms for children aged 4;0–16;0 ($\alpha = .78$–$.85$; Hawes & Dadds, 2004). While the SDQ has not yet been validated with a DLD population, there is preliminary evidence for its use (Conti-Ramsden et al., 2013; Helland, Helland, & Heimann, 2014). The questionnaire comprises five sub-scales, examining conduct problems, hyperactivity, peer problems, emotional symptoms, and prosocial behaviour. Each sub-scale has five items that ask the respondent to rate whether each item is (0) *not true*, (1) *somewhat true* or (2) *certainly true* for them (e.g. *I worry a lot*). The internalising score is calculated by summing the emotional and peer problems' scales, and the externalising score by summing the conduct and hyperactivity scales. Both the internalising and externalising scores range from 0 to 20, and higher scores indicate increased symptoms. The SDQ total score

ranges from 0 to 40 and is the sum of the internalising and externalising scores, measuring the overall risk of mental health symptoms. Both parent and child report versions of the SDQ are available (Hawes & Dadds, 2004). We used the self-report version of the SDQ, and it demonstrated adequate reliability for both internalising ($\alpha = .74$) and externalising ($\alpha = .79$) symptoms in our sample.

Bullying victimisation measure. The Social and Health Assessment Peer Victimisation Scale (SHAPV) is a nine-item self-report questionnaire that was used to measure bullying victimisation (Ruchkin, Schwab-Stone, & Vermeiren, 2004). Although the scale has not yet been validated with adolescents with DLD, it has demonstrated strong reliability with an adolescent sample in the US ($\alpha = .82$; Maynard & Joseph, 2000) as well as in our own sample ($\alpha = .87$). Participants were asked to report whether they had experienced the peer victimisation behaviour outlined in each item (0) *never*, (1) *once*, (2) *two or three times* or (3) *four or more times* in the past year (e.g. *During this year, has anyone called you names or sworn at you?*). All items were summed to generate a total score, ranging from 0 to 27. This score was standardised to ensure comparability between the age groups in the present study. Higher scores indicated increased bullying victimisation experiences.

Self-esteem measures. Harter's (2012a, 2012b) Self-Perception scales include the Self-Perception Profile for Adolescents (SPPA) and Self-Perception Profile for Children (SPPC) and are self-report instruments measuring a range of self-perception constructs that contribute to a Global Self-Worth score. This score represents the average of six items pertaining to global self-worth and ranges from 1 to 4. Each survey item is scored between 1 and 4, where 4 represents the highest level of self-worth and 1 represents the lowest. Items were designed to follow a "structured alternative format" (Harter, 1982), where respondents are required to identify to what extent they associate with either end of a scale of behaviour or pattern of thought (e.g. *Some kids often forget what they learn, but other kids can remember things easily*). This format is reported to counterbalance the tendency for children to respond in a socially desirable way, thereby increasing the reliability of the results (Harter, 2012a, 2012b). The Global Self-Worth score was standardised to ensure comparability between the age groups in the present study. Harter's scales have sound psychometric properties for community samples (SPPA: $\alpha = .80$–$.89$; SPPC: $\alpha = .78$–$.87$; Harter, 2012a, 2012b), and were found to be similarly reliable in our sample (SPPA: $\alpha = .76$; SPPA $\alpha = .87$). The scales have also been used to successfully measure self-esteem in a language-disordered sample (Jerome et al., 2002; Lindsay, Dockrell, & Palikara, 2010; Tomblin, 2008).

Language measure. The Clinical Evaluation of Language Fundamentals-4 (CELF-4) (Semel, Wiig, & Secord, 2006) is a widely used Australian-normed language measure with sound validity and reliability (reliability coefficients $\geq .90$ across language indicators) and provides Receptive, Expressive and Core language scores (the Core language score is an overall measure of language ability). Raw scores for each subtest are converted to scaled scores according to age norms, which are summed and converted to an overall standard score for the Core, Receptive and Expressive language scores. Scores that fell in the range of 1.5–2 standard deviations below the mean of the normative sample were classified as moderately low, and scores falling in the range of 2 or more standard deviations below the mean were classified as severely low, as per the test manual.

Procedure

Data were collected by a certified, practising speech pathologist with several years' experience administering assessments and intervention to children with DLD. Participants were interviewed by the researcher in a quiet room in their home. It was made clear to all participants that consent was completely voluntary, and adolescents were shown a visual schedule to support comprehension. Participants in both groups undertook a formal assessment of their language skills using the CELF-4 as well as the aforementioned series of self-report measures to examine their self-esteem, bullying victimisation experiences and mental health. Where participants had difficulty understanding the language in assessments, the researcher defined terms (as long as this did not compromise standardised protocols). At the end of the assessment, adolescent participants were provided with a movie voucher and parents with a report outlining their child's language results. As per the ethically approved protocol, if participants' SDQ scores fell in the *High* or *Very High* range ($n = 2$), their parents were contacted by a registered psychologist on the research team who provided further information about accessing support.

Data analyses

Data were analysed in three stages using SPSS 24 (IBM Corp., 2016). First, we examined the data for univariate and multivariate outliers, and a missing value analysis was conducted. One participant's data point was missing completely at random on the bullying victimisation measure (SHAPV) [$\chi^2(56) = 10.93$, $p > .99$].

Therefore, this single data point was imputed using expectation maximisation. Second, the descriptive statistics were examined, disaggregated by DLD history, in order to ensure that the groups did not differ systematically on any sociodemographic variables. Correlations between DLD history, age, gender, language scores, internalising, externalising and total scores, bullying victimisation and self-esteem scores were also examined. Finally, associations between the history of DLD, self-esteem, bullying victimisation, and both internalising and externalising symptoms were tested in two hierarchical multivariate linear regressions. The first regression examined the SDQ internalising score as the dependent variable, and the second examined the SDQ externalising score as the dependent variable. Within each regression, two models were tested. History of DLD, bullying victimisation and self-esteem were entered simultaneously in Step 1. We then tested the history of DLD × bullying victimisation and history of DLD × self-esteem interactions in simple regression models, including only the relevant predictors and interaction term. Where the interactions were significant in the simple models, they were included in the final multivariate model (Step 2). All predictor variables were standardised and significant interactions were probed using simple slope analyses (Aiken, West, & Reno, 1991).

Results

Bivariate analyses

First, a series of bivariate correlation analyses were conducted. Participant data from both groups were compared on measures of language, mental health, bullying and self-esteem. Age and gender were also included in order to determine whether they were potential confounders and needed to be adjusted. Descriptive statistics and correlations between the variables of interest are summarised in Tables 1 and 2, respectively. As expected, adolescents with a history of DLD scored significantly lower on the language assessments. The groups did not differ significantly in terms of age [$t(40) = .08$, $p = .934$]. However, there was a significantly greater proportion of females in the group with no history of DLD as compared to the history of DLD group [$\chi^2(1) = 4.01$, $p = .045$].

Overall, the correlations were in the expected directions (Table 2). Consistent with the notion that DLD is likely to endure, a history of DLD was associated with poorer expressive and receptive scores on the current language assessment. Bullying victimisation and internalising symptoms were strongly and positively correlated [$r(40) = 0.52$, $p = .001$], and self-esteem and mental health were negatively correlated [$r(40) = -.31$, $p = .045$]. Unexpectedly, a history of DLD was not associated with either internalising or externalising symptoms in between group comparisons. History of DLD was not significantly associated with self-esteem. Regression analyses were conducted in the interest of exploratory investigation to determine how much a history of DLD, self-esteem and bullying predicted internalising and externalising symptoms.

Multivariate analyses

To test multivariate associations between the history of DLD, bullying victimisation and self-esteem, and both internalising and externalising symptoms, we conducted two hierarchical linear regressions.[2]

Internalising symptoms. Step 1 accounted for a significant 35.5% of the variance in internalising symptoms [$F(3,37) = 6.79$, $p = .001$]. Neither the history of DLD

Table 1. Group means and standard deviations.

	Means (SDs)		Between group comparisons
	History of DLD	No history of DLD	*p*
Age	12.45 (1.85)	12.5 (2.02)	.934
Core language index	91.00 (18.48)	111.32 (13.15)	<.001***
Receptive language index	90.85 (19.10)	109.95 (12.37)	<.001***
Expressive language index	90.50 (18.09)	111.66 (14.04)	<.001***
SDQ internalising	4.85 (3.48)	3.64 (2.50)	.199
SDQ externalising	5.7 (3.31)	6.18 (3.69)	.659
SDQ total	10.55 (5.31)	9.82 (4.48)	.631
SHAPV total	5.00 (6.33)	4.18 (4.77)	.640
SPPC global self-esteem (10–13 years)	3.40 (.59)	3.64 (.29)	.174
SPPA global self-esteem (14–16 years)	3.60 (.42)	3.66 (.36)	.796

Note: All between group comparisons are one-way ANOVAS. SDQ: Strength and Difficulties Questionnaire; SHAPV: Social and Health Assessment Peer Victimisation Scale; SPPC: Self-Perception Profile for Children.
*$p < .05$, **$p < .01$, ***$p < .001$.

Table 2 Correlations between language ability, mental health, self-esteem, victimisation and potential confounders (age and gender).

	Age	Gender	Group	CLI	RLI	ELI	Internalising symptoms	Externalising symptoms	Total mental health	Bullying victimisation	Self-esteem
Age	–	.332*	−.013	.051	.165	.010	.108	−.081	.010	−.181	−.022
Gender		–	−.309*	.035	−.023	.056	.221	−.204	−.008	−.059	−.140
Group			–	−.547***	−.523***	−.562***	.202	−.070	.076	.075	−.204
CLI				–	.925***	.975***	−.378*	.081	−.179	−.418**	.289
RLI					–	.868***	−.408**	.153	−.146	−.418**	.328*
ELI						–	−.358*	.046	−.191	−.388*	.208
Internalising Symptoms							–	.103	.700***	.518**	−.278
Externalising Symptoms								–	.782***	.266	−.192
Total Mental Health									–	.518**	−.312*
Bullying Victimisation										–	−.037
Self-Esteem											–

CLI: Core language index; RLI: Receptive language index; ELI: Expressive language index.
*Correlation is significant at the 0.05 level (two-tailed).
**Correlation is significant at the 0.01 level (two-tailed).
***Correlation is significant at the 0.001 level (two-tailed).

Table 3. Summary of hierarchical linear regression for internalising symptoms.

	Model summary			Coefficients			
	R^2	ΔR^2	Sig. $F\Delta$	B(SE)	β	t	p
Step 1	.36	.30	.001***				
Group				.73 (.81)	.12	.89	.377
Bullying victimisation				1.38 (.36)	.51	3.83	<.001***
SE				−.74 (.41)	−.24	−1.80	.080
Step 2	.45	.39	.019*				
Group				.61 (.76)	.10	.80	.431
Bullying victimisation				−1.24 (1.11)	−.46	−1.11	.273
SE				−.71 (.39)	−.23	−1.84	.074
Group × bullying victimisation				1.67 (.68)	1.01	2.46	.019*

ΔR^2: adjusted R^2; Sig. $F\Delta$: significant F change; B(SE): unstandardised regression coefficient (standard error); β: standardised regression coefficient.
*$p < .05$, **$p < .01$, ***$p < .001$.

nor self-esteem was significantly associated with internalising symptoms; however, bullying victimisation was positively associated with internalising symptoms. In simple regression models including only the relevant predictors and two-way interaction, the history of DLD×self-esteem interaction was not significant [$\beta = .48$, $p = .433$]. However, the history of DLD × bullying victimisation interaction was significant [$\beta = 1.01$, $p = .019$], and we therefore entered this into the full multivariate model to determine whether it remained significant. Step 2 accounted for a significant 38.7% of the variance in internalising symptoms [$F(1,36) = 7.31$, $p < 0.001$]. Bullying victimisation as well as the interaction between the history of DLD and bullying victimisation were both significant predictors in this model (see Table 3). Furthermore, given the difference in proportion of boys and girls across the DLD and comparison groups, we re-ran the full multivariate model adjusting for gender; bullying victimisation and the interaction between the history of DLD and bullying victimisation both remained significant (see Table 5 in Supplementary materials). In order to probe the interaction between the history of DLD and bullying victimisation, we conducted simple slope tests (Aiken et al., 1991). Internalising scores for individuals with and without a history of DLD were

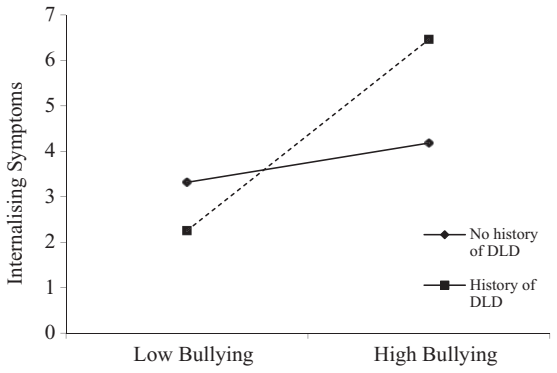

Figure 1. Interactions between bullying and group with regard to internalising symptoms.

Table 4. Summary of hierarchical linear regression for externalising symptoms.

	Model summary			Coefficients			
	R^2	ΔR^2	Sig. $F\Delta$	B(SE)	β	t	p
Step 1	.01	−.02	.664				
Group				−.48 (1.10)	−.07	−.44	.664
Step 2	.11	.04	.120				
Group				−.89 (1.09)	−.13	−.82	.420
Bullying victimisation				.79 (.48)	.25	1.63	.112
Self-esteem				−.75 (.56)	−.21	−1.34	.187

ΔR^2; adjusted R^2; Sig. $F\Delta$: significant F change; B(SE): unstandardised regression coefficient (standard error); β: standardised regression coefficient.

plotted at low (−1SD) and high (+1SD) levels of bullying victimisation (Figure 1). DLD was not associated with internalising symptoms at low levels of bullying victimisation [$t(41) = -.67$, $p = .51$]. However, there was a significant association between the history of DLD and internalising symptoms at high levels of bullying victimisation [$t(41) = 2.52$, $p = .02$].

Externalising symptoms. The results of the regression analyses indicated no significant relationships between the history of DLD, bullying victimisation, self-esteem and externalising symptoms (see Table 4). Neither the DLD×self-esteem nor the DLD×bullying victimisation interactions were significantly associated with externalising symptoms.

Discussion

This study aimed to further explore the association between DLD and both internalising and externalising symptoms, and examine whether self-esteem and bullying victimisation moderated this association. Unexpectedly, having a history of DLD was not directly associated with bullying victimisation, self-esteem or either internalising or externalising symptoms in our sample. However, bullying victimisation did interact with the history of DLD in predicting internalising symptoms. Specifically, the history of DLD was associated with internalising symptoms, but only at high levels of bullying victimisation. These findings extend the research indicating higher prevalence of bullying victimisation for children with DLD than for TD peers (Conti-Ramsden & Botting, 2004; Redmond, 2011; van den Bedem et al., 2016). Our findings also align with those of Wadman et al. (2011), who reported that participants with DLD who were at increased risk of experiencing depression at 16 and/or 17 years remained at risk if they had experienced bullying victimisation at 16 years. The present study builds on these findings by examining internalising symptoms across a broader age group for adolescents with and without DLD.

Our findings also reflect the view put forward by Conti-Ramsden and Botting (2008); that children with a history of language disorder experience increased risk of emotional health difficulties, but this does not appear to relate directly to poor communication experiences. Rather, it is likely that other factors are at play (Conti-Ramsden & Botting, 2008; Goh Kok Yew & O'Kearney, 2013), as discussed in a recent meta-analysis conducted by Curtis, Frey, Watson, Hampton, and Roberts (2018) who also suggest that other "mechanisms" or factors are key in predicting mental health outcomes for the DLD population, in particular emotional regulation and executive functioning. Investigating the influence of such factors for individuals with DLD across the lifespan is key to identify patterns within participant profiles. Conti-Ramsden et al. (2018) indicate that generally, development in children with DLD is varied, as is the development of emotional difficulties and peer problems. In their longitudinal study, five distinct patterns of development were identified; participants varied as to the prevalence, severity and age of onset of emotional and peer problems throughout childhood and adolescence (Conti-Ramsden et al., 2018). Variability in developmental trajectories reflected the influence of a range of factors.

Interestingly, a history of DLD and externalising symptoms were not associated in the present study. It is possible that additional factors linked with externalising symptoms (e.g. family problems, academic achievement) may not have been pervasive for our participants at this stage in their lives (Hser et al., 2015; Vaillancourt, Brittain, McDougall, & Duku, 2013). These factors were not investigated in the present study, and further research is necessary into whether they may mediate or moderate any association between language and externalising symptoms. Externalising

symptoms also tend to decline over the course of development, while internalising symptoms typically emerge as children enter pre-adolescence, which may help to explain the lack of association in the present study (Miner & Clarke-Stewart, 2008; Toumbourou, Williams, Letcher, Sanson, & Smart, 2011). Another key consideration is the influence of early language intervention on mental health. Where research populations have been drawn from psychological service providers, the prevalence of unidentified language impairment has been consistently high, up to 89% (Benner, Nelson, & Epsein, 2002; Hollo, Wehby, & Oliver, 2014). In such populations, access to oral language interventions has likely been limited or non-existent. Furthermore, the prevalence of mental health symptoms in individuals with identified DLD is also reportedly high; children with DLD are two times more likely to experience clinical levels of internalising and externalising symptoms (Goh Kok Yew & O'Kearney, 2013). Existing research has clearly established that evidence-informed early intervention is effective in improving language abilities for children with DLD (Spencer, 2018). However, there is very little literature examining mental health outcomes for children who have received early oral language intervention (Goldfeld et al., 2017). Our participants with a history of DLD were recruited from an early language intervention setting and had all spent at between one and three years in a specialist classroom with highly structured and intensive oral language support. Comparison of internalising and externalising symptoms for individuals with DLD who have and have not attended an early intervention setting is recommended, as well as investigation of oral language and social skills intervention in early childhood as a protective factor for individuals with DLD.

As expected, lower self-esteem was associated with poorer mental health for the whole sample in correlation analyses. This is consistent with the literature (Jerome et al., 2002; Steiger, Allemand, Robins, & Fend, 2014). However, in the present study, no significant associations between the history of DLD, psychosocial outcomes and self-esteem were found. One possible explanation for this unexpected finding is the variability in how self-esteem is defined as a construct in the literature. Our study focussed on self-esteem as a global construct, which has been linked with mental health outcomes in psychology literature and DLD research (Durkin et al., 2017; Millings, Black, Montgomery, Spears, & Stallard, 2012). However, where other studies have been powered to do so, self-esteem has been considered a multi-dimensional construct. Lindsay et al. (2010) examined self-esteem in a sample of 54 adolescents with language disorder and identified vulnerability to lower academic self-esteem at 16 years across the cohort and lower self-esteem in social and physical appearance domains for female participants. A similar approach was taken by Jerome et al. (2002) to investigating scholastic, social and behavioural self-esteem for adolescents with language disorder. Considering self-esteem as a multi-dimensional construct in research and practice may allow the specific needs of adolescents with DLD to be represented more clearly. However, an alternative explanation for the results of the present study may lie in the age of our participants. Durkin et al. (2017) indicated that language ability in adolescence was associated with self-esteem at 24 years for individuals with a history of DLD, and suggest that language skills in middle-adolescence may be a key factor affecting social confidence. Furthermore, these patterns were not as apparent where language ability at 17 years was examined as a potential factor affecting self-esteem and social confidence at 24 years (Durkin et al., 2017). This would suggest that the effects of having DLD in adolescence may become increasingly evident as the individual enters adulthood. Given that our participants were aged between 10 and 16 years, the full effects of experiencing language deficits in early childhood and adolescence may not be evident.

Limitations

The present study was conducted with a relatively small sample of participants, which may have affected power. Future research should attempt replication with a larger sample. Participants were also recruited by responding to an advert, which may be associated with a self-selection bias. In addition, participants' mental health, self-esteem and experiences of bullying victimisation were measured using self-report tools, which, like all self-report measures, can be subjective. Replication with triangulation of the child's self-report measure with parent and teacher reports is also recommended. Finally, while we attempted to account for possible weaknesses in working- and short-term memory through the use of visual supports, participants' memory and processing skills were not assessed. This may be a relevant consideration in reviewing the results.

Implications for clinical practice

The findings of our study have a number of clinical implications. Speech language therapists have an important role to play in monitoring the psychosocial wellbeing of individuals with DLD. This responsibility has been recognised in the Speech Pathology Australia (2015), and in the Speech Pathology Australia (2018). Additionally, examining the impact of anti-bullying

interventions on mental health for children and adolescents with DLD is recommended. Finally, further investigation into early and intensive language intervention as a protective factor for adolescent mental health should be prioritised.

Summary

Internalising and externalising symptoms can significantly impact all facets of an individual's daily life. For adolescents with a history of DLD, the risk of experiencing internalising difficulties in adolescence was higher than for TD peers if they had also experienced more bullying victimisation. Given current focus on DLD theory and diagnostic criteria, a prime opportunity exists to promote awareness of the impact of early language impairment on social, emotional and mental health outcomes in adolescence. Speech language therapists have a crucial role to play in advocating for clients with DLD, monitoring their psychosocial wellbeing and encouraging further investigation into language and mental health.

Declaration of conflicting interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: Tina Kilpatrick worked as Support Officer Speech and Language at the North East Metropolitan Language Development Centre, March 2014–February 2019. The other authors did not have any conflict of interest to declare.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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Notes

1. The term "language disorder" is here used to refer to (a) impairment in language associated with DLD, (b) a language disorder associated with a biomedical condition and (c) the previous diagnostic terminology, "Specific Language Impairment". Within the literature review, where research populations have been described as presenting with "Specific Language Impairment", the term "language disorder" has been used. This terminology is used to differentiate it from "Developmental Language Disorder".
2. While small, the sample size was approximately 10 participants per predictor in the models, indicating adequate power to detect moderate effects (Wilson VanVoorhis & Morgan, 2007).

Supplemental material

Supplemental material for this article is available online.

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Appendix 4: Summary of Hierarchical Linear Regression for Internalising Symptoms, Adjusting for Gender

Table 16

Summary of Hierarchical Linear Regression for Internalising Symptoms, Adjusting for Gender

	Model Summary			Coefficients			
	R^2	ΔR^2	Sig. FΔ	B(SE)	β	t	p
Step 1	.05	.03	.17				
Gender				1.56(1.10)	.22	1.42	.17
Step 2	.43	.37	**.00****				
Gender				2.06(.96)	.29	2.15	**.04***
Group				1.34(.82)	.22	1.63	.11
Bullying				1.40(.34)	.52	4.09	**.00****
Victimisation							
SE				-.55(.40)	-.18	-1.37	.18
Step 3	.52	.45	**.02***				
Gender				1.96(.89)	.28	2.19	**.04***
Group				1.20(.77)	.20	1.55	.13
Bullying				-1.12(1.06)	-.41	-1.05	.30
Victimisation							
SE				-.53(.38)	-.17	-1.41	.17
Group*Bullying				1.61(.65)	.98	2.49	**.02***