Developmental Language Disorder: A secondary analysis investigating risk and resilience for mental health difficulties.

K FRADLEY

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KATHRYN FRADLEY

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Abstract

Young people diagnosed with Developmental Language Disorder (DLD) are more likely to experience worse mental health difficulties (i.e. poorer internalising and externalising problems), compared to their typically developing peers. DLD is diagnosed when an individual experiences severe and persisting language difficulties with no known biomedical cause. Mental health difficulties broadly refer to when an individual may not be adequately functioning (socially, emotionally, or behaviourally) in their everyday life. Nonetheless, some young people diagnosed with DLD do demonstrate resilience and can overcome the negative effects of risk exposure. The current project aimed to provide a deeper insight into risk factors for mental health difficulties, as well as to identify any possible factors that promote resilience for mental health difficulties, in young people diagnosed with DLD.

To achieve the project aims, secondary analysis of the data collected by the Millennium Cohort Study was performed. A longitudinal approach was adopted to detect changes to the development of mental health difficulties, in those selected as at risk of DLD (rDLD). In relation to the inclusion criteria, scores on the Naming Vocabulary subtest was used to select through rDLD. Also, mental health difficulties were indicated by scores on the parent-reported Strengths and Difficulties Questionnaire when the young person was fourteen years old.

The first investigation revealed that young people rDLD were more likely to experience worse mental health difficulties at age fourteen, compared to their typically developing peers. The second investigation identified early risk factors (up to age five) for general mental health difficulties, internalising problems, and externalising problems at age fourteen, within young people rDLD. Internalising problems are broadly described as mental health difficulties that are expressed internally; and externalising problems are expressed externally. Early risk factors for general mental health difficulties, included high levels of parent-child conflict and harsh discipline practices. For internalising problems, the early risk factors were high levels of parent-child conflict and being female, and for externalising problems, high levels of

parent-child conflict, harsh discipline practice, and exposure to second-hand smoke.

The third investigation revealed that the identified early risk factors operated in a cumulative fashion, within young people rDLD. This means that as the number of exposed risks (up to age five) increased, there was a greater severity of general mental health difficulties, internalising problems, and externalising problems at age fourteen.

The final investigation identified school-age factors (between seven and fourteen years) that encourage resilience for general mental health difficulties, internalising problems, and externalising problems, at age fourteen. High levels of prosocial behaviour, better problem-solving ability, and fewer sleep disruptions significantly predicted less severe general mental health difficulties at age fourteen. These factors also predicted less severe externalising problems at age fourteen. Finally, high prosocial behaviour predicted less severe internalising problems, at age fourteen. These factors increase the likelihood of resilience for mental health difficulties through compensating for early risk exposure.

The findings drawn from the present project were discussed in relation to the Ecological and Developmental Perspective for understanding risk and resilience for mental health difficulties. Therefore, the project provides a unique contribution to our current understanding of this dynamic process in young people diagnosed with DLD.

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List of Abbreviations

DLD	Developmental Language Disorder
rDLD	At risk of Developmental Language Disorder
WHO	World Health Organization
MCS	Millennium Cohort Study

1 Introduction

1.1 Thesis statement

Developmental Language Disorder (DLD) affects approximately 7% of children in England (Norbury et al., 2016). DLD is diagnosed when an individual experiences severe and persisting language difficulties with no known biomedical cause. Children and adolescents, otherwise known as 'young people', diagnosed with DLD are more likely to experience worse mental health difficulties, compared to their typically developing peers (Clegg et al., 2005; Law et al., 2009; Conti-Ramsden et al., 2013; Armstrong et al., 2017b). Mental health difficulties broadly refer to when an individual may not be adequately functioning (socially, emotionally, or behaviourally) in their everyday life. Also, young people diagnosed with DLD are likely to experience a greater severity of internalising and externalising problems, compared to their typically developing peers (Durkin and Conti-Ramsden, 2010; Mouridsen and Hauschild, 2009; Winstanley et al., 2018; Özcebe et al., 2020; Yew and O'Kearney, 2013). Internalising problems are broadly described as mental health difficulties that are expressed internally; and externalising problems are expressed externally.

However, not all young people diagnosed with DLD will experience mental health difficulties in adolescence. There are some known factors that may encourage risk and resilience for mental health difficulties, in young people diagnosed with DLD. However, more research is needed to identify factors that increase the likelihood of risk or resilience for mental health difficulties in this population. Additionally, no research attempts to understand how these factors may operate together. Considering the gaps in the DLD literature, the current project aims to build upon our current understanding of risk and resilience for mental health difficulties in young people diagnosed with DLD.

1.2 Researcher's positioning

The background of the researcher conducting this project is predominately in psychology. The researcher does not have professional experience working in Speech and Language Therapy, nor in clinical psychology. This means that the current thesis is written from a psychological research perspective, and not from experience in practice. Hence, considering the researcher's background, DLD and mental health is understood through the discussions in the literature, rather than professional experience.

1.3 Overarching aims

Considering the previous literature around mental health and DLD, the main aim of the present project is to build upon our current understanding of risk and resilience for mental health difficulties in adolescents who are, or likely to be diagnosed with DLD. To achieve this main aim, the objectives of the present project were:

1. To provide a foundation for the current project.
    a. To determine if young people who are likely to be diagnosed with DLD experience worse mental health difficulties (i.e. internalising and externalising problems) during adolescence, compared to the general population and typically developing peers.
    b. To determine if young people who are likely to be diagnosed with DLD experience worse cognitive and literacy difficulties, compared to the general population and typically developing peers.
2. To identify early risk factors for mental health difficulties, internalising problems and externalising problems during adolescence, in young people who are likely to be diagnosed with DLD.

3. To investigate whether the identified early risk factors operate in a cumulative fashion, in young people who are likely to be diagnosed with DLD.
4. To identify protective or promotive factors for mental health difficulties, internalising problems and externalising problems during adolescence, in young people who are likely to be diagnosed with DLD.

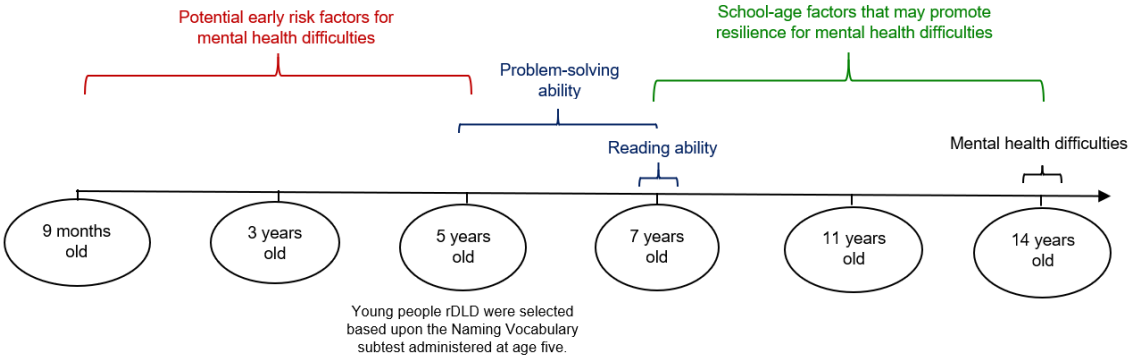
1.4 **Methodology**

To achieve the objectives of the current project, a secondary analysis was performed. The data collected by the Millennium Cohort Study (henceforth referred to as MCS) was selected and then analysed for four investigations. Each investigation focused on addressing one of the main objectives described in the previous section. Mental health difficulties, internalising problems and externalising problems were assessed by the Strength and Difficulties Questionnaire at age fourteen. The sample selected for the current project were young people who at age five, were at risk of DLD (rDLD). This was informed by the current consensus for an appropriate criterion for selecting a sample that reflects young people diagnosed with DLD, in the present DLD literature.

Due to the nature of the data collected by the MCS, a longitudinal investigation of risk and resilience for mental health difficulties, in young people rDLD, was performed. **Figure 1** provides a summary of the timeline that was investigated in the current project. Also, as the data collected by the MCS is vast, an ecological theoretical framework could be and was adopted.

Figure 1.

Summary of the overall timeline of the investigations performed in the current project.



Note. Blue indicates the timeline for the first investigation. Red indicates the timeline for the second and third investigation. Lastly, green indicates the timeline for the fourth investigation. Mental health difficulties and the selection of those rDLD remained in black as these were used in the same manner throughout all the investigations.

Across the four investigations in the current project, the data was analysed using STATA. For the first investigation, a group-comparison design was adopted. Particularly, a test of mean differences was performed to determine if the selected sample, young people rDLD, indeed experienced worse mental health difficulties at age fourteen, compared to their typically developing peers and the general population. A test of mean difference was also adopted to determine if the sample selected experience additional difficulties, beyond language. This includes problem-solving ability at ages five and seven, as well as reading ability at age seven. Together, the findings from the first investigation provide an insight into the developmental context (including mental health difficulties) of the sample selected.

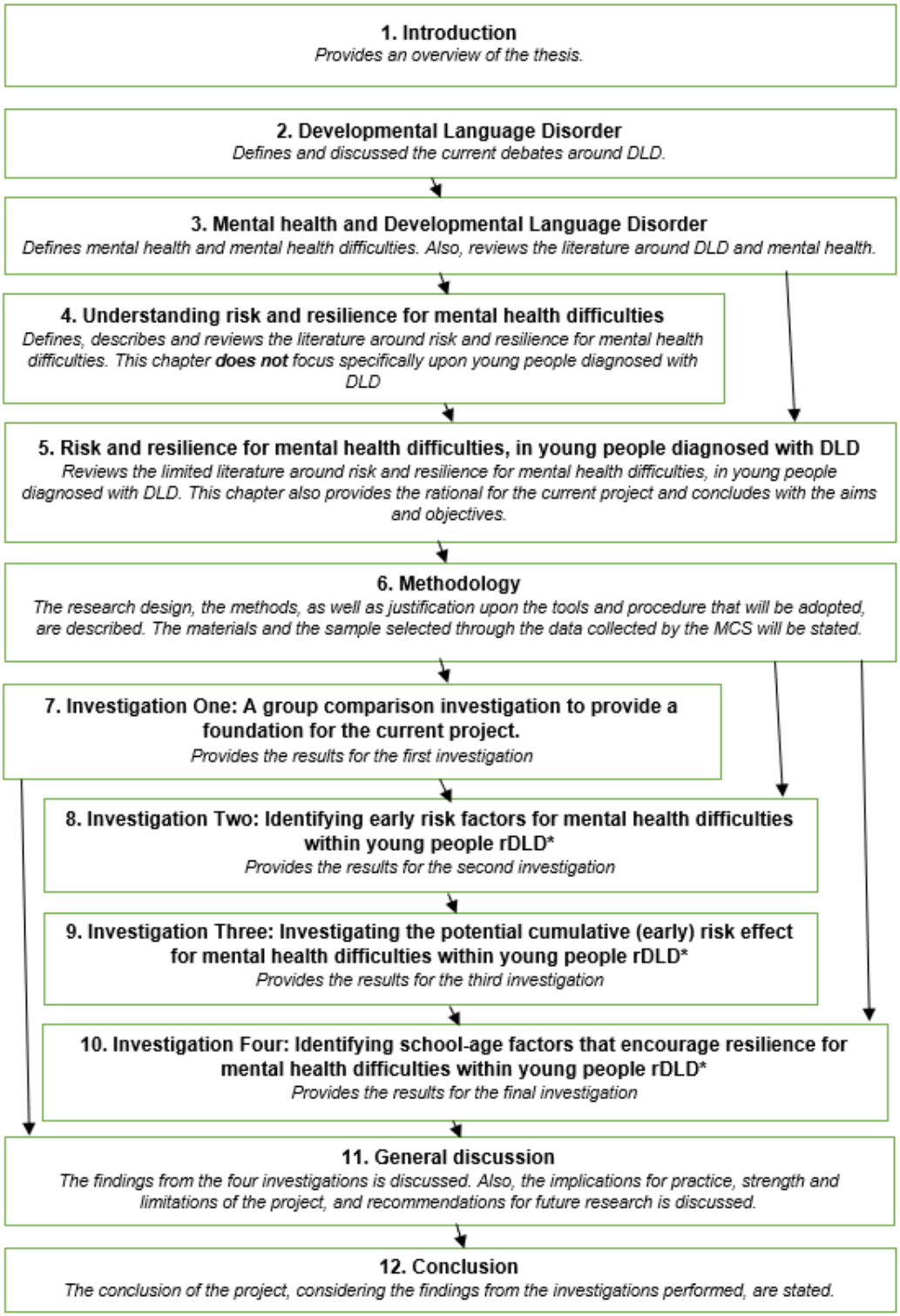
Following the first investigation, a within-group design was adopted. Hence, the investigations that focused upon risk or resilience for mental health difficulties in early adolescence were only performed for young people rDLD. As for the analysis, regression modelling, particularly multiple and hierarchical regressions, were performed. In the final investigation, a moderation analysis was performed through a hierarchical regression.

1.5 Thesis layout

Figure 2 provides a visual representation of the structure of the current thesis. It includes the title and a brief description of the chapters. Some chapters may not directly flow into the following chapter. The arrows are included to demonstrate how some chapters may return to some of the arguments and, or ideas expressed within the earlier chapters.

Figure 2.

Summary and visual representation of the structure of the current thesis.



* The sample selected were children at risk of DLD (rDLD) at age five.

2 Developmental Language Disorder

2.1 Introduction

In the present chapter, there will be a brief overview of what language is, including the components of language and language development. This overview will provide context to the types of difficulties that may be experienced by individuals diagnosed with Developmental Language Disorder (DLD). DLD will then be defined and discussed. Whilst adults can experience DLD, children and adolescents (young people) diagnosed with DLD will be the focal point during the present project. Firstly, discussions around DLD will include the inconsistency in the terminology adopted for this group of young people. Secondly, there will be a review of the current consensus amongst researchers in selecting samples of young people diagnosed with DLD, especially in a community or cohort sample. Thirdly, future recommendations discussed by researchers for investigations into DLD will be highlighted and considered throughout this project. Finally, the additional difficulties and long-term consequences of a DLD diagnosis will be stated.

2.2 Language

Whilst there is no concrete and universal definition of ‘language’, language is generally described as an abstract and organised system of sounds, grammar, and symbols, which enables the communication between individuals (Bloom, 1974; Bloom and Lahey, 1978; Locke, 1995; Budwig, 2003; Easey et al., 2019). Communication is the transmission of thought, or expression, from one individual to another. Communication includes understanding the ideas shared by another. Hence, language is a structured medium for two-way communication (Bloom, 1974; Budwig, 2003). Language can be represented verbally, but also, through sign language or writing. In the present project, the focus will be upon spoken (verbal) language.

2.2.1 *Components of language*

Language is portrayed as a code representing the abstract form of thought (Bloom and Lahey, 1978; Honig, 2007). There are many components within this code. Yet, according to Lahey and Bloom (1978), spoken language has three main overlapping components. This includes 'form', 'content' and 'use'.

Firstly, ‘form’ refers to the surface characteristics of language. Surface characteristics include morphology, syntax, and phonology. Morphology refers to the formation of words. Syntax is the rules that govern the combination of meaningful words and phrases. Phonology refers to the delivery or the production of words or phrases. In typical language development, children learn the surface characteristics of their household and native language. Hence, morphology, syntax, and phonology differ across languages.

Secondly, ‘content’ refers to the topics and ideas transmitted through the medium of language. As discussed in detail by Bloom and Lahey (1978), successful communication requires pre-existing semantic knowledge. Semantics refers to the message, meaning, or interpretation of the vocabulary (lexicon) or phrase. Semantics not only refers to word identification but also cause and effect, placements, actions, and interconnections between words.

Lastly, ‘use’ refers to the purpose and the manipulation of language. Purpose includes the intent of the message, such as, to ask, to inform, or to persuade. The manipulation of language is known as ‘pragmatics’. Pragmatics includes the ability to understand and adapt language in accordance with the relationship of the recipient, or social context. This can involve changing the volume or pitch of speech or altering the vocabulary for appropriateness. Similarly to content and form, the societal rules for language differ between cultures.

However, 'form', 'use', and 'content, as described by Bloom and Lahey (1978), are not the only overarching components adopted in the previous

literature. It also includes terminology such as ‘expressive’ and ‘receptive’ language. These describe the components of language which are transmitted (expressive) or decoded (receptive). These terms are adopted throughout research (Hawa and Spanoudis, 2014; Kwok et al., 2015; Newbury et al., 2019), including practice and intervention-based studies (Boyle et al., 2010; Petursdottir and Carr, 2011). Also, researchers have developed measures that assess these overarching components of language (Harper and Kraft, 1986; Hresko et al., 1991; Elliott et al., 1997). Therefore, understanding spoken language as expressive or receptive is generally accepted in the literature.

2.2.2 *Typical and atypical language development*

There is yet to be a consensus amongst researchers and disciplines upon how language develops or is acquired. Yet, to some degree, there are broad agreements across key theorists and disciplines aiming to understand language development.

Firstly, there is consensus in the previous literature that the interaction between the child and their social world plays a role in the development of language (Bloom, 1974; Bloom and Lahey, 1978; Locke, 1995; Budwig, 2003; Easey et al., 2019). Without social interaction, the sounds to produce, the meaning of the words or the rules that govern the structure of the spoken language cannot be, or at least will be poorly, established. Additionally, social interaction is likely to enable the child to learn and embed cultural rules, meaning, and etiquette into their pragmatic language. Across theories, it is debated how, and to what extent, social interaction impacts, influences, or drives language development (Bloom, 1974; Bloom and Lahey, 1978; Locke, 1995; Budwig, 2003; Easey et al., 2019). Therefore, it is generally accepted that social interaction plays a role in the development of language.

Furthermore, it is consensus amongst theorists and researchers that there are internal factors, such as cognitive processes or neurological systems that enable the utilisation of language as a medium. In the literature,

there is a focus upon how cognitive processes impact, predict or play a role in children's language development (Bloom, 1974; Gibson et al., 1993; Locke, 1995; Perszyk and Waxman, 2018; Easey et al., 2019). A review of the modern ideas drawn from researchers and theorists around the development of language was performed by Kempe and Brooks (2016). Kempe and Brooks (2016) concluded that researchers generally agree that infants and children have operational mechanisms that enable them, through internal processes, to learn a language. Therefore, in addition to social interaction, cognitive or biological internal processes are likely to play a role in the development of language.

Additionally, language development is discussed from a biological and developmental perspective. Language develops as the child's cognition and brain matures (Kempe and Brooks, 2016). It is unsurprising, therefore, that the children's cognitive development and age may reflect or predict their language ability (Durkin, 1995; Locke, 1995; Perszyk and Waxman, 2018; Felix, 2019; Paradis, 2019). By the age of five, typically developing children are likely to have mastered language for everyday communication. Particularly, by this age, typically developing children can understand and form complicated sentences using a vast number and range of words. Typically developing children may understand more than 2,000 words. Concepts such as time sequences and rhythm are also understood. Overall, typically developing children, by the age of five, have mastered multiple complex language abilities (expressive and receptive), so that they can engage in everyday conversations. According to Bloom and Lahey (1978), throughout their life, including school years, children continue to practice and develop their language ability. This is generally agreed upon by the key theorists of the field (Owens, 2012).

However, not all children will have a typical language development. Atypical language development refers to a deviation from what is considered 'normal' or not representative of typical language development. An atypically developing young person may display difficulties in one or multiple language components. Possible language difficulties include, but are not limited to, lexical (word) retrieval, syntax, phonology, and, or, morphology. Moreover,

atypically developing young people could be loosely described to be experiencing receptive and, or expressive language difficulties.

Atypical language development could be displayed as a language delay or disorder. A language delay refers to difficulties that are experienced by the child, and yet are later resolved. Within a language delay, difficulties are resolved during childhood (Dale et al., 2003; Horwitz et al., 2003; Wang et al., 2018; Wooles et al., 2018; Galvin et al., 2020). It is thought that children with a language delay will 'catch-up' to their typically developing peers. However, unresolved language difficulties indicate a disorder, rather than a language delay. Disorders are severe and persistent throughout the individual's lifespan. Young people with a disorder require specific support and interventions for the language difficulties they experience. Before this, a professional must identify the severity, persistence, or cause of the language difficulties experienced. Moreover, professionals must determine what type of disorder is present.

2.3 **Developmental Language Disorder**

Developmental Language Disorder (DLD) affects approximately 7% of children in England (Norbury et al., 2016). DLD is diagnosed, by a Speech and Language Therapist, when an individual experiences severe and persisting language difficulties with no known biomedical cause. Firstly, the language difficulties, within young people diagnosed with DLD, are likely to negatively impact their everyday functioning. For young people, language difficulties may impact their ability to engage in classroom activities and, peer and family social interaction (Conti-Ramsden et al. 2009; Nelson, 2010; Lindsay and Dockrell 2012;). Particularly, the young person may struggle to understand what their teachers or peers say; to understand and engage with social interactions; to make and keep friendships with peers. In relation to education, a young person who experiences language difficulties may experience difficulties in their reading ability and mathematical thinking (Nelson, 2010; Cross, Joanisse and Archibald, 2019). Additionally, these young people may express difficulties in understanding and engage in story

problems, which are often used to assess the young person in the classroom. If a young person exhibits such difficulties, their parent or teacher may suspect the presence of severe and persisting language difficulty or disorder. When this suspicion is acted upon, an evaluation of the observable language difficulties is performed by a Speech and Language Therapist.

Secondly, DLD is diagnosed by a Speech and Language Therapist when there is no biomedical cause for the disruptions in language development. Possible biomedical causes include, but are not limited to: hearing loss in infancy or childhood (Moeller, 2000; Svirsky et al., 2000; Vohr et al., 2008; Vohr, 2016; Yoshinaga-Itano et al., 2017); and, neurodevelopmental conditions, such as Autism and Down's syndrome (Chapman, 1997; Charman et al., 2003; Lord et al., 2004; Loveall et al., 2019; Smith et al., 2020). If a Speech and Language Therapist, upon their evaluation, detects a biomedical cause for a young person's severe and persistent language difficulties, then the diagnosis 'language disorder' is given. Yet, if a biomedical cause is not detected then the diagnosis of DLD is given instead.

However, there are genetic and environmental factors that are likely to be associated with disruptions in language development, which do not preclude a diagnosis of DLD. Firstly, disruptions to language may be due to genetics (Newbury et al., 2010; Graham and Fisher, 2015; Fisher, 2017; Gialluisi et al., 2017; Reuter et al., 2017; Fisher, 2019). Yet, there is no current and established diagnostic genetic marker to indicate the presence of DLD. Secondly, adverse environmental factors are likely to disrupt language development within children (Scanlon, 1977; Morisset et al., 1990; Landry et al., 2002; Sharp and Hillenbrand, 2008; Korpilahti et al., 2016; da Rocha Neves et al., 2016; Marini et al., 2017; Bishop et al., 2017). A lack of, or poor quality parental social interaction and relationships are associated with disruptions in language development (Safwat and Sheikhany, 2014; Zauche et al., 2016). Also, wider environmental influences are likely to impact the development of language; specifically, socioeconomic status (SES). Low SES, especially living in poverty, is likely to have a detrimental impact on young peoples' language development (Fernald et al., 2013; Hoff, 2013; Betancourt et al., 2015). Therefore, there are biomedical, genetic, and

environmental factors that may impact language development in young people. Biomedical factors preclude a diagnosis of DLD.

2.4 **Terminology**

Before the promotion to adopt the term DLD (Raising Awareness of Developmental Language Disorder, Online), the terminology ‘Specific Language Impairment’ (SLI) was commonly adopted. SLI, as well as DLD, was preferred amongst UK and USA based professionals, as opposed to ‘Developmental Dysphasia’ or ‘Developmental Aphasia’ (Bishop, 1992). As explained by Bishop (1992), SLI was preferred because, it was perceived not to infer a cause upon why disruptions to language development have occurred (Bishop, 1992). Thus, terminology, such as SLI, was deemed more appropriate amongst professionals within the UK and USA (Bishop, 1992; Norbury and Sonuga-Barke, 2017). Over time, and perhaps due to its perception, SLI was commonly adopted in the literature in comparison to ‘Developmental Dysphasia’ or ‘Developmental Aphasia’ (Bishop, 2003b; Leonard, 2014; Zantomio, 2019). More recently, SLI has also been commonly adopted amongst non-UK and USA countries (Zantomio, 2019; Sharma and Singh, 2020).

However, the term SLI was later criticised (Reilly et al., 2014a; Reilly et al., 2014b; Bishop et al., 2017) and alternatives were preferred. Reilly et al.’s (2014a) argued that the word ‘specific’, within SLI, may not be an appropriate label for the described group of young people. As a group, the described individuals may also experience cognitive and literacy difficulties (Reilly et al., 2014a; Reilly et al., 2014b; Bishop et al., 2017). Additionally, these individuals are likely to experience symptoms of Attention-Defect/Hyperactivity Disorder (ADHD) and Autism (Bishop and Norbury, 2002; Tager-Flusberg and Caronna, 2007). Therefore, the literature demonstrates that the difficulties experienced within the described group may not be ‘specific’ to language ability. Due to this, it was recommended that the ‘specific’, in SLI, be removed until a more appropriate label is adopted (Reilly et al., 2014b).

Considering the recommendation by Reilly et al., (2014a), 'Language Impairment' (LI) has been adopted in the literature. However, alongside LI, the terms DLD and SLI have continued to be adopted (Miller and Klee, 2017; Carroll and Critten, 2019; Graham and Tancredi, 2019; Rothweiler et al., 2019; Schoff, 2019; Snowling et al., 2019; Rice, 2020; Snowling et al., 2020; Wilder and Redmond, 2020). The lack of suitable and appropriate terminology may be a plausible explanation for the inconsistencies in the terminology adopted within the previous literature. This inconsistency may hinder research and practice concerning DLD. In research, inconsistency in terminology may lead to the unintended exclusion of research during literature reviews around these young people. As for practice, inconsistency in the terminology may be a barrier to increasing public awareness (Bishop et al., 2017; Graham and Tancredi, 2019).

Recent influential research by Bishop et al., (2017) aimed to address the issue of inconsistency within this field. Bishop et al.'s research consisted of gathering expert opinions from professionals within the field, concerning what might be the most appropriate terminology for the described individuals. This included the participation of international professionals, encompassing speech and language therapists, and teachers. Despite some disagreement, it was concluded that the term 'Developmental Language Disorder' (DLD) is the most appropriate term to adopt for young people experiencing language difficulties with no known biomedical cause. Due to this conclusion, recent research has adopted the term 'DLD' to encourage consistency in the literature (Conti-Ramsden et al., 2017; Luders et al., 2017; Kwok et al., 2018; van den Bedem et al., 2018; Lisa et al., 2019; Snowling et al., 2019; St Clair et al., 2019; Alonzo et al., 2020; Arslan et al., 2020; Chen et al., 2020b; Snowling et al., 2020). Moreover, the term DLD has been adopted within clinical practice and campaigns to raise public awareness of this disorder (Raising Awareness of Developmental Language Disorder, Online). Therefore, research by Bishop et al., (2016; 2017) has been influential in addressing the issues around the inconsistent terminology, for individuals who experience what is now known as 'DLD'.

However, ‘Specific Language Impairment’ is still adopted in recent research for individuals experiencing severe and persisting language difficulties with no known biomedical cause (McDonald et al., 2018; Saletta et al., 2018; Selin et al., 2019). Recent research published in Italy and India adopted the term ‘SLI’ (Zantomio, 2019; Sharma and Singh, 2020). Therefore, the adoption of SLI may be due to differing terms in different countries, regions, and perhaps even research areas.

Additionally, the use of the term SLI, rather than DLD, may be due to the disagreement with the term ‘Developmental Language Disorder’. Not all professionals agree that the terminology ‘DLD’ is most appropriate. As highlighted within Bishop et al.’s (2017) paper, the word ‘developmental’ within DLD may negatively imply that only young people experience such severe and persistent difficulties. Thus, it may lead to the reduction of services and support available to adults who experience language difficulties with no known biomedical cause (Bishop et al., 2017). However, despite disagreements, the term DLD may be more appropriate, compared to SLI, LI, and Developmental Dysphasia or Aphasia. Therefore, the term DLD is currently deemed most suitable in describing young people experiencing language difficulties, which are of no known biomedical cause; but this terminology is not without its flaws.

In conclusion, the term DLD will be adopted in the current project. However, it should be acknowledged that previous research may have adopted a different term, such as SLI and LI. Regardless of the differences in the terminology, the sample selected in these investigations may reflect the same group: individuals who experience severe and persistent language difficulties with no known biomedical cause. When reviewing the DLD literature, exclusion of studies should not occur due to the difference across terminology, but rather differences across samples. Therefore, moving forwards in the present project, research will be discussed if the sample selected represents, or to some degree reflects, young people who experience severe and persisting language difficulties with no known biomedical cause.

2.5 Selecting samples of young people diagnosed with DLD

Not all samples within the previous DLD literature contain young people diagnosed with DLD. Particularly, within community and cohort data (secondary data) the clinical presence of DLD may be unknown. Instead, the researcher selects samples that reflect young people diagnosed with DLD. Researchers are required to adopt an appropriate inclusion and exclusion criterion to ensure that the sample selected reflects young people diagnosed with DLD (Bishop et al., 2016; 2017).

2.5.1 *Inclusion criteria*

The selection of DLD requires suitable language measures. These may include standardised measures and parent reports. Language measures aim to assess the young person's language ability. Whilst they might provide an insight into general language development, some measures are likely to assess a specific component of language. Additionally, the age at which the language measures are administered should be carefully considered. Identifying language difficulties too young might lead to the section of a sample reflecting a language delay and not a diagnosis of DLD.

2.5.1.1 **Standardised language measures.** In the previous literature, selecting samples of DLD using standardised language measures is somewhat inconsistent regarding the type or number adopted. To exemplify, research by Snowling et al., (2016) used one measure; the Expressive One-Word Picture Vocabulary Test. In comparison, research by Brownlie et al., (2016) administered three language measures, which did not include the Expressive One-Word Picture Vocabulary Test. Differences in the types and number of adopted standardised language measures are common throughout the literature around DLD (Armstrong et al., 2017a; Brownlie et al., 2017; Kauschke et al., 2017; Forrest et al., 2018; McMurray et al., 2019; Schoff, 2019; St Clair et al., 2019; Chen et al., 2020b; Lee et al., 2020; Stuart

et al., 2020). Therefore, there is no consistency between the set number or type of standardised language measure that should be used to select samples that reflect young people diagnosed with DLD.

However, it is beneficial to adopt more than one standardised language measure when selecting samples that reflect young people diagnosed with DLD (Armstrong et al., 2017a; Brownlie et al., 2017; Hughes et al., 2017). The adoption of more than one measure, whereby different components of language are assessed, increases the strength of the claim that the sample experiences DLD. Due to its nature, DLD is a heterogeneous group, that is, different types of language difficulties are likely to be experienced within the group. One measure would lead to the claim that a specific language difficulty is identified, rather than a heterogeneous group. Moreover, limited measures may also select samples that reflect young people at risk of DLD, rather than a clinical diagnosis (Forrest et al., 2018; St Clair et al., 2019; Toseeb and St Clair, 2020). Therefore, whilst it is not agreed upon how many or which measures are to be administered, the literature suggests that more than one is needed to select samples reflecting young people diagnosed with DLD.

When standardised language measures are adopted, researchers generally select samples of DLD as those who performed ‘significantly below’ their age-matched peers (Nicola and Watter, 2015; Armstrong et al., 2017a; Brownlie et al., 2017; Eadie et al., 2018). This method assumes that if a child or adolescent performs significantly below their age-matched peers then that young person is likely to experience difficulties in the area which were assessed. Yet, to perform ‘significantly below’ is established by the researcher. Some researchers may use 1 standard deviation (SD) (Armstrong et al., 2017a) below the mean, whereas others use 1.5 SD (Hughes et al., 2017). Therefore, across research methods, different cut-offs may be used to select young people likely to be diagnosed with DLD.

Additionally, researchers may adopt different SD cut-offs for different measures used within their research. For example, research by Brownlie et al., (2017) selected their target group as children, aged five, who performed

significantly below on either of the administered measures. Different language measures, however, had different SD cut-offs, ranging from 1 SD below to 2 SD below age-matched peers. A plausible explanation may be that there are differences in standardised cut-offs already established by the authors of the measure. Therefore, researchers should acknowledge that there may be differences in cut-offs adopted across and within investigations when selecting samples that reflect young people diagnosed with DLD.

However, in a detailed discussion by Spencer, Clegg, and Stackhouse (2012), it was recommended that 1.5 SD below the population mean should be adopted for future research. This was particularly recommended when researchers administer just one standardised language measure. It was previously argued that 1.5 SD below the mean may lead to over-identification of language difficulties. This would lead to a sample that contained individuals who may not be diagnosed with DLD. However, Spencer et al., (2012) refute this argument. Instead, Spencer et al., strongly claimed that the adoption of 1.5 SD below the population mean may select children who have unsuspected, unrecognised, and undiagnosed language difficulties. As demonstrated within Cohen et al.'s (1993) research, 34.4% of children in psychiatric services had unsuspected language impairment. Hence, over a third of children had unsuspected, unrecognised, and undiagnosed language difficulties. Therefore, by adopting 1.5 SD as a cut-off, researchers might include young people not diagnosed with DLD, who ought to have been. It is unsurprising, therefore, that recent research has adopted 1.5 SD due to this recommendation (Nicola and Watter, 2015; Hughes et al., 2017).

2.5.1.2 **Parent reports.** Standardised parent reports have been used to select cases of DLD. Parent reports identify language difficulties through the parental concerns of their child's language ability or development (Forrest et al., 2018; St Clair et al., 2019). Whilst generally parent reports may have low interrater reliability (48%) (Manders and Verbruggen, 2004), they are likely to have a good predictive validity (Thal et al., 1999; Klee et al., 2000; Marchman and Martínez-Sussmann, 2002; Sachse and Von Suchodoletz,

2008b). Additionally, the combination of parent reports and language measures has been demonstrated to be very effective in selecting young people diagnosed with DLD (Bishop and McDonald, 2009). It is unsurprising, therefore, that researchers have adopted this selection approach (Forrest et al., 2018; St Clair et al., 2019; Toseeb and St Clair, 2020).

2.5.1.3 **Age of identification.** It is generally accepted that the presence of language difficulties at the age of five or beyond could indicate a diagnosis of DLD (Hartas, 2011; Nicola and Watter, 2015; Brownlie et al., 2016; Girard et al., 2016; Armstrong et al., 2017a; Brownlie et al., 2017). The consensus is that language difficulties, at age five, are likely to persist. Stothard et al., (1998) found that children who had DLD at the age of five (average: five years and six months) were more likely to continue to experience severe language difficulties at age fifteen to sixteen years. Moreover, there is contradictory evidence that a diagnosis of DLD could be identified before the age of five (Weismer and Evans, 2002; Chung, 2008; Conti-Ramsden and Durkin, 2012). This means that identification of language difficulties before the age of five could lead to the selection of language delay, rather than a disorder. It is unsurprising, therefore, that researchers often identify persisting language difficulties in children around the age of five, or beyond (Hartas, 2011; Nicola and Watter, 2015; Brownlie et al., 2016; Girard et al., 2016; Armstrong et al., 2017a; Brownlie et al., 2017). Hence, there is consensus that sample selection at age five increases the strength of the claim that the young person experiences DLD, as opposed to language delay.

Furthermore, research indicates that language difficulties at age five are associated with adverse outcomes in adolescence. Stothard et al., (1998) found that children whose language difficulties did not resolve by age five were likely to experience adverse outcomes during adolescence, whereas, those whose language difficulties did resolve, did not experience such outcomes. Adverse outcomes included mental health difficulties. The findings suggest that difficulties at age five may lead to long-term developmental

disruptions. Therefore, there is a plausible connection that exists between language difficulties at age five and persistent developmental disruption, which results in adverse outcomes. Together, this suggests that identification of language difficulties at age five or beyond is likely to persist, or at least, is connected to disruptions in other aspects of a young person's development.

2.5.2 *Exclusion criteria*

There is an agreement amongst practitioners and researchers that there ought to be an exclusion criterion when selecting samples of young people with DLD (Rodríguez et al., 2016; Assous et al., 2018; Ramírez-Santana et al., 2018; St Clair et al., 2019). An exclusion criterion is adopted to ensure that the language difficulties identified are due to no known biomedical cause, which is in line with the definition of 'DLD'. As for the current literature, the exclusion criteria within investigations often involve the following when selecting samples of young people diagnosed with, or reflect a diagnosis of, DLD:

- Diagnosis of Autism
- Experience hearing loss
- Diagnosis of Down's syndrome
- Reports of a Developmental Delay
- Those who do not have English as their main language; or are not mono-linguistic English speakers.

Researchers often include these factors when establishing an exclusionary criterion for selecting samples of DLD (Hick et al., 2002; Gregory and Bryan, 2015; Nicola and Watter, 2015; Hsu and Iyer, 2016; Levickis et al., 2017; Eadie et al., 2018). This adoption of the described criterion might lead to the selection of young people with 'pure' language difficulties (Bishop et al., 2016: 14 and 18). These excluded conditions, if present, are most likely a biomedical cause of the language difficulty. Additionally, the criterion removes children who have had limited exposure to the natively spoken language (English). Therefore, research selecting

samples of young people with DLD should include the described exclusion criteria, if possible.

However, there is somewhat uncertainty as to whether reports of 'Developmental Delay' should preclude a diagnosis of DLD. Developmental Delay is whereby a young person does not reach their developmental milestones (First and Palfrey, 1994; Association for All Speech Impaired Children, 2017). A Developmental Delay could influence a young person's language development (Oberklaid and Efron, 2005; Association for All Speech Impaired Children, 2017). The presence of a Developmental Delay could be an early sign of a learning or an intellectual disorder. Bishop et al., (2016; 2017) recommends that the presence of learning or intellectual disorders should not lead to the exclusion of a diagnosis. Nonetheless, Developmental Delay may be the symptom of an underlying cause, such as cerebral palsy, foetal alcohol syndrome, fragile X syndrome, or brain injury (Association for All Speech Impaired Children, 2017). These underlying causes would lead to an exclusion for a diagnosis of DLD. Additionally, organisations such as AFASIC expressed that DLD is not the result of a general Developmental Delay. This implies that cases of Developmental Delay should be excluded from a diagnosis of DLD (Association for All Speech Impaired Children, 2017). More research and discussions are needed to determine whether developmental delay should exclude young people from a diagnosis of DLD. As for now, researchers selecting samples of DLD ought to be aware of this current uncertainty.

2.5.3 *Considerations for future DLD investigations*

There have been discussions, as well as disagreements, on how theorists, researchers, and practitioners should conceptualise DLD. Particularly, the arguably questionable conceptualisation of DLD, as an overarching label, continues to be discussed within the literature (Novogrodsky, 2015; Bishop et al., 2017). As a group, young people diagnosed with DLD are likely to experience difficulties in multiple components of language. The components of language were described

earlier in the chapter. As stated previously, researchers strive to obtain samples that reflect the heterogeneous nature of DLD.

However, the heterogeneous nature of DLD may be hindering the research field. Due to the heterogeneous nature, young people diagnosed with DLD may have varying types (referring to language components) and severity of language difficulties. Thus, among young people diagnosed with DLD, some may experience difficulties in lexical (word) retrieval, whereas others may not. Recent research has begun to question whether the heterogeneity of this group has had a detrimental impact on DLD investigations. Vugs et al., (2013) argue that 'DLD' may not be specific enough and thus, future investigations should focus upon the language difficulties experienced. This has been recently agreed by Archibald (2017), Novogrodsky (2015), and to some degree Bishop et al., (2017). Novogrodsky questioned to what extent does our current conceptualisation of DLD accurately depicts how we understand these individuals. In addition to Novogrodsky, this was also discussed briefly and concisely within Bishop et al.'s, (2017) study. Specifically, Bishop et al., (2017: 1077) discussed the extent to which our current understanding of DLD, as a 'categorical nosology', accurately reflects the described group.

For now, future researchers ought to be aware of how the heterogeneous nature, as well as differences across samples of DLD may negatively impact the general literature. Concerning this, key DLD researchers have discussed the plausibility and suitability of sub-groups; the need to focus upon the language difficulty, rather than the 'DLD' label; and provides some recommendations for future researchers investigating DLD (Novogrodsky, 2015; Bishop et al., 2017). These will be considered in the current project.

2.5.3.1 **The possibility of sub-groups of DLD.** A much-debated question is whether sub-groups better conceptualise DLD, rather than an overarching label. Specifically, Novogrodsky claims that there is a need to focus on the language difficulties experienced by these young people when researchers are identifying or selecting those diagnosed with DLD. Thus,

instead of ‘DLD’, an overarching label, researchers should adopt terms such as: ‘lexical-DLD’ and ‘pragmatic-DLD’. The reason for this recommendation is that, in DLD, young people displaying different language difficulties may also experience different cognitive difficulties (Novogrodsky, 2015). The difference in language ability, as well as additional difficulties, may mean that there should be differences in the interventions or support provided to them. Yet, the term ‘DLD’ would encompass both these children, who may require different support. Over-reliance on the term ‘DLD’ within research, may not lead to effective and tailorable intervention strategies that consider the developmental context of the young person. Therefore, as argued by Novogrodsky, researchers should consider the notion of sub-groups of DLD.

However, as explained by Bishop et al., (2017), there is inconclusive evidence that sub-groups of DLD are stable over time. Bishop et al. does not refute the idea of sub-groups; instead, acknowledged the contradictory evidence for sub-groups. Bishop et al. highlights earlier work by Conti-Ramsden and Botting (1999). Conti-Ramsden and Botting’s research was a follow-on study from Conti-Ramsden, Crutchley, and Bottling (1997), which suggested six distinct sub-groups of DLD. The suggested sub-groups included, but were not limited to, lexical (word)-semantic difficulties; phonological-syntactic difficulties; semantic-pragmatic difficulties; and, speech difficulties, such as verbal dyspraxia. Research by Conti-Ramsden and Botting (1999) investigated the stability of the previously suggested sub-groups for over eight years. It was found that there is little evidence of stability over time, as there was a significant number (45%) of children who changed sub-groups. This inconsistency might be capturing the dynamic development of language across age, which is supported (Conti-Ramsden and Adams, 1995; Miller, 1996). So far, however, research exploring the notion of sub-groups of young people diagnosed with DLD is limited. Therefore, due to the current contradictory literature, researchers may not be confident to adopt sub-groups of young people diagnosed with DLD.

Instead of sub-groups, Bishop et al., (2017) suggests that researchers could focus upon a homogenous DLD sample of young people. A homogenous sample could be selected by investigating samples with specific

language difficulties (no known biomedical cause), or ‘principal areas’ (Bishop et al., 2017: 77). The suggestion to investigate a sample of individuals with DLD, with a principle area as a focus, would benefit future intervention-based studies (Bishop et al., 2017). Investigating specific difficulties in these children could inform and tailor the type of interventions that they are introduced to, to increase the effectiveness of the given support. Therefore, whilst sub-groups are not currently recommended, Bishop et al., (2017) highlight that researchers could investigate principal areas in young people diagnosed with DLD.

2.5.3.2 **Language descriptions.** To some degree, Novogrodsky (2015) and Bishop et al. (2017) propose the notion of including language descriptions of young people diagnosed with DLD in research. Firstly, Bishop et al. argue that it would be beneficial for future research to provide a detailed description of the language difficulties of young people diagnosed with, or likely to reflect, DLD. Arguably, due to the heterogeneous nature of DLD, the samples across investigations may have considerable variations in the types of language difficulties experienced. Due to this variation, across investigations, the findings from one sample may not equate to those from another sample, whose predominant difficulties may differ. As a result, there may be differences in the findings or interpretations between these studies. Therefore, a lack of clarity upon the language profile of the sample may lead to inaccurate generalising of the difficulties in those diagnosed with DLD, across the research.

A possible consequence of an inaccurate generalisation across samples includes a lack of specificity in recommending the best practice when supporting young people diagnosed with DLD. To encourage impactful discussions, it may be beneficial for researchers to provide a detailed language description of the samples or to specify the predominant language difficulties which are likely to be experienced by the group. This is, in part, agreed by Novogrodsky (2015). Novogrodsky argued that there may be groups of those diagnosed with DLD that vary in language descriptions.

Hence, there ought to be a focus upon these language descriptions, rather than a simple strive to select a heterogeneous group. Therefore, it is argued that there are major implications for researchers to state the predominant language difficulty experienced within the selected samples, or to provide a detailed language description (Novogrodsky, 2015; Bishop et al., 2017).

Taken together, there may be a need to focus upon the language difficulties experienced in those with DLD when describing the sample. Researchers should acknowledge the complexity that is DLD and provides some description of the difficulties experienced within the sample that is investigated. Recommendations involve providing a full description of the language abilities within samples or detailing the specific language difficulty likely to be present. The implication of adhering to these recommendations may include in-depth discussions into effective and tailorable interventions in supporting young people diagnosed with DLD.

2.6 DLD and associated additional difficulties

As alluded to previously, young people diagnosed with DLD are likely to experience difficulties beyond language. Firstly, as a group, young people diagnosed with DLD are likely to experience worse cognitive and literacy difficulties, compared to their typically developing peers (Marton et al., 2005; Stanton-Chapman et al., 2007; Vugs et al., 2013; Vugs et al., 2014; Vissers et al., 2015; Isoaho et al., 2016; Pavelko et al., 2017). These include executive functioning (including working memory), problem-solving, conflict resolution and detection, reading difficulties, and social cognition. Whilst these children predominately experience language disruptions, these may be co-morbid, associated, or even lead to difficulties in these additional areas. Hence, young people diagnosed with DLD are likely to experience cascading disruptions to other developmental processes. These should be discussed and acknowledged by researchers investigating young people diagnosed with or selecting samples that reflect a diagnosis of DLD (Reilly et al., 2014a; Reilly et al., 2014b; Bishop et al., 2017). Therefore, researchers should

acknowledge that young people diagnosed with DLD are not likely to experience difficulties solely in language, but also cognition and literacy.

Secondly, young people diagnosed with DLD are more likely, compared to their typically developing peers, to experience worse long-term outcomes (Durkin and Conti-Ramsden, 2010; Conti-Ramsden et al., 2013; Bakopoulou and Dockrell, 2016; Hughes et al., 2019; Chen et al., 2020a). Adverse long-term outcomes include, but are not limited to, mental health difficulties in later life (Law et al., 2009; Conti-Ramsden et al., 2013). Within this population, mental health difficulties are likely to be severe and persistent enough to impact everyday functioning, as early as fifteen years old (Snowling et al., 2006).

2.7 Chapter conclusion

From the current chapter, four main conclusions can be drawn from the previous DLD literature. Firstly, the term Developmental Language Disorder (DLD) will be adopted throughout the present project to describe individuals who experience severe and persisting language difficulties, with no known biomedical cause. Yet, it should be noted that there are inconsistencies in the previous literature regarding the terminology for this described group of young people. Regardless of the terminology, findings from such investigations will be discussed.

Secondly, whereby a clinical presence of DLD is unknown, researchers select samples that reflect young people with this diagnosis. An appropriate inclusion and exclusion must be adopted if researchers are selecting samples of DLD.

Thirdly, future researchers should be aware of how the heterogeneous nature of DLD may hinder research. Researchers ought to consider the current discussions and recommendations to address this issue during future investigations. Whilst sub-groups may not be appropriate, focusing upon the language difficulties experienced or ‘principal areas’ within samples of DLD is advised. Moreover, to aid further investigations, researchers should provide a

detailed and clear description of the language difficulties experienced within their sample.

Lastly, DLD is often accompanied by disruptions in other developmental domains. Young people diagnosed with DLD may experience difficulties in their cognition and literacy. Additionally, a diagnosis of DLD is associated with adverse outcomes in later life. Particularly, as early as fifteen years of age, young people diagnosed with DLD are at risk of developing mental health difficulties that negatively impact their everyday functioning.

3 Mental health and Developmental Language Disorder

3.1 Introduction

In the previous chapter, Developmental Language Disorder was defined and discussed. It was highlighted that young people diagnosed with DLD are likely to experience adverse outcomes, such as mental health difficulties. In the current chapter, firstly, reviews will be performed to define and conceptualise mental health for the present project. This will include the definitions proposed by the World Health Organization, as well as the commonly adopted definition: 'psychological wellbeing'. Secondly, mental health difficulties (including disorders) will be defined and discussed. Additionally, there will be a brief discussion around how mental health difficulties may manifest. This will include describing internalising and externalising manifestation of mental health difficulties.

Thirdly, the literature around mental health and Developmental Language Disorder (DLD) will be reviewed. The types of mental health difficulties that may be experienced by young people diagnosed with DLD will be highlighted. Following this, the current ideas around the development of mental health difficulties in this population will be discussed. It will be explained that the connection which exists between mental health difficulties and DLD is complex. Moreover, investigations adopting within-group designs, compared to comparison-groups, may better provide initial and valuable insights into this complex relationship.

3.2 Definition and conceptualisation of mental health

3.2.1 *The WHO's definition of mental health.*

The World Health Organization (WHO, 2013: 6) defines 'mental health', whereby an:

'… individual realizes 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. With respect to children, an emphasis is placed on the developmental aspects, for instance, having a positive sense of identity, the ability to manage thoughts, emotions, as well as to build social relationships, and the aptitude to learn and to acquire an education, ultimately enabling their full active participation in society…'

According to the WHO (2013), mental health is developed throughout childhood. A positive and enriched development throughout this stage may build a strong foundation for an individual's mental health in later life. A positive development during childhood could be encouraged through the cognitive, family, and environmental resources available to them. This is supported by several sources (World Health Organization, 2001; Weich et al., 2009; Feinberg et al., 2012; Bornstein, 2013; Aldridge and McChesney, 2018; Deighton et al., 2018; deLara, 2019; Hughes et al., 2019). A strong foundation increases the likelihood that the child will become an individual who can manage everyday stress, effectively engage within their community, and achieve a positive sense of self. Thus, individuals can manage and regulate themselves, to optimally function, and experience their social world. Therefore, according to the WHO's definition, mental health is the development of emotional, social, and behavioural functioning, which can be influenced by an individual's environment, relationships, and cognition over-time.

The vagueness of the WHO's (2013) definition is perhaps intentional to acknowledge the contextual differences across individuals. These differences may stem from differing cultures, social norms, situations, or circumstances. The wording '…can cope with the normal stresses of life…' implies that

individuals do experience daily stress and respond emotionally to adversity, such as a loss of a loved one, within their lives. Individuals who can regulate themselves and manage their everyday stress are better able to adequately function. Additionally, '…their full active participation in society…' focuses upon the individual's engagement with their environment, whether that be related to occupation, role in society, neighbourhood, or community engagement. Neither statements are specific to what '…normal stresses…' or '…society…' are. The definition does not attempt to normalise a certain set of experiences. Instead, due to the broad nature of the wording, the definition proposed by the WHO (2013) is likely to focus upon the individual's level of functioning. Therefore, considering its broadness, the World Health Organization (2013) provides a concrete definition of an abstract and inclusive conceptualisation of mental health.

3.2.2 *Mental health and wellbeing*

Mental health has also been broadly described as 'a positive state of psychological wellbeing' (Pilgrim, 2017: 3), or 'mental wellbeing' (cMind, Online). Whilst perhaps simplistic, this definition may provide valuable insight into the conceptualisation of mental health. Firstly, however, 'wellbeing' needs to be defined.

Pilgrim (2017) explains that the definition of wellbeing may not be easily defined. The conceptualisation of wellbeing may differ across contexts and perspectives. For instance, 'wellbeing' can loosely refer to concepts reflecting individuals' quality of life, overall health (Pilgrim, 2017), or has been defined as: '…optimal psychological experience and functioning.' (Deci and Ryan, 2008: 1). Also, 'wellbeing' has been used to refer to the economy ('Economic wellbeing') (Osberg and Sharpe, 2002), teacher-student relationship ('Teacher wellbeing') (Spilt et al., 2011), and 'Occupational wellbeing' (Cotton and Hart, 2003). Together, this demonstrates that 'wellbeing' might not have a universal definition; instead, it is defined under the context it is discussed. For the current project, 'wellbeing' will be loosely be referred to as 'quality of life', 'contentment or overall health', and 'experience and functioning'.

Wellbeing is likely to be a multidimensional concept that equates to the overall quality of life, including physical, spiritual, and mental health (Pilgrim, 2017). Mental health is likely to be embedded within an individual's wellbeing. As expected, the literature demonstrates that improvements in an individual's mental health are associated with better wellbeing (Keyes, 2005; Slade, 2010; Slade et al., 2017). This continues to be agreed upon by researchers, professionals, and organisations (cMind, Online; World Health Organization, 2013; Galderisi et al., 2015). Thus, it is unsurprising that clinical practices, government, and international initiatives, and charities associated with mental health have adopted this term (cMind, Online; World Health Organization, 2013; Galderisi et al., 2015). Particularly, 'mental wellbeing' (cMind, Online) and 'psychological wellbeing' (Pilgrim, 2017) have been used to describe mental health amongst these organisations. Therefore, understanding this term as: '…a positive state of psychological wellbeing.' (Pilgrim, 2017: 3) acknowledges that mental health is embedded within an individual's overall wellbeing, and thus, quality of life.

However, the description 'psychological wellbeing' or 'mental wellbeing' may be too simplistic to define mental health. Mental health and wellbeing are separate constructs. This can be exemplified through the differences between the concepts associated with wellbeing and mental health. 'Happiness' is one example, which is generally described as a subjective positive emotion or state, which is void of adversity (Cieslik, 2019; Compton and Hoffman, 2019). Amongst researchers, there is a consensus that 'wellbeing' is an indicator of, or is associated with, 'happiness' (Deci and Ryan, 2008). The consensus for this assumption can be demonstrated through the inventories and questionnaires assessing an individual's wellbeing, through items related to their happiness (Hayes and Joseph, 2003; Watkins et al., 2003; Diener, 2009). In contrast, mental health is not a key indicator of happiness. As argued by Galderisi et al., (2015), understanding 'mental health' through 'happiness' may be too simplistic and perhaps inaccurate. It is generally agreed that an individual's experience of happiness, or unhappiness, is not always in accordance with their mental health (Galderisi et al., 2015). Therefore, there are concepts associated with

wellbeing that ought not to be included when describing mental health. Hence, defining mental health as ‘psychological wellbeing’, for instance, is too broad and thus, simplistic.

3.2.3 *Mental health definition and conceptualisation conclusion*

Taken together, defining mental health as ‘psychological wellbeing’, or ‘mental health wellbeing’ is, whilst somewhat accurate, perhaps too simplistic. Yet, the definition proposed by the World Health Organization focuses on the notion of developing a strong foundation for an optimal level of functioning. Young people who build a strong emotional, social, and behavioural foundation are likely to become adults who can optimally function within their social world. Specifically, that an individual can adequately engage, cope, and manage within their community and in their everyday activities; whilst acknowledging the importance of subjectivity and cultural differences. It is unsurprising, therefore, that a vast amount of literature has adopted this definition when introducing the concept of mental health (Botha and Kourkoutas, 2016; Ford and Parker, 2016; Malti and Noam, 2016; Ortuño-Sierra et al., 2018; Blewitt et al., 2019; Thomson et al., 2019; Barton et al., 2020; Sloan et al., 2020; Trotta et al., 2020). The present project will also adopt the definition of mental health proposed by the World Health Organization.

3.3 **Mental health difficulties**

It is established from a variety of studies, that young people who are unable to develop a healthy emotional, social and behavioural foundation may suffer from mental health difficulties in later life (Cefai and Cooper, 2009; Roughan and Hadwin, 2011; Wynne et al., 2016; Doyle et al., 2018). Yet, a precise definition of ‘mental health difficulties’ has proved elusive. This term, under the definition proposed by the World Health Organization (2013: 6), loosely refers to individuals who…

'…does not realize their own potential; cannot cope with normal everyday stress; cannot work productively; and lastly, cannot contribute to their community.'

An individual who may not be functioning adequately in their everyday life is described as experiencing mental health difficulties. Mental health difficulties may manifest differently across individuals. Manifestations of mental health difficulties may include but are not limited to, sleep disruptions, abnormal levels of energy, and, or, mood (too high or low).

It is consensus that, if interventions are not introduced, mental health difficulties may become severe and persistent enough to warrant the diagnosis of a disorder (also known as a 'psychiatric diagnosis') (Barry et al., 2013; Ebert et al., 2017; Arango et al., 2018; O'Reilly et al., 2018; Clarke and Hoggett, 2019). A specific set of difficulties, otherwise known as symptoms, may lead to a diagnosis of a certain mental health disorder. Mental health disorders are recognised and diagnosed, by professionals, under the Diagnostic Statistical Manual of Mental Disorders (DSM) (American Psychiatric Association, 2013). The DSM categorises, describes, and explains the criteria for mental health disorders. Ultimately, individuals with severe and persisting mental health difficulties may require support to function in their everyday life.

Often investigations into the development of mental health difficulties include all, or a combination of social, emotional, and behavioural functioning (DuPaul and Weyandt, 2006; Clancy et al., 2019). The literature demonstrates a plausible connection that exists between disruptions to any, or all, forms of functioning and an increased likelihood of experiencing mental health difficulties. There is consensus amongst researchers that emotional, social, and behavioural functioning could provide valuable insight into, if not indicate, an individual's mental health. Hence, researchers have generated measures that aim to assess emotional, social, and behavioural functioning, and claim that these may equate to an individual's overall mental health, or psychopathology (Wynne et al., 2016; Doyle et al., 2018). Yet, as alluded to previously, mental health difficulties may manifest differently across

individuals. These observable differences may be due to the types of disruptions apparent in individuals.

3.3.1 *Emotional functioning and mental health difficulties*

Emotional functioning refers to self-regulation, self-detection, and management of emotional outbursts, as well as identifying emotional expressions or cues from others (Herbert, 2004; Denham and Brown, 2010). Poor functioning may increase feelings of loneliness, sadness, and frustration, for instance (Bellini, 2004; Wols et al., 2015). These are likely to increase the probability of developing mental health difficulties (Bellini, 2004; Deckers et al., 2017; Danneel et al., 2019). Disruptions to an individual's level of emotional functioning are associated with mood-related symptoms, commonly experienced with a diagnosis of Depression and Anxiety (American Psychiatric Association, 2013). Mood related symptoms include, but are not limited to, feelings of loneliness, irritability, and unhealthy sleep patterns. Therefore, the literature demonstrates a likely connection that exists between disruptions to an individual's level of emotional functioning and the development of mental health difficulties; especially mood-related difficulties.

3.3.2 *Social functioning and mental health difficulties*

Social functioning is broadly described as the individual's ability to interact within their surroundings, or with others; whether that be peers, family, or those within the community (Herbert, 2004; Denham and Brown, 2010). Social functioning is required to establish and maintain relationships, as well as managing social interactions. It is unsurprising, therefore, that research demonstrates that young people who have lower social functioning are more likely to have fewer and poorer quality friendships or relationships (Rubin et al., 2004). Additionally, poor functioning is associated with peer problems, including being a victim of bullying (Goldbaum et al., 2003; Rubin et al., 2004). Consequently, experiences of peer problems may lead to

feelings of isolation, lower self-worth, and loneliness (Rubin et al., 2004). These feelings may be signs, or symptoms of mental health difficulties (Deckers et al., 2017; Danneel et al., 2019). Therefore, the literature demonstrates a likely connection that exists between disruptions to an individual's level of social functioning and the development of mental health difficulties.

3.3.3 *Behavioural functioning and mental health difficulties*

Unlike emotional and social, behavioural functioning is not as easily defined. Behavioural functioning is loosely described as to what the individual 'does', 'acts', or how they 'conduct themselves' concerning an internal (thought, desire, and emotion) or external drive (stimulus, condition, or circumstance). These 'acts' may include the physical expression of adhering to norms or customs upon interacting with others. This includes conforming to established rules in an organised system, such as schools (DuPaul and Weyandt, 2006; Jiang et al., 2011). Therefore, behavioural functioning refers to how, or to what extent, an individual regulates or copes within their everyday life using their embodied self. Difficulties in this domain may negatively impact an individual's ability to self-regulate their behaviour. Disruptions in behavioural functioning are associated with mental health difficulties, such as increase aggression and violence (Charach et al., 2017; McAloon and Lazarou, 2019) and hyperactivity (DuPaul and Weyandt, 2006; DuPaul et al., 2011). Disruptions to an individual's behavioural functioning are associated with a diagnosis of Conduct Disorder (American Psychiatric Association, 2013; Charach et al., 2017; McAloon and Lazarou, 2019) and Attention-Deficit/Hyperactivity Disorder (DuPaul and Weyandt, 2006; DuPaul et al., 2011). Therefore, the literature demonstrates a likely connection that exists between disruptions to an individual's level of emotional functioning and the development of mental health difficulties.

3.4 Internalising and externalising manifestations of mental health difficulties

The manifestation of mental health difficulties has also been broadly described as internalising or externalising. Internalising problems refer to difficulties that are primarily expressed or inflicted internally. Internalising problems may include, but are not limited to, withdrawing socially, experiencing low mood, and physical symptoms (headaches). Externalising problems refer to difficulties that are expressed behaviourally (externally). Externalising problems may include, but are not limited to, disobeying rules, physical or verbal aggression, as well as hyperactivity. These two manifestations of mental health difficulties have been widely accepted in the literature (Bayer et al., 2012; Mastrotheodoros et al., 2019; Pouwels et al., 2019; Tien et al., 2019; Whitten et al., 2019). Additionally, there is recent preliminary neurological evidence to support the separate existence of the two (Whittle et al., 2020). Therefore, it is likely that mental health difficulties may manifest as either internalising or externalising problems.

The previous literature generally supports the notion that internalising and externalising problems are predictive of a specific set of symptoms (Côté et al., 2009; Coplan et al., 2010; Reef et al., 2011). Internalising problems are predictive of mood-related disorders, such as Anxiety and Depression (Mesman et al., 2001; Mesman and Koot, 2001; Khan et al., 2005; Côté et al., 2009). Yet, externalising problems are predictive of Conduct Disorder or Attention-Deficit/Hyperactivity Disorder (ADHD) (Mesman et al., 2001; Mesman and Koot, 2001; Reef et al., 2011). It is unsurprising, therefore, that there have been investigations to generate effective strategies and interventions to reduce internalising and externalising problems in adolescence, or earlier (Rubin et al., 1995; Coplan et al., 2010). Taken together, there is a need for future research to understand the development of internalising and externalising problems, alongside general mental health difficulties.

3.5 Mental health and Developmental Language Disorder

There is a wealth of research demonstrating that young people diagnosed with Developmental Language Disorder (DLD) are more likely to experience mental health difficulties in later life, compare to their typically developing peers (Cohen et al., 1998; Clegg et al., 2005; Law et al., 2009; Conti-Ramsden et al., 2013; Armstrong et al., 2017b). It is unsurprising, therefore, that these young people experience disruptions to their social, emotional, and behavioural functioning (Durkin and Conti-Ramsden, 2010; Conti-Ramsden et al., 2013; Bakopoulou and Dockrell, 2016). Thus, as a group, young people diagnosed with DLD, are at risk of developing severe mental health difficulties (Snowling, Bishop, Stothard, Chipchase, and Kaplan, 2006). Due to the vast amount of literature, this notion is generally accepted amongst researchers in the field (Durkin and Conti-Ramsden, 2010; Conti-Ramsden et al., 2013; Bakopoulou and Dockrell, 2016). Particularly, research by Snowling et al., (2006) found that those diagnosed with DLD, compared to typically developing peers, were more at risk of developing a mental health disorder as early as fifteen years old. This means that for some young people diagnosed with DLD, mental health difficulties may negatively impact everyday emotional, social, and behavioural functioning in early adolescence. Therefore, due to the difficulties experienced, these young people are at risk of developing mental health disorders.

The literature around mental health and DLD is supported further in non-clinical DLD samples (Wadman et al., 2008; Yew and O'Kearney, 2013; Forrest et al., 2018; Toseeb et al., 2020). As explained in chapter 2, not all investigations in this field select young people (children and adolescents) with a known diagnosis of DLD. Research by Forrest et al., (2018) found that children (at age five) at risk of DLD were likely to experience emotional problems at age seven. Additionally, a meta-analysis drawn from cohort-samples, by Yew and O'Kearney (2013), concluded that there is a plausible connection that exists between children experiencing difficulties reflecting DLD, and severe and persisting emotional and behavioural difficulties.

Therefore, the connection between DLD and mental health difficulties has been supported in clinical and non-clinical (DLD) samples.

Furthermore, young people diagnosed with DLD are more likely, compared to typically developing peers, to experience internalising and externalising problems. Yet, unlike internalising problems, the literature around externalising problems and DLD is somewhat complex.

3.5.1 *Internalising problems and DLD*

Research demonstrates that young people diagnosed with DLD are more likely to experience internalising problems in early adolescence, compared to typically developing peers (Durkin and Conti-Ramsden, 2010; Yew and O'Kearney, 2013). Observable signs of internalising problems may include but are not limited to, self-isolation or withdrawal, feelings of sadness, loneliness and, or anxiety. As explained earlier in the current chapter, the greater severity of internalising problems is likely to predict an increased likelihood of a diagnosis of depression and, or anxiety. It is unsurprising, therefore, that research by Conti-Ramsden and Botting (2008) found that young people diagnosed with DLD are more likely to experience greater severity of symptoms for depression and anxiety as early as fifteen years old. Whilst the stability of these symptoms may be complex, the connection between DLD and internalising problems has been generally supported (Wadman et al., 2011). Also, this has been supported in clinical (Conti-Ramsden and Durkin, 2008; Wadman et al., 2011) and non-clinical samples of DLD (Forrest et al., 2018). Therefore, it is likely that young people diagnosed with DLD are at risk of severe and persisting internalising problems.

3.5.2 *Externalising problems and DLD*

The relationship between young people diagnosed with DLD and externalising problems is complex. Observable signs of externalising

problems include, but are not limited to, self-dysregulation to a social situation, inattention and, or aggression. Research has demonstrated that young people diagnosed with DLD are likely to experience externalising problems in later life (Özcebe et al., 2020). However, this has been contradicted for certain forms of externalising problems, such as rule-breaking and aggressive behaviours (Mouridsen and Hauschild, 2009; Winstanley et al., 2018).

There is perhaps a plausible explanation as to why contradictions have occurred in the literature around DLD and externalising problems. Firstly, as explained earlier in this chapter, externalising problems include difficulties in abiding to rules and an increase in their aggression severity. Severe and persisting externalising problems are likely to predict the diagnosis of Conduct Disorder in young people (American Psychiatric Association, 2013; Charach et al., 2017; McAloon and Lazarou, 2019). Due to the rule-breaking and anti-social behaviour, the symptoms of Conduct Disorder, are significantly associated with offending behaviours (Moffitt et al., 2002). Offending behaviours refer to engagement in criminal activity and anti-social behaviour. Considering the literature around DLD and externalising problems, it is unsurprising that there is a proportion of adolescents amongst the offending population who are diagnosed with DLD (Snow and Powell, 2011). Therefore, there is a theoretical assumption that young people diagnosed with DLD are more likely, compared to their typically developing peers, to engaging in offending behaviours. This connection is due to the known increased severity of externalising problems in young people diagnosed with DLD.

However, young people diagnosed with DLD may not be at a greater risk of offending, compared to typically developing peers. Winstanley, Webb and Conti-Ramsden (2018) found that offenders who are diagnosed with DLD had increased severity of violence and aggression, rather than a greater risk of offending (or, rule-breaking behaviours). This suggests that the severity of aggression amongst adolescents that offend and are diagnosed with DLD is perhaps greater compared to typically developing offenders. As discussed by Winstanley, Webb and Conti-Ramsden (2018), the assumption that

externalising problems can equate, or indicate, risk of offending may somewhat explain the inconsistency in the literature. Researchers might not find group differences in externalising problems due to the focus of the outcome: prevalence of offending, rather than increased aggression in offending behaviours.

Accompanying this, externalising problems are associated with symptoms of Attention-Deficit/Hyperactivity Disorder (ADHD). ADHD is the overarching and broad term for individuals (predominately children) who experience severe and persisting difficulties in their concentration, exhibit hyperactivity or both. It is widely accepted that there is a subgroup of young people diagnosed with DLD and ADHD (Mueller and Tomblin, 2012). This suggests that some children diagnosed with DLD are more likely to exhibit behavioural problems that are symptomatic of ADHD. As explained earlier in the current chapter, in addition to conduct disorder, externalising problems are associated with ADHD. This demonstrates that is possible to experience externalising problems that are not associated with an increased risk of offending, but dysregulation of one's behaviour. Therefore, again, externalising problems may not always equate, or indicate the young person's risk of offending.

Taken together, young people diagnosed with DLD are more likely to experience externalising problems, compared to typically developing peers. Yet, these problems may relate to increased severity of symptoms of ADHD and aggression in violent offending behaviours, rather than the risk of offending. Future research ought to be cautious and clear upon their definition of 'externalising problems'; the term alone may be too broad by itself, in this field of investigation.

3.6 The development of mental health difficulties, in young people diagnosed with DLD

The literature may provide some insight as to why young people diagnosed with DLD are at greater risk of mental health difficulties in

adolescence, compared to their typically developing peers. Research by Conti-Ramsden and Botting, (2008) concluded that mental health difficulties, especially emotional problems, may not be due to a direct result of the disruptions to language development, within DLD. This has been supported by Bokopoulou and Dockrell (2016), as well as Kilpatrick, Leitao, and Boyes (2019). Therefore, the relationship between language difficulties, experienced by young people diagnosed with DLD, and mental health difficulties is indirect. This means that there is likely a factor that mediates, or better explains, the relationship between DLD and mental health.

It is generally accepted amongst researchers that relationships play a role in the development of mental health difficulties, of young people diagnosed with DLD (see review: Durkin and Conti-Ramsden, 2010). In the context of the current project, relationships refer to the feelings, attitudes, and behaviours between individuals that have formed over time through social interactions. Researchers generally agree that the language difficulties experienced by this population may lead to low-quality or, even adverse relationships. In return, low-quality and, or adverse relationships may negatively impact the development of mental health in young people diagnosed with DLD (see review: Durkin and Conti-Ramsden, 2010).

As a group, young people diagnosed with DLD experience low-quality peer relationships, compared to typically developing peers. Young people diagnosed with DLD are often ignored, rejected, and not viewed as preferable playmates by peers, compared to typically developing children (Marton et al., 2005). Also, Chen et al., (2020) found that those with DLD had fewer social networks, in comparison to typically developing children and those who were considered to have a disability. The observable peer problems within Marton et al.'s and Chen et al.'s research may be due to the additional difficulties experienced by young people diagnosed with DLD. Particularly, this group of young people are likely to experience difficulties in establishing and maintaining healthy relationships, as well as engaging in positive social interactions (Durkin and Conti-Ramsden, 2007; Wadman et al., 2008; Durkin and Conti-Ramsden, 2010). These additional difficulties may be explained, in part, by the language difficulties experienced by the

group. This is agreed upon in the DLD literature (Conti-Ramsden and Botting, 2004; Mok et al., 2014; Forrest et al., 2018; van den Bedem et al., 2018; van den Bedem et al., 2019). Therefore, the literature suggests that young people diagnosed with DLD may experience long-term peer problems, as their language difficulties may impact the quality of friendships (Durkin and Conti-Ramsden, 2007) and restrict social networks (Chen et al., 2020).

Additionally, qualitative differences in parent-child relationships may, in part, explain the group differences in the severity of mental health difficulties in adolescence. Whilst contradicted (Isoaho et al., 2016), Scheffner, Bruce, Tomblin, Zhang, and Weiss (2001) found qualitative differences in the relationship between parents engaging with their young typically developing children, and those diagnosed with DLD. Scheffner et al., (2001) argued that the relationship between young people diagnosed with DLD and their parents might be influenced by parental concerns. Parents of young people diagnosed with DLD are likely to express concerns around their future development; their independence, quality of peer relations, prosocial behaviour, and conduct problems (Conti-Ramsden and Botting, 2008; Conti-Ramsden and Durkin, 2008). Yet, not all parents expressed concerns, and this is a plausible explanation as to why the findings by Scheffner et al., (2001) have been contradicted (Isoaho et al., 2016; Conti-Ramsden and Durkin, 2008).

However, language difficulties amongst parents may also explain qualitative differences in child-parent relationships between young people diagnosed with DLD, and typically developing peers (Scheffner et al., 2001). Parents of young people diagnosed with DLD are likely to have language difficulties themselves. As explained within Bishop et al.'s (2006) overview of the possible causes of DLD, it was highlighted that, in part, DLD is inherited. This means that the parents, of young people diagnosed with DLD, could experience the same difficulties as their children. Due to the language difficulties experienced by these parents, this may lead to individual difficulties in the way in which parents interact with their child. This is acknowledged by researchers investigating the child-parent relationships, in young people diagnosed with DLD (Conti-Ramsden and Durkin, 2008).

Particularly, Conti-Ramsden and Durkin (2008) argued that the language ability of parents may have impacted their interactions, beliefs, and concerns, around raising their child. Therefore, there are qualitative differences in parent-child relationships, between young people diagnosed with DLD and their typically developing peers. This may be due to parental concerns, or language difficulties experienced by either the child or the parent.

There have been attempts to understand whether relationships mediate the connection between mental health and DLD. A comprehensive study by van den Bedem et al., (2018) argued that the lower quality of, or opportunity for, social interactions in young people diagnosed with DLD may negatively impact the development of emotional regulation. The notion that poor quality and, or lack of opportunity for social interactions, experienced by young people diagnosed with DLD, has a cascading impact upon their development is not a new idea (Fujiki et al., 2004; Rieffe and Wiefferink, 2017). It is also an idea that has continued to be drawn upon when understanding the relationship between DLD and mental health (Toseeb and St Clair, 2020). Therefore, it may be likely that language difficulties experienced in DLD disrupt the development of emotional functioning due to the poor relationships, and social interactions experienced.

However, the relationship between DLD and mental health difficulties may be due to mediating developmental disruptions. Bokopoulou and Dockrell (2016) concluded that social cognition was a better predictor of mental health difficulties than language ability. This suggests that there may be developmental disruptions, associated with a diagnosis of DLD, that may impact mental health development. As stated in chapter 2, a diagnosis of DLD is associated with difficulties in executive functioning (including working memory), problem-solving, conflict resolution and detection, reading difficulties, and social cognition (Vugs et al., 2013; Vugs et al., 2014; Vissers et al., 2015; Isoaho et al., 2016; Pavelko et al., 2017). Therefore, the developmental context of the young person diagnosed with DLD should be considered when understanding the development of mental health difficulties.

Taken together, the literature provides some insight as to why young people diagnosed with DLD experience worse mental health difficulties, compared to their typically developing peers. Due to their language difficulties, young people diagnosed with DLD may experience low-quality peer and parent-child relationships. The lack of or poor quality of relationships may negatively impact other developmental domains, such as emotional functioning. In return, the young person is likely to experience mental health difficulties in adolescence (see review: Durkin and Conti-Ramsden, 2010). Yet, disruptions to social cognition may better explain the development of mental health difficulties, compared to language difficulties (Conti-Ramsden and Botting, 2008; Bakopoulou and Dockrell, 2016). This means that developmental disruptions, beyond language, should be considered when understanding the development of mental health difficulties.

3.7 Within-group differences in mental health difficulties, in DLD

Most of the findings from research around mental health and DLD is derived from group comparisons. Often, mental health difficulties are compared between those diagnosed with DLD and typically developing or other atypically developing peers (commonly Autism) (Law et al., 2009). As reviewed in the previous section, the findings from group comparisons have provided an insightful foundation for our current understanding of the relationship between mental health and DLD.

However, there is a limitation for investigating the development of mental health difficulties, in young people diagnosed with DLD, through a group-comparison design. As explained in Botting, Bean-Ellawadi, and Williams (2016)'s review, due to the wide heterogeneity within the young people diagnosed with DLD, findings drawn from group-comparison investigations cannot be generalised to all those amongst this population. This means that the findings from group-comparison investigations may not lead to the implementation of effective strategies to support all young people in this group. Therefore, there is perhaps a need to understand the development of

mental health difficulties from within a group of young people diagnosed with DLD.

Whilst limited, the literature adopting a within-group design has provided valuable insights into the individual differences in mental health difficulties, among young people diagnosed with DLD. Particularly, the findings from within-group investigations into DLD and mental health highlight how complex this relationship is. The complexity may stem from the heterogeneous nature within a sample of young people diagnosed with DLD. It is widely recognised that there is large heterogeneity in this population, across various investigations, including mental health outcomes (Conti-Ramsden and Durkin, 2008; Conti-Ramsden et al., 2017; Özcebe et al., 2020).

Firstly, not all young people diagnosed with DLD will experience mental health difficulties in adolescence. Particularly, research by Pickles et al., (2016) found that approximately one-third of young people diagnosed with DLD, were not likely to experience severe or persisting externalising problems; specifically, conduct and hyperactivity difficulties. Additionally, Conti-Ramsden et al., (2019) found that not all young people diagnosed with DLD, despite a high level of peer problems, experienced emotional difficulties. These findings suggest that some young people, diagnosed with DLD, do not develop severe externalising nor internalising problems. Therefore, there are individual differences amongst young people diagnosed with DLD, concerning their mental health development. This is generally accepted by researchers of this field (Conti-Ramsden and Durkin, 2008; Conti-Ramsden et al., 2017; Özcebe et al., 2020). Therefore, it is likely that within a group of young people diagnosed with DLD some may experience lesser or greater severity of mental health difficulties than expected.

Secondly, findings from within-group investigations might challenge the notion that mental health difficulties, within DLD, are due to low-quality relationships. There are individual differences in peer relationships, amongst young people diagnosed with DLD. Research by Mok et al., (2014) investigated the role of peer relationships in the development of mental

health difficulties in early adolescence, within children diagnosed with DLD. Mok et al., found that approximately 22% of children diagnosed with DLD were not likely to experience peer problems, or if so, this was low, throughout childhood to adolescence. These findings demonstrate that there is a proportion of children, diagnosed with DLD, who are not likely to experience peer problems. This was also supported by Conti-Ramsden et al.'s (2019) recent investigation.

Furthermore, Conti-Ramsden et al., (2019) found that there are subgroups of young people diagnosed with DLD who portrayed differing trajectories of emotional and peer difficulties. Firstly, there was a large proportion of young people who experienced emotional and peer difficulties, and these developed alongside each other throughout childhood, and into adolescence. Yet, these difficulties did not co-develop in all young people. There was a sub-group of young people who experienced increases levels of peer problems, and yet, did not display emotional difficulties. This suggests that emotional difficulties could develop independently of peer problems. The findings by Conti-Ramsden et al., (2019) demonstrate that not all conclusions drawn from group-comparisons investigations can be generalised to all young people diagnosed with DLD.

Thirdly, findings from within-group investigations may explain why there are individual differences in mental health difficulties, as well as relationship quality, in young people diagnosed with DLD. Individual differences within this population may be due, in part, to the type of language difficulty experienced. As explained in chapter 2, young people diagnosed with DLD may experience different types of language difficulties. Certain language difficulties are likely to be associated with specific mental health difficulties. Snowling et al., (2006) concluded that, in those diagnosed with Speech and Language Disorders, certain language disruptions (within the sample) may lead to specific mental health difficulties. Particularly, Snowling et al., (2006) found that children who were reported to have attentional problems were likely to experience expressive language difficulties. Expressive language, as described in chapter 2, refers to language that is encoded and transmitted. Yet, in the same sample, Snowling et al., found that children who were

reported to have social problems were more likely to experience expressive and receptive language difficulties. Receptive language refers to language that is received and decoded. Therefore, Snowling et al., findings suggest that expressive and receptive language difficulties may be associated with certain forms of mental health manifestations.

The notion that specific language difficulties are associated with certain mental health difficulties has had continued support. Van Daal et al., (2007) was found that phonological problems were significantly related to behavioural problems. As described in chapter 2, phonology is the systematic organisation of sounds produced through or decoded from speech (or signs, in sign language). Internalising problems were significantly associated with semantic language difficulties. Semantics refers to the meaning within a phrase, word, or text, that is embedded in the use or decoding of language. Therefore, the literature generally demonstrates that the type of language difficulties should be considered when understanding mental health difficulties, in young people diagnosed with speech and language disorder.

Additionally, the notion that certain language difficulties are associated with specific mental health difficulties has been supported in samples of young people diagnosed with DLD (Mok et al., 2014). Mok et al., (2014) found that pragmatic language difficulties were associated with higher peer problems throughout childhood to early adolescence, in young people diagnosed with DLD. Together, it is plausible that the component of language (such as phonology, semantics, and pragmatics) may be associated with certain mental health difficulties, in young people diagnosed with DLD.

The connection between specific language difficulties and certain mental health difficulties may explain the heterogeneity observed in Conti-Ramsden et al.'s, (2019) within-group investigation. As explained previously, in some young people diagnosed with DLD, peer problems did not co-develop with emotional problems. Conti-Ramsden et al., (2019) found that children who experienced co-developing emotional and peer difficulties were likely to demonstrate difficulties in pragmatic language ability. Whilst the reason is yet unknown, this suggests that pragmatic ability plays a role in the co-

development of emotional and peer problems in young people diagnosed with DLD. Overall, the literature highlights that within young people diagnosed with DLD, the trajectory of mental health difficulties may differ in accordance with the type of language difficulties that are experienced.

However, there may be another plausible explanation as to why there are individual differences in the development of mental health difficulties in young people diagnosed with DLD. Individual factors may influence the development of mental health difficulties, in young people diagnosed with DLD. Mok et al., (2014) found that the difference between the trajectories was predicted best by the child's level of prosocial behaviour. Prosocial behaviours are acts that intend to benefit or care for another. Often this includes, but is not limited to, sharing and co-operating with, and helping others. This suggests that prosocial behaviour may have played a role in the quality of peer interactions throughout childhood and adolescence, in young people diagnosed with DLD. Prosocial behaviour is not the only individual factor found to explain individual differences in mental health outcomes, in young people diagnosed with DLD (Zolkoski and Bullock, 2012; Botting et al., 2016; Fritz et al., 2018; van den Bedem et al., 2018; St Clair et al., 2019). Therefore, the literature suggests that there may be individual factors that influence the development of mental health, in young people diagnosed with DLD.

Taken together, the findings from within-group investigations reveal that there are individual differences in mental health outcomes, as well as relationship quality, in young people diagnosed with DLD. Individual differences may be due to different types of language difficulties experienced within this group. Yet, there may be additional factors that play a role in the development of mental health difficulties. Particularly, additional factors might provide insight as to why some young people experience lesser or greater severity of mental health difficulties than expected. This highlights the need to understand how, or what factors influence individual differences in mental health difficulties, in young people diagnosed with DLD.

3.8 **Chapter conclusion**

Within the present project, the definition proposed by the World Health Organization will be adopted. The World Health Organization defines mental health broadly as an individual who…

'… individual realizes 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. With respect to children, an emphasis is placed on the developmental aspects, for instance, having a positive sense of identity, the ability to manage thoughts, emotions, as well as to build social relationships, and the aptitude to learn and to acquire an education, ultimately enabling their full active participation in society…'

There is a focus upon building a healthy social, emotional and behavioural foundation. Disruptions to this foundation may lead to an individual who experiences mental health difficulties. Yet, there are different manifestations of mental health difficulties. The different manifestations of mental health difficulties could be loosely described as internalising or externalising problems.

Young people diagnosed with DLD are likely to experience worse mental health difficulties, compared to their typically developing peers. This includes worse internalising and externalising problems. Conclusions from group-comparison investigations highlight that the increasing severity of difficulties across groups, is could be due to low-quality relationships and, or, disruptions in other developmental domains (social cognition). However, findings from recently emerging within-group investigations reveal the complex relationship between mental health and DLD. Particularly, not all young people diagnosed with DLD will experience mental health difficulties. Also, additional factors may explain the individual differences in mental health outcomes, in this group. There is, therefore, a need to further understand risk and resilience for mental health difficulties, in this population. In doing so, this could provide an insight into why some young people experience lesser or greater severity of mental health difficulties than expected.

4 Understanding risk and resilience for mental health difficulties

4.1 Introduction

In the previous chapter mental health was defined and discussed. Also, the literature on mental health and Developmental Language Disorder (DLD) was briefly reviewed. The current chapter will build upon the previous chapter by reviewing the vast amount of literature around risk and resilience for mental health difficulties within young people. However, unlike the previous chapter, the focus will not move onto DLD. Some ideas or perspectives have yet to be considered when understanding risk and resilience for mental health difficulties in young people diagnosed with DLD. This includes understanding risk, the cumulative risk hypothesis, and the process of resilience, as well as, how the ecological and developmental perspective has influenced our insight into risk and resilience for mental health difficulties, in young people. Thus, before focusing upon DLD (chapter 5), these concepts and perspectives must be defined and discussed.

Firstly, risk will be defined and the mechanism to which risk occurs will be briefly discussed. Additionally, the cumulative risk hypothesis (CRH) will be explained. The CRH is important to consider as it might provide researchers, as well as professionals, with an insight into who may be at higher risk of developing mental health difficulties in later life.

Secondly, resilience is defined under the context of risk exposure. Hence, after a brief description of what resilience is agreed to be amongst researchers and theorists, risk and resilience as a dynamic process for mental health difficulties in young people will be discussed.

Furthermore, when understanding risk and resilience for mental health difficulties researchers should be aware of the inconsistency in terminology across this investigatory field. Particularly, there is a lack of consistency or clarity in the definitions, models, and, or mechanisms assumed by researchers. This may hinder our ability to provide an in-depth understanding

into how resilience for mental health difficulties occurs. Thus, the complexity around factors that encourage resilience for mental health difficulties will be discussed and considered throughout the current project.

Thirdly, there are important perspectives that ought to be considered when attempting to gain an in-depth understanding of risk and resilience for mental health difficulties. Particularly, the Ecological and Developmental perspective has provided a significant contribution to our understanding of this dynamic process, as well as within practice. Thus, these perspectives, where possible, will be incorporated into the present project. Therefore, these perspectives will be explained and briefly discussed in the current chapter.

Lastly, a review of the literature highlighting factors that influence risk and resilience for mental health difficulties will be performed.

4.2 Understanding risk for mental health difficulties in young people

Risk is often conceptualised through events, circumstances, or conditions that increase the likelihood of an adverse outcome, such as mental health difficulties in early adolescence (Kraemer et al., 2005). Our current understanding of how risk occurs stems from the ideas proposed by Rutter (1979). A key figure in the field of child and adolescent psychology, Rutter (1979) proposes an epigenetic analytical understanding of risk (Rutter et al., 1999; Rutter et al., 2006a). Particularly, it is the complex interaction between gene expression and the environment which arguably increases the risk of mental health difficulties. This has been supported (Thapar et al., 2017; Assary et al., 2020). Moreover, as technology in genetics and biomechanics have advanced, the support for the role of epigenetics in the development of mental health difficulties has continued to grow (McGowan and Roth, 2015; Berens et al., 2017). Specifically, such alternations in gene expression from environmental factors have been observed within individuals diagnosed with mental health disorders (McGowan and Roth, 2015). Taken together, there is demonstratable support for the role of epigenetics within the development of mental health difficulties.

4.3 Cumulative risk hypothesis

Rutter et al., (1979) proposed the Cumulative Risk Hypothesis (CRH). Rutter argued that as the number of exposed factors increases, there will be greater severity of an adverse outcome. It was stated that the CRH may better predict mental health difficulties through the number of risk factors, compared to the severity of an individual factor.

The CRH, despite criticisms, has support (Appleyard et al., 2005; Raviv et al., 2010; Horan and Widom, 2015; Oldfield et al., 2015). Within the general population, Bøe et al., (2018) found that young people (age 11 to 13) who are exposed to lower socioeconomic status, greater adverse life events and family stress, are more likely to experience worse mental health difficulties. This suggests that the number of exposed risk factors, for mental health difficulties, should be considered when predicting the severity of the outcome. The cumulative effect in risk factors for mental health difficulties is also supported amongst atypically developing children (Oldfield et al., 2015). Oldfield et al., (2015) found that, within young people with special educational needs and disabilities, as the number of exposed risk factors increased, the severity of the behavioural difficulties also increased. Together, the literature demonstrates support for the CRH (Appleyard et al., 2005; Raviv et al., 2010; Horan and Widom, 2015; Oldfield et al., 2015; Bøe et al., 2018). Therefore, the number of exposed risk factors for mental health difficulties should be acknowledged, as it may predict the severity of the outcome.

Furthermore, the CRH highlights that exposed risk factors for mental health difficulties may operate in a linear or quadratic fashion. A linear relationship describes a consistent and proportional increase in the severity of the outcome, as the number of exposed risk factors increases. A quadratic relationship suggests that the severity of the outcome is disproportional. The functional form of the cumulative relationship between risk factors and severity of an adverse outcome may differ across atypically and typically developing young people. The majority of the literature suggests that for mental health difficulties, the accumulation of exposed risk factors for mental health difficulties has a linear relationship (Appleyard et al., 2005; Raviv et

al., 2010; Horan and Widom, 2015). However, research by Oldfield, Humphrey, and Hebron (2015) investigated the CRH upon behavioural difficulties in young people, who may require additional educational support or are diagnosed with a disability. Oldfield et al., found that a quadratic cumulative relationship exists between risk factors and behavioural difficulties. Together, the current literature demonstrates that the predictive relationship between risk and the outcome may differ depending upon the population of interest.

The CRH has been criticised for not acknowledging the severity of the risk factors. However, as explained by Rutter (1979), the CRH is not intended to replace our understanding that some risk factors may be more severe than others. The CRH argues that whilst severity is important, the accumulation of risk factors should be considered also. Understanding the development of mental health difficulties, through the CRH, has implications for professional practice. It may be possible to predict which young people are at high risk of developing mental health difficulties through the number of exposed risk factors. Therefore, understanding the CRH within the development of mental health difficulties may be beneficial for professionals, in determining which young people may require further support or intervention for mental health difficulties.

4.4 Understanding resilience for mental health difficulties in young people

Whilst the theory behind resilience remains unclear, resilience has been defined by Luthar et al., (2000: 1) as...

> *'... A dynamic process encompassing positive adaptation within the context of significant adversity.'*

Two key assumptions are embedded within this definition of resilience. Firstly, there must be exposure to a significant degree of risk. This means that there requires an event, circumstance, or individual factor to increase the likelihood that the child will experience mental health difficulties in

adolescence. Secondly, despite expectation, considering the risk exposure, the young person does not experience severe mental health difficulties. Whilst the mechanism is still debated, some young people experience positive adaptation despite the risk exposure. Depending upon the theorist, positive adaption is the ability to effectively maintain or manage mental health difficulties; or, to regain emotional, social, or behavioural functioning, so that difficulties are no longer experienced, or if they are, their severity is lessened. Positive adaption, whether that be through maintaining, managing, or regaining mental health, occurs as a response to adversity. Overall, these key assumptions have been accepted as the basic understanding of resilience for mental health difficulties, as this is agreed across the key theorists of the field (Werner, 1982; Garmezy, 1991; Ungar, 2004; Rutter, 2006; Masten, 2014).

4.4.1 *Risk and resilience for mental health difficulties in young people*

As alluded to within Luthar et al.'s (2000) definition, the concept around young people's risk and resilience is favoured towards a 'process', rather than a 'trait'. Trait infers that resilience is a personal characteristic. Yet, a process infers that there is an active adaption that reduces, counteracts, or compensates for the detrimental impact of risk exposure. Key researchers generally agree that risk and resilience is a dynamic process (Werner, 1982; Garmezy, 1991; Ungar, 2004; Rutter, 2006; Masten, 2014). Particularly, Rutter (1999; 2006a; 2012) refuted the notion that resilience in young people is a trait, as this implies a deterministic nature. Also, within recent reviews around young people's resilience, it is clearly stated that: '…resilience should be considered as a dynamic and changing concept, not as a static trait' (Fritz et al., 2018: Online). This statement is drawn from previous research papers and discussions around resilience for mental health difficulties in young people (Fergus and Zimmerman, 2005; Zolkoski and Bullock, 2012). Therefore, risk and resilience in young people ought to be described as a dynamic process; and perhaps a long-term one (Masten et al., 1999).

Within the literature, it is accepted that relationships are important when understanding resilience in the face of adversity (Ayed et al., 2019). A recent and comprehensive review of the mental health literature, by Ayed et al., found that resilience for mental health difficulties is likely to be aided by 'social resources', such as healthy and good quality relationships. The notion that relationships are likely to play a role in the development of positive mental health, despite risk exposure, is accepted amongst key theorists (Ungar, 2004; Rutter, 2006; Luthar and Brown, 2007; Masten, 2014). This includes arguably biologically driven perspectives upon resilience for mental health difficulties (Rutter, 2006; Luthar et al., 2000). Particularly, Luthar and Brown (2007: 19) states that…

'Relationships lie at the "roots" of resilience…. the presence of support, love, and security fosters resilience in part, by reinforcing people's innate strengths….'

Healthy relationships enable the young person to access and obtain resources that enhance their ability to overcome adversity. Rutter claims that the wider context, such as family and the community, influences the likelihood of resilience for mental health difficulties occurring. This has been supported and agreed upon by other key theorists (Zolkoski and Bullock, 2012; Shean, 2015), as well as researchers in the field (Ayed et al., 2019). Therefore, the dynamic process of resilience for mental health difficulties may be encouraged by a positive and supportive environment; particularly good quality relationships.

However, healthy and good quality relationships are not the only factors that influence the process of resilience for mental health difficulties in young people. Factors may be stem from differing environmental systems, that may directly or indirectly impact the development of mental health difficulties. Moreover, factors may be derived from the young person's wider development. Therefore, before highlighting the factors that influence risk and resilience for mental health difficulties, it is important to acknowledge how the Ecological and Developmental perspective has changed our conceptualisation of this dynamic process.

4.4.2 *The definitions for factors that encourage risk and resilience for mental health difficulties, in young people.*

Firstly, risk factors refer to events or circumstances that increase the likelihood of an adverse outcome, such as mental health difficulties. Yet, a causal mechanism is not assumed when discussing risk. Instead, the focus is upon factors that are associated, or have a plausible connection with an adverse outcome.

Secondly, the definition of factors that encourage resilience for mental health difficulties varies in the literature, as there might be terminological confusion (Zimmerman et al., 2013). Factors that encourage resilience for mental health difficulties may be known as promotive or protective factors. These terms are often used interchangeably. Also, these terms may have been adopted without, or with inaccurate, clarification upon their meaning (Zimmerman et al., 2013). Currently, the mechanism regarding how resilience for mental health difficulties is likely to occur is not established. Moreover, the definition of these terms may vary depending upon the mechanism and, or model adopted by researchers investigating risk and resilience for mental health difficulties. This may be a plausible reason for the apparent lack of clarity of 'promotive' or 'protective' factors within the literature (Zimmerman et al., 2013).

It has been argued that a strong framework for resilience may not be achieved whereby there is a lack of clarity amongst researchers in which model, and mechanism, is adopted, assumed, or investigated (Zimmerman et al., 2013; Luthar and Brown, 2007). Considering this argument, for the remainder of the present project, the Protective model will be adopted. The reason for this decision is that, unlike other models, the Protective model acknowledges that factors may interact with risk differently to encourage resilience for mental health difficulties.

Under the Protective model of resilience, protective and promotive factors have different meanings. Firstly, according to Patel and Goodman (2007: 703), promotive factors '…actively enhance positive psychological

well-being'. Promotive factors, in this model, have the opposite effect to risk factors (Zimmerman et al., 2013). Thus, promotive factors could be described as a spectrum. Where an individual is on this spectrum may predict their likelihood of developing mental health difficulties. Additionally, promotive factors, in this model, are independent to risk factors (Zimmerman et al., 2013). Promotive factors compensate risk as they encourage positive mental health development. In return, promotive factors increase the likelihood of resilience for mental health difficulties.

Secondly, protective factors interact with risk, by moderating the relationship between the risk exposure and the predicted outcome. Thus, protective factors are likely to disrupt or dampen the effect of the exposed risk factor. Additionally, in the Protective model, it is acknowledged that protective factors can also have a promotive mechanism. The notion of different mechanisms to promote resilience has, to some extent, been adopted within the literature (Gutman et al., 2002; Zimmerman et al., 2013; Dvorsky and Langberg, 2016).

4.5 Understanding the Ecological perspective for the development of mental health difficulties, in young people.

Researchers have built upon our understanding of the process of risk and resilience for mental health difficulties, through an Ecological perspective. Particularly, it was Garmezy (1987; 1991) and Werner (1982), who incorporated the Ecological perspective into their understanding of this dynamic process. This incorporation has been accepted by researchers and professionals within practice (Hoagwood et al., 2010; Solantaus et al., 2010; Tavkar and Hansen, 2011; Fazel et al., 2014; García-Carrión et al., 2019; Prime et al., 2020; Wade et al., 2020). Therefore, the current project will consider the Ecological perspective when understanding risk and resilience for mental health difficulties.

The Ecological perspective is drawn upon the ideas from the Ecological Systems Theory, as proposed by Bronfenbrenner (1979). The main idea

proposed by Bronfenbrenner (1979) is that the environment is complex and interactive. The environment was described as a series of systems or layers, with the first being known as the Microsystem. The Microsystem is the immediate environment for the young person. Factors in the Microsystem include interaction with peers, family members, siblings, and teachers, for example. The relationships that the young person forms with these individuals have a direct impact on their development. Additionally, how the young person interacts with these individuals may, over time, influence how they (peers, teachers, family) interact with the young person. Thus, the relationships in the immediate environment are bidirectional. As argued by Bronfenbrenner (1979), and later Bronfenbrenner and Ceci (1994), factors from the immediate environment should be considered when predicting, changing, or understanding human development. This has been supported in the literature; especially in young people's mental health development (Prime et al., 2020; Wade et al., 2020). Therefore, the Microsystem is the immediate environment, and the factors within this system are perhaps most important to consider when understanding human development.

Despite being influential, the Microsystem within the original Ecological Systems Theory was criticised. It was argued that the theory included little discussion around the mechanism as to how factors in the immediate environment impact human development (Christensen, 2016). Thus, within the Ecological System Theory, the described interaction between the individual and the environment could be too simplistic. This was considered in Bronfenbrenner's later editions. The bio-ecological model, and later the Process-Person-Context-Time model empathised that the individual plays an active role in their development. Factors in the immediate environment were later labelled as 'proximal processes'. Proximal process refers to the interaction between the young person and their environment, which impacts their development over time.

Moving on from the Microsystem, there are wider environmental systems that may impact factors in the young person's immediate environment. Factors in the young person's immediate environment, such as parents and teachers, may interact with each other. In return, this may impact the

relationship between the young person and parent or teacher. The interconnection between Microsystems is known as the Mesosystem. Yet, cultural and societal influences, such as government policy, an individual's socioeconomic status, and ethnicity, also has an indirect impact on human development. Bronfenbrenner proposed that these factors could be grouped under the individual's Macrosystem.

Together, Bronfenbrenner proposed that young people develop in a complex environment. Factors may indirectly and directly impact mental health development. Direct factors are more important to consider than indirect factors when understanding human development (Bronfenbrenner, 1979; Bronfenbrenner and Ceci, 1994; Wade et al., 2020; Prime et al., 2020). Yet, the wider context (socioeconomic status, poverty, culture) of the young person may impact their immediate environment.

The conceptualisation of different environmental systems influencing the development of mental health difficulties, in young people has been adopted by researchers (Carter et al., 2004). Particularly, interventions for mental health difficulties in young people has focused upon and within different environmental systems. This includes the introduction of interventions that incorporate schools (Fazel et al., 2014; García-Carrión et al., 2019), communities (García-Carrión et al., 2019) and within the family (Hoagwood et al., 2010; Solantaus et al., 2010; Tavkar and Hansen, 2011). Additionally, the ecological perspective highlights how the wider environment may aid in promoting positive mental health development in young people, through government policies and initiatives (Bergmark et al., 2017; Campion and Knapp, 2018; Vigo et al., 2019).

4.6 Understanding the Developmental perspective for the development of mental health difficulties, in young people.

Similar to the Ecological perspective, researchers have built upon our understanding of the process of risk and resilience for mental health difficulties through a Developmental perspective. Particularly, it was Rutter's

later ideas (2012), and Masten (2011; 2014) who incorporated the Developmental perspective into their understanding of this dynamic process. The ideas proposed through the Developmental perspective has provided an in-depth insight into the development of mental health difficulties. These have aided and informed practice (Taylor and Rogers, 2005; Sameroff and Rosenblum, 2006; Latimer et al., 2012; Lauritzen, 2014; Crawford et al., 2015). Therefore, the current project will consider the Developmental perspective when understanding this dynamic process for the development of mental health difficulties.

The developmental perspective broadly explains that adverse outcomes are likely due to abnormal growth throughout the lifespan. Particularly, genetics and, or environmental events may have changed or disrupted the developmental trajectory of the individual. As a result, the change or disruption may have negatively impacted the individual's developmental processes: such as emotional, social, and behavioural functioning (see chapter 3). Moreover, certain developmental stages within a young person's life may be more sensitive to disruptions than other stages. Particularly, prenatal and early childhood stages are described as sensitive periods for human development. Disruptions that may occur during these early stages may have long-lasting consequences.

As explained early in the current chapter, Rutter provided valuable insights in understanding risk for mental health difficulties (see **Understanding risk for mental health difficulties**). However, the original ideas proposed by Rutter were criticised for ignoring the importance of the young person's development. Thus, Rutter et al.'s (2006b) later conceptualisation of risk for mental health difficulties incorporated a developmental perspective. Within Rutter et al.'s (2006b) later ideas, it was argued that early risk factors may have a greater impact on the development of mental health, compared to factors introduced in school years, or later. This has been supported in research (Yaari et al., 2019; Craig et al., 2017). Also, the importance of early risk factors for mental health difficulties has been acknowledged in professional adult and adolescent mental health practices (Taylor and Rogers, 2005; Sameroff and Rosenblum, 2006; Latimer

et al., 2012; Lauritzen, 2014; Crawford et al., 2015). Therefore, Rutter's later works highlighted the importance of developmental psychology when discussing or identifying young people at risk of mental health difficulties.

Furthermore, Rutter's ideas around resilience for mental health difficulties were built upon by Masten to incorporate a developmental perspective. Firstly, Rutter provided original valuable insight into how resilience, as a positive adaption, might occur. According to Rutter (2006) (and later Rutter, 2012), factors that promote resilience are mental operations that aid the individual to positively adapt from exposure to adversity. These include, but are not limited to, self-esteem, self-efficacy, and problem-solving ability. Research has demonstrated that individual difficulties in mental operations, or 'mental functions', may explain why some young people undergo positive adaption to adversity (Merry and Spence, 2007; Zolkoski and Bullock, 2012; Bleidorn et al., 2016; Abdel-Khalek and Lester, 2017; Di Giunta et al., 2018; Fritz et al., 2018). Therefore, Rutter argues that resilience occurs due to positive mental functioning to overcome risk exposure.

Whilst Masten (2011; 2014) generally agrees with the key ideas proposed by Rutter (2012), it was argued that the developmental perspective has been somewhat ignored. Considering the evidence, Masten (2014: 6) defined resilience as: '…the capacity of a dynamic system to adapt successfully to disturbances that threaten system functioning, viability, or development'. Masten argues that the process of resilience is a functional form embedded in an individual's development. Positive human development may lead to a better innate system to adapt to risk exposure. Yet, disruptions in an individual's development may impede their ability to successfully adapt under exposure to adversity. Thus, individual differences in human development may lead to differences in the functioning of the innate adaptive process that is resilience. Moreover, the effectiveness of resilience, as a functional process, may differ across time and developmental stages. Together, the process of resilience may be due to an innate adaptive system and its effectiveness is influenced by the young person's development.

Masten (2014) argues that understanding the wider development of the young person is important to consider when discussing mental health difficulties. The wider development includes, but is not limited to, young people's cognitive, motor, or linguistic development. Masten argues that the young person’s developmental milestones may somewhat predict the extent to which young people will undergo resilience for mental health difficulties (Masten et al., 1990; Masten et al., 1999; Masten and Reed, 2002; Riley and Masten, 2005; Masten, 2011; Masten and Barnes, 2018). This is supported as, atypically developing children, compared to their typically developing peers, often experience worse mental health difficulties (Cohen et al., 1998; Clegg et al., 2005; Law et al., 2009; Conti-Ramsden et al., 2013; Armstrong et al., 2017b). Therefore, the atypically developing young people may be vulnerable to disruptions to their ability to undergo positive adaption to exposure to adversity.

However, Masten agrees with other key researchers that positive environmental resources may compensate, counteract, or moderate the exposure to risk (Werner, 1982; Garmezy, 1991; Luthar et al., 2000; Ungar, 2004; Rutter, 2006; Rutter, 2012). Healthy relationships and a supportive environment may promote resilience for mental health difficulties in young people. Examples include, but are not limited to, family cohesion, parental relationships, and education. Despite risk exposure, positive environmental resources may improve the young person's ability to successfully adapt in the face of adversity. Also, individual differences in mental operations, such as problem-solving ability may explain difficulties across young people’s ability to overcome adversity. Therefore, whilst atypically developing young people may be more vulnerable to adverse mental health difficulties, positive adaption can still occur with the right support.

4.7 A review of the factors that influence the development of mental health difficulties

The following is a review of the literature which highlights possible risk, promotive and protective factors for mental health difficulties in young people. **Table 1.** provides a summary of this literature. To acknowledge the potential lack of clarity in investigations surrounding promotive and protective factors, the phrase ‘factors which promote resilience’, ‘positive factor for mental health’, or a variation of which may be adopted.

Table 1.

A summary of the possible factors influencing the development of mental health difficulties as highlighted in the literature.

Risk factors for mental health difficulties	Factors that promote resilience for mental health difficulties
Individual factors	
Prenatal conditions	
Infant temperament	
Language difficulties	
Chronic illness	
Gender or biological sex	
Low levels of self-regulation	High levels of self-regulation
Low levels of self-esteem	High levels of self-esteem
Low levels of self-efficacy	High levels of self-efficacy
Low levels of problem-solving ability	High levels of problem-solving ability
Low levels of executive functioning	High levels of executive functioning
Unhealthy sleeping behaviours	Healthy sleeping behaviours
	Cognitive reappraisal
	Frequent exercise
	Educational motivation
	Frequent engagement in leisure activities
	High levels of prosocial behaviour
Family factors	
Main caregivers' psychological distress	
Low maternal attachment	
Conflicts within the family	
Parents with a physical illness	
Parents with substance abuse	
Death of a parent	
Parent engagement	
Household structure	
Abuse	
Domestic violence	
Low levels of parent-child closeness	High levels of parent-child closeness
	Authoritarian parenting styles
	Parental support
Household factors	
Low income*	
Single parenthood*	
Parents with minimum education*	
Unemployment*	
Overcrowding (household)	
Exposure to second-hand smoke	
Peer and community factors	
Being a victim of bullying	
	Safe neighbourhood
	Good school climate
	Teacher and peer support
	Engagement in the community

Note. Some factors appear in both columns. This is to exemplify that these may be promotive factors.

* These factors are also indicators of low socioeconomic status.

4.7.1 *Individual factors*

Pre-natal conditions. It is widely accepted that prenatal conditions are likely to play a role in the development of mental health difficulties in young people (Linnet et al., 2003; Ashford et al., 2008; van den Bergh et al., 2017; Glynn et al., 2018; Easey et al., 2019). Prenatal conditions include maternal stress (van den Bergh et al., 2017); unpredictable mood patterns (Glynn et al., 2018); alcohol use (Easey et al., 2019); and smoking (Linnet et al., 2003; Ashford et al., 2008) during pregnancy. As stated previously, disruptions during the prenatal stage may lead to cascading and long-term consequences upon a young person's mental health development (Huizink and Mulder, 2006; Williams and Ross, 2007; Irner, 2012; Sandtorv et al., 2017; Sandtorv, 2018). Therefore, prenatal conditions should be considered when discussing or investigating mental health development in young people.

Infant temperament. Terrikangas, Aronen, Martin, and Huttunen (1998) concluded that an infant's temperament is likely to predict symptoms of mental health disorders in adolescence. It was found that children with fussy or demanding temperaments, as early as six months old, compared to children who were not, were more likely to experience mental health difficulties at ages 14 to 15 years old. There has been continued support that such temperaments predict mental health difficulties, including externalising and internalising problems, in adolescence (Lahey et al., 2008; Goodnight et al., 2016). Moreover, research by Sayal et al., (2014) found other temperaments that might be early risk factors for mental health difficulties, in young people. These include regularity, adaptivity, and mood temperaments in early childhood. Regularity refers to the predictability in the child's biological functioning. Adaptivity refers to the degree an individual can change to a new environment or situation with ease. Mood refers to the overall description of an individual's manner or feelings. Sayal et al., (2014) also found that at twenty-four months of age, multiple types of temperament were associated with a psychiatric diagnosis at seven years of age.

Therefore, there might be certain temperaments of an infant or child that increases their risk of mental health difficulties in late life.

Language difficulties. Language difficulties experienced by young people should be considered as a risk factor for mental health difficulties in adolescence (Law et al., 2009; Schoon et al., 2010; Mok et al., 2014; Conti-Ramsden and Durkin, 2016). The literature generally demonstrates that young people with atypical language development, displayed as language difficulties, are more likely, compared to their typically developing peers to experience greater severity of mental health difficulties (Cohen et al., 1998; Clegg et al., 2005; Snowling et al., 2006; Law et al., 2009; Whitehouse et al., 2009; Conti-Ramsden et al., 2013; Armstrong et al., 2017b). Therefore, it is generally agreed that language ability is likely to play a role in the development of mental health difficulties (Durkin and Conti-Ramsden, 2010; Conti-Ramsden et al., 2013; Bakopoulou and Dockrell, 2016). Atypical language development is a risk factor for mental health difficulties in young people.

Chronic illness. The presence of long-term or chronic physical illness is a risk factor for mental health difficulties in young people. An extensive amount of literature suggests that young people with long-term or chronic illnesses are at greater risk of mental health difficulties (Butler et al., 2018; Smith et al., 2018). Particularly, Butler et al., concluded that the development of a mental health disorder is likely within young people (6 to 16 years old) with a chronic physical condition. This includes, but is not limited to, food allergy, asthma, and epilepsy. Therefore, the physical wellbeing of young people should be considered when discussing the development of mental health difficulties.

Gender or biological sex. Gender or biological sex differences and mental health is complex (Afifi, 2007). Gender and biological sex each have

separate assumptions on how they impact the development of mental health, in young people. Yet, often these terms are used interchangeably and without clarification upon what is being investigated.

Biological sex refers to but is not limited to, the physical, physiological, and neurological differences between the expression of an individual's sex chromosomes and genetics. When discussing biological sex as a risk factor for mental health difficulties, it is assumed that the differences are due to, in part, the individual's neurology, physiology, and endocrinology (hormones). Whilst contradicted (Romans et al., 2013), this has been supported (Ussher, 1992; Bryant et al., 2014). Therefore, there might be biological differences between males and females that play a role in the development of mental health difficulties, in young people.

Gender refers to the sense of self or identity. Gender is often associated with an individual's biological sex; but not always. Gender assumes that internal and external factors play a role in the development of mental health difficulties. As for internal, mental health difficulties may arise when there is a lack of cohesion between the individual's sense of self and their perceived gender. Lack of cohesion may lead to feelings of internal conflict. As for external, this assumes that the cultural or societal rules and pressures, based upon the individual's perceived gender, negatively impacts their social, emotional, or behavioural functioning. Engagement, or lack thereof, with such rules, may lead to feelings of frustration, as well as a low sense of belonging or acceptance. Research has demonstrated that factors associated with gender may play a role in the development of mental health difficulties in young people (Seedat et al., 2009; Reisner et al., 2016; Assari and Lankarani, 2017; Burger and Scholz, 2018; Crissman et al., 2019).

Together, there is a clear difference between the assumptions between gender and biological sex, and how they impact the development of mental health difficulties. Due to this, researchers ought to be clear in what mechanisms cause, or are correlated with, mental health difficulties in young people.

In typically developing adolescents, it is suggested that differences in gender or biological sex should be considered when discussing specific types of mental health difficulties. The literature generally demonstrates that females exhibit greater internalising problems (emotional) compared to males. In comparison to females, however, males are more likely to experience greater externalising (behavioural) problems. This has been supported (Schuch et al., 2014; Boyd et al., 2015; Gestsdottir et al., 2015). Taken together, gender and biological sex may influence the development of mental health difficulties in young people.

Self-regulation. It is widely accepted that low levels of self-regulation, especially emotional, are associated with mental health difficulties in adolescence (Cole and Deater-Deckard, 2009; Röll et al., 2012). Self-regulation can be loosely described as an individual's ability to manage their impulsive and disruptive emotions and behaviour. The literature generally demonstrates that disruptions in self-regulation is a risk factor for mental health difficulties in young people (Rieffe and De Rooij, 2012; Röll et al., 2012; Eastabrook et al., 2014; Schäfer et al., 2017). Particularly, research demonstrates that lower self-regulation predicts greater severity of internalising and externalising problems. Therefore, disruptions in self-regulation is likely to be a risk factor for mental health difficulties in adolescence.

Furthermore, the literature does demonstrate that greater self-regulation is likely to promote resilience for mental health difficulties (Dias and Cadime, 2017). A systematic review by Zolkoski and Bullock (2012) highlighted that self-regulation must be considered when discussing or investigating factors that promote resilience for mental health difficulties, in young people. Therefore, greater self-regulation is likely to promote resilience for mental health difficulties.

Self-esteem. As described by Blascovich and Tomaka (1991), self-esteem refers to confidence in the individual's abilities and often includes the concept of self-worth. High self-esteem has been found to promote resilience in the face of adversity in children (Zolkoski and Bullock, 2012; Bleidorn et al., 2016; Fritz et al., 2018). Particularly, Arslan (2016) found that high self-esteem is likely to partially mediate the relationship between social, emotional, and behavioural difficulties and psychological maltreatment. Bleidorn et al., (2016) concluded that in young people aged between 14 to 19 who experience maltreatment, high self-esteem is likely to promote resilience for these difficulties. Also, self-esteem is likely a promotive factor for mental health difficulties. A recent review performed by Keane and Loades (2017) concluded that, in young people, low levels of self-esteem predicted greater severity of mental health difficulties; especially internalising problems. Therefore, there is support that self-esteem is a promotive factor that encourages resilience for mental health difficulties (Fritz et al., 2018).

Self-efficacy. As coined by Bandura (1997; 2010), self-efficacy is the individual's belief that they can effectively perform and complete an action or task appropriate for the context of the situation. Self-efficacy is not only associated with how one approaches a task but is linked to the motivation to complete the task. Young people with high self-efficacy are more likely to believe that they can effectively perform said task or action, and the probability of success is high. In return, this belief may increase the motivation to complete the task. This can relate to everyday functioning. If an individual feels incapable of overcoming the everyday stresses and perform the necessary daily activities, then they may be less likely to function adequately. This is supported in the literature (Muris et al., 2001; Tahmassian and Moghadam, 2011; Dupéré et al., 2012; Abdel-Khalek and Lester, 2017; Di Giunta et al., 2018). Overall, high self-efficacy was found to be associated with less severe mental health difficulties. Also, less self-efficacy is associated with greater severity of mental health difficulties. Therefore, high self-efficacy is likely to be a promotive factor that encourages resilience for severe mental health difficulties in young people.

Problem-solving. Problem-solving is loosely described as a cognitive process to establish a solution to an issue or obstacle. This often consists of multiple cognitive skills, such as understanding the issue, analytical or logical thinking skills, and evaluating the effectiveness of solutions, as for a few examples. Young people with better problem-solving abilities will manage better in establishing solutions to issues that are greater in terms of complexity and difficulty. Also, there is a wealth of research demonstrating that better problem-solving skills are associated with less severe mental health difficulties (Vance et al., 2002; Merry and Spence, 2007). Together, this suggests that everyday emotional, social, and behavioural difficulties could be reduced whereby the young person can find a solution to cope with everyday stress. Moreover, lower problem-solving ability might predict a greater severity of mental health difficulties; especially externalising problems (Aebi et al., 2014). Therefore, problem-solving ability may be a promotive factor that encourages resilience for mental health difficulties.

Executive functioning. As explained in detail in chapter 2, executive functioning is the management of a series of cognitive processes to achieve a goal. It encompasses working memory, inhibitory control, and cognitive flexibility. A systematic review by Fritz et al., (2018) concluded that executive functioning, especially cognitive flexibility and reappraisal, is associated with positive mental health. Whilst the relationships may be complex (Wallace et al., 2016), research generally supports the notion that higher functioning is associated with less severe mental health difficulties (Vogan et al., 2018). Moreover, low executive functioning is associated with greater severity of mental health difficulties; especially disruptions in emotional and social functioning (Fujii et al., 2013). Together, the evidence demonstrates that executive functioning is likely to be a promotive factor that encourages resilience for mental health difficulties.

Sleep behaviours. It is widely accepted that young people who engage in healthy sleeping behaviours are less likely to experience mental

health difficulties (Peach et al., 2016; Cairns et al., 2014). Healthy sleeping behaviours include regularly gaining an adequate amount of sleep; lack of disruption during sleeping; as well as an adequate amount of time in which they fall to sleep (sleep latency). A healthy amount of sleep is between eight to nine hours per night, for an adolescent (National Health Service, Online). As for sleep latency, there is a consensus that young people should fall asleep within 15 minutes to be considered healthy (Kirhan and Uzer, 2019); or at least before 45 minutes (Ohayon et al., 2017). Whilst the reason behind why we sleep remains unclear, sleep is likely to be important for our cognitive and behavioural functioning (Blum and Carey, 1996; Paavonen et al., 2002; Sadeh et al., 2002; Turner et al., 2016). Therefore, healthy sleep behaviours might promote optimal functioning. In return, healthy sleep behaviours may increase the young person's ability to manage mental health difficulties.

Coping strategies. Coping strategies are active and conscious solutions or methods to reduce or endure stress, derived from adversity (Kim et al., 2016). Yet, unlike problem-solving ability, coping strategies can be emotional, as well as problem focused (Endler and Parker, 1990; Litman, 2006). Coping strategies may be described as an aspect of cognition, emotional, and behavioural functioning, that has been developed for the young person to cope with past, present, and future stress. These are likely to be apparent from an early age and play a role in young persons' development (Compas et al., 1991).

The literature suggests that effective coping strategies are likely to promote resilience to mental health difficulties (Steinhardt and Dolbier, 2008; Cairns et al., 2014; Bleidorn et al., 2016; Kim et al., 2016; Cheung et al., 2018). Coping strategies are likely to also promote resilience in different at-risk groups. These include individuals from ethnic minority groups (Sanchez et al., 2018), from the Lesbian Gay Bisexual and Trans (LGBT) community (Shilo et al., 2016), as well as, those with a chronic or life-long physical health condition (Burns et al., 2016). Together, the literature demonstrates

that effective coping strategies are likely to promote resilience for mental health difficulties, in young people.

Frequent exercise. Frequent exercise should be considered as a factor that promotes resilience for mental health difficulties, in young people. An investigation by Stathopoulou et al., (2006) found that adults who have been diagnosed with depression and anxiety, experience fewer difficulties if they frequently exercised. Whilst there have been disagreements (Radovic et al., 2017), some researchers recommended that professionals, such as mental health nurses, should promote exercise activities to reduce the severity of depressive symptoms, in adolescents (Carter et al., 2016). Additionally, the relationship between exercise and symptoms of depression and anxiety has been observed in non-clinical samples (Moljord et al., 2014). Exercise increases the release of neurochemicals, such as endorphins and noradrenaline (Basso and Suzuki, 2017). These may increase feelings of self-esteem (Lubans et al., 2016). In return, this may improve one's internalising problems in young people. Together, the positive impact of frequent exercise is likely to promote resilience for internalising problems, in young people.

Educational motivation. Motivation is often described as a stimulating feeling and desire to achieve a goal (Deci et al., 1991). Specifically, the context refers to educational attainment. A student who displays high educational motivation may engage with classroom activities, their teacher, and their assignments, with a high level of effort and persistence. This student could be described as having high self-determination (Deci et al., 1991). Educational motivation may be associated with positive psychological well-being, according to Kaplan and Maehr (1999). As explained, it may be that educational motivation is an indicator of feelings of hopefulness, self-worth, self-efficacy, determination, sense of self, and independence. This is supported by Severino, Aiello, Cascio, Ficarra, and Messina (2011). Severino et al., (2011) found that learning achievement

and educational motivation, increase self-efficacy and locus of control within individuals. Therefore, educational motivation may indirectly promote resilience for mental health difficulties, through the encouragement of positive feelings and self-belief. Hence, educational motivation could a factor that promotes resilience for mental health difficulties, in young people.

Leisure activity. Leisure activities are associated with acts performed during an individual's free time for relaxation or entertainment. This includes reading for fun. Whilst limited, and focused beyond adolescence, the literature suggests that engagement in leisure activities might have a positive impact on an individual's mental health (Ponde and Santana, 2000). This has also been recently supported (Sala et al., 2019). Sala et al., found that leisure activities may improve older adult's mental health, as well as certain cognitive functions. It may be that leisure activities reduce and alleviate stress or provide temporary escapism for everyday distress. Regardless, frequent engagement in leisure-time activity, such as reading for fun, may reduce the likelihood of mental health difficulties.

Prosocial behaviours. Prosocial behaviours are acts that intend to benefit or care for another. Often this includes, but are not limited to, sharing, co-operating with, and helping others. Additionally, this can encompass acts that conform to societal or cultural rules. Thus, prosocial behaviours include acts that are perceived as socially acceptable. A systematic review of the literature highlights that prosocial behaviour is likely to be associated with less severe mental health difficulties in young people (Fritz et al., 2018). Therefore, high displays of prosocial behaviour may promote resilience for mental health difficulties.

4.7.2 *Family factors*

Main caregivers' psychological distress. Another possible risk factor for mental health difficulties in young people is caregivers (primarily mothers) with mental health difficulties; either psychological distress or known disorders. A few studies demonstrate that young people whose mothers reported experiencing mental health difficulties were more likely to experience such difficulties themselves (Ensminger et al., 2003; Wille et al., 2008; Apter et al., 2017). This has had recent continued support (Hope et al., 2019). Hope et al., (2019), through analysing the data collected by the Millennium Cohort Study (see chapter 6), found that caregivers who were likely to have psychological distress, (indicated by the Kessler-6 psychological distress scale) are associated with children with mental health difficulties (as indicated by the Strength and Difficulties Questionnaire). Hope et al.'s (2019), research continues to support the notion that the main caregiver's psychological distress is a risk factor for mental health difficulties in children. This is supported for adolescents (Goodman et al., 2011). Therefore, previous research has established that having a main caregiver who experiences psychological distress is likely to be a risk factor for mental health difficulties in young people.

Low maternal attachment. In the literature, it has been demonstrated that insecure, or low-quality maternal attachments lead to adverse outcomes in children; especially mental health difficulties (Thompson, 2008; Weinfield et al., 2008; Lam et al., 2019; Phua et al., 2020). An insecure attachment could be loosely described as a dependent, fearful and, or avoidant relationship between the birth mother and their infant. The concept and theory of maternal attachment have been discussed and built upon by many researchers and theorists (Bowlby 1979; Bowlby and Ainsworth, 2013; Geddes, 2006; Geddes, 2018). The overarching idea is that the infant or young person has an internal and innate need to bond with the main caregiver. Maternal attachment is an important concept to consider when investigating mental health difficulties in early adolescence (Mikulincer and

Shaver, 2012; Lam et al., 2019). Particularly, insecure attachment styles from the main caregiver (usually the biological mother), are associated with mental health difficulties in young people (Bronsard et al., 2016; Nonnenmacher et al., 2016; Cooke et al., 2019). Therefore, insecure maternal attachment styles are likely to be a risk factor for mental health difficulties among young people.

Conflicts within the family. Another risk factor for mental health difficulties is conflicts within the family. Conflicts within the family involved, but are not limited to, members (regardless of role, or age) engaging in non-peaceful forms of communication. These include arguments around views, ideas, or beliefs. If not resolved, prolonged conflict may increase feelings of avoidance, resentment, and even, anger towards the other family members involved. There is research to suggest that conflict between family members, regardless of engaging in or witnessing, is associated with mental health difficulties in early adolescence, in typically developing children (Repetti et al., 2002; Rice et al., 2006; Wille et al., 2008; Timmons and Margolin, 2015). Witnessing or engaging in family conflict might lead to a seemingly hostile home environment depending on the level of conflict. Engaging in the family conflict could indicate that the young person has difficulties with their mood and regulation (Timmons and Margolin, 2015). However, it is yet to be confirmed whether witnessing and engaging in family conflicts are separate risk factors for mental health difficulties in typically developing adolescents. Yet, regardless of the type, conflict within the family is likely to be a risk factor for mental health difficulties in young people.

Parents with a physical illness. Wille et al., (2008) found that young people (ages between 7 to 17) with parents who had a physical illness, compared to those who did not, were more likely to experience mental health difficulties. The physical illness itself might not have a direct impact on the development of mental health difficulties. Instead, parents with physical illness may change the opportunities, parent-child relationships, and increase

the level of stress, in young people. This may include the child taking carer-like responsibilities, poor parent-child relationship, or lack of parental engagement (beyond care). Therefore, whether it is a direct or indirect impact, ‘parents with a physical illness’ is likely to be a risk factor for mental health difficulties in young people.

Parents with substance abuse. Substance abuse refers to the misuse of psychoactive substances despite harmful consequences to social, physical, financial, or mental health. There has been some supportive evidence that parental substance misuse may impact negatively the development of mental health within young people (Hanson et al., 2006; Bazrafshan et al., 2016; Velleman and Templeton, 2016; McGovern et al., 2018; Wangensteen and Westby, 2019). Especially, parental substance misuse increases the likelihood of behavioural dysfunction (McGovern et al., 2018), as well as, an increased risk of suicide within adolescents (Bazrafshan et al., 2016). It is unsurprising, therefore, that the World Health Organization (WHO) (2019) concluded that parents with substance, including alcohol, abuse is a risk factor for mental health difficulties in young people.

However, there is contradictory evidence that suggests parents with substance abuse might not be a risk factor for mental health difficulties (Wille et al., 2008; Pajarn and Theeranate, 2012). The discussions by Miskell (2014) and Jennison, (2014) might provide insight into why contradictions have been observed in the literature. Miskell (2014) found a relationship between the parent’s motive for their alcohol misuse and the child’s emotional security. The findings suggest that the misuse itself may not be an important factor but, the wider familial context should be acknowledged. This is supported by Jennison, (2014). Jennison found that behavioural problems increased in adolescents whose father misused alcohol. Yet, in these adolescents, other adverse family factors were apparent. These include, but are not limited to, poor marital quality, high levels of conflict, and low family cohesion. The findings suggest that the context of the family environment needs to be considered when discussing the role of parental misuse in the

young person's mental health development. Therefore, contradictions in the literature may be due to the complex nature between (parental) substance abuse and young people's mental health development.

Death of a parent. Experiencing bereavement of a parent is a risk factor for mental health difficulties (specifically emotional problems), and this has been agreed upon for decades (Birtchnell, 1970; Birtchnell, 1972; Birtchnell, 1975; Pfeffer et al., 2000; Fearnley, 2010; McClatchey and Wimmer, 2014; Stikkelbroek et al., 2016). Death of a parent, or family bereavement, likely increases the probability of sleep problems, anger, and irritability temperaments (Silverman and Worden, 1992), as well as lower self-esteem (Mack, 2001). Also, the death of a parent might negatively impact the family environment. Specifically, the death of a parent is associated with loss of income, which may impact parental stress and the socioeconomic status of the young person (Dowdney, 2000; Cerel et al., 2006). In return, bereaved adolescents are more likely to experience internalising problems (Mack, 2001), including severe symptoms of depression (Gray et al., 2011), as well as externalising problems (Silverman and Worden, 1992). It is not surprising that there are many reports, or investigations into possible interventions for these young people (Setou and Takada, 2012; Hidalgo, 2017). Therefore, it is widely accepted that the death of a parent is a likely risk factor for mental health difficulties in young people.

Parental engagement. Parental engagement focuses on social rituals, activities, and traditions as a family unit (Compañ et al., 2002). Whilst limited, there is research to suggest that there is an association between adolescents who have higher reported mental health difficulties and lower parental engagement. Low parental engagement could lead to difficulties in communication between family members. As found by Levin, Dallago, and Currie (2012), difficulties in parent-child communication are associated with lower life satisfaction in typically developing adolescents. This suggests that parental engagement provides opportunities for and enhances the child's

development. Therefore, low parental engagement may increase the likelihood of mental health difficulties in young people.

Household structure. Whilst limited, there is research to suggest that young people who are brought up in a household with no, or limited structure, are likely to experience adverse socio-emotional adjustment (Evans et al., 2005). A lack of or limited household structure might increase the risk of conduct problems, in young people (Steinberg and Avenevoli, 2000; Supplee et al., 2007). Steinberg and Avenevoli argued that the lack of structure could lead to a lack of discipline that corrects the young person's behaviour, where needed. Thus, the young person has been allowed to express themselves in a way rules and social consequences have not been enforced. This might in turn cause conduct problems in later life, such as within school years, due to the sudden importance of structure. Regardless of speculation, the household structure may play a role in the development of mental health difficulties, especially conduct problems, in young people.

Abuse. According to the National Society for the Prevention of Cruelty to Children (NSPCC) abuse is defined as acts against children that have a harmful impact, or intent. The 'abuser' can be either a child or an adult (NSPCC, Online). There is a wealth of research to suggest that child abuse is likely to be a risk factor for mental health difficulties (Salokangas et al., 2018; Widom et al., 2018; Easton et al., 2019). Additionally, young people diagnosed with mental disabilities, specifically intellectual, may experience severe forms of child abuse (Dion et al., 2018). Therefore, child abuse is a risk factor for mental health difficulties; and some children may be more vulnerable to abuse than others.

There are various forms of child abuse. Child abuse encompasses sexual, emotional, physical abuse, and neglect. Firstly, child sexual abuse refers to when the child is forced to take part in sexual activities, and this includes non-physical contact activities (NSPCC, Online). A wealth of studies

demonstrates that sexual abuse is likely to be a risk factor for mental health difficulties in typically developing young people (Kmett and Eack, 2018; Levine et al., 2018; Zeanah and Humphreys, 2018).

Secondly, emotional abuse is whereby an individual intentionally psychologically harms a child. This includes humiliating and shaming them, deliberately scaring or isolating the child (NSPCC, Online). According to the NSPCC however, emotional abuse is the hardest form of abuse to detect (NSPCC, Online). It is unsurprising, therefore, that there is limited research around the impact of emotional abuse and mental health difficulties in early adolescence (Glaser, 2002; Norman et al., 2012). However, emotional abuse can have a detrimental impact on a child's emotional development and regulation (Burns et al., 2010; NSPCC, Online). This suggests that child emotional abuse might have an impact on the developmental foundation of mental health.

Thirdly, according to the NSPCC, child physical abuse is whereby one intentionally hurts and injures a child. This includes, but is not limited to, deliberately hitting and burning a child (NSPCC, Online). Similarly to the research into sexual abuse, there is an extensive amount of research indicated that physical abuse is a risk factor for mental health difficulties in typically developing young people (Norman et al., 2012; Sugaya et al., 2012; Nilsson et al., 2017).

Lastly, child neglect encompasses the continued lack of providing the basic needs of the child. This includes, but is not limited to, food, education, supervision, health care, and attention (NSPCC, Online). Neglect is the most common form of child abuse (NSPCC, Online). Similar to the other forms of abuse, there is extensive research to suggest that neglect is a risk factor for mental health difficulties in young people (Norman et al., 2012; Geoffroy et al., 2016; Zeanah and Humphreys, 2018).

Domestic violence. Domestic violence negatively impacts the mental health development of typically developing young people (Turner et al., 2006; Meltzer et al., 2009; Artz et al., 2014). Domestic violence is a series of acts

from a partner, ex-partner, family member, or carer to another adult, which underpin a controlling, coercive, and harmful intent (Women's Aid, Online). Research by Meltzer et al., (2009) found that domestic violence is a risk factor for mental health difficulties in typically developing children. Therefore, domestic violence is likely to play a role in the development of adverse mental health in young people.

Further research, however, should acknowledge the currently unclear relationship between domestic violence and internalising and externalising difficulties. There is some debate around what manifestations of mental health difficulties are influenced by domestic violence. Meltzer et al., (2009) found that domestic violence is a risk factor for conduct disorder (externalising problem) in children. On the contrary, Turner et al., (2006) found that young people who had reported having witnessed family violence were more likely to have higher levels of depression and aggression, compared to those who did not. Whilst the high levels of aggression are expected; higher levels of depression were not. One explanation of the difference between research findings is the inclusion of adolescents within Turner et al.'s research sample. It could suggest that emotional problems might be more apparent in adolescents, compared to children. Therefore, emotional problems might be a long-term consequence of domestic violence.

Parent-child closeness. Parent-child closeness is loosely described as the family bond that is supportive, warm, and responsive to the young person's needs. The literature suggests that greater parent-child closeness is likely to reduce the experience of severe mental health difficulties. This includes internalising and externalising problems (Miller-Lewis et al., 2013; Fritz et al., 2018; Tamura, 2019). Yet, it may be that low parent-child closeness predicts severe mental health difficulties in young people (Chen et al., 2017). This is not surprising as it was previously explained that low maternal attachment is a risk factor for mental health difficulties. Low levels of maternal attachment include a lack of parent-child closeness. Therefore, parent-child closeness is likely to be a promotive factor that encourages

resilience for mental health difficulties in early adolescence. However, due to the possible connection to low maternal attachment, this factor should also be considered as a risk factor for mental health difficulties.

Authoritative parenting. There is evidence to suggest that authoritative parenting styles promote resilience for mental health difficulties in adolescence (Zolkoski and Bullock, 2012; Cairns et al., 2014). This concept refers to highly responsive parenting styles whereby there is successful enforcement of boundaries. Parents who display this type of parenting are often described as strict, but also warm, supportive, and responsive to their children. This is different from 'authoritarian' parenting styles, whereby they are described as strict, but not warm, supportive nor responsive to their children. The literature suggests that children raised by authoritative parents are less likely to experience mental health difficulties in adolescence (Xiong et al., 2020). This includes internalising and externalising difficulties. Therefore, authoritative parenting is likely to promote resilience for mental health difficulties in early adolescence.

Parental support. Parental support is likely to promote resilience for mental health difficulties in adolescence. Parental support, whilst arguably subjective, loosely refers to parental guidance, advice, encouragement for when the young person experiences challenges in their life. Additionally, parental support may increase feelings of acceptance or a sense of belonging in the family unit. A wealth of literature demonstrates that children with supportive parents, compared to those without, experience less severe mental health difficulties in adolescence (Stadler et al., 2010; Cairns et al., 2014; Collishaw et al., 2016; Fritz et al., 2018). Therefore, supportive parenting styles might promote resilience for mental health difficulties.

4.7.3 *Household resources*

Low socioeconomic status. Low socioeconomic status (SES) may be a risk factor for mental health difficulties in young people. SES refers to the abstract social class of an individual or a specific group. SES is likely to have an impact on the availability of advantageous opportunities and resources. In those considered to be of low SES, this is likely to be limited (Bradley and Corwyn, 2002). Low SES is generally associated with mental health difficulties in young people (Wille et al., 2008; Reiss, 2013; Bøe et al., 2014). Therefore, the reduction of available opportunities and resources may disrupt the developmental foundation of mental health.

However, the indicators of SES may more important to consider than the overarching label. A systematic review by Reiss (2013) accurately explains that low socioeconomic status is often indicated through low income; single-parent household; parents with minimum education; and, or, unemployed parents. The separate indicators for low SES have been identified as independent risk factors for mental health difficulties, in typically and atypically developing young people (Wille et al., 2008; Gray et al., 2012; Park et al., 2013; Bøe et al., 2014; Heinrich, 2014; Zilanawala et al., 2015; Hodgkinson et al., 2017). Yet, in those diagnosed with Autism, Grey et al., concluded that low income was an important risk factor for mental health difficulties. Grey et al.'s findings suggest that the indicators of SES might be more important to consider, compared to SES as an overarching concept, in this population. Therefore, instead of low SES as a single overarching factor, it might be beneficial to investigate the separate indicators, especially when investigating mental health difficulties in atypical samples.

Yet, as acknowledged in the literature, factors that indicate low SES may interact and influence each other (Darin-Mattsson et al., 2017; Maselko et al., 2018). For instance, low income may be due to unemployed parents, or a single-parent household. Additionally, family and factors, such as parents with physical illness and, or psychological distress, may explain why parents are unemployed. Yet, indicators of SES might be associated with factors from the home environment. For instance, low income and single-parent

households may increase the likelihood of parental psychological distress. Therefore, similar to many risk and positive factors reviewed in the current section, factors may influence each other.

Low income. Low income is associated with mental health difficulties in young people (Larson and Halfon, 2010; Eaton et al., 2011; The Children's Society, Online). In the United Kingdom, low income is defined as whereby an individual earns below 60% of the national mean living wage (Francis-Devine et al., 2019). Low household income is often an indicator for a young person living in poverty. Young people living in poverty means that there is not enough household income to buy or possess the materials for their personal needs. It is known that living in poverty is associated with mental health difficulties (Elliott, 2016; The Children's Society, Online). Low income, and thus poverty, may reduce the opportunities, resources, stimulation available to the young person. The lack of such may harm the young person's ability to build a strong emotional, social, and behavioural foundation. Therefore, low income is likely to increase the risk of mental health difficulties in young people.

Single parenthood. Another risk factor for mental health difficulties, which is an indicator of low socioeconomic status, is single parenthood. Single parenthood is whereby one individual lives with and cares for a child or children. Research has found an association between growing up in a single-parent household and mental health difficulties in typically developing adolescents (Fergusson et al., 2007; Wille et al., 2008; Reiss, 2013). Single-parent households are likely to be associated with low income and a limit of resources or opportunities. Additionally, a single-parent household may be associated with an increase in parental stress. Therefore, single parenthood is likely to be a risk factor for mental health difficulties.

Parents with minimum education. In the United Kingdom (UK), minimum education refers to the attainment of qualifications through compulsory education. Currently, in the UK, compulsory education is completed between the approximate ages of five and eighteen (Ministry of Education, 1998). For children born before September 1997, compulsory education was to be completed between five and sixteen. Whilst perhaps indirect (Bøe et al., 2014), young people who have parents with minimum education are more likely to exhibit mental health difficulties (McLaughlin et al., 2012; Reiss, 2013; Bøe et al., 2014). Compared to higher education, minimum education may reduce the opportunities and resources available to the child. Therefore, parents with minimum education may be a risk factor for mental health difficulties in young people.

Unemployed parents. Young people who have unemployed parents are more likely to experience mental health difficulties, compared to peers whose parents are employed (Sleskova et al., 2006; Frasquilho et al., 2016; Frasquilho et al., 2017). Unemployment is associated, quite naturally, with lower income. Additionally, there could be reasons as to why the parent is unemployed, which may impact the young persons' mental health development. This includes, but is not limited to, parents with severe and persisting psychological distress, or physical illness, which is debilitating enough so that the individual cannot work (Christoffersen, 1994; Frasquilho et al., 2016). Regardless, there may be a link between parents who are unemployed and mental health difficulties in young people; although, this connection may be indirect.

Overcrowding. Overcrowding refers to a household that has more current residents than there is space or sleeping areas. Whilst limited, overcrowding has been highlighted as an independent risk factor for mental health difficulties in typically developing adolescents (Gove et al., 1979). This has been supported recently (Adegoke, 2014; Pepin et al., 2018). Yet, overcrowding may be associated with sibling bullying, inter-family conflict,

and lack of resources which in turn negatively impacts the development of mental health. Therefore, whether it is indirect or direct, there is a plausible connection that exists between overcrowding within households and an increased likelihood of mental health difficulties, in young people.

Exposure to second-hand smoke. Exposure to second-hand smoke in the household may impact the development of certain mental health difficulties in young people (Bandiera et al., 2011; Padrón et al., 2014; Padrón et al., 2016). Second-hand smoke exposure is whereby smoke from a burning tobacco product is inhaled by another individual (Centers for Disease Control and Prevention, Nodate). Findings by Bandiera et al., (2011) found that second-hand smoke exposure is a risk factor for conduct disorder and attention-deficit/hyperactivity disorder (AD/HD). This implies that second-hand smoke exposure might not be associated with emotional, or general mental health difficulties. Instead, it is associated with certain forms of mental health difficulties, such as externalising problems. In part, this has been supported (Padrón et al., 2016). Using the Strength and Difficulties Questionnaire (2001), Padron et al., found that exposure to second-hand smoke in their household are associated with AD/HD, but not conduct and nor emotional disorders, within children. Therefore, second-hand smoke exposure is likely to be a risk factor for externalising difficulties, especially hyperactivity and inattention, in young people.

The reason why second-hand smoke exposure might negatively impact young people's mental health development is unknown. Smoking behaviours are associated with low socioeconomic status (SES) (Crittenden et al., 2007; Tsourtos and O'Dwyer, 2008). It may be that second-hand smoke exposure, as an association with mental health difficulties in young people, is a proxy for low SES. However, there is a growth in the literature demonstrating that second-hand smoke, as a harmful chemical exposure negatively impacts the child's neurological, or neurochemical development (Pagani, 2014). Consequently, disruptions in brain development, due to harmful chemicals, may increase the risk of developing mental health difficulties in young people

(Swan and Lessov-Schlaggar, 2007; Dwyer et al., 2009; Heath and Picciotto, 2009; Chen et al., 2015). Moreover, research has demonstrated that the disruptions to a young person's neurodevelopment, through exposure to second-hand smoke, increase the likelihood of developing AD/HD (Dunn and Bennett, 2002; Little et al., 2018). Together, more research is needed to determine why exposure to second-hand smoke is associated with mental health difficulties in young people. For now, researchers should be aware of the uncertainty.

4.7.4 *Peer and community factors*

Being a victim of bullying. Bullying is an act of deliberate emotional, social or physical harm. This includes, intimidating, insulting, humiliating, or harming another individual. There is a wealth of research indicating that being a victim of bullying (bully victimisation) is a risk factor for mental health difficulties in young people (Arseneault et al., 2010; Copeland et al., 2013; Takizawa et al., 2014). Additionally, Arseneault et al., (2010) emphasised that bully victimisation has a persisting effect on young people's mental health development. Therefore, bullying victimisation is likely to be a risk factor for mental health difficulties in young people.

Furthermore, since the readily accessible use of the internet, cyberbullying has emerged. This presents as similar acts as bullying, yet it is performed through a digital medium: phone calls and texts, and social media, for instance (Smith et al., 2008; Agatston et al., 2012; Kowalski et al., 2012). There is growing research that indicates that cyberbullying is a risk factor for mental health difficulties in typically developing children (Suzuki et al., 2012; Bannink et al., 2014; Bottino et al., 2015). Therefore, similar to 'traditional bullying' (Kowalski and Limber, 2013), cyber-bullying victimisation is likely to be a risk factor for mental health difficulties, in young people.

Safe neighbourhood. A safe neighbourhood is described as a community with little criminal activity. Within this community, young people may feel secure and accepted (Flouri et al., 2015a). Safe neighbourhoods, or the subjective perception of which, are associated with less severe mental health difficulties in adolescences (Ziersch et al., 2005; Flouri et al., 2015a). Therefore, living in a safe neighbourhood is likely to promote resilience for mental health difficulties in adolescences.

Good school climate. School climate is difficult to define. As referred to by Cohen, McCabe, Michelli, and Pickeral (2009: 182) school climate is... 'the quality and character of school life'. Whilst broad, it encompasses a wide range of concepts that may influence school life. This includes the young person's experience of and engagement in school; engagement with peers; teaching styles; and organisational structure. There has been continued support demonstrating that school climate was associated with less severe mental health difficulties in adolescence (Aldridge and McChesney, 2018). Therefore, a good school climate is likely to promote resilience for mental health difficulties, in young people.

Additionally, it is important to acknowledge how the school environment may play a role in the development of mental health difficulties in young people. It is generally accepted that for many young people schools may provide a secure base, outside of their family unit (Geddes, 2006; Carpenter et al., 2017; Zsolani & Szabó, 2020). This means that the young person feels that their school environment fulfils their basic needs, protects them from harm and provides them with the resources to build upon their abilities (reading, mathematics and social) under careful and supportive supervision. Moreover, the school environment may be the first secure base for children whose home environment is not considered safe, supportive, or able to fulfil their basic needs**.** Therefore, researchers should acknowledge that the school environment, such as school climate, might play a vital role in children's development, including mental health development (Geddes, 2006; Carpenter et al., 2017; Zsolani & Szabó, 2020). This includes providing

young people with resources to increase the likelihood of resilience for mental health difficulties.

Teacher and peer support. As described previously, support refers loosely to concepts around encouragement, guidance, and acceptance, when a child experiences a challenge or adversity. Children are likely to form relationships with individuals other than their parents, such as teachers and peers, which may also be considered supportive. Whilst limited, the literature does suggest that teacher and, or peer support is associated with less severe mental health difficulties (Stadler et al., 2010). It was found that school (teacher) and peer support might actively protect against being a victim of bullying. Regardless, teacher and peer support are likely to reduce the likelihood of severe mental health difficulties, despite risk exposure. Therefore, teacher and peer support are likely to promote resilience for mental health difficulties, in young people.

Engagement in the community. Engagement within the community is likely to promote resilience for mental health difficulties (Zeldin, 2004; Rothon et al., 2012; Russell and Gordon, 2017; Abdel-Khalek and Tekke, 2019). Specifically, frequent participation in organised activities, within a church (religious), or youth clubs (non-religious), such as sports or music, predicts less severe mental health difficulties in young people. Arguably, it is the sense of belonging to a group that is associated with less severe mental health difficulties in early adolescence (Cairns et al., 2014; Scarf et al., 2016; Fritz et al., 2018; Koni et al., 2019).

4.8 Chapter conclusion

Firstly, in the current chapter, key terms such as ‘risk’ and ‘resilience’ for mental health difficulties were defined. Additionally, the cumulative risk hypothesis was explained.

Secondly, the literature around risk and resilience for mental health difficulties, in young people, was discussed. Risk and resilience for mental health difficulties is likely to be a dynamic process.

However, future researchers should provide some indication of the assumptions or models adopted in their investigations, for the process of resilience for mental health difficulties. Considering this, the Protective model of resilience for mental health difficulties will be adopted for the present project. Within this model, factors may have a promotive or protective mechanism for encouraging resilience for mental health difficulties. Promotive is independent and opposite risk factors; thus, they compensate for risk exposure by encouraging positive mental health. Protective factors interact with the risk exposure, to disrupt or dampen adversity. The definition of risk factors does not differ across models explained by Zimmerman et al., (2013). Risk factors are events, circumstances or situations that increase the likelihood of an adverse outcome.

Lastly, the Ecological and Developmental perspectives have been embedded in our current conceptualisation of risk and resilience for mental health difficulties. The ideas and assumptions that stem from these perspectives have been accepted by researchers and have informed professionals within practice. These perspectives were explained and briefly discussed in the current chapter and will be considered within the present project.

5 Risk and resilience for mental health difficulties, in young people diagnosed with DLD

5.1 Introduction

In the previous chapter, risk and resilience for mental health difficulties in young people were defined, reviewed, and discussed. The current chapter will review the literature around risk and resilience for mental health difficulties, specifically within young people diagnosed with DLD. Whilst limited, the literature has identified some factors that are likely to influence this dynamic process. Following this, the rationale for the present project will be explained and justified. Lastly, the chapter will conclude by clearly stating the aim and objectives of the current project.

5.2 Risk and resilience for mental health difficulties, in DLD

The literature around risk and resilience for mental health difficulties, in young people diagnosed with DLD, is somewhat limited. Yet, there has been a recent growth in investigations that attempt to identify early risk factors and school-age factors that encourage resilience for mental health difficulties in this population. Early risk factors often include events or circumstances that increase the likelihood of an adverse outcome, that occur during the sensitive stages of an individual's development. This generally includes during pregnancy (prenatal factors) and within the first five years of life (early childhood).

School-age factors may refer to resources and opportunities that are available once the young person's social world has been opened to include peers and their community (school). As explained in chapter 2, at age five, the young person enters compulsory education. This expands the young person's social environment, allowing them to navigate through and use different psychosocial resources to promote resilience for mental health difficulties. School-age factors include individual differences in mental

operations, which may have been developed through the resources and opportunities available upon entry to compulsory education.

In the following section, a review will be performed around the factors that encourage risk and resilience for mental health difficulties, in young people diagnosed with DLD. The table below (**Table 2.**) provides a summary of the factors that have been identified to influence risk or resilience for mental health difficulties, in young people who are, or are likely to be diagnosed with DLD.

Table 2.

A summary of the possible factors influencing the development of mental health difficulties, in young people diagnosed with DLD, as highlighted in the literature.

Early risk factors for mental health difficulties	School-age factors that promote resilience for mental health difficulties
Low-quality relationships	
Low emotional regulation	
High levels of maternal distress	
Gender differences	
	High displays of prosocial behaviour
	High levels of self-efficacy
	High levels of self-esteem

5.2.1 *Early risk factors for mental health difficulties, in DLD*

Whilst limited, there has been a recent growth in the literature around early risk factors for mental health difficulties, in young people diagnosed with DLD (van den Bedem et al., 2018; van den Bedem et al., 2018; St Clair et al., 2019). Particularly, some early risk factors for mental health difficulties, in this group, have been identified. These include low-quality relationships with peers and parents; low emotional regulation; and, to some degree, maternal stress, and gender differences.

5.2.1.1 **Low-quality relationships.**

As alluded to in chapter 3, relationships may play an important role in the development of mental health difficulties, in young people diagnosed with DLD. It is unsurprising, therefore, that low-quality relationships have been investigated as potential early risk factors for mental health difficulties in this group. Particularly, there has been a focus on peer and parent-child relationships. St Clair et al., (2019) found within children (at age five) who were at risk of Developmental Language Disorder (rDLD), low-quality peer and, or parent relationships predicted significantly greater severity of emotional problems. St Clair et al., (2019) suggests that within children rDLD peer and parent-relationship may be early risk factors for emotional problems. This supports the previous literature around the quality of relationships and, mental health and DLD. Therefore, low-quality peer and parent relationships are likely to be early risk factors for mental health difficulties, in young people diagnosed with DLD.

The findings from Wadman et al.'s research support the conclusions by St Clair et al., (2019). Whilst it was not investigated as an early risk factor, being a victim of bullying might have a detrimental impact on mental health development, in young people diagnosed with DLD. There is evidence that being a victim of bullying ('bully victimisation') is associated with greater severity of internalising problems, in young people diagnosed with DLD (Wadman et al., 2011). This supports the research by St Clair et al., (2019), as being a victim of bullying could be a manifestation of low-quality peer relationships or, at least, peer problems.

However, the relationships between bullying victimisation and internalising problems are likely to be complex. Kilpatrick, Leitao, and Boyes (2019) found internalising problems was only significantly predicted by high reports of bullying victimisation, in young people diagnosed with DLD. This interaction effect, as a predictor of internalising problems, was not found in young people without a diagnosis of DLD. Also, in young people diagnosed with DLD, low reports of bully victimisation did not significantly predict internalising problems. Together, Kilpatrick et al.'s (2019) findings suggest that bully victimisation plays an interactive role with the difficulties associated with a diagnosis of DLD, such as language ability, to negatively impact the development of mental health. Yet, as discussed by Kilpatrick et al., (2019), more research is needed to understand the possible interactive role between risk factors and mental health difficulties, within DLD. As for now, researchers should be aware of this when investigating the role of bullying victimisation and internalising problems, in young people diagnosed with DLD.

Furthermore, being a victim of bullying may not predict externalising problems, in young people diagnosed with DLD. Whilst not the aim of the investigation, Kilpatrick et al., (2019) did not find that bully victimisation predicted externalising problems, in young people diagnosed with DLD. This suggests that there may be different risk factors for differing manifestations of mental health difficulties, in young people diagnosed with DLD. This is similar to typically developing children (see chapter 4). Therefore, there may that certain risk factors (including early risk factors) influence certain manifestations of mental health difficulties, in young people diagnosed with DLD.

5.2.1.2 **Emotional regulation.** Emotional regulation may play a role in the development of mental health difficulties, in young people diagnosed with DLD (van den Bedem et al., 2018; St Clair et al., 2019). A salient piece of research by van den Bedem et al., (2018) investigated the role of emotional regulation in the development of depressive symptomatology in young people (mean age 11.5 years) diagnosed with DLD. It was found that young people

who used positive strategies (challenging the problem) were reported to have a reduction in symptom severity. Young people with negative strategies (worrying and exhibiting behavioural problems) were reported to have greater symptom severity. This has been supported by St Clair et al. (2019) as an early risk factor (up to age five) in this population. Together, the findings suggest that emotional regulation strategies might play a role in the development of depression, in young people diagnosed with DLD.

However, emotional dysregulation may not be an early risk factor for emotional problems, in all samples of DLD. In St Clair et al.'s (2019) study, to some extent, there were two samples of young people at risk of DLD (rDLD). Firstly, rDLD included children (at age five) whose main caregiver reported concerns relating to their language development; or who performed significantly below on the Naming Vocabulary subtest. Another sample of children rDLD was selected, based solely upon the Naming Vocabulary subtest performance. These children will be known as 'rDLD-NV'. St Clair et al., (2019) found that emotional regulation significantly predicted emotional problems in young people rDLD. However, this was not found for young people rDLD-NV. The findings suggest that the identification of early risk factors may differ depending upon the language difficulties experienced in young people diagnosed (or at risk of) DLD.

5.2.1.3 **Maternal distress.** Whilst the research is limited, maternal distress should be considered when discussing mental health difficulties in young people diagnosed with DLD. It is known that maternal distress (including psychological distress) increases the likelihood of mental health difficulties in young people (Ensminger et al., 2003; Wille et al., 2008; Apter et al., 2017; Masarik & Conger, 2017; Hope et al., 2019; Jones et al., 2021). Whilst the parent-child relationship ought to be considered (Davis et al., 2017; Jones et al., 2021), parental stress may lead to physiological changes within the infant, child and or adolescent, which in return leads to mental health difficulties (Waters, West & Mendes, 2014). A salient research by Waters et al., (2014) concluded that infants, either through visual and, or

verbal cues, have a physiological reaction to the maternal distress, without being exposed to the stressful event themselves. This is also described as stress, or affect cognation (Waters et al., 2014), whereby one individual reactively reflects the distress experienced by another. The notion that stress contagion plays a role in the development of mental health difficulties in young people is generally supported (Crum and Moreland, 2014; Hyang et al., 2014; Hooper et al., 2015; Harmeyer et al., 2016; Masarik & Conger, 2017; Jones et al., 2021). Therefore, parental stress is likely to impact the development of mental health difficulties in young people.

Considering the literature in typically developing young people, parental stress should be considered when understanding early risk of mental health difficulties in those diagnosed with DLD. Research by Lisa, Pola, Fran, and Jessica (2019) found that, compared to typically developing peers, mothers of those diagnosed with DLD were reported to experience greater stress. Lisa et al., concluded that the additional stress was derived from concerns around the child's level of functioning, their prospects, education attainment, as well as their independence. Also, it was highlighted that the stress may stem from the additional support that young people diagnosed with DLD require. Therefore, parents of young people diagnosed with DLD may experience greater feelings of stress due to the additional parental concerns, and support needed for their children. The greater stress experienced by the parent may influence the level of physiological stress experienced by the young person diagnosed with DLD. In return, parental stress, including maternal psychological distress, may increase the likelihood of mental health difficulties in this population. Together, there is a need to consider maternal distress, as an early risk factor for mental health difficulties in young people diagnosed with DLD.

5.2.1.4 **Gender differences.** In typically developing young people, it is known that gender (or biological sex) may influence the likelihood of internalising or externalising problems (Schuch et al., 2014; Boyd et al., 2015; Galderisi et al., 2015). Yet, in young people diagnosed with DLD, this

has been contradicted (Conti-Ramsden and Botting, 2008). Research by Conti-Ramsden et al., (2008) found that the gender of the young person did not predict the emotional problems, in this group. This means that gender may not play a role in the development of mental health difficulties, in young people diagnosed with DLD. However, within the discussion, it was suggested that more research is needed before strong conclusions around gender and mental health difficulties, in young people diagnosed with DLD, can be drawn. Hence, future research should determine if certain genders (or biological sex) are early risk factors for internalising or externalising problems, in these young people.

5.2.2 *Factors that promote resilience for mental health difficulties, in DLD*

Whilst limited, investigations have highlighted factors that may encourage resilience for mental health difficulties in young people diagnosed with DLD. These factors are high levels of prosocial behaviour; self-efficacy; and self-esteem.

However, similar to the literature around typically developing young people, the mechanism in which resilience occurs is not always explicitly stated by researchers. Additionally, the terms ‘promotive’ and ‘protective’ factors may be adopted interchangeably and without definition. This will be considered when reviewing the factors that are likely to encourage resilience for mental health difficulties, in young people diagnosed with DLD.

5.2.2.1 **Prosocial behaviour.**

Research by Toseeb et al., (2017) highlights the importance of prosocial behaviours in the role of mental health difficulties in young people diagnosed with DLD. It was found that those who self-reported that they were more prosocial (prosocial perception), compared to peers who did not experienced less severe social problems. This has been supported recently by Toseeb and St Clair (2020). Toseeb and St Clair found

that in children (at age five) at risk of DLD, those who were reported to display high levels of prosocial behaviour, experienced less severe social and emotional difficulties during late childhood. Together, the findings suggest that prosocial behaviour reduces the likelihood of severe internalising (social and emotional) problems, in young people diagnosed with DLD.

However, the described relationship between prosocial behaviour and mental health difficulties may be complex. Toseeb and St Clair (2020) found that internalising scores were not associated with prosocial behaviour, during early childhood. Yet, this association was found in late childhood. This suggests that factors that promote resilience for mental health difficulties, may differ across developmental stages. This is acknowledged by key theorists around risk and resilience for mental health difficulties, in all young people (Luthar et al., 2000). It is unknown why prosocial behaviour was not associated with less severe internalising problems (emotional and social) in early childhood. As for now, future researchers should acknowledge that the developmental stage may impact the findings from investigations into factors that promote resilience for mental health difficulties, in young people diagnosed with DLD.

Additionally, it is inconclusive whether prosocial behaviour reduces the likelihood of severe externalising problems, in young people diagnosed with DLD. In Toseeb et al.'s (2017) investigation, a significant relationship was not found between higher prosocial perception and fewer behavioural difficulties, specifically, aggression and rule-breaking behaviours. This demonstrates that certain factors may influence the development of certain manifestations of mental health difficulties within young people diagnosed with DLD. However, recent evidence contradicts Toseeb et al., (2017) findings. Research by Toseeb et al., (2020) found that higher levels of prosocial behaviour predicted less severe externalising problems, in this group of young people. Therefore, it is inconclusive whether prosocial behaviours predict less severe externalising problems, in young people diagnosed with DLD.

There is perhaps some insight into the mechanism in which prosocial behaviour encourages resilience for mental health difficulties in young people diagnosed with DLD. Research by Toseeb and St Clair (2020) found that low levels of prosocial behaviour, in children at risk of DLD, were not associated with greater severity of emotional and social problems. This could suggest an interaction effect between prosocial behaviour and the adversity experienced by young people at risk of DLD, as a predictor of emotional and social problems. Hence, prosocial behaviour may not simply encourage positive mental health development, like a promotive factor. Instead, it might be that, in this group, engagement in high levels of prosocial behaviour might counteract the adversity and vulnerability that stems from experiencing language difficulties. It could be argued that prosocial behaviour might be a protective factor for mental health difficulties, in young people diagnosed with DLD. Regardless, prosocial behaviour, may be considered as a relative strength for the development of positive mental health, in young people diagnosed with DLD.

It is uncertain why prosocial behaviour seems to be a strength in young people diagnosed with DLD. As explained by Fujiki et al., (1999), prosocial behaviour is associated with language ability. As young people diagnosed with DLD experience language difficulties, they, as a group, might be less able to engage in prosocial behaviours, compared to typically developing peers. This has been supported (Fujiki et al., 1999; Toseeb and St Clair, 2020). Particularly, Toseeb and St Clair (2020) found that children, at age five, at risk of DLD (rDLD), compared to the general population, were reported to display less prosocial behaviours. Therefore, young people diagnosed with DLD experience difficulties to engage in prosocial behaviours, compared to the general population.

However, young people diagnosed with DLD may not believe they are less prosocial than their peers. Toseeb et al., (2017) found that, as a group, self-reports of prosocial behaviour between adolescents diagnosed with DLD, and their typically developing peers, did not significantly differ. In Toseeb et al.'s (2017) discussion, it was noted that not all forms of prosocial behaviour require language ability. There may be forms of prosocial behaviour that are

not assessed in self- or parent-reports, which assess prosocial behaviour. Together, the reason why prosocial behaviour plays an important and complex role in the development of mental health, in young people diagnosed with DLD, is unknown.

5.2.2.2 **Self-efficacy.** Self-efficacy may be a factor that encourages resilience for emotional problems in individuals diagnosed with DLD. As explained in the previous chapter, self-efficacy is the belief or confidence in one's self that they can achieve a goal, target, or action. Whilst focusing upon young adults (age 24), Botting et al., (2016) found that high reports of self-efficacy were associated with less severe emotional problems. Specifically, there was a reduction in symptom severity of depression and anxiety. Therefore, it is suggested that self-efficacy might promote resilience for internalising problems in young people diagnosed with DLD. However, as acknowledged with Botting et al.'s (2016) discussion, the mechanism to which self-efficacy promotes resilience for mental health difficulties (emotional), is yet unknown.

5.2.2.3 **Self-esteem.** Whilst contradicted, high self-esteem may encourage resilience for mental health difficulties, in young people diagnosed with DLD. Self-esteem refers to ones' confidence in their abilities and often includes the concept of self-worth. There is evidence to suggests a plausible connection between self-esteem and mental health difficulties, in young people diagnosed with DLD (Zolkoski and Bullock, 2012; Fritz et al., 2018). Particularly, high self-esteem is associated with less severe mental health difficulties. However, this evidence has been contradicted (Kilpatrick et al., 2019). In Kilpatrick et al.'s investigation, high levels of self-esteem did not significantly predict less severe mental health difficulties, in young people diagnosed with DLD. Future research is needed to determine whether higher levels of self-esteem reduces the severity of mental health difficulties, in this population.

5.2.3 *A summary of the literature around risk and resilience for mental health difficulties, in young people diagnosed with DLD.*

The current literature does highlight possible early risk factors for mental health difficulties, within young people diagnosed with DLD. These include low-quality peer and parent relationships; low emotional regulation; and, to some degree, maternal stress, and gender differences. Additionally, the literature highlights factors that might encourage resilience for mental health difficulties, in young people diagnosed with DLD. These include high levels of prosocial behaviour, self-efficacy, and self-esteem as likely factors that promote resilience for mental health difficulties. Whilst there is speculation, it is inconclusive as to how these factors may encourage resilience for mental health difficulties.

Overall, the previous literature has been able to identify some factors that could be incorporated into practice to identify 'at-risk' young people diagnosed with DLD, for mental health difficulties in late childhood and, or into adolescence. In doing so, professionals could identify young people diagnosed with DLD who may require additional support and, or, early interventions for mental health difficulties. Additionally, the previous literature has been able to identify some factors that could be incorporated into tailorable interventions for mental health difficulties, for this population. In return, such interventions may become effective for reducing the severity of, or even preventing severe and persisting mental health difficulties in young people diagnosed with DLD. Therefore, whilst limited, the previous literature around risk and resilience for mental health difficulties, in those diagnosed with DLD, has highlighted important implications for supporting these young people in practice. However, as alluded throughout the previous section, more research is needed to understand risk and resilience for mental health difficulties, in young people diagnosed with DLD.

5.3 The rationale for the current project

As stated by St Clair et al., (2019: 2768), the findings derived from their analysis...

'…may be one piece of the puzzle that helps to move the field towards effective preventative approached to management of emotional difficulties in children with DLD.'

St Clair et al., (2019) recognised that there are gaps within the previous literature around risk and resilience for mental health difficulties in young people diagnosed with DLD. This is perhaps due to the current lack of research in this area. There is a need to build upon our current knowledge of this dynamic process in young people diagnosed with DLD. As stated previously, understanding risk and resilience for mental health difficulties, in young people diagnosed with DLD, has practical implications. Understanding factors that influence the development of mental health in this population might later inform professional practice in identifying and supporting high-risk individuals.

Considering the lack of literature, the current project will provide a greater and in-depth understanding of risk and resilience for mental health difficulties in young people diagnosed with DLD, by incorporating the ideas drawn from the vast amount of literature around this dynamic process. Particularly, the current project will attempt to understand the developmental context of young people diagnosed with DLD, when investigating their development of mental health difficulties. Secondly, there are known factors, such as prenatal and community factors, that may influence risk and resilience for mental health difficulties in typically and atypically developing young people. Yet, before the present project, it is unknown whether they play a role in the development of mental health difficulties in young people diagnosed with DLD. Additionally, as it has yet to be investigated, the present project will provide an insight into how these factors may operate. Alongside these main objectives, the current project will incorporate minor considerations and recommendations highlighted in the mental health, and DLD literature.

5.3.1 *Understanding the developmental context of the sample selected in the current project.*

As a group, young people diagnosed with DLD are more likely, compared to their typically developing peers, to experience greater severity of cognitive and literacy difficulties (Vugs et al., 2013; Vugs et al., 2014; Vissers et al., 2015; Isoaho et al., 2016; Pavelko et al., 2017) (see chapter 2). These include difficulties in executive functioning (separately, including working memory); problem-solving ability; social cognition (such as conflict resolution and detection); as well as, reading and writing ability. Therefore, young people diagnosed with DLD, are likely to experience cascading disruptions to other developmental processes, beyond language.

However, there is perhaps little consideration to the wider development of young people diagnosed with DLD, when discussing the development of mental health difficulties in this group. As explained by Masten et al., (2011) the development of the young person may play an important role in the process of resilience for mental health difficulties. Particularly, disruptions in a young person's development may impede their ability to undergo this adaptive process. Individual differences in the process of resilience for mental health difficulties may be, in part, due to differences in their development. This is important to consider as, as stated, there are individual difficulties in the cognitive difficulties experienced amongst young people diagnosed with DLD (Vugs et al., 2013; Kapa and Erikson, 2019; Archibald, 2017; Pavelko et al., 2017). Yet, there is little discussion around how the developmental differences, within a group of young people diagnosed with DLD, may impact research findings around the development of mental health difficulties.

The present project will consider the discussion within the previous paragraph. Firstly, there will be an attempt to understand the wider developmental context of the sample selected to reflect young people diagnosed with DLD (see chapter 2). Secondly, the present project will determine whether developmental differences among young people diagnosed with DLD play a significant role in the development of mental

health difficulties. These developmental difficulties consist of individual factors, such as problem-solving ability. Together, the developmental perspective of mental health difficulties will be, to some degree, incorporated into the current project.

5.3.2 *Incorporating factors that have yet to be investigated when understanding risk and resilience for mental health difficulties, in DLD.*

As reviewed earlier in the current chapter, previous literature has identified some factors that encourage risk and resilience for mental health difficulties, in young people diagnosed with DLD. Yet, the literature review performed in chapter 4 highlighted many factors that influence risk and resilience for mental health difficulties in young people. Many of these factors have been ignored or are yet considered when investigating this dynamic process in young people diagnosed with DLD. This includes prenatal, individual, familial, and community (including peers) factors.

The current project will attempt to incorporate previously ignored potential factors when investigating this dynamic process in young people diagnosed with DLD. In doing so, the present project might identify possible factors to consider when understanding the development of mental health in this population, that have up to now been ignored.

5.3.2.1 **Prenatal factors.**

There is a wealth of literature demonstrating that prenatal factors play a role in the development of mental health difficulties (Linnet et al., 2003; Ashford et al., 2008; van den Bergh et al., 2017). Prenatal factors refer to adverse conditions that are exposed to the individual during the perinatal period or pregnancy. Adverse prenatal conditions include, but are not limited to, smoking during pregnancy (Linnet et al., 2003; Ashford et al., 2008). According to Rutter (2006a), the perinatal period is a sensitive developmental stage. Disruptions that occur during the prenatal stage are likely to have long-term consequences to the development

of mental health (Linnet et al., 2003; Ashford et al., 2008; van den Bergh et al., 2017). However, there is no investigation into whether prenatal factors, such as smoking during pregnancy, increases the likelihood of mental health difficulties, in young people diagnosed with DLD. This project will include this prenatal factor when identifying early risk factors for mental health difficulties, in young people diagnosed with DLD.

5.3.2.2 **Individual factors.** Considering the literature, there have been individual factors that may influence the development of mental health difficulties, in young people diagnosed with DLD. As reviewed earlier in the current chapter, these include emotional regulation, prosocial behaviour, and to some degree, self-esteem. However, some individual factors have not been considered during investigations into risk and resilience for mental health difficulties, in young people diagnosed with DLD. For potential risk factors, this includes long-term or chronic illness. For possible positive factors (see chapter 4), these include, but are not limited to, better problem-solving abilities, frequent exercise, and healthy sleeping behaviours. The current project will incorporate individual factors yet considered in the literature, as possible factors that encourage risk and resilience for mental health difficulties, in young people diagnosed with DLD.

5.3.2.3 **Family factors.** The previous literature highlights the importance of the quality of relationships in the development of mental health difficulties, in young people diagnosed with DLD. However, as explained in chapter 4, relationships are complex and dynamic. A relationship could be described as close, warm, supportive, high levels of conflict, and dependent, for example. In the mental health literature, certain forms, or types of relationships may play a role in specific manifestations of mental health difficulties (Acar et al., 2019). Recent research by Acar, Ucus, and Yildiz (2019) found that higher levels of parent-child conflict was associated with greater severity of externalising problems; this was not found for internalising problems. Additionally, as discussed by Acer et al., (2019), parent-child

conflict, compared to closeness, may play a role in the peer problems. Together, in addition to the quality, the form of relationships should be considered when understanding the development of mental health difficulties, in typically developing children and adolescents. The form of the relationship upon the development of mental health difficulties has yet to be considered in young people diagnosed with DLD. The current project will consider the complexity of relationships when investigating risk and resilience for mental health difficulties, in young people diagnosed with DLD.

Additionally, there has been little discussion around positive parental or family factors upon the role of the development of young people diagnosed with DLD, compared to risk. St Clair et al., (2019) concluded that poor quality of relationships between the parent and the child is a risk factor for emotional difficulties, in children (at age five) at risk of DLD. However, Lyons and Roulstone's (2018) revealed that positive relationships may be a possible factor that promotes resilience for mental health difficulties, in children diagnosed with a speech and language disorder. It is unknown if a similar conclusion could be drawn for young people diagnosed with DLD. The current project will consider whether the role of relationships in the development of mental health difficulties, in young people diagnosed with DLD, ought to focus upon risk or resilience.

Lastly, there are family factors that may not be explicitly described as relationships. This includes, but is not limited to, main caregivers with physical or psychological distress, as well as harsh discipline practices. There is a wealth of literature demonstrating the role of these described family factors upon the development of mental health difficulties, in typically developing peers (Pfeffer et al., 2000; Kessler et al., 2002; Cairney et al., 2007; Drapeau et al., 2010; Fearnley, 2010; Stikkelbroek et al., 2016; Flouri et al., 2019; Hao et al., 2020). Additionally, the main caregiver's psychological distress has been investigated as a potential early risk factor, for children at risk of DLD (rDLD; selected through standard reports and informal parent reports) (St Clair et al., 2019). St Clair et al., (2019) did not find a significant association between the main caregiver's psychological distress and greater severity of emotional problems in late childhood, in

children rDLD. Future research is needed to determine if the main caregiver's psychological distress is not an early risk factor for mental health difficulties, beyond emotional problems, and beyond late childhood. Also, investigations into early risk factors for mental health difficulties in adolescence, in those diagnosed with DLD, should include additional family factors. The current project will attempt to fulfil these gaps in the literature.

5.3.2.4 **Household factors.** The wider environment, and its role in the development of mental health difficulties, in young people diagnosed with DLD, has somewhat been ignored. As explained in chapter 4, the wider environment, including, but not limited to, low socioeconomic status may indirectly impact the development of mental health in young people. Low socioeconomic status, as well as its indicators (single parenthood and low income, for instance), may be associated with fewer or poorer quality of resources, cognitive stimulation within the household, or opportunities. In return, this might negatively impact the emotional, social and behavioural development; and, thus increase the risk of developing mental health difficulties in adolescence (Wille et al., 2008; Bøe et al., 2014; Reiss, 2013). Amongst typically developing children, there is a consensus that low socio-economic status impacts the development of mental health (Willie et al., 2008; Reiss, 2013; Boa et al., 2014).

Whilst it is agreed upon that household factors play some role in the development of mental health difficulties, in young people diagnosed with DLD, this is somewhat vague (Yew and O'Kearney, 2015). Yew and O'Kearney (2015) discussed the notion that household factors are likely to play, in part, a role in the development of mental health difficulties (especially, emotional problems), in young people diagnosed with DLD. However, there is yet an investigation that determines the significance of household factors in the development of mental health difficulties, in this population. Therefore, the current project will explicitly investigate whether household factors significantly influence the development of mental health difficulties, in young people diagnosed with DLD.

5.3.2.5 **Peer and community factors.** Peer and community factors include relationships outside of the family unit, as well as a sense of belonging and feelings of safety within the neighbourhood. It is uncertain whether these play a role in the development of mental health, within young people diagnosed with DLD. Peer factors include having close and supportive friendships with peers; which is associated with less severe mental health difficulties in typically developing young people (Stadler et al., 2010). Community factors include a sense of belonging within a religious or non-religious context (Cairns et al., 2014; Scarf et al., 2016; Fritz et al., 2018; Koni et al., 2019).

Generally, the literature demonstrates that a sense of belonging within the community, specifically in schools, is likely to promote resilience for mental health difficulties in typically and atypically developing young people. This includes establishing and maintaining healthy relationships with individuals outside the family unit. Hence, a sense of belonging, outside the family unit, should be considered when investigating resilience to mental health difficulties, within young people diagnosed with DLD. Also, the feelings of safety and security within the neighbourhood may be important (Ziersch et al., 2005; Flouri et al., 2015a). The current project will investigate whether peer and community factors play a significant role in the development of mental health difficulties, within young people diagnosed with DLD.

5.3.3 *Investigating the Cumulative Risk Hypothesis for mental health difficulties, in young people diagnosed with DLD.*

The current project will investigate whether early risk factors for mental health difficulties do adhere to the assumptions of the Cumulative Risk Hypothesis (CRH) (Rutter, 1979), in young people diagnosed with DLD. There is yet an investigation that attempts to understand how early risk factors for mental health difficulties operate, in young people diagnosed with DLD. As explained in chapter 4, risk factors are likely to operate together to increase the likelihood of developing mental health difficulties. One plausible

model is the CRH (Rutter, 1979). To briefly recap, the CRH assumes that it is the number of exposed risk factors that can predict the severity of mental health difficulties in later life (such as, adolescence). This has been supported in typically and atypically (Autism) developing children (Appleyard et al., 2005; Raviv et al., 2010; Oldfield et al., 2015). However, as stated, no research investigates whether early risk factors for mental health difficulties adheres to the CRH, in young people diagnosed with DLD.

5.3.4 *Incorporating the Protective Factors Model when investigating risk and resilience for mental health difficulties, in young people diagnosed with DLD.*

There is a lack of understanding around how factors encourage resilience for mental health difficulties, in young people diagnosed with DLD. Previous DLD investigations have perhaps provided some speculation as to how factors promote resilience for mental health difficulties. However, this is currently vague and unclear. Moreover, previous DLD investigations have adopted terms such as ‘protective’ without clarification upon how the researcher interprets the definition of the term. Unlike previous literature, this project will try to understand how resilience for mental health might occur, or at least attempt to be clear in the assumptions established by the researcher.

In part, the assumptions around how resilience for mental health difficulties might occur has already been achieved in the current project. As stated in chapter 4, the current project will adopt the ‘Protective Factors model’. Under this model, factors that promote resilience may be protective, promotive, or both. To briefly recap, promotive factors compensate for risk exposure as they encourage positive mental health development. In return, promotive factors increase the likelihood of resilience for mental health difficulties. Protective factors interact with risk, by moderating the relationship between the risk exposure and the predicted outcome. Thus, protective factors are likely to disrupt or dampen the effect of the exposed risk factor.

The present project will attempt to understand the mechanism (promotive or protective) in which school-age factors encourage resilience for mental health difficulties, in young people diagnosed with DLD. The investigations in the current project will be the first to provide a clear and initial insight into understanding how factors encourage resilience for mental health difficulties, in this population.

Additionally, there are practical implications in attempting to understand how factors influence resilience for mental health difficulties, in young people diagnosed with DLD. Whilst providing valuable insights into the process (Luthar et al., 2000; Zimmerman et al., 2013), understanding the mechanism behind resilience may inform how, or if, an intervention is delivered, or designed. Promotive factors could be introduced to encourage positive mental health development. Yet, protective factors, which do not have a promotive mechanism, may only be effective if there is risk exposure. Therefore, understanding how factors encourage resilience may inform researchers (designing the intervention), or practitioners (delivering the intervention) in how to provide the most effective and tailorable interventions for mental health difficulties, in young people diagnosed with DLD.

5.3.5 *Incorporating an Ecological perspective when investigating risk and resilience for mental health difficulties, in young people diagnosed with DLD.*

The current project will investigate risk and resilience for mental health difficulties, in young people diagnosed with DLD, from an Ecological perspective. Particularly, this project will be the first to investigate whether factors, drawn from different environmental systems, influence the development of mental health difficulties in this population. The different systems include the Microsystem, the immediate environment; the Macrosystem, the connections between the immediate environment; and, the Mesosystem, the indirect environment (Bronfenbrenner, 1979). As explained earlier in the present chapter, currently the literature around DLD and mental health focuses upon the immediate environment (relationships and positive

interaction), as well as individual factors (prosocial behaviour). Yet, factors drawn from the wider environmental factors may play a role in the development of mental health difficulties.

Within Lyons and Roulstone's (2018) discussion it was argued that future quantitative research should investigate mental health from an Ecological perspective. Whilst not focused upon DLD, Lyons and Roulstone (2018) highlighted that investigating the development of mental health difficulties from an Ecological perspective may build upon our current understanding of this relationship. Particularly, Lyons and Roulstone (2018) found that in children diagnosed with speech and language disorders, risk factors for mental health difficulties were likely to stem from the immediate environment, compared to the wider. Yet, it is currently unknown if similar assumptions can be claimed in young people diagnosed with DLD. There is a need to understand, or confirm, which subsystem of the environment should be considered when discussing or investigating mental health and DLD. Therefore, the current project will incorporate an Ecological perspective when investigating risk and resilience for mental health difficulties, in this population.

5.3.6 *Investigating risk and resilience for the different manifestations of mental health difficulties.*

The current project will investigate risk and resilience for mental health difficulties, alongside the manifestations of such difficulties (internalising and externalising problems), in young people diagnosed with DLD. In the previous literature, there is often a focus upon one manifestation of mental health difficulties, particularly emotional problems. Yet, different factors may influence the development of different manifestations of mental health difficulties, in young people diagnosed with DLD. In Kilpatrick et al.'s (2019) investigation, high reporting of bully victimisation, in children diagnosed with DLD, predicted worse internalising problems; but not externalising problems. This suggests that there may be certain factors that promote risk and

resilience for different manifestations of mental health difficulties. Hence, it should not be assumed that significant factors for mental health difficulties, referring to everyday emotional, social, and behavioural functioning (see chapter 3), will have the same impact upon internalising or externalising problems. Understanding and investigating how factors may influence the development of different manifestations of mental health difficulties may better inform tailorable interventions. For instance, interventions that focus upon internalising problems, to reduce symptom severity of anxiety and depression; or externalising problems to reduce symptoms of conduct disorder and ADHD (see chapter 3), may benefit from incorporating certain factors, compared to others.

The current project will investigate risk and resilience for general mental health difficulties, as well as internalising and externalising problems, in young people diagnosed with DLD. General mental health difficulties refer to overall emotional, social, and behavioural functioning. Yet, internalising, and externalising problems predict how mental health difficulties are likely to be expressed, or manifest. This will be the first project to attempt to understand risk and resilience for mental health difficulties, as well as internalising and externalising problems in unison.

5.4 The aims of the current project

Considering the gaps within the literature, the present project aims to build upon our current understanding of risk and resilience for mental health difficulties in adolescents who are, or likely to be diagnosed with DLD. The overarching objectives of the current project will be:

1. To provide a foundation for the current project.
    a. To determine if young people who are likely to be diagnosed with DLD experience worse mental health difficulties (i.e. internalising and externalising problems) during adolescence, compared to the general population and typically developing peers.

    b. To determine if young people who are likely to be diagnosed with DLD experience worse cognitive and literacy difficulties, compared to the general population and typically developing peers.
2. To identify early risk factors for mental health difficulties, internalising problems and externalising problems during adolescence, in young people who are likely to be diagnosed with DLD.
3. To investigate whether the identified early risk factors operate in a cumulative fashion, in young people who are likely to be diagnosed with DLD.
4. To identify protective or promotive factors for mental health difficulties, internalising problems and externalising problems during adolescence, in young people who are likely to be diagnosed with DLD.

Taken together, the project will take a novel approach to investigate and further understand risk and resilience for mental health difficulties, in young people diagnosed with DLD. Compared to the previous literature, the current project will attempt to incorporate the valuable insights from the mental health literature to understanding this dynamic process in young people diagnosed with DLD. Particularly, the present project will identify factors that have yet to be considered, which perhaps will otherwise continue to be ignored in the DLD literature. Additionally, this project will be the first to provide insight into how these factors operate (CRH) or encourage resilience (Protective-factors model) for mental health difficulties, in this population.

Overall, the findings and conclusions drawn from the current project will contribute to our current understanding of risk and resilience for mental health difficulties, in young people diagnosed with DLD.

6 Methodology

6.1 Introduction

The main aim of the current project is to build upon the previous literature around risk and resilience for mental health difficulties, in young people diagnosed with DLD. To achieve this, the project objectives are:

1. To provide a foundation for the current project.
    a. To determine if young people who are likely to be diagnosed with DLD experience worse mental health difficulties (i.e. internalising and externalising problems) during adolescence, compared to the general population and typically developing peers.
    b. To determine if young people who are likely to be diagnosed with DLD experience worse cognitive and literacy difficulties, compared to the general population and typically developing peers.
2. To identify early risk factors for mental health difficulties, internalising problems and externalising problems during adolescence, in young people who are likely to be diagnosed with DLD.
3. To investigate whether the identified early risk factors operate in a cumulative fashion, in young people who are likely to be diagnosed with DLD.
4. To identify protective or promotive factors for mental health difficulties, internalising problems and externalising problems during adolescence, in young people who are likely to be diagnosed with DLD.

The current chapter consists of describing how the present project will address the stated objectives. The research design, the methods, as well as justification of the tools and procedures that will be adopted, are described.

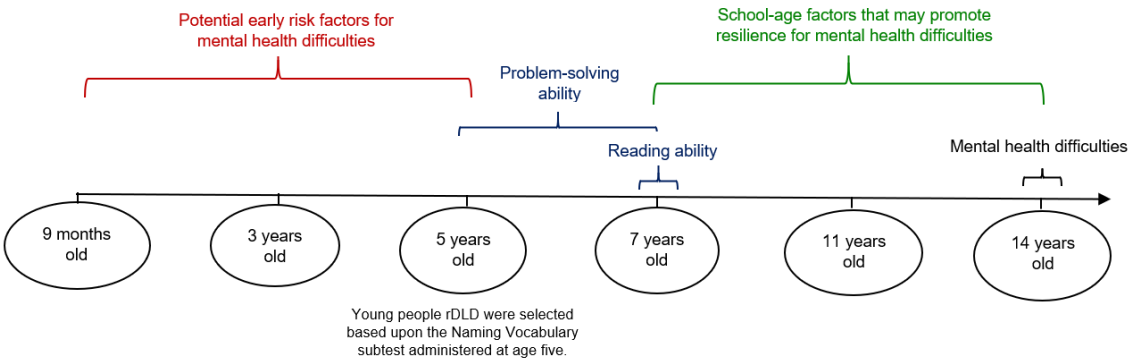
6.2 Research design

The design of the current project adopted a longitudinal approach. A longitudinal approach enabled the researcher to understand the participants' developmental trajectory overtime. Additionally, a longitudinal approach enabled the researcher to detect changes to the development of mental health difficulties, in the participants. Through analysing the secondary data collected by the Millennium Cohort Study (MCS), it was possible to adopt a longitudinal approach.

Figure 3 provides a summary of the timeline that was investigated in the current project. Within this timeline, certain factors were analysed at specific ages. Mental health difficulties, internalising and externalising problems, were measured and analysed when the young people were fourteen years old. As for cognitive and literacy difficulties, problem-solving was measured and analysed at five and seven years old. Reading difficulties was measured and analysed at seven. Early risk factors include factors up to the first five years of life. School-age factors for resilience for mental health difficulties were analysed between ages seven and fourteen years old.

Figure 3.

Summary of the overall timeline of the investigations performed in the current project.



Note. Blue indicates the timeline for the first investigation. Red indicates the timeline for the second and third investigation. Lastly, green indicates the timeline for the fourth investigation. Mental health difficulties and the selection of those rDLD remained in black as these were used in the same manner throughout all the investigations.

The current project adopted a group-comparison and then, a within-group design. Firstly, group comparisons were performed to provide a foundation for the current project. Whilst it is likely that the sample selected in the current project (see **Participants**) experience worse mental health difficulties, compared to typically developing peers and the general population, no investigation determines this. Thus, the first study aims to investigate if the participants selected in the present project indeed experienced worse mental health difficulties, compared to typically developing peers and the general population. Also, to determine if the participants experienced worse internalising and, or externalising problems at age fourteen, compared to typically developing peers and the general population.

Additionally, the developmental context of the sample selected (see **Participants**) in the current project is unknown. As stated in chapter 3, there is wide heterogeneity in mental health difficulties, as well as cognitive and literacy difficulties within a group diagnosed with DLD. Hence, whilst it is likely, it should not be assumed that the participants in the current project will

experience worse cognitive, literacy, as well as mental health difficulties, internalising and externalising problems, compared to the general population or their typically developing peers. Therefore, the first study will investigate whether the sample selected experience worse problem-solving (at ages five and seven) and reading (at age seven) difficulties, compared to their typically developing peers and the general population. Together, the first investigation adopted a group-comparison design to provide a foundation for investigating risk and resilience for mental health difficulties, in the sample selected (see **Participants**).

Secondly, within-group designs were adopted when investigating risk and resilience for mental health difficulties, in young people diagnosed with DLD. This means that, after providing a foundation for the project, analysis was only performed on the selected sample (see **Participants**). As concluded in chapter 3, within-group designs may be able to provide an in-depth understanding of the individual differences between mental health outcomes, in young people diagnosed with DLD. Compared to group-comparison investigations, the findings drawn from within-group designs could contribute to our current understanding of why at-risk young people experience worse or better outcomes (Luthar and Zigler, 1991; Luthar et al., 2000). Hence, the findings from within-group investigations will provide valuable insights into how best to support these young people, who are already at risk of developing mental health difficulties (Luthar and Zigler, 1991; Luthar et al., 2000). Due to this, a within-group design was adopted for investigating risk and resilience for mental health difficulties, in this population.

6.3 Theoretical framework

An ecological framework was adopted when identifying factors that encourage risk and resilience for mental health difficulties in adolescence, within young people diagnosed with DLD. Currently, previous research around mental health and DLD has focused upon identifying factors derived from an individual level (self-esteem, low emotional regulation) and the

immediate environment (parent-child relationships). As explained in chapter 4, factors that influence this dynamic process may stem from different environmental systems. Moreover, there are likely to be many interacting factors, from differing systems, that influence the development of mental health difficulties. Overall, the young person is likely to be developing through interacting with, and within a complex and changing environment.

In the current project, multiple potential factors, from various environmental systems, were investigated together to determine which of these factors plays an important role in the development of mental health difficulties, in young people diagnosed with DLD. These factors were placed into abstract groups based upon our theoretical understanding of how they might influence the development of mental health difficulties. This includes ‘prenatal factors’, ‘individual factors’, ‘family factors’, ‘household factors’, and ‘peer and community factors’. These different groups suggest why, and how these factors may influence the development of mental health difficulties, in this population.

Prenatal factors assume that disruptions during the prenatal stage may lead to cascading and long-term consequences upon a young person’s mental health development (Huizink and Mulder, 2006; Williams and Ross, 2007; Irner, 2012; Sandtorv et al., 2017; Sandtorv, 2018). Adverse conditions during the prenatal stage may lead to disruptions in the infant’s neurodevelopment. This includes, but is not limited to, negative changes to the infant’s neurochemistry and neurological structures.

Individual factors assume that the individual differences within the young person influence their development of mental health difficulties. As explained in chapter 4, Rutter (2006) (and later Rutter, 2012) argues that differences in mental operations may explain why some young people experience less severe, than expected, mental health difficulties in later life. Better mental operations aid the individual to positively adapt from the exposure to adversity. Mental operations include, but are not limited to, self-esteem, self-efficacy, and problem-solving ability. In part, the current project adopted the same assumptions. Yet, individual differences in lifestyle choices or

behaviour were included as individual factors that may influence the development of mental health difficulties. Lifestyle factors include, but are not limited to, healthy sleeping behaviours. Therefore, individuals' factors influence the development of mental health directly as they reside within the young person's cognition, lifestyle, or behaviour.

Family factors assume that the interactions within the family members, in their household, plays a role in the development of mental health difficulties. Family factors are within the young person's immediate environment. This includes, but is not limited to, child-parent relationships, harsh discipline practices, and psychological distress of the main caregiver. However, household factors assume that the environment, as well as the resources and opportunities available to the young person indirectly influences human development. Household factors include low income, single parenthood, as well as exposure to second-hand smoke.

It is assumed that 'Peer and community factors' influence the development of mental health difficulties through the interactions outside of the family unit. It is the resources available to the young person that is derived from the wider community, organised activities, peers and school. Unlike other theoretical groups within the current project, factors under the 'Peers and community factors' is wide ranging. Factors from this group may influence the immediate environment, such as peer and teacher interactions, as well as the feelings of safety within their community. Whilst vague, these factors derived from outside the family unit. Therefore, they are known as 'Peer and community factors'.

6.4 **Epistemology**

Epistemology refers to the belief that the methods that are adopted will obtain knowledge. The researcher's epistemology would inherently influence the decisions made throughout the current project. The researcher's epistemology could be labelled as post-positivism. Post-positivism is loosely described as the belief that the knowledge is conjectural; scientists construct

a representation of reality. Our understanding of reality is through the consensus of researchers in the field, which is informed by multiple findings, methods, and interpretations. The obtainment of knowledge through one researcher is limited, as they are bounded by their own experience, values, and background. Researchers must understand their own biases so that they can peruse objectivity.

Firstly, the researcher believes that their experience, previous knowledge, and values can influence what is observed throughout the current project. The decisions made throughout the present project were informed by the researcher's understanding of the current consensus and conceptualisation of quantitative research methods in the field of psychology. This includes the decision to adopt certain modelling, criterion, and interpretation of the analysis performed in the present project.

Additionally, the decisions made throughout the current project were informed by the researcher's understanding of the literature around mental health and DLD. The researcher’s background is academic; whereby, there is no previous experience as a trained clinical psychologist or speech and language therapist. This means that the decisions made throughout the current project were informed by the literature around mental health difficulties and DLD, rather than practical experience. Therefore, the researcher believes that they can obtain, interpret, and discuss new knowledge. However, this is bounded by the knowledge drawn from previous literature.

Secondly, the researcher in the current project aims to build upon the literature, rather than replace or refute previous knowledge of risk and resilience for mental health difficulties, in young people diagnosed with DLD. It is believed that the findings drawn from this project should be discussed considering the previous literature. It should not lead to the replacement, nor abandonment of previous findings. Instead, there is a need to understand why differences, new, or unexpected findings have occurred. This occurrence is likely to be demonstrating the complex nature of human development, including mental health difficulties in young people diagnosed with DLD. The

findings and interpretations from the current project should be discussed in future research so that together, researchers can construct a representation of reality that may inform tailorable and effective interventions for supporting young people diagnosed with DLD.

Taken together, the researcher believes that the decisions and interpretations throughout the current project were likely informed by previous experience. The ‘experience’ of this researcher is purely academic, rather than practical. New knowledge can be obtained through understanding and adhering to the current consensus in the literature regarding research methods, mental health and DLD.

6.5 Millennium Cohort Study

As stated previously, the current project will achieve the stated objectives through analysing pre-existing data collected by the Millennium Cohort Study (MCS). The data collected by the MCS has been previously analysed to investigate DLD (Forrest et al., 2018; St Clair et al., 2019; Toseeb and St Clair, 2020). Additionally, the data collected by the MCS has enabled researchers to identify factors that promote risk and resilience for mental health difficulties, internalising and externalising problems, in various populations (Parkes et al., 2013; Twamley et al., 2013; Ahn et al., 2018; Kelly et al., 2018). This includes identifying early risk factors for emotional difficulties, in children at risk of DLD (St Clair et al., 2019). Moreover, due to the vast amount of information collected, an ecological framework can be adopted (Hawkins et al., 2009). Therefore, the data collected by the MCS is likely to be sufficient for investigating risk and resilience for mental health difficulties in young people who are, or likely to be diagnosed with DLD.

The MCS was and continues to be, a survey design. The study aimed to gain a vast amount of data about the development and upbringing of children who were born at the turn of the millennia (2000 – 2001). These children were referred to as ‘cohort members’ and those who completed the survey on their behalf (especially in the early years) were known as ‘main

responders'. Information was also obtained about the cohort members' parents and their siblings; for instance: parenting styles, pregnancy, and sibling bullying. The survey aimed to obtain a substantial amount of information from questionnaire interviews using a CAPI (Computer Assisted Personal Interviewing) software. This is a digital interviewing technique where the interviewer can immediately enter and store the data or response into an electronic device.

It was designed and overseen by the Centre of Longitudinal Studies (CLS). The CLS is Britain's leading Economic and Social Research Council resource centre, for designing and completing cohort studies. Apart from the MCS, the CLS is also responsible for the collection of three other large cohort studies in Britain. For more information see: https://www.cls.ioe.ac.uk . The data collected by the MCS was deposited into the UK data service (https://www.ukdataservice.ac.uk) to ensure that the data is sharable amongst researchers. The CLS also provides supporting documents, such as user guides and technical reports, to aid researchers when using their data for future research.

In the first collection point, 18,553 families responded to the survey. For the following collection points, only those who entered the first and second survey collection points received requests to continue and contribute to the MCS. To date (May, 2020), there are six collection points where there is available data for 9 months, 3 years, 5 years, 7 years, 11 years, and 14 years. As expected, the number of responses dropped throughout the collection points. Families were not compensated for their time during the interviews. The table below (**Table 3**) demonstrates how many families responded to the surveys for each time point.

Table 3.

Summary of the number of completed surveys for each data collection, within the MCS.

Collection point	Age of the cohort	Number of responses (families)	Number of cohorts
1	9 months	18,552	18,818
2	3 years	15,590	15,808
3	5 years	15,246	15,459
4	7 years	13,857	14,043
5	11 years	13,287	13,469
6	14 years	11,726	11,884

The majority of the ‘main responders’, across all the collection points, were the cohort member’s birth mother. However, whilst they were the priority, it was not always possible nor appropriate for the birth mother to be the main responder within the MCS. Other possible individuals who were the main responder, other than the birth mother, may have been the birth father, foster parents or siblings, grandparents, adoptees, stepparents, the partner of the parent, or ‘other’.

Older siblings, teachers, and the cohort members themselves were also requested to complete surveys. Older siblings were invited to take part in the MCS during the second and third data collection points; whereby, the cohort member was three, and then, five years of age. Teachers were invited to take part in the MCS during the fourth collection point, when the cohort member was seven years old. However, teachers were only requested to complete the survey if the main responder and the cohort member gave permission, if they were contactable, and if they agreed. Teacher reports are considered a subgroup of the overarching population; 8,876 teachers reports were eligible and were completed. Lastly, the cohort member was invited to take part in the MCS within the latest (May, 2020) collection point,

whereby, they were approximately fourteen years of age. In summary, the following table (**Table 4**) describes who and when they completed surveys for the MCS.

Table 4.

Summary of who completed the available surveys in the MCS.

Collection point	Age of the cohort member	Responders
1	9 months old	Main responders and partners
2	3 years old	Main responders, partners, older siblings, and cohort members
3	5 years old	Main responders, partners, older siblings, and cohort members
4	7 years old	Main responders, partners, cohort members, and teachers
5	11 years old	Main responders, partners, and cohort members
6	14 years old	Main responders, partners, and cohort members

The surveys were different for each type of responder. The partner questionnaire interviews were tailored to obtain information about the partner, which includes their involvement with the cohort member. In the teachers' questionnaires, the items consisted of behaviours the cohort member displayed within the school setting, as well as their current educational progress. Older siblings were asked about their behaviours and relationship with the cohort member. Therefore, each questionnaire interview, or survey, was tailored to the individual being questioned.

There were many families in the cohort study whose first language was not English (Fitzsimons et al., 2017). Also, there are reports of families that did not speak in English within the household, or if so, this was only half of the time. This means that there are likely to be main caregivers or cohort

members, who completed the MCS, who may have not comprehended all the questions that were asked. For these individuals support was available to aid them in completing the MCS. Firstly, supplementary materials to the MCS were translated into Arabic, Bengali, Gujarati, Hindi, and Punjabi (Gurmukhi and Urdu scripts). Secondly, if possible, a translator was found to support the main responder, and potentially cohort member, during the obtainment of consent forms and the conduction of the interview. The translator may have been from the household (family or friend of the main responder) or was a bilingual interviewer (Fitzsimons et al., 2017). However, whether the translation was sufficient is unknown.

Overall, the MCS's surveys were designed to obtain information around a vast range of areas. To exemplify, within the main responders' questionnaire interview there were multiple sections. Also, their questionnaire interview contained multiple questions within each section. The following are the sections that were in the main responders' questionnaire interview during the first collection point:

'Household', 'Non-resident parents', 'Father's involvement with baby', 'Pregnancy, Labour and Delivery', 'Baby's Health and Development', 'Childcare', 'Grandparents and Friends', 'Parent's Health', 'Self-completion', 'Employment and Education', 'Housing and local area', and lastly 'Interests and time with baby'.

Hence, data collected by the MCS is vast and encompasses a wide range of topics that might be of interest to researchers. The data collected by the MCS has been analysed to investigate risk and resilience in areas such as obesity (Pearce et al., 2010; Massion et al., 2016), psychological distress (mental health) (Carson, Redshaw, Gray and Quigley, 2015), breastfeeding (Heikkila et al., 2011), and exposure to second-hand smoke (Griffiths et al., 2005; Kelly and Watt, 2005). Additionally, the data collected by the MCS has enabled researchers to investigate specific populations, such as children at risk of Developmental Language Disorder (Forrest et al., 2018; St Clair et al., 2019; Toseeb and St Clair, 2020), children in poverty (Dearden et al., 2011; Dickerson and Popli, 2018), and children whose main caregiver reported that

they were diagnosed with Autism (Midouhas et al., 2013; Dillenburger et al., 2015; Totsika et al., 2015) or ADHD (Flouri et al., 2015b).

6.6 Materials

The tables below (**Table 5** and **Table 6**) provides a summary of all the materials, or measures, selected to be analysed in the current project. Firstly, **Table 5** provides a summary of the measure selected to indicate the participants' severity of mental health difficulties, internalising and externalising problems, in early adolescence. Also, **Table 5** includes the measures selected to indicate cognitive and literacy difficulties associated with the participants. Specifically, measures that can indicate the individual's problem-solving and reading ability were selected.

Table 6 provides a summary of the available and suitable measures that could indicate factors that encourage risk and resilience for mental health difficulties. This summary includes what factors can be measured, and whether it was investigated as a factor that encourages risk, or resilience for mental health difficulties. The selected measures, and at what age that were administered within the data collection of the MCS will be included. Lastly, it will be stated whether the available data collected by the MCS, for the potential factor, has a categorical or continuous response.

Table 5.

Summary of the measures selected to investigate possible developmental differences (including mental health outcomes) between young people diagnosed, or likely to be, with DLD, and the general population and their typically developing peers.

Selected measures	The measure adopted in the MCS	Age of cohort member
Mental health difficulties*	Strengths and Difficulties Questionnaire	14 years old
Internalising problems*	Strengths and Difficulties Questionnaire	14 years old
Externalising problems*	Strengths and Difficulties Questionnaire	14 years old
Problem-solving ability	Picture Similarities subtest	5 years old
	Pattern construction subtest	5 and 7 years old
Reading ability	Word reading subtest	7 years old

Note. * Mental health difficulties, internalising and externalising problems, at age fourteen, was the outcome variable when investigating risk and resilience for mental health difficulties, in young people diagnosed with DLD.

Table 6.

Demonstrates the summary of the potential early risk factors (up to age five) for mental health difficulties, at age fourteen, available within the MCS, as well as any relevant additional information.

Investigated under 'Risk' or 'Resilience'	Potential factors	The measure adopted in the MCS	Age of cohort member	Responses
		Prenatal conditions		
Risk	Smoking during pregnancy	Informal report	9 months	Categorical
		Individual factors		
Risk	Physical illness (child)	Informal report	5 years	Categorical
Risk	Language ability*	Naming Vocabulary Scores	5 years	Continuous
Risk	Gender differences	Informal report	5 years	Categorical
Resilience	Self-esteem	Rosenberg Grid	14 years	Continuous
Resilience	Problem-solving ability	Pattern construction	7 years	Continuous
Resilience	Sleep disruption	Self-report	14 years	Continuous
Resilience	Sleep latency	Self-report	14 years	Continuous
Resilience	Exercise	GENEActive device	14 years	Continuous
Resilience	Educational motivation	Self-report	14 years	Continuous
Resilience	Reads for fun	Self-report	14 years	Continuous
Resilience	Prosocial behaviour	SDQ, prosocial subscale	14 years	Continuous
		Family factors		
Risk	Main caregivers' psychological distress	Kessler-6	5 years	Continuous
Risk	Unhappiness in relationship	Combin. *	5 years	Continuous
Risk	Parent-child conflict	Child-parent relationship scale	3 years	Continuous
Risk	Physical illness (parent)	SF-8	5 years	Continuous
Risk	Death of a parent	Informal report	5 years	Categorical
Risk	Parental engagement	informal report	5 years	Continuous
Risk	Harsh discipline practice	Straus Conflict Tactic Scale	5 years	Continuous
Risk	Parent-child closeness*	Child-parent relationship scale	3 years	Continuous
Resilience	Parent-child closeness*	Main caregiver report	14 years	Continuous
		Home environment		
Risk	Low income	OECD*	5 years	Categorical
Risk	Single parenthood	Informal report	5 years	Categorical
Risk	Unemployed main caregivers	Informal report	5 years	Categorical
Risk	Second-hand smoke exposure	Informal report	5 years	Categorical
		Peer and community factors		
Resilience	Safe neighbourhood	Self-report	14 years	Continuous
Resilience	Close friends	Self-report	14 years	Categorical
Resilience	Attendance to religious groups	Self-report	14 years	Continuous
Resilience	Attendance to youth clubs	Self-report	14 years	Continuous
Resilience	Attendance to band practice	Self-report	14 years	Continuous
Resilience	Mental health interventions	Main caregiver report	14 years	Categorical

Note. Language ability, as assessed by the Naming Vocabulary subtest will be reviewed and evaluated under 'participants'.
Combin. * For unhappiness in a relationship, a combination of items selected from the Golomobok and the informal questions were used.
OCED = Organisation for Economic Co-operation and Development
Unlike the other factors in this investigation, parent-child closeness will be investigated under risk and resilience.
Apart from the Kessler-6 and the Naming Vocabulary subtest, modifications were performed on standardised measures.
All self or main caregiver reports were informal.

6.6.1 *Selected measures for mental health difficulties*

Mental health difficulties in early adolescence will be indicated by the parent-reported Strengths and Difficulties Questionnaire (SDQ) data collected by the Millennium Cohort Study (MCS). This questionnaire was chosen to indicate mental health difficulties at age fourteen in the current project for two reasons. Firstly, there is a wealth of support suggesting that the SDQ could be adopted as a reliable and valid screening tool for mental health difficulties in young people (Stone et al., 2010; Goodman and Goodman, 2011; Mathai et al., 2002; Johnson et al., 2014; Kovacs and Sharp, 2014; Hill and Hughes, 2007; Becker et al., 2004). Due to the sensitivity and specificity of the questionnaire, it can, to some degree, detect mental health difficulties in large UK populations (Messer et al., 1995), unlike the other mental health measures administrated in the MCS (See **Appendix A:** *Materials: Mental health and the MCS*). This means that the SDQ can identify young people who are likely to experience severe and persisting mental health difficulties. Hence, one reason that the SDQ was adopted is that it is likely to be a reliable and valid measure to indicate young people's mental health within a large UK population; such as the representative sample collected by the Millennium Cohort Study.

Secondly, unlike the other mental health measures that were administered in the MCS (See **Appendix A:** *Materials: Mental health and the MCS*), the data collected from the SDQ would enable researchers to investigate internalising and externalising problems, alongside general mental health difficulties. This means that the data collected through the SDQ would allow researchers to study and provide an insight into risk and resilience for mental health difficulties, whilst acknowledging that mental health is indeed a multidimensional construct. Particularly, investigating internalising and externalising problems in the current project would lead to the identification of factors that influence their development. As stated in chapter 5, understanding the development of these specific manifestations of mental health difficulties could be valuable for, and inform future intervention-based investigations.

In summary, the data collected through the SDQ, in the MCS, was investigated in the current project due to two key reasons. Firstly, the SDQ is a valid and reliable questionnaire for indicating young people's mental health difficulties within a large UK representative sample. Secondly, the data collected by the MCS enables the researcher to investigate mental health difficulties, as well as internalising and externalising problems. These were considered advantages over the other administered mental health measures within the MCS (see **Appendix A**).

Within the MCS, up to date (May, 2020), the SDQ has been completed by the main responder when the cohort member was aged three, five, seven, eleven, and fourteen. The main responder was usually the child's mother. However, as stated previously, this was not the case for every cohort member. Across all the SDQ versions the same twenty-five items were included: asking the responder about the young person's psychological attributes. The terminology, where appropriate, changes across versions by the context or cohort members' age. For instance, the 'P4-17' SDQ instructs the responder to focus on the cohort member's behaviours in the past six months. Yet, the SDQ completed by the teachers instructed them to focus on either the last six months of the school year. **Table 7** below summarises at what ages the SDQ was completed, and who completed them.

Table 7.

Summary of who completed the SDQ and for what age of the cohort member.

Age of the cohort member	Informant
3 years old	Main respondent
5 years old	Main respondent
7 years old	Main respondent
11 years old	Main respondent and teachers (if contactable)
14 years old	Main respondent

The MCS administered the SDQ parent-reports when the cohort member was aged between 13-15 years old (average 14 years of age). The SDQ data at age fourteen will be analysed to indicate mental health difficulties. Particularly, 'P4-17' parent-report version of the SDQ was used (Fitzsimons et al., 2017). The 'P4-17' version is suitable for parent observations of young people who are aged between four and seventeen.

As with the design of the questionnaire, the items are separated into five subscales; and there are five items in each subscale. The subscales are 'emotional', 'conduct', 'hyperactivity/inattention', 'peer problems', and 'prosocial behaviour'. The responder is instructed to answer whether the item is 'not true', 'somewhat true', or 'certainly true'. Apart from prosocial behaviour, the scores from all the subscales combine to form a 'total difficulties' score. The SDQ and the scoring instructions are readily available at www.sdqinfo.org.

6.6.1.1 **SDQ scores and subscales.** As previously stated, the total difficulties score is established through the combination of the subscales: emotion, conduct, hyperactivity/inattention, and peer problems. The total difficulties score reflects the wide range of mental health difficulties the young person may experience. The higher the total difficulties score; the greater the mental health difficulties experienced. Goodman (2001) found that those who were considered as a high psychiatric risk compared to low psychiatric risk, according to a clinical review, had significantly higher total difficulties score. This finding was not unexpected as earlier research demonstrated that the total difficulties score of the SDQ was able to distinguish between a non-psychiatric and psychiatric sample (Goodman, 1997). It was, therefore, concluded that the total difficulties score of the SDQ could be used to identify the presence of a disorder in the general population (Goodman, 2001).

However, it is important to clarify that the total difficulties score can only detect mental health difficulties that are relevant to the subscales. These include depression, anxiety, ADHD, oppositional defiant disorder, or conduct disorder. Moreover, the total difficulties score may not indicate which disorder

is detected. Instead, the scores indicate the symptom severity of the described disorders, in which young people experience.

Emotional problems. The items from this subscale reflect components that are associated with emotional problems. An example item for this subscale is ‘many fears, easily scared’. Some items in this subscale also measure physical symptoms associated with emotional distress, such as frequent headaches. Higher scores on this scale would indicate that the young person experiences greater severity of emotional problems. Those with a diagnosis of depression or anxiety scored significantly higher, compared to those who did not, on the emotional subscale of the SDQ (Goodman, 2001). Therefore, it was concluded that the emotional subscale of the SDQ does measure emotional problems, as described by the Diagnostic and Statistical Manual for Diseases (DSM; see chapter 3).

Conduct problems. The five items from this subscale reflect the extent to which the young person experiences conduct problems. Items include physical harm to others: ‘often fights with other children’. Items also include deceptive behaviours such as ‘often lies or cheats’. High scores on this subscale would indicate that the young person is often defiant and deceptive, thus has high severity of conduct problems. Those with a diagnosis of oppositional defiant disorder or conduct disorder scored significantly higher, compared to those that were not, on the conduct subscale of the SDQ (Goodman, 2001). Therefore, it was concluded that the conduct subscale of the SDQ does measure conduct problems.

Hyperactivity/inattention. The items for this subscale reflect the extent to which the young person is hyperactive or is inattentive. Items focus on behaviours such as impulsivity and restlessness. Items include ‘easily distracted’, ‘concentration wanders’ and ‘thinks things out before acting’. High scores on this subscale would indicate that the child or adolescent is often

hyperactive or inattentive. Those with a diagnosis of attention deficit hyperactivity disorder (ADHD) scored significantly higher, compared to those who did not, on the hyperactivity/inattention subscale of the SDQ. It was, therefore, concluded that this subscale measures hyperactivity and inattention.

Peer problems. Items in this subscale measure interpersonal relationships, as well as the observed balance between engagement with others and solidarity. Items include 'rather solitary', 'tends to play alone' and 'has at least one good friend'. This subscale also acknowledges that being a victim of bullying is a prominent peer problem, as it includes the item 'picked on or bullied by other children'. Interestingly, compared to the other subscales, Goodman (2001) did not find an association between high peer problems score and a specific relatable diagnosis. Goodman, instead, found that high scores in this subscale were associated with all the disorders previously mentioned. It was, therefore, concluded that peer problems may not be related to a disorder, but might be related to many diagnoses, such as mood disorders, ADHD, or oppositional defiant disorder (Goodman, 2001).

Internalising problems and externalising problems. According to Goodman et al., (2010), scores for internalising and externalising problems can also be generated. For internalising, this is the summed total for emotional and peer problems. For externalising, hyperactivity/inattention and conduct problems are summed together. This is commonly achieved and investigated in the literature using the SDQ (Hiller et al., 2019; Zilanawala et al., 2019; Flouri et al., 2020; Mewton et al., 2020).

6.6.1.2 **SDQ and mental health difficulties, in adolescence.** The SDQ is likely to be a valid and reliable measure of mental health difficulties in early adolescents. Firstly, Mathai, Anderson, and Bourne's (2002) research confirm both the internal and predictive validity of the SDQ, stating that the

SDQ closely resembles the DSM-4 diagnostic criteria. Mathai et al., (2002) continues to conclude that the SDQ is a meaningful screening tool for young people's mental health difficulties, as described by the DSM. This conclusion is strongly supported throughout the literature (Becker et al., 2004; Hill and Hughes, 2007; Johnson et al., 2014; Kovacs and Sharp, 2014). This demonstrates that the validity of the SDQ is supported by many researchers, especially as the SDQ is a useful screening tool for childhood and adolescent's mental health difficulties in both non-clinical (Johnson et al., 2014) and clinical (Mathai et al., 2002; Becker et al., 2004) populations.

Furthermore, research suggests that the validity of the SDQ has high sensitivity (Hill and Hughes, 2007). High sensitivity means that the SDQ is likely to accurately detect the presence of young people's mental health difficulties in a community sample. According to Goodman et al., (2003) the sensitivity of the SDQ is 94.6% (Goodman et al., 2003). Goodman et al., concluded that the SDQ is a valid screening tool for detecting young people's mental health difficulties in community samples. This is supported (Lai et al., 2014; Aebi et al., 2017). Therefore, the SDQ is likely to predict mental health difficulties or disorders within young people.

However, the specificity of the SDQ as a screening tool for young people's mental health difficulties may not be high (Hill and Hughes, 2007). Hill and Hughes concluded that the validity of the SDQ has moderate specificity. Moderate specificity means that the SDQ, to some degree, accurately identifies those that do have a mental health disorder from those that do not. Together, these findings suggest that the SDQ is likely to correctly identify young people who experience severe mental health difficulties; however, there is a risk that the SDQ may falsely identify young people with severe mental health difficulties, when they may not experience severe difficulties. Therefore, the SDQ may, somewhat, overestimate, or over-identify, young people with severe mental health difficulties.

Regardless, the SDQ could be used to identify mental health difficulties in the general population. Particularly, Stone et al. (2010) strongly argues that the SDQ should continue to be utilised as a screening tool for young

people's mental health difficulties. Stone et al., reviewed forty-eight studies that investigated the validity and reliability of the SDQ's parent and teacher reports. It was concluded that both parent and teacher reports of the SDQ are satisfactory screening tools for young people between the ages of four and twelve. Additionally, Kovacs and Sharp's (2014) research supports the validity of the SDQ parent-reports for detecting mental health difficulties in adolescents between the ages of twelve and seventeen. Together, it is likely that SDQ parent-report is a valid screening tool for ages between four and seventeen (Stone et al., 2010; Kovacs and Sharp, 2014).

The SDQ can detect young people's mental health difficulties in a large UK representative sample (Goodman and Goodman, 2011). Goodman and Goodman investigated the extent to which the SDQ can predict the prevalence of young people (aged between five and sixteen) mental health difficulties in a large (18,415) UK representative population. Goodman and Goodman's sample contained children from different backgrounds and most likely a range of different risk factors for mental health difficulties, as these were intentionally not controlled. It was demonstrated that the SDQ was able to predict the prevalence of young people's mental health difficulties, as identified by diagnostic interviews. Therefore, it was concluded that the SDQ can accurately detect mental health difficulties in a large UK population.

Lastly, the SDQ allows researchers to investigate general mental health difficulties, alongside internalising and externalising problems. There is a wealth of literature investigating internalising and externalising problems, alongside mental health difficulties in young people (Rubin et al., 1995; Coplan et al., 2010). These investigations have provided a comprehensive contribution to our understanding of mental health difficulties, by acknowledging that the experiences across individuals may differ. Investigating general mental health, alongside manifestations of mental health, may help to pinpoint the types of difficulties that the group may experience. Moreover, understanding what types of difficulties the young person may experience may aid in predicting the most effective interventions to reduce the severity or persistency of difficulties. Therefore, alongside general mental health difficulties, researchers need to consider what types of

difficulties might develop, and if severe and persistent, to what mental health disorders. Analysing data collected by the SDQ enables this consideration.

6.6.1.3 **DSM versions and the SDQ.** As previously explained, the SDQ was designed for measuring symptoms for some psychiatric disorders described in the DSM-IV criteria (Goodman, 2001). Yet, at the age of fourteen, the current edition of the DSM (DSM-5) had been published. It is important to discuss if the changes from the earlier edition (DSM-IV) to the current DSM (DSM-5) affects the validity or reliability of the SDQ data collected by the MCS. Particularly, the SDQ was described to reflect the symptoms of depression, anxiety, ADHD, oppositional defiant disorder (ODD), and conduct disorder (Goodman, 2001). Starcevic and Portman (2013) examined the change between DSM-IV and DSM-5 specifically for general anxiety disorder (GAD). According to Starcevic et al., the criteria for GAD have not changed from DSM-IV to DSM-5. This means that the validity and reliability of the SDQ data collected by the MCS are unchanged. This is also the case for ADHD, ODD, and conduct disorder (Frick and Nigg, 2012; Rosales et al., 2015; Thompson et al., 2017).

The criteria for depression, specifically Major Depressive Disorder (MDD) has somewhat changed for DSM-5 (Uher et al., 2014). The DSM-5 introduces the feeling of ‘hopelessness’ as one important criterion for MDD. It is possible, in the DSM-5, to be diagnosed with MDD if the individual reports feelings of ‘hopelessness’ in the absence of ‘sadness’. Yet, previously in the DSM-IV, the feeling of hopelessness was not acknowledged in the DSM-IV criteria for MDD. Instead, a diagnosis for MDD requires the individual to report feelings of sadness. However, Uher et al., (2014) strongly claim that the criteria for MDD in the DSM-5 are broader and that this may be problematic. This broadening may have caused a reduction in the diagnostic reliability of the diagnosis of MDD as described by the DSM-5. The reliability of the diagnostic criteria for MDD in the DSM-5 was lower, compared to the criteria for MDD in DSM-IV (Uher et al., 2014). Therefore, analysing the SDQ

data collected by the MCS might be advantageous as it maps onto the MDD symptoms as described by the DSM-IV.

6.6.2 *Selected measures for cognitive ability and literacy*

As summarised earlier in the current section, there was an investigation to understand whether the participants in the project experience additional developmental difficulties. The data collected by the MCS allowed the research to understand the participants' problem-solving ability between the ages of five and seven, as well as their reading ability at age seven. The data collected around the young people's wider cognitive development were all subtests of the British Ability Scales (BAS). The BAS is an established and standardised battery of tests for assessing children's and young people's cognitive ability and educational achievement. The BAS is predominately used to assess children and young people who live in the UK. The BAS, as well as the subtests within it, are likely to be valid and reliable in what they assess (Kline, 1995; Elliott et al., 1997; Styles, 1999). Therefore, the subscales within the BAS are likely to measure what they claim the assess in young people who live within the UK.

6.6.2.1 **Problem-solving ability.** Two problem-solving tasks were administered during the data collection of the MCS. These were the Picture Similarities and Pattern Construction test.

Picture Similarities subtest. The picture similarities task was administered when the cohort member was five years old. The Picture Similarities task is likely to measure non-verbal reasoning (Elliott et al., 1997; Hansen, 2014). Non-verbal reasoning describes the individual's ability to analyse and solve problems through, and of, visual information, without the need for their language ability. Examples of non-verbal reasoning include mathematics and physics. According to Dockrell, Stuart, and King (2001), it

was reported that the Picture Similarities subtest has satisfactory test-retest reliability. This suggests that there is consistency, over time, in the internal validity of the task. Higher scores on the Picture Similarities subtest indicate greater non-verbal reasoning ability.

Pattern construction subtest. The Pattern Construction task was administered when the cohort member was five and seven years old. According to Hansen (2014), the Pattern Construction task measures children's spatial problem-solving ability. Spatial problem-solving ability refers to understanding and providing testable solutions, that are specific to navigation, visualisation of distance, space, or angles. Also, spatial problem-solving ability includes noticing differences or fine details within objects and faces. According to Dumont, Willis, and Elliott (2008), the Pattern Construction subtest has a high internal consistency of .95. Higher scores indicate greater spatial problem-solving ability.

6.6.2.2 **Reading ability.** At age seven, the Word Reading subtest was administered. According to Elliott (1997), the Word Reading task measures children's reading ability. This has been supported by Wechsler (1997), as it was found that higher scores on the Word Reading ability were associated with better reading development. Wechsler (1997) concluded that this subtest is likely to be a reliable and valid measure of reading ability. Therefore, scores on the Word Reading subtest may provide insight into the child's reading development. As for an interpretation of the Word Reading ability subtest, higher scores equate to better reading ability.

However, due to the nature of the task, there may be children who performed well on the Word Reading subtest, but experience difficulties in complex reading ability. The procedure of the Word Reading subtest involves the child reading a single word. Thus, whilst a child may be able to read one word, they may have difficulties in reading a sentence. Therefore, whilst the

Word Reading ability might provide insight into the child's reading development, researchers should be aware that reading ability is complex.

6.6.3 *Selecting measures for the potential factors that promote risk and resilience, in the MCS*

Potential factors that encourage risk and resilience for mental health difficulties were informed by the literature review in chapter 4. Data indicating the described factors was included if it was available, and was suitability measured by, the MCS. Information regarding factors that were not investigated and why is provided in **Appendix A:** *Measures not selected within the current project.*

The following section details the factors that were selected to be investigated in the current project. Also, moving forwards in the current project, these factors will be organised into appropriate groups: 'Prenatal condition', 'Individual factors,' 'family factors, 'home environment' and 'community factors'. Factors drawn from these groups may impact the development of mental health difficulties differently. 'Family factors implies that the quality of the family and interaction is important, whereas 'home environment' considers the resources available to the young person. This is to highlight the ecological framework adopted in the current project.

For early risk factors and school-age factors that promote resilience, for mental health difficulties, the latest available and suitable data were analysed. Yet, potential early risk factors included data collected up to age five. Potential school-age factors included data collected when the cohort member (young person) was seven, eleven, or fourteen years old. Together, the latest available and suitable data for early risk factors is age five; whereas, for school-age factors, this is fourteen.

Additionally, there will be no overlap, regarding the age of data collection, across potential early risk and school-age factors. This means that whilst age five could be within school-age years, age five data will not be selected to

identify factors that encourage resilience for mental health difficulties. This is decided to provide a clear distinction between developmental stages in early risk (prenatal and early childhood) and school-age factors (middle childhood and early adolescence).

Lastly, unless otherwise stated, potential promotive factors will not also be investigated as an early risk factor. This is to provide a clear distinction between risk and resilience for mental health difficulties during data analysis. Moreover, whilst some factors are likely to be a promotive factor, this is uncertain within young people diagnosed with DLD.

6.6.3.1 **Prenatal conditions.**

Smoking during pregnancy. There is a variable, collected through informal reports, that was selected to indicate smoking during pregnancy. This variable is a follow-up question from whether the mother of the young person smokes cigarettes. If yes, then the follow-up question asks the mother for the number of cigarettes smoked during pregnancy. Any responses that report more than zero indicate smoking during pregnancy. Therefore, this variable will be analysed in investigations for the current project. However, the mother could have been smoking during the early stages of pregnancy, when the individual is unaware. Additionally, due to the nature of the question, social desirability bias may be present. Intentional inaccurate information may have been given to avoid feelings of embarrassment or guilt if the mother were to admit to smoking during pregnancy. Instead, a socially desirable, but inaccurate answer is given. Despite the limitations, this variable was selected to indicate exposure to smoking during pregnancy.

6.6.3.2 **Individual factors.**

Physical illness (child). There is available data when the cohort member was aged five, that was selected to indicate a long-term chronic illness. During the data collection of the MCS, an informal question asks the

main caregiver: ‘Does [cohort member] have any long-standing illness, disability or infirmity? By longstanding I mean anything that has troubled [cohort member] for a period of time or is likely to affect [cohort member] over a period of time’. The responses could be ‘yes’ or ‘no’. Main caregivers who responded yes, could be used to indicate the presence of a long-term chronic condition in cohort members. Yet, it cannot inform the illness, disability or infirmity experienced by the individual. Regardless, this data was selected to indicate cohort members with long-term chronic conditions during the investigations in the current project.

Language ability. The Naming Vocabulary subtest was adopted in the data collection of the MCS when the cohort member was aged three and five. This standardised measure will be discussed in more detail and evaluated under ‘participants’. As for now, the data collected by the Naming Vocabulary was selected to investigate language difficulties as a potential early risk factor for mental health difficulties, in the current project. The Naming Vocabulary is a subtest of the British Ability Scale (BAS). As explained under ‘6.6.2: Selected measures for cognitive ability and literacy’, the BAS is likely to be a reliable and valid battery of tests for young people’s cognitive ability and educational achievement. For ‘language ability’, the Naming Vocabulary was a continuous variable, whereby lower scores indicate greater severity of language difficulties, within the selected sample (see ‘Participants’).

Gender differences. Throughout the collection of the MCS, the interviewer asks the main caregiver the biological sex of the cohort. The response is ‘female’ or ‘male’: thus, it is a binary variable. This has previously been used in research as an indicator of the cohort’s ‘gender’ (Hansen and Jones, 2011). It has therefore been assumed, by parents, that gender of the cohort member is indicated through their biological sex. Whilst this variable was selected for the current project, care should be taken when interpreting such findings due to the complexity around gender and biological sex. As

explained in chapter 4, gender and biological sex may influence the development of mental health in different ways: through psychological and societal pressures; or, through neurochemical and neurological differences between females and males. Also, children's gender may not align with their biological sex; thus, there may be children who are gender-fluid or transgender. Regardless, gender (or biological sex), as reported by the main caregiver when the cohort member was five years old, was selected and analysed within the investigations in the current project.

Self-esteem. Moving onto possible protective or promotive factors, at age fourteen, self-esteem was measured using items from the Rosenberg self-esteem scale (Rosenberg, 1965). These include: 'I feel good about myself' and 'I am a person of value'. The original measure is likely to measure global self-esteem. Also, the Rosenberg Self-Esteem scales is likely to be a reliable and valid measure for global self-esteem in British Adolescents (Bagley et al., 2001). Despite not using the original measure, the Cronbach's alpha for the item selected in the MCS remained very high (α = .90). Hence, this measure was deemed appropriate to measure adolescent's (global) self-esteem. Where needed items were reversed, and then all the item scores were summed to a total self-esteem score. As for an interpretation, fewer scores indicate greater self-esteem.

Problem-solving ability. At age seven, the pattern construction subtest of the British Ability Scale was administered when the cohort members were ages five and seven. As explained under '6.6.2: Selected measures for cognitive ability and literacy', the pattern construction test is a subtest of the British Ability Scale (BAS). The BAS is likely to be a reliable and valid battery of tests for young people's cognitive ability and educational achievement. The pattern construction subtest is likely to measure spatial problem-solving ability. Spatial problem-solving, at age seven, was investigated for this project. The pattern construction subtest remained a continuous variable. Higher scores indicate greater spatial problem-solving

ability. Beyond the pattern construction subtest, however, there are no measures that claim to assess any component of problem-solving after the age of five.

Adequate sleep. In the MCS, there is data was collected regarding the disruption and latency of the cohort member's sleep. This was collected at age fourteen, through informal self-reports.

Firstly, the cohort member was asked about the frequency to which their sleep is disrupted. Whilst this question focuses on the cohort members' past four weeks of completing the self-report, the responses have been used in previous literature to investigate sleep quality (Kelly et al., 2018). Yet, previous research converts the continuous variable into four-categories (Kelly et al., 2018). However, the reason or benefit of doing this is unclear. Due to the lack of clarity in the benefit of converting the continuous variable, in the current project, the responses remained continuous. The interpretation is that lower scores equate to less sleep disruption.

Secondly, the cohort member was asked 'how long does it usually take to get to sleep', in the previous four weeks of completing the self-report. This variable has been used in the previous literature (Kelly et al., 2018). Usually, sleep latency is assessed through devices that can measure brainwaves to ensure that the individual has entered a sleep state. However, the self-report may provide a proxy for latency. This data will be analysed during the investigations in the current project. Similarly to disruption, previous literature converted the self-report for latency into a four-category variable (Kelly et al., 2018). Yet, again, the benefit of this conversion is unclear. Therefore, the responses remained continuous for self-reported sleep latency. For an interpretation, fewer scores equate to greater self-reported sleep latency.

Exercise. At age fourteen, adolescents were invited to wear a device that is claimed to measure their physical activity throughout the day. This device was the GENActiv Original accelerometer, and there is data from

10,337 cohort members. The device was meant to be worn on two selected days; one during a weekday, and another on a weekend. The device recorded their sensory movements from four in the morning to four in the late afternoon. Reminders were sent via text messages.

As explained in the user guide for the GENAactiv device in the MCS (Gilbert et al., 2017), due to the coding software available (GGIR program) there is data on the mean time spent in moderate to vigorous activity. This was calculated for high levels for five seconds, one and five minutes. It is assumed that a higher mean score equates to a greater frequency to which the cohort member engaged in moderate to vigorous physical activity. In this project, five-second data was used. Similar to previous studies, this was encoded into four categories. Higher scores indicate a greater frequency of moderate to vigorous physical activity.

Educational motivation. At age fourteen, the cohort member was asked informal questions regarding their educational motivation. This was a part of the MCS's educational motivational 'grid'. It contained six items, including: 'how often do you try your best at school?' and 'how often do you find school interesting?'. Together these six items are said to measure the individuals' educational motivation (Hansen, 2014). The Cronbach's alpha for the six items was high ($\alpha = .75$). This suggests that this educational motivation grid, or set of items, has good internal consistency. After reversing the appropriate items, a total score was generated. Higher scores indicate better educational motivation. Therefore, educational motivation was investigated in the current project.

Reading for fun. There are questions concerning the leisure time activities that the cohort member engages in. One such item includes 'Read for enjoyment (not for school)?'. Higher scores indicate a greater frequency of reading. This data will be analysed in the investigations of the current project. Other data does include watching TV, however, reading for fun may

highlight some notion of escapism from the adversity experienced in everyday life, compared to the passive act of watching TV. Therefore, this project investigated whether reading for fun is a factor that promotes resilience for mental health difficulties.

Prosocial behaviour. In the MCS, the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 2001) was completed by the main caregiver when the cohort was fourteen years old. The SDQ contains a prosocial subscale. As stated under '6.6.1: Selected measures for mental health difficulties', the SDQ is likely to be a reliable and valid measure for assessing young people's mental health difficulties, and this includes prosocial ability (Stone et al., 2010; Goodman and Goodman, 2011; Mathai et al., 2002; Johnson et al., 2014; Kovacs and Sharp, 2014; Hill and Hughes, 2007; Becker et al., 2004). The prosocial subscale is separate from the 'problem' scale used to indicate the severity of symptoms of certain mental health disorders. The prosocial behaviour subscale is a positive scale, and it has five items. Items include: 'Considerate of other people's feelings' and 'Shares readily with other children'. This subscale has been used by researchers to investigate prosocial behaviour (Girard et al., 2016). Hence, the data derived from this SDQ subscale was selected to indicate prosocial behaviour. Higher scores indicate greater displays of parent-reported prosocial behaviour.

6.6.3.3 **Family factors**

Main caregivers' psychological distress. There was an appropriate variable that could indicate the main caregivers' psychological distress in the MCS: the Kessler-6 (Kessler et al., 2002). The Kessler-6 was administered to the main caregiver when the cohort member was five years of age. The Kessler-6 is a six-item scale that is valid, reliable and is a widely used tool to measure psychological distress within research (Kessler et al., 2002; Cairney et al., 2007; Drapeau et al., 2010; Flouri et al., 2019; Hao et al., 2020). Items consisted of sentence finishers to 'During the past 30 days, about how often

did you feel...', which included 'nervous?', 'hopeless?', 'worthless?'. Together, the literature suggests that the data derived from the Kessler-6 is likely to be an indicator of main caregivers' psychological distress.

There is a strength of the Kessler-6 as a measure of psychological distress. Drapeau et al., (2010) concluded that the Kesler-6 is not likely to have gender bias. This suggests that gender differences in psychological distress are likely to be due to an actual difference, rather than due to the measurement. Therefore, the main caregiver's gender was not likely to impact the interpretation of the Kessler-6. This is a major advantage as the main caregiver may be of any gender (male or female).

Unhappiness in relationships. Dissatisfaction within parental marriage, or relationship, might increase the likelihood of arguments and disagreements between parents/carers, resulting in a form of conflict. This is implied as items include: 'my [partner] doesn't seem to listen to me' and 'Our relationship is full of joy and excitement'. However, the data collected regarding happiness in the relationship is not simple. This consisted of four items from the Golombok Rust Martial Inventory (short form; GRIMS) and four informal questions. The GRIMS is likely to be a reliable measure (Rust et al., 2010). Cronbach alpha was used to assess the internal reliability of all the items; just the items selected from the GRIMS; and lastly, the items from the informal questions. It was demonstrated that internal validity was high when all the related items were combined ($\alpha = .70$). Therefore, the appropriate items were reversed, and, due to the differences in the responses, scores were standardised before summing together to create a summary score. A higher score indicates greater happiness in the (marital) relationship.

Parent-child conflict. A subscale in the Child-Parent Relationship scale could indicate conflict in the family, especially between the child and the main caregiver. According to Hair et al., (2005), the child-parent relationship scale is a valid and reliable measure in assessing the

relationship between parent and child. In the MCS there are two subscales: ‘closeness’ and ‘conflict’. Items in the conflict subscale include ‘dealing with [cohort member] drains my energy’ and ‘[Cohort member] and I always seem to be struggling with each other’. According to the documentation accompanying the data collected by the MCS (Hansen, 2014), the Cronbach alpha of the conflict items indicate high internal consistency (α =.83). Therefore, the scores from the conflict subscale were summed to generate a parent-child conflict score (continuous variable). Higher scores would indicate greater parent-child conflict.

Main caregiver with a physical illness. The Short Form health survey questionnaire-8 (SF-8) was completed by the main caregiver when the cohort member was five years old. The SF-8 is a self-report that consists of eight items regarding the general health of the main caregiver. These eight items were selected from the SF-36. The SF-36 and the SF-8 are valid, reliable, and consistent measures to longstanding physical illness in adults (Brazier et al., 1992; Ware Jr et al., 1996; Jenkinson et al., 1993). Jenkinson et al., (1997) found that regardless of the number of items selected from the SF, in longitudinal studies, the results were significantly similar. Therefore, the SF-8 is likely to measure the main caregiver’s health.

However, the adapted SF-8 questionnaire is not limited to longstanding physical illness as it includes mental illness. Consequently, for this project, the following items were removed:

‘(During the past 4 weeks), how much did your physical health or emotional problems limit your usual social activities with family or friends?’

‘(During the past 4 weeks), how much have you been bothered by emotional problems (such as feeling anxious, depressed or irritable)?’

‘(During the past 4 weeks), how much did personal or emotional problems keep you from doing your usual work, college or other daily activities?’

The items left may equate to longstanding physical health. For instance: ‘(During the past 4 weeks), how much difficulty did you have doing your usual work, college or other daily activities because of your physical health?’. With the remaining items, a Cronbach alpha was performed. The Cronbach alpha for the remaining physical items on the SF-8 was high (α = 81). Therefore, for the current project, the sum of the remaining items on the SF-8 were selected to indicate the main caregiver’s physical illness. As the responses across items differ, the scores were standardised first, and then summed together. Higher scores on the SF-8 indicate worse physical health of the main caregiver.

Death of a parent. There is data on whether a parent or the main caregiver has died. One of the responses to the question ’What happened to [name of person]?’ is that the individual in question has ‘deceased’. The interviewer askes the main caregiver this question when the cohort member is five years old. This was selected to indicate the death of a parent.

Parental engagement. There are informal questions that ask about the level of engagement from the main caregiver to the child. These include and are not limited to: ‘how often do you tell stories to the [cohort member]?’, ‘How often do you draws/paints with the [cohort member]’, and ‘How often plays physically active games with the [Cohort member]’. Together, there are six questions regarding parental engagement. Cronbach alpha revealed that the items have good internal reliability (α = .71). Therefore, parental engagement was investigated in this project. Scores were summed together to create a parent engagement score; higher scores indicate greater parental engagement.

Harsh discipline practices. The Straus’s Conflict Tactics Scale (Straus and Hamby, 1997) assesses harsh discipline practices. Items include ‘How often do you [ignore him/her/them] when the [cohort member] is

naughty' and 'How often do you [smack him/her/them] when the [cohort member] is naughty'. This scale is a valid and reliable scale for measuring harsh discipline practices (Straus and Douglas, 2017).

In the MCS the main caregiver compared the Straus's Conflict Tactics Scale, when the cohort member was three and five years old. In the MCS, six items were selected from this scale. A Cronbach alpha was used to determine if the six items have high internal consistency. The Cronbach Alpha was high (α = .91). Hence, a summary score of the remaining Conflict Tactic Scale could be used to indicate harsh discipline practice. Higher score on this continuous variable indicates higher harsh discipline practice. Therefore, whilst, physical abuse cannot be measured, harsh discipline practices (at age five) will be investigated in the project.

Parent-child closeness. Parent-child closeness was the only factor considered as an early risk and a potential factor that encourages resilience for mental health difficulties. This is because of the complex and important nature of relationships upon the development of mental health difficulties, in typically developing young people and the target population. Firstly, as explained in chapter 4, good quality relationships are likely to play an important role in the process of resilience for mental health difficulties in young people. However, there is little research that investigates good quality relationships, such as parent-child closeness, as a factor that encourages resilience for mental health difficulties within young people diagnosed with DLD. Instead, low-quality relationships have been identified as an early risk factor for mental health difficulties, especially emotional problems, in young people diagnosed with DLD. Therefore, in the current project, if not revealed as an early risk factor, parent-child closeness was investigated as a potential factor that encourages resilience for mental health difficulties in young people diagnosed with DLD.

As a potential early risk factor, when the cohort member was three years old, the parent-child relationship scale was completed by the main caregiver. As stated previously, according to Hair et al., (2005), the child-parent

relationship scale is a valid and reliable measure in assessing the relationship between parent and child. In the MCS there are two subscales: ‘closeness’ and ‘conflict’. Items in the closeness subscale include ‘I share an affectionate, warm relationship with my child’, ‘If upset, my child will seek comfort from me’, and ‘My child values his/her relationship with me’. The scores from the closeness subscale were summed to generate a parent-child closeness score (continuous variable). Lower scores indicate greater parent-child closeness.

As stated, if it is revealed during this project that lack of parent-child closeness is not an early risk factor for mental health difficulties, then this data will be analysed as a potential factor that might encourage resilience. At age fourteen, parent-child closeness was measured through a parent informal report. Unlike in earlier years, when the cohort member was fourteen years of age a simple question was asked. The item asks the main caregiver ‘Overall, how close would you say you are to the [Cohort member]’. The available responses are: ‘not very close’, ‘fairly close’, ‘very close’, and ‘extremely close’. This could be used to informally measure parent-child closeness, from the main caregiver’s perspective.

Whilst other informal questions were asked, from the adolescent's perspective, it is unclear as to what relationship they are referring to. The informal question, answered by the adolescence, was ‘how close would you say you are too...’ either to their mother or father. Yet, their mother or father, may not be their main caregiver. There are situations or circumstances whereby the cohort member’s main caregiver is their sibling, grandparents, or adoptees. Therefore, concerning parent-child closeness, the informal question which asked the main caregiver on their perspective was selected for the current project.

6.6.3.4 **Home environment**

Low income. There is data regarding the families’ income using the information adopted by the Organisation for Economic Co-operation and

Development data (OECD). The OECD collects data on a wide range of topics which could indicate families' financial stability concerning their country of residence. Topics range from family or household (for example, overcrowding) to national factors (economic growth). This data was selected to indicate if a family is living in poverty. More information can be found at https://www.oecd.org/about/

However, the MCS used a modified version of the OECD scales to calculate and identify families living in poverty. Whilst the original OECD would consider overall economic growth, the MCS calculates financial stability through available individual family factors. Poverty, or 'low income' is defined as families whose net income is below 60% of the population. This is the same definition given within the UK government statement regarding poverty, using the OECD (Cribb et al., 2018). In the current project, families with low income were those who reported having below 60% OECD equalized scale for the latest relevant data: age five.

Single parenthood. There is data available to indicate single parenthood. The variable is an informal question that asks the main responder (main caregiver) the number of carers and, or parents that are currently living within the household. The response was 'one carer/parent', which could be used to indicate single parenthood. This data, when the cohort member was five years old, was selected and analysed within the investigations of the current project.

Main caregivers who are unemployed. An informal question regarding the main caregiver's employment status was asked when the cohort member was five years old. Whilst the partner was also asked, only the main caregiver's response will be included. It is assumed that the main caregiver is the provider of resources within the home. Hence, the main caregiver being unemployed may lead to reductions to finical ability to provide the appropriate resource. It is uncertain if the partner's employment

status has an impact upon the resources available to the child; not all the partners in the MCS may live in or contributed to the household. Regardless, the main caregiver's employment status was indicated through the response ('yes' or 'no') collected from the informal report.

Second-hand smoke exposure. The data to indicate second-hand smoke was available from when the cohort member is nine months of age, to eleven years. These are informal reports on 'whether anyone smokes in the same room as child'. The wording of which does differ across time points, but only to appreciate the context of that time. For data collected at nine months, the main caregiver was informally asked: 'whether anyone smokes in same room as baby'; as for five years the main caregiver was asked: 'whether anyone smokes near the [cohort member]'. The responses to these questions, despite slight differences in wording, are binary: 'yes' or 'no'. The data derived from this question was selected to indicate those who at age five were exposed to second-hand smoke.

6.6.3.5 Peer and community factors

Safe neighbourhood. At age fourteen, cohort members (at age fourteen) were asked questions concerning their feeling, or opinions of the neighbourhood in which they reside. Particularly, the cohort members were asked, in the young person's questionnaire, 'How safe is area around home to play in?'. The available responses were 'Very safe', 'safe', 'not very safe', and 'not at all safe'. The use of self-reports to indicate how safe the neighbourhood has an advantage. The question focuses on the interpretation and feeling of the cohort members. Hence, the question measures the extent to which the cohort members feel secure and safe where they live; thus, the subjectivity of such feelings is acknowledged here. For interpretation of the scores, higher scores indicate fewer feelings of safety in the neighbourhood. The data collected from this informal measure was selected during the investigations in the current project.

Close friends. There is data that could be used to indicate the level of support from peers. In the young person's questionnaire, the cohort member (at age fourteen) was asked 'Do you have any close friends (Friends that you feel at ease with and can talk too)'. The response was binary, either 'yes' or 'no'. This data could be used to indicate if the cohort member feels close enough to a peer or young people that they can receive emotional support from them. Therefore, peer support or close friendships was investigated in the current project.

Community engagement. Multiple informal measures focus upon specific aspects of community engagement: religion and non-religious (youth clubs and bands). These were informal self-reported completed by the cohort member at age fourteen. The internal consistency from all the items was low (α = .35). Hence, the items for religious and non-religious community engagement were reviewed separately.

Firstly, the cohort members were asked about their attendance at a religious service. The item was: 'How often do you attend a religious service?'. The available responses were: 'most days', 'at least once a week', 'at least once a month', 'several times a year', 'once a year or less', 'never or almost never'. The data indicating community engagement (religious) was investigated in the current project.

However, for the interpretation of the findings, there are some considerations for the data indicating cohort member's attendance to a religious service. It should be acknowledged that it is unknown whether the frequency of attendance is voluntary or heavily encouraged by family members. Thus, the reason for the attendance of religious services is unknown, this should be discussed in the interpretation of the results. Also, the phrasing of the question is inclusive to all religions. This is important to acknowledge as the type of religion is not measured here, but simply the frequency to which one attends a service.

Secondly, informal reports were used to determine how often the cohort member attended organised activities. This includes youth clubs (including

scouts and guides), and band practices. Whilst it is uncertain if these are organised outside of the school environment, they are extracurricular activities. Cronbach alpha revealed that together the internal consistency is low (α = .27). Thus, the two items are not likely to measure the same construct: non-religious organised activity. This suggests that these items are likely to measure specific types of organised activities. Therefore, these types of organised activities (youth clubs and band practice) were analysed separately within the investigations in the current project. Lower scores indicate greater attendance to the extracurricular activity, albeit young clubs and, or band practice.

Mental health interventions. Whilst not highlighted as a positive factor for mental health development in young people, the introduction of mental health interventions should be considered. Mental health interventions may include or encourage positive psychosocial resources. To identify positive factors for mental health, the introduction of mental health interventions should be controlled for, or at least, acknowledged during investigations.

At age eleven, there are informal reports of emotional or mental health support received. These were obtained if the main responder responded ‘yes’ to the question of whether the cohort member has additional support from schools or services. The main responder is then asked to give the reason or type of support. Responses include, but are not limited to, ‘support from Child and Adolescent Mental health Services’, ‘support for behavioural problems’, and ‘support for ADHD’. Responses that indicate that the cohort member has received support due to difficulties in the level of their emotional, social or behavioural functioning, will be used in the generation of the ‘mental health intervention’ variable. This variable was selected to identify adolescents who have received support or not, using the data drawn from the responses of the described follow up question.

6.7 Participants

As alluded to previously, for the current project, young people who reflects those diagnosed with DLD was selected from the data collected by the MCS. Overall, at age fourteen, there was data collected from a total of 11,726 families who were willing to take part. Approximately 49.83% (n = 5,843) of the young people, at age fourteen, were reported to be female; 50.18% (n = 5,884) of young people reported to be male. Within the whole MCS cohort at age fourteen, 3,463 reported that their household income was 60% below the national average. This means that 29.56% of the MCS population are living in poverty, at age fourteen. Lastly, during the design and the data collection of the MCS, there was a strive to include ethnic minority groups to ensure that the MCS cohort is representative to the UK population. At age fourteen, the ethnic majority group is white British young people (76.51%, n = 8971). This reflects the ethnic majority group within the UK population: White British. West or east Asian ethnicity (Indian, Chinese, Pakistani, for instance) is the second majority ethnic group within the MCS population at age fourteen (10.67%, n = 1,251). In the MCS at age fourteen, 3.10% of those reported that their ethnicity is black (Black British or Black African-Caribbean for instance). 4.55% (n = 534) of the MCS cohort reported that their ethnicity is mixed.

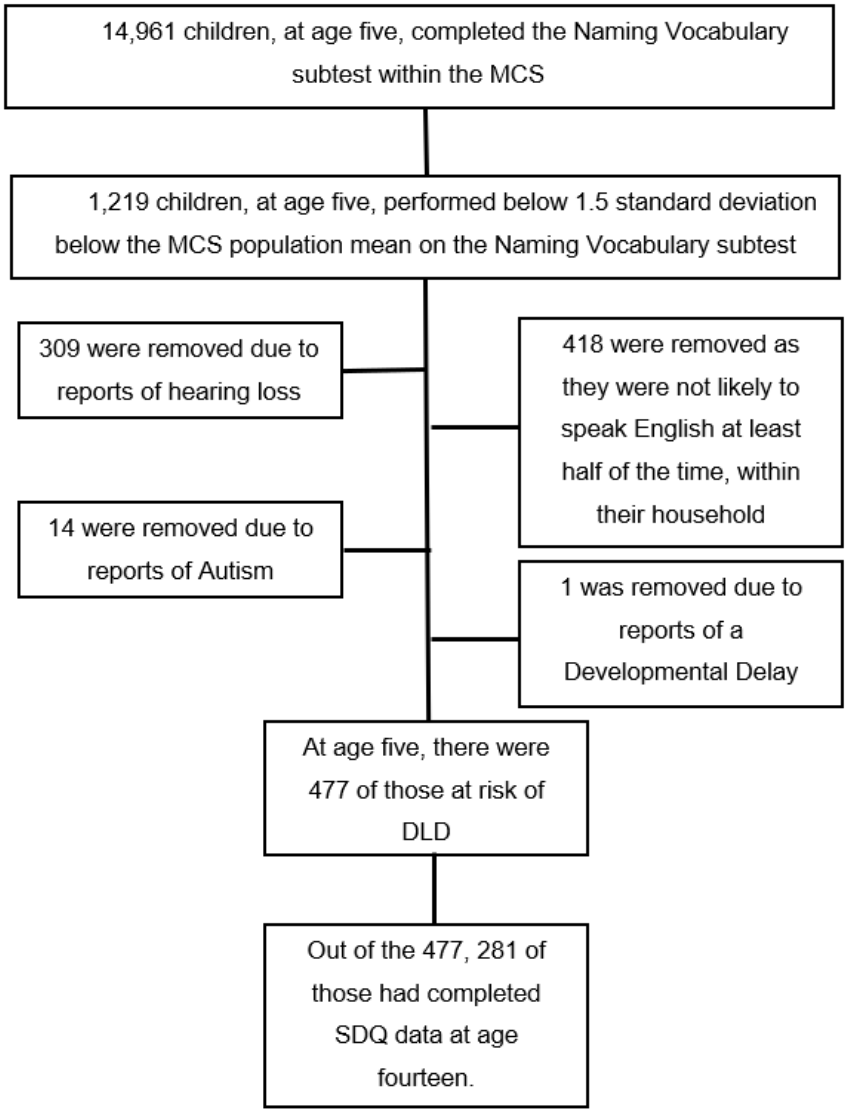
6.7.1 *Selecting a sample that reflects young people diagnosed with DLD*

The inclusion criteria, for the current project, were children who, at age five, performed 1.5 standard deviation below the MCS population mean on the Naming Vocabulary subtest. The exclusion criteria were any reports of hearing loss, and Developmental Delay, at any of the time-points. Reports of the diagnosis of Autism and Down's syndrome led to exclusion if reported at the latest (age fourteen) available time point. Also, lack of exposure to spoken English, within the household, at any time point, led to exclusion.

Figure 4 provides a summary of the process of selecting young people at risk of DLD (at age five). The sequence of enforcing the exclusion criteria was: ‘reports of hearing loss’; ‘were not likely to speak English at least half of the time’; ‘reports of Autism’; ‘Reports of Down’s Syndrome’; and lastly, ‘reports of Developmental Delay’. None were removed due to reports of Down’s Syndrome. It is possible that those reported to be diagnosed with Down’s Syndrome were already excluded under other criteria, such as hearing loss.

Figure 4.

Summary of the sample selection of children at risk of DLD at age five.



The criterion adopted in the current project is not the same as the one adopted in previous DLD investigations that analysed the data collected by the MCS. For a full description and review of the criterion adopted by previous DLD investigations, analysing the data collected by the MCS, see **Appendix A**: *Measures not selected within the current project.* In summary, the current criterion included the latest (up to date, May 2020) data collected by the MCS. Thus, data collected when the cohort member was age fourteen was selected in the criterion in the present project. This was not done within previous DLD investigations analysing the data collected by the MCS. Additionally, unlike previous DLD investigations, the informal reports of parental concerns, regarding the young person's language development, was not included in the inclusion criteria in the current project. The reason for not including reports of parental concerns is that it is uncertain what language components were measured. Due to the complex nature of DLD and mental health difficulties, a clear language description is recommended (Novogrodsky, 2015; Bishop et al., 2017). Therefore, the sample selected in the current project, does not share the same criterion as previous DLD investigations that analysied the data collected by the MCS (Forrest et al., 2018; St Clair et al., 2019; Toseeb and St Clair, 2020) (for a review, see **Appendix A**: *Measures not selected within the current project*).

Additionally, unlike previous DLD investigations that have analysed the data collected by the MCS, reports of a Developmental Delay led to exclusion from the project's sample. A young person with Developmental Delay is likely to experience a wide range of difficulties, including speech and language, emotional cognition, as well as sensory difficulties (First and Palfrey, 1994; Association for All Speech Impaired Children, 2017). Whilst the cause may be unknown, Developmental Delay may be influenced by genetics, adverse conditions during the prenatal period, and premature birth (Shaffer, 2005; Jedrychowski et al., 2008; Association for All Speech Impaired Children, 2017; O'Connor et al., 2020). Yet, Developmental Delay may be the symptom of an underlying cause, such as cerebral palsy, foetal alcohol syndrome, fragile X syndrome, and brain injury (Association for All Speech Impaired Children, 2017). A Developmental Delay could influence a young

person's language development (Oberklaid and Efron, 2005; Association for All Speech Impaired Children, 2017). It is unsurprising, therefore, that organisations such as AFASIC express that DLD is not the result of a general Developmental Delay (Association for All Speech Impaired Children, 2017). Moreover, Developmental Delay has been excluded in recent DLD investigations in the previous literature (Eadie et al., 2018). Therefore, the sample for the current project excluded those who were reported to have a Developmental Delay.

Lastly, the sample will be referred to children or young people at risk of DLD (rDLD). This is the same terminology adopted within previous DLD investigations analysing the data collected by the MCS. This is adopted to ensure consistency in the literature relating to young people experiencing severe and persisting language difficulties with no known biomedical cause. Yet, the inclusion of 'at risk of' highlights that a clinical sample of DLD was not selected.

6.7.1.1 Inclusion criteria

Naming Vocabulary subtest. When the cohort member was three and five years old, the Naming Vocabulary subtest was administered by trained interviewers. The age suitability of the Naming Vocabulary subtest is between two years and eleven months, to seven years and eleven months. This task is a subtest of the British Abilities Scale II (Elliott et al., 1997). As explained earlier, the BAS is an established and standardised battery of tests for assessing children's and young people's cognitive ability and educational achievement. The BAS is predominately used to assess children and young people who live in the UK. The BAS, as well as the subtests within it, are likely to be valid and reliable in what they assess (Elliott et al., 1997; Styles, 1999; Kline, 1995). Therefore, the subscales within the BAS are likely to measure what they claim the assess in young people who live within the UK.

As for the procedure of the Naming Vocabulary subtest, the interviewer presents coloured pictures of objects to the cohort member (the child). One

picture, of an object, is shown at one time. The cohort members were asked by the interviewer to name the object in the picture. According to the technical report of the MCS (Hansen, 2014), the child needs to be motivated and engaged in the task to assess their spoken vocabulary. Refusal to speak will lead to low performance on the Naming Vocabulary subtest. Also, this subtest is not suitable for children who have major visual impairments or have no prior experience with picture books (MCS technical report) (Hansen, 2014). There is no information, however, on whether children not suitable for the Naming Vocabulary subtest were identified and excluded from completing this subtest, during the collection of the MCS.

According to Elliott et al., (1997), as described in the technical report of the MCS (Hansen, 2014), the Naming Vocabulary subtest assesses spoken vocabulary in children. The authors state that performance in this subtest depends on the child's current vocabulary knowledge of nouns. Elliott et al., (1997) claims that low performance on the Naming Vocabulary subtest could provide researchers with insight into the children's:

'*Expressive language skills*

Vocabulary knowledge of nouns

Ability to attach verbal labels to pictures

General knowledge

General language development

Retrieval of names from long-term memory

Level of language stimulation.' (Hansen, 2014: 63)

Yet, specifically, Elliott et al., (1997) argued that the Naming Vocabulary subtest measures a children's lexical retrieval, as well as the knowledge, of nouns. Due to the nature of the procedure, this is supported. The procedure of the Naming Vocabulary subtest is similar to the 'picture-naming' task (Glaser, 1992; Herbert et al., 2008; Kambanaros, 2010). A picture-naming task is likely to be a valid assessment tool for measuring lexical retrieval

ability or ‘word-finding’ ability (Herbert et al., 2008; Kambanaros, 2010). Additionally, German (2002) concluded that picture naming tasks, as an assessment of lexical retrieval ability, have good ecological validity. This suggests that the task used in the ‘Naming Vocabulary’ subtest arguably can reflect everyday lexical retrieval ability in young people. Yet, the stimuli (the pictures) in the Naming Vocabulary subtest, adopted in the MCS, were of objects; hence, lexical retrieval of nouns, rather than general ability, was likely assessed.

Friedmann, Biran, and Dotan’s (2013) explain that the plausible cause of difficulties in (noun) lexical retrieval may be speculative. Difficulties in lexical retrieval could be due to a lack of prior knowledge about the object; the inability to recognise the object; or underlying deficits in the cognitive mechanisms associated with lexical retrieval. Also, difficulties in lexical retrieval may be due to poor comprehension of the pictures observed, indicating a defect in the individuals’ conceptual system. Additionally, difficulties in the individuals’ word production may lead to low performance in a picture-naming task (Friedmann et al., 2013). Therefore, according to Friedmann et al.’s explanation, in such picture naming tasks, it cannot be determined where, in relation to the cognitive processes involved, the disruption has occurred. Instead, the task may only determine that the individual experiences difficulties in their (noun) lexical retrieval ability.

Lexical retrieval difficulties and DLD. To some degree, lexical retrieval difficulties, as assessed by the Naming Vocabulary subtest, could select a sample reflecting young people diagnosed with DLD. The literature generally demonstrates that children diagnosed with DLD (also referred to as ‘SLI’; see chapter 2) are more likely to experience lexical retrieval difficulties, or ‘word-finding difficulties’ (Dockrell and Lindsay, 1998; Bragard et al., 2012), compared to typically developing children. Additionally, research suggests that children diagnosed with DLD perform worse on picture naming tasks, compared to typically developing children (Ketelaars et al., 2011; Jongman et al., 2017; Biran et al., 2018). Together, it is likely, compared to

typically developing peers, that children diagnosed with DLD are more likely to experience (noun) lexical retrieval difficulties. Hence, low performance on the Naming Vocabulary subtest could select samples that reflect young people diagnosed with DLD.

There is a plausible explanation as to why lexical retrieval difficulties are worse in children diagnosed with DLD, compared to their typically developing peers. Biran et al., (2018) states that lexical retrieval is an important component of general language development. It is generally agreed that lexical retrieval difficulties may disrupt mastery of further and complex language abilities in young people. Thus, if a child or adolescent has difficulties with naming one object, or retrieving a single word, then they may have further difficulties in retrieving two words or object names. It is generally agreed that lexical retrieval difficulties may disrupt mastery of further and complex language abilities in young people. It is unsurprising, therefore, that lexical retrieval is described as ‘one of the central processes in language’ (Friedmann et al., 2013, pp. 1). Hence, young people who experience lexical retrieval difficulties may exhibit cascading disruptions to complex language development, which increases the likelihood of a diagnosis of DLD, or other communicative disorders. Therefore, young people diagnosed with DLD may perform worse, compared to typically developing peers, on picture naming tasks because these are likely to assess one of the core components of language.

Furthermore, difficulties in lexical retrieval ability may indicate difficulties in other components of language. Research by Dockrell and Messer (2007) found that children who experienced lexical retrieval difficulties were significantly more likely, compared to typically developing children, to demonstrate difficulties in phonological fluency. Phonological fluency, or phonology, as described in chapter 2, is a component of language, which refers to the storage, comprehension, and use of organised spoken sounds. Dockrell and Messer’s (2007) findings suggest that there is an association between difficulties in lexical retrieval ability and difficulties in phonological fluency. Therefore, it could be argued that measuring lexical retrieval could provide associative insight into the individuals’ phonological ability. Together,

difficulties in lexical retrieval may be associated with cascading disruptions in complex language ability and phonological fluency. This might explain why young people diagnosed with DLD are more likely to experience (noun) lexical retrieval difficulties, compared to their typically developing peers.

However, lexical retrieval may not indicate or predict the performance of all language abilities. During Friedmann and Novogrodsky's (2007) comprehensive study, it was revealed that children with lexical retrieval difficulties may have intact word comprehension and syntax ability. Syntax, as stated in chapter 2, refers to the rules, comprehension, and ability to structure words to form a sentence. This suggests that whilst lexical retrieval may impede phonological fluency, it may not have an impact upon other domains of language. Hence, measuring lexical retrieval might not indicate general language development. An individual may perform well on the Naming Vocabulary subtest, suggesting good lexical retrieval ability, and yet, experience language difficulties in other components (syntax and word comprehension). Therefore, not all young people diagnosed with DLD will experience lexical retrieval difficulties.

Furthermore, the Naming Vocabulary subtest focuses on the lexical retrieval of nouns (objects). The discussions and conclusions were drawn by Friedmann, Biran and Dotan (2013) and Friedmann and Novogrodsky's (2007) focuses upon overall lexical retrieval ability. This includes lexical retrieval of nouns and verbs. However, the Naming Vocabulary subtest specifically measures noun lexical retrieval. Whilst not focusing specifically upon DLD, Dockrell, and Lindsay found that 23% of children referred to speech and language therapy experience (noun) lexical retrieval difficulties. This suggests that it is likely that there are children with severe and persisting language difficulties, and yet, intact (noun) lexical retrieval ability. Therefore, it is not likely that all young people diagnosed with DLD experience (noun) lexical retrieval difficulties.

Taken together, young people diagnosed with DLD could, to some degree, be selected through the data collected by the Naming Vocabulary subtest, when the cohort member was five years old. Research evidence

suggests that, as a group, young people diagnosed with DLD performed worse on picture naming tasks, such as the Naming Vocabulary subtest, compared to their typically developing peers (Ketelaars et al., 2011; Jongman et al., 2017; Biran et al., 2018). However, not all young people diagnosed with DLD will experience (noun) lexical retrieval difficulties at age five.

6.7.1.2 **Exclusionary criteria**

The table below (**Table 8.**) provides a summary of the measures, and at what ages, were selected to exclude young people from the sample.

Table 8.

Summary of the variables were selected within the exclusion criteria for selecting samples of DLD, as well as when they are available.

Exclusionary variable	Age of the cohort member
Reports of a diagnosis of Autism	14 years old
Reports of Developmental Delay	14 years old
Reports of a diagnosis of Down's syndrome.	11 years old
Household language is not spoken at least English half of the time	14 years old 11 years old 7 years old 5 years old 3 years old 9 months old
Reports of hearing loss	14 years old 11 years old 7 years old 5 years old 3 years old 9 months old

Note. All reports were informal parent reports.

For the current project, any reports of hearing loss and developmental delay at any of the time points will result in exclusion from the sample. Yet, reports of the diagnosis of Autism, and Down's syndrome, lead to exclusion if reported at the latest available time point. These conditions, unlike hearing loss, are likely to be longstanding conditions. Hence, it is not necessary to use information from previous time points. The described factors, hearing loss and diagnosis of Autism, for instance, all have a binary response: 'yes', or 'no'. Responses that are 'yes', to any of the described factors lead to exclusion.

Additionally, a lack of exposure to spoken English, within the household, will lead to exclusion. An informal question was asked across the time points asking the main caregivers 'what is your main household language'. The answers from the informal question were 'mainly English', 'mostly English', 'Half English half other', 'mostly other', and 'only other'. Similar to previous DLD investigations analysing the data collected by the MCS, the current project selected the data drawn from the described informal report. At any available time-point or age, if the main caregiver's report that English is not the main spoken household language for at least half of the time, then these cohort members were excluded.

6.7.1.3 **Selecting young people at rDLD for the current project**

Using STATA12, the sample for the current project was selected through the data collected by the MCS. As stated, the inclusion criteria were children, at age five, who performed 1.5 standard deviation below the MCS population mean. At age five, 14,961 children completed the Naming Vocabulary subtest. Out of those children, 1,219 children at age five were selected in the inclusion criteria.

As for the exclusion criteria, firstly, hearing loss at any of the surveyed time points was removed, removing 309 from the original sample. 418 of the remaining 910, were likely to have a lack of exposure to English, and thus were removed. From the remaining 492, 14 of those were removed due to a reported diagnosis of Autism. Lastly, one child was removed due to a

reported diagnosis of Developmental Delay. A diagnosis of Down's syndrome did not lead to the removal of a child. Therefore, those rDLD at age five, with no known biomedical cause was 477. Out of this sample, 281 had available SDQ data at age fourteen. In the selected sample, young people rDLD, there were 154 males and 127 females who had completed the SDQ data at age fourteen. See **Figure 4** for a visual summary of described selection process.

6.7.1.4 Language description of the project sample

In the current project, children, at age five were selected as those at risk of DLD (rDLD). The predominant language difficulty experienced in the selected sample is in (noun) lexical retrieval ability (at age five). Also, the sample selected may experience difficulties in phonological fluency (Dockrell and Messer, 2007). However, considering the measures adopting during the data collection of the MCS, the presence of other language difficulties is known. Therefore, in the selected sample, children are likely to experience (noun) lexical retrieval difficulties at age five; other difficulties are unknown.

As for individual differences within the selected sample, this will be likely. The explanation by Friedman et al., (2013) highlights that there may be individual differences in the specific forms of lexical retrieval difficulties. Also, within the group selected as rDLD there may be individual differences in the severity of lexical retrieval difficulties. Therefore, due to the complex nature of language development and abilities, individual difficulties will exist.

There may be children within the selected sample who may have difficulties in (noun) lexical retrieval difficulties but may not be diagnosed with DLD. Instead, difficulties in (noun) lexical retrieval ability could be due to cognitive or learning difficulties. Friedman, Biran, and Dotan (2013) explain how the conceptualisation, or conceptual system, may impact lexical retrieval ability. Disruptions or the absence of the conceptualisation of the object may lead to lower Naming Vocabulary scores. Thus, the child may simply not know what the object is being displayed; or, their mental image of the object may not match the visual representation of the object displayed. An absence of conceptualisation of the object could be due to cognitive difficulties outside

of language, or due to a learning disorder. Therefore, low scores on the Naming Vocabulary subtest may be due to cognitive, or learning difficulties, rather than language.

Additionally, there may be children, selected as rDLD, who have little experience with picture books. Not all children living within the UK may have enough household income to afford resources, stimulation, or opportunities to build upon their lexical retrieval difficulties. This includes the procession of picture books. In return, this could have an impact on their performance on the Naming Vocabulary subset at age five. Therefore, there may be children who are selected as rDLD that may have been selected due to a lack of resources to develop a conceptual framework for the objects presented.

Lastly, the pictures introduced to the child may, somewhat, be culturally specific to British culture. There may be children not as accustomed to this culture, or whereby, English is not their main language. Whilst the exclusion criteria may have removed the majority of these children, it cannot be certain that cultural biases have not played a role in low Naming Vocabulary scores in some children selected in the project sample. Therefore, there may be children included within the sample selected whose first spoken language is not English, who may display lexical retrieval difficulties, as assessed by the Naming Vocabulary subtest.

Together, not all young people diagnosed with DLD will have been selected under the inclusion criteria adopted for the current project. Young people can be diagnosed with DLD and not experience (noun) lexical retrieval difficulties at age five. Additionally, there may be children selected in the project sample who are not diagnosed with DLD. Low Naming Vocabulary scores could be due to other factors that impact the development of language at age five. These include low socioeconomic status or lack of exposure to picture books; unknown cognitive or learning difficulties; and lastly, English not as their first language, or due to a potential cultural bias within the task. The described factors may have led to low Naming Vocabulary scores. Overall, the sample selected for the current project is

young people who were at risk of DLD (rDLD) at age of five, as assessed by the Naming Vocabulary subtest.

6.7.1.5 Additional description of the project sample

At age fourteen, 45.20% (n = 127) of the sample were reported to be female. Approximately 150 of the sample reported that their household income is below 60% of the average population. This means that 53.38% of the sample were likely to be living in poverty. The ethnic majority group within the project sample was white (white British, white Irish, white England, for instance) at 53.02%. Follow this, those who reported that their ethnicity is west or east Asian was 11.38%. Those who reported that their ethnicity is black was 7.47%. Those who reported that their ethnicity is mixed, within the project sample, was 6.76%. Lastly, at age fourteen, one young person within the sample also reported that they spoke another language (Welsh).

6.7.2 *Generation of comparison groups*

Comparison groups were generated to understand the relationship between young people rDLD and, mental health difficulties at age fourteen; problem-solving ability at ages five and seven; and (one word) reading ability at age seven. It is important to note that both the comparison groups may contain young people who may have language difficulties, and intact (noun) lexical retrieval abilities, at age five. Hence, some young people may likely experience DLD or language difficulties within the comparison groups.

6.7.2.1 **The general population.** The comparison group known as ‘the general population’, were young people who were not selected during the inclusion criteria. The inclusion criteria for young people rDLD, were those who performed 1.5 standard deviation below the population mean on the Naming Vocabulary subtest at age five, in the MCS. Also, there were no exclusion criteria for the selection of the general population. Therefore, the

general population might contain young people who are diagnosed with Autism, Developmental Delay, Down's syndrome, as well as, have hearing loss, and a lack of exposure to the English language. The general population contains 14,027 young people at age five.

At age fourteen, 50.04% (n = 4,950) of the generated general population, for the current project, were reported to be female. Approximately 3,452 of the sample reported that their household income is below 60% the average population. This means that 31.71% of the generated general population, for the current project, were likely to be living in poverty. Lastly, the ethnic majority group within the project sample was white (white British, white Irish, white England, for instance) at 81.77%. Follow this, those who reported that their ethnicity was west or east Asian is 6.71%. Those who reported that their ethnicity is black was 2.28%. Those who reported that their ethnicity is mixed, within the project sample, was 4.44%.

6.7.2.2 **Typically developing peers.** Typically developing peers were young people who were not selected during the inclusion criteria. To recap, the inclusion criteria for young people rDLD, as those who performed 1.5 standard deviation below the population mean on the Naming Vocabulary subtest at age five, in the MCS. Unlike the general population comparison group, the same exclusionary criteria for the sample group was enforced. Hence, young people in typically developing peers are unlikely to experience (noun) lexical retrieval difficulties, nor have conditions or circumstances associated with disruptions to language development. Typically developing peers contain 9,749 young people at age five. The young people selected in typically developing peers may also be selected in the general population.

At age fourteen, 51.83% (n = 3,497) of the generated typically developing sample, for the current project, were reported to be female. Approximately 1,546 of the sample reported that their household income is below 60% the average population. This means that 22.91% of the generated typically developing sample, for the current project, were likely to be living in poverty. Lastly, the ethnic majority group within the project sample was white

(white British, white Irish, white England, for instance) at 85.65%. Follow this, those who reported that their ethnicity is mixed, within the project sample, was 4.55%. Those who reported that their ethnicity is west or east Asian was 3.52%. Those who reported that their ethnicity is black was 2.18%.

6.8 Ethical considerations

The original MCS obtained ethical approval through the NHS (National Health Service) Research Ethics Committees (RECs) (Shepherd, 2012). Following the recommendation by the NHS REC, information was given to eligible participants in a letter and leaflet form. Written consent was obtained from families willing to take part in the study. The main caregiver (parent or guardian) gave consent on behalf of the child until age eleven (data collection point five). At age eleven, written permission from the main caregiver for the interviewer to ask the child for their consent was obtained. If given, the interviewer proceeded to gain consent from the child. This was also performed for age fourteen (data collection point six). However, for the interviewer to take a saliva sample of the child was still given by the main caregiver through written permission.

The data can be and was obtained through the UK DATA service. This is a depository of shareable data collected by studies, such as the MCS. For the researchers to obtain and analyse the data collected by the MCS, there were requirements regarding its use. Firstly, the data cannot be analysed for commercial use. Secondly, the data cannot be linked, or merge with national databases (such as the NHS database). Merging such datasets increases the possibility of identifying individuals. Concerning the dataset itself, individuals are anonymous. Individuals' names are not available. Instead, a unique MCS identifying code was established and given to each individual. Therefore, researchers who access the dataset cannot identify individuals through their names. However, sensitive information such as their date of birth and area of the household is available to the researcher. It could be plausible to identify individuals through their sensitive information. Hence, the

last ethical requirement is that the researcher does not attempt to identify individuals using the data collected by the Millennium Cohort Study.

Regarding the current project, the researcher agreed to the requirements detailed above (see **Appendix B**). The MCS datasets were not merged with other datasets, such as the NHS database. Also, only the information needed for the project was included in the analysis. Sensitive information, such as the cohort members' date of birth and area of the household, were removed. Therefore, the researcher of the current project is not able to identify individuals who participated in the MCS.

Furthermore, the analysis of the data collected by the MCS has also received ethical approval from the Manchester Metropolitan University (MMU) Ethics Committee on the 14/11/2018 (see **Appendix C**). Under this agreement, the MCS data is to be stored on a password-protected personal laptop or computer. Also, the researcher is to adhere to the requirements outlined in the previous paragraphs.

6.9 Data analysis

Throughout the investigations of the project, the statistical software STATA was used. Due to the interface, STATA enables researchers to efficiently and effectively manage and analyse large datasets. Also, using STATA, macros, and loops can be created. A macro is a typed instruction or series of commands that can perform a task. Macros can be created to analyse the data but, do not contain data; including sensitive information. This means that macros can be shared across researchers within and outside the investigatory team. Hence, the macros used in the current project, to investigate risk and resilience for mental health difficulties in DLD, can be openly shared with other researchers. The use of the macros requires the other researchers to have the statistical software, STATA, as well as the dataset designed for the series of commands. Therefore, STATA was used in the project to analyse the MCS data.

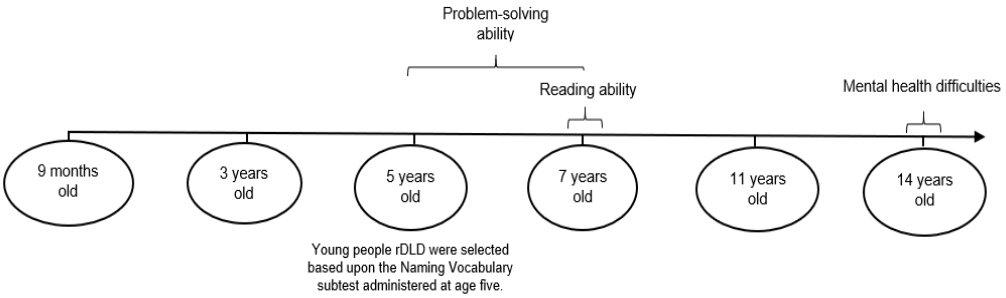
6.9.1 *A group comparison investigation to provide a foundation for the current project.*

The first investigation was performed to provide a foundation for the current project. The sample selected in the present project is not the same as previous DLD investigations analysing the data collected by the MCS. It was unknown if the sample selected for the current project indeed experiences worse mental health difficulties, internalising and externalising problems at age fourteen, compared to the general population or typically developing peers.

Additionally, researchers should attempt to understand the developmental context of their selected sample (Bakopoulou and Dockrell, 2016; van den Bedem et al., 2018). No investigation provides a full sample description of a sample selected in DLD investigations using the data collected by the MCS. A full sample description includes the potential additional difficulties associated with a diagnosis of DLD. As explained in chapter 2, young people diagnosed with DLD more likely to experience worse cognitive and literacy difficulties (Vugs et al., 2013; Vugs et al., 2014; Vissers et al., 2015; Isoaho et al., 2016; Pavelko et al., 2017). The first investigation (chapter 7) highlighted any potential developmental disruptions experienced as a group of young people rDLD. Through investigating the developmental context of the young people rDLD this enhanced our description which may be useful when interpreting the results of the project. Therefore, the first investigation determined whether the participants experience worse cognitive and literacy difficulties, compared to the general population and their typically developing peers. The figure below (**Figure 5**) provides the timeline for the first investigation.

Figure 5.

Summary of the timeline of the first investigation.



Firstly, the assumptions of the data collected, and selected for this investigation, was analysed. This was also performed for the comparison groups. These were the general population and typically developing peers (see **Participants**). Secondly, descriptive analysis was performed on the selected data.

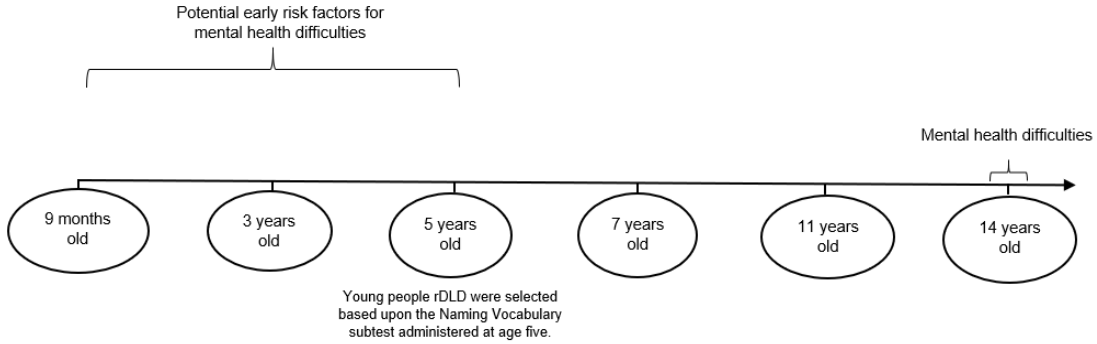
Finally, tests of mean difference were performed to determine whether there were significant group differences in mental health difficulties, internalising and externalising problems, as well as problem-solving and reading ability, between young people rDLD and the comparison groups. Yet, to which test of mean differences was performed depended upon the results of the assumptions and descriptives.

6.9.2 *Identifying early risk factors for mental health difficulties in young people rDLD*

The second investigation attempts to identify early risk factors (up to age five) (see **Table 6**) for mental health difficulties, internalising and externalising problems, as assessed by the scores derived from the SDQ, at age fourteen. All analysis was performed within young people rDLD. The figure below (**Figure 6**) provides the timeline for the second investigation.

Figure 6.

Summary of the timeline of the second investigation.



For the second investigation, multiple regression analysis was performed to determine which potential early risk factors (up to age five) explain or predict total difficulties score (mental health difficulties) at age fourteen, within young people rDLD. The multiple regression analysis was also separately performed for internalising and externalising problems.

Before the multiple regressions, however, the assumptions of the data, descriptives, and tests of association were performed. The assumptions consist of understanding the missing data that is apparent when performing multiple regressions. The descriptives of the SDQ scores and the potential risk factors were performed and reported. Following the descriptives, preliminary tests of association were performed to identify factors that are associated with the total difficulties score, internalising and externalising scores. Factors found to have a significant association were inputted into the multiple regression analysis. The findings from the multiple regression determined which factors are early risk factors for mental health difficulties, internalising and, or externalising problems at age fourteen, in young people rDLD.

6.9.3 *Investigating the potential cumulative (early) risk effect for mental health difficulties, within rDLD*

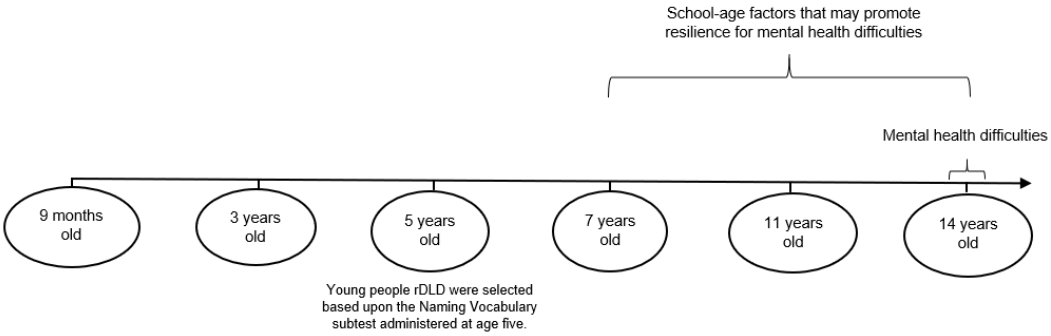
After the identification of early risk factors, the cumulative risk hypothesis was investigated. Similar to previous methods, a total risk score for the SDQ total difficulties score (general mental health difficulties), internalising and externalising scores were generated. After the generation of a total risk score, the assumptions of the data and descriptives were performed. Following this, the cumulative risk effect was investigated through hierarchical regression analysis (Horan and Widom, 2015; Hebron et al., 2017; Patwardhan et al., 2017; Jirek and Saunders, 2018; Lamela et al., 2018). Through hierarchical regression, researchers can determine the functional form (linear or quadratic) of the cumulative effect, if present (Horan and Widom, 2015; Hebron et al., 2017; Patwardhan et al., 2017; Jirek and Saunders, 2018; Lamela et al., 2018).

6.9.4 *Identifying school-age factors that encourage resilience for mental health difficulties, within young people rDLD*

The final investigation attempts to identify school-age factors that promote resilience for mental health difficulties otherwise referred to as 'positive factors' (see **Table 6**). All analysis was performed within young people rDLD. The figure below (**Figure 7**) provides the timeline for the final investigation.

Figure 7.

Summary of the timeline of the final investigation.



A moderation analysis was performed using hierarchical regression. This is performed to identify factors that encourage resilience for the SDQ scores (total difficulties, internalising and externalising scores), as well as, to determine the mechanism in which they encourage positive adaption. Three hierarchical regressions were performed, one for each outcome: general mental health difficulties (total difficulties score), internalising, and externalising problems.

Before the moderation analysis, however, the assumptions of the data, descriptives, and tests of association were performed. The assumptions consist of understanding the missing data that is apparent when performing multiple regressions. The descriptives of the outcome and the potential positive factors were performed and reported. Following the descriptives, preliminary tests of association were performed to identify factors that are associated with the outcome of interest (mental health difficulties, internalising and externalising problems). Factors found to have a significant association were inputted into the moderation analysis. The findings from the moderation analysis determined which factors are school-age positive factors for mental health difficulties, internalising and, or externalising problems at age fourteen, in young people rDLD. Also, the moderation analysis provides insight into the mechanism in which the significant factors may encourage resilience for mental health difficulties.

Additionally, before the moderation analysis an interaction term, or ‘moderator variables’ were created. This is needed to determine if the significant factors are protective factors, rather than promotive factors. The moderator variables were generated by multiplying the cumulative risk score and the potential factor that promotes resilience for mental health difficulties.

Upon performing the moderation analysis, through a hierarchical regression, three steps were included. Firstly, the total risk score, which was generated in the second investigation (chapter 9), was the predictor variable. The second step introduced the potential positive factors as predictor variables. The second step includes the potential positive factors as promotive factors. The third, and final step, introduced the potential moderator variables; thus, the final step includes the potential positive factors as protective factors. The moderator variables in the interaction term of the potential positive factors and the total risk score. More detail and explanation of the moderation analysis, through a hierarchical regression, is provided when presenting the results (see chapter 10).

7 Investigation One: A group comparison investigation to provide a foundation for the current project.

7.1 Introduction

The participants in the current project are young people who at the age of five were at risk of DLD (rDLD). The inclusion criteria, for the current project, were children who, at age five, performed 1.5 standard deviation below the MCS population mean on the Naming Vocabulary subtest. The exclusion criteria were any reports of hearing loss, and Developmental Delay, at any of the time-points. Reports of the diagnosis of Autism and Down's syndrome led to exclusion if reported at the latest (age fourteen) available time point. Also, lack of exposure to spoken English, within the household, at any time point, led to exclusion. More detail is presented under: '6.7 Participants'. As a summary, at age five, there were 477 who were selected as those rDLD. Out of the 477, 281 had data collected by the administered Strengths and Difficulties Questionnaire at age fourteen.

Overall, these young people are likely to experience (noun) lexical retrieval difficulties; other difficulties are unknown. There is no previous research into the sample selected. Hence, it is unknown whether the young people selected as rDLD experience additional difficulties that are associated with a diagnosis of DLD (see chapter 2). These include mental health difficulties in adolescence, as well as cognitive and literacy difficulties.

The first investigation was performed to build upon our current understanding of the selected sample (young people rDLD). Particularly, to understand whether the sample selected is at risk of mental health difficulties, internalising or externalising problems in adolescence. Also, to understand whether young people rDLD experience difficulties in other developmental domains (cognition and literacy). The findings determine the feasibility of investigating risk and resilience for mental health difficulties at

age fourteen, in the young people rDLD. Additionally, the findings drawn from the investigation within the present chapter provided a fuller description of the current project's selected sample.

The objectives of the present investigation were:

1. To determine if young people who were selected as rDLD experience worse mental health difficulties, internalising and externalising problems at age fourteen, compared to the general population and typically developing peers.
2. To determine if young people who were selected as rDLD experience worse problem-solving (at ages five and seven) and reading (at age seven) difficulties, compared to the general population and typically developing peers.

7.2 Results

7.2.1 *Assumptions*

7.2.1.1 Test of normality

A Shapiro-Wilk test was performed to determine whether the scores derived from the Strengths and Difficulties Questionnaire (SDQ), Pictures Similarities, Pattern Construction, and the Word reading subtest were normally distributed. It is important to recap that the data collected through the SDQ obtained three sets of scores that are analysed in the present project. These were the total difficulties score, internalising score, and externalising score. It was revealed that the SDQ scores at age fourteen, for all the groups, were not normally distributed (total difficulties score: $p = .001$; internalising score: $p = .001$; externalising score: $p = .001$).

Secondly, the results from the Shapiro-Wilk test revealed that the scores from the Picture Similarities subtests at age five, and the Pattern Construction subtests at ages five and seven, for all the groups, were not normally distributed (all results were: $p = .001$). Lastly, the findings revealed

that the scores derived from the Word Reading subtest at age seven, for all the groups, were also not normally distributed (p = .001).

7.2.1.2 **Test of equal variance**

Levene's test of equal variance was performed for the selected sample (young people rDLD) and the comparison groups (the general population and typically developing peers). A Levene's test was not performed for between the comparison groups, as analysis was not performed to determine significant differences between these groups in the current investigation.

Yet, Levene's test revealed that the variance of total difficulties scores and the externalising score, between the young people rDLD and the general population was unequal (w = .37, p < .001; w = 10.24, p < .001). Yet, Levene's test revealed that the internalising scores, between young people rDLD and the general population were equal (w = 3.10, p = .08). Also, Levene's test revealed that the total difficulties, externalising and internalising scores, between young people rDLD and the typically developing peers were unequal (w = .37, p < .001; w = 10.24, p < .001; w = 10.95, p < .001).

Additionally, the Levene's test revealed that the pattern construction scores at age seven between young people rDLD and each of the comparison groups, was equal (general population: w = .85; p = .36; typically developing peers: w = .20; p = .65). Yet, the Levene's test revealed that the variance of the picture similarities scores at age three, pattern construction scores at age three, and word reading scores at age seven, between the young people rDLD and the general population was unequal (w = 29.50, p < .001; w = 65.91, p < .001; w = 7.13, p < .001). Also, the Levene's test revealed that the variance of the picture similarities scores at age three, pattern construction scores at age three, and word reading scores at age seven, between the young people rDLD and the typically developing peers was unequal (w = 58.98, p < .001; w = 25.04, p < .001; w = 5.27, p < .001).

7.2.1.3 **Missing data**

The selection of the sample (young people rDLD) and the comparison groups (the general population and typically developing peers) was selected at five years old (see 6.7 **Participants**). The measures that were analysed in the current investigation were: SDQ scores at age fourteen; Picture similarities at age five; Pattern construction at ages five and seven; and lastly, Word reading subtest at age seven. Missing data from the measures stated is apparent across the three groups.

Analysis was performed to determine if there may be potential biases within the groups. Firstly, for young people rDLD who have completed SDQ data at age fourteen, the sample may be biased towards females. Additionally, the sample of young people rDLD who completed the picture construction subtest at age five may be biased towards those living in average to high-income households. Other possible biases beyond gender differences and household income were not analysed.

Secondly, the general population and typically developing young people are likely to share the same biases for the same measures. It is likely that, for both groups, samples for those who had completed data for the SDQ (at age fourteen), Picture similarities (at age five), and Word reading subtest (at age seven) may be bias towards females and those of average to high-income households. Other possible biases beyond gender differences and household income were not analysed.

7.2.2 ***Descriptives***

Descriptive analysis included understanding the mean (*M*), standard deviation, the range of the scores, as well as the sample size for each of the groups. The groups were: young people rDLD, typically developing peers and the general population, as selected through the Millennium Cohort Study (see chapter 6: ‘Methodology’). The table below (**Table 9**) provides a summary of the descriptives for the scores derived from the Strengths and Difficulties

Questionnaire (SDQ), Pictures Similarities, Pattern Construction, and the Word reading subtest.

Table 9.

Summary of the descriptives for each of the SDQ scores, as well as the problem-solving and reading measures, for each group.

Variables	Young people rDLD			General population			Typically developing peers		
	n	*M (SD)*	Range	*n*	*M (SD)*	Range	*n*	*M (SD)*	Range
At age five									
Picture similarities	279	73.19 (14.35)	10-103	9772	83.16 (11.24)	10-119	9739	82.92 (11.44)	10-119
Pattern construction	277	69.80 (25.10)	10-129	9737	89.58 (17.95)	10-149	9699	89.04 (18.27)	10-149
At age seven									
Pattern construction	244	105 (17.99)	10-211	9226	118.14 (16.10)	10-201	8818	117.40 (16.69)	10-211
Word Reading	242	82.50 (32.94)	10-170	9133	109.87 (32.94)	10-222	6368	110.11 (29.50)	10-222
At age fourteen									
Total difficulties score	281	9.98 (6.55)	0-34	9893	7.90 (5.86)	0-38	6747	7.46 (5.51)	0-38
Internalising score	281	4.58 (3.54)	0-14	9893	3.65 (3.37)	0-19	6747	3.41 (3.17)	0-19
Externalising score	281	5.39 (3.93)	0-20	9893	4.25 (3.50)	0-19	6747	4.05 (3.37)	0-19

Note. To recap, the SDQ scores that were selected and analysed for the current project, were: total difficulties scores, internalising scores and externalising scores

Additionally, boxplots (**Figures 8. – 14.**) were performed for each group, for their scores on the highlighted measures. Particularly, boxplots (see **Figures 8. - 10.**) were performed to provide a visual description of the total difficulties score, internalising, and externalising scores, between the three groups. Boxplots (**Figures 11. – 13.**) were performed to provide a visual description of the mean scores on the Pictures Similarities subtest at age five, and the Pattern Construction at ages five and seven, between the three groups. Lastly, boxplots were performed for visual presentation of the mean scores in the Word Reading subtest across the groups (See **Figure 14**).

Boxplots are useful as they provide a visual summary of the scores on the highlighted measures, across each group. This includes the distribution of the skewness and average of the group's scores. The grey box itself represents the interquartile range of the scores, which includes the upper and lower quartiles. The upper and lower quartiles are separated by the black horizontal line inside of the grey box, which represents the median of the groups' scores. The line that extends from the grey box represents the variability of the data beyond the upper and lower quartiles. The extended lines also demonstrated the minimum and maximum score of the group, which are not considered to be outliers. Outliers are scores that seem to be abnormally, or extremely far away from the scores of the group. Outliers are represented as black dots. Together, boxplots provide a descriptive visual summary of the distribution, skewness, and average of the scores, for each group.

Figure 8.

Boxplots for total difficulties scores at age fourteen between young people rDLD and the comparison groups.

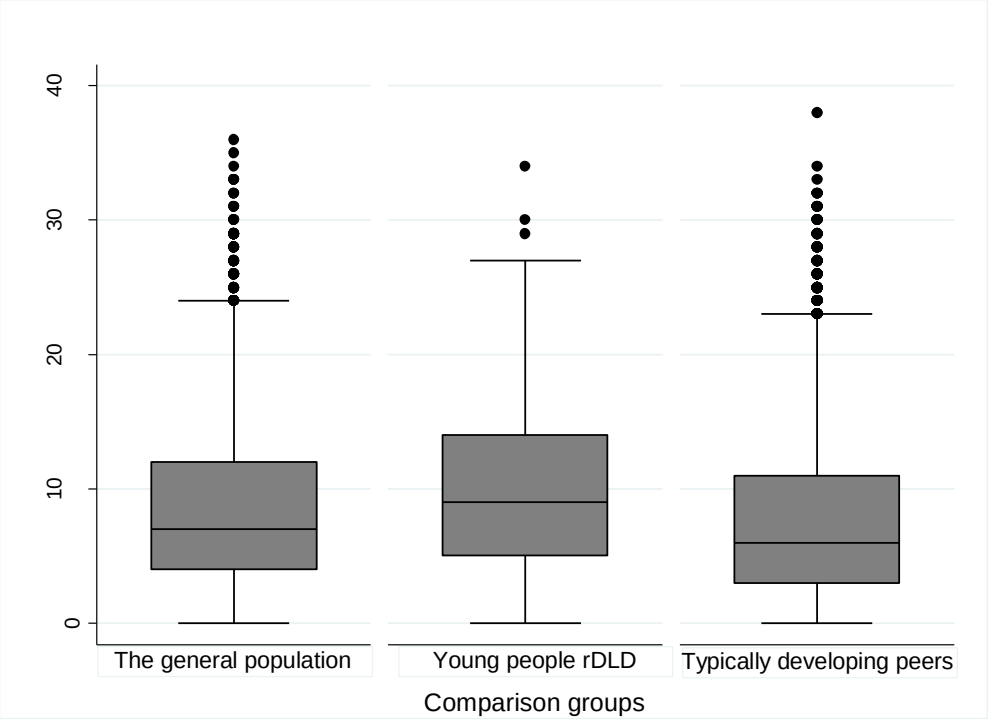


Figure 8. demonstrates that young people rDLD, compared to the two comparison groups have higher total difficulties score. This suggests that, on a descriptive level, young people rDLD are more likely to experience greater severity of mental health difficulties at age fourteen by comparison.

Figure 9.

Boxplots for internalising scores at age fourteen between young people rDLD and the comparison groups.

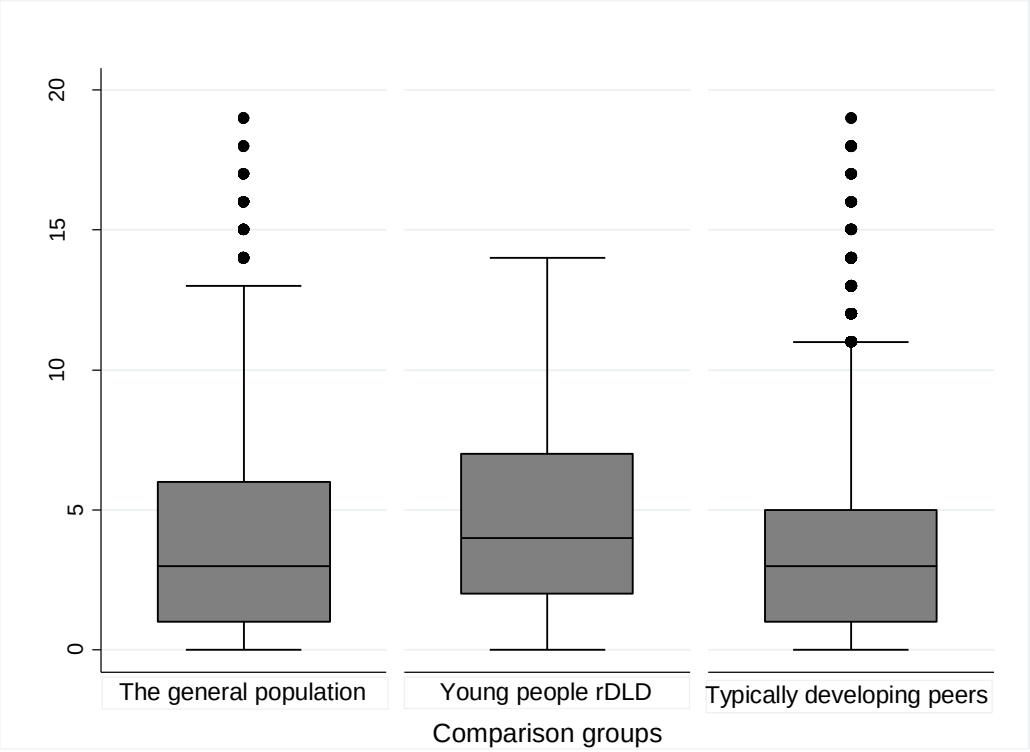


Figure 9. demonstrates that young people rDLD, compared to the two comparison groups have higher internalising score. This suggests that, on a descriptive level, young people rDLD are more likely to experience greater severity of internalising problems at age fourteen by comparison.

Figure 10.

Boxplots for externalising scores at age fourteen between young people rDLD and the comparison groups.

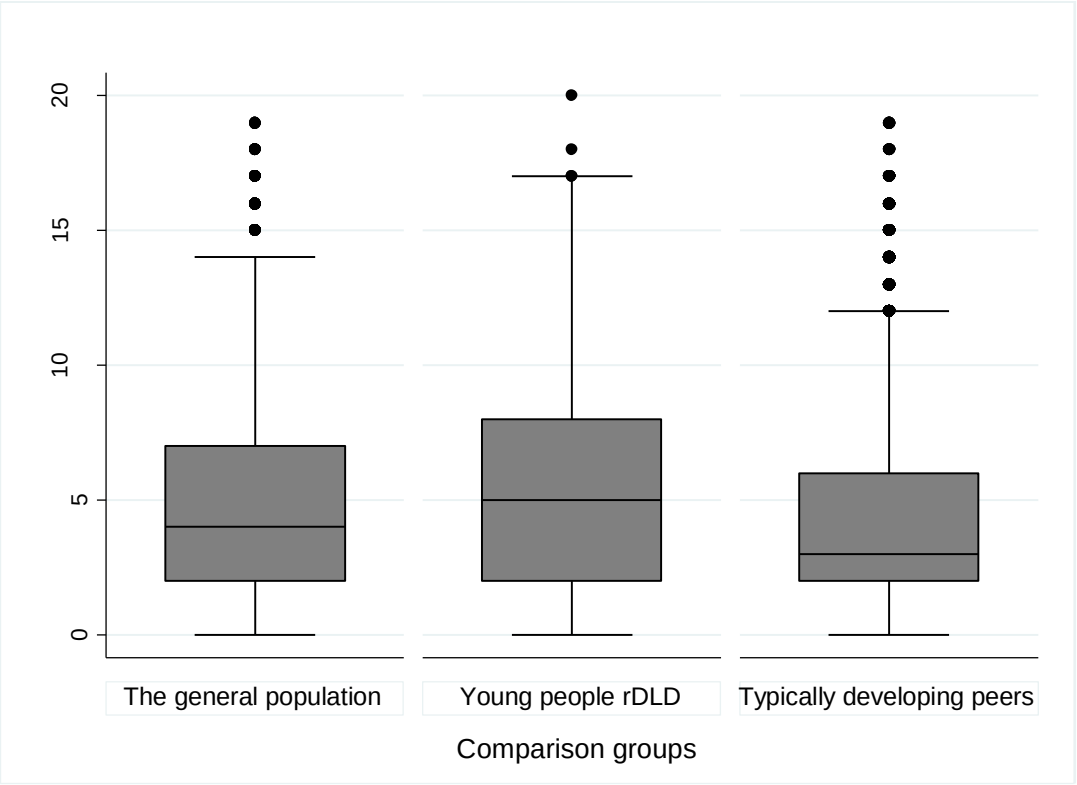


Figure 10. demonstrates that young people rDLD, compared to the two comparison groups have higher externalising score. This suggests that, on a descriptive level, young people rDLD are more likely to experience greater severity of externalising problems at age fourteen by comparison.

Figure 11.

Boxplots for Picture Similarities abilities score at age five, between young people rDLD and the comparison groups.

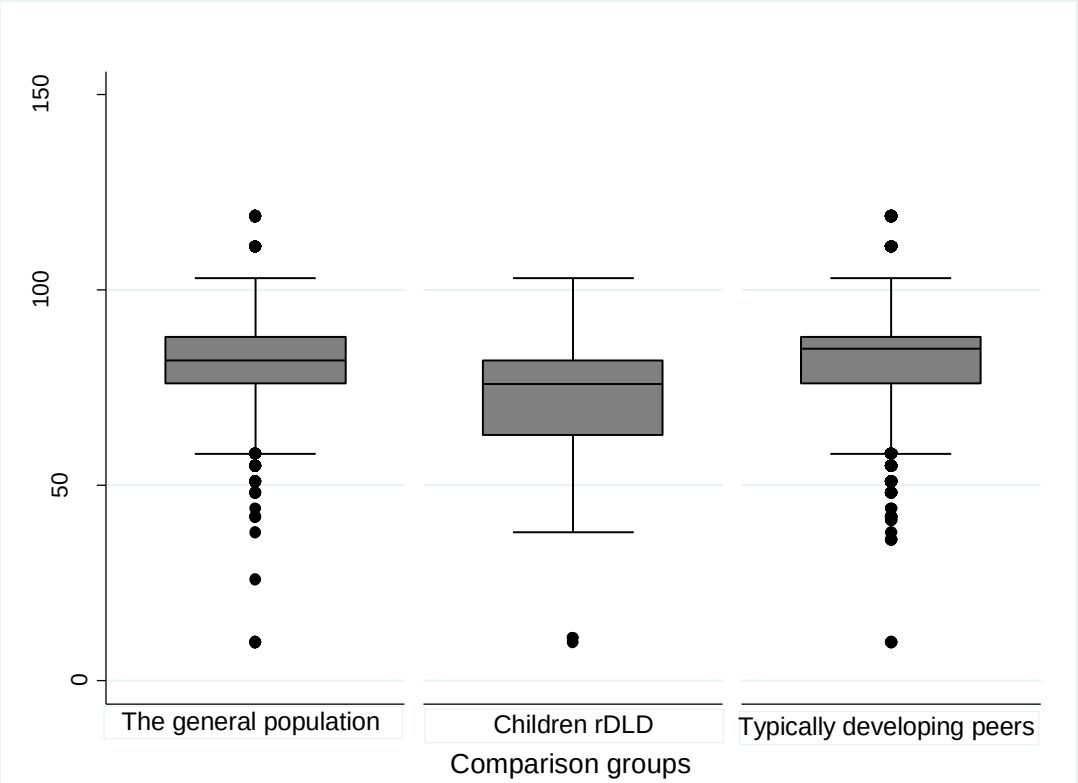


Figure 11. demonstrates that children rDLD, compared to the two comparison groups have lower scores on the Picture Similarities subtest at age five. This suggests that, on a descriptive level, children rDLD are more likely to experience greater severity of difficulties in their non-verbal reasoning at age five by comparison.

Figure 12.

Boxplots for Pattern construction ability score, at age five, between young people rDLD and the comparison groups.

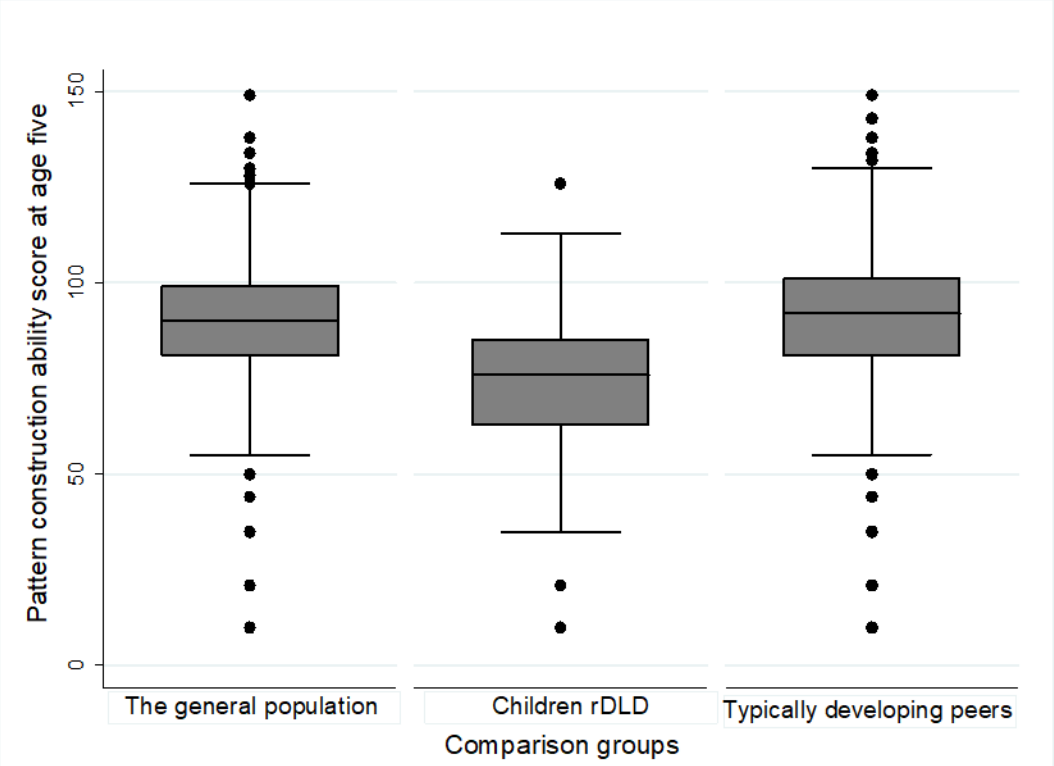


Figure 12. demonstrates that children rDLD, compared to the two comparison groups have lower scores on the Picture Construction subtest at age five. This suggests that, on a descriptive level, children rDLD are more likely to experience greater severity of difficulties in their spatial problem-solving at age five by comparison.

Figure 13.

Boxplots for Pattern construction ability score, at age seven, between young people rDLD and the comparison groups.

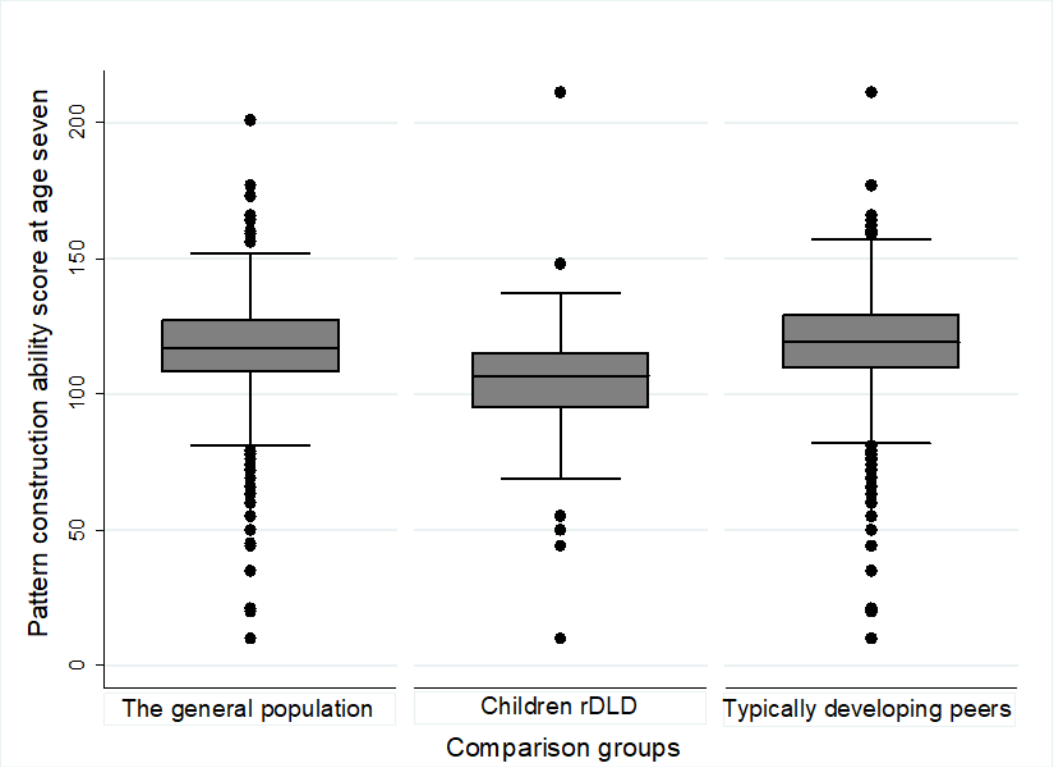


Figure 13. demonstrates that children rDLD, compared to the two comparison groups have lower scores on the Picture Construction subtest at age seven. This suggests that, on a descriptive level, young people rDLD are more likely to experience greater severity of difficulties in their spatial problem-solving ability at age seven by comparison.

Figure 14.

Boxplots for Word Reading ability score, at age seven, between young people rDLD and the comparison groups.

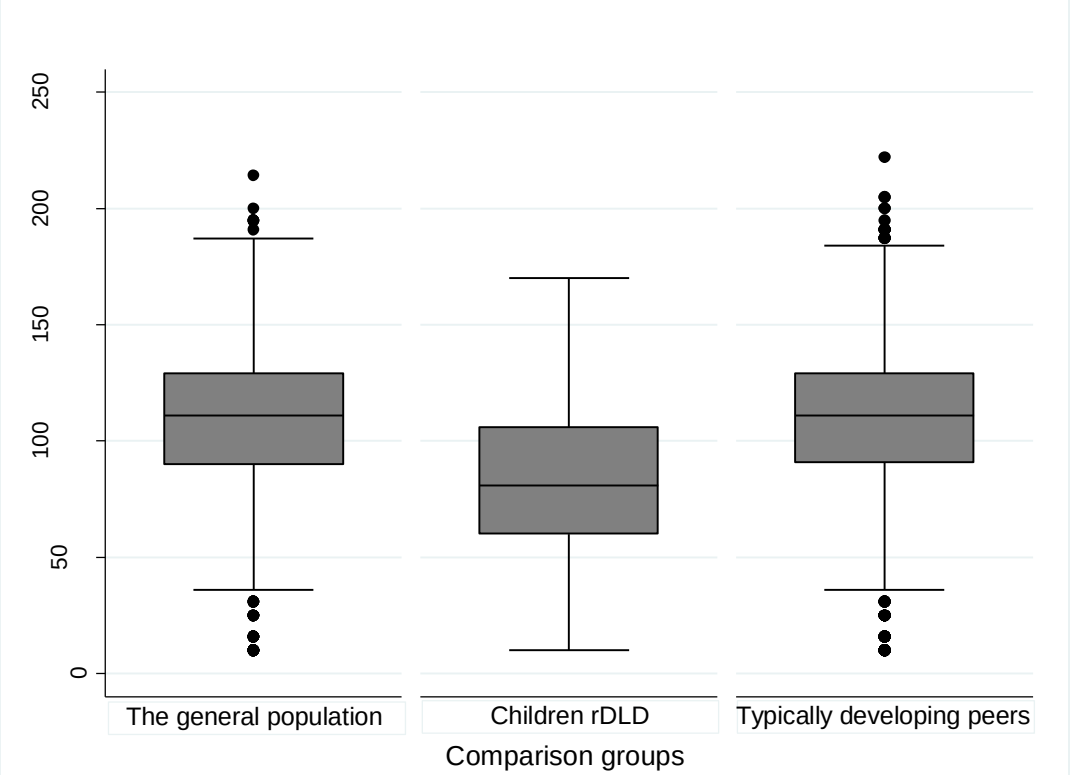


Figure 14. demonstrates that children rDLD, compared to the two comparison groups have lower scores on the Word Reading subtest at age seven. This suggests that, on a descriptive level, children rDLD are more likely to experience greater severity of difficulties in their (one-word) reading ability at age seven by comparison.

7.2.3 *Test of mean difference*

Following the descriptives, a test of mean difference was performed. However, due to known violations, independent samples t-test were not performed in the current investigation. Instead, a Mann-Whitney U test and Welch unequal variance t-test were considered.

Considering the literature, there are limitations to adopting either Mann-Whitney U or the Welch t-test in the context of the current investigation. Fagerland (2012) investigated the impact of non-parametric tests when using large samples. It was highlighted that for large samples, non-parametric tests, such as Mann-Whitney U may not be as advantageous. In the current project, the overall sample size, regardless of the comparison group used, is large (up to 9,893). Considering this limitation, Welch's unequal variance t-test should be considered instead. However, caution should be taken when adopting Welch's unequal variance t-test when testing for a significant difference between means of non-normally distributed samples, in large samples (Ahad and Yahaya, 2014). In the current project, as stated, the SDQ is not likely to be normally distributed. Therefore, researchers should be cautious when interpreting the findings from Mann-Whitney U and Welch's unequal variance t-test in the current investigations.

Together, considering the information around appropriate and suitable tests of mean differences, the Mann-Whitney U test and the Welch's unequal variance t-test were performed to analyse the difference in all the scores between young people rDLD and the comparison groups. There was no difference between the results of either of the test during the current investigation. Therefore, this results section will only demonstrate the findings from Welch's unequal variance t-test (see **Appendix D** for the results of the Mann-Whitney U tests).

Firstly, **Table 10** provides a summary of the (Welch) t-test results for total difficulties, as well as, internalising and externalising scores, between young people rDLD and the general population. **Table 11** provides a similar summary, but between young people rDLD and typically developing peers. Both tables include a descriptive summary of the groups.

Table 10.

Summary of the results from the Welch t-test for SDQ scores at age fourteen, between young people rDLD and the general population, at age five.

SDQ scores at age fourteen	Young people rDLD			The general population			*t* statistic	Effect size
	n	*M (SD)*	Range	*n*	*M (SD)*	Range		
Total difficulties	281	9.98 (6.55)	0-34	9893	7.90 (5.86)	0-38	*t*(293) = 5.96***	.33
Internalising	281	4.58 (3.54)	0-14	9893	3.65 (3.37)	0-19	*t*(295) = 4.35***	.27
Externalising	281	5.39 (3.93)	0-20	9893	4.25 (3.50)	0-19	*t*(293) = 4.83***	.31

Note. * $p < .05$ ** $p < .01$ *** $p < .001$
Effect sizes were calculated through Cohen's D.

Table 10 demonstrates significant differences in SDQ mean scores, between young people rDLD and the general population. This includes mean scores for total difficulties score, as well as, the internalising and externalising score. The findings suggest that young people rDLD, compared to the general population, are more likely to experience greater severity of mental health difficulties at age fourteen. Additionally, young people rDLD, compared to the general population, are more likely to experience greater severity of internalising and externalising problems at age fourteen. Therefore, young people rDLD are likely to experience mental health difficulties, internalising and externalising problems at age fourteen.

Table 11.

Summary of the results from the Welch t-test for SDQ scores at age fourteen, between young people rDLD and typically developing peers, at age five.

SDQ scores at age fourteen	Young people rDLD			Typically developing peers			*t* statistic	Effect size
	n	*M (SD)*	Range	*n*	*M (SD)*	Range		
Total difficulties	281	9.98 (6.55)	0-34	6747	7.46 (5.51)	0-38	*t*(297) = 6.34***	.42
Internalising	281	4.58 (3.54)	0-14	6747	3.41 (3.17)	0-19	*t*(299) = 5.45***	.35
Externalising	281	5.39 (3.93)	0-20	6747	4.05 (3.37)	0-19	*t*(298) = 5.64***	.37

Note. * $p < .05$ ** $p < .01$ *** $p < .001$
Effect sizes were calculated through Cohen's D.

Table 11 demonstrates significant differences in SDQ mean scores, between young people rDLD, and typically developing peers. This includes mean scores for total difficulties score, as well as the internalising and externalising score. The findings suggest that young people rDLD, compared to their typically developing peers, are more likely to experience greater severity of mental health difficulties at age fourteen. Additionally, young people rDLD, compared to their typically developing peers, are more likely to experience greater severity of internalising and externalising problems at age fourteen. Therefore, young people selected as rDLD are likely to experience mental health difficulties, internalising and externalising problems at age fourteen.

Secondly, **Table 12** provides a summary of the Welch's t-tests results for each of the problem-solving measures at ages five and seven, between young people rDLD and the general population. **Table 13** provides a similar summary but between young people rDLD and typically developing peers. Both tables include the mean and standard deviation for each group.

Table 12.

Summary of the Welch t-test results for problem-solving scores, between young people rDLD and the general population.

Problem-solving scores	Young people rDLD	General population	*t* statistic	Effect size
	M (SD)	*M (SD)*		
At age five				
Picture similarities	73.19 (14.35)	83.16 (11.24)	*t*(288) = 11.50***	.77
Pattern construction	69.80 (25.10)	89.58 (17.95)	*t*(284) = 13.03***	.88
At age seven				
Pattern construction	105 (17.99)	118.14 (16.10)	*t*(253) = 11.14***	.77

Note. * $p < .05$ ** $p < .01$ *** $p < .00$
Effect sizes were calculated through Cohen's D.

Young people rDLD have significantly lower scores on all the problem-solving measures, compared to the general population. This includes Picture Similarities subtest at age five and Patten Construction at ages five and seven. This suggests that young people rDLD, compared to the general population are more likely to experience worse non-verbal reasoning at age five, and worse spatial problem-solving ability at ages five and seven. Therefore, young people are likely to experience difficulties in non-verbal-reasoning and spatial problem-solving ability.

Table 13.

Summary of the Welch t-test results for problem-solving scores, between young people rDLD and typically developing peers.

Problem-solving scores	Young people rDLD	Typically developing peers	*t* statistic	Effect size
	M (SD)	*M (SD)*		
At age five				
Picture similarities	73.19 (14.35)	82.92 (11.44)	*t*(288) = 11.22***	.75
Pattern construction	69.80 (25.10)	89.04 (18.27)	*t*(284) = 12.66***	.88
At age seven				
Pattern construction	105 (17.99)	117.40 (16.69)	*t*(254) = 10.49 ***	.71

Note. * $p < .05$ ** $p < .01$ *** $p < .00$
Effect sizes were calculated through Cohen's D.

Young people rDLD have significantly lower scores on all the problem-solving measures, compared to their typically developing peers. This includes Picture Similarities subtest at age five and Patten Construction at ages five and seven. This suggests that young people rDLD, compared to their typically developing peers are more likely to experience worse non-verbal reasoning at age five, and worse spatial problem-solving ability at ages five and seven. Therefore, young people rDLD are likely to experience difficulties in non-verbal-reasoning and spatial problem-solving ability.

Lastly, the findings from the Welch's t-test revealed that there was a significant difference in the Word reading scores between young people rDLD and the general population ($t(251) = 12.79$, $p = .001$, $d = .87$). Young people rDLD performed significantly lower than the general population on the Word Reading Ability subtest. The effect size was .87 (Cohen's D), and this means that the difference is large.

A similar significant difference was found between young people rDLD and typically developing peers ($t(252) = 11.75$, $p = .001$, $d = .88$). Young people rDLD performed significantly lower than their typically developing peers on the Word Reading Ability subtest. The effect size was .88 (Cohen's D), and this means that the difference is large.

Taken together, the findings reveal that young people rDLD experience worse mental health difficulties, internalising, and externalising problems at age fourteen, compared to both comparison groups. Also, the findings reveal that young people rDLD experience additional cognitive difficulties at age five, compared to both comparison groups. Particularly, additional cognitive difficulties in non-verbal reasoning and spatial problem-solving ability. Additionally, as a group, difficulties in spatial problem-solving ability may not be resolved when young people rDLD are seven years old. This suggests persistency in the difficulty's experiences between ages five and seven, in spatial problem-solving ability. Lastly, the findings suggest that young people rDLD at age five, are more likely to experience worse (one word) reading ability at age seven, compared to typically developing peers and the general population.

7.3 **Summary of the results**

In conclusion, the findings from the first investigation informed the project as it moves forwards; risk and resilience for general mental health difficulties, internalising and externalising problems, was investigated, in young people rDLD. Similar to young people diagnosed with DLD, the selected sample of young people rDLD are likely to experience cascading disruptions to other developmental processes. Young people rDLD are likely to experience difficulties with (one word) reading ability at age seven; non-verbal reasoning at age five; and, spatial problem-solving at five and seven years of age.

8 Investigation Two: Identifying early risk factors for mental health difficulties within young people rDLD

8.1 Introduction

There are clear gaps in the previous literature around early risk factors for mental health difficulties, in young people diagnosed with DLD. Firstly, there are early risk factors for mental health difficulties, in DLD, that should be investigated. These include, but are not limited to, indicators of low socioeconomic status, main caregivers with physical illness, and high levels of harsh discipline practices. Also, future research should investigate how forms of relationships impact mental health difficulties, in young people diagnosed with DLD. Secondly, the factors described are likely to stem from different environmental systems. Future research should acknowledge and incorporate an ecological perspective when identifying early risk factors for mental health difficulties, in young people diagnosed with DLD. This was performed in the current investigation

Secondly, the present investigation acknowledges the complexity around early risk factors and the development of different manifestations of mental health difficulties. Hence, this investigation identifies early risk factors for internalising and externalising problems, as well as mental health difficulties, in young people diagnosed with DLD.

Together, considering the described gaps in the literature regarding early risk factors for mental health difficulties, in young people diagnosed with DLD (see chapter 5), the objectives of the current investigation is to identify early risk factors (up to age five) for mental health difficulties, internalising and externalising problems (at age fourteen), in young people rDLD.

8.2 Results section

8.2.1 *Assumptions*

Firstly, not all the scores derived from measures administered by the MCS selected for the current project were raw. Some scores were standardised due to differences in the responses across the items within the measure. In the present project, scores that were standardised were: 'Physical illness (parent)' and 'Main caregiver's happiness in relationship'. More detail is available in chapter 6 within the 'Selecting measures for the potential factors for risk and resilience, in the MCS' section.

Secondly, to test whether the data for each score is normally distributed, a Shapiro Wilks was performed (recommended by Royston, 1992; Razali and Wah, 2011). It was revealed that the data for total difficulties (w = .94, p = .001), internalising (w = .95, p =.001) and externalising score (w = .95, p = .001) was not normally distributed. Shapiro-Wilk W tests were also performed for all the (continuous) potential early risk factors (see **Appendix E**). The findings from the tests revealed that all the continuous factors, apart from harsh discipline practice, are not normally distributed. Categorical potential risk factors were not tested for normality, because of the nature of binary variables: not normally distributed.

Thirdly, Levene's test of equal variance was performed to understand the variance of the data: homoscedasticity (recommended by Gastwirth et al., 2009). Homoscedasticity is whereby the data points that deviate from the 'line of best fit' do so to a similar degree to each other. Heteroscedastic is the opposite; the data points are unequally dispersed. The results from the Levene's test (See **Appendix F: Table F1.** and **Table F2.**) demonstrates that most of the continuous potential factors are likely to be homogenous. However, there were a few exceptions. For total difficulties score the exceptions were harsh discipline practice and main caregiver's happiness in their relationship. The exceptions for the internalising score were harsh discipline practice, the main caregiver's happiness in their relationship, and parent-child closeness. Lastly, for the externalising score harsh discipline

practice, parent-child conflict, parental engagement and exposure to second-hand smoke were the exceptions.

Lastly, missing values were common within the selected data in the current investigation. A little's (1988) test was performed to determine if the missing data were missing completely at random. This means that the missing values are not due to possible biases in the sample. For the regressions for the total difficulties and externalising problem scores, the test revealed that the data were not missing completely at random. Further testing suggests that the missing data is associated with low income. Particularly, children whose main caregiver reported that they have low income, compared to others, were more likely to have missing values. Therefore, the completed data might be bias towards households who are not below the average income, as assessed by the MCS.

Additionally, the missing values for the internalising problems regression were revealed to be missing completely at random. This means that the missing data is not associated with any known variable, for example, low income or the gender of the cohort member. Therefore, it is unlikely that the missing data is influenced by a known factor.

8.2.2 *Descriptives*

Descriptive analysis was performed for the SDQ scores and the potential early risk factors for mental health difficulties at age fourteen. Due to the differing nature of continuous and categorical data, different tests were performed for the potential early risk factors. Just to note, all analysis was performed within young people rDLD.

Table 14 provides a summary of the SDQ scores at age fourteen, within young people rDLD. The SDQ scores include the total difficulties, internalising, and externalising scores. The table includes the number of young people who had available and completed SDQ data; the mean and standard deviation for each of the scores, as a group of young people rDLD; and lastly, the range of the scores.

Table 14.

Summary of the descriptives of the SDQ scores at age fourteen, for young people rDLD.

SDQ scores at age fourteen	Young people rDLD		
	n	*M (SD)*	Range
Total difficulties score	281	9.98 (6.55)	0-34
Internalising score	281	4.58 (3.54)	0-14
Externalising score	281	5.39 (3.93)	0-20

For each potential early risk factors, selected from the data collected by the MCS, descriptive analysis was performed. Yet, different tests were performed for continuous and categorical data, due to their differing natures. As for the continuous potential risk factors, descriptive analysis included: scatterplots; histograms; and lastly, correlation matrix for collinearity. As for categorical potential early risk factors for mental health difficulties (see **Table 6**) descriptive analysis included boxplots and Chi-squared test of independence, for collinearity.

Firstly, the tables below (**Table 15** and **Table 16**) display the summary of the descriptives of the potential early risk factors for mental health difficulties at age fourteen. Overall, the tables summarise the number of young people rDLD with completed data, the mean (*M*), standard deviation (*SD*), the age the measure was completed. **Table 15** provides a summary of the descriptives for all the continuous potential early risk factors for mental health difficulties. **Table 16** provides a summary of the descriptives for all the categorical potential early risk factors. For more details regarding the measures used to indicate each potential early risk factor, see chapter 6.

Table 15.

Summary descriptive of all the potential continuous risk factors for mental health difficulties.

Potential early risk factors	*n*	*M* (SD)	Range
Individual factors			
(Noun) lexical retrieval ability	281	76.73 (9.97)	10-82
Family factors			
Main caregivers' psychological distress	260	4.04 (4.32)	0 – 22
Physical illness (parent)	280	5.53 (4.44)	-.38 – 19.33
Harsh discipline practice	246	16.13 (3.55)	8 – 26
Main caregiver's happiness in relationship	160	-.16 (4.71)	-14.25 – 7.59
Parent-child conflict	178	18.08 (6.33)	8 – 38
Parent-child closeness	174	32.92 (3.27)	10 – 35
Parental engagement	280	18.11 (5.90)	6 – 36

Note. The number of young people rDLD column refers to how many completed reports for that measure or question there are for young people rDLD.

Some potential factors were standardised. This includes 'Physical illness (parent)' and 'Main caregiver's happiness in relationship'.

Table 16.

Summary descriptive of all the potential categorical early risk factors for mental health difficulties, internalising and externalising problems, at age fourteen.

Potential categorical early risk factor	*n* of samples		Total difficulties score *M (SD)*		Internalising score *M (SD)*		Externalising score *M (SD)*	
	Without risk	With risk	Without risk	With risk	Without risk	With risk	Without risk	With risk
Prenatal condition								
Smoking during pregnancy	279	2	9.99 (6.56)	7.5 (4.95)	5.41 (4.14)	4.56 (3.50)	6.65 (4.96)	5.35 (3.90)
Individual factors								
Cohort with physical illness	230	50	4.53 (3.58)	4.72 (3.34)	5.31 (3.90)	5.7 (4.13)	5.31 (3.90)	5.7 (4.13)
Biological sex, or gender	*F*: 127	*M*: 154	*F*: 10.51 (6.78) *M:* 9.53 (6.34)		*F*: 5.11 (3.71) *M*: 4.15 (3.34)		*F:* 5.40 (3.30) *M:* 5.38 (3.97)	
Family factor								
Death of a parent	280	1	-		-		-	
Home environment								
Low income	109	170	9 (6.42)	10.58 (6.59)	4.82 (3.49)	4.82 (3.49)	4.82 (3.70)	5.76 (4.06)
Second-hand smoke	214	66	9.26 (6.08)	12.18 (7.49)	5.09 (3.70)	5.09 (3.70)	4.86 (3.57)	7.09 (4.56)
Single parenthood	198	83	9.34 (6.43)	11.49 (6.62)	4.38 (3.58)	5.06 (3.40)	4.95 (3.81)	6.43 (4.05)
Main caregiver's employment status	107	174	8.76 (6.75)	10.72 (6.33)	3.93 (3.52)	4.97 (3.51)	4.79 (3.92)	5.76 (3.91)

Note. Descriptives were not provided for the death of a parent due to the limited sample size in those 'with risk'.
In main caregiver's employment status, those unemployed is considered as potential risk factor for mental health difficulties in those rDLD.

Considering the descriptives analysis summarised in **Table 16**, the death of a parent was removed as a potential early risk factor for mental health difficulties. It was revealed that only one adolescent (who were rDLD) had experienced the death of a parent by the age of five. Therefore, it is not possible to perform the intended tests for this potential early risk factor. This factor was removed from future analysis.

Secondly, visual representations of the relationship between the potential early risk factors and the SDQ scores were performed. Scatterplots were generated for all the continuous potential early risk factors, for mental health difficulties, internalising, and externalising problems. Scatterplots describe the type of relationship between the potential early risk factor and the outcomes (see **Appendix G: Figure G1. – G16.**). In summary, the majority of potential early risk factors demonstrated linear relationships to all outcomes. However, visually, parent-child closeness seemed flat.

Boxplots were performed to provide the visual representations of the relationship between the potential early risk factors and the SDQ scores were performed (see **Appendix H: Figure H1 – H23.**). In summary, young people rDLD, who are 'at-risk' are more likely to experience higher total difficulties, internalising and externalising scores, compared to those who are not. This means that those 'at-risk' or, exposed to the potential early risk factor might be more likely to experience greater severity of mental health difficulties, internalising and externalising problems.

Regarding outliers, these were common throughout the scatterplots and the boxplots. Within research, exclusion of outliers is not often warranted (Benhadi-Marín, 2018). Additionally, due to the nature of the current investigation, it may not be appropriate to do so. This is because there are factors not included in the present investigation that might have an impact on the outcomes. Also, there may be factors during school age that may also impact the SDQ scores, at age fourteen. Therefore, due to the nature of the current investigation, it may not be appropriate to do so.

Lastly, a correlation matrix (see **Appendix I**) was performed to identify any multicollinearity between the potential early risk factors. A different

analysis for the correlation matrix was performed for the continuous and categorical data. To focus first upon the continuous data, due to known violations, Spearman Rho's correlation coefficient was performed. According to Cohen (1988), a medium-strength correlation is .5 (see **Appendix I**). Hence, under Cohen's definition, there are no continuous potential risk factors that are strongly associated with each other. Hence, no continuous potential risk factors were removed.

A Chi-squared test was performed to identify the presence of collinearity amongst the categorical potential early risk factors. According to Kim (2017), a large effect is at .50. Under this definition, low income and main caregiver unemployment have a large association (see **Appendix** I). Thus, main caregiver unemployment was removed as a potential early risk factor for all the outcomes (see **Appendix I**).

It was also revealed later in the current investigation, that there was a strong correlation between a categorical and continuous data. Under the regress command within STATA, the Variance Inflation Factor (VIF) was performed. VIF indicates the level of multicollinearity between variables in the regression model. Collinearity was detected between a continuous and categorical variable: single parenthood and main caregiver's happiness in their relationship. As there is more research investigating single parenthood and mental health, as opposed to parent's unhappiness in their relationship, the latter was removed. Therefore, moving forwards in the current chapter, the results for the main caregiver's unhappiness in their relationships will be removed.

8.2.3 *Tests of association*

Tests of association were then performed for the potential early risk factors for mental heal difficulties at age fourteen, in young people rDLD. Yet, due to the differing nature between continuous and categorical potential early risk factors, different analysis was performed. Considering the arguments presented by Armstrong (2014), Bonferroni correction was not adopted in the

current project. Through reviewing the literature, Armstrong concluded that Bonferroni corrections should not be adopted as part of a regular procedure and without proper consideration of the consequences. Adopting Bonferroni correction significantly increases the chance of a type two error (false negative), to reduce the risk of a type one error (false positive). Thus, one of the reasons that a researcher should adopted a Bonferroni correction is when it is of vital importance to avoid type one error. In the current project, it is not imperative to avoid type one error, instead, a balanced presence of type one and type two error is expected. An imbalance may lead to falsely ignoring or identifying factors that play a role in the development of mental health difficulties, in those rDLD, beyond a reasonable expectation. This is one reason why Bonferroni corrections were not adopted in the current project.

Additionally, Armstrong (2014) argues that Bonferroni corrections should not be adopted whereby planned comparisons, compared to unplanned, are performed. Using a Bonferroni correction upon planned comparisons might again, reduce the risk of type two errors at the expense of increasing type two errors. In the current project, planned comparisons were performed. Together, therefore, despite that Bonferroni correction is routinely adopted in the literature, Armstrong (2014) concludes that researchers should be critical and understand how these corrections might impact their interpretations. Upon reflection of Armstrong's arguments, Bonferroni correction may not be suitable for the current project, and thus, was not adopted.

Firstly, correlations were performed to determine if the continuous potential early risk factors had a significant association with the SDQ scores (total difficulties, internalising, and externalising score). Specifically, Spearman's Rho correlation coefficient was performed for the continuous potential early risk factors for the SDQ scores. This was used because, the majority of the potential early risk factors, and the SDQ scores, were non-normally distributed (See 'Descriptives'). The table below (**Table 17**) demonstrates the results from the correlations performed for the continuous potential risk factors and each of the outcomes.

Table 17.

Summary of the correlation coefficients between the potential continuous risk factors (up to age five) and total difficulties, internalising and externalising score (at age 14), in young people rDLD.

Potential early risk factors	Total difficulties score	Internalising score	Externalising score
Individual factors			
Lexical retrieval ability	-.13*	-.11	-.10
Family factors			
Main caregivers' psychological distress	.25***	.23***	.20**
Physical illness (parent)	.14*	.14*	.10
Harsh discipline practice	.19**	.12	.21***
Parent-child conflict	.29***	.22**	.27***
Parent-child closeness	-.16*	-.09	-.18*
Parental engagement	-.13*	-.11	-.11

Note. * $p < .05$ ** $p < .01$ *** $p < .001$

Table 17 demonstrates that for mental health difficulties, factors with a significant correlation were (noun) lexical retrieval ability, main caregiver's psychological distress, main caregiver with physical illness, harsh discipline practice, parent-child conflict, parent-child closeness, and lastly, parental engagement.

For internalising problems, factors with a significant correlation were the main caregiver's psychological distress, main caregivers with physical illness, and lastly, parent-child conflict.

For externalising problems, factors with a significant correlation were main caregiver's psychological distress, harsh discipline practice, happiness in relationship, parent-child conflict, and lastly, parent-child closeness.

Secondly, Mann-Whitney U tests were then performed for the categorical potential risk factors. Three sets of Mann-Whitney U tests were performed, one for each SDQ scores (total difficulties, internalising and externalising scores). The tables below (**Table 18, Table 19,** and **Table 20**) demonstrates

the results of the separate tests. **Table 18** provides a summary of the Mann-Whitney U tests when the outcome was the total difficulties score. **Table 19** provides a summary of the Mann-Whitney U tests when the outcome was the internalising score. **Table 20** provides the summary of the Mann-Whitney U tests when the outcome was the externalising score.

Table 18.

Demonstrates the Mann-Whitney U tests of the potential risk factors (up to age five) for total difficulties score (at age 14) in young people rDLD.

Potential early risk factor	*n*			*M (SD)*		z statistic	Effect size
	Without risk	With risk	Combined	Without risk	With risk		
Prenatal condition							
Smoking during pregnancy	279	2	9.98 (6.55)	9.99 (6.56)	7.5 (4.95)	*z* = .61	
Individual factors							
Cohort with physical illness	230	50	4.57 (3.53)	4.53 (3.58)	4.72 (3.34)	*z* = .53	
Biological sex, or gender	*F*: 127 *M*: 154		9.98 (6.55)	*F*: 10.51 (6.78) *M:* 9.53 (6.34)		*z* = 1.02	
Home environment							
Low income	109	170	9.96 (6.56)	9 (6.42)	10.58 (6.59)	*z* =2.18*	.24
Second-hand smoke	214	66	9.95 (6.55)	9.26 (6.08)	12.18 (7.49)	*z* = 2.74**	.42
Single parenthood	198	82	9.98 (6.55)	9.34 (6.43)	11.49 (6.62)	*z* = 2.66**	.33

Note. * $p < .05$ ** $p < .01$, *F* = Female, *M* = Male

Gender differences were not separated into 'with risk' and 'without risk', this is because it is uncertain whether being female, or male is a potential risk factor.

Table 18 demonstrates that three of the potential factors were associated with higher total difficulties score at age fourteen. Firstly, young people (rDLD) who have low household income were more likely to have a significantly higher total difficulties score, compared to those who were not. Secondly, those who were exposed to second-hand smoke were more likely to have a significantly higher score compared to those who were not. Lastly,

those who were living in a household with a single caregiver were more likely to have significantly higher total difficulties score, compared to those who were not. This means that low household income, exposure was associated with greater severity of mental health difficulties at age fourteen, in young people rDLD.

Table 19.

Demonstrates the Mann-Whitney U tests of the potential risk factors (up to age five) for higher internalising score (at age 14) in young people rDLD.

Potential early risk factor	*n*		*M (SD)*			*z* statistic	Effect size
	Without risk	With risk	Combined	Without risk	With Risk		
Prenatal condition							
Smoking during pregnancy	279	2	4.61 (3.54)	5.41 (4.14)	4.56 (3.50)	*z* = .34	
Individual factors							
Cohort with physical illness	230	50	5.38 (3.94)	5.31 (3.90)	5.7 (4.13)	*z* = .61	
Being female	*F:* 127 *M:* 154		4.58 (3.54)	*F*: 5.11 (3.71) *M*: 4.15 (3.34)		*z* = 2.10*	.27
Home environment							
Low income	109	170	4.57 (3.54)	4.18 (3.60)	4.82 (3.49)	*z* = 1.77	
Second-hand smoke	214	66	4.57 (3.53)	4.40 (3.47)	5.09 (3.70)	*z* = 1.36	
Single parenthood	198	83	4.58 (3.54)	4.38 (3.58)	5.06 (3.40)	*z* = 1.86	

Note. * $p < .05$ ** $p < .01$, *F* = Female, *M* = Male

Table 19 demonstrates that females were more likely to have a higher internalising score, compared to males. This means that being female is associated with greater severity of internalising problems at age fourteen, in young people rDLD.

Table 20.

Demonstrates the Mann-Whitney U test of the potential risk factors (up to age five) for higher externalising score (at age 14) in young people rDLD.

Potential early risk factor	*n*		*M (SD)*			*z* statistic	Effect size
	Without risk	With risk	Combined	Without risk	With Risk		
Prenatal condition							
Smoking during pregnancy	279	2	5.44 (3.97)	6.65 (4.96)	5.35 (3.90)	*z* = .86	
Individual factors							
Cohort with physical illness	230	50	5.38 (3.94)	5.31 (3.90)	5.7 (4.13)	*z* = .53	
Being female	*F*: 127 *M*: 154		5.39 (3.93)	*F:* 5.40 (3.30) *M:* 5.38 (3.97)		*z* = .12	
Home environment							
Low income	109	170	5.39 (3.94)	4.82 (3.70)	5.76 (4.06)	*z* = 1.98*	.24
Second-hand smoke	214	66	5.38 (3.94)	4.86 (3.57)	7.09 (4.56)	*z* = 3.59***	.05
Single parenthood	198	83	5.39 (3.93)	4.95 (3.81)	6.43 (4.05)	*z* = 2.95**	.38

Note. * $p < .05$ ** $p < .01$

Table 20 demonstrates that three potential early risk factors that were associated with externalising scores, at age fourteen. Firstly, young people (rDLD) who have low household income were more likely to have significantly higher scores, compared to those who were not. Secondly, young people (rDLD) who were exposed to second-hand smoke were more likely to have a significantly higher externalising score, compared to those were not. Lastly, young people (rDLD) who were living in a household with a single caregiver were more likely to have a significantly higher externalising score, compared to those who were not.

As a summary, **Table 21** describes the potential early risk factors that are revealed to have a significant association to either total difficulties, internalising and, or externalising scores, in young people rDLD. Also, the table includes the type of analysis.

Table 21.

Demonstrates a summary of all the potential early risk factors (up to age five) for the SDQ scores (at age fourteen), in young people rDLD.

Potential risk factor	Age of cohort member	Types of test	SDQ scores		
			Total difficulties	Internalising	Externalising
Prenatal conditions					
Smoking during pregnancy	9 months	Mann-Whitney	No	No	No
Individual factors					
Children with physical illness	5 years	Mann-Whitney	No	No	No
Gender difference (being female)	5 years	Mann-Whitney	No	Yes	No
Parental engagement	5 years	Spearman's Rho	Yes	No	No
(Noun) lexical retrieval score	5 years	Spearman's Rho	Yes	No	No
Family environment					
Main caregiver's psychological distress	5 years	Spearman's Rho	Yes	Yes	Yes
Main caregiver with physical illness	5 years	Spearman's Rho	Yes	Yes	No
Harsh discipline practices	5 years	Spearman's Rho	Yes	No	Yes
Parent-child conflict	3 years	Spearman's Rho	Yes	Yes	Yes
Parent-child closeness	3 years	Spearman's Rho	Yes	No	Yes
Home environment					
Low income	5 years	Mann-Whitney	Yes	No	Yes
Second-hand smoke	5 years	Mann-Whitney	Yes	No	Yes
Single parenthood	5 years	Mann-Whitney	Yes	No	Yes

8.2.4 *Multiple regression*

Using the information from **Table 21**, three multiple regression were performed. These were performed to investigate whether the significantly associated early risk factors had a predictive relationship to the total difficulties, internalising and externalising score, in those rDLD.

8.2.4.1 **Total difficulties score**. Multiple regression was performed to identify early risk factors (up to age five) for total difficulties score (at age 14), in those rDLD. The potential early risk factors included were:

Lower (noun) lexical retrieval ability score, low household income, second-hand smoke, single parenthood, main caregiver's psychological distress, main caregiver's physical illness, harsh discipline practice, parent-child conflict, parent-child closeness, and, lack of parental engagement.

After performing the planned regression (see **Appendix J**), diagnostics revealed possible violations in this model. Overall, diagnostics revealed that the significance of this model may not be accurate. Firstly, only 154 cases were used. This means that over half of the sample were excluded. However, as explained in detail within a review by van Voorhis (2007), whilst there are no perfect formulae, Green (1991) recommends the following for adequate sample size: $n > 50 + 8m$ (n = number of participants; m = number of predictor variables). Adhering to Green's equation, an adequate sample for the multiple regression performed for the total difficulties score is 138. Additionally, before the multiple regressions, a power analysis was performed using G*Power (Faul et al., 2007; Faul et al., 2009). For the multiple regression whereby, the dependent variable was the total difficulties score, the number of children needed for a power of 90% with 10 predictor variables and .05 probability error is 147. Therefore, as the sample for the multiple regression is 154, this is an adequate sample.

Nonetheless, further diagnostics revealed that a violation was present which could negatively impact the significance level or *p*-value of the results. A Shapiro Wilks tests revealed that the residuals, generated from the model

performed, were not normally distributed (w = .96, p < .001). Non-normal distribution of residuals may impact the accuracy of the significance values (Yaffee, 2002; Verardi and Croux, 2009). Therefore, the option 'robust' was used for each of the multiple regression. This option increases the flexibility of the normality assumption upon the multiple regression model performed. However, the adjusted R^2 cannot be obtained under this option.

Compared the original, the regression (robust) model remained significant (F(10, 143) = 3.57, p =.001), with a R^2 of .20. To briefly explain, R is the variance or the degree to which the dependent variable is explained by the predictor variable or variables. In the current context, an R^2 of 20% means that the predictor variables imputed into the regression analysis explain 20% of the total difficulties score. Thus, 80% of the total difficulties score is yet to be explained.

As for the main effects: parent-child conflict and harsh discipline practices were significant predictors of total difficulties score (B = .20, β = .18, p <.05; B = .28, β = .20, p <.05). This was the same for the original regression analysis. However, compared to the original regression, exposure to second-hand smoke was not a significant predictor of total difficulties score in the robust model (p = .07). The findings suggest that high reported levels of parent-child conflict and harsh discipline practices are early risk factors for mental health difficulties at age fourteen, in those rDLD. **Table 22** provides the summary of the multiple regression containing all the potential early risk factors for total difficulties score.

Table 22.

Summary of the (robust) multiple regression for the potential early risk factors for total difficulties score at age fourteen, within young people rDLD.

Potential early risk factors	*B*	*(robust) SE B*	*t*	*β*
Constant	-5.84	6.43	.91	.
Physical illness (parent)	.18	.11	1.56	.12
Parental engagement	.08	.08	1.08	.07
Lexical retrieval score	.02	.03	.49	.03
Main caregiver's with psychological distress	.09	.14	.64	.05
Harsh discipline practices	.38	.16	2.39**	.20
Parent-child conflict	.20	.08	2.53**	.18
Parent-child closeness	-.002	.14	.02	-.001
Low income	.84	1.08	.78	.06
Second-hand smoke	2.71	1.48	1.83	.17
Single parenthood	1.21	1.29	.93	.12

Note. * $p < .05$ ** $p < .01$ *** $p < .001$

8.2.4.2 **Internalising scores.** Similarly, to the total difficulties score, a multiple regression was performed to identify the early risk factors (up to age five) for internalising problems (at age fourteen), in young people with rDLD. Considering the results from the test of associations, the factors included in this analysis were main caregiver's psychological distress, main caregiver with physical illness, parent-child conflict, and being female. A similar process that was performed with the total difficulties score was completed for the internalising score.

Firstly, the multiple regression, using '*regress*' was performed (see **Appendix J**). However, diagnostics revealed possible violations in this model. Overall, diagnostics revealed that the significance of this model may not be accurate. Due to missing data, 154 cases were used in the multiple regression performed for the internalising score. This means that were cases

were excluded upon analysis. Adhering to Green's (1991) equation, an adequate sample for the multiple regression performed for internalising score is 90. Additionally, prior to the multiple regressions, a power analysis was performed using G*Power (Faul et al., 2007; Faul et al., 2009). For a multiple regression, the number of children needed for a power of 90% with 10 predictor variables and .05 probability error is 129. Therefore, as the sample for the multiple regression is 154, this is an adequate sample.

However, a Shapiro-Wilks W test determined that the residuals, generated from the model performed, were not normally distributed (w = .92, p < .001). Hence, similar to the total difficulties score, the 'vce(robust)' option was used within the regression model. This option increases the flexibility of the normality assumption upon the multiple regression model performed. However, the adjusted R^2 cannot be obtained under this option.

The results between the original and the robust regression analysis did not differ. The regression (robust) model remained significant (F(4, 168) = 4.00, p < .05), with a R^2 of 9%. As for the main effect, parent-child conflict and being female were significant predictors of internalising score (B = .09, β = .16, p <.05; B = 1.24, β = .17, p <.05). This means that parent-child conflict and being female are early risk factors for internalising problems at age fourteen, in those rDLD. **Table 23** provides the summary of the multiple regression containing all the potential early risk factors for internalising score.

Table 23.

Summary of the (robust) multiple regression for the potential early risk factors for internalising score at age fourteen, within young people rDLD.

Potential early risk factors	*B*	*(robust) SE B*	*t*	*β*
Constant	.15	1.13	.14	.
Physical illness (parent)	.09	1.13	1.49	.11
Gender differences	1.24	.55	2.25*	.17
Main caregiver's psychological distress	.06	.07	.95	.07
Parent-child conflict	.09	.05	2.01*	.16

Note. * $p < .05$ ** $p < .01$ *** $p < .001$

8.2.4.3 **Externalising scores**. A multiple regression was performed to identify early risk factors (up to age five) for externalising problems (at age 14), in young people rDLD. As highlighted in **Table 21** the potential risk factors included in this analysis were:

Main caregiver's psychological distress, low household income, second-hand smoke, single parenthood, parent-child conflict, lastly parent-child closeness.

A multiple regression, using '*regress*' was performed (see **Appendix J**). However, diagnostics revealed possible violations in this model. Overall, diagnostics revealed that the significance of this model may not be accurate. Firstly, it should be noted that only 154 cases were used. Adhering to Green's (1991) equation, an adequate sample for the multiple regression performed for externalising score is 106. Additionally, before the multiple regressions, power analysis was performed using G*Power (Faul et al., 2007; Faul et al., 2009). For a multiple regression, the number of young people needed for a power of 90% with 7 predictor variables and .05 probability error is 130. Therefore, as the sample for the multiple regression is 154, this is an adequate sample.

However, similar to the other multiple regressions performed, there are possible violations. Using a Shapiro-Wilks W test, it was found that the

residuals were not normally distributed (w = .97, p < .01). Therefore, regression was performed using the 'vce(robust)' option. The results between the original and the robust regression analysis did not differ. The regression (robust) model remained significant (F (7,146) = 5.48, p = .001), with a R^2 of .22%. The three predictors remained to have a significant relationship with externalising scores. This was parent-child conflict (B = .17, β = .25, p <.01), second-hand smoke (B = 2.13, β = .22, p <.01) and lastly, harsh discipline practices (B = .22, β = .03, p <.05). This means that parent-child conflict, second-hand smoke, and harsh discipline practices are early risk factors for externalising problems at age fourteen, in those rDLD. **Table 24** provides the summary of the multiple regression containing all the potential early risk factors for externalising score.

Table 24.

Summary of the (robust) multiple regression for the potential early risk factors for externalising score at age fourteen, within young people rDLD.

Potential early risk factors	*B*	*(robust) SE B*	*t*	*β*
Constant	-1.65	3.22	.51	.
Main caregiver's psychological distress	.03	.08	.38	.03
Harsh discipline practices	.22	.09	2.45*	.19
Parent-child conflict	.17	.05	3.21**	.25
Parent-child closeness	-.02	.08	.28	-.02
Low income	.49	.63	.77	.06
Second-hand smoke	2.13	.85	2.52*	.22
Single parenthood	1.17	.79	1.48	.13

Note. * p < .05 ** p < .01 *** p < .001

8.3 Summary of the results

The table below (**Table 25**) provides a summary of the results, identifying early risk factors for general mental health difficulties (as assessed by the total difficulties score), internalising and externalising problems at age fourteen, in young people rDLD.

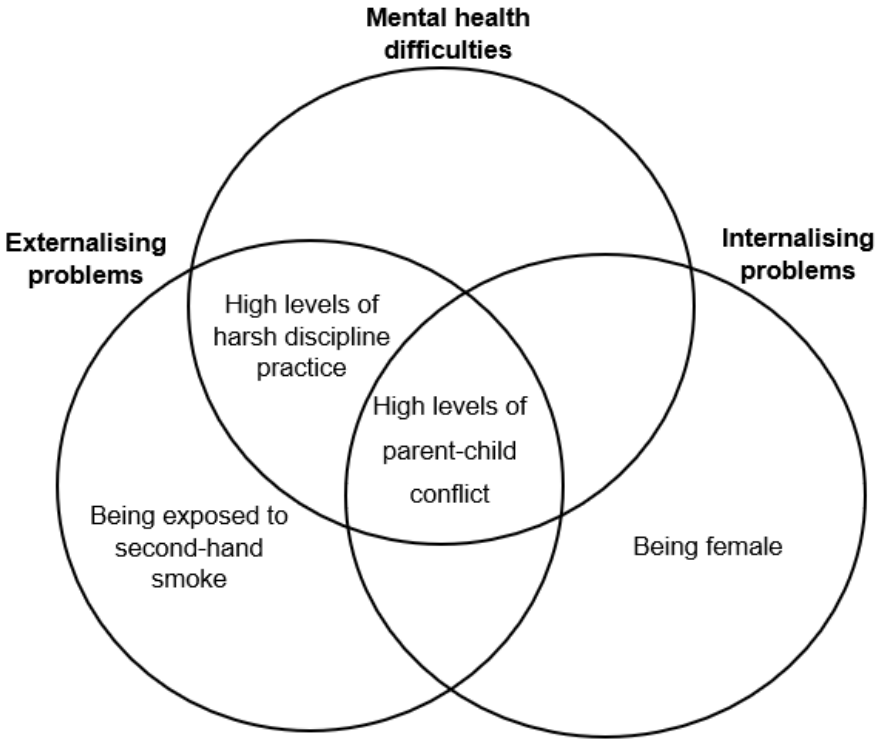
Table 25.

Summary of the early risk factors (up to age five) for mental health difficulties, including externalising and internalising problems, at age fourteen, in young people rDLD.

Mental health difficulties	Internalising problems	Externalising problems
High levels of parent-child conflict	High levels of parent-child conflict	High levels of parent-child conflict
High levels of harsh discipline practice	Being female	High levels of harsh discipline practice
		Being exposed to second-hand smoke

Figure 15.

Summary of the early risk factors that were found to be significant for mental health difficulties, internalising, and externalising problems.



9 Investigation Three: Investigating the potential cumulative (early) risk effect for mental health difficulties within young people rDLD

9.1 Introduction

There is a wealth of evidence supporting the CRH for mental health difficulties in the literature. However, there is currently no investigation that determines whether early risk factors (up to age five) for mental health difficulties in early adolescence, in young people diagnosed with DLD, operate in a cumulative fashion. Moreover, there is no current research that determines how factors may operate in a cumulative fashion: linear or quadratic. Therefore, the current investigation determined if early risk factors, for mental health difficulties, operate in this fashion within young people diagnosed with DLD. If determined, then the functioning form between the number of risk factors and mental health severity was suggested.

The main objective of the current investigation is to investigate whether the identified early risk factors (up to age five) for mental health difficulties, internalising and externalising problems (at age fourteen), operate in a cumulative fashion, in young people rDLD. If a cumulative effect is identified, then the present investigation will attempt to understand whether the functional form of the relationship is linear or quadratic, in young people rDLD.

9.2 Results

This investigation follows from the previous (see chapter 8). Using the findings from the previous investigation (see **Table 25**) the cumulative risk effect was investigated. Specifically, the following investigations determined whether the identified early risk factors for mental health difficulties, internalising or externalising problems (at age fourteen), operate in a

cumulative fashion, in young people rDLD. As the current results section follows directly from the previous, the same measures were used. Hierarchical regression was performed to determine whether the identified early risk factors for mental health difficulties, internalising and externalising scores, operated in a cumulative fashion. However, preparation of the data is needed before performing the hierarchal regression.

9.2.1 *Generation of the total risk scores.*

First, a total risk score needs to be generated for total difficulties, internalising and externalising scores. A total risk score is the individual's number of exposed risks. This is achieved by encoding the presence of the risk factor into either 'at-risk' or 'not at-risk'; which is often coded as 1 for 'at risk' and 0 for 'not at-risk'. These are then added together to create a total risk score, leading to categories of those with exposure to either none, one, two, or more risk factors. This is a common research practice in this area (Appleyard et al., 2005; Solomon et al., 2016; Hebron et al., 2017). Often the total risk score is generated using more than two risk factors. Yet, it is possible to investigate the cumulative risk effect with only two risk factors, as the minimum number of groups required three (none, one, and two exposed risk factors).

Regarding the generation of the total risk scores, categorical variables were added together without transformation due to their binary nature. The continuous variables, however, cannot in their current non-binary state be used to generate a total risk score. Hence, continuous variables were dichotomised. Before dichotomisation, these scores were standardised. In this study, the continuous variables were harsh discipline practice and parent-child conflict. As higher scores indicate greater risk, for harsh discipline practice and parent-child conflict, scores above the upper quartile (75%) indicated risk exposure. This cut-off (upper or lower quartile) is commonly recommended and practiced in research (Appleyard et al., 2005; Evans et al., 2013; Evans and Cassells, 2014; Hebron et al., 2017). The table

below (**Table 26**) summarises the information regarding the cut-offs for each early risk factor.

Table 26.

Demonstrates the cut off for both the continuous and categorical risk variables, for the total difficulties, internalising and externalising score, in young people rDLD.

Identified early risk factor	Cut off	Number of young people rDLD	
		'at risk' (%) *	'not at risk'
Continuous			
Harsh discipline practices	.81	40 (16.26%)	206
Parent-child conflict	.46	52 (29.21%)	126
Categorical			
Second-hand smoke	More than '0'	66 (23.57%)	214
Gender	'Female'	127 (45.20%)	154

Note. For the continuous variables, these were standardised before dichotomisation. Therefore, the scores presented here for the cut-offs are z-scores.

(%) * = Percentage of those either at risk of the group of children rDLD who completed the report for the risk factor.

Despite that it is commonly performed for cumulative risk studies, dichotomising continuous variables is heavily ill-advised (Irwin and McClelland, 2003; Altman and Royston, 2006; Dawson and Weiss, 2012). As explained by Dawson and Weiss, dichotomising continuous variables likely leads to a loss of data. Additionally, loss of power could also stem from changes in sample sizes, due to dichotomisation. In return, loss of data will likely lead to a loss of statistical power. This is an issue because it cannot be assumed that the dichotomised variables will demonstrate a significance between the two newly formed groups. Therefore, dichotomising continuous variables does not always lead to meaningful groups. To ensure that the dichotomisation performed within the current investigation was meaningful, t-tests were performed between those 'at-risk' and 'not at-risk' (see **Appendix K**). It was revealed that those 'at-risk' had significantly greater severity of mental health difficulties, compared to those 'not at-risk'.

Using the newly dichotomised early risk factors, the total risk score for total difficulties, internalising and externalising problem scores were generated. However, there arose a possible issue: the last category for total difficulties score and externalising score had less than twenty within the sample. This may impact the accuracy of the results, as well as the statistical power within the analysis. Therefore, those with two risk factors and those with three risk factors were merged into one group: those with two or more risk factors. The table below (**Table 27**) demonstrates how many cohorts had either: no risk, one risk, two risk, or more exposed risks for each of the outcomes. To restate, there were three total risk scores: one for each SDQ scores, as they had separately identified early risk factors.

Table 27.

Describes how many young people rDLD are exposed to either none, one, and two or more identified early risk factors for mental health difficulties, internalising and externalising problems.

Total risk score	Number of young people rDLD		
	Total difficulties	Internalising	Externalising
0	197	129	155
1	76	125	95
2 +	8	27	31

To test the quadratic functional form of the possible cumulative relationship (see chapter 4), a separate variable was generated. The approach used to create the quadratic term is recommended by Aiken, West, and Reno (1991) and practiced in cumulative risk research (Oldfield et al., 2015; Hebron et al., 2017). This approach is to square the generated total risk score for each individual. This variable will be known as the total risk score squared.

9.2.2 *Missing data within the total risk scores.*

Missing data was present amongst most of the risk factors. Missing values were removed during the generation of the dichotomised variables to ensure that these were not included in the new variable. Little's (1988) test was used to understand the nature of the missing data. This test was performed for all the risk factors for total difficulties total risk score, as well as the total risk scores for internalising and externalising problems (see **Appendix L**). Using Little's test, it was revealed that the missing data was missing completely at random for the total risk factors, for total difficulties (n = 258, p = .21), internalising (n = 281, p = .72) and externalising score (n = 280, p = .54). As the test found that the missing data for all the outcomes are missing completely at random, this suggests that there is likely to be no known bias in the sample used in the current investigation.

9.2.3 *Descriptives*

The descriptives of the individual risk factors were performed in the previous chapter. For the current investigation, the focus is upon the three generated groups, or total risk scores. The table below (**Table 28**) demonstrates the summary of the mean and standard deviation for each of the groups, for each outcome.

Table 28.

Summary descriptives for each of the groups, or 'total risk scores' for total difficulties score, internalising and externalising score at age fourteen

Total risk score	Total difficulties		Internalising problems		Externalising problems	
	n	*M (SD)*	*n*	*M (SD)*	*n*	*M (SD)*
0	197	9.24 (6.20)	129	4.04 (3.33)	155	4.45 (3.34)
1	76	11.33 (7.01)	125	4.91 (3.67)	95	6.05 (3.88)
2 +	8	15.5 (6.82)	27	5.67 (3.56)	31	8.10 (5.11)

Note. The total risk score for each outcome has their own set of risk factors, the description of which is shown in chapter 8: **Table 25.** Hence, the number of children across the number of exposed early risk factors differs across each outcome, see **Table 27** (current chapter)**.**

Table 28. demonstrates that, across all the outcomes, the mean was higher for the group with two (or more) risk factors. For all the outcomes, the lowest mean was observed in those with no reported exposed risk factors. Moreover, as the number of risk factors increases the mean, it also increased across all the outcomes. The box plots below visually demonstrate the range and data distribution between the three groups for total difficulties score (**Figure 16**), internalising score (**Figure 17**), and externalising score (**Figure 18**). As explained in chapter 7, boxplots provide a visual summary of the distribution, skewness, and average of the scores, across the groups.

Figure 16.

Boxplot for total difficulties score for each of the total risk score groups, within young people rDLD.

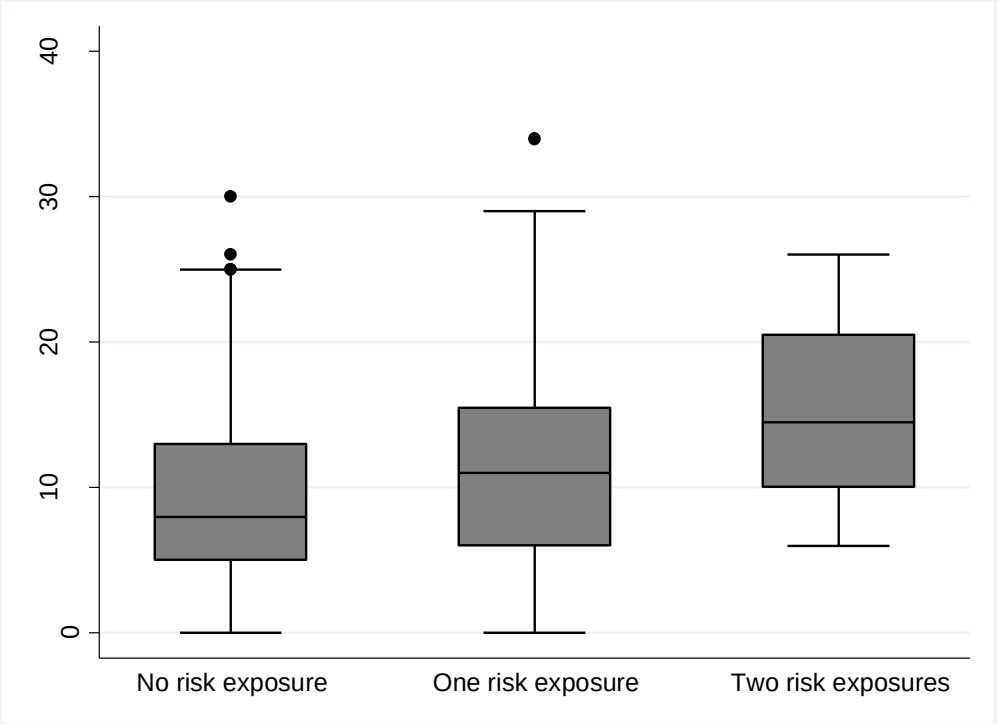


Figure 16. demonstrates that, within young people rDLD, total difficulties scores increased as the number of exposed early risk factors increased. This means that, within young people rDLD, the severity of mental health difficulties increases as the number of exposed early risk factors increases.

Figure 17.

Boxplot for internalising score for each of the total risk score groups, within young people rDLD.

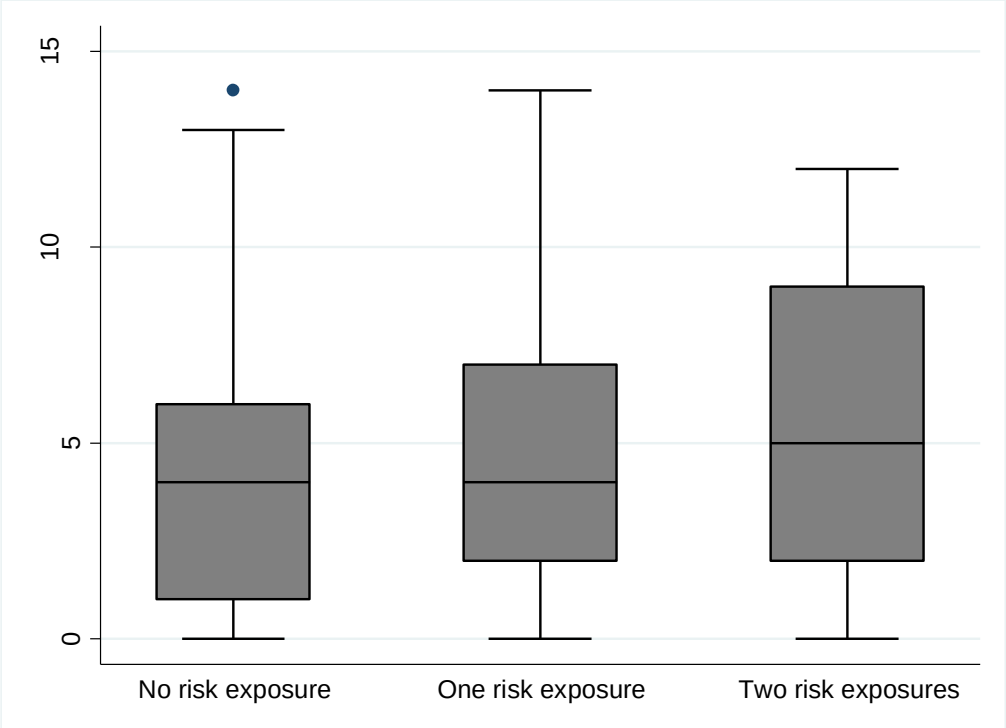


Figure 17. demonstrates that, within young people rDLD, internalising scores increased as the number of exposed early risk factors increased. This means that, within young people rDLD, the severity of internalising problems increases as the number of exposed early risk factors increases.

Figure 18.

Boxplot for externalising problems for each of the total risk score groups, within young people rDLD.

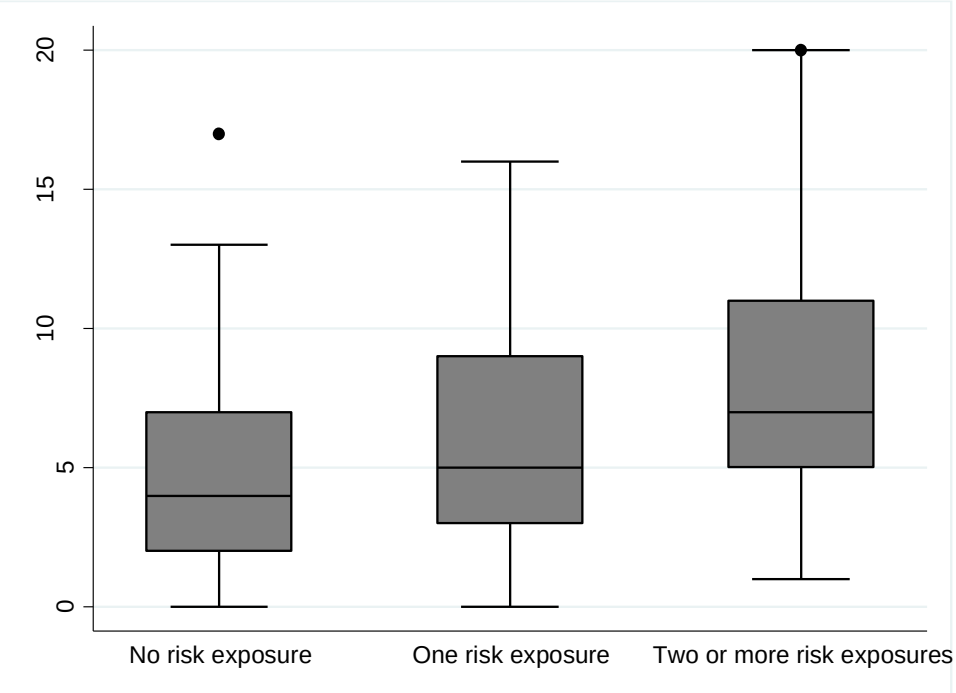


Figure 18. demonstrates that, within young people rDLD, externalising scores increased as the number of exposed early risk factors increased. This means that, within young people rDLD, the severity of externalising problems increases as the number of exposed early risk factors increases.

9.2.4 ***Hierarchical regressions***

Hierarchical regressions were performed to test the cumulative risk effect, as well as to understand the functional form if present. This analysis has been used to test the cumulative risk hypothesis in previous investigations: examples include, Lamela and Figueiredo (2018), Hebron, Oldfield and Humphrey (2017), and Atzaba-Poria, Pike, and Deater-Deckard (2004). As this current study has a similar focus, the same approach was adopted.

Hierarchical regression analyses the change in variance between models. Variance is the extent to which the predictor variables included in the regression explain the outcome of interest. This is often represented as R^2. It has also been described as a sequence of steps; the first step includes a set of predictor variables, then the second step includes the original set with the addition of another, and so on. If there is a significant change between the steps, then it can be suggesting that the 'newer' step (the inclusion of the additional factors) explains the outcome to a greater degree than the former.

In the current investigation, two steps were used in the hierarchical regression. The first step included only the total risk score as the predictor variable for the associated outcome. The second step included the quadratic term, known as 'Total risk score squared'. This is the same method recently adopted by Lamela and Figueiredo (2018), and Hebron, Oldfield, and Humphrey (2017).

9.2.4.1 **Total difficulties score.**

A hierarchal regression was performed for total difficulties score (general mental health), in young people rDLD. Within this hierarchical regression, the required number of observations for a power of 90%, with an error probability of .05, is 73. Thus, the number of observations were adequate for this analysis as there were 281 observations.

The first step only included the total difficulties total risk score as a predictor variable. The results of the regression indicated that the predictor explained 4% of the variance (*Adj.* R^2 = .04, $F(1, 279) = 10.87$, p =. 001). Also, the total risk score significantly predicted higher total difficulties score (B = 2.40, β = .19, $p < .001$). Therefore, this suggests that that the greater number of exposed risk factors significantly predicts a greater severity of mental health difficulties.

In the second step, the total difficulties total risk score squared (quadratic) was included. However, there was no significant change between the variance of the first step and the step (R^2 change = .002, $F(1, 278) = .04$, p = .51). The quadratic term, introduced in this step, was not significant.

Taken together, the results suggest that the number of risk factors for overall mental health difficulties at age fourteen, in young people rDLD, are likely to operate in a cumulative linear fashion.

The diagnostics for the hierarchical regression revealed that the residuals from the models generated were not normally distributed (w = .95, p < .001). Hence, the robust option was later adopted. However, there was no difference between the robust model and the original described in the previous paragraphs. The table below (**Table 29**) provides a summary of the hierarchical regression of the total difficulties score at age fourteen, and the total risk score.

Table 29.

Summary of the hierarchical regression of the total difficulties score at age fourteen, and the total risk score.

Variable	Step 1				Step 2			
	B	SE B	*t*	β	B	SE B	*t*	β
Constant	9.19	.44	21.03	-	9.24	.44	20.86	-
Total risk score	2.40	.75	3.19**	.19	1.18	2.07	.57	.09
Total risk score squared					.92	1.41	.65	.11
R^2	.04				.04			
F for change in R^2					.04			

Note. SE B is robust standardised errors. * = p < .05 ** = p < .01 *** = p <.001
Total risk score is the total difficulties score total risk score.

9.2.4.2 **Internalising score.** A hierarchal regression was performed for internalising score, at age fourteen, in young people rDLD. Within this hierarchical regression, the required number of observations for a power of 90%, with an error probability of .05, is 73. Thus, the number of observations were adequate for this analysis as there were 281 observations.

The first step included the internalising total risk score as a predictor variable. The results of the regression indicated that the predictor explained 2% of the variance (*Adj.* R^2 = .02, $F(1, 279) = 6.79$, $p < .05$). The internalising total risk score significantly predicted higher internalising score (B = .83, β = .15, $p < .01$). This suggests that the greater number of exposed risk factors significantly predicts greater severity of internalising problems, at age fourteen, within young people rDLD.

In the second step, the internalising total risk score squared (quadratic) was included. However, there was no significance change between the variance of the first model and the second (R^2 change = .001, $F(1, 278)$ = .02, p = .90). The quadratic term was not significant. Taken together, the results suggest that the number of risk factors for internalising problems at age fourteen, in those rDLD, are likely to operate in a cumulative linear fashion.

The diagnostics for the hierarchical regression revealed that the residuals from the models generated were not normally distributed (w = .94, $p < .001$). Hence, the robust option was later adopted. However, there were no differences between the robust model and the original described in the previous paragraph. The table below (**Table 30**) provides a summary of the hierarchical regression of the internalising problems, and the (internalising) total risk score, within young people rDLD.

Table 30.

Summary of the hierarchal regression of internalising problems, and the (internalising) total risk score.

Variable	Step 1				Step 2			
	B	*SE B*	*t*	*β*	*B*	*SE B*	*t*	*β*
Constant	4.05	.28	14.46	-	4.04	.29	13.76	-
Total risk score	.84	.32	2.64**	.15	.93	.86	1.08	.17
Total risk score squared					-.06	.49	.12	-.02
R^2	.02				.02			
F for change in R^2					.02			

Note. SE B is robust standardised errors. * = $p < .05$ ** = $p < .01$ *** = $p < .001$
Total risk score is the internalising total risk score.

9.2.4.3 **Externalising score.** A hierarchal regression was performed for externalising score at age fourteen, in young people rDLD. Within this hierarchical regression, the required number of observations for a power of 90%, with an error probability of .05, is 73. Thus, the number of observations were adequate for this analysis as there were 281 observations.

The first step included the externalising total risk score as a predictor variable. The results of the regression indicated that the predictor explained 9% of the variance (*Adj.* R^2 = .09, $F(1, 279) = 28.76$, $p = .001$). The externalising total risk score significantly predicted a higher externalising score (B = 1.76, $\beta = 31$, $p < .001$). Therefore, this suggests that the greater number of exposed risk factors significantly predicts the greater severity of externalising problems.

In the second step, the externalising total risk score squared (quadratic) was included. However, there was no significance change between the variance of the first model and the second (R^2 change = .001, $F(1, 278) = .17$, $p = .68$). The quadratic term was not significant. Taken together, the results suggest that the number of risk factors for externalising problems at

age fourteen, in young people rDLD, are likely to operate in a cumulative linear fashion.

The diagnostics for the hierarchical regression revealed that the residuals from the models generated were not normally distributed (w = .96, p < .001). Hence, the robust option was later adopted. However, there were no differences between the robust models and the original described within the previous paragraph. **Table 31** provides a summary of hierarchal regression for externalising problems and (externalising) total risk score, within young people rDLD.

Table 31.

Summary of hierarchal regression for externalising problems, and (externalising) total risk score.

Variable	Step 1				Step 2			
	B	*SE B*	*t*	*β*	*B*	*SE B*	*t*	*β*
Constant	4.41	.38	16.62	-	4.45	.27	16.51	-
Total risk score	1.76	.38	4.64***	.31	1.39	1.00	1.39	.24
Total risk score squared					.22	.62	.35	.07
R^2	.09				.09			
F for change in R^2					.17			

Note. SE B is robust standardised errors. * = p < .05 ** = p < .01 *** = p <.001
Total risk score is the externalising total risk score.

9.3 Summary of the results

The current chapter provided the results for the third investigation in the present project. The objective of the third investigation was to determine whether the identified early risk factors identified in the second study operated in a cumulative fashion. The results indicate that early risk factors,

within young people rDLD, for mental health difficulties at age fourteen, operated in a cumulative fashion. This was also found for internalising and externalising problems. As for the functional form of the cumulative relationship between early risk factors (up to age five) and mental health difficulties at age fourteen, within young people rDLD, this was linear. This means that there is likely to be a consistently proportional increase of severity of mental health difficulties, internalising and externalising problems, as the number of exposures to early risk factors increases.

10 Investigation Four: Identifying school-age factors that encourage resilience for mental health difficulties within young people rDLD

10.1 Introduction

In the current chapter, the investigation moves onto understanding resilience for mental health difficulties, internalising and externalising problems, in young people rDLD. Many factors have yet to be considered when investigating resilience for mental health difficulties, within young people diagnosed with DLD. The current investigation attempted to fill the described gaps in the literature between mental health and DLD. Specifically, the present investigation identified school-age factors that may promote resilience for mental health difficulties in early adolescents, within young people rDLD. Additionally, the current investigation attempted to provide some indication of the mechanism in which they promote resilience. Therefore, the main objective for the final investigation, presented in the current chapter, is to identify school-age factors (between ages seven and fourteen) that encourages the process of resilience for mental health difficulties at age fourteen, in young people rDLD. The current investigation also determined if these factors have a promotive or protective mechanism.

10.2 Results

10.2.1 *Assumptions*

A Shapiro Wilks was performed to test whether the SDQ scores and the potential positive (encourages resilience) is normally distributed. It was revealed that the data for total difficulties (w = .94, p = .001), internalising (w = .95, p =.001) and externalising score (w = .95, p = .001), not normally distributed. Additionally, Shapiro-Wilk W tests were performed for all the

continuous variables (see **Appendix N**). The results revealed that all the continuous variables are not normally distributed.

A Levene's test was performed to understand the variance of the data i.e. to measure homoscedasticity. Homoscedasticity is whereby the data points that deviate from the 'line of best fit' do so to a similar degree to each other. Heteroscedastic is the opposite: the data points are unequally dispersed. The results from the Levene's test (see **Appendix O**) demonstrates that most of the continuous potential factors are likely to be homogenous. However, there were a few exceptions. For total difficulties score the exceptions were reading for fun; attendance to religious services; belief that the neighbourhood is safe; and problem-solving ability. The exceptions in internalising score was problem solving ability. Lastly, for externalising score, belief that the neighbourhood is safe; educational motivation; and, problem-solving ability, were the exceptions.

Lastly, missing data is apparent when performing the hierarchical regressions in the current investigation. In the total difficulties' hierarchical regression, the second and third step had 69 values missing from the data. In the internalising hierarchical regression, the second and third step had 59 values missing from the data. Lastly, in the externalising hierarchical regression, the second and third step had 70 values missing from the data. For all regressions, Little's (1988) test revealed that the data were not missing at complete random. Further testing suggests that the missing data for prosocial behaviour was associated with low income. This means that the data collected for prosocial behaviour through the parent-reported Strength and Difficulties Questionnaire (SDQ), is biased towards average or high-income households.

10.2.2 ***Descriptives***

Descriptive analysis was performed for the SDQ score, as well as the potential positive factors for mental health difficulties in early adolescence. Yet, different tests were performed for continuous and categorical potential positive factors, due to their differing natures. As for the continuous potential positive factors, descriptive analysis included: scatterplots; histograms; and correlation matrix for collinearity. As for categorical potential positive factors descriptive analysis included: Boxplots; and Chi-squared test of independence, for collinearity.

Firstly, **Table 32** provides a summary of the SDQ scores at age fourteen, within young people rDLD. The SDQ scores include the total difficulties, internalising and externalising scores. The table includes the number of young people who had available and completed SDQ data (*n*); the mean (*M*) and standard deviation (*SD*) for each of the scores, as a group of young people rDLD; and lastly, the range of the scores.

Table 32.

Summary of the descriptives of the SDQ scores at age fourteen, for young people rDLD.

SDQ scores at age fourteen	Young people rDLD		
	n	*M (SD)*	Range
Total difficulties score	281	9.98 (6.55)	0-34
Internalising score	281	4.58 (3.54)	0-14
Externalising score	281	5.39 (3.93)	0-20

The table below (**Table 33.**) displays the summary of the descriptives of the potential positive factors for mental health difficulties at age fourteen. Overall, the tables summarise the number of cohorts with completed data, the mean (*M*), standard deviation (*SD*), the age the measure was completed. **Table 33** provides the summary of the descriptives for all the continuous potential positive factors for mental health difficulties at age fourteen.

Table 33.

Summary descriptives of all the potential continuous factors that promote resilience for mental health difficulties, in young people rDLD.

Potential positive factors	*n*	*M*	*SD*	Range
Individual factors				
Sleep Latency	270	1.97	1.18	1-5
Sleep disruption	269	4.34	1.51	1-6
Self-esteem	254	8.96	2.58	5-19
Exercise	281	3.46	1.00	1-4
Prosocial behaviour	281	8.31	1.82	0-10
Education motivation	267	17.47	3.21	7-24
Reading for fun	270	3.55	1.90	1-6
Problem-solving ability	244	105.18	17.99	10-211
Family environment				
Parent child closeness	270	3.30	.72	1-4
Community resources				
Safe neighbourhood	272	1.88	.67	1-4
Attended religious service	270	4.27	1.98	1-6
Attends youth clubs	270	3.96	2.04	1-6
Attends band practice	267	5.57	1.19	1-6

There were only two categorical variables in the current investigation, and these were ‘mental health intervention’ and ‘close friends’. However, for mental health interventions, it was revealed that only one adolescent did not receive such service or support. This means that all, apart from one adolescent, who was selected as at risk of DLD have received support for their mental health difficulties in their school-age years. Due to the small

sample size of those not receiving support for their mental health difficulties, the variable was removed. Therefore, the only categorical variable analysing in the current investigation is close friends. Overall, the number of completed data on close friends was 270. Adolescents (at age fourteen) who reported having close friends, who they can talk to if needed, were 254; whereas, 16 of those felt that they did not have close friends.

Secondly, scatterplots were generated for all the continuous potential factors, for each of the SDQ scores: total difficulties, internalising, and externalising score. Scatterplots describe the type of relationship between the potential factor and the SDQ scores (**Appendix P: Figures P1 – P26**). As a summary, the majority of potential factors demonstrated linear relationships with all outcomes. Compared to the other scatterplots, the visual representation of the relationship between 'attendance to band practice' and the outcomes seem very weak. This suggests that 'attendance to band practice' is not likely to be associated with the outcomes at age fourteen, within young people rDLD.

Boxplots were performed to provide the visual representations of the relationship between the potential categorical positive factor, close friends, and the SDQ scores were performed (see **Appendix Q. Figures Q1.** and **Q2.**). As stated previously, reports of close friends were the only categorical potential positive factor in the current investigation. In summary, there seems to be little difference in total difficulties, internalising and externalising scores, between those reported to have, and those not to have close friends.

Regarding outliers, these were common throughout all the scatterplots and the boxplot. Within research, exclusion of outliers is not often warranted (Benhadi-Marín, 2018). Additionally, due to the nature of the current project, it may not be appropriate to do so. Factors such as high self-efficacy likely predict, or at least is associated with, less severe mental health difficulties, in young people diagnosed with DLD (Botting et al., 2016). Yet, high self-efficacy is not included within the current investigation as this was not measured within the Millennium Cohort Study (MCS). This means that the outliers could be due to factors, such as high self-efficacy, that promote

resilience for mental health difficulties, internalising or externalising problems. Removal of outliers may lead to the removal of naturally occurring factors that might play a role in the process of resilience, within the population. Therefore, whilst acknowledged, outliers were not be removed within the current investigation.

Lastly, a correlation matrix (**Appendix R: Table R1.**) was performed. This was to determine whether any of the potential factors, that promote resilience for mental health difficulties, are highly associated with each other. High associations indicate collinearity, which is a violation of the regression analysis. As all, apart from one, of the potential factors were identified as being non-normally distributed (see **Appendix N**). Spearman Rho's correlation coefficient was performed. The findings revealed that there were continuous potential factors that were associated with each other (**Appendix R.: Table R2.**). However, according to Cohen (1988), a medium-strength correlation is .5. Therefore, under Cohen's definition, there were no continuous potential factors that are strongly associated with each other, and thus, no continuous variables were removed.

10.2.3 ***Tests of association***

The tests of association were performed to determine which factors are significantly associated with less severe mental health, internalising, or externalising difficulties at age fourteen, in young people rDLD. Correlations were performed for factors that were measured in a continuous manner. Due to violations of the assumptions for Pearson's correlation, Spearman's Rho correlations were performed for the continuous variables. Test of mean difference was performed for the only categorical variables in the current investigation: close friends. Due to known violations, a Mann-Whitney U test was performed for close friendships (categorical variable). As explained in chapter 7. Bonferroni correction was not adopted in the current project. This decision was made considering the arguments and conclusions made by Armstrong (2014).

Firstly, correlations were performed to determine if the continuous potential factors had a significant association with the SDQ scores. Due to known violations, Spearman's Rho correlation coefficient was performed between the continuous potential factors and the total difficulties, internalising, and externalising scores. The table below (**Table 34.**) demonstrates the results from the correlations performed for the continuous potential factors and each of the SDQ scores.

Table 34.

Potential continuous factors (between seven and fourteen) correlation coefficients of total difficulties, internalising and externalising score (at age 14), in those rDLD.

Potential positive factors	Total difficulties score	Internalising score	Externalising score
Individual resources			
Sleep latency	.13*	.10	.11
Sleep disruption	-.14*	-.08	-.15*
Self-esteem	.17**	.13*	.17**
Exercise	-.06	-.05	-.06
Prosocial behaviour	-.36***	-.19**	-.43***
Education motivation	-.26***	-.17**	-.27***
Reading for fun	.15*	.11	.15*
Problem solving ability	-.19**	-.14*	-.17**
Family resources			
Parent-child closeness	.17**	.11	.17**
Community resources			
Safe neighbourhood	.09	.09	.06
Attended religious service	.10	.01	.17**
Attends youth clubs	.11	.16*	.03
Attends band practice	-.01	-.01	.01

Note. * $p < .05$ ** $p < .01$ *** $p < .001$

Table 34. demonstrates that for lower total difficulties scores, factors that revealed to have a significant correlation were: low reported levels of sleep latency, fewer sleep disruptions, as well as, higher reports of self-

esteem; prosocial behaviour; problem-solving ability; educational motivation; reading for fun; and, parent-child closeness.

For lower internalising scores, factors with a significant correlation were higher reported levels of self-esteem, prosocial behaviour, problem-solving ability, and educational motivation. For lower externalising scores, those with a significant correlation were fewer sleep disruptions, as well as, higher reported levels of self-esteem, prosocial behaviour, problem-solving ability, educational motivation, reading for fun, parent-child closeness, and lastly, religious service attendance.

Secondly, a preliminary analysis was performed for the potential categorical school-age positive factor: close friends. For this, Mann-Whitney U tests were performed. For total difficulties score, the mean score for those rDLD who reported not to have close friends was 10.44 (*SD* = 7.46); whereas, for those who reported having close friends was 9.79 (*SD* = 6.33). The Mann-Whitney U test revealed that the scores did not significantly differ across the groups (z = .16, p = .88). The findings suggest having close friends may not be associated with less severe mental health difficulties at age fourteen, in young people rDLD.

For the internalising score, a Mann-Whitney U test also revealed that there was no significant difference (z = .87, p = .39) between those who reported having no close friends (*M* = 5.56, *SD* = 4.34) and those that did report having close friends (*M* = 4.45, *SD* = 3.45). Lastly, for externalising problems score, Mann-Whitney U test also revealed that there was no significant difference (z = .63, p = .53) between those who reported having no close friends (*M* = 4.88, *SD* = 4.11) and those that did report having close friends (*M* = 5.34, *SD* = 3.81). Together, the findings suggest having close friends may not be associated with less severe mental health difficulties, internalising and externalising problems at age fourteen, in young people rDLD.

Table 35 provides a summary of the results for testing the association between the potential positive factors and the SDQ scores (total difficulties, internalising, and externalising scores). The table also includes the type of

test of association (Spearman’s Rho, or Mann-Whitney U), and when they were administered.

Table 35.

Demonstrates a summary of the findings from the tests of association between the potential positive factors (between ages seven and fourteen) for the SDQ scores (at age 14), within young people rDLD.

Potential positive factors	Age of young person rDLD	Type of test	Total difficulties score	Internalising score	Externalising score
Individual resources					
Sleep latency	14 years	Spearman's Rho	Yes	No	No
Sleep disruption	14 years	Spearman's Rho	Yes	No	Yes
Self-esteem	14 years	Spearman's Rho	Yes	Yes	Yes
Exercise	14 years	Spearman's Rho	No	No	No
Prosocial behaviour	14 years	Spearman's Rho	Yes	Yes	Yes
Education motivation	14 years	Spearman's Rho	Yes	Yes	Yes
Reading for fun	14 years	Spearman's Rho	Yes	No	Yes
Problem-solving ability	7 years	Spearman's Rho	Yes	Yes	Yes
Family resources					
Parent-child closeness	14 years	Spearman's Rho	Yes	No	Yes
Community resources					
Safe neighbourhood	14 years	Spearman's Rho	No	No	No
Attended religious service	14 years	Spearman's Rho	No	No	Yes
Attends youth clubs	14 years	Spearman's Rho	No	Yes	No
Attends band practice	14 years	Spearman's Rho	No	No	No
Close friends	14 years	Mann-Whitney U	No	No	No

10.2.4 *Moderation analysis to identify significant promotive or protective factors for mental health difficulties, in young people rDLD.*

Factors that were significant (see **Table 35**) were then imputed into a hierarchical regression for each outcome: total difficulties, internalising, or externalising scores. Hierarchical regressions were adopted to perform a moderation analysis. A moderation analysis would allow the researcher to identify the significant predictors of the mental health outcomes, as well as the mechanism to which they promote resilience for mental health difficulties. Hierarchical regression has been performed for moderation analysis amongst previous investigations (Hayes, 2017)*.*

Specifically, the hierarchical regression performed within the current investigation had three steps. Firstly, the cumulative risk score, generated within the previous chapter, was inputted at step one. There are three separate cumulative risk scores for the three outcomes: total difficulties, internalising, and externalising score. In the second step, the potential positive factors were introduced as predictor variables. In their current form, these are included as potential promotive factors. If the introduction of predictors, within the second step, significantly increases the variance then it can be suggested that the inclusion of the newly introduced factors better explains the outcome. Yet, this increase must be a significant change to determine that the inclusion of the new factors better explains the outcome, than without.

The third and final step introduces the moderator variables, which indicates a protective mechanism for resilience for mental health difficulties. The moderator variables were generated by multiplying the cumulative risk score and the potential factor that promotes resilience for mental health difficulties. Similar to the description in the previous paragraph, the aim is to observe the change in variance between the second and the third step. If a significant change in variance, due to the introduction of the moderator variables, occurs, then this suggests that the introduced factors moderate the relationship between risk exposure and the outcome. Thus, if the final step is

revealed to be the best model, then the significant predictors for the outcome are likely to be protective factors, rather than promotive.

Due to violations, such as the non-normally distribution of residuals, and the likelihood of heteroscedasticity, the option to use robust standardised errors was adopted for all regressions. There were no significant differences between the original regression (see **Appendix S**) and the regression adopting the robust option. To avoid confusion, the hierarchical regression using the robust option will be reported. Yet, this means that the adjusted R^2 value (see chapter 9) cannot be reported as it was not generated under the robust option.

10.2.4.1**Total difficulties score.** A (robust) hierarchal regression was performed to identify factors that significantly predict fewer total difficulties score at age fourteen. Using G*Power (Faul et al., 2007; Faul et al., 2009), it was revealed that, at any one step, the required number of observations for a power of 90%, with an error probability of .05, is 142. In the first step, there were 281 observations. In the second and third step, there were 212 observations in this step. Thus, the number of observations were adequate for this analysis, across all the steps.

The first step included the cumulative (total) risk score for the total difficulties score (mental health difficulties), at age five. There were 281 observations in this step. The results of the (robust) regression indicated that the predictor explained 4% (R^2 = .04) of the variance (F(1, 279) = 10.18, p < .01). It also revealed that the cumulative risk score, as expected, did significantly predict greater total difficulty scores (B = 2.40, β = .19, p < .01).

The second step included the possible factors, that may promote resilience for mental health difficulties at age fourteen. The possible factors were prosocial behaviour, parent-child closeness, self-esteem, reading for fun, educational motivation, lack of sleep disruption, and sleep latency, as well as problem-solving ability. The results of the second step indicated that the predictors explained 25% (R^2 = .25) of the variance (F(9, 202) = 6.73, p = .001). There was a significant change between the variance in the first step

and the second step (R^2 change = .22, $F(8, 202) = 6.67$, $p = .001$). Regarding the predictive variables, it was found that the cumulative risk score continued to significantly predict greater total difficulties, at age fourteen (B = 1.84, $\beta = .16$, $p < .05$). Additionally, higher prosocial behaviours also significantly predicted lower total difficulties score (B = -.82, $\beta = -.23$, $p < .01$), as well as, lack of sleep disruption (B = -.53, $\beta = -.13$, $p < .05$) and higher problem-solving behaviour (B = -.06, $\beta = -.17$, $p < .01$). The other variables modelled into the hierarchical regression, such as self-esteem and closeness, did not reveal to be significant predictors for total difficulties score, at age fourteen.

In the third step, the moderator variables for prosocial behaviour, parent-child closeness, reading for fun, self-esteem, educational motivation, lack of sleep disruption, sleep latency, and problem-solving ability were included. There were 212 observations in this step. Whilst there was an increase in the variance between the second and the third step, this was not a significant change (R^2 change = .03, $F(8, 194) = 1.13$, $p = .35$).

Taken together, this suggests that the possible factors are not likely to moderate the relationship between cumulative risk score (at age five) and total difficulties at age fourteen, in young people rDLD. However, it was revealed that that high prosocial behaviour, lack of sleep disruption, and high problem-solving ability are likely to promotive factors for mental health difficulties, at age fourteen. This means that the factors encourage positive mental health development, and in return, they are likely to compensate the early risk exposure for total difficulties in early adolescence. The table below (**Table 36**) provides a summary of the described moderation analysis for total difficulties score, in young people rDLD

Table 36.

Summary (robust) hierarchal regression for the potential positive factors for total difficulties score at age fourteen, in young people rDLD.

Variables	Step 1				Step 2				Step 3			
	B	*SE B*	*t*	*β*	*B*	*SE B*	*t*	*β*	*B*	*SE B*	*t*	*β*
Constant	2.40	.75	21.03	-	25.56	5.61	4.55	-	24.72	6.31	3.73	-
Total risk score	2.40	.75	3.19**	.19	1.84	.74	2.51*	.16	1.75	10.96	.16	.16
Parent-child closeness					-.61	.55	1.10	-.07	-1.24	.58	2.15*	-.14
Prosocial behaviour					-.82	.27	3.01**	-.23	-.58	.33	1.76	-.17
Reading for fun					.38	.21	1.80	.12	.41	.26	1.59	.12
Self-esteem					.14	.16	.90	.37	-.004	.22	.02	-.002
Educational motivation					-.16	.15	1.06	-.08	-.008	.16	.05	-.004
Sleep disruptions					-.53	.25	2.12*	-.13	-.49	.27	1.80	-.12
Sleep latency					.57	.36	1.56	.11	.72	.43	1.66	.13
Problem-solving ability					-.06	.23	2.73**	-.17	-.07	.02	2.92**	-.20
Parent-child closeness x total risk score									1.58	1.33	1.18	.49
Prosocial behaviour x total risk score									-.65	.52	1.25	-.46
Reading for fun x total risk score									.01	.38	.03	.004
Self-esteem x total risk score									.28	.29	.96	.25
Educational motivation x total risk score									-.27	.29	.95	-.42
Sleep disruption x total risk score									-.27	.55	.49	-.12
Sleep latency x total risk score									-.38	.67	.56	-.08
Problem-solving ability x total risk score									.04	.05	.79	.36
R^2	.04				.25				.29			
F for change in R^2					6.67***				1.13			

Note. SE B is robust standardised errors. * = $p < .05$ ** = $p < .01$ *** = $p < .001$ 'x total risk score' infers that this is the moderator variable.

10.2.4.2 **Internalising score.** A (robust) hierarchal regression was performed to identify factors that significantly predict fewer internalising scores at age fourteen. Using G*Power (Faul et al., 2007; Faul et al., 2009), it was revealed that, at any one step, the required number of observations for a power of 90%, with an error probability of .05, is 123. In the first step, there were 281 observations. In the second and third step there were 222 observations in this step. Thus, the number of observations were adequate for this analysis, across all the steps.

Similar to the total difficulties, within the first step of the hierarchal regression (robust) for internalising problems at age fourteen, included the internalising cumulative (total) risk score. The results of the first step of the regression indicated that the predictor explained 2% (R^2 = .02) of the variance (F(1, 279) = 6.98, p <. 01). The cumulative risk score for internalising problems within the first step, as expected, did significantly predict greater internalising scores (B = .84, β = .15, p < .01).

The second step included the possible factors that may promote resilience for internalising problems, at age fourteen. The possible factors were reports of high prosocial behaviour, self-esteem, educational motivation, youth club attendance, and problem-solving ability. The results of the second step indicated that the predictors explained 12% (R^2 = .12) of the variance (F(6, 215) = 4.95, p < .001). There was a significant change between the variance in the first step and the second step (R^2 change = .09, F(5, 215) = 4.07, p = .001). Regarding the predictive variables, it was found that the cumulative risk score continued to significantly predict greater internalising problems score, at age fourteen (B = .89, β = .17, p < .01). In addition to this, higher prosocial behaviour significantly predicted lower internalising problems score, at age fourteen (B = -31, β = -.16, p < .05).

In the third step, the moderator variables for prosocial behaviour, self-esteem, educational motivation, attendance to youth clubs, and problem-solving ability were included. Whilst there was an increase in the variance between the second and the third step, this was not a significant change (R^2 change = .04, F(5, 210) = 1.81, p = .11).

Taken together, the results suggest that the possible factors are not likely to moderate the relationship between cumulative risk score (at age five) and internalising problems at age fourteen, in young people rDLD. Instead, the findings revealed that high prosocial behaviour is likely to be a promotive factor for internalising difficulties, at age fourteen. This means that the factors encourage positive mental health development, and in return, they are likely to compensate the early risk exposure for internalising problems in early adolescence. The table below (**Table 37**) provides a summary of the results from the moderation analysis for internalising problems, in young people rDLD.

Table 37.

Summary hierarchal regression for the potential positive factors for internalising score at age fourteen, in young people rDLD.

Variables	Step 1				Step 2				Step 3			
	B	*SE B*	*t*	*β*	*B*	*SE B*	*t*	*β*	*B*	*SE B*	*t*	*β*
Constant	4.05	.28	14.46	-	9.94	2.96	3.36	-	3.62	3.10	1.17	-
Total risk score	.84	.32	2.64**	.15	.89	.34	2.59**	.17**	9.42	3.69	2.55*	1.79
Prosocial behaviour					-.31	.13	2.42*	-.16*	-.12	.16	.79	-.06
Self-esteem					.09	.11	.81	.06	.19	.14	1.43	.15
Educational motivation					-.12	.09	1.28	-.11	.04	.10	.43	.04
Youth clubs					.10	.11	.84	.06	.31	.13	2.37*	.18
Problem-solving ability					-.03	.01	1.82	-.12	-.02	.01	1.74	-.12
Prosocial behaviour x total risk score									-.25	.19	1.34	-.41
Self-esteem x total risk score									-.12	.14	.82	-.23
Educational motivation x total risk score									-.21	.11	1.87	-.69
Youth clubs x total risk score									-.34	.18	1.91	-.33
Problem-solving ability x total risk score									-.002	.02	.14	-.06
R^2	.02				.12				.15			
F for change in R^2					4.07***				1.81			

Note. SE B is robust standardised errors. * = $p < .05$ ** = $p < .01$ *** = $p < .001$
Total risk score is the internalising total risk score.
'x total risk score' infers that it is a moderator variable.

10.2.4.3 **Externalising score.** A (robust) hierarchal regression was performed to identify factors that significantly predict fewer externalising problem scores at age fourteen. Using G*Power (Faul et al., 2007; Faul et al., 2009), it was revealed that, at any one step, the required number of observations for a power of 90%, with an error probability of .05, is 142. In the first step, there were 281 observations. In the second and third step there were 211 observations in this step. Thus, the number of observations were adequate for this analysis, across all the steps.

Similar to the previous two hierarchical regressions, the first step included the (total) cumulative risk score for externalising problems, at age five. The results of the regression indicated that the predictor explained 9% (R^2 = .09) of the variance (F(1, 279) = 21.57, p < .001). The cumulative risk score, as expected, did significantly predict greater total difficulty scores (B = 1.79, β = .31, p = .001).

The second step included the possible factors that may promote resilience for externalising problems at age fourteen. The possible factors were prosocial behaviour, parent-child closeness, reading for fun, self-esteem, attendance to religious services, educational motivation, lack of sleep disruptions, and problem-solving ability. The results of the second step indicated that the predictors explained 27% (R^2 = .27) of the variance (F(9, 201) = 7.60, p = .001). There was a significant change between the variance in the first step and the second step (R^2 change = .18, F(8, 201) = 4.58, p = .001). Regarding the predictive variables, it was found that the cumulative risk score continued to significantly predict greater externalising scores, at age fourteen (B = .82, β = .15, p < .05). As for the main effects, higher prosocial behaviour significantly predicted lower externalising scores (B = -.65, β = -.31, p = .001), as well as, lack of disturbed sleep (B = -.34, β = -.13, p < .05) and higher problem-solving ability (B = -.03, β = -.13, p < .05).

In the third step, the moderator variables for prosocial behaviour, parent-child closeness, reading for fun, self-esteem, attending a religious, educational motivation, lack of sleep disruptions, and problem-solving ability were included. Whilst there was an increase in the variance between the

second and the third step, this was not a significant change (R^2 change = .05, $F(8, 193) = 1.94$, $p = .06$).

Taken together, the results suggest that the possible factors are not likely to moderate the relationship between cumulative risk score (at age five) and externalising problems at age fourteen, in young people rDLD. Instead, the findings revealed that high prosocial behaviour and problem-solving ability, as well as, fewer sleep disruptions, are likely to be promotive factors for externalising problems, at age fourteen. This means that the factors encourage positive mental health development, and in return, they are likely to compensate the early risk exposure for externalising problems in early adolescence. The table below (**Table 38**) provides a summary of the results from the moderation analysis for externalising problems, in young people rDLD.

Table 38.

Summary hierarchal regression for the potential positive factors for externalising score at age fourteen, in young people rDLD.

Variables	Step 1				Step 2				Step 3			
	B	*SE B*	*t*	*β*	*B*	*SE B*	*t*	*β*	*B*	*SE B*	*t*	*β*
Constant	4.41	.27	16.62	-	16.99	3.13	5.44	-	12.15	4.28	2.84	-
Total risk score	1.76	.38	4.64***	.31	.82	.39	2.12*	.15	9.42	5.27	1.79	1.73
Parent-child closeness					-.18	.37	.49	-.03	-.60	.42	1.44	-.11
Prosocial behaviour					-.65	.16	3.91***	-.31	-.40	.23	1.72	-.19
Reading for fun					.17	.13	1.32	.08	.08	.17	.49	.04
Religious service					.03	.12	.23	.01	.24	.13	1.75	.13
Self-esteem					.02	.09	.23	.01	.13	.13	1.00	.09
Educational motivation					-.16	.08	1.92	-.13	-.03	.10	.34	-.03
Sleep disruption					-.34	.16	2.15*	-.13	-.29	.18	1.58	-.11
Problem-solving ability					-.03	.01	2.35*	-.13	-.03	.01	2.08*	-.13
Parent-child closeness x total risk score									.50	.60	.83	.31
Prosocial behaviour x total risk score									-.24	.20	1.17	-.37
Reading for fun x total risk score									.10	.19	.51	.08
Religious service x total risk score									-.39	.19	2.09*	-.37
Self-esteem x total risk score									-.16	.14	1.14	-.31
Educational motivation x total risk score									-.24	.13	1.82	-.72
Sleep disruption x total risk score									-.11	.21	.54	-.10
Problem-solving ability x total risk score									-.01	.02	.36	-.16
R^2	.09				.27				.32			
F for change in R^2					4.58***				1.94			

Note. SE B is robust standardised errors. * = $p < .05$ ** = $p < .01$ *** = $p < .001$
Total risk score is the externalising total risk score. 'x total risk score' = moderator

10.3 Summary of the results

In the current investigation, school-age (between ages seven and fourteen) promotive factors for mental health difficulties, internalising and externalising problems at age fourteen, in young people rDLD, were identified. These are likely to encourage resilience by compensating the early risk (up to age five) exposure and promote positive mental health development, in young people rDLD. The table below (**Table 39**) demonstrates a summary of the identified promotive factors.

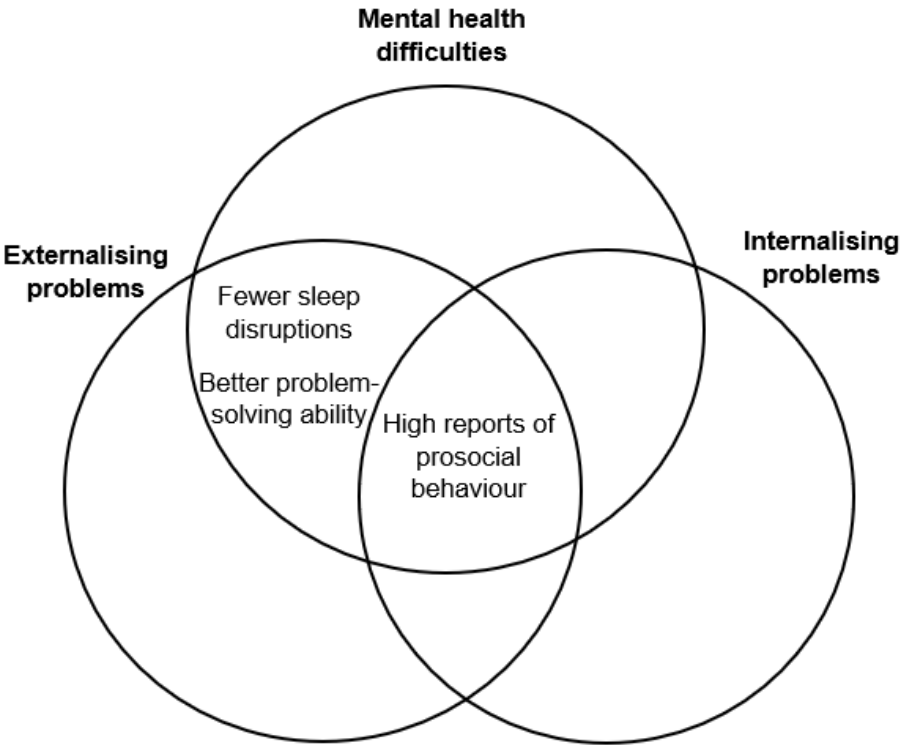
Table 39.

Summary of the promotive factors that were found to be significant for mental health difficulties, internalising, and externalising problems, in young people rDLD.

Mental health difficulties	Internalising problems	Externalising problems
High reports of prosocial behaviour	High reports of prosocial behaviour	High reports of prosocial behaviour
Fewer sleep disruptions		Fewer sleep disruptions
Better problem-solving ability		Better problem-solving ability

Figure 19.

Summary of the identified school-age promotive factors mental health difficulties, internalising, and externalising problems, in young people rDLD.



11 General Discussion

11.1 Introduction

The overarching aim of the current project was to build upon the previous DLD literature around risk and resilience for mental health difficulties. To achieve this purpose, the project's main objectives were:

1. To provide a foundation for the current project.
    a. To determine if young people who were selected as rDLD experience worse mental health difficulties, internalising and externalising problems at age fourteen, compared to the general population and typically developing peers.
    b. To determine if young people who were selected as rDLD experience worse cognitive and literacy difficulties, compared to the general population and typically developing peers.
2. To identify early risk factors (up to age five) for mental health difficulties, internalising and externalising problems (at age fourteen), in young people rDLD.
3. To investigate whether the identified early risk factors (up to age five) for mental health difficulties, internalising and externalising problems (at age fourteen), operate in a cumulative fashion, in young people rDLD.
4. To identify school-age factors (between ages seven and fourteen) that encourage the process of resilience for mental health difficulties at age fourteen, in young people rDLD.

Each of the main objectives was investigated by analysing the data collected by the MCS (see chapter 6). In the current chapter, the findings from all four investigations will be discussed. Firstly, the findings derived from each investigation will be re-stated and discussed. Following this, a synthesis of all the findings revealed in the present project will be performed. It will be discussed how the findings within the current project contribute to our

understanding of risk and resilience for mental health difficulties, in young people rDLD. This discussion will draw upon the ideas proposed within the Ecological perspective and Developmental perspectives of the development of mental health difficulties.

Thirdly, the possible implications for practice considering the findings in the present project will be discussed. Fourthly, the strengths and limitations of the current project will be discussed. Lastly, whilst minor recommendations for future research are suggested throughout and where appropriate, major recommendations will be discussed nearer the end of this chapter.

11.2 Discussions for each of the investigations within the current project

11.2.1 *A group comparison investigation to provide a foundation for the current project.*

The first investigation found that young people rDLD were more likely to experience greater severity of mental health difficulties compared to both the comparison groups, at age fourteen. The findings demonstrate that young people rDLD may have negative long-term disruptions to their social, emotional, and behavioural functioning, compared to typically developing peers and the general population. This finding was not unexpected as it is known that young people diagnosed with or reflect a diagnosis of DLD are at risk of developing mental health difficulties in adolescence. Therefore, there is a plausible connection that exists between the young people selected as rDLD at age five, and mental health difficulties at age fourteen.

Additionally, the findings revealed that young people who were selected as rDLD were more likely to experience greater severity of internalising and externalising problems at age fourteen, compared to the comparison groups. This demonstrates that the selected sample, young people rDLD, are at risk of internalising and externalising problems. As stated in the earlier chapters (chapter 3), Snowling (2006) concluded that specific types of language

difficulties may be associated with certain types of mental health difficulties (Snowling et al., 2006). Whilst the latter may be true, this was not demonstrated for young people rDLD, even though they are likely to experience (noun) lexical retrieval difficulties. It may be that young people rDLD may experience difficulties in other components of language. Yet, it may be that (noun) lexical retrieval plays an important role in the development of mental health difficulties. Regardless, young people within the sample selected for the current project are at risk of developing mental health difficulties, internalising and externalising problems, at age fourteen.

The effect size for the majority of the significant findings were small. The small effect size indicates that the impact upon mental health difficulties, between young people rDLD and the comparison groups, is minimal. There is a plausible reason for this small effect size. The minimal impact could be due to the presence of un-identifiable language difficulties within the comparison groups. It is known that phonological difficulties, for instance, are associate with behavioural difficulties (van Daal et al., 2007), which was assessed by the Strengths and Difficulties Questionnaire (SDQ). Hence, unknown language difficulties that could be present in the comparison groups may be associated with higher SDQ scores. Therefore, the presence of un-identifiable language difficulties in the comparison groups could impact the effect size of the difference between young people rDLD and the comparison groups.

Secondly, it was revealed that young people rDLD, compared to typically developing peers and the general population, were more likely to experience worse non-verbal reasoning ability (at age five), spatial problem-solving ability (at ages five and seven), and reading ability (at age seven). The findings suggest that young people rDLD may have had disruptions to problem-solving and reading abilities, compared to the comparison groups. To some degree, the notion that young people rDLD, in the current project, may experience such cognitive and literacy difficulties is not surprising. As stated in chapter 2, young people diagnosed with DLD are likely to experience cascading disruptions to other developmental processes (Vugs et al., 2013; Vugs et al., 2014; Vissers et al., 2015; Isoaho et al., 2016; Pavelko

et al., 2017). These findings demonstrate a likeness between young people rDLD, selected in the current project, and young people diagnosed with DLD. Therefore, young people rDLD, selected in the current sample, may reflect the wider developmental context of young people diagnosed with DLD.

Together, the results demonstrate that young people rDLD had significantly worse total difficulties, internalising and externalising scores at age fourteen, in comparison to typically developing peers and the general population. This informed the current project moving forwards. The outcomes for the investigations, in the present project, were general mental health difficulties, as well as internalising and externalising problems, at age fourteen. Additionally, the results highlight that the sample selected for the current project may experience additional difficulties beyond their language ability. Particularly, problem-solving (spatial and non-verbal reasoning) at ages five and seven, as well as reading ability at age seven. The sample selected may, therefore, reflect young people diagnosed with DLD as they are also likely to experience difficulties beyond their language ability (see chapter 2).

11.2.2 *Identifying early risk factors for mental health difficulties within young people rDLD*

Early risk factors for mental health difficulties, internalising and externalising problems, at age fourteen in young people rDLD were identified in the second investigation. Firstly, for general mental health difficulties at age fourteen, high reports of harsh discipline practices and parent-child conflict are early (up to age five) risk factors, in young people rDLD. For internalising problems at age fourteen, it was found that high reports of parent-child conflict and ‘being female’ were early risk factors, in young people rDLD. As for externalising problems at age fourteen, it was found that high reports of parent-child conflict and harsh discipline practices, as well as exposure to second-hand smoke, were early risk factors, in young people rDLD.

11.2.2.1 **High levels of parent-child conflict.** High levels of parent-child conflict was a consistent early risk factor for mental health difficulties, as well as internalising and externalising problems. Parent-child conflict refers to protracted disputes, disagreements, or arguments between the main caregiver and the child. This builds upon the current literature around the quality of relationships and mental health, in young people diagnosed with DLD. St Clair et al., (2019) found that the parent-child relationship, as a combination of conflict and closeness, was an early risk factor for emotional difficulties in a similar sample. However, in the findings drawn from the current project, parent-child relationships were separated into 'closeness' and 'conflict'. Reports of closeness were not found to be a risk factor for any of the outcomes. On the contrary, reports of conflict were found to be a significant risk factor for all three. Therefore, the findings from the present project suggest that parent-child conflict, compared to closeness, might be more important to acknowledge when discussing the development of mental health difficulties, in young people rDLD.

There may be a plausible reason as to why high levels of parent-child conflict is an early risk factor for mental health difficulties, in young people rDLD. Whilst parental stress may play a role (Bayer et al., 2006), research suggests that children diagnosed with DLD may have difficulties using effective conflict resolution strategies (Marton et al., 2005). The effectiveness of the conflict resolution strategies, in children diagnosed with DLD, may be further hindered by their demonstrated difficulty in detecting conflict within social situations (Epstein et al., 2014). Conflict resolution and detection difficulties may reduce the child's ability to manage adverse, or stressful social interactions or situations. The difficulty in managing such situations may increase feelings of stress and frustration that stems from unmanaged or, unresolved conflict; especially, if this occurs over a long period. As a consequence of the high level of unresolved, and perhaps continuous, conflict between the child and the parent, this may increase the likelihood of mental health difficulties in these young people.

However, due to the limitations of the MCS, it is unknown whether the selected sample does experience conflict resolution and detection difficulties.

There is also a lack of research to determine whether (noun) lexical retrieval ability is associated with an individual's ability to resolve or detect a conflict. As there is a lack of research, the internal mechanism between parent-child conflict (up to the age of five) and the development of mental health, in young people rDLD or diagnosed with DLD, warrants further investigation. In doing so, future research could build upon our current understanding as to why some young people diagnosed with DLD experience greater severity of mental health difficulties.

11.2.2.2 **Harsh discipline practices.** A salient early risk factor for mental health difficulties and externalising problems, at age fourteen, was higher reports of harsh discipline practices. This finding is not unexpected. Research indicates that reports of high-level harsh discipline practices, which is associated with abuse (Zolotor et al., 2008), has a detrimental effect on young people's mental health development (Regalado et al., 2004; Slade and Wissow, 2004; Afifi et al., 2017). Particularly, it is likely young people who experience harsh discipline practices, compared to those who do not, may have developed lower emotional, social, and behavioural functioning. Additionally, young people who experience high levels of such practices are less likely to establish and maintain relationships, compared to those who do not (Lynch and Cicchetti, 1991). Concerning the present investigation, currently, it can only be assumed that a similar plausible connection exists within young people rDLD, and mental health difficulties at age fourteen.

Unexpectedly, however, harsh discipline practices were not revealed to be an early risk factor for internalising problems. There is a plausible reason for differences found between internalising and externalising problems, and this relates to the data collected by the MCS. Through analysing the general population, Rajyaguru, Moran, Cordero, and Pearson (2019) found differences in the relationship between 'active' and 'withdrawal' types of discipline, and mental health difficulties. Active harsh discipline practices included items such as smacking, shouting, and telling off the child. Withdrawal items included ignoring the child, removal of their privileges, and

sending the child to their bedroom. Raiyaguru et al., (2019) revealed that the active approach was associated with emotional problems; this was not found for the withdrawal approach. This finding suggests that emotional (an aspect of internalising) problems are associated with a certain type of harsh discipline practices. In the current study, however, harsh discipline practices included active and withdrawal items. Therefore, a plausible explanation as to why high levels of harsh discipline practices was not found to predict internalising problems at age fourteen, might be due to the combination of active and withdrawal items.

Considering the current and previous findings into harsh discipline practices and mental health, more research is needed before a conclusion can be drawn. The findings from the current project highlight the need to understand how harsh discipline practices play a role in the development of mental health in young people rDLD. Harsh discipline practices are associated with signs of abuse (Block et al., 2016; Beckerman et al., 2017; Son et al., 2017; Maul et al., 2019). Thus, there may be a need for future research into the role of reported and identifiable types of abuse in the development of mental health difficulties in adolescence, in young people rDLD, or diagnosed with DLD.

11.2.2.3 **Gender effects.** Females, compared to males, were more likely to experience greater severity of internalising problems at age fourteen. This finding is unsurprising, as it supports a vast amount of evidence that females are more likely, compared to males, to experience a greater severity of internalising problems (Schuch et al., 2014; Boyd et al., 2015; Galderisi et al., 2015). This includes greater symptom severity of depression and anxiety, compared to males.

However, it is unknown as to how ‘being female’ impacts the development of mental health difficulties, in young people rDLD. The data analysed in the current project was derived from a parent-reported informal question, asking the main caregiver ‘what is the biological sex of the child’. A binary response of ‘male’, or ‘female’ was available. Hence, to acknowledge

the complexity of gender and biological sex (see chapter 4), the term ‘being female’ was adopted. Due to how the data was gathered, it is unclear whether the risk here is concerning the biological sex of the individual, or the gender. Thus, it is unknown if it is the biological component at play; and, or whether it is the behavioural expectations or pressures that are placed upon biological females, which increases the risk for internalising problems (World Health Organization, 2002; Afifi, 2007), in young people rDLD. Therefore, future research should determine whether being female, as a risk factor for mental health difficulties in early adolescents in those rDLD, is due to a biological or biopsychosocial influence.

11.2.2.4 **Second-hand smoke exposure.** Exposure to second-hand smoke, at age five, significantly predicted greater severity of externalising problems at age fourteen, in young people rDLD. Second-hand smoke exposure is whereby smoke from a burning tobacco product is inhaled by the individual. This finding contributes to the complex literature on mental health difficulties and exposure to second-hand smoke. Whilst contradicted for conduct problems, the literature supports the notion that a high level of second-hand smoke exposure is associated with greater severity of externalising problems (Bandiera et al., 2011; Padrón et al., 2016). Therefore, the findings from the current investigation support the general literature, but within young people rDLD.

Yet, the current findings support the conclusion drawn by Bandiera et al., (2011), rather than Padron et al., (2016). Bandiera et al., found that second-hand smoke was associated with conduct problems, as well as inattention and hyperactivity. On the contrary, Padron et al., only found an association between second-hand smoke and, inattention and hyperactivity. The findings drawn from the current investigation demonstrate that exposure to second-hand smoke plays a role in the development of externalising problems, in young people rDLD. Externalising problems included symptoms of ADHD and conduct problems. Therefore, in young people rDLD, the findings support

the literature around second-hand smoke and externalising problems (including conduct problems).

It is uncertain why second-hand smoke exposure increases the risk of externalising problems in early adolescence, in young people rDLD. To focus firstly upon hyperactivity, whilst scarce, the literature suggests that severe hyperactivity could stem from neurological, or chemical disruptions due to the exposure of second-hand smoke (Pagani, 2014; Yolton et al., 2014; Abdel Hamed et al., 2019). However, the suggestion of neurochemical disruptions may not explain why conduct problems were predicted by the exposure of second-hand smoke. Instead, there is a wealth of literature demonstrating that smoking behaviours are predictive of low socio-economic status and stress (Finkelstein et al., 2006; Crittenden et al., 2007; Tsourtos and O'Dwyer, 2008; Tsourtos et al., 2008). Thus, it may be that second-hand smoke mediates the relationship between household and family factors, and externalising problems, within young people rDLD. Yet, within the current investigation, second-hand smoke was not strongly associated with factors indicating low socio-economic status; these were low income, main caregiver unemployment, and single parenthood. Beyond speculation and further research, therefore, it is uncertain as to why exposure to second-hand smoke is an early risk factor for externalising problems in early adolescence, in young people rDLD.

11.2.3 *Investigating the potential cumulative (early) risk effect for mental health difficulties within young people rDLD*

The findings from the third investigation revealed that the identified early risk factors, for mental health difficulties at age fourteen, are likely to operate in a cumulative fashion, in young people rDLD. A cumulative effect was also revealed for internalising and externalising problems. The findings support the current literature, as well as, the cumulative risk hypothesis (Appleyard et al., 2005; Raviv et al., 2010; Horan and Widom, 2015; Oldfield et al., 2015; Bøe et al., 2018). Particularly, the findings from the third investigation reveal

that the cumulative risk effect for mental health difficulties is apparent in young people rDLD, similar to their typically developing peers.

Additionally, the findings support, to some degree, the discussions in St Clair et al., (2019) research. Within St Clair et al.'s, (2019) discussion, it was highlighted that an increase of emotional difficulties is likely to be due to an increased number, as opposed to a greater potency, of risk. The risk exposures speculated in St Clair et al.'s discussion were the language difficulties experienced by young people diagnosed with DLD, and low emotional regulation. The third investigation in the current project, however, is the first to demonstrate a cumulative effect for mental health difficulties, in young people rDLD. Thus, the findings from the third investigation support the ideas discussed briefly within St Clair et al.'s paper. Together, the findings drawn from the present investigation supports the notion that for young people rDLD, early risk factors indeed operate in a cumulative fashion.

Furthermore, in young people rDLD, early risk factors may operate in a similar cumulative fashion as demonstrated in typically developing peers. As stated in chapter 4, there are likely to be differences in the cumulative relationships between typically and atypically developing young people. A linear cumulative effect has been observed within typically developing peers (Appleyard et al., 2005; Raviv et al., 2010; Horan and Widom, 2015). Yet, within children who have special educational needs or disabilities, a quadratic effect is observed for risk factors and behavioural problems. The findings from the current project demonstrated a linear cumulative effect between the number of exposed risk factors and mental health difficulties, in young people rDLD. Thus, how early risk factors operate, in young people rDLD closely resembles the fashion observed within typically developing peers.

However, there is a limitation of the cumulative risk investigation performed. The size of the sample in those with two or more exposed risk factors, especially for the total difficulties score, is considered small (n = 8). Future research should replicate the cumulative risk study with larger sample sizes, as a small size might have obfuscated a quadratic effect. Nevertheless, due to the nature of the investigation, small sample sizes were

expected. Previous DLD literature analysing the data collected by the MCS (Forrest et al., 2018; St Clair et al., 2019) also had relatively small samples.

11.2.4 *Identifying school-age factors that encourage resilience for mental health difficulties within young people rDLD*

The final investigation identified school-age (between ages seven and fourteen) factors that significantly predicted less severe mental health difficulties, at age fourteen, within young people rDLD. For general mental health difficulties at age fourteen, high prosocial behaviour, high problem-solving ability, and fewer sleep disruptions predicted less severe mental health difficulties, in young people rDLD. These factors were also significantly predicted of less severe externalising problems at age fourteen. As for internalising problems at age fourteen, high prosocial behaviour predicted less severe mental health difficulties. All the factors that predicted less severe mental health difficulties, as well as, internalising and externalising problems, were revealed to have a promotive mechanism. The described factors are likely to promote positive mental health development, and thus, have a compensatory effect upon the early risk exposure. Thus, the positive factors increase the likelihood of resilience for mental health difficulties occurring.

11.2.4.1 **Prosocial behaviour.** The findings from the final investigation provide continued support for the connection between higher displays of prosocial behaviour and less severe mental health difficulties, internalising and externalising problems, in young people diagnosed with DLD. High prosocial behaviour is likely to play an important role in the development of positive mental health difficulties, in early adolescence, in young people rDLD. Prosocial behaviours refer to acts that involve or result in benefiting or caring for another. Often this includes, sharing and co-operating with, and helping others. Additionally, prosocial behaviours may encompass acts that conform to societal or cultural rules. The findings from the current project

support the existing literature around DLD and mental health. Generally, the literature demonstrates that a plausible connection might exist between higher displays of prosocial behaviour and less severe mental health difficulties, within young people diagnosed with DLD (Toseeb et al., 2017; Toseeb and St Clair, 2020).

Furthermore, the findings from the final investigation suggest a connection between higher displays of prosocial behaviour and less severe externalising problems within young people diagnosed with DLD. As explained in chapter 5, there is contradictory evidence suggesting that that higher displays of prosocial behaviour is not associated with less severe externalising problems (Toseeb et al., 2017). Toseeb et al., (2017) found that high parental reports of prosocial behaviour, of children diagnosed with DLD, was not predictive of a reduction in aggression or rule-breaking behaviours. In addition to recent evidence (Toseeb and St Clair, 2020), the findings from the final investigation support the connection between high displays of prosocial behaviour and less severe externalising problems.

There may be a few explanations for the differences in the results between Toseeb et al.'s (2017), and the findings drawn from the final investigation. There are differences across investigations in what describes externalising problems. In the current investigation symptoms of ADHD were incorporated into externalising problems. Yet, within Toseeb et al., (2017) investigation, the focus was upon rule-breaking and aggression. It could be suggested that a predictive relationship was revealed between prosocial behaviour and externalising problems in the final investigation of the current project, due to the inclusion of symptoms of inattention and hyperactivity. Therefore, high displays of prosocial behaviour may be a better predictor of externalising problems or symptoms of ADHD, rather than specifically conduct problems, within young people diagnosed with DLD.

Additionally, there are differences between samples across Toseeb et al., (2017) and the current project. Toseeb et al., (2017) investigated children diagnosed with DLD. The group selected within Toseeb et al.'s investigation, due to the nature of DLD, is likely to be a heterogeneous group in

comparison to the selected sample for the current project. The sample selected in the present project might be homogenous. Young people selected as those rDLD in the current project are likely to have intact (noun) lexical retrieval difficulties; other difficulties are unknown. As explained in chapter 2, findings may differ across investigations with different samples of DLD. Hence, in a heterogeneous sample of DLD, higher displays of prosocial behaviour may not significantly predict less severe externalising problems. Yet, in young people rDLD who may as a group predominately experience (noun) lexical retrieval at age five, high displays of prosocial behaviour are likely to predict less severe externalising problems. Therefore, within the context of the current investigation, in young people rDLD who experience (noun) lexical retrieval difficulties, who also display high levels of prosocial behaviours are less likely to experience severe externalising problems.

To move the focus onto the mechanism in which prosocial behaviour promotes resilience for mental health difficulties, the current findings, to some degree, are unexpected. The previous DLD literature and discussions have assumed or stated that high displays of prosocial behaviour is a protective factor for mental health difficulties. Particularly, research by Toseeb et al., (2017), and more recently Toseeb and St Clair (2020) described high displays of prosocial behaviour to be a protective factor for mental health difficulties. The reason for this assumption is due to the lack of a significant association between low displays of prosocial behaviour and greater severity of mental health difficulties. However, in the current investigation, the factors identified are likely to have a promotive mechanism for resilience. This suggests that low levels of prosocial behaviour would predict less severe mental health difficulties. The findings from the final investigation somewhat contradict the conclusions drawn from the previous DLD literature, concerning the relationship between prosocial behaviour and the development of mental health difficulties.

However, there is a plausible explanation as to why there may be differences in the findings between previous research, and the current investigation. The contradiction may stem from the type of interaction adopted. In the current investigation, a moderator variable was generated.

These were generated to determine if the mechanism, in which factors promote resilience for mental health difficulties, is protective. The moderator variables were the interactions between the plausible factor, that promotes resilience for mental health difficulties, and the cumulative risk score. The findings reveal, through hierarchical regression analysis, that factors that promote resilience for mental health difficulties are not likely to interact with risk exposure. Yet, within previous investigations, an interaction might exist between DLD, as a group experiencing language difficulties, and prosocial behaviour (Kilpatrick et al., 2019); rather than an interaction with risk exposure within their environment. Future researchers should acknowledge and understand how, and which risk exposure might interact with positive factors, to promote resilience for mental health difficulties. In the context of the current investigation, within young people rDLD, high prosocial behaviour is likely to be a promotive factor for mental health difficulties.

11.2.4.2 **Sleep disruptions.** Lack of sleep disruptions seems to encourage resilience of mental health difficulties and externalising problems at age fourteen, in young people rDLD. To our current knowledge, this is the first study to identify that sleep disruptions play a role in reducing the likelihood of mental health difficulties, especially externalising problems, in a sample selected to reflect young people diagnosed with DLD.

There may be recent research that provides some preliminary insight into why sleep disruptions were revealed to promote positive mental health development in young people rDLD. Recent research by Botting and Barakas (2018), and Chénier-Leduc et al., (2019) highlights a plausible connection between poor sleep quality and cascading language difficulties, within children diagnosed with DLD, or communication disorders. Botting and Barakas (2018) found that, as a group, young people diagnosed with a communicative disorder (including DLD), compared to typically developing peers, are more likely to experience unhealthy sleep behaviours. Unhealthy sleep behaviours, within Botting et al.'s study, included restlessness; difficulties in latency and waking up; disruption; and lastly, breathing

concerns during sleep. It was revealed that unhealthy sleep behaviours were significantly associated with greater language difficulty, within all children. It was concluded, therefore, that young people diagnosed with DLD, who experience worse sleeping behaviours were more likely to experience greater severity of language difficulties. Therefore, it may be that within young people rDLD, sleep disruptions may have an indirect impact upon the development of mental health, through the severity of language difficulties experienced.

However, in the current study, sleep disruption, rather than sleep behaviours, was found to negatively impact the development of mental health at age fourteen, within young people rDLD. The previously described research found that sleep behaviours, not limited to disruption, may lead to greater severity of language difficulties within young people diagnosed with DLD. It would be expected in the current study, therefore, that sleep latency, as well as disruptions, would have a significant predictive relationship to less severe mental health difficulties at age fourteen. However, this was not found within the present project. Instead, the findings suggest that sleep disruption, rather than sleep behaviours, is an important factor to consider when discussing the development of mental health, within young people diagnosed with DLD.

However, it may be that the differences between the investigatory groups may have led to differing results across investigations. The sample within Botting and Barakas's (2018) investigation were children diagnosed with DLD; a heterogeneous group. By comparison, in the current study, young people rDLD, who were likely to experience (noun) lexical retrieval difficulties at age five, was selected. The differences across the conclusions drawn between the current and Botting et al.'s study could be due to the samples selected. Regardless, it is evident that more discussions and investigations around DLD and mental health should focus upon sleep behaviours; especially, sleep disruptions.

Furthermore, more research is needed using measures that have been designed and tested to investigate sleep behaviours. The speculations drawn in the previous paragraph stem from research using parent or self-reports. As

stated in chapter 6, self-reports may provide some insight into individuals' sleeping behaviours. Self-reports on an individual's sleep are as valid and useful as objective measures (Jungquist et al., 2015; Tonetti et al., 2016). However, how the self-report is completed may impact the accuracy of the data collected (Ibáñez et al., 2018). Additionally, self-reports may not be as accurate as certain objective measures in reporting information for sleep phases, including latency (Ibáñez et al., 2018). Thus, a plausible reason why the current study did not find a predictive relationship between sleep latency and less severe mental health difficulties, within young people rDLD, may be due to the use of a self-report measure. Sleep latency may be more accurately tested through measures assessing sleep through brain patterns, which can reliably measure the time it takes for an individual to enter a sleep state. Together, whilst self-reports provide a good indication of latency, as well as disruption, future research should include electronic sleep measures.

11.2.4.3 **Problem-solving ability.** Higher levels of problem-solving ability seem to play a role in the development of positive mental health at age fourteen, in young people rDLD. This is in addition to externalising problems. Yet, problem-solving ability, as measured by the MCS at age seven, may only provide inside into a component of which: spatial problem-solving. Spatial problem-solving ability is specific to navigation, visualisation of distance, space, or angles, as well as, noticing differences or fine details within objects and faces. Thus, the findings, drawn from the current investigation, implies that spatial problem solving is a promotive factor for mental health difficulties in early adolescence, in this group. Beyond the current findings, no research investigates the role of (spatial) problem-solving ability in the development of positive mental health, within young people diagnosed with DLD. Therefore, the findings from the current investigation identified a factor that should be discussed when understanding the relationship between mental health and DLD.

However, how spatial problem-solving impacts the development of mental health, within young people rDLD, is unknown. It may be that spatial

problem ability indicates general problem-solving ability. Moreover, general problem-solving ability may be used within social situations, as a form of social cognition. Bakopoulou (2010) found that social cognition mediates the relationship between mental health difficulties and disruptions to language development, within DLD. This suggests that social cognition has been implicated as an important factor in the role of DLD and mental health. Ergo, lower level levels of general problem-solving ability may lead to difficulties in solving emotional and social problems, and in return may negatively impact the mental health development, within DLD. Therefore, the findings from the current investigation may be demonstrating that higher levels of spatial problem-solving predict less severe mental health difficulties, as an indicator of general, or even social problem-solving ability.

11.3 A synthesis of the findings within the current project

The current section will focus on how, or to what extent, the findings from the current project supports the DLD literature around mental health. Moreover, there will be discussions into how the findings from the present project build upon the previous DLD literature. Particularly, how the findings provide a deeper insight into risk and resilience for mental health difficulties in early adolescence, in young people diagnosed with DLD.

Overall and firstly, the findings from the current project demonstrate some consistency with the conclusion drawn from previous DLD literature around risk and resilience for mental health difficulties (see chapter 5). Also, the findings revealed in the current project has built upon the previous literature by identifying additional factors for risk and resilience for mental health difficulties in this population. This includes, but is not limited to, problem-solving ability, second-hand smoke, and the level of disruption during sleep.

Secondly, the findings in the current project suggest that factors drawn from the immediate environment and at the individual level should be considered when understanding the development of mental health difficulties,

in young people diagnosed with DLD. This is in comparison to wider environmental factors, such as low socioeconomic status. Hence, the findings from the current project do, somewhat, adhere to the assumptions made within the Ecological perspective (see chapter 4).

However, some factors within the immediate environment and at an individual level may be more important to consider, compared to others. To some extent, why some factors may be more important to consider within the immediate environment, and at an individual level, could be explained through a Developmental perspective. Therefore, there may be a need to consider the incorporation of an Ecological and Developmental perspective when understanding the risk and resilience for mental health difficulties, in young people diagnosed with DLD.

Lastly, the findings from the current project have provided insight into how factors encouraging risk and resilience for mental health difficulties, in young people diagnosed with DLD, operate together. Therefore, the findings provide some understanding of the dynamic process between early risk factors (up to age five), and school-age positive factors (between ages seven and fourteen) for mental health difficulties at age fourteen, in young people diagnosed with DLD.

11.3.1 ***The immediate environment***

The findings from the current project, to some degree, support the previous literature around mental health and DLD. As explained in chapter 3 and 5, the DLD literature already acknowledges the importance of relationships for the development of positive and adverse mental health (Durkin and Conti-Ramsden, 2010). The findings from the current project found that higher levels of child-parent conflict predicted greater severity of mental health difficulties at age fourteen, in those rDLD. Additionally, this was revealed for internalising and externalising problems at age fourteen. Parent-child conflict refers to the engagement of non-peaceful forms of communication between children and their parent, or parents. These include

arguments around views, ideas, or beliefs. A higher level of parent-child conflict may indicate lower quality of relationships (Pianta, 1992; Acar et al., 2019; Hutchinson et al., 2019; Li and Liu, 2020). Hence, parent-child conflict is likely to be an aspect of parent-child relationships. Therefore, an aspect of child-parent relationships was found to play a likely role in the development of mental health difficulties within young people rDLD. Thus, supporting the previous DLD literature.

Furthermore, some factors that predicted the severity of mental health difficulties at age fourteen, in young people rDLD, may influence the quality of peer and familial relationships. These include prosocial behaviours and harsh discipline practices. Firstly, it is agreed that, whilst prosocial behaviour may not be predictive, it may influence the quality of peer relationships (Greener, 2000; Pakaslahti et al., 2002; Ma et al., 2020). Higher displays of prosocial behaviours are associated with being more liked by peers (Greener, 2000; Pakaslahti et al., 2002). Also, recent research Hachey and Conry-Murray (2020) demonstrate that prosocial behaviour is predicted by the prospect of establishing better relationships with peers. Therefore, to some degree, high displays of prosocial behaviour may have predicted less severe mental health difficulties at age fourteen, as this behaviour intends to improve the quality of friendships.

Secondly, harsh discipline practices refer to any intended emotional or physical pain directed towards the young person to correct or manage their behaviour. Similar to prosocial behaviour, harsh discipline practices may also influence the quality of relationships between the child and their main caregiver (Holden et al., 2017). Therefore, it may be that, to some degree, high levels of harsh discipline practices predicted greater severity of mental health difficulties at age fourteen, as this might worsen the quality of the parent-child relationship.

Together, the findings from the present project support the current literature on DLD and mental health. The DLD literature already acknowledges the importance of relationships for the development of mental health difficulties (Durkin and Conti-Ramsden, 2010). Particularly, the

findings from the current project demonstrate that relationships, as well as their influencers, should continue to be considered when discussing mental health difficulties within people young rDLD.

Additionally, the findings support previous general literature about risk and resilience for mental health difficulties. Particularly, the literature around mental health and, typically developing young people. As stated in chapter 4, key researchers around risk and resilience for mental health difficulties highlight the importance of relationships (Luthar et al., 2000; Luthar et al., 2006; Rutter, 2006; Rutter, 2012; Masten, 2014; Masten and Barnes, 2018). Good quality relationships are associated with an increased feeling of self-esteem (Harris and Orth, 2019), for example. In return, the individuals may be likely to undergo positive adaption, despite risk exposure. The previous literature supports the connection between good quality relationships and positive mental health among young people (Goldbaum et al., 2003; Rubin et al., 2004). It is unsurprising therefore, the findings from the current project continue to support this literature; as well as within the DLD literature.

However, not all forms of relationships were predictors of mental health difficulties, within young people rDLD. In the current project, parent-child conflict in early childhood predicted a greater severity of mental health difficulties. Yet, parental closeness and engagement did not. Additionally, greater parental closeness did not significantly predict lesser mental health difficulties, within young people rDLD, during school-age years. As defined in chapter 4, parental closeness reflects concepts around the family bond, responsiveness, and engagement. Similar to conflict, closeness may indicate the quality of parent to child relationships. Parental engagement refers to social rituals, activities, and traditions as a family unit (Compañ et al., 2002). Like prosocial behaviour and harsh discipline practices, engagement may not predict but influences the quality of child to parent relationship. The findings from the current project demonstrated that not all forms of relationships predicted mental health difficulties in early adolescence, within young people rDLD. Therefore, the findings from the present project provide a unique contribution to our current understanding of risk and resilience for mental health difficulties, in young people rDLD.

Evidence by Bakopoulou (2010) may provide some insight into why parent-child conflict (up to age five) might be an important aspect of a relationship to consider when discussing mental health and DLD. Bakopoulou (2010) concluded that social cognition plays a direct role in social-emotional functioning, compared to language ability. Social cognition refers to how individuals store, process, and apply information in a social context. This entails understanding theirs and other's emotion, as well as the distinction between the two (Cohen et al., 1998). Yet, as a group, young people diagnosed with DLD may experience difficulties in social cognition (Cohen et al., 1998; Marton et al., 2005; Stanton-Chapman et al., 2007). This includes difficulties in conflict detection and resolution (Marton et al., 2005). Thus, when parent-child conflict occurs, the young person may not have the ability to manage social interaction. The difficulty in managing conflict may lead to distress within young people rDLD. Parent-child closeness and engagement may not be directly affected by social cognition in the same manner as conflict. Therefore, parent-child conflict may be more important to consider when understanding the development of mental health difficulties, as young people diagnosed with DLD experience disruptions to their conflict detection and resolution (social cognition). However, future research is needed to provide evidence of this connection. As for now, developmental differences within young people rDLD, should be acknowledged when discussing mental health development.

Together, the interpretations drawn from the findings of the current project support the notion that relationships are likely to play a role in the development of mental health difficulties and DLD. This is supported, as the findings from the current project revealed that there were factors that predicted mental health difficulties at age fourteen, in those rDLD, which are indicators, or influencers, of relationship quality. This was also revealed for internalising and externalising problems. However, not all aspects of relationships significantly predicted mental health difficulties, in young people rDLD. Hence, the findings from the current project suggest that not all aspects of relationships are equally important to consider when understanding the development of mental health difficulties, in young people

rDLD. It may be that the developmental context of the young person rDLD explains why certain factors were salient, compared to others.

11.3.2 *Individual level factors*

Individual factors should be considered when understanding risk and resilience for mental health difficulties, in young people diagnosed with DLD. This is supported in the previous literature, and by the findings from the current project. Yet, similar to the previous section, it may be certain factors are more important than others, when discussing mental health and DLD.

Concerning risk, it was revealed in the current project that being female was an early risk factor for internalising problems at age fourteen, in those rDLD. As explained in chapter 4, there is inconclusive evidence around gender differences and predicting mental health difficulties in young people diagnosed with DLD. The findings from the current projects support the notion that being female, as an individual factor, plays a role in the development of internalising problems, in young people diagnosed with DLD. Yet, during the investigation in the current project, being male was not associated with externalising problems at age fourteen, in those rDLD. The findings suggest that there is a component, either biological or biopsychosocial (see chapters 4), associated with being female, rather than male, that plays a role in the development of mental health difficulties, in those rDLD. This might provide some explanation as to why previous research has found inconclusive evidence for gender effects for mental health difficulties, in young people diagnosed with DLD.

Concerning resilience, individual factors are likely to play a role in the development of positive mental health in early adolescents, within young people rDLD. In the current project, better problem-solving ability, and higher displays of prosocial behaviour, during the school-age years, predicted less severe mental health difficulties. The findings from the present project support and builds upon the previous DLD literature.

Firstly, there are known individual factors that likely encourages resilience for mental health difficulties, in young people diagnosed with DLD. This includes, but is not limited to, higher reported self-efficacy (Botting et al., 2016) and higher displays of prosocial behaviour (Toseeb et al., 2017; Toseeb et al., 2020; Toseeb and St Clair, 2020). Whilst self-efficacy was not investigated in the current project, the likely connection that exists between prosocial behaviour and severity of mental health difficulties, in young people diagnosed with DLD, is supported in the current project. Therefore, the current project does demonstrate some consistency and support for the previous DLD literature.

However, self-esteem in the current project did not predict less severe mental health difficulties at age fourteen, in young people rDLD. This finding, therefore, contradicts the evidence by Wadman, Durkin, and Conti-Ramsden (2008). Wadman et al., found that adolescents diagnosed with DLD were more likely to experience worse self-esteem, compared to their typically developing peers. Wadman et al., concluded that adolescents diagnosed with DLD may experience greater severity of mental health difficulties as they are more likely, compared to typically developing peers, to experience lower levels of self-esteem. Instead, the findings from the current project support the evidence by Kilpatrick et al., (2019). Kilpatrick et al., did not find that self-esteem predicted internalising or externalising problems, in young people diagnosed with DLD. Therefore, whilst there are individual factors that play a role in the development of positive mental health in young people DLD, self-esteem may not be one of them.

Secondly, the present project builds upon the DLD literature by identifying additional individual factors that may predict the severity of mental health difficulties, in young people rDLD. This includes better problem-solving ability, as well as fewer sleep disruptions. Therefore, there are individual factors that may play a role in the development of positive mental health among young people diagnosed with DLD.

However, the described individual factors may not always be what Rutter described as ‘mental operations’ (Rutter, 2006; Rutter, 2012; Thapar et al.,

2017). As stated in chapter 4, Rutter proposed that individual differences in mental operations explain why some people undergo positive adaption to adversity or resilience. Mental operations include problem-solving ability, and thus, the findings from the current project do support Rutter's proposal (Rutter, 2006; Rutter, 2012; Thapar et al., 2017). However, fewer disruptions during sleep may not be a mental operation, as described by Rutter, but a behavioural or lifestyle individual difference. This suggests that individual differences beyond mental operations, such as sleeping behaviours, should be considered when understanding the development of mental health difficulties, in young people diagnosed with DLD.

Together, the present project has identified additional factors that ought to be considered when understanding risk and resilience for mental health difficulties, in young people diagnosed with DLD. Moreover, the current project has provided a deeper insight into this dynamic process by highlighting that that certain individual factors may be more important than others, within this population.

11.3.3 *Incorporating an Ecological and Developmental perspective*

Considering the findings from the current project, there may be a need to consider the incorporation of an Ecological and Developmental perspective when understanding the risk and resilience for mental health difficulties, in young people diagnosed with DLD.

The interpretation of the findings drawn from the current project supports the importance of proximal processes when discussing mental health difficulties, within young people rDLD. To briefly recap, proximal processes refers to the interaction between the young person and their immediate environment, which impacts their development over time. This includes, but is not limited to, relationships with family and peers. Factors that predicted the severity of mental health difficulties at age fourteen were likely to stem from the young person's immediate environment. This includes parent-child conflict (at age 3) and harsh discipline practice (at age 5). Yet, factors from

the wider environment, such as low income and single-parent households, did not significantly predict mental health difficulties. Thus, the present project identified significant factors for the development of mental health difficulties within young people's 'Microsystem', rather than the 'Macrosystem' (Bronfenbrenner, 1979). Therefore, like their typically and atypically developing peers, the immediate environment may play a direct and salient role in the development of mental health difficulties, within young people rDLD.

Additionally, factors drawn from the individual, rather than the wider environment, were likely to play a direct role in the development of mental health difficulties, in young people diagnosed with DLD. This finding further supports the assumptions by the Ecological perspective, especially the assumptions drawn from the later editions of the Ecological System's Theory (Bronfenbrenner, 1979; Bronfenbrenner, 1995). This includes the bioecological model, and later the Process-Person-Context-Time model. The Ecological perspective does assume that the characteristics of the individual interact with their complex environment. Their characteristics will influence the interaction between themselves and their immediate environment. Thus, these characteristics play an important role in the individuals or young person's development. This includes the development of mental health difficulties. Hence, it is unsurprising that both the immediate environment, as well as the individual level factors, seem salient when understanding risk and resilience for mental health difficulties in young people diagnosed with DLD. Yet, this is the first project to determine that, similar to their typically and atypically developing peers, the immediate environment, as well as individual-level factors, should be the focus when understanding mental health and DLD, compared to wider environmental factors.

The interpretations of the current findings, about the Ecological perspective (Bronfenbrenner, 1979; Bronfenbrenner, 1995) may change considering future evidence. It is unknown why second-hand smoke predicted greater severity of externalising problems at age fourteen, in those rDLD. It was stated that second-hand smoke could be a predictor for low socioeconomic status (SES) (Crittenden et al., 2007; Tsourtos and O'Dwyer,

2008). Low SES could be indicated through low income, single parenthood, and the main caregiver's level of education, for example. Yet, it may be that second-hand smoke is associated with neurological disruptions, which impacts the emotional, behaviour, and social functioning of young people diagnosed with DLD (Pagani, 2014; Yolton et al., 2014; Abdel Hamed et al., 2019). Together, it cannot be stated whether second-hand smoke is a proxy of low SES, in the context of the present project. Therefore, considering the interpretations that can be drawn from the present project, there are no known factors within the wider environment, that predict mental health difficulties in young people rDLD.

As indicated previously, there may be a need to incorporate the Developmental perspective when understanding risk and resilience for mental health difficulties, in young people diagnosed with DLD. The findings from the current project found that not all factors within the immediate environment or the individual may be equally important for the development of mental health difficulties, in young people rDLD. Parent-child conflict (at age three) was a significant early risk factor for mental health difficulties, yet, parent-child closeness (at age three) was not. Moreover, better problem-solving ability (at age seven) was identified to be a promotive factor for mental health difficulties, yet, self-esteem was not. These findings might suggest that some factors need to be considered more than others, when understanding risk and resilience for mental health difficulties, in young people diagnosed with DLD.

The ideas proposed under the Developmental perspective may provide valuable insight into why certain factors may be more important than others. As argued previously, the developmental disruptions experienced by young people diagnosed with DLD may explain parent-child conflict (at age three) was a significant early risk factor for mental health difficulties. Particularly, young people diagnosed with DLD are likely to experience difficulties in conflict detection and resolution (Marton et al., 2005). Thus, when parent-child conflict occurs, the young person may not have the ability to manage social interaction. The difficulty in managing conflict may lead to distress within young people rDLD. Parent-child closeness may not be directly

affected by social cognition in the same manner as to conflict. Therefore, due to the developmental context of the young person rDLD, parent-child conflict is more important to consider than closeness.

Furthermore, the present project does demonstrate that developmental differences within young people rDLD may, in part, explain the individual differences in mental health difficulties at age fourteen. During the present project, it was concluded that, as a group, the sample (young people rDLD) were more likely to experience difficulties in (spatial) problem-solving ability, compared to the general population, as well as, their typically developing peers. This means that, as a group, young people rDLD were likely to experience disruptions in their (spatial) problem-solving ability, which could be associated with their language difficulty. Yet, within young people rDLD, better problem-solving ability was predictive of less severe mental health difficulties and externalising problems (chapter 10). The findings suggest that developmental differences could explain why some young people rDLD experience better outcomes than others rDLD. Therefore, considering ideas proposed within the Developmental perspective (Masten, 2011; 2014; 2018), developmental differences might explain why certain individual factors are more important than others.

However, the findings from the current project cannot reflect the ideas proposed by the developmental perspective (Masten, 2011; 2014; 2018) beyond (spatial) problem-solving ability. Particularly, (spatial) problem-solving ability at age seven was the only factor investigated during the first and final investigation (chapters 7 and 10). Yet, there are other potential developmental disruptions associated with a diagnosis of DLD (see chapter 2). Associated disruptions in other developmental areas include, but are not limited to, social cognition, working memory, and executive functioning. Additionally, this includes conflict resolution strategies. These cognitions were not investigated in the current project, because, the MCS did not collect, nor were there suitable data on these.

Regardless, the notion that the developmental context needs to be considered when understanding mental health and DLD is not new

(Bakopoulou, 2010; van den Bedem, 2020). Recent evidence from van den Bedem (2018; 2020) might provide valuable insights into why certain individual differences may be more important, than others. Firstly, the ideas by van den Bedem (2018; 2020) argues that the developmental context needs to be considered, within young people rDLD. Young people diagnosed with DLD may lack internal resources, such as emotional regulation (van den Bedem et al., 2018; van den Bedem, 2020), to manage the distress that stems from the adverse social interaction. Consequently, this may influence the development of mental health difficulties, within young people diagnosed with DLD. This has been supported by St Clair et al., (2019). Therefore, van den Bedem (2018; 2020) highlights that young people's developmental context should be considered when discussing DLD and mental health. The findings from the current project, especially around problem-solving ability, support this recommendation.

Together, the interpretations of the findings suggest that the immediate environment, as well as individual level factors, should be the focus when understanding mental health and DLD. However, not all factors drawn from these environmental systems may play a role in the development of positive or adverse mental health in early adolescence, in those rDLD. The developmental context of the young person rDLD might explain why certain factors are more important than others when understanding risk and resilience for mental health difficulties. Also, developmental differences within young people rDLD may explain the individual differences in mental health outcomes at age fourteen. Hence, understanding risk and resilience for mental health difficulties, in young people diagnosed with DLD, should consider the young person's developmental context. Therefore, the present project provides valuable insights into this dynamic process, in young people diagnosed, through an Ecological and Development perspective. Whilst the incorporation of the Developmental perspective has been somewhat suggested, the current project highlights the need to include the Ecological perspective, as well, when discussing risk and resilience for mental health difficulties, within young people diagnosed with DLD.

11.3.4 *The dynamic process of risk and resilience for mental health difficulties, within young people rDLD*

When understanding or discussing risk and resilience for mental health difficulties, within young people rDLD, the notion of probability should be considered. The findings revealed that early risk factors for mental health difficulties operated in a linear cumulative fashion. This was also revealed for internalising and externalising problems. This means that, as the number of exposed risk factors increases, the severity of mental health difficulties may also increase. Particularly, the severity of symptoms for anxiety, depression, conduct disorder, and hyperactivity and inattention, increase with each exposed risk factor. Hence, these findings suggest that the severity of mental health difficulties, in early adolescence, could be predicted by the number of early factors. Therefore, within young people rDLD, the probability of severe mental health difficulties increases with every early risk exposure.

Furthermore, school-age promotive, as oppose to protective, factors were identified. Promotive factors encourage the likelihood of resilience for mental health difficulties by promoting positive mental health development. Hence, these factors are not likely to interact with early risk factors. Instead, promotive factors may compensate for risk exposure (Zimmerman et al., 2013). In return, promotive factors may reduce the probability of severe mental health outcomes, within young people rDLD. According to Werner (1982), if the number of promotive factors is equal to or beyond the number of risk factors, the process of resilience, for mental health difficulties, is likely to occur. Therefore, there may be a need to understand the number of risk and promotive factors when predicting the severity of mental health difficulties, in young people diagnosed with DLD.

11.4 The possible implications for supporting young people rDLD who are at risk of mental health difficulties in early adolescence

The findings from the current project highlighted factors that predicted the severity of mental health difficulties at age fourteen, in those rDLD. Particularly, the findings from the project identified factors in early childhood, and school-age years, that could be included in future intervention-based studies. Early childhood refers to factors up to age five, otherwise known in the current project as early risk factors. School-age factors, which promotive factors were identified, consisting of the ages between seven and fourteen. Reducing the likelihood of risk of mental health difficulties at age fourteen might be achieved by reducing the level of parent-child conflict in early childhood. Additionally, school-age factors could be introduced to compensate risk exposure and encourage resilience for mental health difficulties in early adolescence. Such school-age factors include higher displays of prosocial behaviour, better problem-solving ability, and lastly, having fewer sleep disruptions. Using this knowledge, future intervention-based studies could incorporate these factors to determine how best to support young people diagnosed with DLD, who are at risk of developing mental health difficulties.

11.4.1 *Early childhood*

High levels of parent-child conflict, amongst young people rDLD, was revealed to be an early risk factor for mental health difficulties at age fourteen. It is also an early risk factor for internalising and externalising problems. Considering these findings, interventions could include reducing the level of parent-child conflict. Reducing the level of parent-child conflict may also reduce risk exposure for developing mental health difficulties. In return, this may decrease the likelihood of adverse mental health outcomes, within young people rDLD. This includes reducing the likelihood of severe symptoms of depression, anxiety, conduct disorder, and hyperactivity and inattention.

Interventions that reduce parent-child conflict, within young people diagnosed with DLD, in early childhood, may reduce risk exposure for mental health difficulties in early adolescence. There are possible interventions adopted within professional practice that aim to reduce parent-child conflict. These include, but are not limited to, the Family Check-Up and Incredible Years School Age (Advanced) interventions (Early Intervention Foundation, Nodate). Thus, there are established and standardised interventions that aim to reduce conflict within the family already adopted within professional practice. Therefore, such interventions could be adapted and introduced to families of young people rDLD, who experience high levels of parent-child conflict.

11.4.2 *School years*

During the school-age years, three promotive factors for mental health difficulties at age fourteen were identified, in young people rDLD. These include high levels of prosocial behaviour, better problem-solving ability, and lack of sleep disruption. These factors could be encouraged throughout the school years to promote positive mental health development. Moreover, promoting such factors may compensate risk exposure in early childhood. In doing so, these factors may increase the likelihood of resilience for mental health difficulties in early adolescence. Yet, due to their differing natures, encouragement might require different techniques.

11.4.2.1 **Prosocial behaviour.**

A higher display of prosocial behaviour is likely to compensate for early risk exposure for mental health difficulties in early adolescence. Prosocial behaviour was revealed to have a similar predictive relationship to internalising and externalising problems. Interventions that promote the likelihood of prosocial behaviour may, therefore, encourage positive mental health development. Hence, such interventions may reduce the likelihood of severe symptoms of depression, anxiety, conduct disorder, and hyperactivity and inattention.

Interventions that promote the likelihood of prosocial behaviour could include skill-building exercises, within young people diagnosed with DLD. Particularly, interventions could focus on enhancing their language and cognitive abilities. It is known that greater language and cognitive ability, may improve prosocial behaviour (Hartas, 2012; Girard et al., 2017; Conte et al., 2018). Also, it is known that social cognition plays an important role in prosocial behaviour (Eisenberg et al., 1997). Thus, enhancing social cognition, alongside language ability, may provide young people rDLD with the tools to engage in prosocial behaviours. In return, engagement in prosocial behaviours promotes positive mental health development.

Additionally, schools could encourage prosocial behaviours amongst their students: as such, a young person is already an interacting participant in a social and responsive environment. Thus, there may be social barriers for the young person, diagnosed with DLD, to engage in prosocial behaviours. These include being a victim of bullying, engaging with non-prosocial peers, or experiencing an adverse response to their prosocial behaviour. These barriers may discourage young people diagnosed with DLD from engaging in prosocial behaviours. Promoting prosocial behaviours in schools, by teachers, may reduce these social barriers. Promoting school-wide prosocial behaviours may include improving the school climate; teaching anti-bullying messages; encouraging and supervising positive and cooperative play. Promoting prosocial behaviours in schools may increase the likelihood that this positive behaviour occurs among young people diagnosed with DLD. Therefore, changing the wider environment, in schools, may impact the direct interaction between young people diagnosed with DLD and their peers. In return, this may promote positive mental health development within this group.

11.4.2.2 **Problem-solving ability.** Higher, or better, problem-solving ability is likely to compensate for early risk exposure for mental health difficulties in early adolescence. Problem-solving ability was revealed to have a similar predictive relationship to externalising problems in early

adolescence. Interventions that promote better problem-solving ability may, therefore, encourage positive mental health development. Hence, such interventions may reduce the likelihood of severe symptoms of depression, anxiety, conduct disorder, and hyperactivity, and inattention. However, problem-solving ability may better compensate risk exposure for externalising problems, compared to internalising problems. This means that improving problem-solving ability might more likely reduce the likelihood of severe symptoms of conduct disorder, and hyperactivity and inattention, compared to depression and anxiety.

Improvement of problem-solving ability could be encouraged through skill-building exercises. Improvement of such skills in school-age years may promote positive mental health in young people diagnosed with DLD, through compensating early risk exposure. However, practitioners administering such exercises should consider the young person's language difficulties. Also, the practitioner should acknowledge any potential additional cognitive difficulties experienced by the young person. As stated demonstrated in the present project, young people diagnosed with DLD may also experience cognitive and literacy difficulties. The effectiveness of skill-building exercises may be affected by the young person’s prior ability. Regardless, future intervention-based investigations for mental health difficulties, within young people diagnosed with DLD, could consider skill-building exercises to improve their problem-solving ability.

11.4.2.3 **Sleep disruptions.** Experiencing fewer sleep disruptions is likely to compensate for early risk exposure for mental health difficulties in early adolescence. Fewer sleep disruptions were revealed to have a similar predictive relationship to externalising problems. Interventions could involve promoting fewer sleep disruptions among young people diagnosed with DLD. In return, this might encourage resilience for mental health difficulties in early adolescence. Hence, such interventions may reduce the likelihood of severe symptoms of depression, anxiety, conduct disorder, and hyperactivity, and inattention. However, fewer sleep disruptions may better compensate for

early risk exposure for externalising problems, compared to internalising problems. This means that interventions that reduce sleep disruptions might more likely reduce the likelihood of severe symptoms of conduct disorder, and hyperactivity and inattention, compared to depression and anxiety. Regardless, future intervention-based investigations for mental health difficulties, in young people rDLD, could include promoting fewer disruptions when sleeping.

11.5 Strengths and limitations of the current project

11.5.1 *Millennium Cohort Study*

The methodology of the current project consisted of a secondary analysis of the data collected by the Millennium Cohort Study (MCS). Due to this, there was a reliance that the data collected by the MCS would yield suitable and appropriate data. The data collected from the MCS did allow investigations of risk and resilience, for mental health difficulties at age fourteen, within those rDLD. However, there are limitations in the data collected by the MCS that may have negatively impacted the current project. This includes limitations in selecting a sample of DLD and selecting factors to analyse risk and resilience for mental health difficulties.

Firstly, an appropriate sample for the current project was selected to investigate risk and resilience for mental health difficulties, in young people diagnosed with DLD. However, the available data on the cohort member's language development collected by the MCS is limited. This is reflected in the inability to select cases of cohort members likely to be diagnosed with DLD, as oppose to rDLD, using the data collected by the MCS. Other language components, which may have been useful, might include receptive language abilities, syntax, and pragmatic use. Through understanding different components of language a profile or a full language description of the sample selected could be obtained. This was not possible with the data collected by the MCS. Future cohorts' studies should include multiple measures that assess a range of language components; allowing insight into

the cohort member's general language development, rather than a select few components.

Additionally, the number of standardised language measures that were administered by the MCS over time, was limited. In the MCS, the only standardised language measure that is administered across time points was the Naming Vocabulary subtest. Despite this, it was administered only across two time points: three and five years old. Lexical retrieval ability beyond the age of five is unknown. It could have been beneficial for the current project if, at least, the Naming Vocabulary subtest, or another (noun) lexical retrieval assessment, was administered beyond the age of five.

Secondly, in the MCS there were no suitable measures to indicate potential factors such as self-efficacy, which is likely to promote resilience for mental health difficulties in those diagnosed with DLD (see chapter 5). Other potential factors include, but are not limited to, parental and teacher support, parenting styles, as well as, mothers who are stressed during pregnancy. Hence, it is unknown whether these factors play a role in the development of mental health difficulties in young people rDLD.

Furthermore, the data collected from emotional regulation was not used within the current project. As argued within the literature review (see chapter 5), there is recent evidence to suggest that emotional regulation plays an important role in the development of emotional problems in young people diagnosed with DLD (van den Bedem et al., 2018; St Clair et al., 2019; van den Bedem, 2020). Particularly, emotional dysregulation could be an important early risk factor for emotional problems (St Clair et al., 2019). Yet, within the current project, the items for emotional regulation revealed to have poor internal consistency. This means that the data collected from these items are not likely to map onto one construct, such as emotional regulation. Thus, emotional dysregulation could not be investigated as an early risk factor for mental health difficulties, within young people rDLD.

However, preliminary evidence in the previous literature suggests that emotional regulation may not be related to emotional problems within the sample selected for the current project. St Clair et al., (2019) found that

emotional dysregulation was not associated with greater emotional problems, within children selected as rDLD through the scores from the Naming Vocabulary Subtest. The findings by St Clair et al., suggest that within children likely to experience (noun) lexical retrieval with no known biomedical cause (rDLD), emotional regulation was not an early risk factor for emotional problems. Hence, it cannot be assumed that emotional regulation would have been an early risk factor for mental health difficulties, within the sample selected for the current project.

Lastly, in the resilience investigation, in the current project, nine possible factors (out of fifteen) were measured through self-reports completed by those rDLD. Yet, researchers should be aware of the limitations of self-reports completed by young people diagnosed with DLD, or rDLD. The language difficulties experienced by young people rDLD could have led to measurement error. Self-reports by nature use language, and thus, a young person rDLD may experience difficulties in accurately answering the items. Also, due to language difficulties, there may have been feelings of anxiety. These factors may have affected the accuracy of the results. However, self-reports are administered within previous investigations into young people diagnosed with DLD. Therefore, due to the developmental context of the group, caution is needed when interpreting the results. Yet, this limitation is a generic notion of caution throughout research in the area of DLD, rather than specific to the current investigation.

Despite its limitations, there are major advantages to analysing the data collected by the MCS. Firstly, the findings that are drawn from analysing the data collected by the MCS may be generalised to the wider UK population. One of the aims of the MCS was to ensure that all ethnic minority groups were represented. Ethnic minority groups refer to people of a race or nationally in which the numbers of the population are smaller than the majority. In the United Kingdom (UK), white British Citizens are in the ethnic majority group (approximately 80%). Ethnic minority groups include black British citizens (3%) and Indians (2.3%). As the data collection performed within the MCS aimed to be representative of all aspects of the UK, this

reduces the likelihood of bias within the data. Therefore, the findings drawn from the current project is likely to be representative of the UK population.

On the contrary, biases could still be apparent within the MCS, as well as the data investigated in the current project. Despite the drive to collect a representative UK sample for the MCS, dropouts were apparent across each survey. Drop-outs could have led to unknown biases with MCS cohort sample, and therefore, might have impacted the findings of the current project. If those who were male were more likely to drop-out of the MCS, then this could have impacted the gender effects revealed in the current project. Underrepresentation of males could have led to non-significant group differences in externalising scores. Also, underrepresentation of males could have led to the exaggeration of gender effects found for internalising scores; whereby, females were significantly more likely to report higher internalising problems. Therefore, future researchers should take note that unknown biases, due to dropouts across the surveys during the MCS, could have affected the results in the current project.

Additionally, as revealed during the investigations in the current project, there may be some biases present within the sample selected. This includes biases in the gender of the sample. In the current project, it was revealed that for certain statistical models, low income and being male was associated with missing data. This means that the findings from the current project may not always be representative of all young people rDLD. Particularly, those who live in households with lower income, or are males, may be under-represented. Therefore, to some degree, biases in the data collected by the MCS may still be present in the current project.

Another strength of the project is the vast amount of available data collected by the MCS. Multiple factors that potentially promoted risk or resilience for mental health difficulties could be investigated in unison. Data consisted of factors from the immediate (parent-child conflict) and the wider environment (low income) that could be investigated together. Also, there was data around individual factors, such as problem-solving ability and being female. Thus, many factors could be investigated at once to determine which

factors play a salient role in the development of mental health difficulties, within young people rDLD. Therefore, the MCS enabled researchers to build upon the current literature through an Ecological perspective.

Lastly, the data collected by the MCS allowed for a longitudinal investigation of mental health and young people rDLD. This included information throughout the different developmental stages, from birth to early adolescence. The data collected from the MCS obtained information concerning prenatal conditions, early childhood to adolescence. It would not have been feasible, nor time-efficient for the method of the current project to be anything other than analysing secondary data. Collecting the data, through a survey-based design similar to the MCS, might have taken at least fourteen years. Also, the data collected, if it were performed by the researcher, would have not been as vast as the data collected by the MCS. Therefore, analysing data collected by the MCS was deemed a better alternative to primary data collection.

Taken together, despite its limitations, the data collected by the MCS enabled an in-depth analysis of risk and resilience for mental health difficulties in young people rDLD. The data collected by the MCS allowed for a longitudinal investigation, whereby a Developmental perspective could be somewhat understood. Also, due to the vast amount of data available, an Ecological theoretical framework was able to be adopted in the present project.

11.5.2 *Mental health, as measured by parent-reports*

There is a strength to using parent-reports of mental health difficulties in the current project. As explained previously, self-reports may not be appropriate for young people who experience language difficulties. This limitation could extend to self-reported mental health measures. As argued by van den Bedem (2020), young people diagnosed with DLD are likely to experience difficulties in understanding or using emotive language. Emotive language was used within the SDQ. Thus, the reliability or validity of self-

reports of young people likely to experience language difficulties is questioned. Therefore, there is an advantage in the current project through analysing parent-reports of the SDQ.

However, parent-reports may not be devoid of such issues, as the biological parent may experience language difficulties themselves. As explained by Bishop et al., (2006), there is likely to be high heritability with DLD. This means that young people diagnosed with DLD, are more likely to have parents who also experience language difficulties. Thus, the data drawn from the parent reported SDQ may be susceptible to measurement error.

Furthermore, beyond language difficulties, there may be other factors that influence the accuracy of the main caregiver's SDQ reports. Low socioeconomic status, such as low income and minimum education, may produce measurement error. Additionally, parental stress can also increase the likelihood of measurement error. This is important to consider as, as stated, the main caregiver's with young people diagnosed with disabilities (including DLD) experience greater stress, compared to caregivers of typically developing young people. The demonstrated stress may be due to the additional support need for young people diagnosed with DLD, as well as the concerns for their future. Hence, the stress experienced by the main caregivers of those rDLD may impact the accuracy of the parent-report SDQ. Therefore, during the collection of the MCS, measurement error might have impacted the accuracy of the parent-report SDQ data.

11.5.3 *The sample selected to reflect young people diagnosed with DLD.*

There is a limitation of the sample selected through the data collected by the MCS. The findings from the current project cannot be generalised to all young people diagnosed with DLD. It was not possible to identify young people diagnosed with DLD, as the MCS did not assess multiple components of language. Instead, young people at risk of DLD were selected. Thus, it is uncertain whether the young people within the sample selected are diagnosed with DLD. Additionally, there may be young people not included in

the sample who are diagnosed with DLD. Together, this means that the discussions drawn from these findings may be specific to young people who are rDLD, or young people diagnosed with DLD who experience (noun) lexical retrieval difficulties. Therefore, it is uncertain if the findings would differ if a clinical and, or heterogeneous sample of DLD was analysed. Also, it is uncertain if findings from the current project would differ whereby different language difficulties were analysed.

However, there is a major strength to the sample selected to reflect young people diagnosed with DLD, in the current project. The language difficulties in the selected sample are clearly described. Particularly, the sample selected is likely to experience (noun) lexical retrieval at age five. Compared to previous DLD investigations analysing the data collected by the MCS, the types of difficulties experienced by the selected sample is clearer. Compared to previous research selecting young people rDLD, parent reports of 'language use' was not used for the inclusion of the current project's sample. The reason for not adopting parent reports is because, of the lack of clarity in what the informal reports assess. 'Language use' might be vague and too broad. Although adopting informal reports upon 'language use' may increase the strength of the claim that a heterogeneous sample is identified, the language description of the group becomes unclear. Therefore, compared to previous DLD literature analysing the data collected by the MCS, the sample selected for the current project is clearer.

A clear description of the language difficulties experienced, during DLD investigations, is advantageous. As discussed in chapter 2, Novogrodsky (2015) recommended that researchers should be focusing on the language difficulties experienced within the group. In doing so, it can help future researchers in understanding DLD, despite the complexity of its heterogeneous nature. This is agreed upon by Bishop et al., whereby, the focus should be upon the language difficulties should be clearly described, rather than the strive to gain a 'categorical nosology' (Bishop et al., 2017: 1077). Therefore, when understanding DLD, researchers should detail and describe the language difficulties experienced in the group; this was achieved in the current project.

Additionally, as explained in chapter 3, it is also known that specific language difficulties may likely be associated with certain mental health difficulties (Snowling et al., 2006; van Daal et al., 2007; Mok et al., 2014). This means that varying language difficulties are likely to portray differing developmental trajectories of mental health, within young people diagnosed with DLD. Researchers should be aware of the complexity of mental health and DLD, due to the heterogeneous nature of the group. This was considered in the current project. Therefore, the findings are drawn from clear language descriptions, of young people rDLD, which may be advantageous for future researchers; especially, for future intervention-based investigations (see chapter 2).

Taken together, the sample selected within the current project was deemed suitable for reflecting young people diagnosed with DLD. Particularly, the sample was likely to reflect young people at risk of being diagnosed with DLD, based upon their (noun) lexical retrieval difficulties. Yet, due to the limitations of the sample, the findings from the current project cannot be generalised to all young people diagnosed with DLD. Moreover, there may be young people selected in the project's sample who are not diagnosed with DLD. However, due to the complexity of the heterogeneous nature of DLD, as well as DLD and mental health, a clear language description was favourable. The current project has likely provided future researchers with valuable and in-depth insight into the relationship between the language difficulties experienced within those rDLD, and their development of mental health difficulties.

11.5.4 *Within-group design*

A major strength of the current project is the adoption of a within-group design to investigate risk and resilience for mental health difficulties, in young people rDLD. As stated by Luthar (2000: online)

'…given a particular at-risk condition, there must be concerted attention to factors that are salient in that particular life context, those that affect a relatively large number of people in that group.'

Though investigating why some young people experienced greater or less severe mental health difficulties, within a high-risk group, the findings may lead to better suggestions for interventions. As explained in chapter 3, research around DLD and mental health generally adopt a group-comparison design to investigate the development of mental health difficulties in DLD. Group comparisons commonly included a group of typically developing peers or young people diagnosed with Autism. Yet, the findings from group-comparison design may not lead to effective and tailorable interventions to support or prevent mental health difficulties within young people diagnosed with DLD. Instead, as explained by Luthar et al., (2006), within-group designs are likely to achieve the latter. Understanding what creates the individual difference for mental health difficulties, within the group, might enable researchers to pinpoint areas for intervention. Therefore, due to the design of the current project, an initial in-depth understanding of risk and resilience for mental health difficulties, within young people rDLD, was achieved.

11.6 Recommendations for future research

Firstly, it is unknown if the findings from the current project would be different if a clinical sample of DLD was analysed. As stated, the sample were selected at age five as those who are rDLD. This is based upon one standardised language measures, which was available in the MCS. Hence, as stated previously, there may be young people in the selected sample who may not be diagnosed with DLD. Future research should determine if the factors that likely to promote risk or resilience for mental health difficulties, in young people rDLD, are the same as those diagnosed with DLD. Doing so could build upon the current discussions into how best to support these young people; especially, those who may be at high risk of mental health difficulties.

Additionally, it is currently unknown if the findings from the current project would be different if a heterogeneous sample of DLD were analysed. Also, it is unknown if the findings from a sample with different known language difficulties would differ. As stated, the sample of young people rDLD were selected, because they were likely to experience (noun) lexical retrieval difficulties at age five. There may be young people diagnosed with DLD, in the MCS, that did not experience (noun) lexical retrieval difficulties at age five. Other language difficulties may include phonology, syntax, and grammar. Additionally, young people diagnosed with DLD are likely to experience a wide range of language difficulties. This means that there may be young people diagnosed with DLD, in the MCS, who experience a combination of language difficulties. Together, it is likely that there are young people diagnosed with DLD whose language profile does not match the sample selected for the current project. Therefore, it is unknown if the findings from the current project could be generalised to all young people diagnosed with DLD. Future research should identify what factors influence, or predict, the severity of mental health difficulties, across language profiles of young people diagnosed with DLD.

Secondly, researchers should continue to investigate the role of relationships, between DLD and mental health. The reason for this suggestion is that, in the current project, not all forms of relationships predicted mental health difficulties, internalising and externalising problems, in young people rDLD. Future research should investigate which aspects of relationships are salient; and why. Other aspects of relationships include, but are not limited to, supportive, attentive, and secure. Future research should also include different relationships, such as teacher and sibling relationships which might impact the development of mental health difficulties, within young people diagnosed with DLD. In doing so, discussions can focus upon which aspects, or types, of relationships interventions for mental health difficulties, in young people diagnosed with DLD, should focus upon.

Thirdly, future research should investigate how the developmental context of young people rDLD impacts their positive or adverse mental health development. The findings from the current project support the ideas

demonstrated by previous evidence around mental health and DLD. This includes evidence by Bakoloupou (2010) and van den Bedem (2020). Particularly, the current project demonstrates that problem-solving ability, as a cognitive difficulty associated with young people rDLD, was likely to lead to individual differences in mental health difficulties in early adolescences. Thus, the wider cognitive development of young people diagnosed, or at risk of, DLD, should be considered when understanding mental health development. Yet, more research is needed to expand upon these findings. Future research should investigate how other developmental disruptions, such as social cognition, in young people rDLD, or diagnosed with DLD, influences the individual differences in mental health outcomes.

Furthermore, future research and discussions into mental health and DLD could consider understanding or incorporating the Ecological perspective (as well as the Developmental perspective). There is consensus amongst theorists (Garmezy, 1991; Masten, 2014; Masten and Barnes, 2018; Rutter, 2012; Werner, 1982), that when understanding the development of mental health, researchers should understand the child's developmental process within their environmental context. This is agreed by Luthar (2000); whereby the young person is developing and interacting in a responsive social world. The findings from the current project suggest that young people diagnosed with DLD may not be the exception.

Lastly, there are many factors not included in the current project. Specifically, there are possible factors that promote risk and resilience that were not analysed. Examples of factors that were not investigated include, but are not limited to, stress during pregnancy; overcrowding in the household; main caregivers with an addiction; being a victim of bullying; a good school climate; and high self-efficacy. It is uncertain if the inclusion of such factors changes the findings in the current project. Therefore, future research should investigate whether these describe factors predict mental health difficulties at age fourteen, in those rDLD, or diagnosed with DLD. Moreover, whereby additional factors have been identified, investigations should determine if the early risk factors remain to operate in a linear cumulative fashion.

12 Conclusion

Considering the gaps in the previous literature, the overarching aim of the project was to provide a deeper insight into risk and resilience for mental health difficulties, in young people who were at risk of DLD. Particularly, the objectives of the project were:

1. To provide a foundation for the current project.
    a. To determine if young people who were selected as rDLD experience worse mental health difficulties, internalising and externalising problems during adolescence, compared to the general population and typically developing peers.
    b. To determine if young people who were selected as rDLD project experience worse cognitive and literacy difficulties, compared to the general population and typically developing peers.
2. To identify early risk factors (up to age five) for mental health difficulties, internalising and externalising problems (at age fourteen), in young people rDLD.
3. To investigate whether the identified early risk factors (up to age five) for mental health difficulties, internalising and externalising problems (at age fourteen), operate in a cumulative fashion, in young people rDLD.
4. To identify school-age factors (between ages seven and fourteen) that encourages the process of resilience for mental health difficulties at age fourteen, in young people rDLD.

Through analysing the data collected by the MCS, these were achieved. The findings from the first investigation informed the project as it moves forwards. It was revealed that the young people rDLD were more likely to experience worse mental health difficulties, internal sing and externalising problems, compared to typically developing peers and the general population. Throughout the current project mental health difficulties, as well as internalising and externalising problems, was analysed through the data

collected by the Strengths and Difficulties Questionnaire. In addition to this, and similar to young people diagnosed with DLD, young people rDLD were likely to experience cascading disruptions to other developmental processes. Young people rDLD were likely to experience difficulties with (one word) reading ability at age seven; non-verbal reasoning at age five; and, spatial problem-solving at five and seven years of age.

Secondly, early risk factors (up to age five, and collected by MCS) for mental health difficulties, internalising and externalising problems at age fourteen, in young people rDLD were identified. It was revealed during the current project that, for general mental health difficulties, the early risk factors were high levels of parent-child conflict and harsh discipline practices. For internalising problems, the early risk factors were high levels of parent-child conflict and being female. For externalising problems, the early risk factors were high levels of parent-child conflict, harsh discipline practice, and exposure to second-hand smoke.

Thirdly, it was revealed that the identified early risk factors for mental health difficulties, in those rDLD, are likely to operate cumulatively. This means that as the number of exposed risks (up to age five) increased, there was a greater severity of mental health difficulties at age fourteen. It was also revealed that the early risk factors for internalising and externalising problems also operated cumulatively.

Lastly, school-age factors (between ages seven and fourteen, and available in the MCS) that encourage resilience for mental health difficulties at age fourteen, in those rDLD, were identified. It was revealed that higher displays of prosocial behaviour, better problem-solving ability, and fewer sleep disruptions significantly predicted less severe general mental health difficulties at age fourteen. These factors also predicted less severe externalising problems at age fourteen. Lastly, high prosocial behaviour predicted less severe internalising problems, at age fourteen. The findings also revealed that these factors may increase the likelihood of resilience for mental health difficulties, through compensating the early risk exposure.

The findings from the current project may have major implications in reflection of the recent pandemic (COVID-19). There is a growing concern that the mental health of young people within the UK has declined during the pandemic (Cowie & Myers, 2021; de Figueiredo et al., 2021; Jones, Mitra & Bhuiyan, 2021; Magson et al., 2021). Moreover, there is a growing concern for young people who were at risk of mental health difficulties before the pandemic, as the risk may have significantly increased for these populations (Jones, Mitra & Bhuiyan, 2021). There is a need to identify and support these individuals who are at further risk of developing severe and persisting mental health difficulties considering the recent pandemic. Most of the responsibility to tackle this issue has, somewhat, been placed upon schools (Outhwaite & Guilliford, 2020). This is despite the concern for the significant rise in emotional and behavioural challenges exhibited by children during the re-opening of schools (Lee, 2020). Regardless, all professionals who work with children and young people should be made aware of how to identify possible young people who would benefit from school-age intervention to reduce mental health difficulties, during the re-opening of schools.

The findings from the current project have identified important factors that should be considered when discussing the mental health development in young people diagnosed with DLD, during and after the recent pandemic. A key factor is parent-child conflict, which could have increased because of lockdown. Another key factor is prosocial behaviour, which, due to school closure, these young people have not had the opportunities to engage in, and with such behaviours with peers. This means that young people diagnosed with DLD have not been able to engage in behaviours that might compensate for the early risk exposure for mental health difficulties. The findings of the current project have highlighted key factors, specifically prosocial behaviour, that ought to be considered when designing and investigating school-based interventions to support this at-risk population, in reflection of the recent pandemic.

In conclusion, the present thesis has provided an original contribution to our current understanding of risk and resilience for mental health difficulties in young people diagnosed with DLD. Previously unconsidered factors have

been revealed to play a significant role in the development of mental health difficulties in this population. Also, the findings from the current project have provided insight into how factors that influence risk and resilience for mental health difficulties may operate. Future research should acknowledge the notion of probability when understanding risk and resilience for mental health difficulties, in young people diagnosed with DLD. Particularly, it is likely that the number of early risk factors predicts the severity of mental health difficulties in early adolescence. Yet, school-age factors may compensate for the early risk exposure by encouraging positive mental health development, in young people diagnosed with DLD. Before the current project, it was difficult to make predictions about how early risk and school-age factors operate together to encourage risk and resilience for mental health difficulties in young people diagnosed with DLD. Together, the findings drawn from this project may have provided a deeper insight for future researchers and professionals in how best to support young people diagnosed with DLD, who are at risk of developing mental health difficulties in early adolescence.

13 Appendices

Appendix A: *Measures not selected within the current project***.**

Three reviews were performed during the methodological stage of the thesis. These were performed to ensure that suitable and appropriate measures, that were administered by the MCS, were adopted in the current thesis. This appendix provides, in part, that review. Firstly, a review was performed to determine the most appropriate mental health measures adopted in the Millennium Cohort Study (MCS). This review informed how mental health difficulties were analysed in the investigations in the present project. Secondly, a review was also performed evaluating the data collected by the MCS that could indicate potential factors encouraging risk or resilience for mental health difficulties.

Lastly, a review was performed to determine how previous DLD investigations, analysing the DLD selected samples that reflect young people diagnosed with DLD. Within this review, it was discussed whether the same inclusion and exclusion criterion could be adopted. It was revealed that it would not be appropriate to adopt the same criterion in the current project. Thus, the language measures administered in the MCS that could be used to select young people diagnosed with DLD was then reviewed. A conclusion was drawn, then the selection criterion adopted for the current project is stated within the main body of the thesis. This overarching review, described in the present paragraph, will be under ‘participants’ to be consistent with the main body of the thesis.

Materials: Mental health and the MCS

Two mental health measures were adopted in the MCS. These are the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 2001) and the short form Moods and Feelings Questionnaire (MFQ). These were reviewed to determine whether they are suitable and appropriate measures for mental

health difficulties, in young people reflecting a diagnosis of DLD. The following provides the review of the short form Moods and Feelings Questionnaire (MFQ).

The Mood and feelings questionnaire (short form; SMFQ) (Costello and Angold, 1988) is a self-report measure that is administered at age fourteen. The SMFQ was given to the adolescent in a digital form: a tablet. The interviewers, who gave the digital questionnaires to the adolescents to complete, noted whether they completed the SMFQ in the same or different room to the interviewer. As for the design, the SMFQ consists firstly of thirteen items, including: 'I felt lonely', 'I felt miserable or unhappy' and 'I hated myself'. The responder was instructed to answer whether the item is 'Not true', 'Sometimes' and 'True' while thinking about the past two weeks. Following this, an additional closed question, 'yes' or 'no' was presented asking whether the adolescent had engaged in any self-harming behaviours within the past year.

The original 'Mood and Feelings Questionnaire' (MFQ) (Angold and Costello, 1987) was designed to identify depressive disorders, such as Major Depressive Disorder (MDD), in young people. The short form of the MFQ (SMFQ) has the same purpose as the MFQ yet, it was specifically designed to be used for epidemiological studies (Angold et al., 1995). Sharp, Goodyer, and Croudace (2006) explain that the items of the MFQ, and thus the SMFQ, were designed to measure the symptoms for depressive disorders, as described by the DSM. Items indicating negative cognitions that were symptomatic of depressive disorders are also included, such as 'I found it hard to think…' and 'I did everything wrong'.

Some research does not support the internal validity of the SMFQ self-reports (Thapar and McGuffin, 1998). Thaper and McGuffin found that the self-report SMFQ was unable to determine between those who were diagnosed with depressive disorders and those who were diagnosed with other disorders, as identified by diagnostic interviews. Thus, Thaper and McGuffin (1998) concluded that self-report SMFQ has low sensitivity. Other than Thaper and McGuffin's findings, there is limited research to determine

the internal validity of the SMFQ, nor the MFQ. Research is especially limited when investigating the latter in a representative UK population, as the conclusion drawn from these findings were derived from a small sample. It is therefore uncertain whether the SMFQ can detect depressive disorders in young people in a UK population.

It is unknown if the SMFQ self-reports have high construct validity for adolescents. Sharp, Goodyet, and Croudace, (2006) found that the SMFQ was able to accurately describe the severity of depressive traits in children. Thus, this means that there is evidence that the SMFQ might measure the symptom severity of childhood depression. Yet, there is no research extending this finding to adolescents aged twelve or over. Therefore, it is unknown if, at age fourteen, the SMFQ is a valid measure of symptom severity of MDD.

Additionally, it is unknown if the SMFQ self-reports have high internal reliability validity for adolescents, age fourteen, in large community samples. Research has demonstrated that the items of the SMFQ relate to one construct, thus demonstrating high internal reliability between items (Angold et al., 1995; Messer et al., 1995). However, the research suggesting high internal reliability between items has limitations. Whilst Angold et al., (1995) investigated the internal reliability of the SMFQ for young people between the ages of six and seventeen, the sample was small (48). Additionally, Messer et al., (1995) did have a large community sample (1502), yet the maximum age of the adolescents was thirteen. There has been no research to confirm the internal reliability of the SMFQ in a UK representative sample for adolescents beyond thirteen. Hence, it is uncertain if the SMFQ self-report would be a reliable questionnaire for early adolescents (beyond thirteen) in the MCS.

Lastly, an important issue that needs to be discussed when reviewing the SMFQ as a self-report is language difficulties. This project aims to investigate young people who potentially have language difficulties, if not Developmental Language Disorder. Language difficulties could consist of an adolescent experiencing impaired language comprehension, for example. These

language difficulties could affect the performance of the self-report SMFQ. Thus, language difficulties may influence the validity or reliability of SMFQ. There is no research indicating whether language difficulties do affect the performance of the self-report SMFQ.

In conclusion, the data collected by the SDQ in the MCS was analysed for the investigations in the present project. Compared to the SMFQ, there is a wealth of evidence suggesting that the SDQ is a valid and reliable measure for assessing behaviours that indicate mental health difficulties. Particularly, the SDQ is a useful, accurate and unbiased screening tool for childhood and adolescent mental health difficulties (Stone et al., 2010; Goodman and Goodman, 2011; Mathai et al., 2002; Johnson et al., 2014; Kovacs and Sharp, 2014; Hill and Hughes, 2007; Becker et al., 2004). Again, unlike the SMFQ, the latter was found for large UK representative samples (Messer et al., 1995). This suggests that the SDQ may be better able to detect mental health difficulties in large community samples, such as the MCS.

Additionally, the SDQ can be used to investigate internalising and externalising problems, as well as overall mental health. The SMFQ focuses on symptoms of Major Depressive Disorder. Investigating different manifestations of mental health difficulties is beneficial. As argued in chapter 3 different factors may influence the development of different manifestations of mental health difficulties. Therefore, in comparison to the SMFQ, the SDQ can contribute to our current multidimensional understanding of mental health.

It is important to restate, however, that the SDQ may not measure the severity of symptoms from all mental health disorders. Instead, the SDQ measures the severity of symptoms associated with depression, anxiety, ADHD, oppositional defiant disorder and, or conduct disorder. Additionally, research does validate the internal validity, predictive validity and internal reliability of the parent SDQ reports as a sole report for measuring and detecting symptoms of mental health difficulties in young people (Stone et al., 2010; Kovacs and Sharp, 2014). Taken together, the data collected by the SDQ was adopted to indicate mental health difficulties, in the current project.

Materials: Potential risk and resilience factors

A review of the MCS measures that might indicate potential factors that promote risk or resilience for mental health difficulties was performed. The review in the current section determined which measures, or data, reliably and accurately indicate factors that promote risk or resilience for mental health difficulties. The current review will provide a description of relevant data, what they assess, and whether they reliably indicate the described factor that promotes risk or resilience for mental health difficulties. The factors and measures that were selected to be analysed in the current project will not be detailed here, but within the main body of the thesis instead (see '6.5.2 *Potential factors that promote risk and resilience, in the MCS).*

Before the reviews, however, there are three considerations. Firstly, analysis will be performed and reported, where appropriate. Some analysis was needed to determine the suitability of the measure under review. There is data available in the MCS that was collected through unstandardised measures. Unstandardised measures include items from a set of informal reports or selected items from standardised measures. Hence, it was unknown if the internal consistency is reliable. Internal consistency refers to the extent to which the items of the scale or questionnaire are likely to measure the same construct. High internal consistency infers that the items measure what they were designed to measure. Yet, low internal reliability may be due to the influence of external factors (Bollen, 2002), such as gender and low socioeconomic status.

For the current project, as stated in chapter 6, regressions were performed. Analysing potential factors for mental health difficulties, using data with low consistency, may negatively impact the interpretation of the multiple and hierarchical regressions performed. It may not be clear what the data measures, and therefore, it is inconclusive whether the potential factors predict mental health difficulties at age fourteen. Additionally, low internal reliability may negatively distort the standardised effects estimates, errors, and coefficient estimates (Bollen and Schwing, 1987). This means the inclusion of measures with low internal reliability, and thus, may reduce the

power of the regression. Power may further decrease as more measures with low internal reliability are included.

To determine the internal consistency of a set of items, a Cronbach alpha was performed (Cronbach, 1951). Cronbach alpha is commonly performed to test the internal consistency of a measure (Tavakol and Dennick, 2011), recent examples include: Mohammadi et al., (2020), Barcaccia et al., (2019), and Thomas, Orme and Kerrigan (2020). It is commonly adopted that a Cronbach alpha of .70 or above suggests high internal consistency in the items. Thus, a set of items with low internal consistency (below .70) were not analysed in the current project.

Table A2. provides a summary of the factors that were not analysed in the current project. This summary includes whether the factors were going to be investigated as a factor that encourages risk, or resilience for mental health difficulties. Additionally, there will be a brief explanation as to why it was not selected for the current project.

Table A2.

A summary of the possible factors that promote risk and resilience for mental health difficulties as highlighted within the literature but were not selected to be investigated in the current project and why.

Risk factors for mental health difficulties	Factors that promote resilience for mental health difficulties	Why it was not selected in the current project
	Prenatal conditions	
Small for gestational age		Limited sample size
Stress during pregnancy		Not measured by the MCS
	Individual factors	
Infant temperament		Low internal consistency
	High levels of self-regulation	Low internal consistency
	High levels of self-efficacy	Not measured by the MCS
	High levels of executive functioning	Not measured by the MCS
	Certain healthy sleeping behaviours	Not appropriately measured by the MCS
	Cognitive reappraisal	Not measured by the MCS
	Family factors	
Low levels of maternal attachment		Low internal consistency
Parents with substance abuse		Not appropriately measured by the MCS
Household structure		Low internal consistency
Abuse		Not available measures up to age five
Domestic violence		Not measured by the MCS
	Authoritarian parenting styles	Not measured by the MCS
	Parental support	Not measured by the MCS
	Household environment	
Overcrowding (household)		Not measured by the MCS
Main caregiver's minimum education		No available measures up to age five
	Peer and community factors	
Being a victim of bullying		No available measures up to age five
	Good school climate	Not measured by the MCS
	Teacher support	Not measured by the MCS

Note. MCS = Millennium Cohort Study. Certain healthy sleeping behaviours that were not selected in the current project include sleep duration.

Prenatal conditions

Small for gestational age. Being small for gestational age is defined as babies who are born with a birth weight that is below 10th centile of the population. Birth weight was informally reported by the main caregiver, in the MCS. Birth weight was reported in kilos and units. Apart from units, there were no observations of babies having a birth weight below 10% of the population. There was one observation when recorded in units. However, due to sample size, this was not investigated as a potential risk factor for mental health difficulties, in young people diagnosed with DLD.

Stress during pregnancy. In the MCS there is no available measure to indicate stress during pregnancy. Therefore, stress during pregnancy was not investigated in this project.

Individual factors

Temperament and self-regulation. At 9 months, the Carey Temperament scale (Carey and McDevitt, 1995) was completed by the main caregiver. The Carey Temperament Scale assesses the overall temperament of infants (including 9 month-year-olds), and this consists of four subscales: 'mood', approach/withdrawal', 'adaptability', 'regularity'. However, similarly to other measures used in the MCS, not all items were used. Five items were taken from the 'mood' subscale. Three items were taken from 'approach/withdrawal', 'adaptability' and 'regularity'. Thus, Cronbach alpha was performed on all the available items, as well as the items for each subscale. For all the items available, the Cronbach alpha was low (α =.65). Cronbach alpha was also low for the subscale items ('Mood', α = .55; 'Regularity', α = .68; 'Approach/withdrawal', α = .56; 'Adaptability', α = .25). Therefore, the data collected by the MCS adopting the Carey Temperament scale, as used by the MCS, will not be investigated in the current project.

When the cohort member was five years old, the main caregiver completed the Child Social Behaviour Questionnaire (CSBQ) (Hogan et al.,

1992). The CSBQ has three sections, which were adopted in the collection of the MCS: ‘independence and self-regulation’, ‘emotional dysregulation’, and ‘cooperation’. As stated in chapter 3, low self-regulation and emotional regulation are possible risk factors for mental health difficulties, in young people. These two scales had five items selected from the original CSBQ. A Cronbach alpha revealed that the internal validity was low for ‘independent and self-regulation’ (α = .62), and ‘emotional dysregulation’ (α =.62). Therefore, the data for self-regulation and emotional regulation was not analysed in the investigations for the current project.

Self-efficacy. In the MCS there is no available measure to indicate self-efficacy. Therefore, self-efficacy was not investigated in this project.

Cognitive reappraisal. In the MCS there is no available measure to indicate cognitive reappraisal. Therefore, cognitive reappraisal was not investigated in this project.

Sleep duration. In the MCS, data was collected on the duration, disruption, and latency of the cohort member’s sleep. This was collected at age fourteen, through informal self-reports.

Despite that there was an informal report, sleep duration was not selected to be investigated in the current project. At age fourteen, the cohort member was asked the number of hours that the adolescent is asleep. These include ‘on a weekday when did you fall asleep’ and ‘on a weekday when did you wake up’. Previous research has used the responses from this data to establish the duration of the adolescents’ sleep. However, the responses from these informal questions may not suggest a clear duration of sleep. The responses are either: ‘before 9pm’, ‘9:00 to 9:59pm’, ’10:00 to 10:59pm’ ’11:00 to 11:59pm’ and ‘midnight’. Due to the broadness of the available responses, the duration of sleep may remain unclear. Hence, this measure may not accurately indicate the duration of sleep in adolescents. As there are

no other measures, this means that sleep duration was not appropriately measured. Therefore, sleep duration was not investigated in the current project.

Coping strategies. In the MCS there is no available measure to indicate coping strategies. Therefore, coping strategies was not investigated in this project.

Executive functioning. In the MCS there is no available measure to indicate executive functioning. Therefore, executive functioning was not investigated in this project.

Family factors

Maternal attachment. The Condon Maternal Attachment questionnaire (Condon and Corkindale, 1998) was completed by the main caregiver when the cohort member was 9 months old. This questionnaire assesses maternal attachment between the mother and the new-born. Only biological mothers completed this questionnaire. This is a valid and reliable questionnaire, and the data collected by the MCS using this questionnaire has been used to investigate maternal attachment (Côté et al., 2013; Sacker et al., 2006; St Clair et al., 2019).

However, the complete questionnaire was not used during the collection of the MCS; six items were selected. A Cronbach alpha was performed on six of the items used for maternal attachment. It was revealed that the internal reliability of these items was low ($\alpha = .51$). Together, low Cronbach's alpha means that maternal attachment cannot be reliably measured using the items from the MCS. Whilst these items have been used to investigate maternal attachment in previous research, it was not analysed in the current project.

Parents with substance abuse. It is not possible to identify parents with substance abuse using the data from the MCS. Firstly, only alcohol intake was collected through informal questions. Thus, the misuse of substances such as psychoactive drugs is unknown. Secondly, whilst there is information gathered regarding the weekly frequency of alcohol intake, information around units is lacking. Units in this context refer to the quantity of pure alcohol within a drink. Units are important to consider because different types of drinks contain a different number of units.

Thirdly, there is no information on where alcohol is consumed. The main caregiver may drink out of sight of the cohort member: a public house, rather than at home. Whilst this information still would not provide an in-depth account, it may infer a different level of exposure to the cohort member. At home, the cohort member may be greatly exposed to alcohol abuse, compared to if the alcohol consumption was in a public house. This leads to the overarching point of whether, or how, does the main caregiver's alcohol weekly intake impact the cohort member. Together, therefore, it may not be possible to identify either substance abuse or alcohol misuse, because the data collected around this area might be too simplistic.

Household structure. For when the cohort member was nine months old, the main caregiver was asked about their parenting beliefs. Five items were taken from the ALSPAC study (Golding et al., 2001) which claims to assess whether new parents believe in a structured or a 'laissez-faire' environment. A 'laissez-faire' environment is described as a lack of structure: avoid punishments and household rules. Thus, there no enforcement upon regularity, discipline, and structure, by the parents. It is unknown if these five items have good internal validity, hence, a Cronbach alpha was performed. The Cronbach alpha of the five items was performed and it indicated low internal validity ($\alpha = .50$). Therefore, parenting beliefs, concerning household structure (including discipline), was not investigated in the current project.

Abuse. Firstly, sexual abuse cannot be measured in the current project. Whilst there is data collected around sexual assault and unwelcomed approaches, this was collected at age fourteen. In the young person's questionnaire, at age fourteen, the cohort member was asked whether, within the past 12 months, an individual has sexually assaulted them or made an unwelcome sexual approach. The possible answer to this question was either 'yes', or 'no'. No further information was gathered on this subject. Hence, data was not collected that could indicate sexual abuse when the cohort member was five years old or younger. Therefore, indicators of sexual abuse cannot be investigated as a potential early risk factor for mental health difficulties, in the current project.

Secondly, due to the same major limitation explained in the sexual abuse section, physical abuse cannot be investigated within this project. Lastly, there were no measures used to assess whether the cohort member was neglected, nor experienced emotional abuse. Therefore, neglect and emotional abuse cannot be investigated in this project.

Domestic violence. Some questions, in the data collection of the MCS, ask the main caregiver whether their ex-partner was physically violent. However, there are limitations to the nature of this question. Firstly, there is no indication that this was directed to the main caregiver; a member of the household; relative or friend. Secondly, there is no indication of whether physical violence is ever witnessed by or known to the cohort member. Together, this means that it is difficult to determine possible cases of domestic violence, from other forms of physical violence, using the data collected by the MCS. Lastly, the question is asked concerning the main caregiver's past relationships. Hence, there is no data around partners outside of the MCS collection, nor domestic violence in current relationships. Therefore, in the data collected by the MCS, is it unknown if domestic violence occurred in the cohort members' household when they were five years old or earlier.

Authoritative parenting. In the MCS there is no available measure to indicate authoritative parenting styles. Therefore, authoritative parenting was not investigated within this project.

Parental support. There is a series of questions asking the cohort members (age fourteen) about their current relationships. Relationships include their peers, members of the community, as well as their family members. However, the Cronbach's alpha on these items was low (α = 56). Additionally, the items seem broad in what they measure. For instance, for 'I have friends and family who help me to feel safe, secure and happy', it does not acknowledge that the adolescent may have friends who make them feel safe and secure and have parents who do not. Therefore, parental support, or peer and community support, was not investigated in the current project.

Household factors

Children in an overcrowded house. There is data on how many individuals (babies to elderly) live within the household. However, there is no data about the house itself: how many bedrooms, or sleeping areas, for instance. Therefore, due to the lack of data on the context of the house, it was not possible to investigate whether overcrowded housing, in the current project.

Main caregiver's with minimum education. There is data available on the main caregiver's education, yet this is available when the cohort member was aged eleven and fourteen. Therefore, main caregivers with minimum education cannot be investigated in the current project. The current project focuses on early risk factors (up to age five).

Peer and community factors

Being a victim of bullying. There is an item that could be used to indicate bully victimisation; however, this might not be appropriate for this project. The item ‘picked on or bullied by other children’ is reported when the cohort member is three years and onwards (up to fourteen years). However, this item is embedded within the peer problems subscale of the SDQ. The data from the SDQ, as concluded previously in the current chapter, will be analysed for the cohort members' mental health difficulties at age fourteen. Therefore, bully victimisation was not investigated.

Regarding being a victim of cyber-bullying, the data on this may not be appropriate for the current project. This data was collected when the cohort member is fourteen years old. Therefore, being a victim of cyber-bullying cannot be investigated in the current project.

School climate. In the MCS there is no available measure to indicate school climate. Therefore, school climate was not investigated in the current project.

Supportive teachers. There are no variables that indicate how supportive the teacher is to the cohort member.

Participants

Selecting a sample of Developmental Language Disorder in the MCS: An informative review.

A review was performed around how DLD has been selected in previous research analysing the data collected by the Millennium Cohort Study (MCS). Up to date (May, 2020), there have been three investigations that have selected samples that reflect children (age five) diagnosed with

DLD, using the data collected by the MCS. These are Forrest et al., (2018), St Clair et al., (2019) and Toseeb and St Clair (2020).

In the previous DLD investigations, analysing the data collected by the MCS, the same inclusion and exclusion criteria were adopted. The inclusion criteria were children, at age five, who either: performed 1.5 standard deviation below the MCS population mean on the Naming Vocabulary Subtest (adopted during the MCS); or parents informally reported concerns regarding their child's language development. Additionally, the exclusion criteria were; (informal) reports of hearing problems; lack of exposure to spoken English within the household; and lastly, a diagnosis of Autism or Down's Syndrome.

Additionally**,** there has been consistency in the terminology adopted across DLD investigations analysing the data collected by the Millennium Cohort Study (Forrest et al., 2018; St Clair et al., 2019; Toseeb and St Clair, 2020). The terminology adopted was 'at risk of' DLD, or 'rDLD'. This terminology adheres to the recommendations and conclusions drawn from Bishop et al.'s (2017) influential investigation. Bishop et al., (2017) concluded that 'Developmental Language Disorder' was deemed most appropriate. However, due to the limited number of language measures adopted in the MCS, the strength of the claim in selecting a clinical presence of DLD is uncertain. Due to this, the inclusion of the phrase 'at risk of' was adopted in previous DLD investigations analysing this data. Together, previous researchers analysing the data collected by the MCS adopted an appropriate term that conceptualised the sample selected: children, at age five, who are at risk of DLD.

Inclusion criteria within previous DLD investigations analysing the MCS

During the previous DLD investigations, analysing the data collected by the MCS, a combination approach of the standardised language measure and parent reports were adopted (Forrest et al., 2018; St Clair et al., 2019; Toseeb and St Clair, 2020). The standardised language measure was the

Naming Vocabulary Subtest. As stated by Forrest et al., (2018), St Clair et al., (2019) and Toseeb and St Clair (2020), the Naming Vocabulary subtest measures expressive language ability. This is also explained within the technical manual of the MCS's dataset (Hansen, 2014). As defined in chapter 2, expressive language ability describes the components of language that are transmitted. Additionally, within the parent report was an informal question asking the parent to state any, and all, concerns regarding their child's speech and language development. In the DLD investigations, the language-based concerns expressed by the main caregiver informed researchers of the child's everyday 'language use' (St Clair et al., 2019). Beyond 'language use', it was not stated what components of language the young person may experience if they were selected based upon the informal parent reports.

Together, the combination approach described in the previous paragraph selected children at age five, at risk of DLD. From this approach, a heterogeneous sample might have been selected. Children rDLD, selected by Forrest et al., (2018), St Clair et al., (2019) and Toseeb and St Clair (2020), experienced language difficulties as assessed by a standardised measure, and may have displayed difficulties in everyday language use.

There are major strengths in the inclusion criteria adopted in previous DLD investigations, analysing the data collected by the MCS. The inclusion criteria selected children when the data collected was approximately five years of age. As concluded in the review that was performed in chapter 2, identification, or selection at age five may indicate persistency in language difficulties in later life (Stothard et al., 1998). This suggests that selection at age five may increase the strength of the claim that samples reflecting DLD are selected, instead of a language delay. Therefore, due to the age of selection in the investigations by Forrest et al., (2018), St Clair et al., (2019) and Toseeb and St Clair's (2020), persisting language difficulties were likely selected.

Additionally, Forrest et al., (2018), St Clair et al., (2019) and Toseeb and St Clair's (2020) adopted a combination approach to selecting sample at risk of DLD. By adopting a combination method, using the data collected in

the MCS, previous DLD investigations have likely selected a heterogeneous sample of children (at age five) at risk of DLD. A heterogeneous sample is more likely to be selected whereby more than one language measure is adopted in the inclusion criteria, compared to a single standardised language measure (homogenous sample) (see chapter 2) A heterogeneous sample better reflects the group of young people diagnosed with DLD than a homogenous sample (see chapter 2).

However, due to the limitations of the MCS, which were discussed in chapter 11, there are limitations in the adopted inclusion criterion. Firstly, the combination approach adopted in previous DLD investigations (analysing the data collected by the MCS) may not reflect the recommendation proposed by Bishop et al., (2009). As stated in chapter 2, research by Bishop et al., (2009) concluded that the combination of standardised language measures and parent reports are more likely to detect those diagnosed with DLD, in comparison to a single standardised language measure. Parent reports provide additional information aiding researchers in selecting samples that reflect young people diagnosis with DLD. Bishop et al.'s conclusions were drawn from standardised measures, including parental reports; the Communication Checklist (Bishop, 2003a). However, in the inclusion criteria adopted for previous DLD investigations, analysing the data collected by the MCS, informal parental reports were adopted. This means that the strength in adopting a combination approach, as stated by Bishop et al., (2009) cannot be mapped to the selection criteria in the sample selected from the MCS dataset. Therefore, it is uncertain whether the combination approach adopted is a more appropriate criterion for selecting cases of DLD, in the data collected by MCS, compared to a single standardised language measure.

Secondly, due to the vagueness of what the language components the parent reports measure, the sample's language description is unclear. The sample contains children who experience difficulties in their everyday ability, utilisation, and engagement, in communicating through spoken language. However, it is unknown whether disruptions to their everyday communication, through spoken language, is due to difficulties in syntax, grammar, phonology, or, their receptive or expressive language. Therefore, it is

uncertain what language difficulties are experienced by the sample selected through the informal parent reports.

Lastly, the Naming Vocabulary subtest may not solely predict the development of expressive language, in children. According to Elliott et al., (1997), as described in the technical report of the MCS (Hansen, 2014), the Naming Vocabulary subtest assesses spoken vocabulary in children. The authors state that performance in this subtest depends on the child's current vocabulary knowledge of nouns. The child's current vocabulary knowledge may provide researchers with an insight into their expressive language development (Elliott et al., 1997). However, other information, such as their development of syntax and phonology, also provides an insight into children's expressive language development. Therefore, a child may perform well on the Naming Vocabulary subtest but experience expressive language difficulties.

The sample selected through the data collected by the MCS, in previous DLD investigations, was not be suitable for the current project. Due to the language measures adopted in the collection of the MCS (discussed later), the sample description of children at risk of DLD (Forrest et al., 2018; St Clair et al., 2019; Toseeb and St Clair, 2020) may be too vague. Whilst it is likely that a heterogeneous sample was selected in previous DLD investigations, the types of language difficulties experienced within the group are unclear. Particularly, it is uncertain what components of language (syntax, grammar, phonology) the informal parents report measure. Understanding, or acknowledging the language difficulties within a selected group of children at risk of DLD is beneficial to future research; especially around DLD and mental health. As explained in chapter 4. specific language difficulties may be associated, predict, or play a role in the development of certain mental health difficulties (Snowling et al., 2006; van Daal et al., 2007). Thus, it is likely that different developmental trajectories for mental health difficulties exist within a heterogeneous sample of young people diagnosed with DLD. It may not be possible for researchers to acknowledge this complexity if the sample being investigated has an unclear language description. This may lead to inconclusive conclusions in such investigations.

Therefore, for the current project, a sample with an unclear language description may not lead to a strong foundation to investigate risk and resilience for mental health difficulties.

Exclusion criteria, within previous DLD investigations analysing the MCS

In previous DLD investigations analysing the data collected by the MCS, an appropriate exclusion criterion was adopted (Forrest et al., 2018; St Clair et al., 2019; Toseeb and St Clair, 2020). Using informal parent reports available in the MCS, the children, at age five, were excluded from the sample if there are indications of: of hearing problems; lack of exposure to spoken English within the household; and lastly, a diagnosis of Autism or Down's Syndrome (Forrest et al., 2018; St Clair et al., 2019; Toseeb and St Clair, 2020). These exclusion criteria are accepted in the previous DLD literature for selecting a sample that reflects a diagnosis of DLD (see chapter 2). Therefore, the data collected by the MCS allows researchers to adopt a suitable exclusion criterion to select samples of DLD.

The data analysed in the previous MCS investigation into DLD focuses upon childhood. The data analysed and used to select samples of DLD relied upon ages 3, 5, 7, 9 and 11 data. Yet, up to date (May, 2020), the MCS has collected data and released data for when the cohort member is (approximately) fourteen years old. A review of the latest data to indicate possible causes for DLD (biomedical, and lack of exposure to spoken English) was be performed. The review revealed that there is consistency in the informal questions asked across the data collection of the MCS. This means that a similar exclusion criterion can be adopted for the current project. Yet, the exclusion criteria for the present project included the latest data up to date (May, 2020).

However, in previous DLD investigations analysing the data collected by the MCS, developmental delay not included in the exclusion criteria. Developmental Delay is whereby a young person does not reach their developmental milestones. A young person with Developmental Delay is

likely to experience a wide range of difficulties, including speech and language, emotional cognition, as well as sensory difficulties (First and Palfrey, 1994; Association for All Speech Impaired Children, 2017). Whilst the cause may be unknown, Developmental Delay may be influenced by genetics, adverse conditions during the prenatal period, and premature birth (Shaffer, 2005; Jedrychowski et al., 2008; Association for All Speech Impaired Children, 2017; O'Connor et al., 2020). Yet, Developmental Delay may be the symptom of an underlying cause, such as cerebral palsy, foetal alcohol syndrome, fragile X syndrome and brain injury (Association for All Speech Impaired Children, 2017). A Developmental Delay could influence a young person's language development (Oberklaid and Efron, 2005; Association for All Speech Impaired Children, 2017). It is unsurprising, therefore, that organisations such as AFASIC express that DLD is not the result of a general Developmental Delay (Association for All Speech Impaired Children, 2017). Moreover, Developmental Delay has been excluded in recent DLD investigations in the previous literature (Eadie et al., 2018). Therefore, the sample for the current project did exclude those reported to have a Developmental Delay.

Selecting a sample of Developmental Language Disorder in the MCS: Conclusion.

Additional reviews were performed to establish an appropriate criterion for selecting a sample that reflects young people diagnosed with DLD. The samples selected by previous DLD investigations, analysing the data collected by the MCS, may have unclear language descriptions. The low performance on the Naming Vocabulary subtest may not equate to expressive language difficulties. Also, there is little description of what the informal parent reports measures, beyond 'language use' (Forrest et al., 2018; St Clair et al., 2019; Toseeb and St Clair, 2020). Therefore, more information was needed before adopting an inclusion criterion for selecting a sample to investigate risk and resilience for mental health difficulties, in

young people diagnosed (or likely to be) with DLD. Therefore, a review was performed detailing and evaluating the relevant language measures adopted during the data collection of the MCS. This will include reviewing the informal measures regarding any diagnosis of a speech and language disorder, as well as parental concerns. Also, language measures that have not yet be discussed which were administered within the MCS will be detailed and reviewed here.

Available language measures within the MCS

Informal reports of speech and language disorders. There is data available around any special education needs (SEN) the cohort member has, between the ages of seven to fourteen years of age. The main responders were asked whether the cohort member's school or the local education board informed them that the child has SEN. If the answer was 'yes', then there were follow-up questions. Specifically, the interviewer asked the main responder whether there was a plan in place to support the cohort member. If the main responder explained that the cohort member is currently being assessed, the interviewer was able to code this into the CAPI software.

Afterwards, the interviewer asked the main responder the reasons for the cohort member's SEN. This was an open question and the interviewer coded the relevant answer into the CAPI software. It was possible to code more than one answer for this follow-up question. One of the possible coded answers were 'problems with speech or language'. Therefore, there is data on whether the cohort member, at age fourteen (eleven and, or seven) was receiving support for speech and language difficulties or disorder.

However, there are no follow-up questions around the nature of the speech and language difficulties. Speech and language difficulties encompass a wider range of severe and persisting problems. This includes a stutter or lisp or difficulties in syntax or lexical retrieval ability. This means that it is unknown if the difficulties, which require support, are related to speech or language. Additionally, a child can have unrecognised and unidentified language difficulties or language disorders. Hence, there may be

cohort members who do not have SEN but do have language difficulties. Taken together, this report may not be a good indicator of the cohort members' language development, ability, or difficulty.

Informal parent reports. In the early years of collection, the main responders were asked informal questions about any concerns regarding the cohort member's speech and language ability. These informal questions were asked when the cohort member was nine months, three years, and five years old. Firstly, the interviewer showed the main responder a card, as displayed in the figure below (**Figure A1.**).

Figure A1.

The card showed to the main caregiver regarding any concerns they have about their child's speech and language development.

1	No concerns
2	His/her language is developing slowly
3	S/he doesn't seem to understand other people
4	S/he pronounces words poorly
5	S/he doesn't hear well
6	S/he stutters
95	Other

The interviewer then asked the main responder "Do you have any concerns about the cohort member's speech and language?". However, if the interviewer knew that there were other individuals in the room during this question, the interviewer was instructed to say: "you can tell me the number

which applies". The interviewer was to code into the CAPI interview which numbers applied to that answer. The interviewer was then instructed to ask if there were any other concerns until all of them were expressed by the main responder.

If any responses would be coded into 'other', the interviewer was to type into the CAPI interview what that concerns were. Examples, whereby the interviewer had to do the latter, were: 'have a lisp', 'have mutism', and 'started talking late/delayed speech'. These were not acknowledged during the design of the interview. Yet, during the editing and coding of the interviews, the editor expanded the original coded responses to include those not acknowledged and yet, common amongst the interviews; such as 'have a lisp'. Despite this, there were some cases where the editor could not place the typed response into a category, or they were deemed too vague or irrelevant. Concerning language or possible concerns for language development, the following responses from this informal report might be useful to consider.

Cohort member(s)…

language is developing slowly

seem to be unable to understand other people

pronounces words poorly

started talking later or has delayed speech

speaks hesitantly

is often understood by parents but not by other people.

According to researchers utilising these questions during investigations, these responses may indicate the child's 'language use' (Forrest et al., 2018; St Clair et al., 2019; Toseeb and St Clair, 2020). Understanding parental concerns may provide some insight into the children's language

development. During professional assessments, these may include the parent's opinions and views on their child's language development. Moreover, professional assessments are often initiated by suspicion from the child's main caregiver. It is unsurprising, therefore, that it is agreed by researchers that parent reports provide valuable insight into their child's language development (Dale, 1991; Thal et al., 1999; Klee et al., 2000; Marchman and Martínez-Sussmann, 2002; Sachse and Von Suchodoletz, 2008a).

However, reports of parental concerns about language development have their limitations (Glascoe, 1999; Glascoe and Marks, 2011). There needs to be cautious when interpreting the scores of parental concerns about their child's language development (Glascoe, 1999). It is important to consider the quality of the question and how it is worded. This means that researchers should consider the responder level of education and their understanding of language or child development. Also, researchers should consider whether the main caregiver's concerns have led to them seek professional advice. Ideally, a professional should determine the importance and accuracy of parental concerns. Therefore, Glascoe et al., (2011) state that the questions given to parents, without professional interpretation, should be specific enough to find out what their concerns are, rather than an overall concern on their child's language development (Glascoe, 1999).

Lastly, this informal measure has been adopted within previous DLD investigations analysing the MCS. The literature does support the notion that parent reports provide valuable insight into their child's language development (Dale, 1991; Thal et al., 1999; Klee et al., 2000; Marchman and Martínez-Sussmann, 2002; Sachse and Von Suchodoletz, 2008a). Particularly, standardised parent reports into the child's language development could predict language difficulties in children from as early as twenty-four months of age (Dale, 1991). However, the informal reports administered in the MCS were not standardised parent inventories, nor were items selected from such inventories. Thus, is it uncertain to what degree, the items in the MCS regarding parental concerns in their child's language development, predict language difficulties when the cohort member is five

years old. Therefore, it is unknown whether these items together provide information that could be used to select samples of young people diagnosed with DLD, without the interpretation and experience of a speech and language therapist.

Furthermore, as stated previously, it is uncertain what components of language are measured by the informal parent reports, in the MCS. The informal parent report focuses solely upon the main caregiver's concerns regarding their child's language development. Understanding parental concerns do provide additional information for researchers, however, it does not lead to a clear description of the language difficulties experienced within a group of young people diagnosed with DLD.

Verbal Similarities. The Verbal Similarities subtest was administered when the cohort member was eleven years old. The age suitability of the Verbal Similarities subtest ranges from five years to seventeen years and eleven months. As described by the technical report of the MCS (Hansen, 2014), a trained interviewer read aloud three words to the cohort member. The cohort members were asked to say how the three words are similar to each other.

It is explained in the MCS manual (Hansen, 2014), Elliott et al., (1997) states that the Verbal Similarities subtest is designed to assess the children's current verbal knowledge and verbal reasoning ability. This is somewhat agreed by Horn (1991). Horn (1991, pp. 20) strongly argues that:

> …verbal knowledge can be assessed with virtually any test that measures understanding of word meanings.

Under this argument, the Verbal Similarities subtest may at least measure the cohort members' basic verbal knowledge. The procedure does require the cohort member to understand the meanings of the words to determine how they are similar. However, concerning the exact procedure administered, beyond Elliott et al.'s (1997) claim, there is no confirmation that this subtest measures verbal reasoning or verbal knowledge. Additionally,

there is little discussion nor research into what may lead to low performance in the task used for the Verbal Similarities subtest. Therefore, there is uncertainty or lack of confidence in claiming that the Verbal Similarities subtest measures verbal knowledge or verbal reasoning ability.

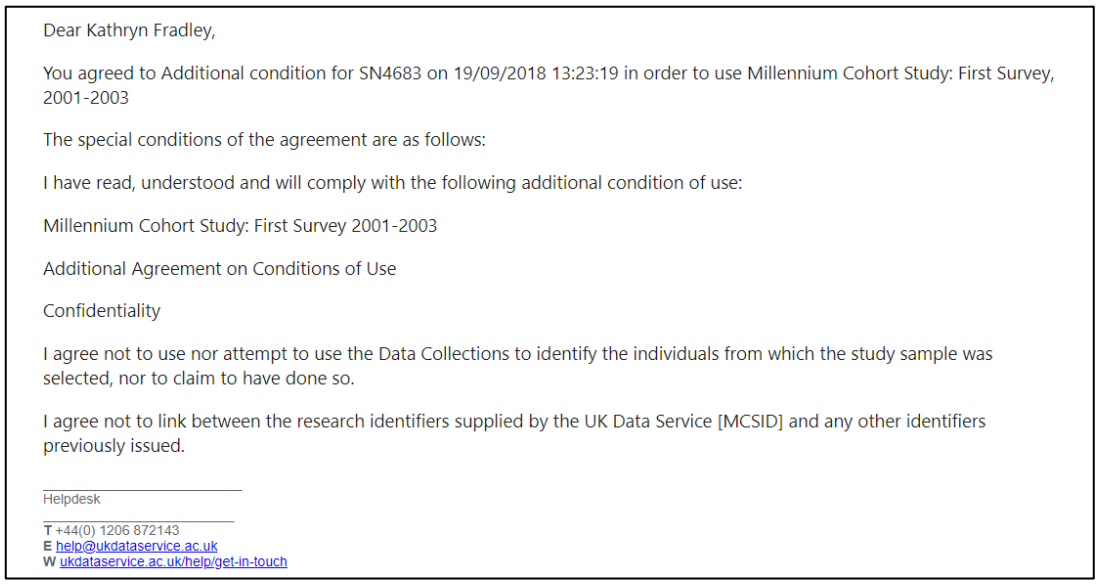
MacArthur Communicative Development Inventory. When the cohort member was nine months old, the interviewer verbally asked the main responder, in question form, four items selected from the MacArthur Communicative Development Inventory (CDI). The four items were related to the infant's use of gestures. These were whether, or what extend the child is: 'giving or reaching out for a toy'; 'appropriately waving goodbye'; 'extending their arms to communicate that they wish to be picked up'; 'nods their head to communicate 'yes''. The main responder was instructed to respond with either 'often', 'sometimes' or 'not yet'.

The original and standardised CDI claims to measure language and communication development or skills in early childhood. The suitability of which is between eight to thirty months of age (Fenson, 2007). The CDI was designed so that the questions were clear, concise, and easy for parents to complete the report. Whilst the CDI is a valid, reliable, and widely used inventory to measure young children's current language development (Law and Roy, 2008), the complete inventory was not adopted in the MCS. The original CDI contains two sections, with multiple subsections in each. Yet, as stated, in the MCS, only four items were selected from the CDI. Therefore, it is uncertain whether the selected items, taken from the CDI, have the same validity and reliability as the original CDI.

Appendix B: *Proof of the UK data service approval to analysis data collected by the MCS.*

Figure B1.

Proof of the UK Data service approval: Email agreement comformation for the data from the first survey



Dear Kathryn Fradley,

You agreed to Additional condition for SN4683 on 19/09/2018 13:23:19 in order to use Millennium Cohort Study: First Survey, 2001-2003

The special conditions of the agreement are as follows:

I have read, understood and will comply with the following additional condition of use:

Millennium Cohort Study: First Survey 2001-2003

Additional Agreement on Conditions of Use

Confidentiality

I agree not to use nor attempt to use the Data Collections to identify the individuals from which the study sample was selected, nor to claim to have done so.

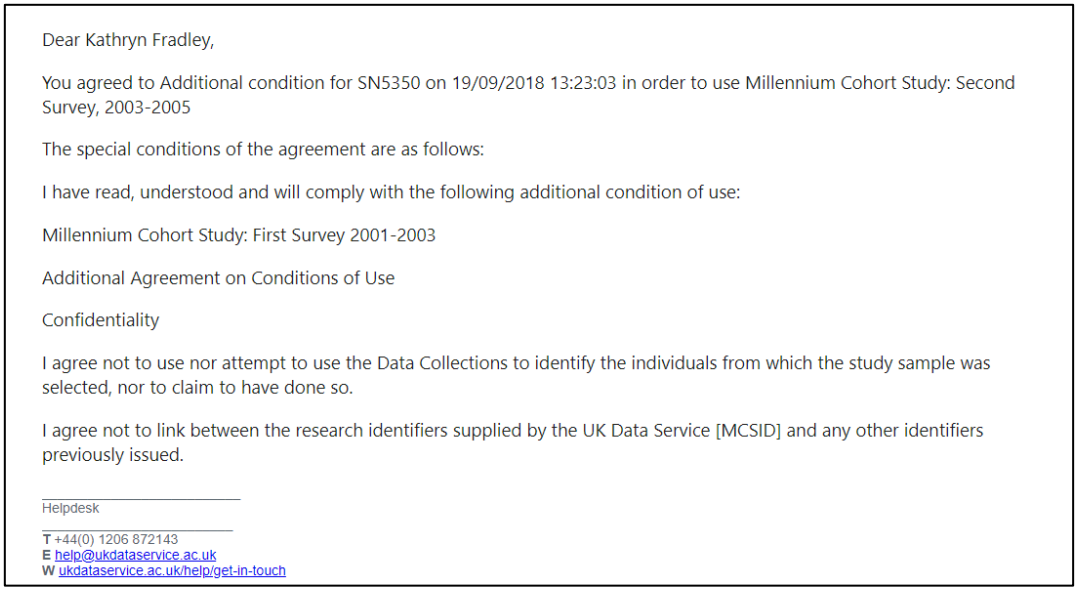
I agree not to link between the research identifiers supplied by the UK Data Service [MCSID] and any other identifiers previously issued.

Helpdesk

T +44(0) 1206 872143
E help@ukdataservice.ac.uk
W ukdataservice.ac.uk/help/get-in-touch

Figure B2.

Proof of the UK Data service approval: Email agreement comformation for the data from the second survey



Dear Kathryn Fradley,

You agreed to Additional condition for SN5350 on 19/09/2018 13:23:03 in order to use Millennium Cohort Study: Second Survey, 2003-2005

The special conditions of the agreement are as follows:

I have read, understood and will comply with the following additional condition of use:

Millennium Cohort Study: First Survey 2001-2003

Additional Agreement on Conditions of Use

Confidentiality

I agree not to use nor attempt to use the Data Collections to identify the individuals from which the study sample was selected, nor to claim to have done so.

I agree not to link between the research identifiers supplied by the UK Data Service [MCSID] and any other identifiers previously issued.

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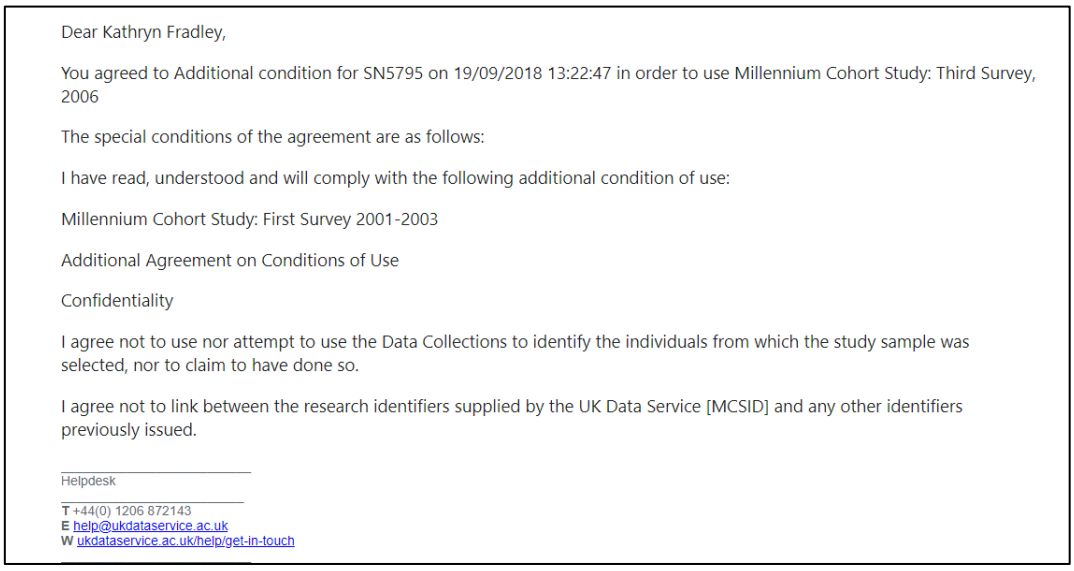
W ukdataservice.ac.uk/help/get-in-touch

Figure B3.

Proof of the UK Data service approval: Email agreement comformation for the data from the third survey



Dear Kathryn Fradley,

You agreed to Additional condition for SN5795 on 19/09/2018 13:22:47 in order to use Millennium Cohort Study: Third Survey, 2006

The special conditions of the agreement are as follows:

I have read, understood and will comply with the following additional condition of use:

Millennium Cohort Study: First Survey 2001-2003

Additional Agreement on Conditions of Use

Confidentiality

I agree not to use nor attempt to use the Data Collections to identify the individuals from which the study sample was selected, nor to claim to have done so.

I agree not to link between the research identifiers supplied by the UK Data Service [MCSID] and any other identifiers previously issued.

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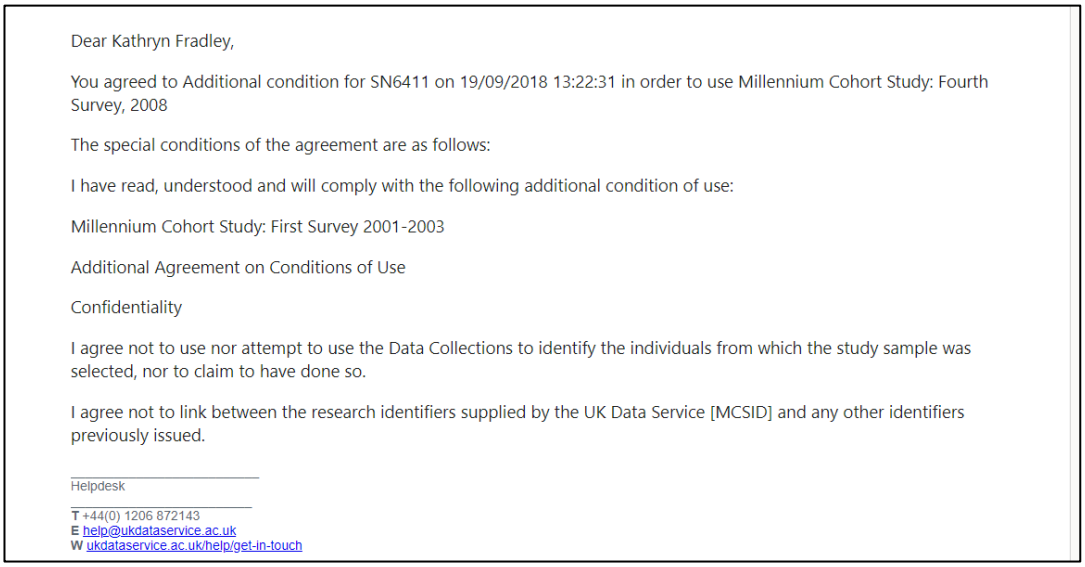
Figure B4.

Proof of the UK Data service approval: Email agreement comformation for the data from the fourth survey



Dear Kathryn Fradley,

You agreed to Additional condition for SN6411 on 19/09/2018 13:22:31 in order to use Millennium Cohort Study: Fourth Survey, 2008

The special conditions of the agreement are as follows:

I have read, understood and will comply with the following additional condition of use:

Millennium Cohort Study: First Survey 2001-2003

Additional Agreement on Conditions of Use

Confidentiality

I agree not to use nor attempt to use the Data Collections to identify the individuals from which the study sample was selected, nor to claim to have done so.

I agree not to link between the research identifiers supplied by the UK Data Service [MCSID] and any other identifiers previously issued.

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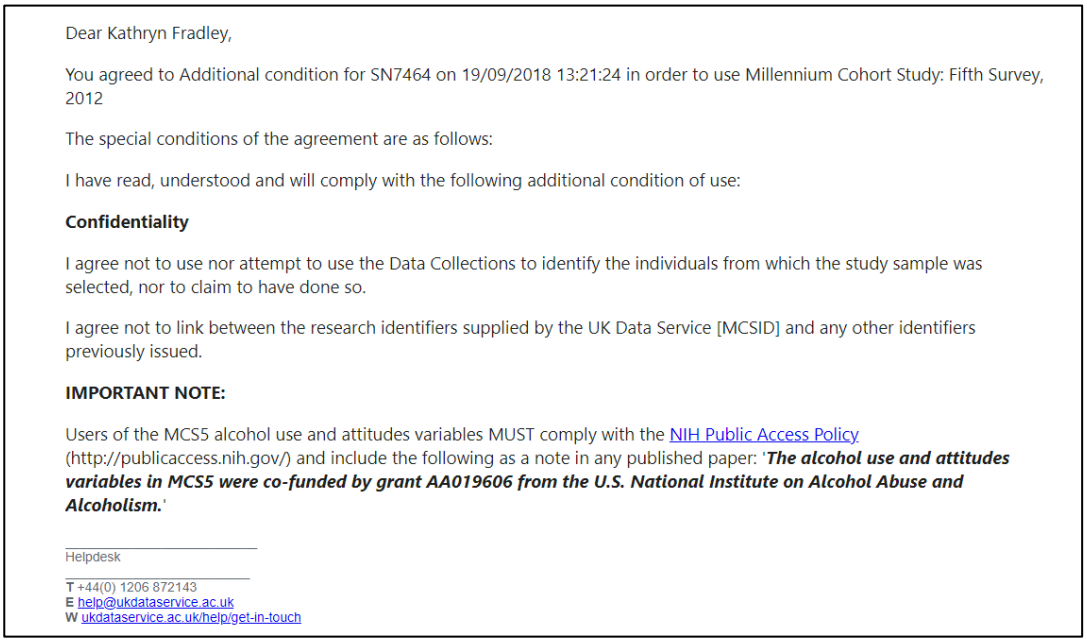
W ukdataservice.ac.uk/help/get-in-touch

Figure B5.

Proof of the UK Data service approval: Email agreement comformation for the data from the fifth survey



Dear Kathryn Fradley,

You agreed to Additional condition for SN7464 on 19/09/2018 13:21:24 in order to use Millennium Cohort Study: Fifth Survey, 2012

The special conditions of the agreement are as follows:

I have read, understood and will comply with the following additional condition of use:

Confidentiality

I agree not to use nor attempt to use the Data Collections to identify the individuals from which the study sample was selected, nor to claim to have done so.

I agree not to link between the research identifiers supplied by the UK Data Service [MCSID] and any other identifiers previously issued.

IMPORTANT NOTE:

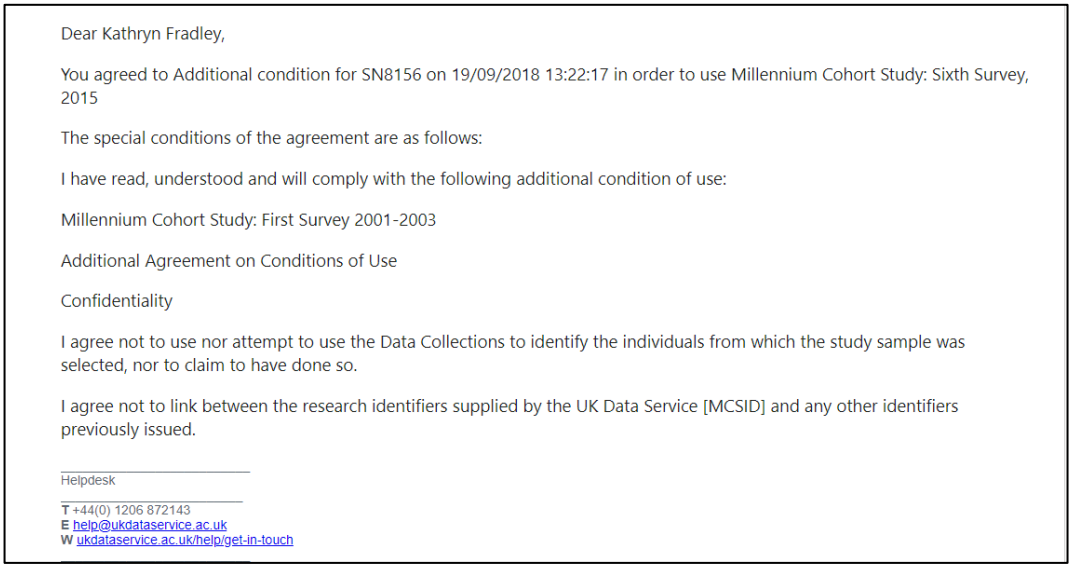
Users of the MCS5 alcohol use and attitudes variables MUST comply with the NIH Public Access Policy (http://publicaccess.nih.gov/) and include the following as a note in any published paper: '***The alcohol use and attitudes variables in MCS5 were co-funded by grant AA019606 from the U.S. National Institute on Alcohol Abuse and Alcoholism.***'

Helpdesk

T +44(0) 1206 872143
E help@ukdataservice.ac.uk
W ukdataservice.ac.uk/help/get-in-touch

Figure B6.

Proof of the UK Data service approval: Email agreement comformation for the data from the sixth survey



Dear Kathryn Fradley,

You agreed to Additional condition for SN8156 on 19/09/2018 13:22:17 in order to use Millennium Cohort Study: Sixth Survey, 2015

The special conditions of the agreement are as follows:

I have read, understood and will comply with the following additional condition of use:

Millennium Cohort Study: First Survey 2001-2003

Additional Agreement on Conditions of Use

Confidentiality

I agree not to use nor attempt to use the Data Collections to identify the individuals from which the study sample was selected, nor to claim to have done so.

I agree not to link between the research identifiers supplied by the UK Data Service [MCSID] and any other identifiers previously issued.

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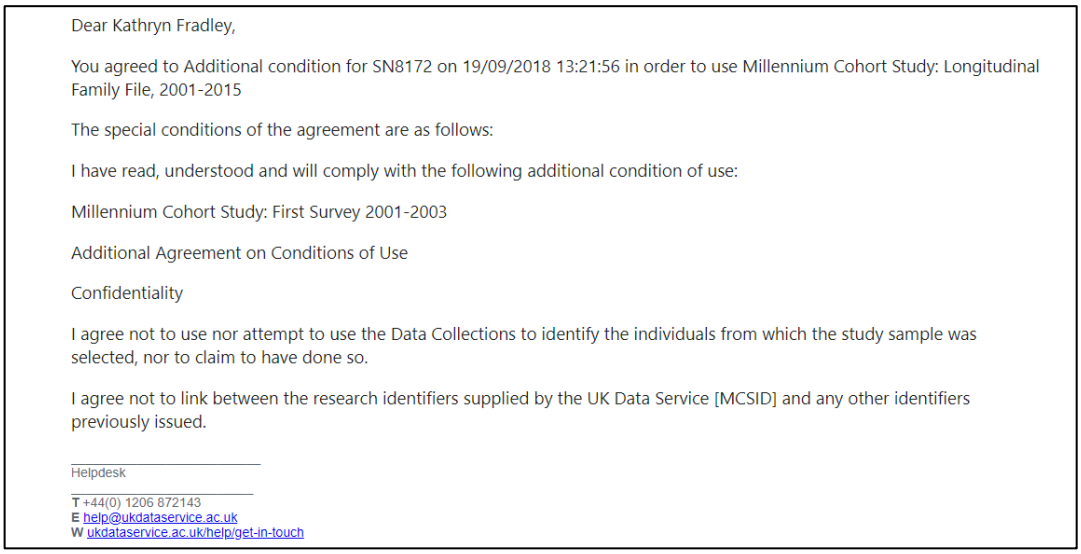
Figure B7.

Proof of the UK Data service approval: Email agreement comformation for the data from the longitudinal family file survey



Dear Kathryn Fradley,

You agreed to Additional condition for SN8172 on 19/09/2018 13:21:56 in order to use Millennium Cohort Study: Longitudinal Family File, 2001-2015

The special conditions of the agreement are as follows:

I have read, understood and will comply with the following additional condition of use:

Millennium Cohort Study: First Survey 2001-2003

Additional Agreement on Conditions of Use

Confidentiality

I agree not to use nor attempt to use the Data Collections to identify the individuals from which the study sample was selected, nor to claim to have done so.

I agree not to link between the research identifiers supplied by the UK Data Service [MCSID] and any other identifiers previously issued.

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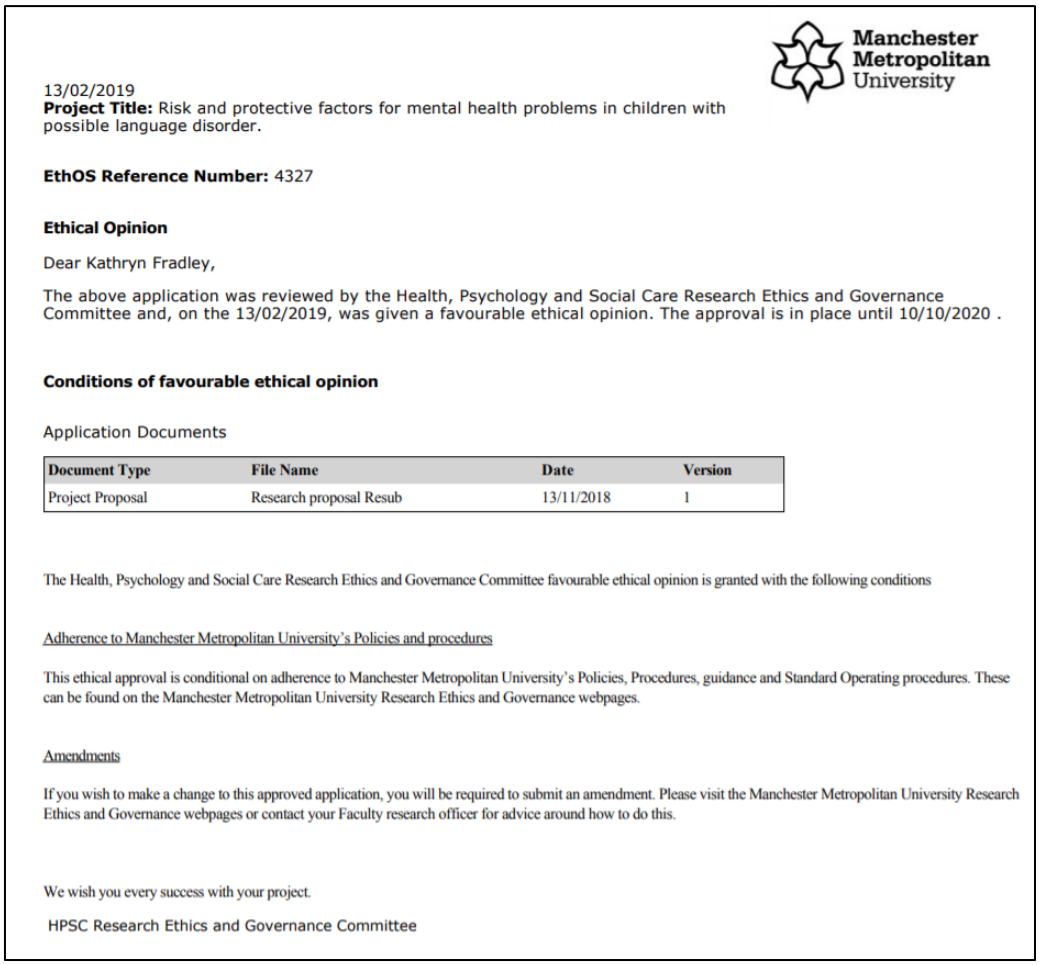
Appendix C: *Proof of MMU ethical approval.*

Figure C1.

Proof of MMU ethical approval for the investigating in the current project.



Manchester Metropolitan University

13/02/2019
Project Title: Risk and protective factors for mental health problems in children with possible language disorder.

EthOS Reference Number: 4327

Ethical Opinion

Dear Kathryn Fradley,

The above application was reviewed by the Health, Psychology and Social Care Research Ethics and Governance Committee and, on the 13/02/2019, was given a favourable ethical opinion. The approval is in place until 10/10/2020 .

Conditions of favourable ethical opinion

Application Documents

Document Type	File Name	Date	Version
Project Proposal	Research proposal Resub	13/11/2018	1

The Health, Psychology and Social Care Research Ethics and Governance Committee favourable ethical opinion is granted with the following conditions

Adherence to Manchester Metropolitan University's Policies and procedures

This ethical approval is conditional on adherence to Manchester Metropolitan University's Policies, Procedures, guidance and Standard Operating procedures. These can be found on the Manchester Metropolitan University Research Ethics and Governance webpages.

Amendments

If you wish to make a change to this approved application, you will be required to submit an amendment. Please visit the Manchester Metropolitan University Research Ethics and Governance webpages or contact your Faculty research officer for advice around how to do this.

We wish you every success with your project.

HPSC Research Ethics and Governance Committee

Appendix D: *Mann-Whitney U tests to determine group differences between young people rDLD, and the comparison groups.*

Table D1.

Mann-Whitney U test for SDQ scores, at age fourteen, between young people rDLD and general population.

SDQ scores at age fourteen	Young people rDLD		The general population		*z*	Effect size
	M (SD)	Range	*M (SD)*	Range		
Total difficulties	9.98 (6.55)	0-34	7.90 (5.86)	0-38	-5.56***	.33
Internalising	4.58 (3.54)	0-14	3.65 (3.37)	0-19	-4.90***	.27
Externalising	5.39 (3.93)	0-20	4.25 (3.50)	0-19	-5.04***	.31

Note. * $p < .05$ ** $p < .01$ *** $p < .001$

Effect sizes were calculated through Cohen's D.

The number of completed total difficulties scores, internalising and externalising scores was the same. For children rDLD, this was 281. For children in the general population this was 9893.

Table D2.

Mann-Whitney U test for SDQ scores, at age fourteen, between young people rDLD and typically developing peers.

SDQ scores at age fourteen	Young people rDLD		Typically developing peers		*z*	Effect size
	M (SD)	Range	*M (SD)*	Range		
Total difficulties	9.98 (6.55)	0-34	7.46 (5.51)	0-38	-6.61***	.42
Internalising	4.58 (3.54)	0-14	3.41 (3.17)	0-19	-5.90***	.35
Externalising	5.39 (3.93)	0-20	4.05 (3.37)	0-19	-5.86***	.37

Note. * $p < .05$ ** $p < .01$ *** $p < .001$

Effect sizes were calculated through Cohen's D.

The number of completed total difficulties scores, internalising and externalising scores was the same. For children rDLD, this was 281. For typically developing children this was 6747.

Table D3.

Mann-Whitney U test for problem-solving scores at ages five and seven, young people rDLD and general population.

Problem-solving scores	Young people rDLD			The general population			z	Effect size
	n	*M (SD)*	Range	*n*	*M (SD)*	Range		
At age five								
Pattern construction	279	73.19 (14.35)	10-103	9772	83.16 (11.24)	10-119	14.71***	.77
Picture similarities	277	69.80 (25.10)	10-129	9737	89.58 (17.95)	10-149	12.09***	.88
At age seven								
Pattern construction	244	105 (17.99)	10-211	9226	118.14 (16.10)	10-201	12.29***	.77

Note. N = number of completions, M = Mean scores, SD = Standard deviation
* $p < .05$ ** $p < .01$ *** $p < .001$
Effect sizes were calculated through Cohen's D.

Table D4.

Mann-Whitney U test for problem-solving scores at ages five and seven, young people rDLD and their typically developing peers.

Problem-solving	Young people rDLD			Typically developing peers			z	Effect size
	n	*M (SD)*	Range	*n*	*M (SD)*	Range		
At age five								
Pattern construction	279	73.19 (14.35)	10-103	9739	82.92 (11.44)	10-119	14.25***	.75
Picture similarities	277	69.80 (25.10)	10-129	9699	89.04 (18.27)	10-149	11.70***	.88
At age seven								
Pattern construction	244	105 (17.99)	10-211	8818	117.40 (16.69)	10-211	11.63***	.71

Note. * $p < .05$ ** $p < .01$ *** $p < .001$

Effect sizes were calculated through Cohen's D.

Table D5.

Mann-Whitney U test for word reading scores at age seven, young people rDLD and general population.

Reading ability	Young people rDLD		General population		z	Effect size
	n	*M (SD)*	*n*	*M (SD)*		
Reading one-word score	242	82.50 (32.94)	9,133	109.87 (29.71)	12.36***	.87

Note. * $p < .05$ ** $p < .01$ *** $p < .001$
Effect sizes were calculated through Cohen's D.

Table D6.

Mann-Whitney U test for word reading scores at age seven, young people rDLD and their typically developing peers.

Reading ability	Young people rDLD		Typically developing peers		z	Effect size
	n	*M (SD)*	*n*	*M (SD)*		
Reading one-word score	242	82.50 (32.94)	6,368	110.11 (29.50)	11.41***	.87

Note. * $p < .05$ ** $p < .01$ *** $p < .001$
Effect sizes were calculated through Cohen's D.

Appendix E: *Test of normality for the potential early risk factors for mental health difficulties.*

Table E1

Skewness/Kurtosis and Shapiro-Wilk W continuous early risk factors

Potential risk factors	*n*	Shapiro-Wilks	Skewness (probability)	Kurtosis (probability)
Naming Vocabulary subtest	281	.53 ***	.001	.001
Main caregiver's psychological distress	260	.89 ***	.001	.001
Main caregiver's happiness in relationship	160	.97 ***	.002	.37
Parent-child conflict	178	.96 ***	.001	.46
Parent-child closeness	174	.64 ***	.001	.001
Parent's physical health	280	.91 ***	.001	.75
Parental engagement	280	.98 ***	.001	.24
Harsh discipline practices	246	.99	.39	.10

Note. * $p < .05$ ** $p < .01$ *** $p < .001$

Appendix F: *Levene's test of equal variance for the potential early risk factors for mental health difficulties.*

Table F1.

Summary of the Levene's test for the continuous potential early risk factors.

Potential risk factors	Total difficulties score W0 (df)	Internalising score W0 (df)	Externalising score W0 (df)
Naming Vocabulary subtest	.46 (7, 273)	.37 (7, 273)	.76 (7, 273)
Main caregiver's psychological distress	.85 (18, 241)	1.01 (18,241)	1.07 (18, 241)
Main caregiver's happiness in relationship	5.94 (139, 20) ***	4.76 (139, 20)	2.34 (139, 20) **
Parent-child conflict	1.49 (24, 153)	1.54 (24, 153)	2.09 (24, 153) **
Parent-child closeness	1.55 (14, 159)	1.77 (14, 159) *	1.25 (14, 159)
Parent's physical health	1.00 (116, 163)	1.23 (116, 163)	1.13 (116, 163)
Parental engagement	1.18 (27, 252)	1.35 (27, 252)	1.78 (27, 252) *
Harsh discipline practices	2.08 (18, 227)	1.69 (18, 227)	1.68 (18, 227) *

Note. * $p < .05$ ** $p < .01$ *** $p < .001$

Table F2.

Levene's test for all the categorical potential early risk factors

Potential early risk factors	Total difficulties score W0 (df)	Internalising score W0 (df)	Externalising score W0 (df)
Smoking during pregnancy	.42 (1,279)	2.61 (1,279)	.01 (1, 279)
Children with physical illness	.15 (1, 278)	.31 (1, 278)	.79 (1, 278)
Biological sex	.86 (1, 279)	3.11 (1, 279)	.11 (1, 279)
Low income	.16 (1, 277)	.01 (1, 277)	1.77 (1, 277)
Single parenthood	.02 (1, 279)	.47 (1,279)	.84 (1, 279)
Main caregiver's in unemployment	.14 (1, 279)	.44 (1, 279)	.01 (1, 279)
Second-hand smoke exposure	2.82 (1, 278)	.17 (1, 278)	6.65 (1, 278)

Appendix G: *Scatterplots for total difficulties, internalising and externalising scores, for each of the potential (continuous) early risk factors.*

Figure G1.

Scatterplot for total difficulties, at age fourteen, and Naming Vocabulary scores.

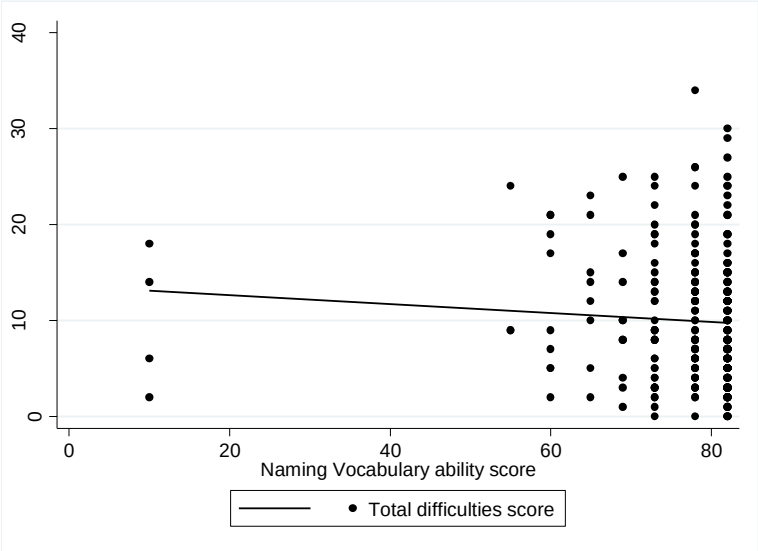


Figure G1. visually describes a, somewhat, negative relationship between naming vocabulary scores and total difficulties scores. This suggests that there may be a relationship between lower (noun) lexical retrieval ability, at age five, and an increase in mental health difficulties at age fourteen.

Figure G2.

Scatterplot for internalising and externalising score, at age fourteen, and Naming Vocabulary scores.

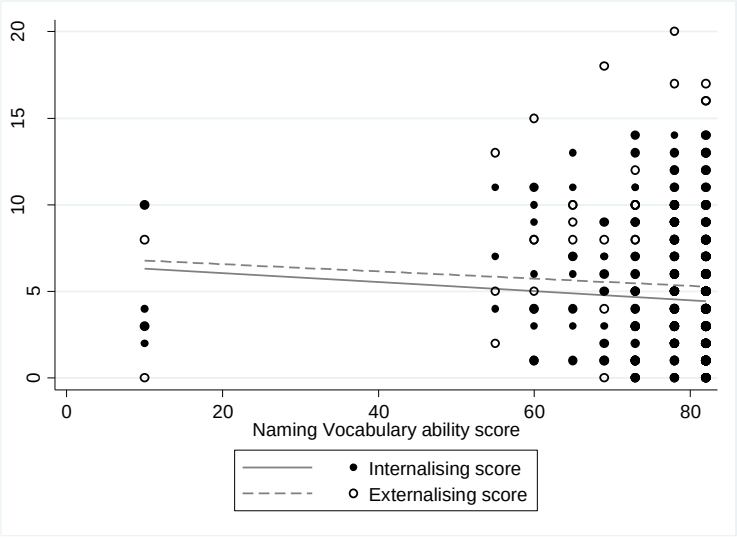


Figure G2. visually describes a, somewhat, negative relationship between naming vocabulary scores and both, internalising and externalising scores. This suggests that there may be a relationship between lower (noun) lexical retrieval ability, at age five, and an increase in internalising and externalising problems at age fourteen.

Figure G3.

Scatterplot for total difficulties, at age fourteen, and main caregiver's psychological distress.

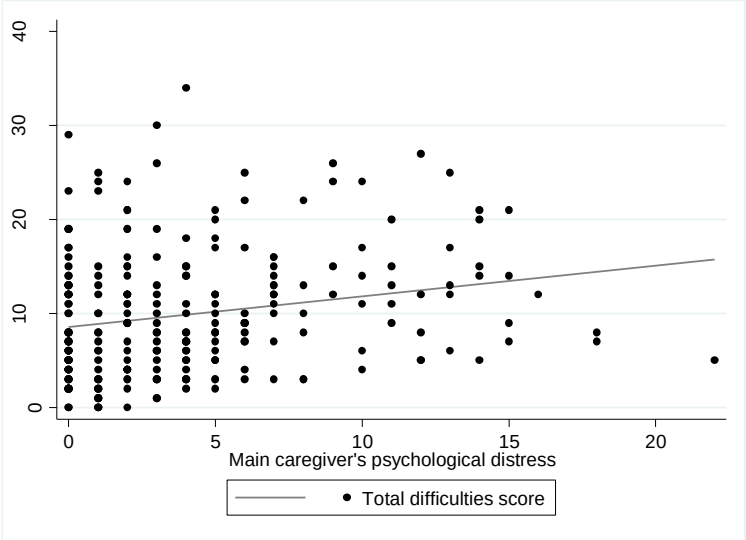


Figure G3. visually describes a, somewhat, positive relationship between main caregiver's psychological distress and total difficulties scores. This suggests that there may be a relationship between poorer caregiver's psychological distress and an increase in mental health difficulties at age fourteen.

Figure G4.

Scatterplot for internalising and externalising scores, at age fourteen, and main caregiver's psychological distress.

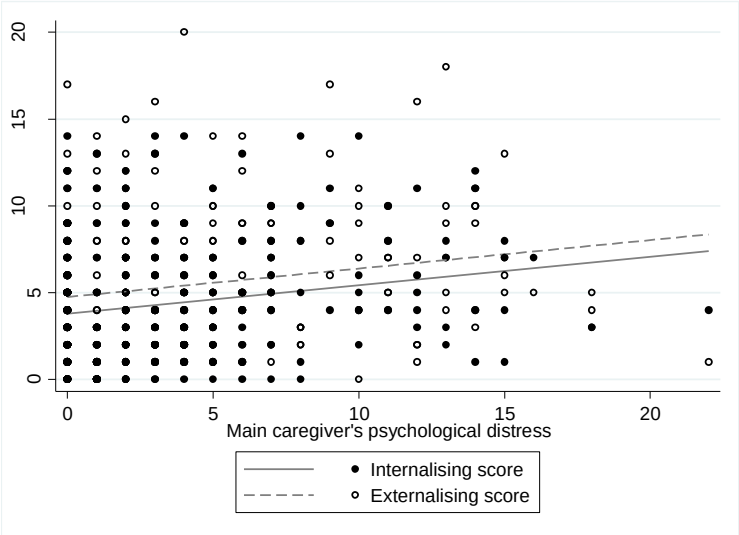


Figure G4. visually describes a positive relationship between main caregiver's psychological distress and both, internalising and externalising scores. This suggests that there may be a relationship between poorer caregiver's psychological distress and an increase in internalising and externalising problems at age fourteen.

Figure G5.

Scatterplot for total difficulties, at age fourteen, and main caregiver's happiness in (martial) relationship.

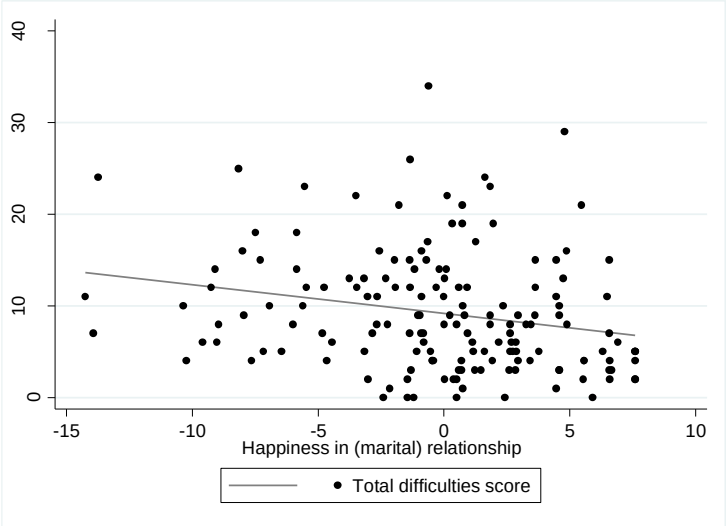


Figure G5. visually describes a negative relationship between main caregiver's happiness in relationships and total difficulties scores. This suggests that there may be a relationship between decrease in caregiver's happiness in relationships and an increase in mental health difficulties at age fourteen.

Figure G6.

Scatterplot for internalising and externalising score, at age fourteen, and main caregiver's happiness in (martial) relationship.

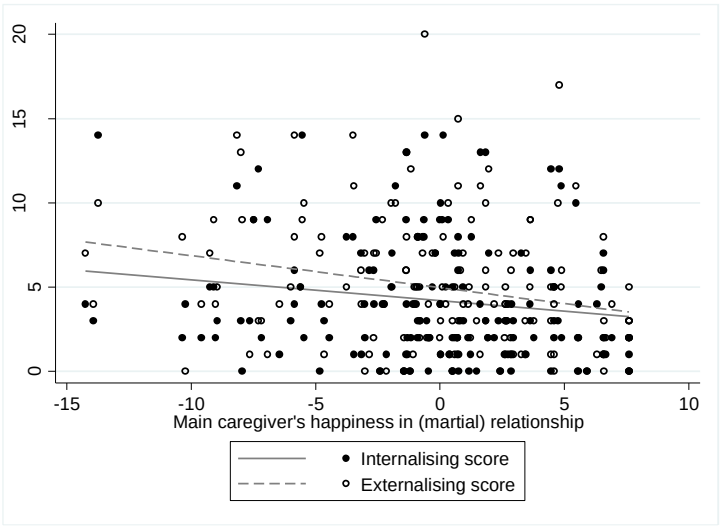


Figure G6. visually describes a negative relationship between main caregiver's happiness in relationships and both, internalising and externalising scores. This suggests that there may be a relationship between decrease in caregiver's happiness in relationships and an increase in internalising and externalising problems at age fourteen.

Figure G7.

Scatterplot for total difficulties, at age fourteen, and parent-child conflict.

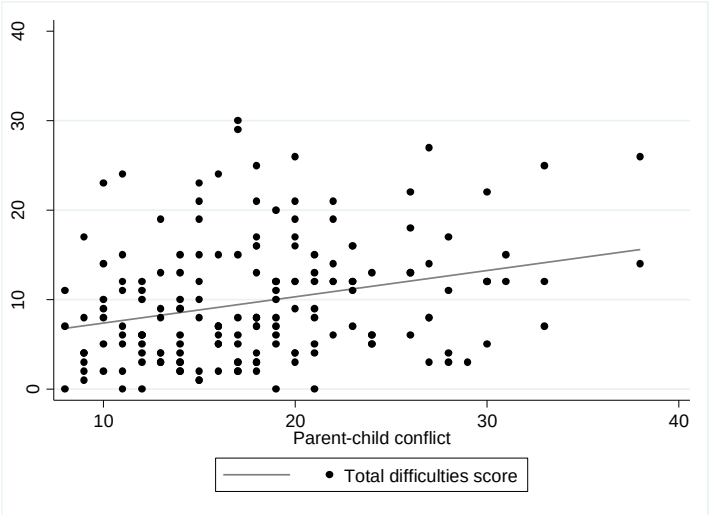


Figure G7. visually describes a positive relationship between parent-child conflict scores and total difficulties scores. This suggests that there may be a relationship between an increase in parent-child conflict and an increase in mental health difficulties at age fourteen.

Figure G8.

Scatterplot for internalising and externalising score, at age fourteen, and parent-child conflict.

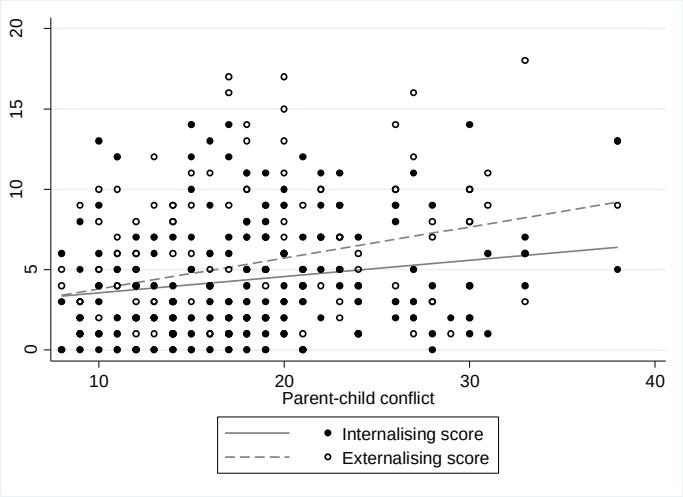


Figure G8. visually describes a positive relationship between parent-child conflict scores and both, internalising and externalising scores. This suggests that there may be a relationship between an increase in parent-child conflict and an increase in internalising and externalising problems at age fourteen.

Figure G9.

Scatterplot for total difficulties, at age fourteen, and parent-child closeness.

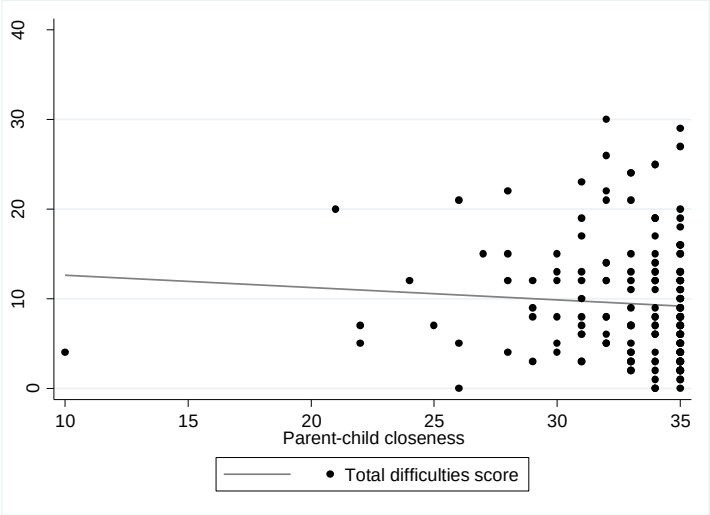


Figure G9. visually describes a, somewhat, negative relationship between parent-child closeness scores and total difficulties scores. This suggests that there may be a relationship between decrease in parent-child closeness and an increase in mental health difficulties at age fourteen.

Figure G10.

Scatterplot for internalising and externalising score, at age fourteen, and parent-child closeness.

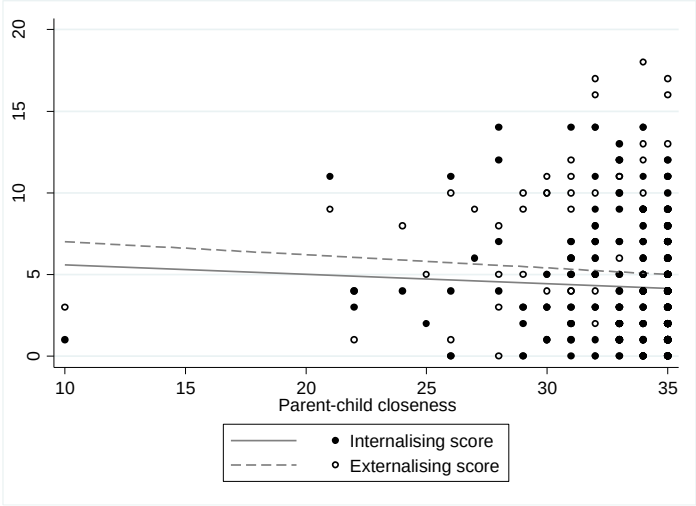


Figure G10. visually describes a, somewhat, negative relationship between parent-child closeness scores and both, internalising and externalising scores. This suggests that there may be a relationship between decrease in parent-child closeness and an increase in internalising and externalising problems at age fourteen.

Figure G11.

Scatterplot for total difficulties, at age fourteen, and main caregiver's physical health.

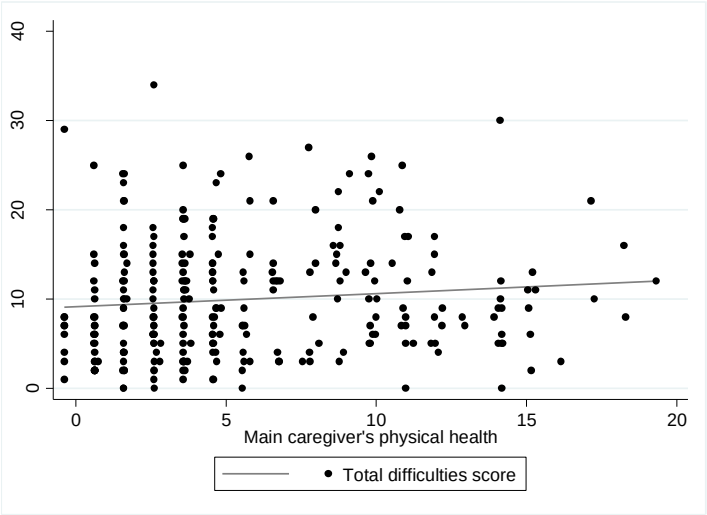


Figure G11. visually describes a, somewhat, positive relationship between main caregiver's physical health and total difficulties scores. This suggests that there may be a relationship between decrease in caregiver's physical health and an increase in mental health difficulties at age fourteen.

Figure G12.

Scatterplot for internalising and externalising score, at age fourteen, and main caregiver's physical health.

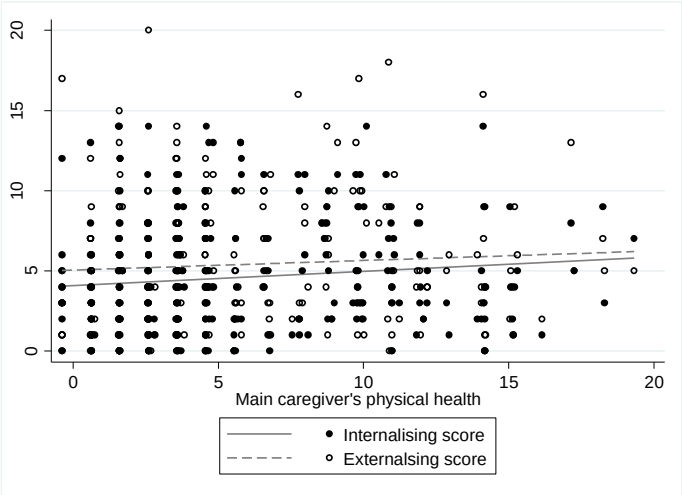


Figure G12. visually describes a, somewhat, positive to flat relationship between main caregiver's physical health and both, internalising and externalising scores. If there is a relationship, it would suggest a link between a decrease in caregiver's physical health and an increase in internalising and externalising problems at age fourteen.

Figure G13.

Scatterplot for total difficulties, at age fourteen, and parental engagement.

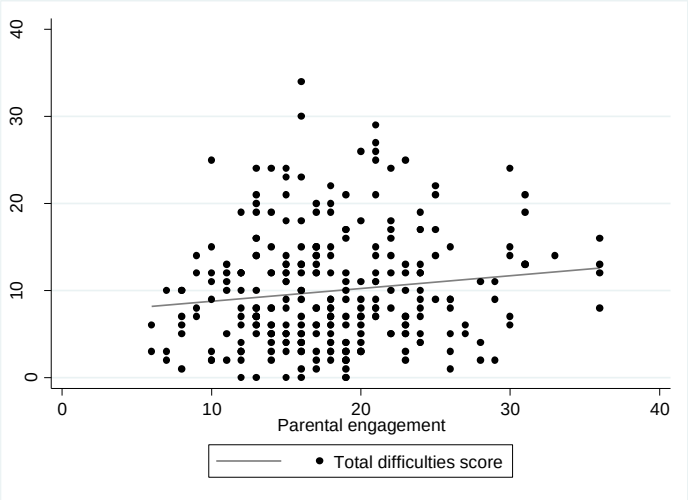


Figure G13. visually describes a positive relationship between parental engagement and total difficulties scores. This suggests that there may be a relationship between decrease in parental engagement and an increase in mental health difficulties at age fourteen.

Figure G14.

Scatterplot for internalising and externalising score, at age fourteen, and parental engagement.

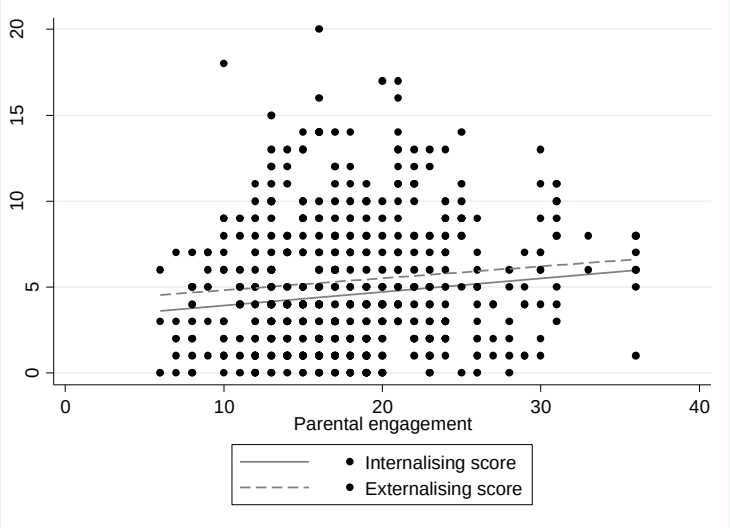


Figure G14. visually describes a positive relationship between parental engagement and both, internalising and externalising scores. This suggests that there may be a relationship between decrease in parental engagement and an increase in internalising and externalising problems at age fourteen.

Figure G15.

Scatterplot for total difficulties, at age fourteen, and harsh discipline practices.

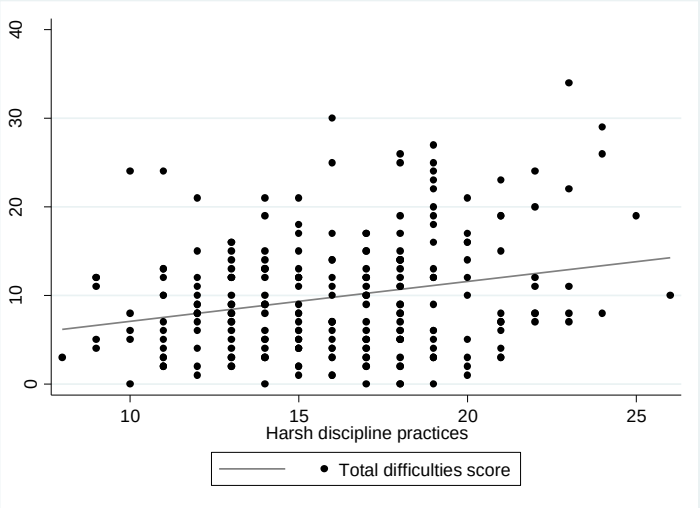


Figure G15. visually describes a positive relationship between harsh discipline practices and total difficulties scores. This suggests that there may be a relationship between decrease in harsh discipline practices and an increase in mental health difficulties at age fourteen.

Figure G16.

Scatterplot for internalising and externalising scores, at age fourteen, and harsh discipline practices.

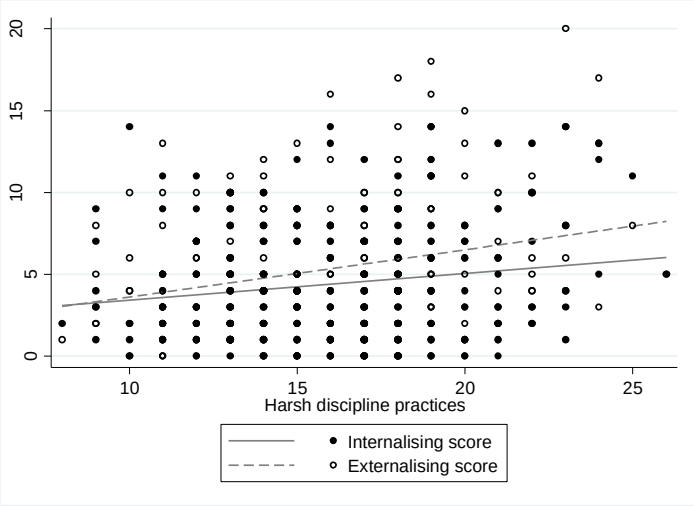


Figure G16. visually describes a positive relationship between harsh discipline practices and both, internalising and externalising scores. This suggests that there may be a relationship between decrease in harsh discipline practices and an increase in internalising and externalising problems at age fourteen.

Appendix H: *Boxplots for total difficulties, internalising and externalising scores, for each of the (categorical) potential risk factors.*

Figure H1.

Boxplot for total difficulties, at age fourteen, and smoking during pregnancy.

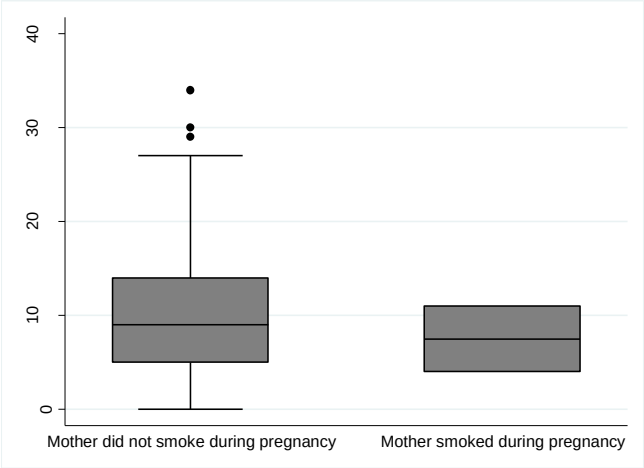


Figure H1. descriptively demonstrates that within young people rDLD, those whose mothers did not smoke during pregnancy had higher total difficulties score. If a significant group differences exists, this suggests that those whose mothers did not smoke during pregnancy were more likely to experience greater severity of mental health difficulties at age fourteen.

Figure H2.

Boxplot for internalising and externalising score, at age fourteen, and smoking during pregnancy.

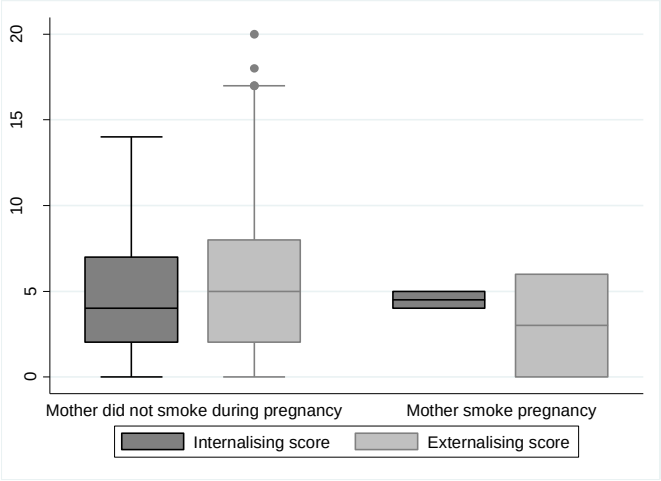


Figure H2. descriptively demonstrates that within young people rDLD, those whose mothers did not smoke during pregnancy had higher internalising score. This suggests that, if a group difference exists, when those whose mothers did not smoke during pregnancy were more likely to experience internalising problems. However, within young people rDLD, those whose mothers did not smoke during pregnancy had lower internalising scores. This suggests that, if a group difference exists, when those whose mothers did not smoke during pregnancy were more likely to experience externalising problems.

Figure H3.

Boxplot for total difficulties, at age fourteen, and children's physical illness.

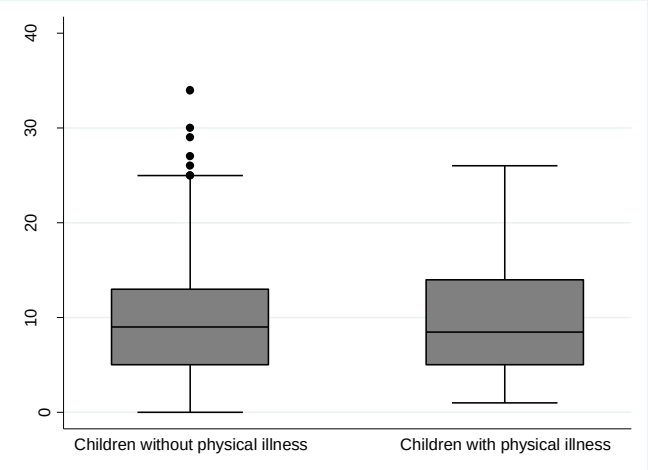


Figure H3. descriptively demonstrates that within young people rDLD, those who had a physical illness had higher total difficulties score. This suggests that those who has a physical illness were more likely to experience greater severity of mental health difficulties at age fourteen.

Figure H4.

Boxplot for total difficulties, at age fourteen, and household income.

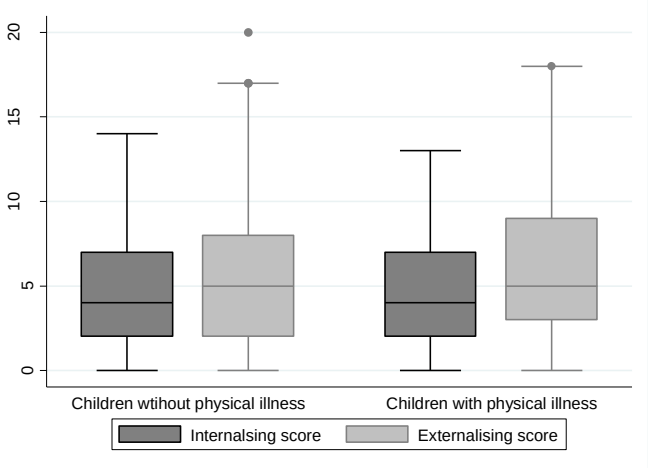


Figure H4. descriptively demonstrates that within young people rDLD, those had a physical illness had higher internalising and externalising score. This suggests that young people rDLD who had a physical illness were more likely to experience internalising and externalising problems.

Figure H5.

Boxplot for total difficulties, at age fourteen, and biological sex.

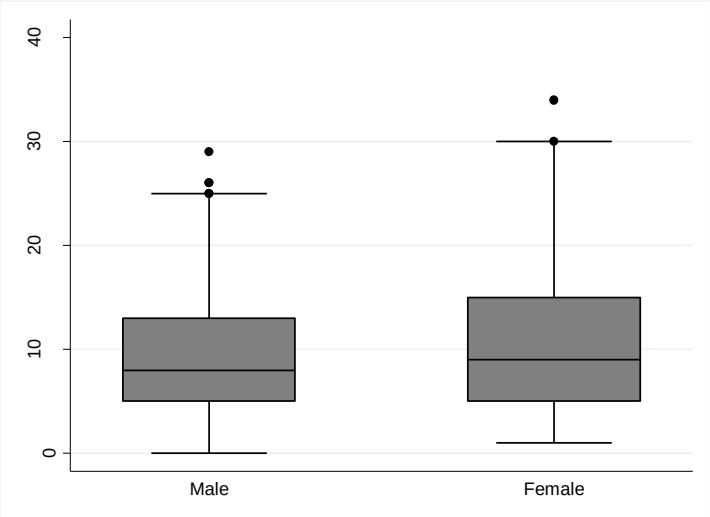


Figure H5. descriptively demonstrates that within young people rDLD, females had higher total difficulties score. This suggests that females, compared to males, were more likely to experience greater severity of mental health difficulties at age fourteen.

Figure H6.

Boxplot for internalising and externalising score, at age fourteen, and biological sex.

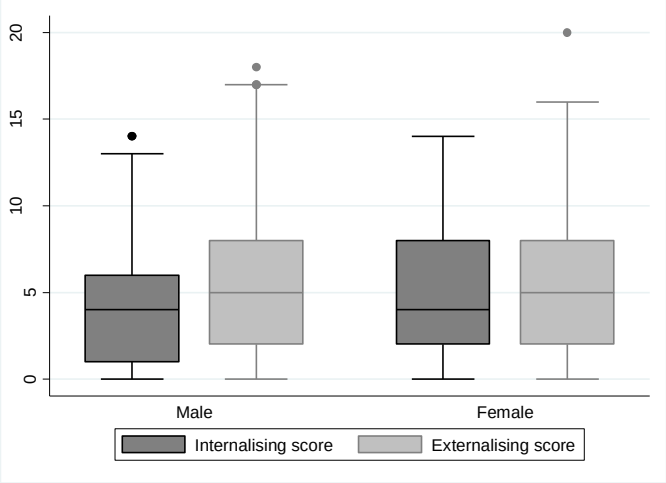


Figure H6. descriptively demonstrates that within young people rDLD, females had higher internalising and externalising score. This suggests that young people rDLD who were females were more likely to experience internalising and externalising problems.

Figure H7.

Boxplot for total difficulties, at age fourteen, and household income.

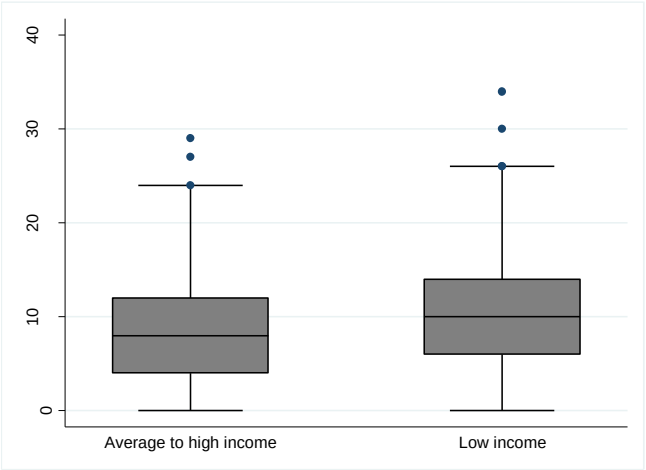


Figure H7. descriptively demonstrates that within young people rDLD, those in low-income households had higher total difficulties score. This suggests those in low-income households were more likely to experience greater severity of mental health difficulties at age fourteen.

Figure H8.

Boxplot for internalising and externalising score, at age fourteen, and household income.

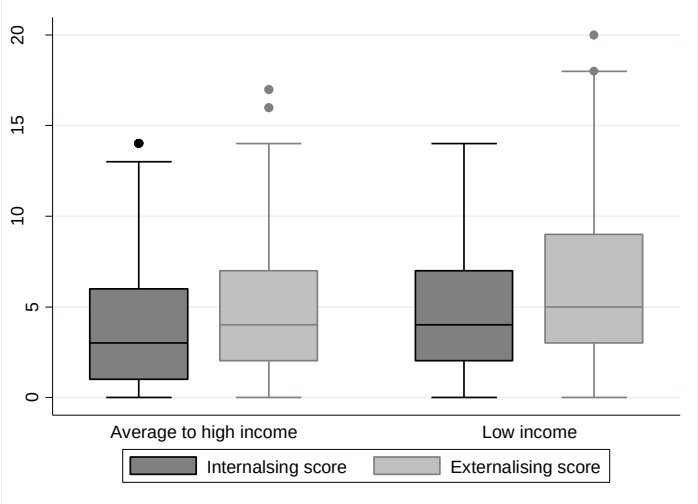


Figure H8. descriptively demonstrates that within young people rDLD, those in low-income household had higher internalising and externalising score. This suggests that within young people rDLD, those in low-income households were more likely to experience internalising and externalising problems.

Figure H9.

Boxplot for total difficulties, at age fourteen, and parent household.

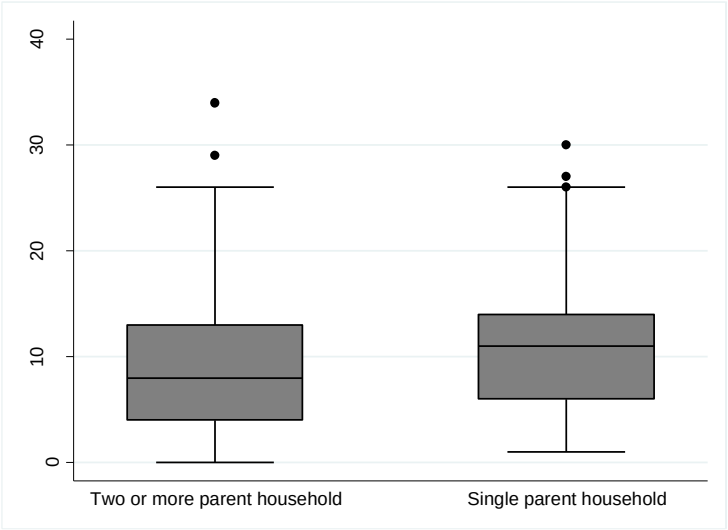


Figure H9. descriptively demonstrates that within young people rDLD, those in single parent household had higher total difficulties score. This suggests that young people rDLD who live in single parent households were more likely to experience mental health difficulties at age fourteen.

Figure H10.

Boxplot for internalising and externalising score, at age fourteen, and parent household.

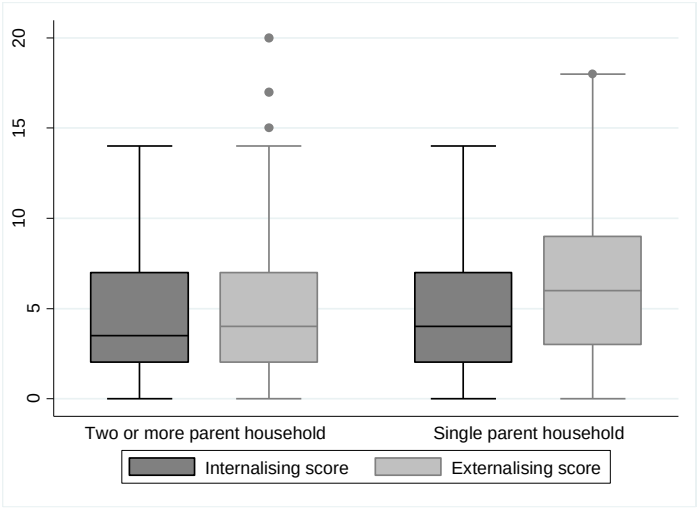


Figure H10. descriptively demonstrates that within young people rDLD, those in single parent households had higher internalising and externalising score. This suggests that young people rDLD who lived in single parent households were more likely to experience internalising and externalising problems.

Figure H11.

Boxplot for total difficulties, at age fourteen, and main caregiver's employment status.

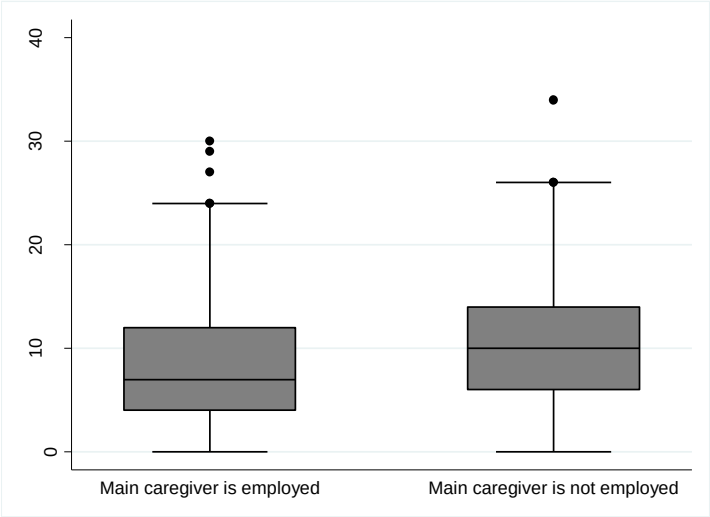


Figure H11. descriptively demonstrates that within young people rDLD, whose main caregiver was unemployed had higher total difficulties score. This suggests that young people rDLD whose main caregiver was unemployed were more likely to experience mental health difficulties at age fourteen.

Figure H12.

Boxplot for internalising and externalising score, at age fourteen, and main caregiver's employment status.

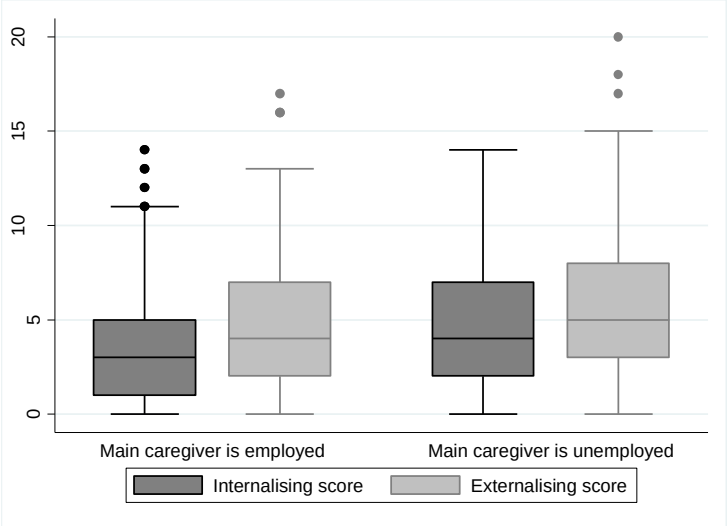


Figure H12. descriptively demonstrates that within young people rDLD, whose main caregiver was unemployed had higher internalising and externalising score. This suggests that young people rDLD whose main caregiver was unemployed were more likely to experience internalising and externalising problems.

Figure H13.

Boxplot for total difficulties, at age fourteen, and second-hand smoke exposure.

Figure H13. descriptively demonstrates that within young people rDLD, who were exposed to second-hand smoke had higher total difficulties score. This suggests that young people rDLD who were exposed to second-hand smoke were more likely to experience mental health difficulties at age fourteen.

Figure H14.

Boxplot for internalising and externalising score, at age fourteen, and second-hand smoke exposure.

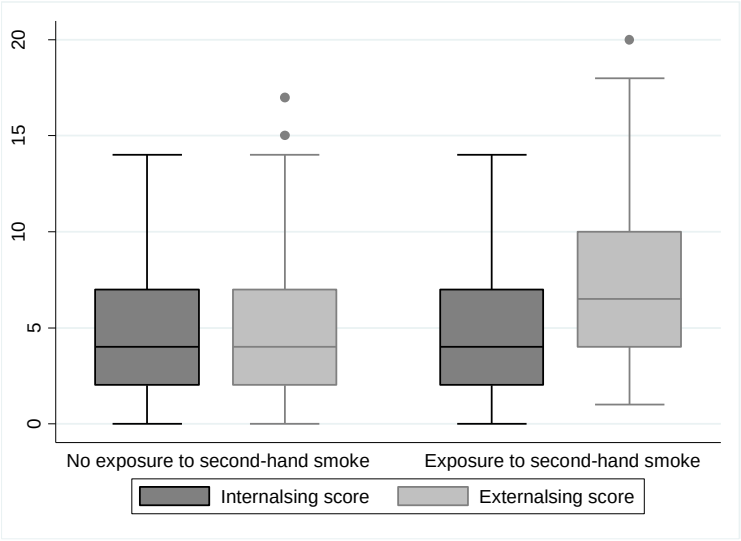


Figure H14. descriptively demonstrates that within young people rDLD, whose main caregiver was unemployed had higher internalising and externalising score. This suggests that young people rDLD whose main caregiver was unemployed were more likely to experience internalising and externalising problems.

Appendix I: *Correlation matrix for the potential early risk factors for mental health difficulties at age fourteen.*

Table I1.

Correlation matrix for all the continuous potential risk factors

	1	2	3	4	5	6	7	8
1. Naming Vocabulary subtest	-	-.14	.009	-.07	.05	.01	-.004	.007
2. Main caregiver's psychological distress	-	-	-.43***	.27***	-.22**	.37***	.13*	.18**
3. Main caregiver's happiness in relationship	-	-	-	-.29***	.20*	-.07	-.05	.22**
4. Parent-child conflict	-	-	-	-	-.20**	.14	.01	.11
5. Parent-child closeness	-	-	-	-	-	-.19**	-.10	.05
6. Parent's physical health	-	-	-	-	-	-	.09	.01
7. Parental engagement	-	-	-	-	-	-	-	.06
8. Harsh discipline practices	-	-	-	-	-	-	-	-

Note. * $p < .05$ ** $p < .01$ *** $p < .001$

Table I2.

Correlational matrix for all the categorical potential early risk factor for mental health difficulties in early adolescence.

	1	*2*	*3*	*4*	*5.*	*6*	*7*
1. Smoking during pregnancy	-	.12	2.44	.10	.84	3.28	.62
2. Children with physical illness	-	-	2.15	.14	.55	.12	.20
3. Biological sex	-	-	-	4.27**	.44	.34	2.05
4. Low income	-	-	-	-	35.23***	87.72***	3.84*
5. Single parenthood	-	-	-	-	-	8.15**	17.16***
6. Main caregiver in unemployment	-	-	-	-	-	-	4.11*
7. Second-hand smoke exposure	-	-	-	-	-	-	-

Note. * $p < .05$ ** $p < .01$ *** $p < .001$

Appendix J: *The original multiple regressions for identifying early risk factors for mental health difficulties at age fourteen.*

Total difficulties score.

The original regression model was significant $F(10, 143) = 3.53$, $p = .001$), with a R^2 of .20 (*Adj.* $R^2 = .14$). As for the main effects: parent-child conflict and harsh discipline practices significant predictors of total difficulties score (B = .20, $\beta = -.18$, $p < .05$; B = .38, $\beta = -.20$, $p < .01$). Unlike the results from the robust option, exposure to second-hand smoke was a significant predictor of total difficulties score in the original regression model (B = .271, $\beta = -.18$, $p < .05$).

Internalising score.

The original regression model was significant $F(4,168) = 4.29$, $p = .01$), with a R^2 of .09 (*Adj.* $R^2 = .07$). As for the main effects: parent-child conflict and being female are significant predictors of internalising score (B = .09, $\beta = .16$, $p < .05$; B = 1.24, $\beta = .17$, $p < .05$).

Externalising score.

The original regression model was significant $F(7, 146) = 6.02$, $p = .001$), with a R^2 of .22 (*Adj.* $R^2 = .19$). As for the main effects: parent-child conflict (B = .17, $\beta = -.25$, $p < .01$), harsh discipline practices (B = .22, $\beta = -.19$, $p < .05$) and second-hand smoke exposure (B = 2.13, $\beta = -.22$, $p < .01$) are significant predictors of externalising score.

Appendix K: *Test of mean difference between the newly dichotomised early risk factors for SDQ scores at age fourteen.*

Table K1.

T-tests for the at-risk and not at-risk.

Dichotomised early risk factors	At risk		Not at risk		*z*	Effect size
	n	*M (SD)*	*n*	*M (SD)*		
Total difficulties						
Parent-child conflict	47	11.79 (6.25)	119	8.95 (6.89)	-2.94**	.43
Harsh discipline practice	31	12.32 (7.70)	135	9.16 (6.59)	-2.20*	.46
Internalising score						
Parent-child conflict	47	5.21 (3.52)	119	3.98 (3.67)	-2.48*	.34
Externalising score						
Parent-child conflict	47	6.57 (4.13)	119	4.97 (4.05)	-2.38*	.39
Harsh discipline practice	31	6.97 (4.78)	135	5.07 (3.89)	-2.00*	.44

Note. * $p < .05$ ** $p < .01$ *** $p < .001$

Appendix L: *Missing values on the total risk scores, for mental health difficulties, internalising and externalising score.*

For the total difficulties score total risk scores the number of observations was 258. Little's test revealed that the data is missing at random ($p = .21$).

For internalising total risk score the number of observations was 281. Little's test revealed that the data is missing at random ($p = .72$).

For externalising total risk score the number of observations was 280. Little's test revealed that the data is missing at random ($p = .54$).

Appendix M: *The robust hierarchical regressions for investigating the possible cumulative effect between early risk factors and mental health difficulties at age fourteen.*

Total difficulties score

The first step of the robust hierarchical regression included the total difficulties total risk score. The first step of the robust regression model was significant $F(1, 279) = 10.18$, $p < .01$), with a R^2 of .04. As for the main effects (total difficulties) total risk scores did predict total difficulties score (B = 2.40, $\beta = .19$, $p < .01$). The second step introduced the quadratic term for the total difficulties total risk score. Despite that the regression model is significant (R^2 = 4%, $F(2, 278) = 5.48$), $p < .01$), the variance between step one and two did not significantly differ (R^2 change = .002, $F(1,278) = .44$, $p = .51$).

Internalising score

The first step of the robust hierarchical regression included the internalising problems total risk score. The first step of the robust regression model was significant $F(1, 279) = 6.98$, $p < .01$), with a R^2 of .02. As for the main effects internalising problems total risk scores did predict internalising problems (B = .84, $\beta = .15$, $p < .01$). The second step introduced the quadratic term for the internalising problems total risk score. Despite that the regression model is significant ($R^2 = .02$, F(2, 278) = 3.49), $p < .05$), the variance between step one and two did not significantly differ (R^2 change = .001, $F(1,278) = .02$, $p = .90$).

Externalising score

The first step of the robust hierarchical regression included the externalising problems total risk score. The first step of the robust regression model was significant $F(1, 279) = 21.57$, $p < .001$), with a R^2 of .09. As for the main effects (externalising problems) total difficulties scores did predict externalising problems (B = 1.76, β = .31, $p < .001$). The second step

introduced the quadratic term for the externalising problems total risk score. Despite that the regression model is significant (R^2 = .09, F(2, 278) = 11.25), p < .001), the variance between step one and two did not significantly differ (R^2 change = .001, F(1,278) = .17, p = .68).

Appendix N: *Test of normality for the continuous potential positive factor.*

Table N1.

Skewness/Kurtosis and Shapiro-Wilk W continuous potential positive factors.

Potential school age positive factors	*n*	Shapiro-Wilks W	Skewness (probability)	Kurtosis (probability)
Individual				
Sleep latency	270	.95***	.001	.11
Sleep disruption	269	.96***	.001	.002
Self-esteem	254	.97***	.21	.49
Exercise	281	.96***	.001	.02
Reads for fun	270	.98**	.88	-
Prosocial behaviour	281	.90***	.001	.001
Problem-solving ability	244	.92***	.57	.001
Family				
Parent-child closeness	270	.96***	.001	.69
Community				
Educational motivation	267	.98**	.002	.60
Safe neighbourhood	272	.97***	.05	.52
Attendance to religious groups	270	.97***	.001	.001
Attendance to youth clubs	270	.97***	.09	-
Attendance to band practice	267	.82***	.001	.001

Note. * p < .05 ** p < .01 *** p < .001

Appendix O: *Levene's test of equal for the potential school age positive factors.*

Table O1.

Summary of the Levene's test for the continuous school age positive factors

Potential school age positive factors	Total difficulties score W0 (df)	Internalising score W0 (df)	Externalising score W0 (df)
Individual			
Sleep latency	.65	1.14	1.16
Sleep disruption	.54	.90	.64
Self-esteem	1.34	1.21	.77
Exercise	.79	.61	1.20
Reads for fun	2.28*	1.16	1.48
Prosocial behaviour	1.48	1.45	1.73
Problem-solving ability	1.48	1.45	1.73
Family			
Parent-child closeness	.23	1.51	.63
Community			
Educational motivation	1.57	1.04	1.71*
Safe neighbourhood	3.36*	2.41	3.92**
Attendance to religious groups	2.26*	1.90	1.23
Attendance to youth clubs	.67	.32	.64
Attendance to band practice	1.20	1.17	.81

Note. * $p < .05$ ** $p < .01$ *** $p < .001$

Table O2.

Levene's test for the categorical potential school-age factors: close friends

Potential school age positive factors	Total difficulties score W0	Internalising score W0	Externalising score W0
Close friends	.49	2.67	.02

Appendix P: *Scatterplots for total difficulties, internalising and externalising scores, for each of the continuous school-age positive factors.*

Figure P1.

Scatterplot for total difficulties score, at age fourteen, for reported levels of self-esteem.

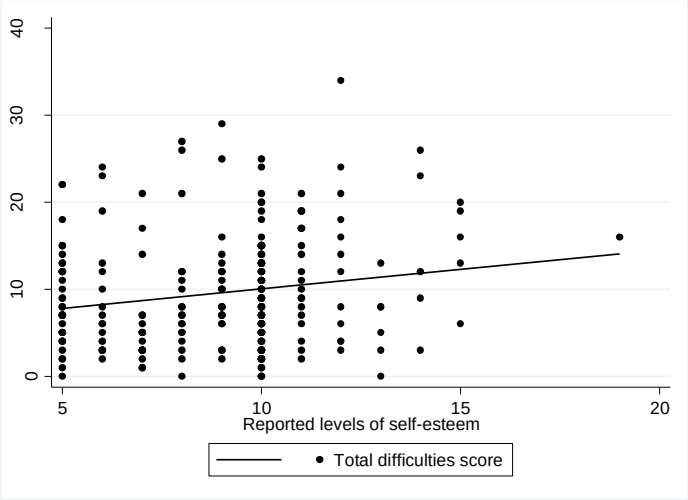


Figure P1. visually describes a, somewhat, positive relationship between self-esteem scores and total difficulties scores. This suggests that there may be a relationship between lower self-esteem and an increase in the severity of mental health difficulties at age fourteen.

Figure P2.

Scatterplot for internalising and externalising score, at age fourteen, for reported levels of self-esteem.

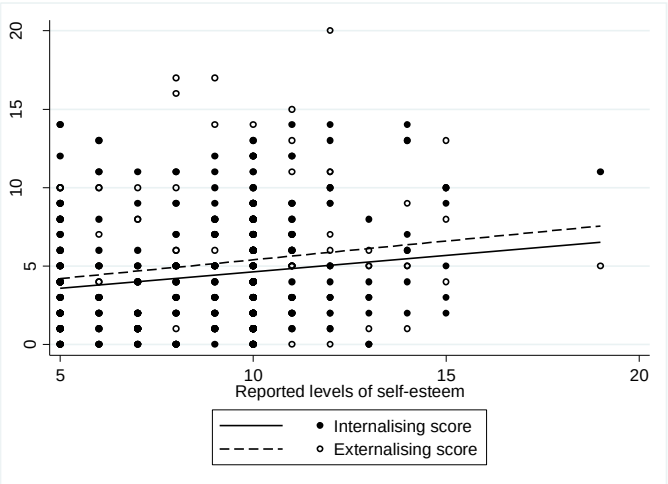


Figure P2. descriptively demonstrates a positive relationship between self-esteem scores and higher internalising and externalising score. This suggests that there may be a relationship between lower self-esteem and a greater severity of internalising and externalising problems at age fourteen.

Figure P3.

Scatterplot for total difficulties score, at age fourteen, for (spatial) problem-solving ability.

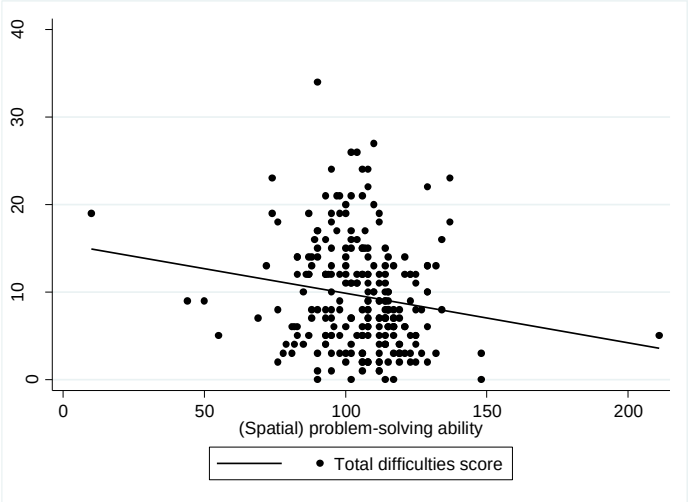


Figure P3. visually describes a negative relationship between (spatial) problem-solving ability and total difficulties scores. This suggests that there may be a relationship between lower (spatial) problem-solving ability and an increase in the severity of mental health difficulties at age fourteen.

Figure P4.

Scatterplot for total difficulties score, at age fourteen, for reported levels of self-esteem.

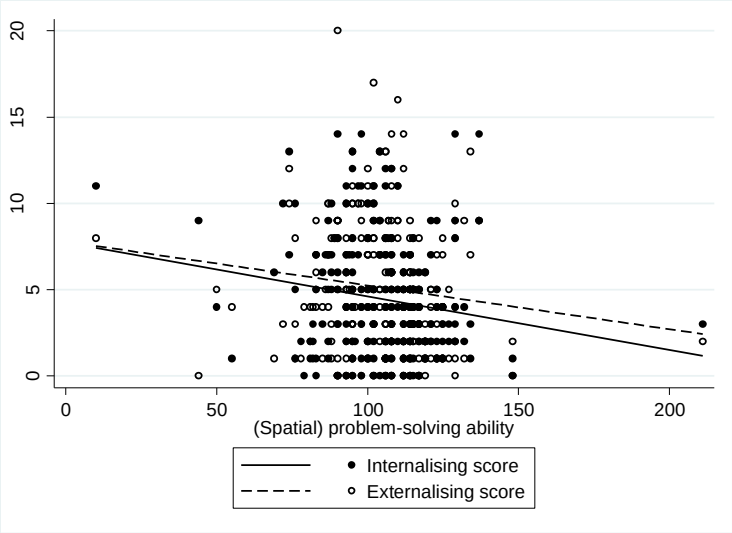


Figure P4. descriptively demonstrates a negative relationship between (spatial) problem-solving ability and higher internalising and externalising score. This suggests that there may be a relationship between (spatial) problem-solving ability and a greater severity of internalising and externalising problems at age fourteen.

Figure P5.

Scatterplot for total difficulties score, at age fourteen, and frequency of sleep disruption.

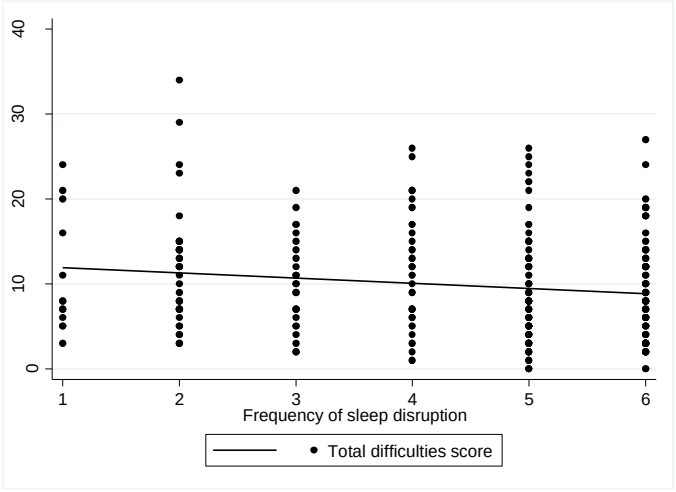


Figure P5. visually describes a, somewhat, negative relationship between the frequency of sleep disruption and total difficulties scores. This suggests that there may be a relationship between an increase frequency of sleep disruption and an increase in the severity of mental health difficulties at age fourteen.

Figure P6.

Scatterplot for internalising and externalising score, at age fourteen, and frequency of sleep disruption.

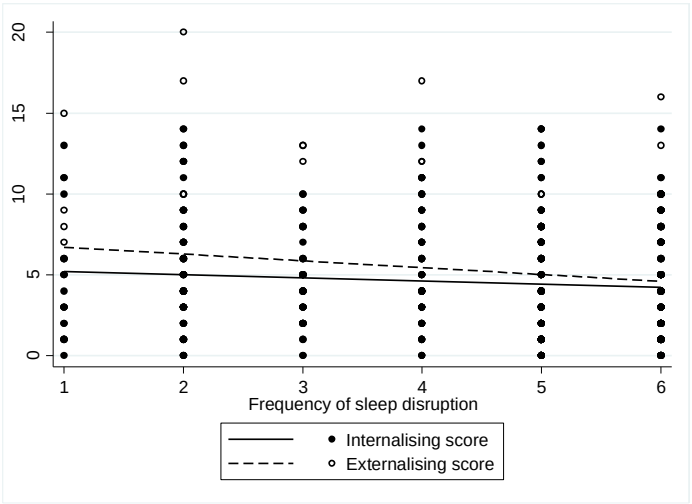


Figure P6. descriptively demonstrates a, somewhat, negative relationship between the frequency of sleep disruption and higher internalising and externalising score. This suggests that there may be a relationship between an increase in frequency of sleep disruption and a greater severity of internalising and externalising problems at age fourteen.

Figure P7.

Scatterplot for total difficulties score, at age fourteen, and sleep latency.

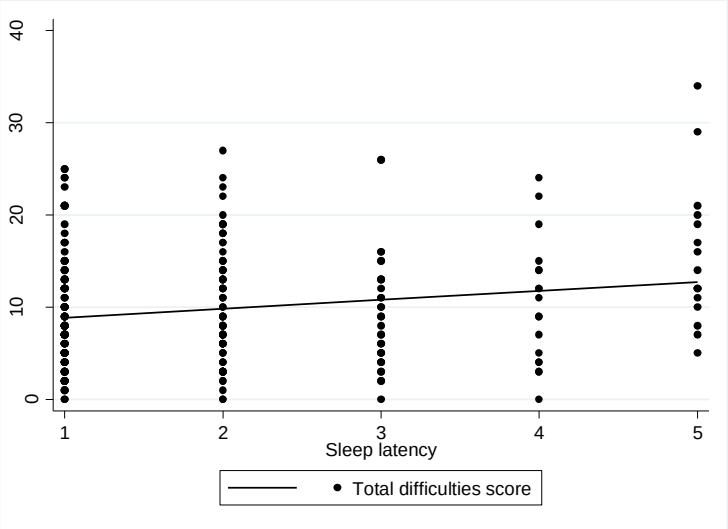


Figure P7. visually describes a positive relationship between sleep latency and total difficulties scores. This suggests that there may be a relationship between an decrease sleep latency and an increase in the severity of mental health difficulties at age fourteen.

Figure P8.

Scatterplot for internalising and externalising score, at age fourteen, and sleep latency.

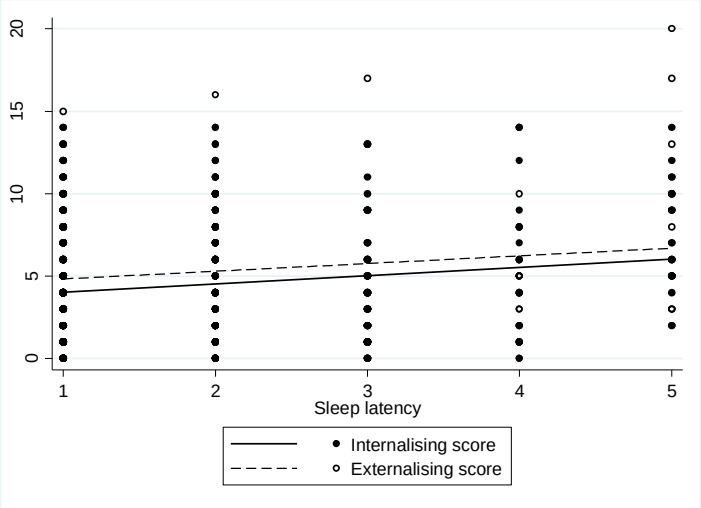


Figure P8. visually describes a positive relationship between sleep latency and both, internalising and externalising scores. This suggests that there may be a relationship between an increase frequency of sleep disruption and an increase in the severity of internalising and externalising problems at age fourteen.

Figure P9.

Scatterplot for total difficulties score, at age fourteen, and frequency of physical exercise.

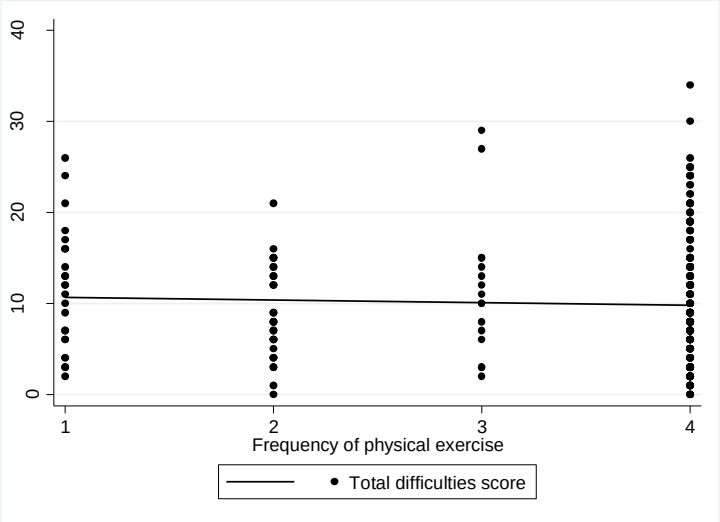


Figure P9. visually describes a flat relationship between frequency of exercise and total difficulties scores. This might suggest that there is no relationship between frequency of exercise and the severity of mental health difficulties at age fourteen.

Figure P10.

Scatterplot for internalising and externalising score, at age fourteen, and frequency of physical exercise.

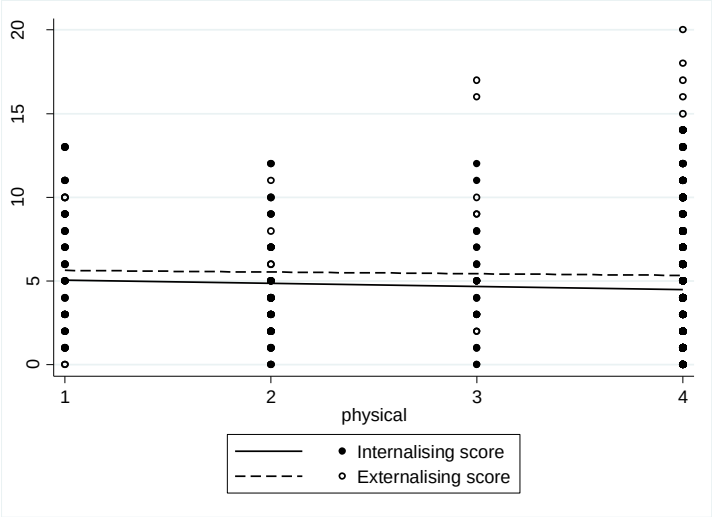


Figure P10. visually describes a seemingly flat relationship between frequency of exercise and both, internalising and externalising scores. This suggests that there may be no relationship between frequency of exercise and, internalising and externalising problems at age fourteen.

Figure P11.

Scatterplot for total difficulties score, at age fourteen, for reported levels of educational motivation.

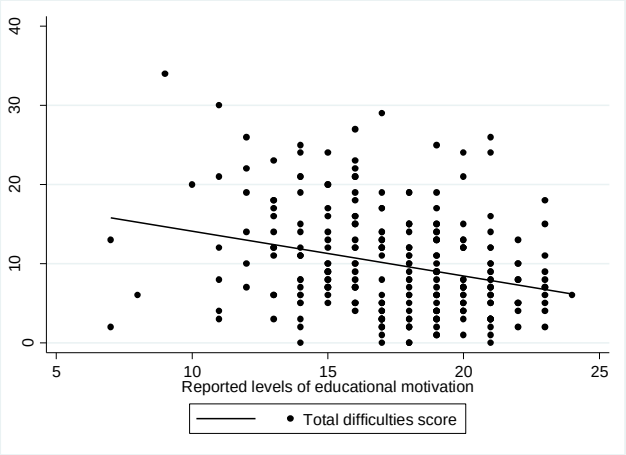


Figure P11. visually describes a negative relationship between reported levels of educational motivation and total difficulties score. This suggests that a relationship may exist between lower levels of educational motivation and an increase severity of mental health difficulties at age fourteen.

Figure P12.

Scatterplot for internalising and externalising score, at age fourteen, for reported levels of educational motivation.

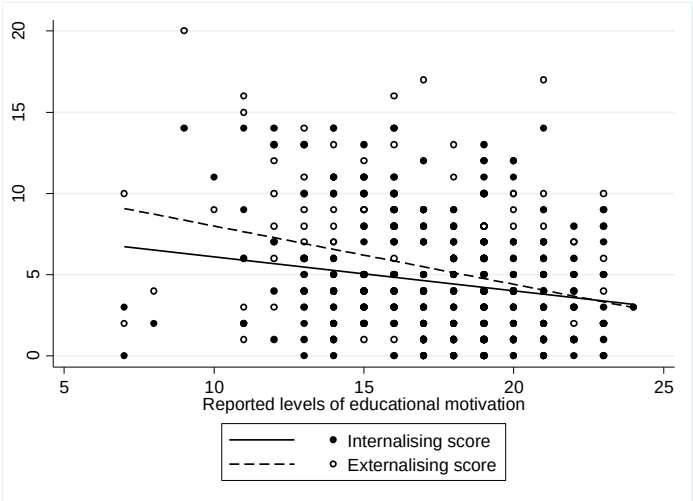


Figure P12. descriptively demonstrates a negative relationship between reported levels of educational motivation and higher internalising and externalising score. This suggests that there may be a relationship between a lower reported levels of educational motivation and a greater severity of internalising and externalising problems at age fourteen.

Figure P13.

Scatterplot for total difficulties score, at age fourteen, and reports of reading for fun.

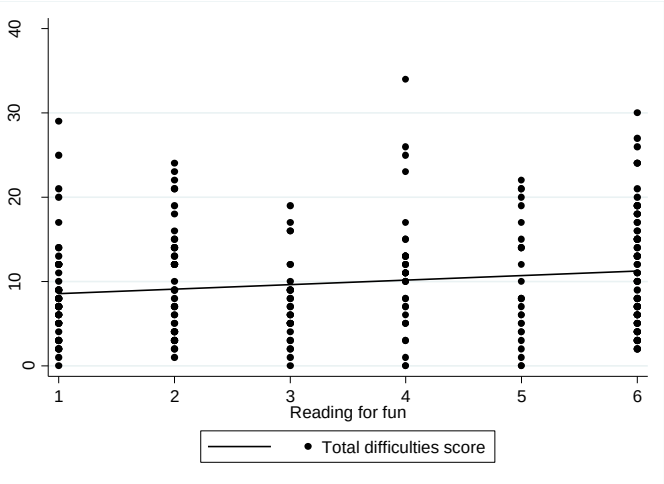


Figure P13. visually describes a positive relationship between reported levels of reading for fun and total difficulties score. This suggests that a relationship may exist between lower reports of reading for fun and an increase severity of mental health difficulties at age fourteen.

Figure P14.

Scatterplot for internalising and externalising score, at age fourteen, and reports of reading for fun.

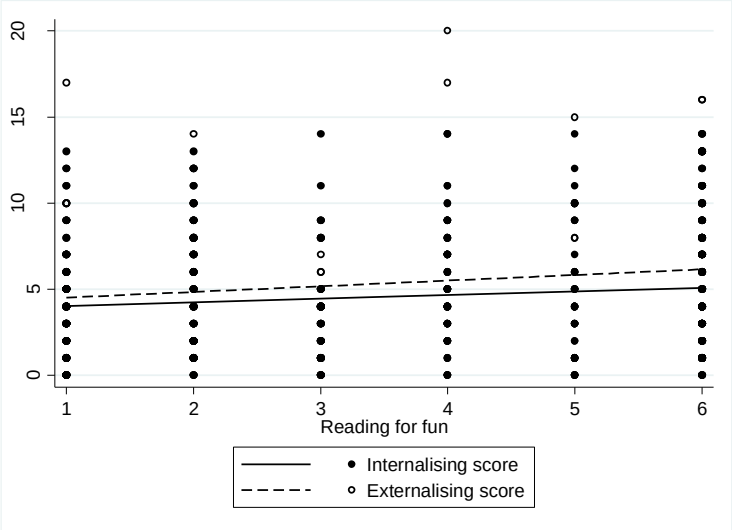


Figure P14. descriptively demonstrates a positive relationship between reported levels of reading for fun and higher internalising and externalising score. This suggests that there may be a relationship between a lower between reported levels of reading for fun and a greater severity of internalising and externalising problems at age fourteen.

Figure P15.

Scatterplot for total difficulties score, at age fourteen, for reported levels of prosocial behaviour.

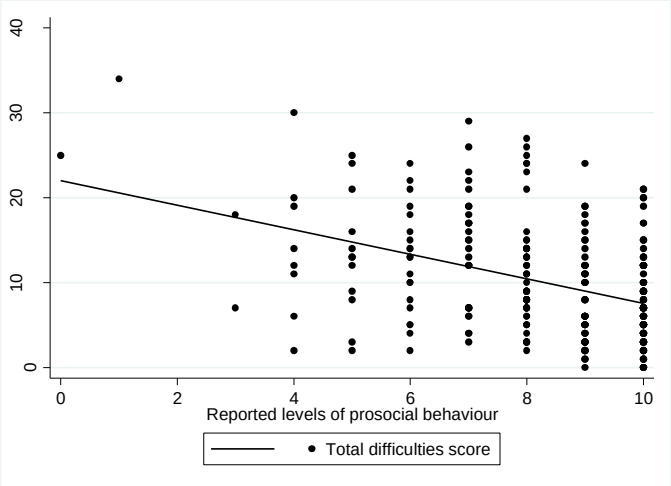


Figure P15. visually describes a negative relationship between reported levels of prosocial behaviour and total difficulties score. This suggests that a relationship may exist between lower reports of prosocial behaviour and an increase severity of mental health difficulties at age fourteen.

Figure P16.

Scatterplot for internalising and externalising score, at age fourteen, for reported levels of prosocial behaviour.

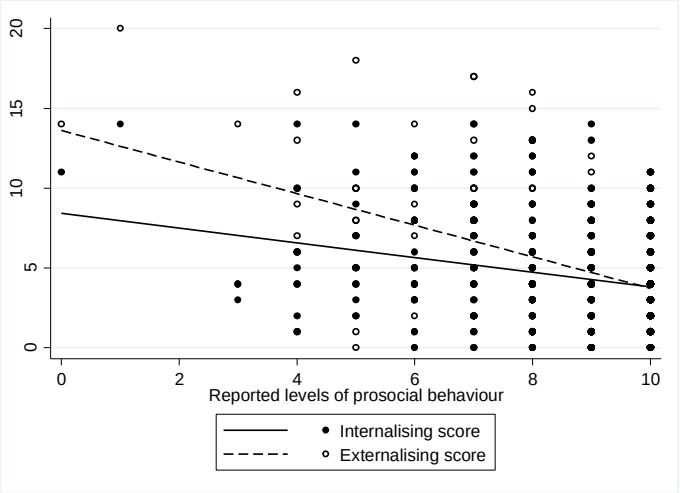


Figure P16. descriptively demonstrates a negative relationship between reported levels of prosocial behaviour and higher internalising and externalising score. This suggests that there may be a relationship between a lower reported level of prosocial behaviour and a greater severity of internalising and externalising problems at age fourteen.

Figure P17.

Scatterplot for total difficulties score, at age fourteen, and parent-child closeness.

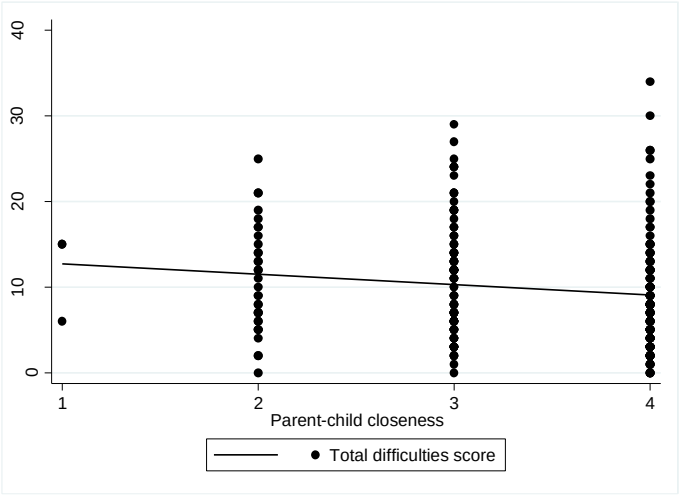


Figure P17. visually describes a negative relationship between parent-child closeness scores and total difficulties score. This suggests that a relationship may exist between a decrease in parent-child closeness and an increase severity of mental health difficulties at age fourteen.

Figure P18.

Scatterplot for total difficulties score, at age fourteen, and parent-child closeness.

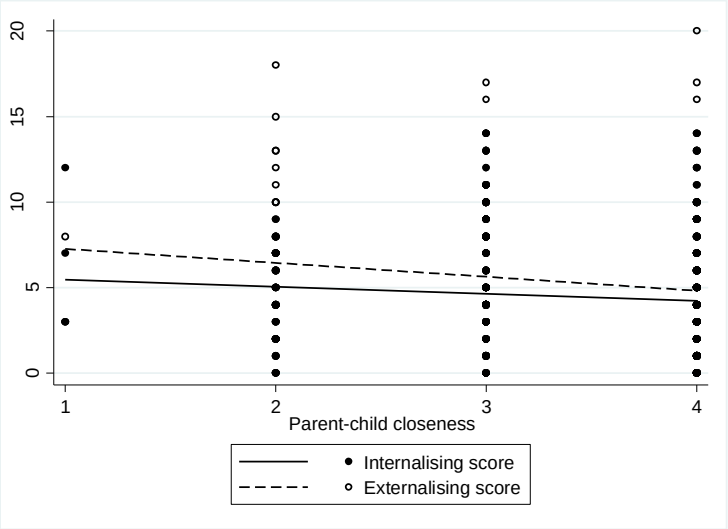


Figure P18. descriptively demonstrates a, somewhat, negative relationship between parent-child closeness scores and higher internalising and externalising score. This suggests that there may be a relationship between a decrease in parent-child closeness and a greater severity of internalising and externalising problems at age fourteen.

Figure P19.

Scatterplot for total difficulties score, at age fourteen, and neighbourhood safety.

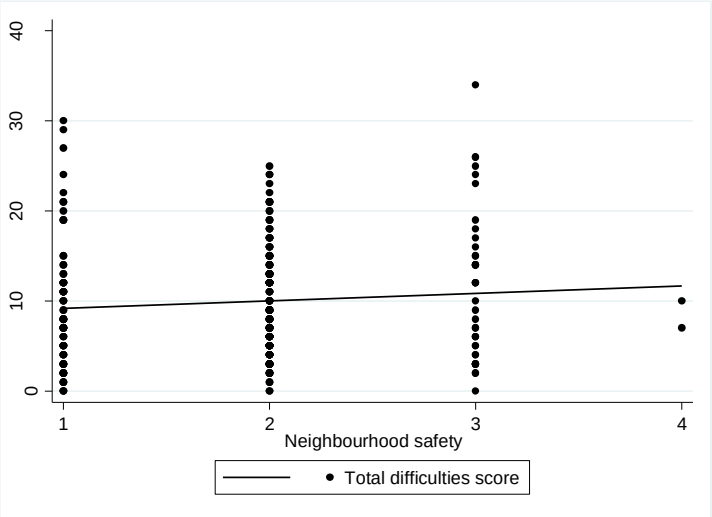


Figure P19. visually describes a positive relationship between reports of neighbourhood safety and total difficulties score. This suggests that a relationship may exist between a decrease reports of neighbourhood safety and an increase severity of mental health difficulties at age fourteen.

Figure P20.

Scatterplot for internalising and externalising score, at age fourteen, and neighbourhood safety.

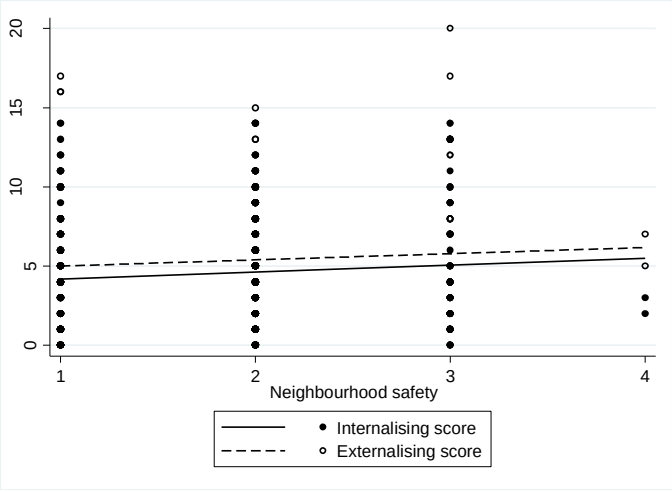


Figure P20. descriptively demonstrates a positive relationship between reports of neighbourhood safety and higher internalising and externalising score. This suggests that there may be a relationship between a decrease reports of neighbourhood safety and a greater severity of internalising and externalising problems at age fourteen.

Figure P21.

Scatterplot for total difficulties score, at age fourteen, and attendance to religious services.

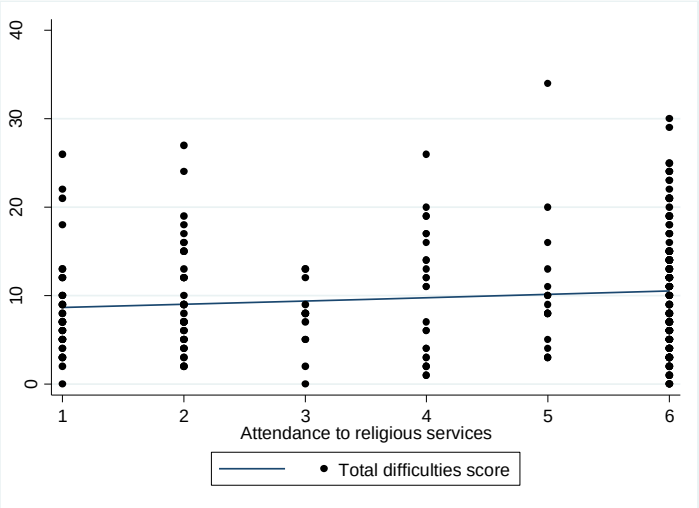


Figure P21. visually describes a positive relationship between attendance to religious services and total difficulties score. This suggests that a relationship may exist between lower attendance of religious services and an increase severity of mental health difficulties at age fourteen.

Figure P22.

Scatterplot for internalising and externalising scores, at age fourteen, and attendance to religious services.

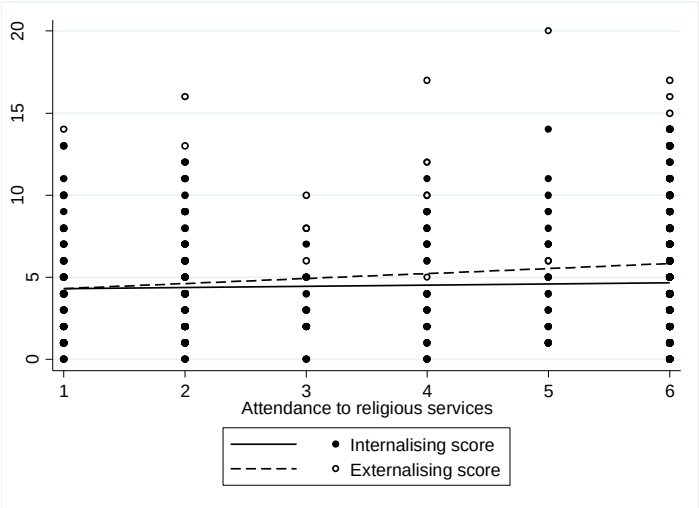


Figure P22. descriptively demonstrates, somewhat, a positive relationship between attendance to religious services and higher internalising and externalising score. This suggests that if there is a relationship, then would indicate a link between a lower attendance to religious services and a greater severity of internalising and externalising problems at age fourteen.

Figure P23.

Scatterplot for total difficulties score, at age fourteen, and attendance to organised activities.

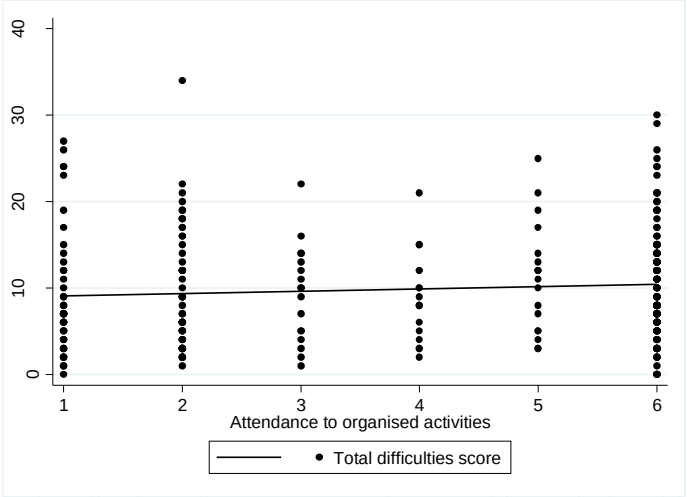


Figure P23. visually describes a, somewhat, positive relationship between attendance to organised activities and total difficulties score. This suggests that if a relationship does exist, then the link would be between lower attendance of organised activities and an increase severity of mental health difficulties at age fourteen.

Figure p24.

Scatterplot for internalising and externalising score, at age fourteen, and attendance to organised activities.

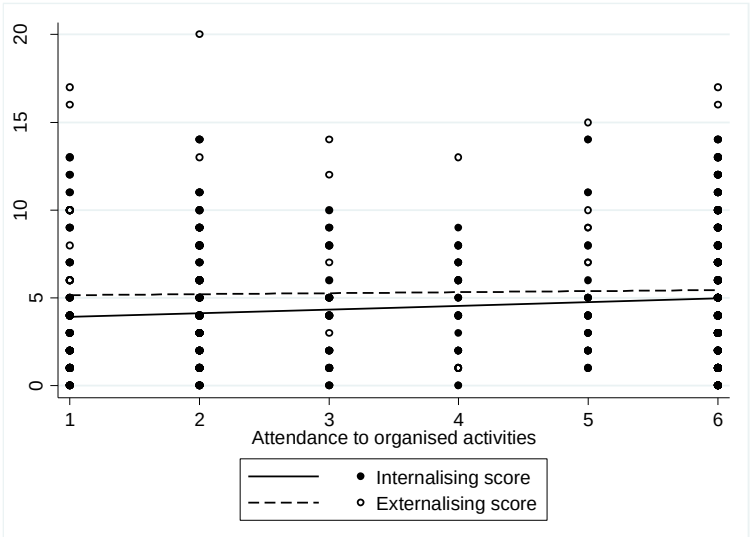


Figure P24. descriptively demonstrates, somewhat, a positive relationship between attendance to organised activities and higher internalising and externalising score. This suggests that if there is a relationship, then would indicate a link between a lower attendance to organised activities and a greater severity of internalising and externalising problems at age fourteen.

Figure P25.

Scatterplot for total difficulties score, at age fourteen, and attendance to band practice.

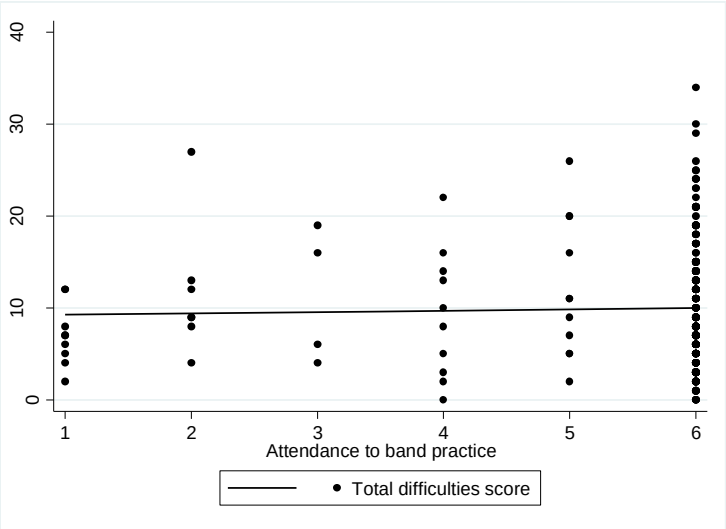


Figure P25. visually describes a, somewhat, positive relationship between attendance to band practices and total difficulties score. This suggests that if a relationship does exist, then the link would be between lower attendance of band practices and an increase severity of mental health difficulties at age fourteen.

Figure P26.

Scatterplot for internalising and externalising score, at age fourteen, and attendance to band practice.

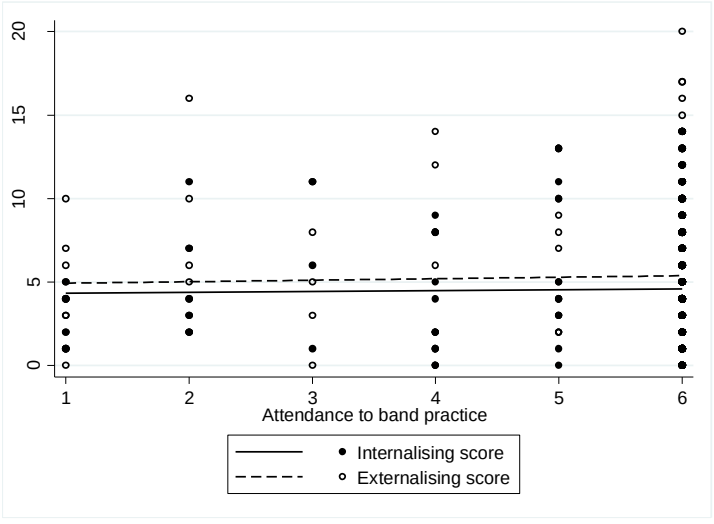


Figure P24. descriptively demonstrates, somewhat, a positive relationship between attendance to band practices and higher internalising and externalising score. This suggests that if there is a relationship, then would indicate a link between a lower attendance to band practices and a greater severity of internalising and externalising problems at age fourteen.

Appendix Q: *Boxplots for total difficulties, internalising and externalising scores, for the categorical potential school-age positive factor.*

Figure Q1.

Boxplots for total difficulties score, at age fourteen, and reports of close friendships.

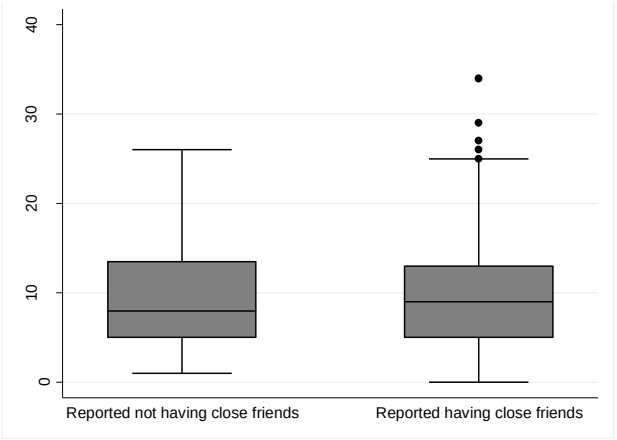


Figure Q1. descriptively demonstrates that within young people rDLD, whose who reported that they have close friendships had higher total difficulties score. This suggests that young people rDLD whose who reported that they have close friendships were more likely to experience mental health difficulties at age fourteen.

Figure Q2.

Scatterplot for internalising and externalising score, at age fourteen, and reports of close friendships.

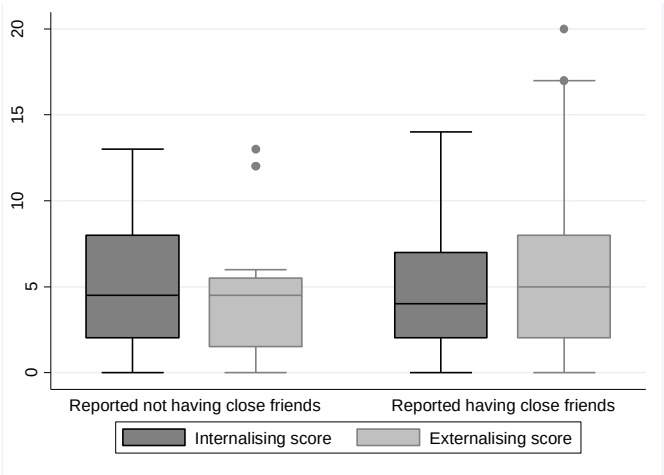


Figure H14. descriptively demonstrates that within young people rDLD, whose who reported that they have close friendships had higher internalising and externalising score. This suggests that young people rDLD whose who reported that they have close friendships were more likely to experience internalising and externalising problems.

Appendix R: *Correlation matrix of the potential school-age positive factors.*

Table R1.

Correlation matrix of all the continuous potential positive factors.

Potential school age positive factors	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Sleep latency	-	-.14*	.15*	-.01	.11	-.11	.02	-.002	-.24***	.09	.08	.01	-.11
2. Sleep disruption	-	-	-.13*	-.15	.06	-.03	.02	-.01	.25***	-.06	-.18**	-.07	-.03
3. Self-esteem	-	-	-	-.13	.15*	-.13	.07	-.10	-.42***	.24***	.16*	.10	-.13
4. Exercise	-	-	-	-	-.10	-.19**	-.11	.22*	-.06	.10	.11	-.07	.04
5. Reads for fun	-	-	-	-	-	-.11	.08	-.33	-.21***	.10	.24**	.07	-.19**
6. Prosocial behaviour	-	-	-	-	-	-	-.004	.22***	.13*	-.01	-.08	-.07	-.13*
7. Problem-solving ability	-	-	-	-	-	-	-	-.10	-.07	.02	.02	.10	.009
8. Parent-child closeness	-	-	-	-	-	-	-	-	.11	-.08	-.08	-.10	-.05
9. Educational motivation	-	-	-	-	-	-	-	-	-	-.19***	-.16**	-.05	.13
10. Safe neighbourhood	-	-	-	-	-	-	-	-	-	-	.13*	.05	-.01
11. Attendance to religious groups	-	-	-	-	-	-	-	-	-	-	-	.11	-.08
12. Attendance to youth clubs	-	-	-	-	-	-	-	-	-	-	-	-	-.07
13. Attendance to band practice	-	-	-	-	-	-	-	-	-	-	-	-	-

Note. * $p < .05$ ** $p < .01$ *** $p < .001$

Appendix S: *Original hierarchal Regression for the final investigation.*

Total difficulties score

The first step included the cumulative (total) risk score for the total difficulties score (mental health difficulties), at age five. There were 281 observations in this step. The results of the original hierarchical regression indicated that the predictor explained 4% (R^2 = .04, *Adj.* R^2 = .03) of the variance (F(1, 279) = 10.18, p < .01). It also revealed that the cumulative risk score, as expected, did significantly predict greater total difficulty scores (B = 2.40, β = .19, p < .01).

The second step included the possible factors, that may promote resilience for mental health difficulties at age fourteen. The possible factors were prosocial behaviour, closeness, self-esteem, reading for fun, educational motivation, lack of sleep disruption and latency, as well as problem-solving ability. There were 212 observations in this step.

The results of the second step indicated that the predictors explained 25% (R^2 = .25, *Adj.* R^2 = .22) of the variance (F(9, 202) = 7.63, p = .001). There was a significant change between the variance in the first step and the second step (R^2 change = .22, F(8, 202) = 6.67, p < .001). Regarding the predictive variables, it was found that the cumulative risk score continued to significantly predict greater total difficulties, at age fourteen (B = 1.84, β = .16, p < .05). Additionally, higher prosocial behaviours also significantly predicted lower total difficulties score (B = -.82, β = -.23, p < .01), as well as, lack of sleep disruption (B = -.53, β = -.13, p < .05) and high problem-solving behaviour (B = -.06, β = -.17, p < .01). The other variables modelled into the hierarchical regression, such as self-esteem and closeness, did not reveal to be significant predictors for total difficulties score, at age fourteen.

In the third step, the moderator variables for prosocial behaviour, closeness, reading for fun, self-esteem, educational motivation, lack of sleep disruption, sleep latency, and problem-solving ability were included. There were 212 observations in this step. Whilst there was an increase in the

variance between the second and the third step, this was not a significant change (R^2 change = .03, $F(8, 194) = 1.13$, $p = .35$).

However, it was revealed that the residuals were not normally distributed ($w = .97$, $p = .001$). This means that there is a violation in the original hierarchal regression. Hence, the robust regression was performed also. There were no differences between the original and robust hierarchal regressions.

Internalising score

Similar to the total difficulties, within the first step of the original hierarchal regression for internalising problems, at age five, including the internalising cumulative (total) risk score. As stated previously, the cumulative risk score for internalising problems was generated within the risk investigation (see chapter 9). There were 281 observations in this step. The results of the first step of the regression indicated that the predictor explained 2% ($R^2 = .02$, *Adj.* $R^2 = .02$) of the variance ($F(1, 279) = 6.79$, $p <. 01$). The cumulative risk score, for internalising problems, within the first step did significantly predict greater internalising scores (B = .84, $\beta = .15$, $p < .01$).

The second step included the possible factors that may promote resilience for internalising problems, at age fourteen. The possible factors were reports of high prosocial behaviour, self-esteem, educational motivation, youth club attendance, and problem-solving ability. There were 222 observations in this step. The results of the second step indicated that the predictors explained 12% ($R^2 = .12$, Adj. $R^2 = .09$) of the variance ($F(6, 215) = 4.68$, $p < .001$). There was a significant change between the variance in the first step and the second step (R^2 change = .09, $F(5, 215) = 4.07$ $p = .001$). Regarding the predictive variables, it was found that the cumulative risk score continued to significantly predict greater internalising problems score, at age fourteen (B = .89, $\beta = .17$, $p < .01$). In addition to this, higher prosocial behaviour also significantly predicted lower internalising problems score, at age fourteen (B = -31, $\beta = -.16$, $p < .05$).

In the third step, the moderator variables for prosocial behaviour, self-esteem, educational motivation, attendance to youth clubs, and problem-solving ability were included. There were 222 observations in this step. Whilst there was an increase in the variance between the second and the third step, this was not a significant change (R^2 change = .04, $F(5, 210) = 1.81$, $p = .11$).

However, it was revealed that the residuals were not normally distributed ($w = .97$, $p < .001$). This means that there is a violation in the original hierarchal regression. Hence, the robust regression was performed also. There were no differences between the original and robust hierarchal regressions.

Externalising scores

Similar to the previous two hierarchical regressions, the first step included the original cumulative risk score for externalising problems, at age five. There were 281 observations in this step. The results of the regression indicated that the predictor explained 9% ($R^2 = .09$, *Adj.* $R^2 = .09$) of the variance ($F(1, 279) = 28.76$, $p < .001$). The cumulative risk score, as expected, did significantly predict greater total difficulty scores (B = 1.79, $\beta = .31$, $p = .001$).

The second step included the possible factors that may promote resilience for externalising problems at age fourteen. The possible factors were prosocial behaviour, closeness, reading for fun, self-esteem, attendance to religious services, educational motivation, lack of sleep disruptions, and problem-solving ability. There were 211 observations in this step. The results of the second step indicated that the predictors explained 27% ($R^2 = .27$, *Adj.* $R^2 = .24$) of the variance ($F(9, 201) = 8.21$, $p < .001$). There was a significant change between the variance in the first step and the second step (R^2 change = .18, $F(8, 201) = 4.58$, $p < .001$). Regarding the predictive variables, it was found that the cumulative risk score continued to significantly predict greater externalising scores, at age fourteen (B = .82, $\beta = .15$, $p < .05$). As for the main effects, higher prosocial behaviour significantly predicted lower externalising scores (B = - .65, $\beta = -.31$, $p = .001$), as well as,

lack of disturbed sleep (B = -.34, β = -.13, p < .05) and higher problem-solving ability (B = -.03, β = -.13, p < .05).

In the third step, the moderator variables for prosocial behaviour, closeness, reading for fun, self-esteem, attending a religious, educational motivation, lack of sleep disruptions, and problem-solving ability were included. There were 211 observations in this step. Whilst there was an increase in the variance between the second and the third step, this was not a significant change (R^2 change = .05, F(8, 193) = 1.94, p = .06).

However, it was revealed that the residuals were not normally distributed (w = .97, p < .001). This means that there is a violation in the original hierarchal regression. Hence, the robust regression was performed also. There were no differences between the original and robust hierarchal regressions.

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