Children who screen positive for language delay but not autism: from 2.5 to 6 years

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To my family

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ABSTRACT

Background: Language disorders (LDs) are prevalent, affecting approximately 10% of children. Among them, 7.5% have developmental language disorder (DLD), while 2.5% have LD associated with a known medical condition. In Sweden, nearly all children undergo language screening through the Child Health Services (CHS) between 2.5 and 3 years of age. In Gothenburg, autism screening is also conducted at 2.5 years.
Aim: To clinically describe and longitudinally follow the language and neurodevelopmental trajectories of children referred to the Paediatric Speech and Language Pathology Clinic (SLP Clinic) after screening positive for language problems but not for autism at the 2.5-year screening at CHS.
Methods: In 2016, at a mean age of 2.9 years, 100 mono- or multilingual children, referred to the SLP Clinic, participated in a language assessment. Parents completed a newly developed questionnaire (2-5) concerning their child's development (motor, language, memory, attention, impulsivity, learning, social skills and behaviour). At age 6 years, 85 of the 100 children participated in a follow-up language assessment. Parents completed questionnaires about child development (same areas as at 2.9 years) and parents and children reported on child quality of life (QoL). A review of paediatric records was conducted after the SLP assessment with a view to obtain information about language interventions and other possible diagnoses.
Results: At 2.9 years, 87 children met DLD criteria and parent-reported concerns were mainly related to the child's language, communication and social skills. At age 6 years, 68 children had diagnosis of DLD, 6 had speech sound disorder, and 11 had no language disorder diagnosis. Half of the parents of children with DLD reported concerns about child development, predominantly related to language, but some also reported other concerns e.g.

about executive functions. Parents reported no impaired QoL, although some of the children themselves reported challenges in school and social functioning. At both 2.9 years and 6 years, the multilingual children in the DLD group performed significantly worse than the monolingual children on the language tests, except for the phonological and non-verbal tasks at 6 years of age. The review of paediatric records revealed that families only participated in half of the offered intervention sessions. Monolingual families participated to a greater extent in the introduction of alternative and augmentative communication (pictural support). In agreement with the family, the SLP completed contact with monolingual families at a significantly higher rate than multilingual ones. Out of the 85 6-year-old children, 20 had received an additional ESSENCE diagnosis (Early Symptomatic Syndromes Eliciting Neurodevelopmental Clinical Examinations), 5 of whom had autism.

Conclusion: DLD was found to be persistent in both monolingual and multilingual children, with multilingual children having greater language difficulties already at 2.9 years based on the test results. At age 6 years, some children perceived their QoL as partially impaired, which was not confirmed by their parents. The presence of additional neurodevelopmental diagnoses at age 6, underscores the need for follow-up of these children using a holistic ESSENCE perspective.

Keywords: language disorder, multilingualism, ESSENCE, neurodevelopmental disorder, screening, autism

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SAMMANFATTNING PÅ SVENSKA

Språkstörningar (LD) förekommer hos cirka 10% av alla barn, varav tre fjärdedelar har utvecklingsrelaterad språkstörning (DLD), och en fjärdedel LD i samband med ett känt medicinskt tillstånd. I Sverige genomgår nästan alla barn barnhälsovårdens (BVC) språkscreening mellan 2,5 och 3 års ålder. I Göteborg genomförs även screening för autism vid 2,5 års besöket. Syftet med avhandlingen är att kliniskt beskriva och longitudinellt följa den språkliga och generella utvecklingen hos barn som remitterats till logopedmottagningen barn och ungdom i Göteborg efter att ha screenats positivt för sen språkutveckling men inte för autism vid BVCs språkscreening vid 2,5 års ålder.

Under 2016, vid en medelålder av 2,9 år, deltog 100 en- eller flerspråkiga barn som remitterats till logopedmottagningen i en språkbedömning. Föräldrarna fyllde i ett nytt frågeformulär (2-5) om sitt barns generella utveckling (motorik, språk, minne, uppmärksamhet, impulsivitet, inlärning, sociala färdigheter och beteende). Vid 6 års ålder deltog 85 av de 100 barnen i en uppföljande språkbedömning. Föräldrarna fyllde i frågeformulär om barnets utveckling (samma områden som tidigare) och både barn och föräldrar bedömde barnets livskvalitet (QoL). En journalgranskning genomfördes efter logopedbedömningen för att få information om vilken typ och omfattning av språkinterventioner som erbjudits och om eventuell förekomst av andra diagnoser.

Vid 2,9 års ålder uppfyllde 87 barn kriterier för DLD och föräldrarapporterad oro var främst relaterad till barnets språk, kommunikation och sociala färdigheter. Vid 6 års ålder hade 68 barn DLD, 6 barn fonologisk språkstörning, och 11 barn hade ingen språkstörningsdiagnos. Hälften av föräldrarna till barn med DLD rapporterade oro för barnets utveckling, främst språk, men även för vissa andra områden, till exempel för exekutiva funktioner. Föräldrarna rapporterade ingen försämrad livskvalitet, trots att vissa barn rapporterade svårigheter i skolan och socialt fungerande. Vid både 2,9 och 6 års ålder presterade de flerspråkiga barnen i DLD-gruppen signifikant sämre än de enspråkiga på språktesterna, med undantag för de fonologiska och icke-verbala uppgifterna vid 6 års ålder. Journalgranskningen visade att familjerna endast deltog i hälften av de erbjudna interventionssessionerna. Enspråkiga familjer deltog i större utsträckning i introduktionen av alternativ och kompletterande kommunikation (bildstöd). I

överenskommelse med familjen avrundande logopeden kontakten med enspråkiga familjer i signifikant högre grad än flerspråkiga. Av de 85 6-åriga barnen hade 20 fått en ytterligare ESSENCE-diagnos (Early Symptomatic Syndromes Eliciting Neurodevelopmental Clinical Examinations), varav 5 hade autism.

Sammanfattningsvis visade resultaten att DLD var bestående hos både enspråkiga och flerspråkiga barn och att de flerspråkiga barnen hade större språkliga svårigheter redan vid 2,9 års ålder baserat på testresultaten. Vid 6 års ålder upplevde vissa barn sin livskvalitet delvis annorlunda än deras föräldrar gjorde. Förekomsten av de övriga utvecklingsneurologiska diagnoserna vid 6 års ålder understryker vikten av att följa dessa barn ur ett holistiskt ESSENCE-perspektiv.

LIST OF PAPERS

This thesis is based on the following studies, referred to in the text by their Roman numerals.

I. Schachinger Lorentzon, U., Kadesjö, B., Gillberg, C., & Miniscalco, C. Children screening positive for language delay at 2.5 years: language disorder and developmental profiles. *Neuropsychiatric Disease and Treatment*, 2018, 3267-3277.

II. Schachinger Lorentzon, U., Carlsson, E., Billstedt, E., Gillberg, C., & Miniscalco, C. Developmental language disorder: similarities and differences between 6-year-old mono- and multilingual children. *Submitted.*

III. SchachingerLorentzon, U., Billstedt, E., Gillberg, C., & Miniscalco, C. Neurodevelopmental Disorders and Interventions in Children with Developmental Language Disorder - a Longitudinal Paediatric Record Study. *Manuscript*.

IV. Ottosson, S., Schachinger Lorentzon, U., Kadesjö, B., Gillberg, C., & Miniscalco, C. Neurodevelopmental problems and quality of life in 6-year-olds with a history of developmental language disorder. *Acta Paediatrica* 2022, *111*(1), 115-122.

Study I is an accepted manuscript of an article published by Taylor & Francis in the *Journal of Neuropsychiatric Disease and Treatment* in *2018.*

Study IV is reprinted with permission from John Wileys and Son.

CONTENTS

ABBREVIATIONS

2-5	Two To Five, Questionnaire for Evaluation of Development and Behaviour in 2-5 year old Children
5-15R	Five To Fifteen, Questionnaire for Evaluation of Development and Behaviour -Revised
ADHD	Attention-Deficit/ Hyperactivity Disorder
CHS	Child Health Services
DLD	Developmental Language Disorder
DSM-5	Diagnostic and Statistical Manual of Mental Disorders 5th edition
ESSENCE	Early Symptomatic Syndromes Eliciting Neurodevelopmental Clinical Examinations
ICD-10	International Classification of Diseases 10th edition
ICD-11	International Classification of Diseases 11th edition
ID	Intellectual Disability
LD	Language Disorder
MLU	Mean Length of Utterance
NDD	Neurodevelopmental Disorders
PedsQL	Paediatric Quality of Life
QoL	Quality of Life
SLCN	Speech and Language Communication Needs
SLI	Specific Language Impairment
SLP Clinic	Paediatric Speech and Language Pathology Clinic

SLP	Speech and Language Pathologist
SSD	Speech Sound Disorder
T1	Timepoint 1
T2	Timepoint 2

1 INTRODUCTION

Language disorder (LD), including developmental language disorder (DLD), is one of the most prevalent neurodevelopmental disorders affecting young children. The overall prevalence of LD in children is 10%, with DLD accounting for 7,5% and LD associated with another known medical condition comprising 2.5% (Tomblin et al., 1997). DLD remains relatively "understudied" compared to other less common neurodevelopmental disorders (NDDs) such as autism.

Given the pivotal role of language in a child's overall development, coupled with compelling evidence supporting early intervention, the National Board of Health and Welfare proposed in 1991 that a language screening be implemented at 2.5 years through the Child Health Services (CHS). This initiative aligns with the objectives of the National Child Healthcare Programme. This proactive approach allows for the identification of children experiencing language difficulties at an early age. Children screening positive for language problems are subsequently referred to a speech and language pathologist (SLP) for a comprehensive language assessment and tailored interventions. There is limited knowledge in the field of LD regarding the definitive outcomes of screening, specifically in terms of identifying "established" LDs, as well as the subsequent developmental trajectories and interventions offered to the child and their family over time. The clinical experience in Sweden suggests that DLD is rarely the only applicable diagnosis. It is important to foster a more comprehensive understanding of developmental trajectories in early childhood, particularly in cases where delayed language development is the most predominant symptom. Existing studies indicate an association between DLD and other NDDs (Marinopoulou et al., 2021; Miniscalco et al., 2018).

The overarching aim of this thesis is to longitudinally follow the language development of children who have screened positive for language problems but not for autism at CHS language screening, at 2.5 years of age. The aim is also to proactively identify any potential co-occuring developmental difficulties even in instances where the autism screening has yielded a negative result.

1.1 LANGUAGE DEVELOPMENT

In the early stages of a child's development, language acquisition is a process that is both intense and complex. Babbling emerges around 3-4 months of age and transitions into two-syllable babbling by 9 months. Typically, the first words appear around 1 year of age (Nettelbladt & Salameh, 2007). Between 1.5 to 2 years of age, children begin to construct 2-word sentences, while their vocabulary steadily expands. It is more important for the child at this stage to introduce new words than for them to be phonologically precise. Additionally, the child is expected to comprehend simple instructions (Miniscalco et al., 2005). By the age of 3, children are anticipated to have progressed to phonologically more advanced words and to be utilising 3-4-word sentences. At age 4, the child should also be capable of narrating a simple story with grammatically correct sentences and beginning to understand inference-based stories (pragmatic) (Westerlund, 2009). Before the age of 6-7 years, it is expected that a child will have predominantly developed their phonology, grammar, semantics and pragmatics abilities. In addition, the child should be able to employ these language abilities in social contexts, such as storytelling (Miniscalco et al., 2007; Norbury et al., 2016). Language development does not progress in isolation but interacts with other cognitive functions such as executive functions, as a part of a child's general development. Distinguishing language ability from other cognitive capacities necessitates a deep understanding of language and LDs. It is equally important to consider whether a child is in language vulnerability, affecting their capacity to communicate verbally and interpret their surroundings, such as in preschool and peer interactions, in a manner consistent with their age. Cultural disparities or language difficulties can underlie such vulnerabilities. It is crucial to be mindful that as expectations of a child heighten, so do the risks with associated language vulnerability (Bruce et al., 2016). An Australian study showed that approximately one out of every five to six children are susceptible to language vulnerability (McLeod & McKinnon, 2007) .

Another aspect important to consider is multilingualism, which has gained increasing significance due to profound global and societal shifts in recent years. The term "the multilingual turn" characterises this transformation (Meier, 2017), wherein language globalisation has accelerated over time and

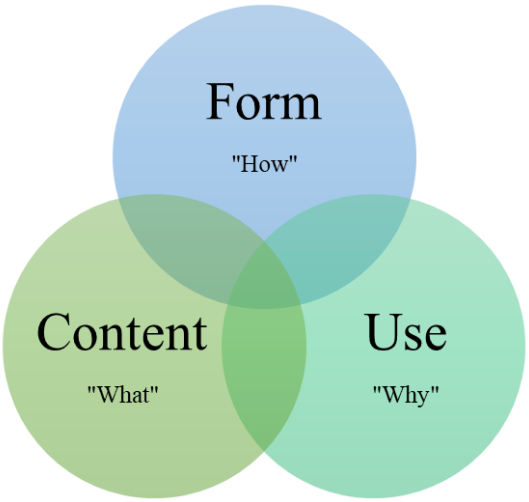
space. This shift impacts not only the educational system but also matters of inclusion, social contexts and pedagogical theories. Formerly monolingual societies have become more multilingual, resulting in individuals using multiple languages in their daily lives. The theory of translanguaging (Williams, 1996) assumes that once an individual has acquired proficiency in one language, it serves as a foundation for learning other languages (common underlying proficiency). Translanguaging transcends simple word-for-word translation; it involves interpretation and effective communication of meaning, drawing upon the entirety of the child's language ability (Wei, 2018). This concept has gained traction in both preschools and schools. Research also indicates cognitive benefits associated with multilingualism. All languages are active simultaneously, but a child's inhibitory skills maintain their separation (Garraffa et al., 2015). It has been argued that this fosters an extended attention span (Linck et al., 2008) and heightened creativity (Fürst & Grin, 2018). However, these findings have been questioned (Paap et al., 2015). Nevertheless, the amount and quality of exposure to a second language are pivotal for the child's acquisition of it (Govindarajan & Paradis, 2019). Upon commencing school around age 5 years (in many English-speaking countries), children are expected to have acquired a repertoire of common and everyday words. Multilingual children from multicultural and socioeconomically vulnerable areas may have a limited vocabulary in both their second language and their native language, owing to the scarcity of speakers in their environment (Andreou & Lemoni, 2020).

The approach to understanding language development and LD has evolved from a focus on language rule patterns (Chomsky, 1965) to a more multi-factorial perspective. The theory of "emergentism", views language proficiency as the result of an interplay of multiple factors rather than being solely determined by any one factor. The form of language emerges through interaction with contextual elements, such as the interlocutors, subject matter and environmental settings in which one communicates. The dynamic process of language development is influenced and either bolstered or constrained by factors such as cognitive capacities, language input and social interaction (Perkins, 2005). Intervention should be guided by an emphasis on supporting the development of complex, interactive systems that underlie language, rather than exclusively targeting specific impairments (Evans, 2001).

A parallel perspective on language development, is provided by the Blom & Lahey model (Bloom & Lahey, 1978). It conceives the development of language and functional language proficiency as a dynamic system involving three mutually influencing elements: “Form” (phonology/speech sounds and grammar), “Content” (semantics/vocabulary) and “Use” (pragmatics and social interaction).

Figure 1.

Model of language development according to Blom & Lahey 1978.



The concept of “*Content”* pertains to our capacity to acquire words within various contexts, thereby comprehending their meanings and enabling us to effectively combine them with other words. “*Form”*, on the other hand, denotes our ability to assimilate phonological and grammatical structures, encompassing the grammatical rules to which we are exposed. *“Use”* encapsulates our proficiency in discerning when and how to employ language appropriately, as well as and how to interpret it within different contexts. All elements hold equal significance, and their refinement primarily occurs through interaction with others, as well as observations from their linguistic behaviour. This process also engages other cognitive faculties. Blom and Lahey assert that language developmental is an integral part of the child's

overall growth, rather than an isolated phenomenon. The cultivation of functional language proficiency necessitates the harmonious development of these three key elements.

1.1.1 LANGUAGE SCREENING IN CHILD HEALTH SERVICES

To be able to identify DLD, early detection is important. Screening methods serve to discern individuals with suspected disabilities from the general population (Wilson et al., 1968). Screenings should be quick to administer and have the potential to highlight difficulties warranting further assessment. While screening with high sensitivity is desirable, it may come at the expense of specificity (accuracy). Additionally, screenings can help identify, the so-called "hard to reach" groups such as children of parents with low "health literacy" (Shaghaghi et al., 2011). Early identification of language difficulties is perhaps particularly important as it allows for timely intervention, which might greatly influence the child's long-term development. (Bercow, 2008). In Sweden, all families are offered participation in the CHS programme for child development at the child's birth. This programme involves following language development through health visits and examinations in the first year, at 18 months (emphasising communicative ability and acquisition of 8-10 words) and subsequent screenings at 2.5 to 3 years (focusing on language), 4 years (emphasising both language and speech) and 5 years (centred on functional language use e.g. by storytelling or referencing events). Simultaneously, psychomotor development (encompassing motor skills, behaviour, hearing, eating and sleep habits as well as social skills) is examined at these same age intervals (Rikshandboken. Barnhälsovården, 2023). CHS nurses also gather information about known risk factors such as heredity, parental education and the history of older siblings (Zambrana et al., 2014). In Gothenburg, children are additionally routinely screened for autism during the 2.5-year visit (Nygren et al., 2012). The 2.5-year language screening at the CHS in Gothenburg is extended to both mono- and multilingual children with the aim identifying delayed or deviant language development. If a child screens positive for language difficulties, they will be referred to an SLP. In the case of a positive

outcome on the autism screening, or both screenings yield positive results, the child will be directed to a multidisciplinary team. There is also the possibility to repeat the language screening at age 3 if the outcome of the 2.5-year screening remains uncertain. Specific instructions are available to the CHS nurse in cases where the child is multilingual i.e. examine the child's exposure time to the Swedish language and also screen the child in their native language.

While international research points out the uncertainty surrounding screening and proposes focusing on identifying at-risk children through parental questionnaires (Bishop et al., 2017) a systematic review underscores that screening both before and after 4 years of age seems to yield similar sensitivity and accuracy (So & To, 2022). One study indicates that up to 2/3 of children with language delay experience persistent difficulties (Conti-Ramsden et al., 2018). Recent research advocates for early screening around the ages 2-3 years of age based on validated assessment instruments and early predictors of DLD (Sansavini et al., 2021). International research also highlights the importance of early interventions for at-risk children (Dowdall et al., 2020; Law et al., 2018). The interventions should be evidence-based, ensuring the highest benefit relative to the cost of screening each child. Systematic reviews conclude that there is a lack of valid and universally accepted assessment instruments (Warren et al., 2016; Zhang et al., 2021). It is not only the application of the same methodology that is crucial, but also how the results are implemented and interpreted. One Swedish qualitative study showed that the language screening at 2.5 years can be perceived as the most difficult visit to carry out in the CHS programme, especially with multilingual children (Lindgren Fändriks et al., 2023) and examining multilingual children with positive outcomes in language screening discovered a “wait and see” approach among CHS nurses (Nayeb et al., 2015). Another Swedish study revealed that CHS nurses tend to deviate from the protocol and that this deviation increased when screening multilingual children (Dahlén et al., 2022) In a doctoral project based in Gothenburg the same screening instrument was employed for all children (Miniscalco Mattsson et al., 2001), irrespective of socio-economic background or multilingualism, and has yielded positive results in a longitudinal study (Miniscalco et al., 2005; Westerlund & Sundelin, 2000). This ensures that the cohort presented in this thesis is uniformly assessed from the outset, providing a robust foundation for a consistent methodology throughout.

1.1.2 THE SLP LANGUAGE ASSESSMENT

To ensure active participation in a test scenario, a child must demonstrate proficiency in interaction skills, sustained concentration, executive functioning and a clear grasp of the situation at hand. It is important to note that language assessment is inherently nuanced (Sullivan et al., 2019) and does not possess a universally accepted standard (Denman et al., 2017). In addition to test outcomes, achieving a comprehensive understanding of a child's functional language abilities necessitates a consensus derived from multiple sources, including insights from the family and preschool, as well as the consideration of potential challenges. The primary objective of the assessment is to gain insight into and effectively convey the child's functional language capabilities in everyday life, taking into account both their strengths and weaknesses (Bishop et al., 2017). Assessing a child under the age of three can be challenging and it is important for the SLP to create an environment that is appealing with attractive materials to engage them (Nettelbladt & Salameh, 2007). It can be assumed that the sooner the intervention occurs, the more favourable the outcomes of LDs will be (Yoder & Warren, 2004).

Assessing DLD in a multilingual child poses a distinct challenge. Both international and Swedish researchers have undertaken studies to ascertain whether multilingualism exerts an adverse influence on language development. They have discovered that DLD invariably impacts all languages mastered by a child due to its constraining effect on language processing (Nayeb et al., 2021). Typically, by the age of 6-7, or following approximately two years of immersion in a preschool environment where the second language is the medium of instruction, children are expected to have acquired a foundational vocabulary in that language (Salameh et al., 2004). Thus, some researchers and clinicians argue that it becomes important to assess the child's proficiency in all their languages. A survey-based study demonstrated that SLPs express confidence in assessing multilingual children (Rethfeldt et al., 2023). It is worth noting that too little exposure to the second language holds significant importance, as research indicates a potential risk of *overdiagnosis* of DLD (Andersson et al., 2019). Similarly, another study has unveiled that multilingual children may exhibit a restricted vocabulary and encounter challenges with morphosyntax (grammatical form), mirroring the language difficulties observed in children with DLD. This again highlights the potential

of overdiagnosis (Vender et al., 2018). Furthermore, there is an indication of a risk of *underdiagnosis* due to lack of adequate assessment instruments, established norms and a comprehensive understanding of multilingualism, leading to language difficulties being erroneously attributed solely to multilingualism (Laasonen et al., 2018; Nayeb et al., 2021). In the early stages of this research, the term multilingualism replaced the earlier term bilingualism.

1.1.2.1 TEST INSTRUMENTS USED TO ASSESS LANGUAGE ABILITY

Standardised test instruments are supported by both research and evidence and have several advantages. They provide an objective way of assessing individuals and ensuring consistency. They follow specific procedures and scoring systems, enhancing the reliability of the results. They provide a comprehensive evaluation of different cognitive language domains that help identify specific disorders and conditions (Hansson & Nettelbladt 2007). They identify areas of difficulty or strengths and assist in the choice and application of evidence-based interventions tailored to individual needs. The test also helps the SLP to follow progress and outcome (Hansson & Nettelbladt 2007).

However, it is important to emphasise that a test is rarely perfect, especially not for young children. It provides an indicative result that should be considered based on the design of the test in relation to the child's ability to participate and the availability of current norms. It is important to use test instruments within ethical guidelines and by professionals who are trained in their administration, scoring and interpretation. Consideration of cultural and individual differences is essential to ensure valid and fair assessments (Rethfeldt et al., 2023). To facilitate and avoid an incorrect language diagnosis of a child, especially a multilingual one, several researchers recommend dynamic assessment. Dynamic assessment is an interactive and adaptive approach that recognises the dynamic nature of language learning for multilingual children. It embraces their language diversity, focuses on learning potential, and offers a holistic view of their language abilities in various

contexts (Cummins, 1984). Arguably, this approach ultimately contributes to more accurate and insightful assessments, leading to tailored interventions that foster effective language development in multilingual children. However, prominent concerns with dynamic assessment are the challenge to score, time-consuming, and, without any norms subjective (Haywood & Tzuriel, 2022), which makes the form less suitable in research e.g. group comparisons.

In this thesis, several validated tests for the assessment of receptive and expressive language ability were used with a view to strengthening the accuracy of group comparisons.

1.1.2.2 QUESTIONNAIRES USED TO ASSESS LANGUAGE ABILITY AND BROADER DEVELOPMENTAL OUTCOMES

Items in a questionnaire should relate to what is requested, i.e. the form should function as an independent instrument that does not require explanations. It should be time-saving for the assessor, but also be able to be completed at the convenience of the recipient. The form should function as a complementary assessment and to a greater extent capture the functional impact that is not obtained through the SLP assessment (McGregor, 2020). Questionnaires often have as well-developed psychometric properties as do standardised tests. They can validly identify stress and anxiety about the situation in parents of children with DLD (Kotsis et al., 2023). It has been suggested that parents can reliably identify communicative problems in toddlers through questionnaires from child age 18 months (Fäldt et al., 2021).

In this thesis screening questionnaires were used for surveying parent-reported concern about their child's neurodevelopment (motor skills, learning, social behaviour, language, perception, memory, executive functions and behavioural problems), and, in an attempt to clarify quality of life (QoL), a questionnaire based on health-related QoL items (emotional functioning, physical health, school functioning, psychosocial health and social functioning) was used.

1.1.2.3 QUALITATIVE GLOBAL ASSESSMENT

A qualitative assessment gives an in-depth understanding and a holistic perspective (Goldman, 1990), in addition to the quantitative measures. The qualitative assessment comprises the clinician's observations of the child's communication and behaviour, data gathered from family members and preschool, and outcomes from the quantitative language evaluation. An assessment of a child's developmental status must never contain only quantitative measures (Bishop et al., 2017; Reilly et al., 2014). These must always be interpreted qualitatively by a trained clinician. During the qualitative gathering of anamnesis, information about development and present behaviour, important information that is decisive for the outcome of the assessment often emerges, information that does not emerge in any other way during the assessment. In this thesis, the SLP collected qualitative measures through parent interviews, rating the child's ability to participate during the assessment, consultations with CHS, preschool and other clinicians relevant to the child) to summarise their assessment.

1.2 LANGUAGE DISORDER DIAGNOSIS

Late language development can be due to several different factors. A well-known risk factor is heredity (Bishop, 2006) but also socio-economic status and language stimulation are of importance (Smithson et al., 2014). According to international studies, LD occurs in about 7-10%, either isolated or simultaneously with other disabilities (Tomblin et al., 1997). However, these numbers are based on the previous definition of LD "specific language impairment" and do not always include children from lower socio-economic areas (Reilly et al., 2014). LDs can affect one or more language areas, for example, phonological, grammatical, semantic and/or pragmatic abilities. Children diagnosed with LD have significant difficulties in one or more of these areas that affect spoken language and/or comprehension and/or language

use (Bishop, 2006; Ebbels et al., 2017; Miniscalco et al., 2007). LDs can be lifelong and lead to mental health problems (Dubois et al., 2020).

1.2.1 DEVELOPMENTAL LANGUAGE DISORDER

Previously, LD was considered an isolated specific disorder "specific language impairment" (SLI) i.e. the condition could not be directly attributed to neurological disease, abnormality in the speech apparatus, sensory disorders, mental developmental disorder or environmental factors. In 2016, the consortium CATALISE (Bishop et al., 2016) consisting of 59 internationally recruited experts from research, clinical practice, and parent/ patient associations presented a modernised classification of the former SLI concept as development-related; "developmental language disorder" (DLD). This classification is found in the latest version of the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5) (APA 2013). According to CATALISE, diagnosis before the age of 4 years should be avoided as it is believed that it does not predict whether the language difficulties examined will persist. There is also a desire to give weight to the diagnosis by calling it a "disorder", since it can be assessed to have long-reaching effects in the same way as attention-deficit/hyperactivity disorder (ADHD) or autism. According to DSM-5, it is important to determine the extent of the LD (regardless of the nature of the difficulties) based on the level of daily language functioning. The former disparity between language and non-verbal proficiency has been eliminated. The main rationale in diagnosing LD is to provide intervention irrespective of other cognitive capacities. If the incongruity with non-verbal proficiency persists, there is a risk that children requiring intervention may be unconsidered. The term 'Speech and Language Communication Needs' (SLCN) is employed to describe children whose language development is either disordered or delayed. While SLCN may sometimes be transient and eventually resolve, they often persist and can exert a lifelong impact, akin to a sustained vulnerability in language acquisition This concept was introduced to draw attention to a broader group of individuals with any kind of challenges in language ability (Bruce et al., 2016).

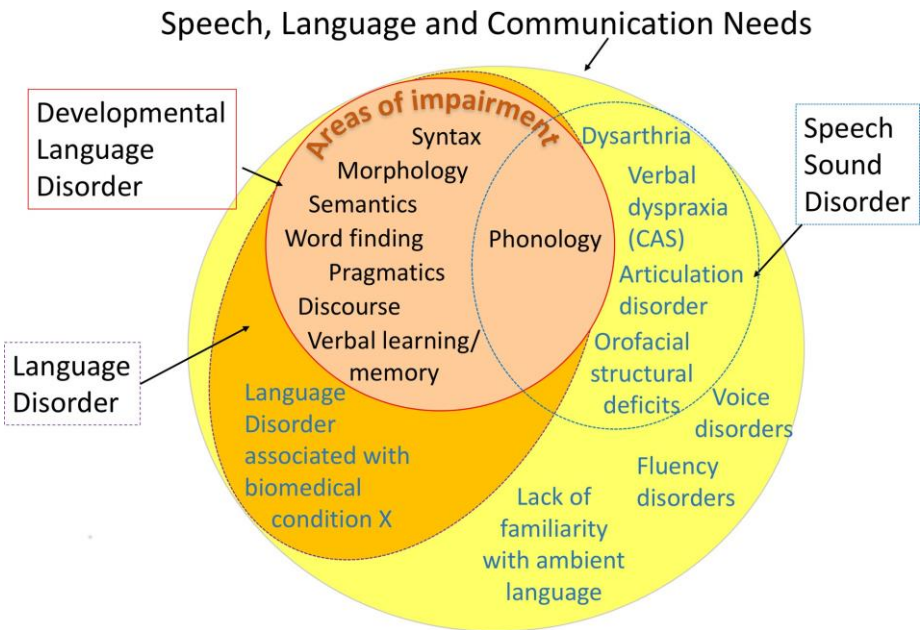
The language difficulties are based on the concept of DLD, and the more prominent difficulties are described in the text. The CATALISE consortium

proposes a reevaluation of the way we approach the concept of LD. Instead of applying exclusion criteria, they advocate a comprehensive perspective that encompasses the differentiation of conditions, examination of risk factors and consideration of co-occuring conditions in the context of LD.

The diagnosis "speech sound disorder" (SSD) is a language differential diagnosis that focuses on difficulties with articulation and speech sounds. The underlying cause is speech-motor and/or language-based. To establish SSD, other language areas must not be impaired.

Figure 2.

Terminology of language disorders and how they overlap according to CATALISE (Bishop et al., 2016). (This figure is reused according to Wiley's Open Access Terms and Conditions.)



The term DLD is an umbrella term for both mild and more severe language difficulties, which can lead to some ambiguity when handed over to other recipients. In the International Classification of Diseases 10th edition (ICD-10), on the other hand, DLD is diagnosed according to the following categories: *specific disorder of the articulation ability, receptive language disorder, and expressive language disorder* with associated subgroups e.g. semantic language disorder. Here, the focus is on diagnosis and not description, which can sometimes be misleading as there may be specific difficulties that need to be highlighted but which are not categorised with an underdiagnosis such as word mobilisation difficulties. The current project focuses on the child's developmental trajectory based on late language development and has therefore chosen to use the DSM-5 (APA 2013) concept.

One way to achieve an assessment of the child's functional language ability is to address QoL. In this thesis, we do not refer to child's QoL in general, but more specifically to health-related QoL, a concept that has been used in a previous study (Spieth & Harris, 1996), but will hereafter be referred to as QoL. QoL is an assessment of how an individual perceives their life circumstances within the context of their personal objectives (WHO, 1995). QoL assessments encompass a wide range of factors, such as health, education, environment, social connections and personal satisfaction. It can provide vital data regarding the health status within a community or population (Coghill et al., 2009) and results in a holistic viewpoint of human well-being, offering an understanding of an individual's overall state (Lee et al., 2016).
This data plays a key role in evaluating the effects of language intervention and the acceptance of a diagnosis. In the realm of research, these measures contribute to a better comprehension of the elements that impact one's QoL (Coghill et al., 2009). Studies involving children with various neurodevelopmental conditions have provided evidence indicating lower QoL for those with ADHD (Lee et al., 2016) autism (Egilson et al., 2017), and intellectual developmental disabilities (ID) (Ncube et al., 2018).
An important aspect of DLD is how it affects the child's everyday life. Previous studies show that QoL associations between self-reports and proxy-reports are less pronounced in younger age groups (Coghill et al., 2009). In older children, however, the associations are stronger usually showing the social aspect to be the most affected. Nevertheless, there are few Swedish QoL studies on children with DLD, consequently, there is limited information about approaching the

subject with successful results at all ages. This becomes more relevant over time as a study shows that children aged 6-12 with DLD experience increased anxiety (Burnley et al., 2023).

1.3 ESSENCE AND NEURODEVELOPMENTAL DISORDERS

According to the DSM-5 (APA 2013) NDDs are categorised as follows: communication disorders, autism spectrum disorder, ID, attention-deficit/hyperactivity disorder, specific learning disorder, motor disorders and other neurodevelopmental disorders with subcategories. Concerns about early symptoms at 3 to 5 years of age should warrant a clinical assessment and one approach aimed at highlighting this is the concept Early Symptomatic Syndromes Eliciting Neurodevelopmental Clinical Examinations (ESSENCE) (Gillberg, 2010). ESSENCE addresses the intricate nature of the co-occurrence of various neurodevelopmental deficits or disorders in children. It is crucial to be attentive to several areas, including motor skills, attention, overall development, language, communication, social skills, behaviour, eating and sleep. If a child has difficulties that lead to concern in any of these areas before the age of 5, an increased risk emerges, not only of ongoing problems but also of encountering additional challenges in other areas. Comorbidity among ESSENCE/ NDDs disorders is prevalent, indeed, it is almost the rule. The estimate of school-aged children that are affected by some form of ESSENCE problem is the same as the prevalence of LD together with another diagnosis or a known medical condition, 10% (Fernell & Gillberg, 2023; Gillberg, 2010). Language difficulties are a risk marker for other ESSENCE problems and in early school years (Fernell & Gillberg, 2023). With this knowledge, intervention might be a protective factor against the negative effects that impaired communicative development can have (Miniscalco et al., 2018). One Swedish longitudinal study with 237 children who had screened positive for language or autism at the age of 2.5 years were assessed 5 years later. The outcome showed that 40% had a diagnosis or disabilities in other developmental areas (Miniscalco et al., 2018). More studies shows that, at school age, children with autism may have difficulty interpreting the meaning

of more complex words, which indirectly affects their language comprehension (Henderson et al., 2011) and a long-term follow-up study of Swedish children who attended language preschool due to severe language impairment showed that at age 16-17, 1/3 had a mild ID or learning disabilities, 1/3 had autism or autistic traits, 1/4 had ADHD and 85% still had their LD and reading difficulties (Ek et al., 2012). Furthermore, children with DLD have an increased risk of reading and maths difficulties (Snowling et al., 2021).

1.4 LANGUAGE INTERVENTION

To plan an intervention adapted to a child's needs and abilities, the following important variables should be taken into account: 1) should the intervention be given to the child either individually or in a group (direct intervention) and 2) is there a need for counselling and education to be given to parents or other important everyday people (indirect intervention). In addition, 3) how long and how many times an intervention should last. A systematic review study showed that more intensive sessions were not necessarily more effective (Frizelle et al., 2021), a British / American meta-analysis pointed out longer duration of intervention having a positive effect (Law et al., 2004). One way to systematically evaluate the intervention offered, is to structure the procedure into tiers based on the child's difficulties. Then to follow and with a reassessment conclude the outcome after a reasonable time has elapsed. An evidence based tier-model, has been proposed (Ebbels et al., 2019) inspired by the “response to intervention” -model that is structured into three tiers a) parental counselling, b) group intervention by SLP and combination of a) and b) (Fuchs & Fuchs, 2006). There is evidence for both direct intervention of different language domains (Tarvainen et al., 2020), (Broomfield & Dodd, 2011; Hodson, 2011; Palle et al., 2014; Yoder & Warren, 2004) as well as for indirect intervention with a focus on parent education e.g. augmentative and alternative communication (Akamoglu & Meadan, 2018; Eberhart et al., 2017; Grindal et al., 2016). The Paediatric Speech and Language Pathology Clinic (SLP Clinic) provides assessments and interventions for preschool children with a range of speech and language problems. The attendance of children at the SLP Clinic varies considerably, and the level of involvement in interventions can vary even among children with similar language difficulties.

As a result, it is essential to investigate the participation rate of children in a variety of interventions.

2 AIMS

2.1 GENERAL AIM

The overall aim of the thesis has been to clinically describe and longitudinally follow the language and neurodevelopmental trajectories of children who have been referred to the SLP Clinic after screening positive for language but not for autism on the 2.5-year language screening at CHS.

2.2 SPECIFIC AIMS

The specific aims were to:

- investigate language disorder and neurodevelopmental functioning in children who screened positive for language problems at age 2.5 years **(study I)**.

- explore the language ability at age 6 years in children with DLD identified at the 2.5 years language screening and compare the mono- and multilingual children regarding similarities or differences **(study II)**.

- longitudinally explore language development at 6 years of age in children with language delay at 2.5 years, and to investigate coexisting ESSENCE disorders and offered language interventions through a paediatric record review **(study III)**.

- investigate neurodevelopmental functioning and QoL in 6-year-old children with suspected DLD at age 2.5 years through parental reports on questionnaires **(study IV)**.

3 MATERIALS AND METHODS

3.1 PARTICIPANTS

In Gothenburg, the CHS offers a 2.5-year language screening to every child (Miniscalco Mattsson et al., 2001). This screening is administrated by a CHS nurse who asks the child to identify and name toys and pictures and to follow verbal instructions. If the child does not follow or use a limited number of words or two-word sentences, it results in a positive outcome in the screening. Concurrently, the child undergoes an autism screening focusing on social interaction and social communication (Nygren et al., 2012). Should the child receive a positive result in either the autism screening alone or in conjunction with the language screening, they are recommended for a thorough interdisciplinary assessment at the Child and Adolescent Neuropsychiatry Unit. Conversely, if the child has a positive outcome solely in the language screening, the child is referred to the SLP Clinic. In 2016, 6434 children underwent language and autism screening at CHS throughout the urban area of Gothenburg according to M. Wennergren (personal communication November 11th, 2020) business developer at the CHS. Among them, 100 mono- and multilingual 2.5-year-olds with suspected DLD were referred to the SLP Clinic for comprehensive language assessment and intervention conducted by SLPs. All referrals to the SLP Clinic stemmed from a positive outcome in the language, but not autism screening at CHS. No child exhibited any known hearing impairments or known biomedical condition such as a syndrome at the time of identification. The children and their parents were invited to take part in study I -Time point 1 (T1) during their initial visit. Among the multilingual group 22 native languages were represented. All the children were born in Sweden and attended preschool.

At age 6 years, all 100 children were invited to participate in a secondary language assessment - Time point 2 (T2) (as detailed in Study II), of which 85 consented. The number of multilingual children within the group remained high (*n*=41), with all families affirming Swedish to be the most developed language. Depending on the nature of their language difficulties, these children were offered interventions at the SLP Clinic between the ages of 2.9 and 6

years. The attrition group comprised 15 children, 13 were diagnosed with DLD and 2 had no DLD in accordance with the language assessment at 2.9 years of age.

Table 1.

Demographic data from the study group at 2.9 and 6 years respectively.

Demographic variables	**T1 2.9 years** *n*=100	**T2 6 years** *n*= 85
Sex (boys/girls)	68/32	55/30
Heredity[1)]	49	41
Multilingual	51	41
Interpreter for parents	12	8
Mean age (year/months) for assessment	2:9	6:0

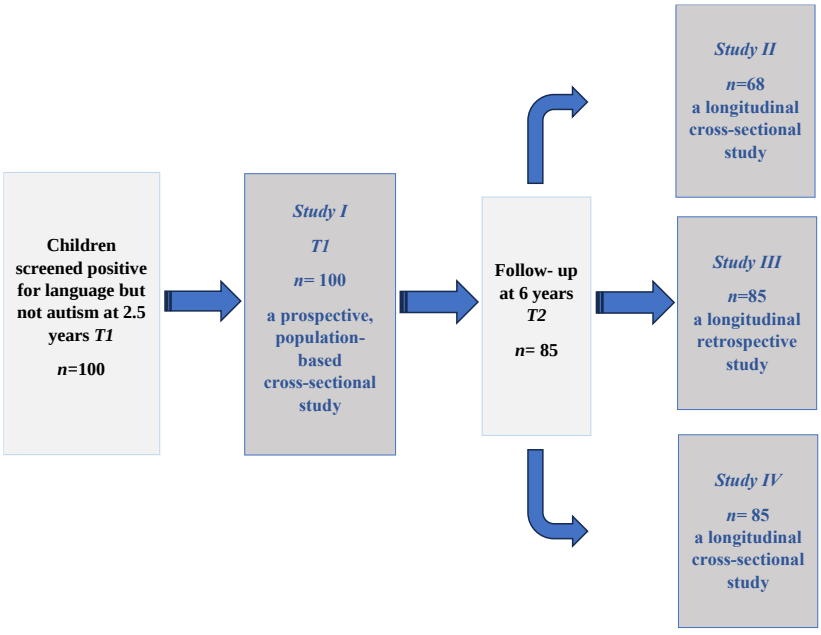
Note: 1) Heredity for neurodevelopmental disorders (incl DLD) and intellectual disability.

3.2 METHODS

This thesis consists of four different types of studies using the same cohort.

Figure 3.

Description of study designs used in this thesis and of the cohort (n=100 out of totally 6434 screened children during 2016 in Gothenburg according to M. Wennergren (personal communication November 11th, 2020) business developer at the CHS).



3.2.1 STUDY I-II, IV

3.2.1.1 TIME POINT 1

The children were recruited consecutively and assessed by an SLP at a mean age of 2.9 years with a validated, normed language comprehension test and the child's spoken words and sentences were transcribed (for the SLP to able to compute Mean Length of Utterance). The parents underwent an anamnestic interview structured and led by the SLP. The parents also answered questionnaires about the child's social behaviour and development (language, learning, memory, perception, motor ability, executive functions, social ability and psychological problems). Informed consent was given both orally and in writing at the time of the assessment. Since the DSM-5 (APA 2013) and forthcoming International Classification of Diseases 11th edition (ICD-11) (WHO, 2018) recommends the clinician to assess any difficulties based on functional ability, the SLP reviewed the test and questionnaire results together with anamnestic information. In addition, a global assessment was made by the SLP based on the child's ability to participate (graded as - good, - with support, - does not participate). A parental interview based on an anamnestic questionnaire developed by the SLP clinic was also used at the family's initial visit. If more information about the child's functional language level was needed, the SLP contacted the preschool for information. Most assessments were performed during a single visit; however, additional visits were provided if necessary. An interpreter was used with 12 families. The children were offered interventions in accordance with the SLP Clinic guidelines. In cases where the SLP identified additional concerns beyond language, a comprehensive interdisciplinary assessment was recommended.

3.2.1.2 TIME POINT 2

At the age of 6, 85 children participated in a follow-up assessment. The children were assessed by an SLP with valid language tests, while parents

completed questionnaires about their child's language and neurodevelopment. Simultaneously, both children and parents were requested to complete a questionnaire about QoL. The parents of all the multilingual children stated Swedish to be the child's most developed language. The SLP additionally estimated the child's ability to participate during the assessment using the scale "- good, - with support, - does not participate". If the child still maintained active contact with the SLP Clinic, they were automatically invited by their attending SLP, whereas others were called and invited by the test leader from T1. Both verbal and written parental consent was obtained following consultation with the children. Interpreters were offered when needed (*n*=8). Most assessments were carried out during a single visit, with provision for breaks and snacks, if needed, additional sessions were offered.

3.2.1.3 MATERIALS

In both T1 and T2 assessments, standardised, validated and normed tests were used. At T2 (6 years of age), there was an opportunity to assess the children's language ability more thoroughly and consequently using more tests. At T1 (2.9 years of age), the capacity for a nuanced language assessment was more limited compared to T2 due to the child's young age. However, a language comprehension test was offered along with play materials and books designed to encourage expressive skills in the child. At T2 the parents had followed their child's general development and well-being over an extended period, enabling them to address a broader range of areas in their responses from the questionnaires. Table 2 shows a summary of all administered tests and questionnaires along with who carried them out.

Table 2.

Test, questionnaires, and participants during T1 and T2.

Materials	Ability	Participants			References
T1 at 2.9 years (*n*=100)		*Child*	*Parent*	*SLP*	
Reynell Developmental Scales III	*Language comprehension 2-5 years*	*x*			*1*
2-5 Questionnaire	*Screening of the child's overall development 2-5 years (8 domains)*		*x*		*2*
Global assessment	*Qualitative assessment of the child's functional level*			*x*	
T2 at 6:0 years (*n*=85)					
Test of Reception of Grammar-2	*Grammatical comprehension 4-17 years*	*x*			*3*
Peabody Picture Vocabulary Test- 4	*Word comprehension 2:6–17 year*	*x*			*4*
CELF- 4	*Formulated sentences*	*x*			*5*
CELF- 4	*Word classes 1*	*x*			*5*
CELF- 4	*Grammatical structures*	*x*			*5*
Word Finding Vocabulary Test	*Vocabulary*	*x*			*6*
WASI WMN	*Nonverbal*	*x*			*7*
The Bus Story	*Narrative*	*x*			*8*
NELLI- neurolinguistic test for children with language disorder. Words/nonwords repetition.	*Phonological ability*	*x*			*9*
PedsQL	*Quality of life*	*x*	*x*		*10*
The Children's Communication Checklist-2 Questionnaire	*Communicative profile and language ability*		*x*		*11*
5-15R Questionnaire	*Screening of the child's overall development 5-15 years (8 domains)*		*x*		*12*
Global assessment	*Ability to participate during the assessment*			*x*	

Note: 1= (Edwards et al., 1999), Swedish norms by (Eriksson & Grundström, 2000), 2=(Kadesjö B), 3=(Bishop, 2009), 4=(Dunn, 2007), 5=(Semel et al., 2004) (Semel et al., 2013), 6= (Renfrew, 1995), 7= (Wechsler & Naglieri, 2006), 8= (Renfrew, 1997), Swedish version (Svensson & Tuominen-Eriksson, 2000), 9= (Holmberg, 2001), 10= (Varni et al., 2004), 11= (Bishop, 2003), 12= (Kadesjö et al., 2018).

3.2.2 STUDY III

3.2.2.1 PAEDIATRIC RECORD REVIEW

A comprehensive examination was conducted to review the child's attendance at various clinics. This examination took place after obtaining the second ethical amendment approval. To evaluate diagnostic stability, information pertaining to language diagnosis at approximately 2.9 and 6 years was sourced from the paediatric records. The children were subsequently categorised into three diagnostic subgroups according to the DSM-5: DLD and SSD as well as a non-diagnosis group. Given that the Swedish healthcare system adheres to the ICD-10 system, the language diagnoses “Generell språkstörning” and “Expressiv språkstörning” were translated into DLD, while “Fonologisk språkstörning” was categorised as SSD. Additionally, information on other diagnoses within the realm of ESSENCE or diagnoses commonly occurring with DLD was also extracted from the paediatric records. Information about the frequency and type of interventions at the SLP Clinic offered to the children was retrieved from the paediatric records. The focus was on studying how often and in what type of intervention the children/parents participated. The variable “active contact at the SLP Clinic” was scrutinised and the results were categorised as either “closed by the SLP” or “closed by the family”.

All data was subsequently categorised into groups based on whether the children were mono- or multilingual, as well as into specific diagnostic groups.

3.2.3 DEFINITION OF LANGUAGE DISORDER (STUDY I-IV)

The DSM-5 language diagnoses DLD and SSD are used in this thesis. Recognising that diagnosis establishment lacks a definitive scientific method with a precise cut-off point, we have opted to align with population-based

studies to determine DLD (Norbury et al., 2016; Tomblin et al., 1997). The recommended cut-off score lies at or below -1.5 standard deviations of the mean across at least two tests concerning other LD studies within clinical populations and clinical practice (Loucas et al., 2008; Silva et al., 1983). This cut-off was applied in studies II-IV. To determine SSD, in these studies, the child's spontaneous speech would be assessed, requiring a score at or below -1.5 SD on nonword repetition, while passing the remaining tests. If the child did not fall beyond the -1.5 SD threshold (cut-offs for DLD or SSD), a language diagnosis was not established.

In study I, only one validated language test was used due to the participant's low age. However, the identical -1.5 SD cut-off was maintained. This, together with analysis of spontaneous speech, specifically "Mean length of utterance (MLU)", and the global assessment made by the SLP, formed the basis for diagnosis. If the children scored at or below the agreed-upon cut-off and had a limited MLU, DLD was determined with the modifier "mixed" indicating challenges in both receptive and expressive language ability. Conversely, if the child passed the test but had a limited MLU for their age, the DLD was specified as "expressive" DLD. If the child did not fail the test or showed limited MLU, no language diagnosis was assigned, a classification referred to as so-called "late Bloomers".

3.2.4 PARENTAL QUESTIONNAIRES (STUDY I, IV)

To measure parental responses, we administered questionnaires. In study I, a questionnaire tailored for toddlers, the Evaluation of Development and Behaviour in 2 – 5 year old Children (2-5) (Kadesjö B) was used. The 2-5 questionnaire is unpublished but evaluated in a master's thesis where the language domain was compared with Bayley scales of infant and toddler development-III (Bayley, 2006; Bayley, 2009) which gave a good agreement (Johansson & Karlsson, 2015). The 2-5 questionnaire, which was completed by the parents, addresses different developmental domains such as motor skills, learning, social behaviour, language, perception, memory, executive functions and behavioural problems. The 2-5 questionnaire is an adaption of the more established Questionnaire for Evaluation of Development and

Behaviour (5-15R) (Lambek & Trillingsgaard, 2015) that was used in study IV. 5-15R is a validated questionnaire (Lambek & Trillingsgaard, 2015) which makes is easier to compare to other school-age questionnaires. The response options were graded along an ascending scale indicating various degrees of proficiency. Responses other than "no limitation" were categorised as "concerns" within that specific developmental area which is psychometrically calculated with percentiles. For a positive outcome indicating parental concerns in this questionnaire, responses need to equal or surpass the 90th percentile. In study IV, the health Quality of Life (PedsQL) (Varni et al., 2001) was used to measure the child's QoL across various domains encompassing physical, psychosocial, emotional and school functioning. Studies have shown that PedsQL is appropriate for children with DLD (Feeney et al., 2017; Nicola & Watter, 2018). The administration of this questionnaire necessitates the consideration of both parental and children's responses, with equal weight assigned to each. Parents filled out the questionnaire by themselves, while the SLP read the items to the children, who responded with help from a simpler pictorial support. Responses were considered a positive outcome at -1 standard deviation.

3.2.5 GLOBAL ASSESSMENT OF ESSENCE (STUDY I-II)

Given the complexities of child disabilities it is important to adopt an ESSENCE perspective when assessing children. Since the SLP typically operated independently, occasionally there was a necessity for a more holistic understanding of a child's neurodevelopmental abilities beyond what the SLP retrieved in a language assessment with the child and their parents. More specifically, the SLP often needed to retrieve information about the child from other sources e.g. preschool, and/or CHS nurses. To retrieve information about duration of exposure to second language (when applicable), communicative competence and social behaviour, but also if the child had undergone additional assessments pertinent to their overall development was essential. This type of measure aimed to give the SLP as complete picture as possible of

the child's functional ability in everyday life. Additionally, it also served as a basis for discussing a possible further referral. When the needs arose, the SLP together with the CHS nurse would agree to initiate contact with a psychologist or specialist physician, allowing for a thorough examination of developmental outcomes, a practice often carried out.

3.2.6 STATISTICAL ANALYSIS

In **Study I** The Mann-Whitney U test was employed for analysing continuous variables, whereas Fisher's exact test was utilised for examining categorical variables. When comparing three unordered groups, the Kruskal-Wallis test was applied to continuous variables, and the Chi-squared test was used for dichotomous variables and categorical variables. The significance level (alpha) was set at $p < 0.05$. Cronbach's alpha was used to assess the reliability of the items within each domain of the FTF-toddlers assessment.

In **Study II** T-test was initially used. However, due to the skewed nature of the distribution, non-parametric tests were subsequently used. Specifically, the Mann-Whitney U test was utilised to compare continuous data between two subgroups. Chi-square test and Fisher's exact test were used for comparing categorical backgrounds variables. The significance level (alpha) was set at $p < 0.05$. Z -value was calculated with the Mann-Whitney U test. Spearman's rho was used for correlation analysis.

In **Study III** the Chi-square test and Fisher's exact test were used for group comparison with categorical variables, more specifically comparing monolingual and multilingual children regarding type of assessment, diagnosis, and interventions. Comparison between diagnostic subgroups were also calculated with Chi-square test and Fisher's exact test.

To evaluate, in **Study IV**, Mann - Whitney U test and Kruskal-Wallis test was used for continuous variables and Chi-square test for categorical variables. An evaluation was conducted to determine whether the results significantly exceeded the 90th percentile for each of the seven domains in the 5-15R assessment, as well as surpassing -1 standard deviation on the scales and

summary scores in the PedsQL. This analysis was carried out using 95% confidence intervals. If the confidence interval overlapped with or extended beyond the cut-offs of the 90th percentile or -1 SD, respectively, the result was deemed statistically significant, indicating a positive outcome. Cohens kappa was used for intra- and inter-rater reliability regarding language assessment.

3.3 ETHICAL CONSIDERATIONS

This thesis includes 3 ethical approvements granted by the Swedish Ethical Review Authority: Dnr 306-17 (pertaining to the collection of data from assessments at 2.9 years of age), Dnr T1045-18 (allowing for a follow-up study and data gathering) and Dnr 2022-03230-02 (permitting a comprehensive paediatric record review). All participating families have given their consent both orally and in writing. Feedback on the language assessment and recommendations for interventions were provided if requested by the parents. All results are presented at a group level, which means that no individual participant can be identified.

4 RESULTS

4.1 STUDY I

In 2016, 113 families were consecutively asked to participate in the study and 100 accepted. They had all demonstrated positive screening results at the 2.5-year language screening, participated willingly in this study and underwent assessment at age 2.9 years T1. Those who met the criteria received a LD diagnosis. The distribution of diagnosis in the group was as follows: 52 children with mixed DLD, 35 with expressive DLD and 13 with no diagnosis. Responses from parents regarding their child's development, as per the questionnaire, did not yield significantly differing results. However, there was an observable trend wherein parents of children facing more pronounced language difficulties (mixed DLD) tended to report greater limitations not only in language development, but also in neurodevelopmental areas related to language and communicative development e.g. social behaviour. Meanwhile, parents in the expressive DLD group raised similar concerns regarding speech when compared to those in the mixed DLD group.

4.2 STUDY II

The findings from T2 revealed that out of the 85 participating children, 68 fulfilled criteria for DLD, 6 for SSD while 11 children did not meet criteria for any language diagnosis. Within the DLD group, there was an even distribution between monolingual and multilinguals participants, which enabled group comparisons to be made. The mono- and multilingual groups demonstrated no significant differences in performance on non-verbal test or assessment involving phonological ability. However, the multilingual group exhibited notably poorer performance on assessments related to vocabulary development, including language comprehension, receptive and expressive vocabulary, narrative proficiency but also sentence repetition. Early language

milestones such as babbling development and lexical debut displayed no significant disparities between the monolingual and multilingual groups. However, at 2.9 years of age, the multilingual group demonstrated significantly lower scores on language comprehension test than the monolingual children (p=<0.01) and at MLU (p=.04). This discrepancy persisted in the follow-up assessment at 6 years of age. The results also indicated that the monolingual group has a higher proportion of cases with a heredity component compared to the multilingual group.

4.3 STUDY III

Study III, a paediatric record review, focused on a) the persistence or transience of language diagnosis at 6 years of age b) external ESSENCE assessments and diagnosis or medical diagnoses at 6 years of age and c) interventions offered during the period of 2.9-6 years. The findings indicated a notable degree of diagnostic stability in language diagnoses. Among the 85 children participating in T2, 74 still fulfilled LD diagnosis. Those initially identified with expressive DLD at T1 often continued to exhibit DLD at the age of 6. Some children experienced a shift from "General språkstörning", i.e. DLD to phonological difficulties. In the group that did not meet the criteria for language diagnosis at the age of 2.9 years, six of the children were diagnosed with DLD at 6 years of age. Among the entire group at 6 years of age, 20 were diagnosed with another ESSENCE diagnosis, with ADHD and autism being most prevalent. Additional diagnoses such as ID, learning disabilities, anxiety, epilepsy and selective mutism was also present. In terms of external assessments, including neuropsychiatric and intellectual functioning assessments, they tended to be (albeit not statistically significantly) more prevalent among multilingual children compared to their monolingual counterparts. However, these assessments did not result in a higher frequency of diagnoses among the multilingual children in this study. Regarding interventions, families tended not to participate in full throughout the offered interventions, a result that did not differ among the groups. However, parents of monolingual children participated significant more $\chi 2$ (1, N = 59) = 5.544, p = .034) in the introduction of augmentative, and alternative communication. Another result

from this study showed that the monolingual families' contact with the SLP Clinic was significantly more $\chi 2$ (1, N = 59) = 5.544, p = .034) likely to be concluded by the SLP than the multilingual families.

4.4 STUDY IV

At age 2.9, parents did not observe any significant impairments in their child's other neurodevelopmental abilities. However, the findings from T2 revealed that by age 6, parents noted impairments in a significantly wider range of neurodevelopmental domains and to a greater extent than at T1. The primary areas of concern for parents were language, memory, perception and motor skills. Notably, parents of children with DLD expressed the greatest level of concern. Assessment of children's QoL involved the administration of a questionnaire to both children, facilitated by the SLP, as well as to parents. The results showed that parents reported no issues, whereas children with DLD reported a certain impaired QoL concerning school functioning, and children with SSD reported a certain level of impaired QoL regarding their social functioning. An intra-rater (80%) and inter-rater (76%) reliability was performed between to authors regarding diagnostic subgroups. The first and second author assessed the test results at two times with a substantial agreement at Kappa values 0.71 and 0.66.

4.5 FALSE POSITIVES

From the screening outcome, 5 children did not receive a language diagnosis at 2.9 years. At the follow-up at age 6 years 3 of them participated and did not receive a language diagnosis. They are to be considered as false positives. They all were monolingual, and the sex distribution was (boys n=1, girls n=2). They were characterised by satisfying language test results at 2.9 years of age and good participation, however, some parents reported problems with language and other areas such as overactivity and behaviour. At the 6-year follow-up, 2/3 had other diagnoses (autism and ADHD). When it came to QoL, 1 child

reported impairment with psychosocial function, and the parent reported impairment in physical and social function. One parent reported concern about several of the child's neurodevelopmental domains such as language, and perception, but also motor skills, executive functions, memory, emotion and behaviour.

The **Attrition** from T1 to T2 (*n*=15) was calculated with Chi-square test and Fisher's exact test regarding language, heredity, language diagnosis and sex, and no significance was found.

5 DISCUSSION

The primary findings of this thesis, drawn from a comprehensive data collection process at two time points, demonstrate the presence of diagnostic stability in the early assessment of language development in children ranging from 2.9 years to 6 years of age. Notably, these children had failed the language, but passed the autism screening at age 2.5 years. The results also showed that DLD is a "dynamic condition" e.g. a child initially showing expressive language difficulties may later manifest problems with receptive language, or an initial expressive difficulty may "transform" into less extensive difficulties, such as phonological problems. At 2.9 years, a new questionnaire focusing on the overall development was employed with a view to gathering insights into the child's level of daily functioning. Half of the parents of children with DLD reported concerns about child development predominately related to problems with language, communication and social behaviour. These results may be due to absence of symptoms, under-reporting by parents or a complete reliance on the clinician to inform them if other difficulties arise. By the age of 6 years, parents, particularly those of children with DLD, reported concerns about various areas including motor skills, executive functions, perception, memory, social skills and emotional behaviour. This underscores the importance of early detection and continued monitoring of these children's progress. At the language assessment at age 6 years, as expected, all children with DLD demonstrated low performance on the language test, confirming their difficulties. Multilingual children with DLD exhibited significantly lower performance in several language tests compared to their monolingual counterparts. This highlights the question of the level of exposure to the Swedish language. The review of pediatric records revealed that parents and children did not participate in interventions as anticipated. Possible reasons for this may include the challenge of integrating weekly visits to the SLP Clinic in their everyday lives. There is a need to further investigate the underlying causes of this poor attendance as it could yield crucial insights for refining the guidelines at the SLP clinic. It was also observed that SLPs concluded contact more frequently with monolingual children than with multilingual ones, suggesting that multilingual children from different cultural backgrounds may be more difficult to assess. Despite passing the autism screening at 2.5 years,

almost one in four of the cohort received an additional ESSENCE diagnosis by age 6 years, of whom one in four was identified as having autism. This indicates that other problems have become more prominent as the child develops. This finding points to the importance of initiating new assessments if the child's needs change. The utilisation of a questionnaire to assess QoL as a pivotal factor in the child's daily life yielded varying responses from child and parent, emphasising the importance of using different sources e.g. preschool, when collecting information about the child's level of functioning in everyday life.

5.1 LANGUAGE SCREENING FROM AN EARLY AGE

Early identification of ESSENCE, including LDs, is a crucial approach that underscores the need to detect potential neurodevelopmental challenges in young children. This enables the provision of timely and targeted interventions to support their overall growth and well-being (Gillberg, 2014). This strategy acknowledges the critical importance of the early years in a person's life for cognitive, emotional and social development. Several studies have concentrated on screening at early age for deviations in a child's development, including delays/problems in babbling (Lieberman et al., 2022; Miniscalco et al., 2018; Miniscalco et al., 2006) Nevertheless, early language screening remains a subject of extensive discussion. Two systematic reviews concluded that there is insufficient evidence to support early language screening (Law et al., 2000; Nelson et al., 2006). However, it emphasised the significance of identifying children with early language delays, as they are at heightened risk of comorbid conditions, potentially leading to issues with social behaviour and literacy (Sim et al., 2019). There is uncertainty regarding the optimal age for conducting screening. A child with emerging language difficulties may experience an intensive period of language development at the time of screening, potentially leading to a false negative result. (Law et al., 2000). Conversely, another child's language development may be slow at the time of screening but later advances to a functionally acceptable level (Reilly et al.,

2010). In such cases, the child should perhaps undergo screening at a later stage or at least at two different distinct time points to establish the persistence or transience of language difficulties (Law et al., 2012). Establishing a definitive safe age for screening is thus deemed challenging. Contrary, to the “wait and see” approach, recent research does not lend support to delaying intervention (Capone Singleton, 2018). Delayed language acquisition can have broader implications beyond language development, affecting social behaviour, school readiness and leading to long-term challenges (Capone Singleton, 2018).

In Sweden, there exists a well-established system within the CHS for assessing children's development at various age groups, encompassing language as well as other developmental domains such as social skills and behaviour. The language screening programme incorporates visits to CHS at different ages to evaluate crucial language milestones. The participation rate in Sweden ranges from 95 to 99% (Jansson et al., 2017). This ensures that children at risk of delayed language development can be offered appropriate interventions at an early stage, irrespective of whether they are mono- or multilingual. A Swedish longitudinal study on children who screened positive for language problems at 2.5-year, (but who were not screened for autism at the same time), revealed that over 70% encountered difficulties within the area of ESSENCE or received an additional ESSENCE diagnosis by age 6 years (Miniscalco et al., 2006). The findings in study I corroborated the expectation that language screening in early childhood identified DLD as being persistent throughout the preschool period and into early school years (87%). Nonetheless, delineating development in toddlers can be challenging. While none of the children in study I screened positive for autism, 12 did not engage sufficiently in the SLP's assessment at T1 to yield a satisfactory test result (Schachinger Lorentzon et al., 2018) emphasising the need for further research into diverse methods identifying ESSENCE in early childhood.

5.2 IDENTIFYING DLD THROUGH LANGUAGE TESTS

In the language comprehension assessment at 2.9 years (study I) and the language assessment at 6 years (study II-IV) language tests were used. The language tests chosen are validated (reliable result), standardised (manual based), normed (tested on a population) and several of them used in research studies. Language tests serve as crucial instruments in evaluating DLD (Sansavini et al., 2021). However, there are several factors to consider. It is important to adhere to consistent administration procedures outlined in the respective manuals to ensure that the results align with the intended purpose of the test (Nettelbladt & Salameh, 2007). Therefore, when testing a group systematically, it is essential to have a solid familiarity with the tests, and if multiple tests are involved to follow a predetermined order in their administration. It is worth noting that the outcome of the test can also be influenced by the child's behaviour on the day of testing (Nettelbladt & Salameh, 2007). These factors are important to consider when interpreting the results.

The presence of a consistently high number of multilingual children at T1 51 (51%) and T2 41 (48%) throughout this thesis allowed for a unique opportunity to compare mono- and multilingual children with DLD over time across variables, a practice not frequently observed in many Swedish studies. While some international studies have included distinct bilingual groups, such as Ohana & Armon Lotem's study focusing on word retrieval in 3 different bilingual pairs: English-Hebrew, Russian-Hebrew and French-Hebrew (Ohana & Armon-Lotem 2023), the studies included in this thesis covered children from diverse socio-economic backgrounds across Gothenburg. Most children had a single native language, albeit at T2, 13 of 41 (32%) children had more than one native language, hence the designation as multilingual children. Nevertheless, comparison between the groups revealed significant disparities despite a similar onset of lexical debut and commencement of preschool attendance. Notably, at 2.9 years, the multilingual group produced shorter utterances (1.6 words) in contrast to the monolingual group (2.0 words). It is expected that children begin using longer and more complex sentences between the age 2-3 years, indicating expressive difficulties in both groups

(Rikshandboken, Barnhälsovården, 2023). In the language comprehension test, multilingual children scored significantly lower than their monolingual counterparts, prompting questions about their exposure to the Swedish language. However, at the age of 6 years, as these children with DLD approached the commencement of Swedish formal education, results from the T2 assessment indicated that the entire group performed more than -1.5 SD below the mean of the language tests. Multilingual children demonstrated notably poorer performance in areas such as language comprehension, receptive and expressive vocabulary, recalling sentences and narrative skills. The disparity in recalling sentences, a recognised clinical marker for DLD (Vang Christensen, 2019) challenges the notion that this is solely attributable to exposure to the Swedish language. Nevertheless, the role of exposure to a second language remains essential (Andersson et al., 2019). Consequently, further studies focusing on monitoring the extent of exposure in everyday life under Swedish conditions when evaluating multilingual children with DLD are desirable.

5.3 EVALUATING DAILY FUNCTIONING IN CHILDREN WITH DLD

Integral to well-being is ensuring that the child experiences motivation and joy in daily life. However, SLPs, often operate independently in isolation from a broader collaborative team. To conduct a comprehensive assessment of the child's intervention needs during follow-up visits at the SLP Clinic, the SLP must gather information not only from the CHS and preschool, but also through engaging parents in interviews and/or administering questionnaires.

In study IV, we endeavoured to explore the QoL experienced by the children. Due to their young age, parents were enlisted to provide insights via questionnaires concerning the child's qualitative everyday life using the PedsQL scale (Varni et al., 2001). The findings revealed disparities in reports across child and parent, consistent with previous research. (Bastiaansen et al., 2020; Bedard et al., 2023). Parent reported no concerns as regards to the child’s QoL while the children themselves expressed concerns regarding school and

social functioning. A larger pool of respondents yields a more nuanced spectrum of opinions that can be combined into a holistic perspective (Bastiaansen et al., 2020). It would have been interesting to also involve preschool staff as respondents in our study. Parents and preschool staff observe the child in distinct settings, thus offering nuanced insights. During the study, children provided their responses to items presented to them by the SLP. A simple pictorial aid was used to assist the child's responses. Nonetheless, responding to questions of a more abstract nature can be challenging at a young age (Coghill et al., 2009), potentially leading to both over- and under-reporting of concerns. Given that most of the children in Study IV experienced difficulty processing language, a more pictorial-based interview might have facilitated their responses (Bornman & Murphy, 2006). Addressing QoL is a pre-emptive approach to potentially avert future psychological issues, as demonstrated by prior studies (Dubois et al., 2020; Horowitz et al., 2007). Early research corroborates that language delays can give rise to notable health concerns (Stothard et al., 1998). In study I, parents completed a new neurodevelopmental questionnaire for ages 2-5 and reported fewer concerns at 2.9 years compared to the results obtained using the companion questionnaire for children ages 5-15 (Lambek & Trillingsgaard, 2015) at 6 years (study IV). At 2.9 years, three quarters of the parents of the DLD group expressed concerns about language, as opposed to half of them who reported such problems at child age 6 years. At this latter point parents also reported concerns in other domains (motor skills, executive functions, perception, memory, social skills and emotional behaviour). This discrepancy may have several underlying reasons. Concerning language at age 2.9 years, parents may have attributed perceived language difficulties as an explanation for other difficulties, a phenomenon known among clinicians as “diagnostic overshadowing” (Jopp & Keys, 2001). Alternatively, parents may have been cognisant of challenges but preferred to adopt a “wait and see” approach.

Another factor could be the emergence of signals from the child’s environment, such as the preschool, as the child matures and the demands increase, consequently heightening parental concerns (Marshall et al., 2016). Also, the child’s behaviour at home may differ from their behaviour in group settings at school. Had the data processing at T1 included input from preschool staff who witness the child in interactive play with peers, and had they completed a developmental questionnaire, the concerns about the child might have been different. By age 6 years, other difficulties may have become more

salient, and expressive language difficulties less pronounced. An additional approach that could have yielded a more profound insight into the timing and manner in which parents commenced contemplating their child's development would have involved not only the completion of a questionnaire pertaining to their child's neurodevelopment, but also active participation in an interview. This would have granted the SLP an occasion to explore a broader array of inquiries regarding the child's neurodevelopmental requirements.

5.4 UNRAVELLING LANGUAGE AND ESSENCE: A LONGITUDINAL PERSPECTIVE

At age 6 years, study III revealed that one in four of the children with DLD exhibited a different or additional ESSENCE diagnosis. This aligns with findings from a previous study (Miniscalco et al., 2018), which demonstrated that two in five of the children who screened positive for either LD or autism at 2.5 years met criteria for another ESSENCE diagnosis by age of 7, in addition to their initially identified concern. In a longitudinal screening study focusing on children who screened positive for autism at 2.5 years, one in four also met the criteria for LD two years later (Kantzer et al., 2018).

The CHS plays a crucial role in the systematic monitoring of at-risk children. Establishing a more structured collaboration between medical care and preschool settings, as well within the medical community, would not only reduce waiting times but also enable the early detection and investigation of neurodevelopmental deviations (Gillberg, 2010; Reilly et al., 2014). A swift and efficient medical care pathway, working in tandem with preschool facilities, would facilitate early interventions — a goal shared by all professionals and caregivers in the child's environment (McKean & Reilly, 2023). It would also serve as an indicator for seeking additional specialised care, if necessary. Given that SLPs often work independently, a more effective approach might involve their integration into an ESSENCE-focused team. This would enhance their capacity to promptly identify any emerging difficulties.

From a patient's perspective, a holistically coordinated assessment is preferable, as it not only saves time but may also alleviate parental anxiety.

A significant insight from Study III was that, in many instances early diagnosed LD persists. Additionally, in some cases, more extensive DLD emerges as the child matures. Notably, by the age of 6 years nearly one in four of the children also exhibited other ESSENCE-related disorders.

5.5 FAMILY PARTICIPATION IN LANGUAGE INTERVENTIONS

After conducting a thorough review of the paediatric records regarding interventions, it was shown that, at the group level, families attended only 50% of the planned intervention sessions. This, in turn, has led to an unwarranted increase in costs for the SLP Clinic, primarily due to the challenge of arranging short-notice interventions for other families or children. It is important to note that parents' relatively lower reported concerns about their child's development at age 2.9 years may not necessarily imply that they did not consider the intervention essential. On the contrary, one research study indicates that 40% of the parents reported concerns regarding their child's overall development, yet participation in interventions was only 5% (Marshall et al., 2016). It is not clear why families do not participate. One reason could be, that the scheduling of weekly interventions can pose challenges in fitting into the family's daily life (Shaghaghi et al., 2011). When the SLP proposed an intervention, parents were afforded the opportunity to seek clarification about its purpose. Despite this, there may have been instances where parents may not have realised the significance of attending all sessions, potentially contributing to the significantly higher attendance among monolingual parents, particularly during the introduction of augmentative and alternative communication methods. Otherwise, no discernible disparities were observed between mono- and multilingual families. It is suggested that, the enactment of a collaborative implementation plan involving both parents and SLPs can foster a shared understanding of the intervention's objective and purposes and aims, as advocated by Singer et al., (Singer et al., 2022) or as described in a single-case

study (Brinton et al., 2005). The absence of such a plan and a desire to reach a consensus with the family may explain the tendency of SLPs to maintain more consistent contact with multilingual families. Allowing parents to deliberate on their perspectives regarding an intervention without the presence of the SLP might yield more comprehensive insights compared to seeking their feedback after all sessions have been concluded. According to in-depth interviews conducted, parents express a desire to be actively involved (Klatte et al., 2023).

5.6 STRENGTHS AND LIMITATIONS

The studies included in this thesis refer to a sample comprising a relatively small cohort, both at T1 (*n*=100) and T2 (*n*=85). The cohort was recruited from a larger population-based sample. A major strength of this thesis lies in the inclusive recruitment process for children, without any exclusionary criteria, but with a singular inclusion criterion: a screen positive outcome for language problems at 2.5 years of age, specifically excluding positive autism screening result as a parameter. The primary objective has been to track the natural development trajectories, with the same participants featured throughout the included studies. Consequently, this has resulted in somewhat unevenly sized diagnostic subgroups. However, it has also yielded a valuable facet - approximately 50% of the children at both T1 51 (51%) and T2 41 (48%) were multilingual. This unique composition enables meaningful comparisons between mono- and multilingual children. Furthermore, the total group was characterised by representation of 22 diverse languages, originating from socioeconomically diverse areas of Gothenburg, rendering it a robust representation of preschool-age children in the city. Nevertheless, a limitation arises from the fact that only parents have completed the developmental questionnaire. It would have been advisable to engage representatives from the child's various everyday environments, extending beyond the home, in this process. Regarding children with additional "ESSENCE", it would have been interesting to analyse outcomes at a later time in the child's life.

6 CONCLUSION AND CLINICAL IMPLICATIONS

The studies included in this thesis have illuminated several key findings:

Study I: Most children who failed the language screening at 2.5 years had DLD and consequently required interventions. When surveyed at this age, parents of young children reported minimal difficulties aside from language and language-related concerns.

Study II: Multilingual children identified with DLD at an early stage demonstrated notably lower proficiency in language assessments at the age of 2.5 years compared to their monolingual children. Despite receiving similar interventions, the multilingual children continued to exhibit significantly lower performance in language assessments at the age of 6 years. They encountered challenges in areas such as language comprehension, recalling sentences, receptive and expressive vocabulary, as well as narrative ability.

Study III: At age 6 years, a quarter of the children who screened positive for language problems and suspected DLD, but negative for autism at age 2.5 years, received an additional diagnosis related to ESSENCE. While parents and children were offered language interventions, attendance at a group level was only approximately 50% during the intervention period.

Study IV: Parents reported more concerns across various neurodevelopmental domains at age 6 years compared to at age 2.9 years, as indicated by neurodevelopmental questionnaires. However, impaired QoL was not reported by the parents. Discrepancies emerged between children and parents regarding QoL, with children identifying impairments in school and social functioning.

The following clinical implications are suggested:

The screening outcomes resulted in 87% receiving diagnoses for LDs, affirming the effectiveness of the screening tool. Questionnaires can offer

crucial insights for language assessment. These questionnaires should be user-friendly, devoid of overly complex grammatical structures, and present answer options that must clearly convey their intended meaning. The SLP can also ensure that parents correctly comprehend the questions, possibly by incorporating follow-up queries on the contents of the questionnaires.

Children with DLD exhibited significant challenges in language processing, encompassing comprehension, vocabulary (receptive and expressive), narrative ability, sentence recalling and phonological proficiency in test settings. To prevent misdiagnosis, for instance, due to too little exposure to the Swedish language, it is recommended to include clinical markers of DLD such as recalling sentences, nonword repetition and past tense, potentially in conjunction with a dynamic test. Some children employ strategies to conceal their difficulties, potentially giving the impression of awareness. This aspect should be emphasised in the child's home, preschool and other significant environments.

Streamlining communication between the child's various care providers i.e. the SLP Clinic and CHS is important. This could be facilitated through a unified health record system and secure digital tools for information transfer. This would result in swifter updates on the child's current developmental status.

During dialogues between the SLP and the child regarding QoL, it was observed that several children misinterpreted the actual meaning of the questions. Therefore, an alternative approach, possibly through conversation aided by pictorial support, is recommended.

Regular follow-up assessments are very important. Equally crucial is to follow the child's well-being and everyday functioning, as these play pivotal roles in guiding clinical decisions and priorities, offering crucial insights into the child's health status. Moreover, it serves as a valuable tool for tailoring individualised treatments and facilitating intervention development. Parents have to be engaged and understand the objective of achieving positive outcomes. Evidence-based interventions should be provided as necessary, with their effectiveness regularly evaluated to achieve desired results.

This thesis compellingly argues that the “wait and see” approach is rarely the correct method, and that early symptoms typically warrant intervention and follow-up.

7 FUTURE PERSPECTIVES

To substantiate the validity of an assessment and/or intervention, it is crucial to routinely conduct systematic evaluations of the employed methods. This encompasses a range of language tests, intervention methods and screenings. For a screening method to be deemed effective in identifying risk groups, it necessitates a follow-up process. Screenings within the CHS are resource-intensive and should effectively encompass most of the at-risk population. While numerous studies have delved into this domain (Kantzer et al., 2018; Lieberman et al., 2022; Miniscalco et al., 2018; Miniscalco et al., 2006), there is a call for more extensive studies involving larger cohorts, preferably through national collaboration, to further underscore the significance of ESSENCE screening.

The committed involvement of the patient's family is pivotal in ensuring the positive development of the child through follow-up assessments and interventions. This can be a challenge for professionals to communicate, particularly in families with a diverse structural dynamic or rooted in varying cultural values. The success of the professional is contingent upon the family's comprehension of the assessments and interventions expected of them for their child. To be able to identify any reservations or concerns regarding assessments and interventions, it is important to carry out a good conversation. Additional studies that systematically employ semi-structured interviews containing cultural-informed questions and to assess families' expectations and experience in participation are warranted.

Further studies are needed regarding the influence of exposure to a second language on the language development of a multilingual child. The findings from this thesis show marked differences between monolingual and multilingual children. The cohort of children with multilingualism is expanding and has changed over the last 15 years, evolving from a background of two languages, often with a same cultural and socially accepted background, to a more linguistically intricate group with multiple languages, both from their homes and immediate surroundings. Frequently, these languages have varying degrees of social acceptance, resulting in uneven progress in the child's

linguistic development. There is a need for more Swedish studies elucidating how multilingual children with DLD encounter different languages in their everyday environment. It is important to understand the role of exposure, in conjunction with factors such as cognition, immediate surroundings, culture and family dynamics. Such studies would enrich our understanding of multilingual children who face an elevated risk of late language development without exhibiting overt language difficulties.

There persists a lack of Swedish intervention studies, despite research indicating supporting evidence for certain interventions in DLD, particularly in preschool-aged children (Tarvainen et al., 2020). Research evaluating interventions needs to be conducted in a systematic manner (Denman et al., 2021) with outcomes providing insights into the most clinically advantageous and effective methods and their appropriate timing and application.

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