SUPPORTING 4- TO 6-YEAR-OLD CHILDREN WITH DEVELOPMENTAL LANGUAGE DISORDER

Communication in daily life, language gains, and effects of morphosyntax intervention



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CONTENTS

Chapter 1 General introduction 9

Chapter 2 Communication in daily life of children with developmental language disorder: parents' and teachers' perspectives 33

Chapter 3 Language gains in 4–6-year-old children with Developmental Language Disorder and the relation with language profile, severity, multilingualism and non-verbal cognition 77

Chapter 4 Focused stimulation intervention in 4- and 5-year-old children with DLD: exploring implementation in clinical practice 113

Chapter 5 Effect of a focused stimulation intervention on morphosyntactic skills of children with Developmental Language Disorder 157

Chapter 6 General discussion 199

Nederlandse samenvatting 221
About the author 227
List of publications 229
Dankwoord 231



CHAPTER 1

General Introduction







"Our son has trouble expressing himself, to make sentences. It is difficult for an outsider to understand him."
"Children do not understand him and therefore do not listen to his input when they play together."
"He knows it but can't explain it properly, which causes communication to get stuck."

The quotes above, taken from parents participating in one of the studies described in this dissertation, highlight how Developmental Language Disorder (DLD) affects children's ability to engage in daily interactions, whether at home, with peers, or in school settings. DLD is a neurobiological developmental disorder characterised by persistent difficulties in language acquisition and use (Bishop et al., 2017). With an estimated prevalence of 7–10% among 4- and 5-year-olds (Norbury et al., 2016), DLD affects a substantial number of children.

The consequences of DLD extend far beyond language difficulties, influencing social and emotional development (Goh et al., 2021; McCabe & Meller, 2004; St Clair et al., 2011; Yew & O'Kearney, 2013). Academic performance is often compromised, with difficulties in learning to read and write and overall low school performance (Harrison et al., 2009; McCormack et al., 2010; Norbury et al., 2016; Ziegenfusz et al., 2022). DLD and its consequences have a negative impact on quality of life (Eadie et al., 2018; Van Agt et al., 2011). Challenges persist into adulthood (Botting et al., 2016; Snowling et al., 2006). Adults with a history of DLD often find it hard to form close friendships and romantic relationships. They also tend to experience long-term educational and professional disadvantages (Clegg et al., 2005; Conti-Ramsden et al., 2018). Mental health problems are also relatively common among adolescents and adults with a history of DLD (Clegg et al., 2005; Snowling et al., 2006).

Children are diagnosed with DLD if they show distinct impairments in their language development that significantly affect their everyday social interactions and educational progress and are expected to be persistent (Bishop et al., 2017). The language deficits in children with DLD cannot be explained by other conditions, such as intellectual disability, sensory impairment, autism spectrum disorder, or neurological disorders (Bishop et al., 2017). The aetiology of DLD is complex, involving genetic factors and environmental influences (Bishop, 2014; Boerma et al., 2023). During the early years distinguishing between DLD and late talking is challenging, as some children eventually catch up (Desmarais et al., 2008; Rescorla & Dale, 2013). By age 4 however, DLD can be diagnosed with reasonable certainty, and the likelihood of persistent delays is significant (Stothard et al., 1998).

Linguistic characteristics of children with DLD vary widely. They may experience difficulties in phonology, morphosyntax, word finding and semantics, pragmatics, discourse, and verbal learning and memory (Bishop et al., 2017). Morphosyntactic difficulties are the most prevalent and persistent and are considered a core feature of DLD (Leonard, 2014). All children with DLD experience difficulties in language production, and about half of them also have delays in language comprehension (Law et al., 2008; Wiefferink et al., 2020). Hence, two language profiles are commonly distinguished: receptive-

expressive language disorder (impairment of receptive and expressive language), and expressive language disorder (impairment of mainly expressive language) (ICD-11; World Health Organization, 2021). Although Bishop (2017) qualifies this categorization as "rather gross" and emphasizes that it is not stable over time, the profiles are widely used in clinical practice. It is commonly assumed that children with receptive-expressive disorders face greater challenges in communication in daily life, though empirical support for this assumption is limited (Law et al., 2004; Leonard, 2014).

While all children diagnosed with DLD experience communication difficulties, the nature and extent of these limitations are not yet well understood, particularly among young children. This dissertation aims to provide insight into these communication difficulties and evaluate the outcomes of speech and language therapy and communicative support in a special education setting, with specific attention to intervention aiming at morphosyntax. Previous research indicates that some children make progress, while others do not. We will therefore also investigate child characteristics that influence intervention outcomes.

DLD in children aged 4-6

The dissertation focuses on children with DLD between the ages of 4 and 6, a critical period, when language and communication difficulties become increasingly apparent and, in most cases, do not resolve themselves. As children enter formal education, they are expected to have acquired complex language skills and to communicate independently. In the Netherlands, compulsory education begins at the age of 5, but most children enter elementary school at age 4. Between the ages of 4 and 6 years, children develop from a free-playing child to being prepared to start formal learning in school (Feldman et al., 2020). Language plays a central role in this process, as children become increasingly able to use language to guide their actions and process information. Their ability to think consciously, realistically and abstractly develops. Typically developing (TD) four-year-old children have mastered the fundamentals of their mother tongue. They use vocabulary for concrete topics and construct grammatically correct sentences that are intelligible to peers and adults. Their conversational skills, though simple, allow them to share experiences, even if not yet in a fully coherent manner (Schaerlaekens, 2021). School-entry accelerates language growth: vocabulary expands, the complexity of morphosyntax increases, and conversational and narrative skills improve. Phonological awareness also develops, and children become interested in letters and numbers. As children increasingly learn language through instruction at school, the boundaries between natural acquisition and explicit learning become less distinct (Schaerlaekens, 2021). Alongside linguistic progress, children also make significant gains in social-emotional skills, personality development and independence (Feldman et al., 2020).

The development of children with DLD aged 4 to 6 differs in all aspects from that of their TD peers. They have difficulty expressing themselves clearly, due to delayed phonological development, limited vocabulary and short, incomplete sentences. Word finding difficulties may arise due to impaired structuring of the mental lexicon (Leonard & Deevy, 2003). The vocabulary gap between children with

DLD and TD peers widens over time, because learning new, more complex or abstract words builds on knowledge of earlier acquired, "basic" words (Penno et al., 2002). Limited vocabulary and delays in the acquisition of morphosyntax can also lead to difficulty in understanding language, in engaging in conversations and in storytelling (Bishop, 2014; Norbury, 2014). Consequently, at school-entry children with DLD face significantly greater challenges in language and communication than their peers. These challenges are exacerbated by rising demands for language proficiency and expectations that they communicate independently. Language skills become increasingly relevant in all school subjects such as mathematics and world orientation, and for essential social and cognitive abilities such as collaboration and planning (Abdul Aziz et al., 2017; Brinton et al., 2000; Murphy et al., 2014; Ziegenfusz et al., 2022). Deficits in oral language development also affect reading and writing skills, which are crucial for successful participation in both school and society (Catts et al., 2008; Snow, 2016). Effective communication with peers is equally important for social development, enabling children to express preferences, concerns and experiences (Lloyd-Esenkaya et al., 2020).

Given these challenges, effective intervention for children with DLD is essential to support their communicative functioning and overall development. For the 4-6 age group, however, there has been limited large-scale research on the effects of interventions (Law et al., 2004; Rinaldi et al., 2021). Most studies focus on younger children, leaving a gap in knowledge about whether young school-aged children with DLD can catch up with their peers across various language domains. Ultimately, interventions aim to improve not just language skills but also children's ability to communicate effectively in everyday situations, making it vital to examine communication in daily life.

Communication in daily life

Understanding the communication challenges faced by children with DLD in everyday contexts is essential for providing adequate support. The International Classification of Functioning, Disability and Health (ICF; World Health Organization, 2001) provides a comprehensive framework for describing language disorders and communication difficulties. Emphasising functioning over impairment, the ICF includes three components: (a) body functions and structures, (b) activities and participation, and (c) contextual factors. Within this framework the concept of "communicative participation" refers to communication that occurs during an individual's involvement in daily life situations (Eadie et al., 2006) and aligns closely with the "activities and participation" component. Domains in which children with DLD often experience difficulties include: "Learning and applying knowledge", "Communication", and "Interpersonal interactions and relationships" (Westby & Washington, 2017). In a Delphi study, Singer et al., (2020) reached consensus on a definition of communicative participation for children (aged 2-8 years): "understanding and being understood in a social context, by applying verbal and non-verbal communication skills" (p. 1801).

Although Singer et al. (2020) identified behavioural indicators of communicative participation, specific difficulties for children with DLD remain underexplored. Instruments for measuring communicative participation are scarce (Alons et al., 2024; Cunningham et al., 2017). Alons et al. found only one relevant parent questionnaire for young children: the Focus on Outcomes of Communication Under Six (FOCUS; Thomas-Stonell et al., 2010). However, not all items in this questionnaire relate to communicative participation. Recent progress includes the development of an item bank to measure communicative participation from the perspective of children and adolescents with communication difficulties (Alons et al., 2025). However, Alons et al. observed that children with DLD between the ages of 5 and 7 often struggle to understand questions about communication difficulties in daily life. As the children in the current study are younger, this challenge also applies to them. Therefore, gaining insight also requires information from adults who know the child well, particularly carers and teachers.

The relationship between language skills and communicative participation is complex. Some children with mild language delays experience severe communication difficulties, while others manage well despite significant delays. Existing research has not established a clear correlation between language deficits and communicative abilities (Cunningham et al., 2019; Gerber et al., 2012). Moreover, improving language skills does not necessarily enhance communicative participation (Singer et al., 2020; Westby & Washington, 2017). It is generally assumed that children with receptive-expressive disorders face greater challenges than those with expressive-only disorders, as they struggle with both understanding and producing language. However, no studies have examined differences in communicative participation between these two language profiles. Understanding these differences would provide valuable insight into the relationship between language skills and communicative participation.

Research in this area remains limited, and few instruments are available to assess communication in daily life. Furthermore, the relationship between language skills and communication in daily life is still poorly understood. This dissertation addresses these gaps by exploring communication in home and school contexts among children with DLD aged 4–6, as observed by parents and teachers. It also examines the relationship between language skills and communication in daily life, with particular attention to differences between children with receptive-expressive disorders and expressive-only disorders. To investigate these questions, the study is situated in a context where intensive language support is provided: special education for children with DLD.

Special education for children with DLD

The research presented in this dissertation is conducted in schools for special education for children with DLD. The Netherlands has a long-standing tradition of specialised education for children with disabilities, including separate schools for children with DLD (Gerrits et al., 2019). In these settings, children receive intensive language stimulation during speech and language therapy sessions and throughout classroom activities. Although language tests are administered regularly, systematic monitoring of language

development has not yet been fully implemented. For this dissertation, language test scores from school records are used to assess progress over the course of a school year.

This dissertation focuses on a subgroup of children with DLD who exhibit significant delays and marked limitations in educational participation, and who, at the time of data collection, qualified for Dutch special education based on the criteria in place (Simea, 2014a):

- A disorder is present in at least two of the following domains: speech; auditory processing; grammar; and lexical-semantic development. This is evidenced by at least two tests per domain with a standard deviation of at least 1.5 below the mean.
- Non-verbal IQ is 70 or above.
- The disorder is persistent with insufficient improvement after at least six months of targeted speech and language therapy.
- There are severe, structural limitations to educational participation, including learning disabilities and/or very poor communicative abilities in the classroom.

Participants in our studies are children the first school grades. Key characteristics of these classrooms include (Gerrits et al., 2019; Simea, 2014b):

- Small classes of 10-12 pupils, typically staffed by a teacher and a teaching assistant.
- Speech and language therapy is provided once or twice a week for all children, either individually or in small groups.
- An educational environment designed to foster communication and language development, with professionals adapting language use and supporting communication, through strategies such as gestures.
- A safe and supportive learning environment, that promotes successful communication and communicative competence and emphasises social relationships and overall well-being.
- Close collaboration between speech and language therapists (SLT) and teachers to provide specialised and intensive language stimulation, focusing on communicative participation in the classroom.
- Individual education plans, developed collaboratively by a team of professionals, including at least one SLT and one teacher.

Language gains and relation to child characteristics

Longitudinal studies suggest that children with DLD generally follow stable developmental trajectories and do not narrow the gap with TD peers (Law et al., 2008; Rescorla, 2011). However, these studies primarily focus on older children leaving limited evidence on younger age groups. Research on domain-specific progress and influencing factors in preschool-aged children is scarce.

Systematic reviews and randomised controlled trials indicate that targeted interventions can lead to gains in specific language domains, though effects vary. Positive outcomes have been reported for

vocabulary, phonology-based speech sound disorders and phonological awareness (Broomfield & Dodd, 2011; Cirrin & Gillam, 2008; Law et al., 2004; Rinaldi et al., 2021), and to a lesser extent for morphosyntax (Ebbels, 2014; Law et al., 2004; Plante et al., 2014). Morphosyntactic difficulties appear to be persistent (Rice, 2004), and it remains unclear how growth potential in this domain relates to gains in others. Evidence on intervention effects for language comprehension is also limited (Berkman et al., 2015; Cirrin & Gillam, 2008; Conti-Ramsden et al., 2012; Rinaldi et al., 2021).

Language gains vary considerably among individual children (Justice et al., 2017; Washington et al., 2015). Factors influencing progress include the language domains affected and social skills. Given the heterogeneity of the DLD population, child characteristics such as language profile, cognitive abilities, and being mono- or multilingual are expected to contribute to variability in outcomes.

Research comparing receptive-expressive and expressive disorders is limited. Intervention studies often exclude children with receptive difficulties to maintain homogeneous groups, or do not analyse data by language profile. Yet many children present with receptive difficulties. Understanding whether receptive difficulties negatively impact growth in both receptive and expressive language domains is therefore essential.

Cognitive ability is another important factor (Bishop et al., 2017; Gallinat & Spaulding, 2014). Although there are arguments against applying a minimum IQ threshold for the diagnosis of DLD, in the Netherlands, a non-verbal IQ of 70 or higher is used as a criterion. All children in special education for DLD meet this criterion, but their scores vary widely. Evidence suggests that speech and language therapy can be beneficial for children across cognitive levels (Tomblin, 2008). However, it remains unclear whether lower non-verbal cognitive abilities constrain progress, or influence gains differently across language domains.

Multilingualism is also relevant. Many children with DLD in special education have a migrant background and are multilingual (Statistics Netherlands, 2023). Diagnosing DLD in multilingual children is challenging because it is difficult to distinguish language delay due to limited exposure from a true language disorder. This complexity, combined with limited knowledge about DLD in multilingual populations, often leads to multilingualism being an exclusion criterion in effectiveness research. Consequently, little is known about how multilingualism influences gains in language proficiency. Children with DLD exhibit language difficulties across all languages they learn, and their impairments resemble those of monolingual children with DLD (Bishop et al., 2017; Blom et al., 2022; Boerma et al., 2017; Gutiérrez-Clellen & Simon-Cereijido, 2009). Investigating language development in Dutch, which is intensively stimulated in school, may provide insight into whether multilingual children benefit from interventions primarily designed for monolingual children.

Despite growing evidence on intervention effects, knowledge gaps remain regarding domain-specific progress and the role of child characteristics in early school-aged children with DLD. This dissertation addresses these gaps by examining gains in vocabulary, morphosyntax and language comprehension separately, and by exploring how language profile, non-verbal cognition and growing up mono- or multilingually affect progress. To answer these questions, data from school records will be analysed. A key advantage of the special education context is the availability of repeated standardised test scores for all children, enabling robust evaluation of language development over time.

Morphosyntax in children with DLD

Research consistently demonstrates significant differences in morphosyntax between children with DLD and TD peers, whether matched by chronological age or language age (Leonard & Kueser, 2019; Redmond et al., 2019; Rice & Wexler, 1996; Van der Lely & Ullman, 2001).

Well-developed morphosyntax is essential for effective communication. To convey precise meaning, children should be able to construct phrases and sentences containing multiple elements. Incomplete sentences with grammatical errors can be difficult for listeners to interpret, and simple sentences often require additional context to avoid ambiguity. Short, incomplete utterances also restrict the expression of semantic relations. Complex grammatical structures are necessary to express complex semantic relations such as temporal and causal ones (Bloom & Lahey, 1978; Rescorla & Mirak, 1997).

Morphosyntactic development influences other language domains. For example, morphosyntax plays a role in acquiring new vocabulary via "syntactic bootstrapping" (Jackson et al., 2019). Comprehension and production of sentence structures, word order and inflections are critical for language understanding and for developing narrative skills, which are essential in social interaction (Bishop, 2014; Bishop & Donlan, 2005). Morphosyntactic proficiency also contributes to reading accuracy and comprehension (Buil-Legaz et al., 2016; Casani et al., 2022; Verhoeven & Perfetti, 2011).

TD children usually have achieved advanced morphosyntax by age four, producing complete sentences of four or more phrases with conjugated verbs, interrogatives, and coordinating or subordinate clauses. Morphological rules are largely mastered, with occasional errors, for instance overgeneralisations (Schaerlaekens, 2021; Schlichting, 2017). From age four onward, development of the child's morphosyntactic repertoire focuses on complexity, as relative clauses, the passive voice and complex interrogatives are mastered. Children also expand verb tense usage, improve pronoun use, and correctly apply degrees of comparison, which are complicated morphosyntactic forms in the Dutch language (Schlichting, 2017).

In contrast, children with DLD have persistent morphosyntactic deficits. The main characteristics in Dutch include errors in sentence structure and verb use.

Characteristics in sentence structure:

- Short and grammatically simple sentences (Bol & Kuiken, 1989; Duinmeijer et al., 2012; Scheffer et al., 2022; Zwitserlood, Van Weerdenburg, et al., 2015); frequent omission of obligatory arguments; few compound and embedded clauses (Bol & Kuiken, 1989; De Jong, 1999; Duinmeijer et al., 2012).
- Limited use of pronouns, determiner + noun combinations and the clitic "er" (Bol & Kuiken, 1989).
- Errors in sentence structure, including verb morphology and word order errors; deletion of words. Patterns resemble those of language-matched TD children in younger years, but diverge with age (Scheffer et al., 2022; Zwitserlood, 2014).
- Errors in plural forms and past participles (Boerma et al., 2017)

Characteristics in verb use:

- Limited use of finite verbs, and agreement errors (Blom et al., 2013; Bol & Kuiken, 1989; De Jong, 1999; Hammer, 2010; Scheffer et al., 2022).
- Use of root infinitives instead of finite verbs (Wexler et al., 2004).
- Use of "dummy auxiliaries" (Zwitserlood, Van Weerdenburg, et al., 2015).

Speech and language therapy aiming at morphosyntax

Systematic reviews on the effectiveness of morphosyntax interventions, also referred to as grammar interventions, report some positive effects but also inconsistent results (Berkman et al., 2015; Law et al., 2004; Rinaldi et al., 2021). For example, Law et al. (2004) found positive outcomes only for interventions lasting eight weeks or more, and primarily for children with expressive delays, not for those with receptive-expressive disorders. Innovative interventions do not consistently outperform usual care (Washington et al., 2011; Yoder et al., 2005). Limitations of these reviews and the included studies are the lack of description of the interventions and variability in participant age and language profiles. Consequently, it remains unclear which intervention components are most effective for which children.

Interventions aiming at morphosyntax vary considerably in their approach. Broadly, two main orientations can be distinguished: clinician-directed approaches, in which the therapist structures and guides the activities, and child-centred approaches, in which the child takes the lead and the therapist follows. Interventions also differ in their reliance on explicit versus implicit learning strategies, the therapeutic techniques employed by the SLT, and the types of play and learning activities incorporated (Baron & Arbel, 2022; Eisenberg, 2013; McCauley et al., 2017). Treatment goals range from broad (for example, producing more grammatically correct sentences) to specific (for example, correct use of the copula "is").

Explicit learning strategies are typically used in clinician-directed approaches. These involve direct practice of target structures, often outside communicative contexts. Techniques include:

- modelling: repeated presentation of the correct form of a target structure
- imitation: asking the child to repeat the target structure
- explicit metalinguistic explanation: explaining grammatical rules and errors, often with visual support

Activities include repeating sentences that match pictures and storytelling with picture sequences, with the therapist explaining why sentences are correct or incorrect (Baron & Arbel, 2022; Eisenberg, 2013). A key advantage is intensive practice of target structures within a short time frame.

Implicit learning strategies are central to child-centred approaches. Here, the SLT facilitates gradual, unconscious acquisition of target structures through meaningful interaction. Techniques include:

- modelling: repeated presentation of correct forms in natural, interactive situations
- (conversational) recasting: repeating and correcting or expanding the child's utterance (Baron & Arbel, 2022; Cleave et al., 2015; Eisenberg, 2013).

Hybrid approaches combine elements of both. The SLT directs the session while encouraging child responses and initiatives (McCauley et al., 2017). Techniques include:

- focused stimulation: repeated modelling of target structures in natural contexts, often highlighted through prosodic stress or extended duration
- elicitation: using pauses, questions, or prompts to encourage production of target structures (Proctor-Williams, 2014; Weismer et al., 2017)

Evidence indicates that modelling, imitation and explicit instruction are effective for improving morphosyntax in older children (Balthazar & Scott, 2018; Ebbels et al., 2007; Nelson et al., 1996; Zwitserlood, Wijnen, et al., 2015). For preschool children, focused stimulation and recasting have shown positive effects (Cleave et al., 2015; Fey et al., 1993; Leonard et al., 2006; Meyers-Denman & Plante, 2016). Comparisons between imitation and recasting suggest that both are effective, though recasting often leads to faster generalisation and requires fewer clinician examples (Camarata et al., 1994; Nelson et al., 1996).

Most studies are efficacy studies conducted in controlled settings, which differ from clinical practice in treatment intensity, therapist training level and participant diversity. These studies typically target specific grammatical structures and use limited intervention techniques, raising questions about generalisability to real-world contexts. Addressing this gap requires evaluating interventions as they are implemented in everyday practice.

Effect of 'Language in Interaction Therapy'

One such intervention designed for clinical practice is Dutch Language in Interaction Therapy (LIT; Van den Dungen, 2007). LIT builds on techniques shown to be effective in efficacy studies and emphasises functional interaction in play situations. While LIT can target all language domains, its application to morphosyntax includes several key features:

- Clearly defined, functional goals and target structures that support daily communication (Fey et al., 2003; Paul & Norbury, 2012). Goals are based on typical language acquisition stages and focus on morphosyntactic structures essential for everyday communication.
- A hybrid approach combining clinician-directed and child-centred elements
- Use of focused stimulation and modelling to highlight target structures
- Elicited production of target structures
- Feedback through general, extended and simplified recasting.
- Use of scripts to support functional use of target structures. Scripts describe a play scenario that allow child initiative while enabling the therapist to guide interaction and frequently offer and elicit target structures (Olswang & Bain, 1991).

LIT is designed to address a wide range of grammatical goals. However, the evidence base informing its development is largely derived from studies on isolated techniques and a limited set of grammatical structures, typically in English. Because Dutch is morphologically richer than English, children need to acquire a broader variety of grammatical structures. To date, no studies have evaluated LIT in Dutch clinical settings or examined its impact on morphosyntactic complexity.

According to the UK Medical Research Council (Skivington et al., 2021), LIT intervention delivered by a SLT qualifies as a complex intervention. It requires specialised professional expertise, and consists of multiple components, is highly flexible, with the activities, goals and desired outcomes varying for each child. The child's broader system, including family and school, is involved in the intervention which influences the outcomes. According to the MRC framework, the present study adopts an effectiveness perspective. The central question is whether LIT will produce the intended outcomes in a real-world setting, addressing the gap between controlled efficacy studies and everyday clinical practice.

RESEARCH QUESTIONS AND OUTLINE OF THIS DISSERTATION

This dissertation investigates language development and communicative abilities in children with DLD aged 4–6 and evaluates the outcomes of speech and language therapy and communicative support in a special education setting for children with DLD, with specific attention to morphosyntax intervention. It has four interrelated aims:

1. Identify communication difficulties children with DLD encounter in daily life
2. Evaluate gains in morphosyntax, vocabulary and language comprehension of children with DLD in the context of special education
3. Explore how child characteristics relate to individual differences in language gains
4. Evaluate the effect of Language in Interaction Therapy (LIT) in clinical practice by comparing its outcomes on morphosyntactic complexity with those of usual care

To address these aims, three studies are conducted involving children receiving special education for DLD.

Research questions

1. Communication in daily life
   a. What limitations in communication do children with DLD (aged 4-6 years) experience in daily life according to their parents?
   b. How do teachers perceive these children's communicative abilities and social functioning in the classroom?
2. Language development and influencing factors
   a. What changes occur in language comprehension, vocabulary and morphosyntax after one year of special education?
   b. How are these changes related to children's language profile, severity of the language disorder, cognitive abilities and being raised mono- or multilingual?
3. Effects of LIT
   a. What is the effect of the evidence-based, protocolised intervention Language in Interaction Therapy (LIT) compared to usual care on morphosyntactic complexity?

Two participant groups aged 4–6 are included: one with 154 children from 18 schools to address questions 1 and 2, and another with 28 children from six schools to address question 3.

Chapter overview

Chapter 2 explores limitations in communication in daily life of children with DLD through parent surveys and teacher assessments. Based primarily on clinical experience, it is assumed that children with DLD experience significant challenges. Differences between children with mixed receptive-expressive disorders and expressive-only disorders are examined and the relationship between language test

scores and communicative abilities in the classroom is described. It is hypothesised that children with receptive-expressive disorders experience greater limitations in communication and language proficiency is not correlated to communicative abilities (Cunningham et al., 2019; Gerber et al., 2012).

Chapter 3 examines progress in morphosyntax, vocabulary, and comprehension using standardised language test scores from school records over one school year. The hypothesis is that gains in morphosyntax will be smaller than in other language domains. The chapter also explores how language gains relate to language profile, severity, being raised mono- or multilingually, and non-verbal IQ. While no relationship is expected with non-verbal IQ, hypotheses regarding other factors remain open because of limited prior research.

Chapter 4 introduces the LIT intervention, detailing its principles and techniques. The overview covers all the components of language intervention as proposed by Frizelle et al. (2021) and focuses on how the LIT design supports SLTs in applying evidence in practice. The chapter includes a single-case A–B design study with five children, comparing progress during LIT and Usual Care (UC). Outcomes include mean length of utterance (MLU) and TARSP-P complexity scores.

Chapter 5 expands on Chapter 4 with a larger sample of 28 children using a single-case design with a non-equivalent control group. Both groups initially receive UC; the LIT group than transitions to LIT, while the control group continues with UC. The study covers one school year (40 weeks), with measurements taken every 4-6 weeks. Outcome measures are the same as in Chapter 4. Individual progress during UC and LIT is compared, with the hypothesis that LIT leads to greater gains in morphosyntactic complexity than UC.

The final **Chapter 6** integrates and discusses the main findings from the preceding studies. Methodological strengths and limitations are critically evaluated, and implications for future research are outlined. The chapter concludes with recommendations for clinical practice and policy, highlighting how the results can inform evidence-based intervention and support for children with DLD in special education.

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CHAPTER 2

Communication in daily life of children with developmental language disorder: parents' and teachers' perspectives

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ABSTRACT

Purpose

This study explores limitations in communication in daily life of children with Developmental Language Disorder (DLD) from their parents' perspective as well as communicative abilities and social functioning in the classroom from their teacher's perspective. Furthermore, differences between children with mixed receptive-expressive and expressive-only disorders in communication in daily life and social functioning are studied.

Method

Data were collected through questionnaires completed by parents and teachers of children (5-6 years old) who attended schools for special education for DLD. Language test scores were retrieved from school records. Parents of 60 children answered open-ended questions about situations and circumstances in which their child was most troubled by language difficulties. Teachers of 83 children rated communicative abilities, social competence and student-teacher relationship.

Results

Parents reported communication with strangers as most troublesome and mentioned the influence of the mental state of their child. Parents considered limitations in expressing oneself, being understood and not being intelligible as core difficulties. Teachers rated the children's communicative abilities in the school context as inadequate, but their scores concerning social competence and the quality of teacher-child relationships fell within the normal range.

Children with receptive-expressive disorder experienced limitations in communication in almost all situations, while those with expressive disorder faced limitations in specific situations. Children with receptive-expressive disorder were also significantly more limited in their communicative abilities and social competence at school than children with expressive disorder. No differences were found between the two groups in the quality of the teacher-child relationship.

Conclusion

The results confirm that children with DLD face significant challenges in a variety of communicative situations. We found indications that children with receptive-expressive disorder experience more severe limitations than children with expressive disorder.

The involvement of parents and teachers in evaluating a child's communicative ability provides valuable and clinically relevant information.

INTRODUCTION

Developmental Language Disorder (DLD) is a common developmental disorder, estimated to affect 7-10% of 4- to 5-year-olds (Norbury et al., 2016). Children with DLD show severe difficulties in their language development and experience serious limitations in communication (Bishop et al., 2016). Their ability to use words and sentences to convey messages is limited and many children have difficulty understanding words and sentences. Consequently, everyday interactions with peers as well as adults can be challenging for children with DLD. DLD has been shown to have consequences for other developmental areas: children with DLD have been reported to have behavioural, emotional and social difficulties and poor school outcomes (Harrison et al., 2009; St Clair et al., 2011). DLD is a persistent disorder that can have lifelong implications: adolescents with a history of DLD achieve lower academic qualifications and are more likely to experience emotional and behavioural problems (Conti-Ramsden et al., 2018; Law et al., 2009; Yew & O'Kearney, 2013). Early intervention is highly desirable.

Although the ultimate goal of intervention should be for children to communicate effectively in all situations that arise in their daily lives, until recently, speech and language therapy has focused almost exclusively on remediating deficits and impairments in language domains, such as morphosyntax, semantics and phonology (Cunningham et al., 2017; Kwok et al., 2022). The assumption was that if children's language disorder was remediated, interactions in daily life would improve as well. Currently, there is agreement among SLTs that the focus of intervention should shift from improvement of language skills (that is, being able to produce and decode spoken messages) to communication in daily life (Kwok et al., 2022; Singer et al., 2020). Baylor and Darling-White (2020) elucidate this in their proposal for an adjusted version of the International Classification of Functioning, Disability and Health (ICF; World Health Organization, 2001). Communicative participation is central to this model, with language skills, communication environment and personal perspectives grouped around it as factors that interact with and contribute to communicative participation. Analysing linguistic deficits and stimulating language skills is still important, but it needs to support the selection of therapy goals that aim at improving communication in daily life. All aspects of Baylor and Darling-White's ICF model, both communicative participation itself and the interacting factors, should be included in diagnostic assessment. This is in line with the holistic approach advocated by the ICF to improve communicative participation.

Communicative participation is in a Delphi study by Singer et al. (2020) defined as "understanding and being understood in a social context, by applying verbal and non-verbal communication skills." For young children, we do not really know what communicative participation means for them and what difficulties they experience. Their participation in communicative situations often occurs under guidance of adults who support them and are trying to prepare them to eventually function independently in social contexts. Still, it is clear that DLD has an impact on communication in daily life. We assume that for young children, communication in daily life means being able to take part in interactions in familiar and unfamiliar situations, with familiar and unfamiliar communication partners. The speech-

language therapist (SLT) is the professional central to assessment and intervention of children with DLD. The SLT collects information on all dimensions of the ICF and tries to synthesize it in order to set intervention goals. This is challenging, if only for the simple fact that SLTs are often unable to observe a child's communication in daily life themselves; they have to ask the children and key adults about their experiences. The current study focuses on young children with DLD (5-6 years of age) for whom it is not easy to obtain direct information on their experiences in communication in daily situations (Janik Blaskova & Gibson, 2021; McCormack et al., 2010). Therefore, we turn to their parents and caregivers, as well as their teachers. A complicating factor is that reliable and validated instruments for assessing communicative participation are virtually lacking (Cunningham et al., 2017), in part because it is a broad and multidimensional concept. In this study we focus on communication in daily life as an aspect of communicative participation and explore the information parents and teachers can provide.

Several sources indicate that parents have a good understanding of their children's speech and language difficulties and the impact they have on their daily lives (Jensen de López, Lyons, et al., 2021; Marshall et al., 2017). However, very few studies have examined parents' views and information. Perhaps this is due to the challenges SLTs face in trying to engage with parents (Davies et al., 2019; Marshall et al., 2017). The present authors' observations suggest that SLTs in educational settings in the Netherlands have little contact with parents. Consequently, input from parents about their children's communicative participation often plays a marginal role in interventions. Roulstone (2015) notes that intervention goals and outcomes of speech and language therapy do not always align with parents' desired goals and outcomes. In the current study, we explored what information on communicative participation would be provided if parents are asked to identify situations in which their children's speech and language difficulties are most troubling, and to describe what kind of difficulties the child experiences in these situations. Throughout this paper, we refer to this aspect of communicative participation as "limitations in communication in daily life".

As a significant part of children's daily lives takes place at school, teachers are also important informants concerning the communicative participation of children with DLD. To our knowledge no research has been conducted on teachers' observations of children with DLD's communication in the classroom. Studies on classroom functioning often focus on academic achievement and behavioural and emotional problems. A qualitative study by Dockrell and Lindsay (2001) shows that teachers mainly focused on speech and language difficulties and did not have an eye for limitations in communicative participation. Although in many educational settings SLTs and teachers collaborate and consult on improvement of communication of the children with whom they are jointly involved, Glover et al. (2015) found indications that this collaboration could be improved. In the current study, we asked teachers to assess their students' communicative abilities and social functioning in the school context. Since no previous research has been conducted on this topic, and no validated measures or instruments exist, we used several questionnaires that, in our opinion, validly address communicative and social functioning in the classroom. We focused on interpersonal interactions and relationships with peers and with the

teacher. These are the components of communication that teachers deal with a lot, and we think they are a useful addition to the information parents can provide. We also asked teachers to give an overall assessment of communicative abilities in the school context. We refer to teachers' information as concerning "communicative abilities and social functioning in the school context".

It is often assumed that severity of language impairment and communication in daily life in children with DLD are related, but this is not supported by clinical experience and research (Baylor & Darling-White, 2020; Cunningham et al., 2019). Based on clinical experience we argue that the association is weak: some children with DLD are effective communicators, others are not (Singer et al., 2020). The more effectively children use gestures, facial expressions, and social behaviour, the better their communication is likely to be. Research on the relation between severity and characteristics of a language disorder on the one hand and communication in daily life on the other is scarce. The few studies that have been done investigated widely divergent aspects of communication in children with diverse ages and disorders. Cunningham et al. (2019) found no significant correlations between vocabulary and consonant inventory and measures of communicative abilities in late-to-talk toddlers whose parents participated in The Hanen Program® (Earle & Lowry, 2015). Gerber et al. (2012) found no relations between language deficits and pragmatic abilities in school-age children. Baylor and Darling-White (2020) indicate that there is a weak relationship between language skills and communicative effectiveness, but this is based on sources concerning communication problems in adults. Hart et al. (2004) examined the social behaviour of children with DLD, which could also be seen as an aspect of communication in daily life or communicative abilities, particularly from the perspective of teachers. Evidence of a relation between DLD severity and social behaviour was found: children with severe DLD showed less prosocial behaviour than children with moderate DLD. The behaviours that were classified as prosocial consisted of helping, sharing, and comforting behaviours in children's social interactions. However, Hart et al. (2004) found no relation between severity of DLD and other aspects of social behaviour, such as withdrawn behaviour. A recent study on severity of DLD and quality of life, which is determined in part by social functioning, also failed to find a relation (Eadie et al., 2018).

The aim of the present study is to get insight into communication in daily life of a large group of young children with DLD. In addition, we explore whether there is a relation between the severity of DLD and communication in daily life by differentiating between two categories from the International Classification of Diseases, Eleventh Revision in our group of participants: 1. DLD with impairment of mainly expressive language and 2. DLD with impairment of receptive and expressive language (ICD-11; World Health Organization, 2021). The classification "Impairment of mainly expressive language" is used when a child's expressive language is markedly below the expected level for their age, but receptive language is relatively intact. Throughout this paper we refer to this subgroup of DLD as "expressive disorder". "Impairment of receptive and expressive language" is used when a child's receptive language is markedly below the expected level for their age and is accompanied by impairments in expressive language. We refer to this subgroup as "receptive-expressive disorder". Although Bishop

(2017) qualifies this categorization as "rather gross" and emphasizes that it is not stable over time, the categories are widely used in practice. For the current study, the classification is useful for exploring the relation between severity of DLD and communication in daily life, because it is often assumed that children with receptive-expressive disorder are more severely impaired than children with expressive disorder (Leonard, 2014). Hardly any research has been done on differences in communication in daily life between children with receptive-expressive disorder and expressive disorder. Lisa et al. (2019) indicate that mothers of children with receptive-expressive disorder are more concerned about their children than mothers of children with expressive disorder, but they did not examine the children's communication in daily life. In a small-scale study by Liiva and Cleave (2005) on the abilities of children with DLD to access and participate in an ongoing interaction between two unfamiliar peer partners, a positive relation was found between expressive language skills and the extent to which the children were able to have equal participation in the interaction. A relation between receptive language levels and the ability to participate in the interaction was not attested. Snowling et al. (2006) found that among adolescents with a history of speech-language impairment, those with social difficulties were more likely to have receptive-expressive disorder, while those with attention deficits were more likely to have expressive disorder. It remains unclear if there are differences between children with receptive-expressive language disorder and children with expressive disorder regarding their communication in daily life. If such differences can be demonstrated, this would provide more insight into the subgroups of children with DLD than a classification based solely on language levels relative to peers. It might be necessary to take the subgroup into account in approaches and guidance to improve communicative participation. In addition to the comparison of children with receptive-expressive disorder and expressive disorder we also examine the relation between delays in language domains and communicative abilities and social functioning according to teachers.

The study brings together parents' information on communication in daily life, teachers' information on communicative abilities and social functioning in the school context and information on language skills from SLTs with the goal of gaining more insight into communicative participation in different situations, for children with receptive-expressive and expressive language disorders.

Research questions are:

1. What do parents consider to be the main limitations in communication in the daily lives of their child with DLD (ages 5-6)?
2. How do teachers perceive the communicative abilities and social functioning of children with DLD in the classroom?
3. What are the differences between children with DLD with receptive-expressive and expressive disorders in parents' and teachers' reported communication in daily life and social functioning?
4. What is the relation between delays in language domains and communicative abilities and social functioning in the school context?

METHODS

We used a cross-sectional observational study in a special education setting for children with DLD. Data were collected through questionnaires completed by parents and teachers and from school records.

Participants and setting

We asked parents and teachers of a cohort of children with DLD (5-6 yrs, *n* = 154) in a longitudinal study we previously reported on to participate (Bruinsma et al., 2023). The children were all visiting the first and second grades in schools for special education for children with DLD, 18 schools in total, geographically spread across the Netherlands, from both urban and rural areas. All children met standard criteria for eligibility to schools for special education for children with DLD:

- Scores of at least 1.5 *SD* below the mean at standardized language (sub)tests addressing at least two out of four speech-language domains: speech sound production, auditory processing, receptive and expressive morphosyntactic development, and receptive and expressive lexical-semantic development, or a score of 2 *SD* or more below the mean on a standardized approved general language test
- Normal hearing
- Non-verbal IQ of at least 70

Special schools for children with DLD in the Netherlands aim at the same attainment levels as mainstream schools, with a curriculum that is adjusted to the communicative needs of the children, and which entails individualized educational goals (Simea, 2014). The teachers are trained in language and reading education, adapted instructing, and enhancing social relations and well-being. Classes have a maximum of 15 children, and in each class a teacher and a teaching assistant are present all day. All children receive speech and language therapy by an SLT at school, individually and in small groups.

Parents gave informed consent on the use of data from their child's school record and on the collection of information through a survey sent by email (see Appendix A). Teachers were also informed about study goals and data processing before they decided to participate and were then sent a questionnaire by e-mail (see Appendix B). Ethical approval was obtained from the Ethical Review Board of HU University of Applied Sciences Utrecht. See for detailed information on the cohort and its recruitment: Bruinsma et al. (2023).

Outcomes and measures

Data on three outcomes 1) communication in daily life; 2) communicative abilities in the school context; and 3) social functioning in the school context were collected with questionnaires, which were different for parents and teachers. For language scores and non-verbal IQ, we used data from the school records of the children.

Communication in daily life

We used a written survey with two open-ended questions to get information on communication in daily life from parents. Open-ended questions fit the exploratory nature of study. Because the survey was anonymous, parents could freely describe their experiences and ideas in their own words. Developing the open-ended questions involved several steps. The first author drafted the questions after having consulted with experts and discussed them with the second and third author. This led to minor changes to clarify the text. The revised version was presented to experts in DLD and SLT research. They found the questions to be valid and clear. The questions were:

- At what times and in what situations are the language difficulties troubling your child the most?
- What kind of difficulties does your child experience at the times and in the situations that you have mentioned?

We started with a question on times and situations, in order to focus as much as possible on communication in daily life. The second question aimed to get more detail about the specific limitations in communication.

Communicative abilities in the school context

Since there are no existing instruments to measure communicative abilities in the school context, we developed a 10-point rating scale for teachers. The authors formulated a definition of communicative abilities in the school context, based on guidelines for professionals in Dutch special education (Simea, 2014). They also formulated anchors for the extremes of the rating scale. The definition and anchors were discussed with experts in DLD and SLT research. The definition was fine-tuned and examples were added. The definition ran as follows: "Communicative abilities can be considered as the capacity to communicate functionally and adequately in agreement with the developmental level and capabilities of the child. Communication can take the form of spoken words, gestures or symbols." We illustrated the definition with examples, such as "make yourself clear to other children"; "respond to questions"; "take the initiative to communicate"; and "show that you didn't understand". Finally, we emphasized that communicative abilities are only partly related to language level and that some children with language delays can be effective communicators if they are able to express themselves by supplementing spoken language with gestures, facial expressions, social behaviour and by not giving up easily if communication fails. The anchor for 1 point on the rating scale was "this child cannot cope with communicative situations at all" and for 10 points it was "this child functions very well in communicative situations". In pilot testing with two teachers, it was found that the definition and anchors were clear and that the rating scale could be completed easily.

Social functioning in the school context

To get an impression of teachers' perception of social functioning in the school context, we focused on social competence and the quality of the teacher's relationship with the child. As a measure of social competence, we used a selection of items from the competencies scale of the Brief Infant-Toddler Social

and Emotional Assessment (BITSEA; Briggs-Gowan & Carter, 2001), which was developed to assess young children's problem behaviours and competencies. The competencies scale consists of positively phrased items on various competencies of young children, such as compliance, empathy and prosocial peer relations. Teachers have to judge if items are applicable on a 5-point scale (definitely untrue – untrue – not untrue, not true – true – definitely true). We based our selection of items on a large-scale cohort study on typically developing children in the Netherlands (Pre-COOL cohort study; Driessen, 2018; Veen et al., 2012). The selected items concern empathy (1 item), compliance (1 item), imitation/play (1 item), social relatedness (3 items) and prosocial behaviour (1 item). Factor analysis in the Pre-COOL study showed that the selected items all loaded on the factor "social competence", explaining 44% of variance. The internal consistency of the 7 items of social competence is 0.78.

To examine the quality of teachers' relationship with children with DLD we used a short version of the Student-Teacher Relationship Scale (STRS; Pianta, 2001). This scale was translated and adapted for use in the Netherlands by Koomen et al. (2007). The STRS represents child-teacher relationship by three different subscales, that are referred to as the Closeness, Conflict, and Dependency subscales. Closeness reflects the degree of affection, warmth and open communication the teacher experiences in the relation with a child; conflict reflects the degree to which a teacher perceives the relation as negative, unpleasant and in an atmosphere of conflict; and dependency assesses the developmentally appropriate degree of reliance and possessiveness of the child in the relationship, as perceived by the teacher. The items were scored on the same 5-point scale as the items from BITSEA. We used the short version of the STRS, as constructed for the Pre-COOL study by selecting 5 items for each subscale on the basis of the highest factor loadings reported in an earlier study (Koomen et al., 2012). Factor analysis of the short version yields the same three factors, explaining 35% of the variance for dependency, 20% for conflict, and 14% for closeness. Internal consistency values in the Pre-COOL study were 0.88 for dependency, 0.89 for conflict, and 0.86 for closeness.

Language and non-verbal cognition

Data on delays in language domains was available in the children's school records. We used recent scores from standardized tests on language comprehension, expressive vocabulary, and expressive grammar (Schlichting Test for Language Comprehension and Schlichting Expressive Language Test; Schlichting & Lutje Spelberg, 2010a, 2010b). Non-verbal intelligence was assessed using the Revised Snijders-Oomen Non-verbal Intelligence Test (SON-R 2½–7; Tellegen et al., 2005). The language tests and the non-verbal IQ test yield quotient scores as age-referenced standard scores, with a mean of 100 and an *SD* of 15. All tests were administered by the children's own SLT in Dutch, so multilingual children were assessed in their second language. Detailed information about the tests can be found in Bruinsma et al. (2023).

Procedure

The study design and participant flow chart are presented in Figure 1. We sent questionnaires to parents and teachers of 154 children. For 114 children at least one questionnaire was completed (74%). We had

to exclude 3 children because recent scores on language tests were missing in their school records. Of the remaining group, questionnaires were completed by parents of 60 children (54%) and teachers of 83 children (73%). For 32 children (29%) both parent and teacher questionnaires were completed.

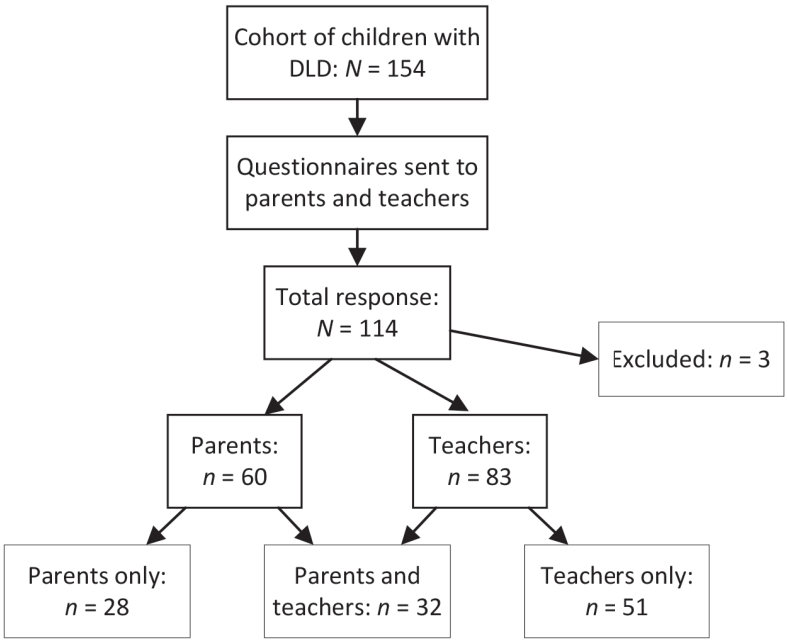


Figure 1. Participant flow
Note. DLD = Developmental Language Disorder

Analysis

Open-ended questions

The answers of the parents to the open-ended questions were analysed qualitatively. To this end, all answers were entered in Atlas.ti (2022) The answers varied in length and completeness: some parents provided a narrative description of the situations and circumstances which troubled their child the most, and the limitations in communication they noticed in their children, with several examples. Others used short descriptions, in telegraphic style.

We used content analysis to interpret the text data. Content analysis is frequently used to analyse answers to open-ended questions and can be defined as 'a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns' (Hsieh & Shannon, 2005, p. 1278). We used a conventional approach, meaning that coding categories are derived directly from the text data, which fits well to the explorative character of our study. This is also called inductive coding (Elo & Kyngäs, 2008). As written responses to open-ended

questions had not previously been used to obtain information from parents about communication in daily life, we were not sure what information this would actually generate. Inductive coding seems the best method beforehand to get as close as possible to parents' experiences.

The first author (GB) carried out the analysis. The children with DLD and their parents were unknown to her, and she had no contact with them. This enhances confirmability, which refers to the neutrality of the data, an important criterion in qualitative research (Polit & Beck, 2004). G.I.B. is an SLT and PhD student, with clinical expertise in children with DLD. Analysis started by reading the answers repeatedly, to get familiar with the data. Subsequently, a word count was used to get a better sense of the words and terminology parents used. There appeared to be a variety of descriptions and terminology. The next phase was initial open coding, with labels derived directly from the answers of the parents. An example of an initial code is "the child is not understood", because several parents mentioned that their child was not understood by others. The initial codes were grouped together in an iterative process: for each new code group the underlying answers were read again, to make sure they would all fit into the new code group. Also, some answers that did not belong to the code group were read and evaluated again, to ensure that the code group exclusively covered the underlying experiences and views. Eventually, the code groups were organized into subcategories and main categories, again in an iterative process. When parents clearly described multiple situations or problems, their answers were assigned to multiple subcategories. Thus, there was no mutual exclusive coding. All phases in the analysis were done through Atlas.ti (2022). We saved records of each step we took in the analysis, that is the generation of codes, code groups, categories and subcategories to ensure transparent reporting and clear derivation of findings from the data.

Another important quality criterion is credibility: confidence in an accurate interpretation of the meaning of the data (Polit & Beck, 2004). To enhance credibility, we used investigator triangulation: the coding was discussed with an independent researcher with expertise in DLD. The independent researcher coded a selection of 25% of the participant responses. For this independent coding process, we selected responses that were difficult to code for various reasons: 1. the participant's response did not directly answer the survey question, 2. the participant answered the two survey questions in one response and 3. responses were keyword only. We supplemented them with a random sample of the remaining responses. The codes that were generated by the two researchers independently were discussed during a face-to-face meeting and adapted where necessary. An example of a discussion point was the coding of adults that are not total strangers to the child but also are not yet familiar, for instance neighbours or staff in a store. We decided to include them into the subcategory "with strangers". Another example was the adding of a new subcategory "the child needs a lot of time" in communication. The supervision of the overall process of analysing the open questions was done by the second (FW) and third author (EG), both senior researchers.

Scale questions

We used descriptive statistics to analyse teachers' answers on the scales. The data were not normally distributed, so we calculated median scores and ranges of scores. We used the Mann-Whitney U test to compare scores of the subgroups of children with receptive-expressive disorder and expressive disorder.

Receptive-expressive and expressive disorders

We divided our sample into two subgroups: children with receptive-expressive disorder and children with expressive disorder. Children with quotient scores of more than 1 SD below the mean (that is, quotient score < 85) on the Schlichting Test for language comprehension (Schlichting & Lutje Spelberg, 2010a) were considered to have a receptive-expressive disorder and children with scores of 85 or higher (that is, receptive skills within the normal range) were considered to have an expressive disorder (Conti-Ramsden & Botting, 1999; Law et al., 2008). In cases where data on the Schlichting Test for language comprehension were missing, we used imputed data (see Bruinsma et al., 2023).

Since we wanted to see if parent reports on limitations in communication in daily life differed for the two types of disorder, we used the subcategories from the qualitative analysis of parents' answers to open questions for a quantitative analysis (Morgan, 1993). We counted the subcategories for both groups and used the percentages of total subcategories to compare them. Inter-rater reliability of the categories was assessed by having 20% of the questions coded by a second reviewer (another independent researcher). The agreement between raters was 82%.

RESULTS

Participant characteristics

Table 1 shows the characteristics of the total group for whom at least one questionnaire was completed, and separately the characteristics of the children for whom the parents filled in the questionnaire and the children for whom the teachers filled in the questionnaire. These groups partly overlap. A total of 23 children were raised in a multilingual environment (21%), which was defined as having at least one parent or caregiver who has another native language than Dutch and uses this language at home. Although the percentage of multilingual children seems representative compared to children with a migrant background in the general population (24%) (Statistics Netherlands, 2015), response was relatively low for parents of multilingual children ($n = 8$; 13.3%). Educational level is classified according to the International Standard Classification of Education (UNESCO, 2012) into low, middle and high. The educational level of parents in our study is lower than in the general population (low: 18.8%; middle: 41.1%; high: 40.1%, Statistics Netherlands, 2015). Scores of the children on language tests show that expressive morphosyntax is significantly more delayed than expressive vocabulary and language comprehension (see also Bruinsma et al., 2023).

Table 1. Participant characteristics

Variable	Total (*n* = 111 children)	Parent questionnaire completed (*n* = 60 children)	Teacher questionnaire completed (*n* = 83 children)
Age in months, *M (SD;* range*)*	70.1 (6.00; 59-80)	69.8 (6.17; 59-79*)*	70.2 (5.83; 59-80)
Female children, *n (%)*	35 (31.5)	19 (31.7)	27 (32.5)
Multilingual children[a], *n (%)*	23 (20.7)	8 (13.3)	18 (21.7)
The Netherlands as country-of-origin child[b], *n (%)*		59 (98.3*)*	
The Netherlands as country-of-origin parents (for both parents, *n* = 116)[c], *n (%)*		103 (88.8)	
Parental education[d]		Low: 26.8% Middle: 39.3% High: 33.9%	
Questionnaire completed by		Father: 21.9% Mother: 78.1%	
Non-verbal IQ[e], *M (SD;* range*)*	100.0 (12.34; 72-129)	101.9 (10.64; 80-129*)*	99.6 (13.04; 72-129)
Language comprehension[f], *M (SD;* range*)*	83.7 (12.85; 58-112*)*	87.1 (12.63; 58-112*)*	82.1 (12.44; 58-109)
Expressive vocabulary[f], *M (SD;* range*)*	86.8 (15.71; 55-130*)*	89.9 (15.66; 57-130)	84.5 (14.05; 55-115)
Expressive morphosyntax[f], *M (SD;* range*)*	75.5 (6.64; 64-99*)*	76.0 (6.56; 67-98)	75.3 (6.44; 64-99)

Note. Test scores are quotient scores, standardized scores with a population mean of 100, a standard deviation of 15, and lower and upper limits of 55 and 145, respectively.

[a] Languages: Turkish, Arabic, Berber, Kurdish, various Chinese languages, Russian, Ukrainian, Farsi, Polish, English, Brazilian-Portuguese, Spanish, Romanian, Thai, Somali, Fula

[b] Other country: Brazil

[c] Other countries: Aruba, Surinam, Indonesia, Morocco, Poland, Russia, Thailand, Romania, Spain, Turkey, Brazil

[d] Low: lower secondary education; middle: upper secondary education and post-secondary education; high: higher education

[e] Non-verbal IQ measured with SON-R 2½–7 (Tellegen et al., 2005)

[f] Schlichting Test for Language Comprehension (Schlichting & Lutje Spelberg, 2010) and subtests Word Development (expressive vocabulary) and Sentence Development (expressive morphosyntax) of the Schlichting Expressive Language Test (Schlichting & Lutje Spelberg, 2010a) were used.

Parent's perspective on their child's communication in daily life

Parents of sixty children with DLD answered the two open questions on times and situations in which the language difficulties were troubling their child the most and the difficulties the child experienced in these situations. We categorized their answers into "situations and circumstances" and "limitations in communication". Within these two main categories, we identified a number of subcategories. We elaborate on the subcategories in the next section.

Situations and circumstances

In parents' descriptions of times and situations in which the language difficulties were troubling their child the most, we found several subcategories of situations and circumstances. These were partly related to conversations partners, but parents also mentioned emotions and other psychological factors, such as "when he is angry" or "when she experiences pressure". In the next paragraphs we explain the subcategories, illustrated with parents' answers.

Almost all circumstances:

Parents indicated that their child was limited by language difficulties in almost all situations and circumstances. Some parents specifically mentioned social situations or situations in which language is important.

> *In social situations in particular. (Child 26)*
> *All situations in which language plays a(n) (important) role. (Child 132)*

With own family:

Parents considered the presence of specific interlocutors relevant. For some children communicating at home, in their own family, was troublesome.

> *As soon as he had to make himself clear, both at home and at kindergarten. (Child 16)*

With peers:

For other children language difficulties were most noticeable in peer contact.

> *When communicating with other children. (Child 17)*

With strangers:

Parents often mentioned that children were most troubled by their language difficulties in contact with strangers. The subcategory "strangers" includes all adults who are not (yet) known or familiar to the child, as well as unfamiliar environments, public places, and situations outside the family.

> *When communicating with other children. When communicating with people outside our own family. Less so within our family. (Child 17)*
> *Within our family we understand him well because we are used to him and we know him well. He experiences problems outside the home: shop, with strangers, public spaces, etc. (Child 142)*

At school:
This subcategory refers to specific circumstances. School or the teacher was most frequently mentioned in this subcategory but also swimming lessons and talking on the phone. This subcategory also includes large groups.

> *If he had to explain something new to us or the teacher. (Child 126)*
> *He mainly suffered from language problems in a larger group. Or when he was tired. (Child 28)*

In certain mental states:
Parents mentioned several circumstances that could be considered as stressful, such as, unexpected situations, or if there was pressure to perform well, for instance during an assessment. Pressure could also occur when the child is not able to express himself or herself clearly. The subcategory also involves emotional states as a result of circumstances other than the communicative situation: being enthusiastic, angry or tired was often reported to worsen limitations due to language difficulties. Parents sometimes noted several situations causing stress for their child. We considered this as one code, with several examples.

> *He mainly suffered from language problems in a larger group. Or when he was tired. (Child 28)*
> *At times when he really wanted to make something clear, and he was not understood (not even by acquaintances). (Child 78)*
> *If he gets nervous, and if he knows he's going to be tested. (Child 179)*

Almost no circumstances:
There was only one parent that reported that there were no situations in which his child was troubled by their language difficulties.

> *Never really very bad. She just couldn't talk, but gestures greatly helped her along the way to make things clear. (Child 148)*

Situations and circumstances unclear:
Some responses were unclear, or they indicated problems with communication but did not include specific situations or circumstances. This was the case for parents of 11 children.

> *Unintelligible for the interlocutor who really has no idea what it is about. B. then found it difficult to describe it differently so that it was indeed understood. (Child 32)*

In the analysis, we used a code from the category "situations and circumstances" 77 times for the 60 participants, so some parents mentioned more than one situation or circumstance. As can be seen in

Table 2, some parents mentioned two or three different subcategories, for instance as below "in certain mental states" and "with strangers".

> *At times when she could not express herself well [in certain mental states]. She also did not dare talk in strange environments. [with strangers]. (Child 48)*

Figure 2 shows that circumstances most frequently mentioned were "with strangers" and "in certain mental states".

Table 2. Situations and circumstances; percentage of parents mentioning one subcategory or more subcategories

Situations and circumstances	Total (N = 60)	Receptive-expressive (n = 28)	Expressive (n = 32)
Almost all circumstances	18.3%	25.0%	12.5%
Almost no circumstances	1.7%	3.6%	0.0%
Other categories:			
One subcategory	42.7%	39.3%	43.8%
Two different subcategories	15.0%	10.7%	18.8%
Three different subcategories	6.7%	3.6%	9.4%
Situations or circumstances unclear	18.3%	17.9%	18.8%

Note. Parents' answers were classified into one or more subcategories of situations and circumstances. In some answers this subcategory was "almost all circumstances" or "almost no circumstances". The other answers contained one or more other subcategories.

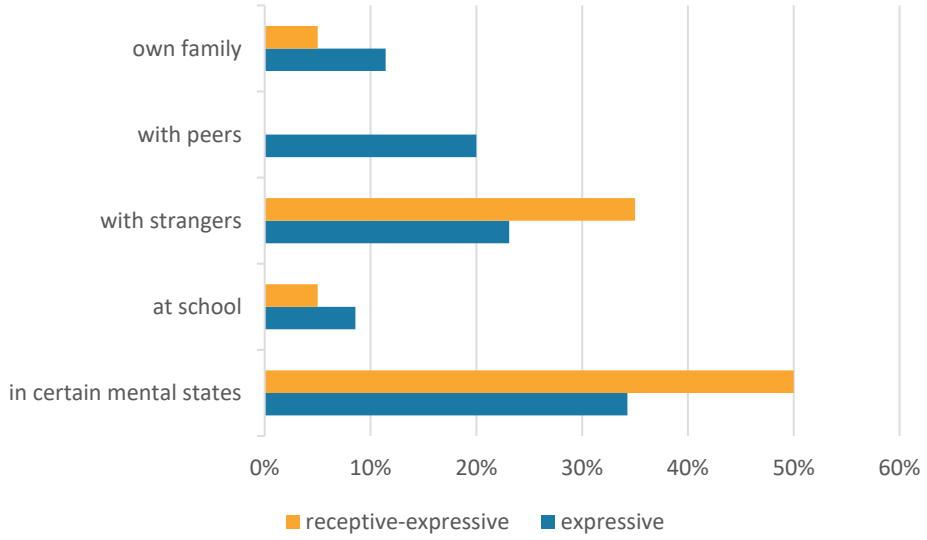


Figure 2. Parents' report on situations and circumstances in which language difficulties are troubling the child the most

Note. Situations and circumstances as percentage of total situations and circumstances mentioned, without the categories "all circumstances" and "no circumstances".

Limitations in communication

The category "limitations in communication" comprises parents' descriptions of their child's communication problems in daily life. To describe the difficulties their child was facing, parents used a variety of expressions and terms. The next paragraphs provide an explanation of the subcategories, illustrated with parents' answers.

Limitations in expressing oneself:

To this subcategory we assigned general indications of difficulties a child experiences in expressing themselves. Parents used various terms to indicate limitations. Descriptions include "has difficulty making clear what he means" and "cannot explain it". Especially "unable to get the words out" was mentioned a lot. This category also includes references to expressing emotions or desires.

> *Unable to get the words out. (Child 28)*
> *He knew it but couldn't explain it properly, which caused communication to get stuck. (Child 173)*
> *Expressing wishes, emotions. (Child 24)*

Child's message is not understood by others:
This subcategory is quite similar to "expressing oneself", with the difference that parents here took the point of view of the conversation partner. Descriptions do not focus on limitations of the child but indicate that the conversation partner does not get the message. The failure of communication is emphasized, rather than the child's inability. This subcategory was sometimes used to complement "limitations in expressing oneself".

> *Other children have difficulty understanding her immediately. (Child 7)*
> *Our son had trouble expressing himself, to make sentences [limitations in expressing oneself]. It was difficult for an outsider to comprehend and understand him [message is not understood]. (Child 68)*
> *Children do not understand him and therefore do not listen to his input into the game. (Child 139)*

Poor intelligibility:
Whereas the "expressing oneself" and "understood by others" categories refer to being understood in general, this subcategory concerns more specifically limitations in intelligibility due to speech problems.

> *Some letters he cannot pronounce well, so he is sometimes unintelligible. (Child 30)*
> *That she is not understood and therefore gets frustrated. (Child 75)*
> *No one can understand him. (Child 138)*

Not able to have conversations:
A few parents specifically mentioned that having conversations was problematic for their child, often in addition to other problems in communication. It seems that the problems could be caused by the interlocutor not understanding the child but also by the child not understanding the interlocutor well.

> *Also having a conversation without any visual support is difficult for him. (Child 132)*
> *Because he talked badly, you couldn't really have a conversation. (Child 155)*

Problems with storytelling:
Another communicative skill that parents explicitly mentioned is storytelling. Sometimes they specifically indicated that it refers to narrating about events the child has experienced. It can also refer to storytelling in general or explaining how something works. This subcategory was often used in addition to the subcategories related to expressing oneself and intelligibility.

> *J. has difficulty in telling people about an experience. He wants to talk very fast and then he gets stuck. (Child 146)*

Limitations in asking questions:
A few parents mentioned that their child was not able to ask questions. This was often mentioned together with other communication problems.

> *If something suddenly happened that was different from what she was used to and she could not make clear what she thought of it or she could not ask why, she became angry and sometimes became physical. (Child 91)*

Needs a lot of time:
Two parents indicated that their child's speaking took a long time. They link the slowness to difficulty expressing themselves, not slowness of comprehension.

> *Talking takes a lot of time because his words do not come easily and he is difficult to follow. (Child 71)*

Poor understanding of spoken messages:
This is the only subcategory that is about language comprehension. Two parents mentioned that their child was not able to understand messages of others.

> *Explaining something or understanding an assignment needs more attention. (Child 133)*

No limitations in communication:
None of the parents reported that their child did not experience limitations in communication. The parent of child 148, who indicated that there were no situations or circumstances in which the language difficulties troubled their child, nevertheless mentioned limitations in communication, namely expressing feelings (coded as "expressing oneself").

> *(At which times and in which situations are the language difficulties troubling your child the most?)*
> *Never really very bad. She just couldn't talk, but gestures greatly helped her along the way to make things clear. (Child 148)*
> *(What are the difficulties your child experiences at the times and in the situations you mentioned?)*
> *She had difficulty expressing her feelings. (Child 148)*

Limitations in communication unclear:
There were also responses without a clear description of the limitations in communication. We suspect that some parents found it difficult to describe them or had problems with (Dutch) language themselves. The answers indicated communication problems that were not explicitly mentioned. There were also parents mentioning specific situations or circumstances, but no description of limitations in communication. Answers of parents of ten children were unclear.

He understands very better. (Child 9)
(At which times and in which situations are the language difficulties troubling your child the most?)
He is improving in large groups. (Child 35)
(What are the difficulties your child experiences at the times and in the situations you mentioned?)
Shy. (Child 35)

We used 83 times a code from the category "limitations in communication". Parents often mentioned more than one limitation. As can be seen in Table 3, in some answers we coded with two or three different subcategories, for instance as below "expressing oneself" and "storytelling".

If he needs to explain something new to us or the teacher [expressing oneself]. He doesn't know how to tell it, simply put, too few words [storytelling]. (Child 126)

Figure 3 shows that the subcategory "expressing oneself" was mentioned most often. Also "being understood" and "intelligibility" were frequently mentioned.

Other categories

Besides "situations and circumstances" and "limitations in communication" parents mentioned other aspects of their child's communication. Although they do not directly address the research question, we would like to mention them. We distinguished three other main categories in parents' answers, namely "consequences", "speech and language impairments", "compensation used or needed". Parents noticed emotional reactions as a consequence of not being able to express oneself, such as frustration and withdrawal. We categorized these answers as "consequences". The category "speech and language impairments" was used when parents mentioned specific speech and language domains that were problematic, mostly pronunciation, finding words, and grammar. Some parents described these symptoms in their own words, for example, "flawed speech", but professional terminology was also used ("grammatically incorrect sentences"). A few parents described adaptations and alternative modes of communication their child or they themselves used to compensate for limitations in speech and language, such as gesturing, repeating, speaking slowly or acting as interpreter. These descriptions were categorized as "compensation used or needed". These categories were mentioned less frequently than "situations and circumstances" and "limitations in communication".

Table 3. Limitations in communication: percentages of parents mentioning one subcategory or more subcategories

Limitations in communication	Total (N = 60)	Receptive-expressive (n = 28)	Expressive (n = 32)
No limitations	0.0%	0.0%	0.0%
One subcategory	46.7%	46.4%	46.9%
Two different subcategories	30.0%	17.9%	40.6%
Three different subcategories	6.7%	10.7%	3.1%
Limitations in communication unclear	16.7%	25%	9.4%

Note. Parents' answers were classified into one or more subcategories of limitations in communication.

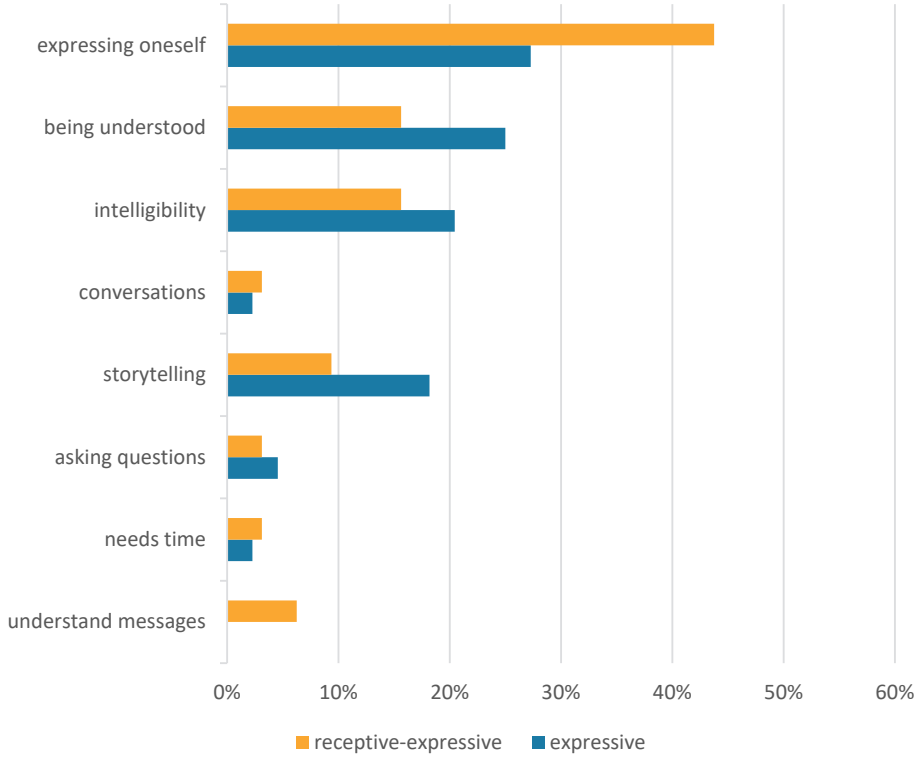


Figure 3. Parents' report on limitations in communication

Note. Limitations as percentage of total limitations mentioned

Teachers' reports on communicative abilities

Teachers' ratings of the communicative abilities of the children on a 10-point-scale resulted in a mean score of 4.5 (*SD* = 2.17, *n* = 83). This indicates insufficient competence to communicate in the school context.

Teachers' reports on social competence and teacher-child relationship

Table 4 shows the judgement of teachers of social competence on the BITSEA (Briggs-Gowan & Carter, 2001). We calculated the mean score on the seven items for each child and subsequently the group median score. The median was 3.7 on a 5-point scale (range 2.4 – 5.0) so teachers judged social competence as sufficient. The items of BITSEA were also administered in a large population study in the Netherlands using a 3-pointscale (Veen et al., 2012). This resulted in a mean score of 2.53 (*SD* = 0.4; *N* = 1283). A conversion of our 5-point scale to a 3-point scale leads to a median score of 2.36 (range 1.7 – 3.0) indicating that our results are not markedly different.

Table 4 also shows the judgement of the quality of the relationship with the child for the three factors of the STRS (Pianta, 2001): closeness, conflict, and dependency. Mean scores on the items of individual children led to group medians of 3.8 (range 2.2 – 5.0) for closeness, 2.0 (range 1.0 – 3.5) for conflict and 2.6 (range 1.2 – 4.6) for dependency on a 5-point scale. The same short version of the STRS was also administered in a large population study in the Netherlands (Veen et al., 2012). Findings (mean scores) were: closeness: *M* = 3.9, *SD* = 0.66; conflict: *M* = 1.5, *SD* = 0.67; dependency: *M* = 2.2, *SD* = 0.75 (*N* = 1283). Our results indicate adequate closeness and no extreme levels of conflict and dependency.

Table 4. Teachers' judgement of social competence and teacher-child relationship for children with receptive-expressive disorder and children with expressive disorder

Subscale	Total (N = 83)		Receptive-expressive disorder (n = 49)		Expressive disorder (n = 34)	
	Mdn	Range	*Mdn*	Range	*Mdn*	Range
Social competence	3.7	2.4 – 5.0	3.6	2.7 – 5.0	3.9*	2.4 – 4.9
Teacher-child relationship:						
Closeness	3.8	2.2 – 5.0	3.8	2.2 – 5.0	3.8	2.4 – 4.8
Conflict	2.0	1.0 – 3.5	2.0	1.0 – 3.5	1.9	1.0 – 2.8
Dependency	2.6	1.2 – 4.6	2.6	1.2 – 4.6	2.5	1.8 – 4.4

Note. Social competence is measured by the BITSEA questionnaire (Briggs-Gowan & Carter, 2001). Teacher-child relationship is measured by the STRS questionnaire (Pianta, 2001). For Social Competence and Closeness higher scores indicate better social competence and adequate closeness. For Conflict and Dependency higher scores indicate more conflicts and more dependency.

*$p < 0.05$

Comparing receptive-expressive and expressive disorders: parents

There were parent data for twenty-eight children with receptive-expressive disorder (47%) and 32 children with expressive disorder (53%). As can be seen in Table 2, parents of children with receptive-expressive disorder more frequently answered that their child experienced problems due to their language disorder in almost all circumstances. Parents of children with expressive disorder more frequently mentioned two or three specific situations.

To take a closer look at the subcategories we calculated the percentages of the total situations and circumstances mentioned for children with receptive-expressive and expressive disorders (Figure 2). In this figure the category "almost no circumstances" is left out, because it is not relevant. The category "almost all circumstances" is also left out, because it overlaps with the other categories. Parents of children with expressive disorder more often reported that their child was limited in situations with their own family and with peers. In both groups parents frequently reported that language difficulties troubled the child in communication with strangers and in certain mental states.

Regarding limitations in communication, parents of children with expressive disorder were more likely to report two specific limitations than parents of children with receptive-expressive disorder. In the responses of parents of children with receptive-expressive disorder, it was more often unclear what the limitations in communication were (see Table 3).

A closer look at the subcategories (see Figure 3) reveals that parents of children with receptive-expressive disorder more often mentioned "expressing oneself", while parents of children with expressive disorder more often used "being understood", "intelligibility" and "storytelling". "Understanding messages" was only mentioned by parents of children with receptive-expressive disorder.

Comparing receptive-expressive and expressive disorders: teachers

Teachers' questionnaires were completed for forty-nine children with receptive-expressive disorder (59%) and 34 children with expressive disorder (41%). For the comparison of children with receptive-expressive disorder and children with expressive disorder we used the Mann-Whitney U test, because of the non-normal distribution of the data. Teachers rated the communicative abilities of children with receptive-expressive disorder ($Mdn = 4$; $n = 49$) as significantly lower than of children with expressive disorder ($Mdn = 6$, $n = 34$) ($U = 490$, $z = -3.198$, $p = 0.001$). Furthermore, as can be seen in Table 4, teachers rated children with expressive disorder as having significantly better social competence than children with receptive-expressive disorder. There are no significant differences between the groups on all factors of teacher-child relationship.

Relations between language domains and teachers' ratings

As can be seen in Table 5, there are significant correlations between the scores on the test for language comprehension; expressive vocabulary; and expressive morphosyntax and teachers' ratings of

communicative abilities, indicating that higher language test scores are related to better communicative abilities. There are no significant correlations between language test scores and teacher's ratings of social competence and teacher-child relationship. There are, however, significant correlations between communicative abilities and social competence on the one hand and dependency in student-child relationship on the other hand but not between communicative abilities and closeness and conflict. There are also significant correlations between social competence and closeness and conflict.

Table 5. Correlations between language tests and teachers' ratings of communicative abilities, social competence and teacher-child relationship

Variable		1	2	3	4	5	6	7	8
1.	Language comprehension	-							
2.	Expressive vocabulary	0.726**	-						
3.	Expressive morphosyntax	0.508**	0.475**	-					
4.	Communicative abilities	0.334**	0.343**	0.236*	-				
5.	Social Competence	0.157	0.064	0.009	0.222*	-			
Teacher-child relationship:									
6.	Closeness	-0.045	0.062	-0.009	0.091	0.611**	-		
7.	Conflict	0.102	0.134	0.199	-0.078	-0.435**	-0.314**	-	
8.	Dependency	-0.061	-0.077	0.178	-0.393**	-0.037	0.173	0.060	-

* $p < 0.05$. ** $p < 0.01$

DISCUSSION

This study focused on communication in different situations in the daily lives of children with DLD aged 5-6 years. We studied limitations in communication in daily life from parents' perspective and communicative abilities and social functioning of the children in the classroom according to teachers. We also looked at relations between delays in language domains and communication in daily life and social functioning in the classroom and compared results of children with receptive-expressive disorder and expressive disorder.

We asked parents to mention the situations and times when their child's language difficulties are most troubling, and to describe what their child is struggling with in these situations. Parents' answers were categorized into "situations and circumstances" and "limitations in communication". Within the "situations and circumstances" category, many parents reported that their child experiences most difficulties in communicating with strangers or in certain mental states, for instance stress, fatigue or emotional states. As core communication problems parents most frequently mentioned limitations in expressing oneself, being understood and not being intelligible.

Teachers rated the children's communicative abilities in the school context with a mean score of 4.5 on a 10-point scale, so they consider the communicative abilities inadequate. However, the results on a social competence scale were not deviant. Also, scores on three dimensions of the quality of teacher-child relationship (closeness, conflict and dependency) were not different from scores of a large cohort study of typically developing children in the Netherlands. This indicates that the children with DLD in our study did not have limitations in social relations with classmates and the teacher.

To obtain a better picture of the relation between language deficits and communication in daily life, we looked at the results for children with receptive-expressive disorder and expressive disorder separately. The results indicate that children with receptive-expressive disorder experience more severe limitations. Parents in this group more often mentioned that the children are troubled by their language disorder in almost all situations, whereas parents of children with expressive disorder more often mentioned a limited number of specific situations. Also, the parents of children with receptive-expressive disorder more often used generic terms to describe their children's communicative difficulties such as "expressing themselves", while parents of children with expressive disorder used more specific terms such as "being understood" and "intelligibility". Teachers rated children with receptive-expressive disorder as significantly more limited in their communicative abilities and social competence than children with expressive disorder. There are no differences between the two groups of children in the teacher-reported quality of the relationship between themselves and the child.

Limitations in communication according to parents

Parents provided detailed information on what they see as their child's main limitations in communication and in which communicative situations their child is most affected by the language difficulties. This is consistent with Jensen de López, Lyons et al. (2021), who concluded that "parents demonstrated contextualized understandings of their children's speech and language (dis)abilities, along with the everyday functional implications of the disorders" (p. 1739). In our study, parents provided clear information in written response to questions about the impact of language impairment.

Parents' information provides an insight into the aspects of communicative participation that children with DLD struggle with in their daily lives. If we place the information next to the ICF, we see that the subcategories in parents' answers align with ICF categories for activities and participation. They are clearly related to the category "communicating – producing" of the ICF, but only marginally to "communicating – receiving". This is consistent with the findings of Singer et al. (2020) and Chan et al. (2022): limitations in the ICF category of "communicating – receiving" are difficult to detect and parents express few concerns about the understanding of messages. Still, children might be troubled by these limitations, so it is important to talk about comprehension problems with caregivers and teachers and include comprehension in shared decisions on the prioritization of goals on communicative participation.

The subcategories parents mentioned also relate to the ICF categories "particular interpersonal relationships"; the life area "education"; and "community life". Evident in our results but not distinguished in the ICF is the subcategory: "in certain mental states". This subcategory is umbrella for the emotions or state the child is in, such as enthusiasm, anger, fatigue, and emotions caused by circumstances surrounding communication, such as when the child feels that they are asked something difficult or in situations that cause stress. The issues parents mentioned for "in certain mental states" could be considered as part of the ICF component "personal factors", which is distinguished as an important contextual factor, but is not detailed in the ICF. The mental states are not constantly present and do not always manifest in the same way. They arise in the interaction between personal characteristics of a child and circumstances and expectations in the environment and can be a major barrier to communication.

Thus, parents' answers concerning the circumstances in which communication problems arise certainly represent daily life problems. It is important for SLTs to ask such questions because it provides information they cannot gather themselves. However, the answers to these questions alone may not provide the full picture. Parents' information may be coloured by recent events or situations with large impact. In clinical practice, structured observation instruments are used mostly to obtain parents' report on the ICF components activities and participation. The Focus on the Outcomes of Communication Under Six (FOCUS; Thomas-Stonell et al., 2010) is frequently used. This instrument consists of 50 statements on speech, language and communication, which parents can score on a 7-point scale. It is constructed to identify changes in communicative functioning as a result of an intervention. Some themes in our data (being intelligible and understandable, storytelling, conversations, and situations with peers and strangers) overlap with outcomes of the FOCUS, but our data provide more detailed and child-specific descriptions of limitations in communication. The type of questions we used are an addition to already existing instruments for communicative participation and can be a starting point for a conversation with caregivers.

Communicative abilities and social functioning according to teachers

Our study is the first to investigate teachers' opinions on communicative abilities and social functioning of a large group of children with DLD. Teachers rated the children's overall communicative abilities as largely insufficient, with 4.5 on a 10-point scale. Social competence, however, was rated with a median of 3.8 on a 5-point scale, which we do not consider deviant. This finding is contrary to previous studies which have found that children with language difficulties have poorer social skills than their typically developing peers (Irwin et al., 2002; Stanton-Chapman et al., 2007).

The teachers in our study did not judge the quality of their relationship with the child as markedly different from what has been reported for the population of typically developing children. Our participants received higher than average scores on the conflict subscale of the STRS, but these are not strongly deviant. McCormack et al. (2011) also reported deviant scores on the conflict subscale of the STRS, but not on the closeness subscale in a group of children whose parents had indicated that they

had language difficulties at an early age compared to typically developing children (aged 7-9 years). Rhoad-Drogalis et al. (2018) found similar scores for teacher-reported closeness as in our study, but lower levels of conflict. Possibly the setting plays a role in the different results on the conflict scale of the STRS in different studies: our participants take part in special education, with small groups and a favourable student-teacher ratio. In Rhoad-Drogalis et al. the children received special education in an inclusive setting, and McCormack et al. used a large cohort in a variety of educational settings. The age of the children may also play a role: at young ages, language problems are obvious, and adults will take them into account more naturally, especially in a special education setting.

Viewed from an ICF perspective, the information we collected on social competence and quality of teacher-child relationship represents two important aspects from the "interpersonal interactions and relationships" category: relating with peers and relating with persons in authority, in this case teachers. To get a complete picture of communicative participation in the classroom, however, more information on limitations in communication is needed. Until now no instruments or protocols exist to gather this information. We used a score on a 10-point scale as an indication of communicative abilities, which is easy to fill in for teachers, but does not provide detailed information. As with information from parents, information from teachers is likely to require a combination of structured observation and open-ended questions.

Relations between language and communication

We found differences between children with receptive-expressive disorder and expressive disorder. Parents of children with receptive-expressive disorder more often indicated that their children were limited by their language difficulties in almost all circumstances than parents of children with expressive disorder. Parents of children with receptive-expressive disorder therefore were less likely to mentioned specific situations or circumstances. If they did, it was more often "with strangers" and "in certain mental states" than for children with expressive disorder. In contrast, parents of children with expressive disorder more often mentioned "own family" and "peers" as the most problematic situations. When describing limitations in communication, parents of children with receptive-expressive disorder more often mentioned the category "expressing themselves" and parents of children with expressive disorder more often mentioned "being understood" and "intelligibility". It appears that parents of children with receptive-expressive disorder were more likely to use general terms and parents of children with expressive disorder were more likely to be specific about the problem. Perhaps the greater complexity of receptive-expressive disorder makes it difficult for parents to disentangle the different aspects of the limitations in communication, whereas for children with expressive disorder it may be easier to distinguish different aspects. The findings of Chan et al. (2022) support this hypothesis. They found that parents were more likely to express concerns about a clearly visible and distinct problem, such as difficulty reading words, than they were about problems with understanding what is being said.

According to teachers, communicative abilities were significantly lower in children with receptive-expressive disorder than in children with expressive disorder. Children with receptive-expressive

disorder also scored lower on social competence than children with expressive disorder. There were no differences in the quality of teacher-child relationship.

There is agreement in parent and teacher observations: both indicate that communication in daily life is more problematic for children who have a receptive-expressive disorder. This is in line with assumptions of researchers and experiences of SLTs these children are more severely limited in their communicative participation than children with expressive disorder. We suspect that the combination of language domains that are deviant from typical development plays an important role: the more language domains with delays and deviance, the larger the limitations in communication are.

Lower language test scores were related to lower teacher ratings of communicative abilities. In contrast to what has been reported in previous studies, this suggests a relation between severity of language impairment and limitations in communicative abilities. We found no correlation between language test scores and social competence. This finding is consistent with that of Eadie et al. (2018), who found no relation between severity of DLD and ratings on the social functioning subscale of a quality-of-life instrument. Because Hart et al. (2004) did find relations between severity of language impairment and teacher's ratings of social behaviour, further, more thorough investigation into the relations between language skills on the one hand and communicative and social functioning on the other is warranted. It is also important to include what is meant by social competence and social functioning from teachers' perspectives. Further investigation should also be done into the teacher-child relationship: Rhoad-Drogalis et al. (2018) found correlations between core language scores on the CELF test and scores on the subscales conflict and closeness of the STRS, but this is not supported by our results.

Strengths and limitations

Because we had a large group of participants, both parents and teachers, our study provides rich insights into communication in daily life of children with DLD from the perspectives of key stakeholders. In designing the study, and collecting and analysing the data, we considered criteria of trustworthiness and rigor for both qualitative and quantitative research, using existing reliable and valid questionnaires wherever possible, supplemented by questions that were carefully developed together with experts in DLD and SLT research. The cross-sectional design allowed us to relate communication in daily life to language skills. With this design, it was not possible to continue recruiting participants until we were sure that we had reached saturation regarding communication in daily life from parents' perspective. In the last five responses we coded, we found no new subcategories and no new codes. Therefore, we believe we have come close to data saturation and have identified many aspects of limitations in communication in daily life for young children with DLD. Regarding generalizability and transferability, we observe that the group of parents who completed the survey might not be totally representative of the entire cohort of children with DLD in the Netherlands. We expect, however, the impact of language difficulties on communication in daily life to be largely universal and independent of demographic characteristics (Jensen de López, Feilberg, et al., 2021)

Because we used a written survey, we did not have the opportunity to ask further questions or support parents in answering the open-ended questions. Partly because of this, many responses were concise and sometimes difficult to interpret, also because some of the parents seemed to have difficulty formulating. This is a threat to the credibility of the study. We have tried to minimize this by analyzing the data with two researchers, adding quotes to the description of the results, and providing examples of expressions that were difficult to analyse. A recommendation for future research is to collect information from parents orally.

The results provide insights into communication in daily life according to parents and teachers, but it is only a first exploration. We had wanted to apply data triangulation, by comparing information from each child's parents and teacher, but this was not possible because data from both parents and teachers are available for only part of the participants and because different questionnaires were used. When considering the teachers' information, it is important to keep in mind that the children are being taught in schools for special education, exclusively for children with DLD and children with hearing impairment. They spend all day with other children with limitations in communication and receive a lot of support in language and communication from teachers and school SLTs. This may explain the teachers' relatively favourable assessment of the social competence and quality of teacher-child relationship. As to the generalizability of our findings, teachers in our study may have had more knowledge on DLD and the language deficits of the children in their class than teachers in mainstream education. An important way to address this in future research would be to ask the teachers to reflect on the way they scored children in their class. The participants are representative for teachers in special education in the Netherlands. We expect the information provided by the teachers to be generalizable to special education in other countries but to a lesser extent to children in inclusive settings. Inclusive settings should be an important focus for future research.

Finally, within the scope of our study, it was not possible to talk to the children. Consequently, we do not know how the children themselves regard the challenges they experience. It is also not yet entirely clear how best to obtain information on how young children with DLD perceive their communication (Lyons et al., 2022). Their insights should of course be included to get a more complete picture of limitations in communication and decide on main goals in improving communicative participation, especially because children have a right to do so (McLeod, 2018). Previous research has also shown that there can be a difference in perception of the speech/language problem between the child themselves and the environment (McCormack et al., 2010).

Implications

Our study sheds new light on the communication of children with DLD both in their home environment and at school and it provides information on aspects of communicative participation. We agree wholeheartedly with previous studies that collaboration with key informants in the home and school environments of a child with DLD is crucial for identifying problems with communicative participation

and determining what is needed in intervention (Kwok et al., 2022; Singer et al., 2022). Parents' and teachers' perspectives are invaluable.
In our study, a helpful way of getting information from parents was to ask what the main limitations in communication were. It is important to keep in mind that what the parents think is most troubling the child is not necessarily what the parents would want to be remedied first, or what the child's most important needs are. For instance, we found that parents seldom mentioned problems in understanding language, even for children who were found to have receptive difficulties. Consequently, a more in-depth interview with parents and child would seem to be needed, and we should search for means to facilitate this. Our question "At what times and in what situations are the language difficulties troubling your child the most?" seems to be a good starting point for such a conversation. This could be combined with relevant parts of the FOCUS instrument. The items that apply may vary from child to child. An item bank with computerized adaptive testing such as is being developed for patient reported outcome measures (PROMIS®; Alonso et al., 2013), could also be useful for conversations with parents of children with DLD about communication in daily life, just as could the ENGAGE conversation tool (Singer et al., 2022).

The questionnaires we used in our study to gather information from teachers provide a global picture of a child's communicative abilities and social functioning in the classroom, but more fine grained and efficient instruments to record communicative participation in the classroom are needed. Existing questionnaires and observational instruments, such as Children's Communication Checklist (Bishop, 2003), the Observational Rating Scale and Pragmatic Profile of the Clinical Evaluation of Language Fundamentals, 5th edition (CELF-5; Wiig et al., 2013) and the Pragmatics Observational Measure (Cordier et al., 2014) mostly focus on pragmatic skills and checking whether children deviate from norms. They are also mostly not designed to be completed by teachers, but by SLTs.

Communicative participation should be central in the diagnostic SLT assessment to get a better understanding of the severity of limitations in communication, and to develop a treatment plan in joint consultation with parents and teachers. In line with what Baylor and Darling-White (2020) and Kwok et al. (2022) advocate, the focus should not only be on the child with DLD: adaptations in the environment can also improve communicative participation. For example, with regard to the role that a child's mental state can play in communication, intervention should start with raising awareness of unfavourable conditions regarding mental state in the communication environment and cooperate with parents and teachers to adjust those conditions. Regarding comprehension problems in daily life, it is important to get insight into what the child can understand and adjust language complexity or use alternative ways of communicating.

Involving the environment is not an obvious approach for SLTs who work with children with DLD. For SLTs who work in schools, the classroom situation is often involved in the intervention (although it is not usually the primary focus), but not the home environment. And in SLT practices, parents are involved

(often primarily to do "homework"), but usually school professionals are not. The persistence of DLD and the lifelong consequences it can have should urge professionals to cooperate and focus on supporting communicative participation. If children are better able to participate in communication in daily life, serious long-term consequences such as academic underachievement, difficulties in relationships and psychological consequences might be reduced.

The relation we found between the severity of the language disorder and problems in communicative abilities in the school context warrants further research. This also applies to the relation we found between the nature of the language disorder, that is whether there are only expressive problems or also problems in language comprehension, and the limitations in communication and communicative abilities in the school context. Our results provide a basis for studies on the possibility of tailoring interventions to language profiles. The combination of language profile, severity of the disorder and communicative participation should also play a role in future severity classification. Currently, there is no international agreement on severity measures for DLD. It is important to develop these to enhance transparency in diagnostics, appropriate interventions and determining clinically relevant effects of scientific research.

CONCLUSION

This study confirms that children with DLD face major communication difficulties, that manifest in many domains, both at home and at school. The problems seem to be more severe in children with receptive-expressive disorder than in children with expressive disorder. Interestingly, while teachers find the children's communicative abilities inadequate, they do not rate social competence and teacher-child relationship as abnormal. Collaboration with the child's environment is crucial to identify problems in daily functioning and determine what is needed in intervention.

Our study has contributed to the exploration of communicative participation of young children with DLD with questions to start a conversation with parents and instruments that can be used by teachers but there is still a lot of work to be done.

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DATA AVAILABILITY STATEMENT

Due to privacy and ethical concerns, neither the data nor the source of the data can be made available.

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APPENDIX A - PARENT SURVEY

Thank you very much for your willingness to complete this survey!
One of the parents is supposed to fill out the survey. By "your child" we always mean the child participating in our study.

We will ask about:

- Information about you and your partner
- The languages you are using with your child
- Your child's language difficulties

Some questions are about you and your partner.

- **You**: this is you when you fill out the questionnaire.
- **Your partner**: this is your spouse of the man or woman you are living with.

Of course, if you have no partner, you do not need to fill in the questions.

Part I. Information about you and your partner

1. Are you a man or a woman?

O a man
O a woman

2. Please check what is applicable:

O I am married / I live together
O I live alone

3. What is the highest level of education you have completed? If you have a partner, what is the highest level of education your partner has completed?

	You	Your partner
No education	O	O
Primary school (1-3 years)	O	O
Primary school (4-6 years)	O	O
Pre-vocational secondary education	O	O
Post-secondary vocational education	O	O
Senior general secondary education	O	O
Pre-university education	O	O
Higher professional education	O	O
University	O	O

Other, namely: ……..

In which country were you born?

O The Netherlands

O Other, namely: .....

In which country was your child born?

O The Netherlands

O Other, namely: .....

In which country was your partner born?

O The Netherlands

O Other, namely: .....

Part II. Different languages

Most families speak more than one language. We would like to know what languages you use with your child.

4. What languages do you speak regularly at home? You can give more than one answer.

	You	Your partner
Dutch	O	O
Frysian	O	O
Dutch regional language or dialect	O	O
Arabic	O	O
Berber	O	O
Chinese	O	O
German	O	O
English	O	O
Farsi	O	O
French	O	O
Javanese	O	O
Croatian	O	O
Kurdish	O	O
Papiamento	O	O
Polish	O	O
Serbian	O	O
Sranan Tongo	O	O
Sarnami Hindustani	O	O
Turkish	O	O
Flemish	O	O
Other, namely:	.....	.....

Language difficulties

Your child has a language disorder. That is why he/she attends special education. The language disorder causes difficulties with speaking and understanding. Can you describe the situations in which the language difficulties are troubling your child the most? What problems does your child experience then?

5. At what times and in what situations are the language difficulties troubling your child the most?

6. What kind of difficulties does your child experience at the times and in the situations that you have mentioned?

APPENDIX B. TEACHER QUESTIONNAIRE

Thank you very much for your willingness to complete this survey!
Please, complete a separate questionnaire for each student participating.
We will ask you about:

- The student's social competence
- The relationship and contact between the student and you

Finally, we will ask you to rate communicative abilities.

Social competence

1. What is applicable to the student?

	Definitely untrue	Untrue	Not untrue, not true	True	Definitely true
The student…:					
tries to help when someone is hurt (for example, gives a toy)	O	O	O	O	O
follows rules	O	O	O	O	O
hugs or feeds dolls or stuffed animals	O	O	O	O	O
is affectionate with loved ones	O	O	O	O	O
looks for you (or another adult in the classroom) when upset	O	O	O	O	O
looks right at you when you say his/her name	O	O	O	O	O
plays well with other children	O	O	O	O	O

Items originate from Brief Infant Toddler Social and Emotional Assessment (BITSEA; Briggs-Gowan & Carter, 2001) and are used with permission. BITSEA contact information and permission to use: Mapi Research Trust, Lyon, France, https://eprovide.mapi-trust.org

Student-teacher relationship

2. What is applicable to the student?

This student…:	Definitely untrue	Untrue	Not untrue, not true	True	Definitely true
needs to be continually confirmed by me	O	O	O	O	O
fixes his/her attention on me the whole day long	O	O	O	O	O
reacts strongly to separation from me	O	O	O	O	O
is overly dependent on me	O	O	O	O	O
asks for my help when he/she really does not need help	O	O	O	O	O
This student and I always seem to be struggling with each other	O	O	O	O	O
This student feels that I treat him/her unfairly	O	O	O	O	O
When this student is in a bad mood, I know we're in for a long and difficult day	O	O	O	O	O
This student's feelings toward me can be unpredictable or can change suddenly	O	O	O	O	O
Dealing with this student drains my energy	O	O	O	O	O
If upset, this student will seek comfort from me	O	O	O	O	O
I share an affectionate, warm relationship with this student	O	O	O	O	O
This student seems to feel secure with me	O	O	O	O	O
My interactions with this student make me feel effective and confident	O	O	O	O	O
This student openly shares his/her feelings and experiences with me	O	O	O	O	O

Items originate from Student-Teacher Relationship Scale (STRS; Pianta, 2001) and are used with permission from the author

Communicative abilities

3. Finally, how would you rate the student's communicative abilities?

Communicative abilities can be considered as the capacity to communicate functionally and adequately in agreement with the developmental level and capabilities of the child. Communication can take the form of spoken words, gestures or symbols.

Communicative abilities include:

- make yourself clear to other children
- take the initiative to communicate
- respond when asked to say something again (when not understood)
- communicate in a socially appropriate way

- respond to questions
- contribute to a classroom circle discussion
- show that you didn't understand
- dare to speak

Communicative abilities are only partly related to language level. Some children with language delays can be effective communicators if they are able to express themselves by supplementing spoken language with gestures, facial expressions, social behaviour and by not giving up easily if communication fails.

Please, indicate on the scale below how you rate this student's communicative abilities.

this child cannot cope with communicative situations at all	O	O	O	O	O	O	O	O	O	O	this child functions very well in communicative situations



CHAPTER 3

Language gains in 4–6-year-old children with Developmental Language Disorder and the relation with language profile, severity, multilingualism and non-verbal cognition

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ABSTRACT

Background

Early and effective treatment for children with Developmental Language Disorders (DLD) is important. Although a growing body of research shows the effects of interventions at the group level, clinicians observe large individual differences in language growth, and differences in outcomes across language domains. A systematic understanding of how child characteristics contribute to changes in language skills is still lacking.

Aims

1. To assess changes in the language domains: expressive morphosyntax; receptive and expressive vocabulary; and comprehension, in children in special needs education for DLD.
2. To explore if differences in language gains between children are related to child characteristics: language profile; severity of the disorder; being raised mono- or multilingually; and cognitive ability.

Methods and procedures

We extracted data from school records of 154 children (4-6 years old) in special needs education offering a language and communication stimulating educational environment, including speech and language therapy. Changes in language were measured by comparing the scores on standardized language tests at the beginning and the end of a school year. Next, we related language change to language profile (receptive-expressive versus expressive-only disorders), severity (initial scores), growing up mono- and multilingually, and children's reported non-verbal IQ scores.

Outcomes and results

Overall, the children showed significant improvements in expressive morphosyntax, expressive vocabulary and language comprehension. Baseline scores and gains were lowest for expressive morphosyntax. Differences in language gains between children with receptive-expressive disorders and expressive-only disorders were not significant. There was more improvement in children with lower initial scores. There were no differences between mono- and multilingual children, except for expressive vocabulary. There was no evidence of a relation between non-verbal IQ scores and language growth.

Conclusions and implications

Children with DLD in special needs education showed gains in language performance during one school year. There was, however, little change in morphosyntactic scores, which supports previous studies concluding that poor morphosyntax is a persistent characteristic of DLD.

Our results indicate that it is important to include all children with DLD in intervention: children with receptive-expressive and expressive disorders; mono- and multilingual children, and children with high, average and low non-verbal IQ scores. We did not find negative relations between these child factors and changes in language skills.

INTRODUCTION

Children with Developmental Language Disorder (DLD) show severe difficulties in their language development, often in several language domains (Bishop et al., 2016). This affects communicative functioning, and impacts reading and learning, causing academic underachievement (Snowling et al., 2001). DLD is associated with social-emotional and behavioural problems (Goh et al., 2021; Thomas-Stonell et al., 2009), is a risk factor for impaired social adaptation, and a psychiatric disorder in later adolescence and adulthood (Clegg et al., 2005). Thus, DLD and its consequences have a negative impact on quality of life (Eadie et al., 2018; Van Agt et al., 2011). Unfortunately, the reality is that poor prognosis is part of DLD, and the risk of persisting difficulties seems to be related to the language domains that are affected (Bishop et al., 2017; Leonard, 2014). Early, effective intervention, aimed at improving communication skills and social participation, is of major importance to offer children with DLD the best possible opportunities in our society.

Effective intervention requires professionals to base their clinical decisions on evidence. However, even though the body of research on effectiveness of interventions for children with DLD is growing, the number of good-quality trials remains low (Berkman et al., 2015; Cirrin & Gillam, 2008; McGregor, 2020), and the results are mixed. Overall, systematic reviews indicate that intervention can be effective, but not for all children with DLD, and not in all language domains. In addition, clinicians have difficulty in translating the results of research to their own clinical practice. Intervention studies generally show average effects, but effects at the group level have little to say about improvement of an individual child in a practitioner's caseload. There are large individual differences in intervention outcomes, with substantial improvement in some children, but not in all (Justice et al., 2017). Furthermore, studies differ in several respects from each other and from clinical settings: a broad variety of interventions and service delivery models are used, and outcome measures differ substantially. Finally, the variability in language profiles, needs, improvement, and communicative functioning in children seen in clinical practice is much larger than in most studies. We observe that intervention studies mostly include a well-delineated sample, which is relatively homogeneous regarding language profile (for example excluding children with receptive disorders) and other relevant characteristics. Some groups of children with DLD that are regularly seen in clinical practice, tend to be excluded from studies, for instance multilingual children with DLD (Crowe et al., 2021; Thordardottir, 2010).

The present study takes a different approach: we focus on outcomes of intervention as actually delivered in clinical practice, involving a representative sample of children with DLD. The service delivery model we focus on consists of schools for special education for children with severe DLD in the Netherlands. Outcomes are scores on standardized tests on separate language domains, which are commonly used in speech and language therapy practice. The eligibility criteria of the schools allow for a heterogeneous group of children with DLD, including children with receptive-expressive disorders, multilingual children, and children with below-average IQ.

This study has two objectives. First, to assess growth in different language domains in children with DLD, during one school year in special needs education. Second to explore if differences in language gains between children are related to child characteristics.

Growth in different language domains

We consider it important to look at a variety of language domains, because children with DLD differ in the areas of language that are affected (Bishop, 2017; Law et al., 2008; Van Weerdenburg et al., 2006). Although most children have problems in morphosyntax (Leonard, 2014), for some the problems in the semantic domain are more manifest, while for others pragmatic problems are interfering most with communicative functioning. Also, the prevalence of phonological disorders varies (Tyler et al., 2003).

Evidence of effectiveness of interventions differs for different language domains. Positive effects of interventions in clinical settings targeting vocabulary, speech sound disorders and phonological awareness have been documented (Broomfield & Dodd, 2011; Cirrin & Gillam, 2008; Law et al., 2004; Rinaldi et al., 2021). There are also successful interventions aiming at morphosyntax (Ebbels, 2014; Plante et al., 2014), but these effects are mostly found in well-controlled studies, under optimal conditions. Implementing these interventions in clinical practice appears to be complex (Bruinsma et al., 2020). There is evidence that problems in morphosyntax are persistent (Rice, 2004), but little is known on how growth potential in morphosyntax relates to gains in other language domains.

Most studies use expressive performance as outcome; receptive outcome measures are seldom reported (Berkman et al., 2015; Cirrin & Gillam, 2008; Conti-Ramsden et al., 2012; Rinaldi et al., 2021). In contrast, the current study explicitly looks at language comprehension, receptive and expressive vocabulary, and expressive morphosyntax. The use of co-normed tests makes it possible to detect any disparities in growth, and this will expand our knowledge on characteristics and developmental trajectories of DLD and support clinicians in realistic goal setting. We did not include phonology, phonological awareness and pragmatics because the co-normed tests do not provide information on these domains.

Child characteristics

Individual characteristics of children with DLD are critical in tailoring an intervention to a child's specific needs and in evaluating its outcomes. Intervention studies and longitudinal studies on growth trajectories of language (Crutchley et al., 1997; Law et al., 2004, 2008) indicate four child characteristics that are likely related to language growth: (1) the nature of the language disorder, that is, receptive-expressive versus expressive-only; (2) the severity of the disorder; (3) if children are being raised mono- or multilingually; and (4) cognitive ability. Theoretically, more factors could be related to language gains, but we chose to study those for which data collection involved low participant burden, as they could be retrieved from the school records. In the next section, we describe the factors and provide arguments for including them.

Receptive-expressive versus expressive language disorders

The traditional classification of children with expressive-only disorders and mixed receptive-expressive disorders is still widely accepted (World Health Organization, 2021). More intervention studies focus on expressive disorders than on receptive-expressive disorders. Results are seldom reported separately for these two subgroups and there are few studies with receptive outcome measures (Boyle et al., 2010; Cirrin & Gillam, 2008; Law et al., 2004; Rinaldi et al., 2021). Broomfield and Dodd's (2011) study is to our knowledge the only one that divided participants into receptive-expressive and expressive subgroups. They found a significant intervention effect on receptive language measures in children with receptive difficulties, and effects on expressive language measures in children with predominantly expressive difficulties. It is unclear if there were differences between the receptive-expressive and expressive subgroups in expressive language outcomes. It is also unclear if there were differences in effects on expressive morphosyntax. Apart from Broomfield and Dodd, the very limited evidence available suggests that children with receptive-expressive language disorders show less improvement in morphosyntax than children with expressive disorders (Law et al., 2004). It has long been assumed that the degree to which language comprehension problems accompany production problems is an important prognostic factor (Paul et al., 1983 in: Leonard, 2014) but there are no recent studies confirming this.

Because there is a lack of information on improvement on both receptive and expressive language in children with receptive-expressive disorders, we analyse outcomes for this group separately. We also compare the improvement between children with receptive-expressive disorders and children with expressive disorders. For children with expressive disorders, of course, we only study improvement on expressive language measures.

Severity

Longitudinal studies on late talkers (Fisher, 2017; Rescorla, 2011) indicate that language scores in early years predict language skills at later ages. Longitudinal studies show that children with DLD's rate of language growth is also fairly stable (Conti-Ramsden et al., 2012; Law et al., 2008; Norbury et al., 2017; Rice, 2004). This implies that children with lower language scores at baseline, that is, more severe DLD, do not shift into groups with higher (or lower) scores. We must keep in mind that these studies only report group level results, and recent studies have drawn attention to continuous individual variability in language level (for example McKean et al., 2017). Moreover, it is not reported if the children in these studies received language intervention. The relation between initial language abilities and benefits of intervention has hardly been studied.

Studies on educational interventions in typical developing children in regular schools do not confirm that language growth rate is stable. A decreasing rate of growth has been reported for children with initial low levels, contrasting with accelerating growth in children with initial high levels (Penno et al., 2002). This version of the "Matthew effect" implies that the gap between children with delays and high functioning children widens over time. It is conceivable that children with severe DLD also show

a smaller growth rate than children with mild disorders. On the other hand, we can hypothesize that children with severe delays have more room for improvement, and this could indicate that they show more growth than children with smaller delays.

In sum, previous studies leave us with two contradicting hypotheses on the role of severity of the language disorder in language growth. Currently, standardized test scores are the only measure of severity, as other, for example communication-oriented indices are lacking (Bishop et al., 2016). Therefore, in testing hypotheses on the relation between severity and language growth, we operationalize severity as low initial scores on standardized language tests.

Monolingual versus multilingual

Although multilingual children with DLD represent a significant portion of the caseload of SLTs they are often excluded in intervention studies. Few studies report growth trajectories and intervention effects in bilingual children, and these often only include specific languages, for example Spanish English-speaking children, instead of the wide variety of languages spoken by the children seen by SLTs in clinical practice (Harvey et al., 2018).

Crutchley et al. (1997) studied a group of twenty-six bilingual children with DLD, aged 6-7 years, in language units across England, with a range of different home languages. Overall, the bilingual children had more severe and complex problems than monolingual children, both at enrolment and after several months or years of visiting language units (4 months – 3 years). The bilingual children with DLD also appeared to progress less quickly than their monolingual peers. McKean et al.'s (2017) population-based cohort study also indicated that being raised multilingually plays a role in developmental language growth. Multilingual children were more likely to show an improvement trajectory over time than a stable trajectory. It is unclear at this time if this pattern is replicated in children with DLD.

As our study population has a substantial number of children speaking Dutch and other languages such as Turkish, Polish, Arabic, and English, we were able to differentiate between language growth in mono- and multilingual children. All children received intervention in Dutch, so the results will add to insights on multilingual DLD and differences in gains between monolingual children receiving intervention in their first language, and multilingual children receiving intervention in their second or other language.

Non-verbal cognition

Even though cognitive referencing in the diagnosis of language disorders has been shown to be irrelevant (Bishop et al., 2016; Gallinat & Spaulding, 2014), it is still widely applied in clinical practice. There is an ongoing debate among Dutch SLTs on whether children with (above-)average scores on non-verbal IQ tests have a better prognosis in language intervention than children with lower non-verbal IQ scores (Dutch SLTs, n.d.). Justice et al. (2017) found indications that non-verbal cognition could

be a prognostic indicator of language development for children with DLD, although it only partially explained variance in language gains, and did not contribute significantly as an individual factor.

So, although we hypothesize that non-verbal cognition is not a relevant factor in language growth in our population, we included it, because Justice et al. (2017) could not confirm that it does not play a role at all, and also because of opinions of professionals on the importance of non-verbal cognition in language growth.

Current study

To summarize, it is important to study language changes in children with DLD at a detailed level, and factors that may explain variability in growth. Here, we focus on child characteristics, in a large cohort of 4- and 5-year-olds enrolled in schools for special education for children with DLD. We examined changes in several language domains over time, during one school year. The cohort is representative for the average caseload of SLTs and includes both monolingual and multilingual children, showing variation in language profile, severity and non-verbal cognition. We were specifically interested in 4- and 5-year-olds, because they are rarely studied as a separate group. Most studies focus on toddlers and preschoolers, or older, school-aged children, but intervention at 4-5 years is particularly important to prevent reading and writing problems and to support communicative functioning at school and with friends and family. At the age of 4-5 years, language problems can still be transient, although it is more likely that the problems will not pass (Stothard et al., 1998).

We emphasize that the children in our cohort were receiving their usual care and education, of which we could not register details. Educational practices and treatment by SLTs have many similarities across schools but are not the same. Therefore, this study should not be seen as an experimental study measuring effects of intervention, but as an exploration of changes in different language domains, differences between language domains, and relations between language gains and child characteristics.

The research questions are:

1. What are the changes in expressive morphosyntax, expressive vocabulary, language comprehension and receptive vocabulary in 4- and 5-year-old children with DLD, in one school year in special needs education?
2. What is the relation between changes in different language domains and language profile (receptive-expressive versus expressive disorder); severity of the disorder; being raised mono- or multilingually, and non-verbal cognition?

METHOD

We conducted a longitudinal cohort study of children in special education for children with DLD, using data from school records.

Participants

We collected data of a cohort of 154 children (mean age 4;8 at the start of the study; range = 3;4 – 5;10 yrs.) at schools for special education for children with DLD. Schools were approached via two large organizations in the Netherlands for care and education of children with language and communication needs, which manage almost all schools for special education for these children. Of the 31 schools approached, 18 consented to take part. Ethical approval was obtained from the Ethical Committee for Research (ECO-GD) of HU University of Applied Sciences Utrecht.

The children were all in the first and second grades of primary education under the Dutch educational system. The schools were geographically spread across the country. We asked parents of 370 children to give informed consent and received this for 177 children (48%). They met standard criteria for eligibility to schools for special education for children with DLD. At the time our study was conducted (2014-2015), these criteria were:

- Scores of at least 1.5 SD below the mean at standardized language (sub)tests addressing at least two out of four speech-language domains: speech sound production, auditory processing, receptive and expressive morphosyntactic development, and receptive and expressive lexical-semantic development, or a score of 2 SD or more below the mean on a standardized approved general language test. Multilingual children have to demonstrate similar severe language difficulties in all languages they speak.
- Normal hearing
- Non-verbal IQ of at least 70
- Inability to participate in mainstream education due to the language disorder, shown by low scores on academic tests or limited communicative participation at school as judged by both the SLT/psychologist and the teacher.

We excluded 23 children as the study progressed, because they did not to meet the eligibility criteria, or their data on T1 were lacking.

The sample consisted of 110 boys (71%) and 44 girls (29%). This is representative for the population of Dutch schools for special education for DLD. A total of 36 children were raised in a multilingual environment (23%), which was defined as having at least one parent or caregiver who has another native language than Dutch and uses this language at home. The initial DLD diagnosis was based on multidisciplinary assessment of all languages spoken at home, by experienced professionals, often using language interpreters. Language exposure in all languages was taken into account. Initial assessment

was done at an early age for most children, at least for the group who visited a special treatment group for toddlers at risk for DLD (72% of the multilingual children; age at start: *M* = 38 months, *SD* = 4.7), because of the eligibility procedure for these groups.

The majority were simultaneous bilingual (Table 1); the amount of exposure to different languages was not reported in their files. We can assume that they had substantial exposure to the Dutch language. The largest group of bilingual families in the Netherlands are from Moroccan and Turkish origin. This is also the largest group in our sample (*n* = 10). Moroccan and Turkish parents in the Netherlands in general speak Dutch to their children for 40-60% of the time and report that they themselves have good proficiency of Dutch (Huijnk & Andriessen, 2016). Almost all children started going to preschool at age 2, where they received substantial exposure to Dutch. They also started with speech and language therapy in Dutch at an early age. The proportion of multilingual children is similar to the proportion of children with a migrant background in the general population (24%), but lower than in other types of special needs education (28%; Statistics Netherlands, 2015).

Almost all children (*n* = 149) had already been receiving speech and language therapy before the onset of this study. For 100 of them this was part of special treatment groups for toddlers at risk for DLD or special education for DLD. The others had received language intervention in private practices. Mean age, non-verbal IQ, history of Speech and Language Therapy, and special care before the start of the study are shown in Table 1.

Procedures

The study span was approximately one year. Children in special needs education are assessed once every year by their own SLT, mostly with the same battery of language tests. Timing of assessments differed between schools (for example, at the start or end of a school year); the mean interval between the two measurements was 11 months (*SD* = 2.9).

Non-verbal cognition was measured as part of the admission procedure to special needs education by a licenced child psychologist and repeated if deemed necessary. In this study, the most recent non-verbal IQ scores were used. The mean age at IQ assessment was 44 months (*SD* = 6.7). Data on language tests, non-verbal IQ tests, and different languages in the child's environment were recorded in a database.

Table 1. Participant characteristics and previous intervention

Age in months, *M (SD)*	
T0	55.6 (6.90)
T1	66.7 (6.62)
Gender, *n (%)*	
Female	44 (29%)
Male	110 (71%)
Mono-/multilingual, *n (%)*	
Monolingual	118 (77%)
Multilingual[a]	36 (23%)
Simultaneous multilingual	21
Sequential multilingual	10
Unclear	5
Non-verbal IQ (at baseline), *M (SD)*[b]	98.9 (12.63)
Age SLT intervention started in months, *M (SD)*[c]	33.0 (7.14)
Time period at special toddler group and special education together in months, (for n = 100), *M (SD)*	13.5 (7.84)

[a] Languages: Turkish, Arabic, Berber, Kurdish, different Chinese languages, Russian, Ukrainian, Farsi, Polish, English, Brazilian-Portuguese, Spanish, Romanian, Thai, Somali, Fula

[b] Non-verbal IQ measured with SON-R 2½–7 (Tellegen et al., 2005)

[c] SLT intervention was either in SLT practices or within a special care toddler group for children at risk for DLD

Measures

The battery of language tests consisted of standardized tests on expressive grammar, expressive vocabulary, language comprehension and receptive vocabulary. All language tests, except the test for receptive vocabulary are co-normed, that is, they have been standardized using the same norm group. The language tests and the non-verbal IQ test yield quotient scores as age-referenced standard scores, with a mean of 100 and SD of 15. All tests were administered in Dutch, so multilingual children were assessed in their second language.

Expressive morphosyntax

Expressive morphosyntax was measured using the subtest Sentence Development of the Schlichting Expressive Language Test (Schlichting & Lutje Spelberg, 2010b). This test is designed for children aged 2-7 years. Items in the subtest Sentence Development consist of syntactic structures with gradually increasing complexity. They are presented in a sequence that mirrors order of acquisition of Dutch morphosyntax. Structures are modelled two to three times in a meaningful context, using pictures and (play) objects, to elicit imitation (Schlichting & Lutje Spelberg, 2003).

An example of a test item with a structure that is acquired between 2;6 and 3;6 years:

Nu wil ik deze
Now want.1SG I this
"Now I want (to have) this one"
Structure: adverbial adjunct + subject + modal verb + direct object; inverted order of subject and verb.
Procedure: SLT and child are choosing objects in turn
Elicitation: the SLT says, "Now I want (to have) this one" and invites the child to choose and say, "Now I want to have this one".

An example of test item with a structure that is acquired between 4 and 6 years:

Dit is de sleutel waar je de deur mee open kan maken
This is the key where you the door with open can make
"This is the key you can use to open the door"
Structure: main clause + relative clause
Procedure: the SLT provides an example of the structure, and the child is asked to imitate it with another picture and a change of words
Elicitation: the SLT says, "This is the key you can use to open the cabinet, and …"

Internal consistency of the subtest Sentence Development is 0.90, indicating good reliability, and test-retest reliability is 0.73 (Schlichting & Lutje Spelberg, 2010b).

Expressive vocabulary

The subtest Word Development of the Schlichting Expressive Language Test (Schlichting & Lutje Spelberg, 2010b) measures expressive vocabulary level of children aged 2-7 years by asking them to name pictured objects, or to complete the description of a picture (for example "This is a snail. He is not moving fast, but he is moving… *slowly*"). Internal consistency of the Word Development Test is 0.89, indicating good reliability, and test-retest reliability is 0.93 (Schlichting & Lutje Spelberg, 2010b).

Language comprehension

Sentence comprehension was measured with the Schlichting Test for Language Comprehension (Schlichting & Lutje Spelberg, 2010a), which is designed for children aged 2-7 years. The child is verbally instructed to manipulate objects and choose pictures that represent spoken sentences. The test items call upon vocabulary, semantic knowledge and understanding of morphosyntax and become more difficult as the test progresses. Several language comprehension tests have served as a model in the construction of the Schlichting Test for Language Comprehension, including the Reynell Developmental Language Scales (Van Eldik et al., 1997), the Token test (De Renzi & Faglioni, 1978), and the Test for Reception of Grammar (Bishop, 1989).

An example of a simple item: "Put the monkey on the house"; the child has to manipulate toys.

An example of a more complex item: "After putting on his hat, the man puts on his coat"; the child has to choose the correct picture out of four.

Internal consistency of the test is 0.93, indicating good reliability, and test-retest reliability is 0.82 (Schlichting & Lutje Spelberg, 2010a).

Receptive vocabulary

We used the Dutch Peabody Picture Vocabulary Test (PPVT-III-NL; (Dunn & Dunn, 2005) to measure receptive vocabulary. This is the Dutch adaptation of the third version of the PPVT, and it is standardized for ages 2;3-90. The child has to select the picture that best matches the orally presented word. Internal consistency for different sets of items of the PPVT-III-NL varies from 0.87 to 0.97, indicating good reliability. Data on test-retest reliability are lacking for children (Dunn & Dunn, 2005).

Non-verbal cognition

Non-verbal intelligence was assessed using the Revised Snijders-Oomen Non-verbal Intelligence Test for children between 2;6 and 7 years (SON-R 2½–7; Tellegen et al., 2005), which does not use spoken or written language. The test involves a reasoning scale (that is, Situations, Categories, and Analogies) and a performance scale (that is, Patterns, Mosaics, and Puzzles). The reliability coefficients increase with age from 0.86 in a child of 2;6 years to 0.92 in a child of 7 years, indicating good reliability. Test-retest reliability is 0.82 (Tellegen et al., 2005).

Intervention: Special education for children with DLD

Specials needs schools for children with DLD in the Netherlands aim at the same attainment levels as mainstream schools, with a curriculum that is adjusted to the communicative needs of the children and individualized educational goals (Simea, 2014). The teachers are trained in language and reading education, adapted instructing, and enhancing social relations and well-being. Classes have a maximum of fifteen children, and in each class a teacher and a teaching assistant are present all day. All children receive speech and language therapy by an SLT at school, individually and in small groups. SLTs and teachers closely work together and SLTs also engage in various classroom activities.

There was variation in the amount of speech and language therapy the participants received, and in the proportions of individual therapy and group therapy. SLT logs were used to estimate individual therapy intensity throughout the academic year. These showed that almost all children received individual sessions, with a mean frequency of once per week; 97 children received additional group sessions. Detailed information is provided in Table 2. Based on the logs, which were mostly kept for 20-30 weeks, we calculated therapy intensity for one academic year (40 weeks). The converted total number of sessions (individual sessions and group sessions together) has a mean of 70 (SD = 38.2). The registration

of SLT's involvement in classroom activities was not done systematically enough to allow quantitative analysis.

SLTs also registered therapy goals they focused on in each session. Figure 1 shows the percentage of sessions in which activities were aimed at the language domains: pragmatics and communicative functioning; lexicon and semantics; morphosyntax; or phonology and articulation. One session could contain activities for more than one language domain. SLTs mentioned other goals in addition, such as phonological awareness and emerging literacy and inferential language skills. Diagnostic assessment also took 2-4 individual sessions for each child.

Table 2. Speech and language therapy: Sessions per week, minutes per week, and length of sessions.

	Total *n* = 132		**Individual** *n* = 129		**Small group (2-4 children)** *n* = 95		**Large group (5-9 children)** *n* = 29	
	M	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***
Number of sessions per week	1.8	0.95	1.1	0.44	0.7	0.63	0.9	0.85
Number of minutes per week	42.4	28.55	23.4	9.48	18.9	19.05	26.7	25.69
Length of sessions	23.4	4.05	22.3	4.03	25.6	4.70	28.9	2.15

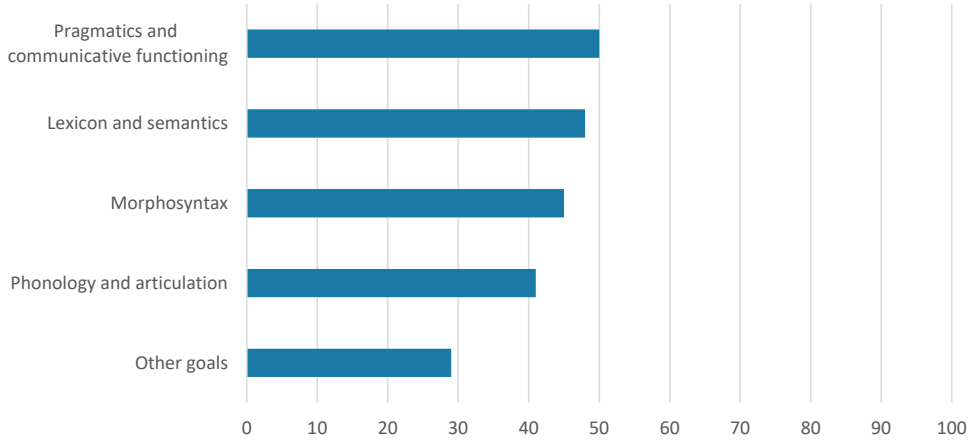


Figure 1. Number of sessions aimed at different language domains as percentage of total sessions

Note. One session could contain activities for more than one language domain.

Data analysis

Statistical analyses were performed using IBM SPSS Statistics, version 25.

Subgroups

We divided our sample into two subgroups: children with both receptive and expressive language disorders and children with expressive language deficiencies only. The mixed receptive-expressive language disorder group consisted of children with quotient scores of more than 1 SD below the mean (that is, quotient score < 85) on both a language comprehension test, and one or more tests for language production. Children with receptive quotient scores of ≥ 85 (that is, receptive skills within the normal range) were considered to have an expressive disorder (Law et al., 2008).

Missing data

Data on one or more tests at T0 were missing for 8% of the children, and for another 12% data on one or more tests at T1 were missing. This led to missing data on the differences between T0 and T1 on one or more tests for 18% of the children. As listwise deletion of missing would have reduced the usable dataset to 64% of the children, we applied multiple imputations to enhance power. Fully conditional specification was used as imputation method. The imputation models included all language measures at T0 and T1, non-verbal IQ, and growing up mono- or multilingually. Ten new datasets with imputed data were created and fitted to a linear regression model. Pooled statistics were used in the analysis, and degrees of freedom were adjusted according to (Barnard & Rubin, 1999).

Analysis

To answer the first research question about changes in expressive morphosyntax, expressive vocabulary, language comprehension and receptive vocabulary, we used paired samples t-tests. We did this for all participants on the tests for expressive language, and for the children with receptive-expressive disorders on the tests for receptive language as well. We also calculated percentages of children that showed improvement, decline or stable scores when comparing T0 and T1 measurements. Improvement of more than 0.5 SD can be considered a significant improvement for an individual child, as the one-sided confidence intervals of T0 and T1 do not overlap in such cases. We looked at both quotient scores and raw scores. Improvement in raw scores does not necessarily mean improvement in quotient scores, because standardized scores are adjusted to developmental growth related to age, and they are supposed to be stable for the general population.

To answer the second research question on the relation between language changes on the one hand and language profile, severity, multilingualism and non-verbal cognition on the other, we compared gains of children with expressive disorders and children with receptive-expressive disorders and used factorial repeated measures analysis of variance (ANOVA) to test for a Time * Group interaction for all language tests separately. Subsequently we divided the participants in four subgroups: monolingual children with expressive or receptive-expressive disorders, and multilingual children with expressive or

receptive-expressive disorders, compared their gains and tested again for a Time * Group interaction. The broad range of scores made it possible to use Pearson's correlations to measure the relation between severity and gains on all tests, and the relation between non-verbal IQ and language gains for all participants, and also for the different groups.

RESULTS

Gains in different language domains

There were more children with a receptive-expressive disorder (n = 90) than children with an expressive disorder (n = 64). First, we present the results of standardized measures on expressive language for all children, and next the scores on receptive language for children with receptive-expressive disorders. Growth in receptive measures is not presented for children with expressive disorders because they already had scores within the mean range at T0, as would be expected (language comprehension: M = 94.0, SD = 6.77; receptive vocabulary: M = 99.5, SD = 11.31).

Expressive language

Expressive language scores at start (T0) and end (T1) of a school year are presented in Table 3, showing that performance was below the age-normed means and that morphosyntactic skills were weaker than vocabulary. About 50% of the children had scores within or above the normal range (that is SD between -1 and +1) on the vocabulary test at T0 (n = 76), but only 7% had scores within the normal range on the morphosyntax test (n = 11).

All scores were normally distributed. Paired-samples t-tests showed a significant improvement from T0 to T1 on morphosyntax ($t(131) = -3.367$, $p = 0.001$) and vocabulary ($t(131) = -4.266$, $p < 0.001$). Still, the mean score on expressive morphosyntax at T1 is 1.6 SD below mean, whereas the mean score on expressive vocabulary at T1 is just within the normal range. Factorial repeated measures ANOVA showed a significant interaction between Time (T0 versus T1) and language domain (morphosyntax versus vocabulary): gains on expressive morphosyntax were significantly smaller than gains on expressive vocabulary ($F(1.153) = 77.33$, $p < 0.001$).

Table 3. Scores on expressive language at T0 and T1

***N* = 154**	**Quotient score T0**			**Quotient score T1**			**Raw score at T0**		**Gains in raw scores**	
	M	***SD***	**Range**	***M***	***SD***	**Range**	***M***	***SD***	***M***	***SD***
Expressive morphosyntax	73.7	7.14	55 - 111	75.4***	6.62	61 - 99	9.0	4.02	3.7	3.44
Expressive vocabulary	81.4	15.86	55 - 123	85.8***	15.08	55 - 130	23.8	8.76	8.4	6.37

Note. Subtests Word Development (expressive vocabulary) and Sentence Development (expressive morphosyntax) of the Schlichting Expressive Language Test (Schlichting & Lutje Spelberg, 2010b) were used. Quotient scores are standardized scores with a population mean of 100, a standard deviation of 15, and lower and upper limits of 55 and 145, respectively. For expressive morphosyntax raw scores of 0-40 are possible, for expressive vocabulary this is 0-70

*** $p < 0.001$

Figure 2 shows the direction of changes in scores between T0 and T1 (stable scores or positive or negative differences of more than 0.5 SD), for raw scores and quotient scores separately. Although most children showed an improvement of more than 0.5 SD on raw scores, only 18% improved in quotient scores on morphosyntax, and 37% on vocabulary. These results indicate that, although there was growth in both language domains, more children had the accelerated growth needed to catch up on their delays in vocabulary than in morphosyntax.

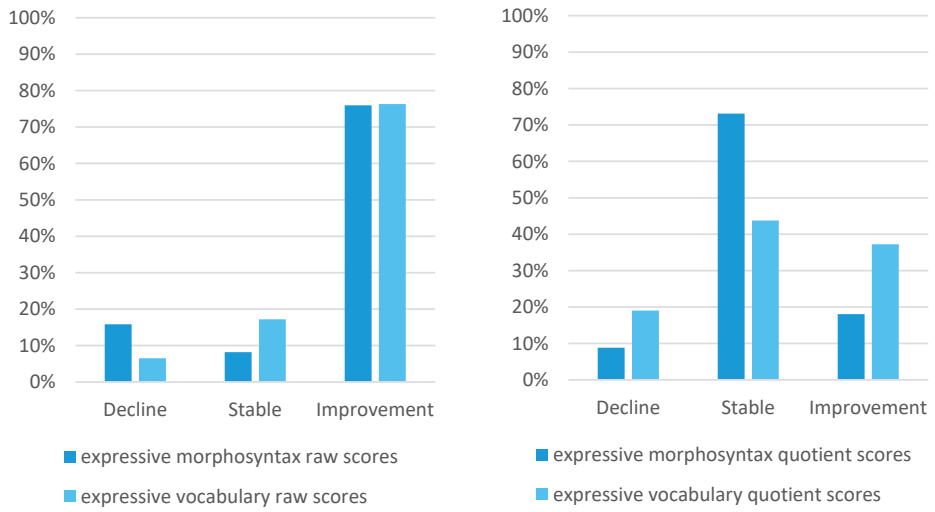


Figure 2. Direction of changes in scores between T0 and T1 for expressive language

Notes. Decline: difference between T0 and T1 < -0.5 SD
Stable: -0.5 SD ≤ difference between T0 and T1 ≤ 0.5 SD
Improvement: difference between T0 and T1 > 0.5 SD
To calculate improvement for raw scores SD on T0 is used, for quotient scores SD of norm population is used

Receptive language

The children with both receptive and expressive language disorders had scores below the age-normed means for language comprehension, as expected, but just within the normal range for receptive vocabulary (see Table 4). About 60% of the children turned out to have scores higher than minus one standard deviation.

All scores were normally distributed. Paired-samples t-tests showed a significant improvement on the test for language comprehension ($t(89) = -5.879$, $p < 0.001$), and not on receptive vocabulary ($t(89) = -1.165$, $p = 0.249$). The scores on language comprehension at T1 were still 1.5 SD below mean, whereas the mean score on receptive vocabulary at T1 continued to be within the normal range.

Figure 3 shows the percentages of participants with stable scores on receptive language tests from T0 – T1, or with positive or negative differences of more than 0.5 SD, for raw scores and quotient scores separately. Although most children showed improvement in their raw scores on both tests, only half of them (46%) caught up on their delays in language comprehension. For receptive vocabulary this was 34%, but there were fewer children with scores below mean for receptive vocabulary at T0.

Table 4. Scores on receptive language at T0 and T1 for the subgroup with receptive-expressive disorders

***N* = 90**	**Quotient score T0**			**Quotient score T1**			**Raw score at T0**		**Gains in raw scores**	
	M	***SD***	**Range**	***M***	***SD***	**Range**	***M***	***SD***	***M***	***SD***
Language comprehension	72.0	8.52	55 - 84	77.9***	11.57	55 - 108	32.1	10.63	16.7	9.34
Receptive vocabulary	86.7	13.03	55 - 120	88.2	12.94	61 - 126	55.6	11.10	12.3	8.88

Notes. Schlichting Test for Language Comprehension (Schlichting & Lutje Spelberg, 2010b) and Dutch Peabody Picture Vocabulary Test (Dunn & Dunn, 2005) were used. Quotient scores are standardized scores with a population mean of 100, a standard deviation of 15, and lower and upper limits of 55 and 145, respectively. For language comprehension raw scores of 0-85 are possible, for receptive vocabulary this is 0-100

*** $p < 0.001$

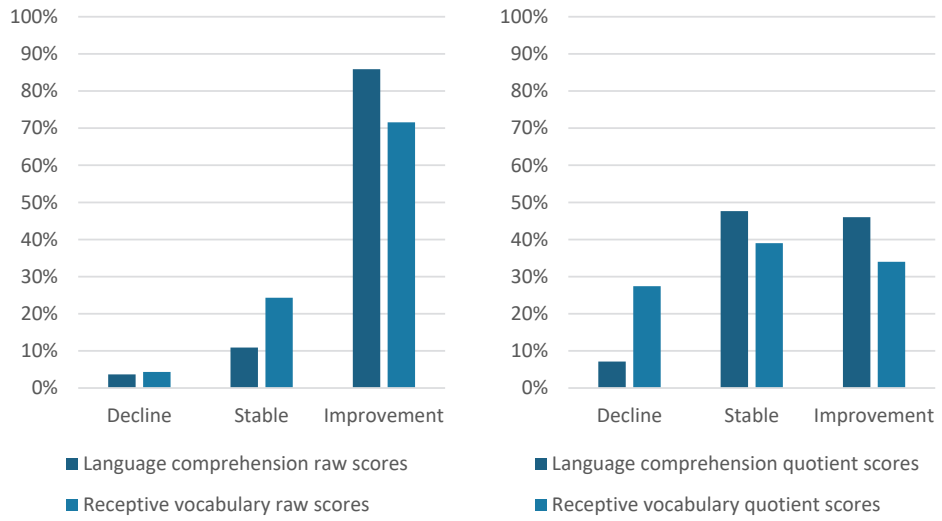


Figure 3. Direction of changes in scores between T0 and T1 for receptive language in the subgroup with receptive-expressive disorders

Notes. Decline: difference between T0 and T1 < -0.5 SD
Stable: -0.5 SD ≤ difference between T0 and T1 ≤ 0.5 SD
Improvement: difference between T0 and T1 > 0.5 SD
For raw scores SD on T0 is used, for quotient scores SD of norm population is used

Clinically meaningful changes

We calculated the numbers and percentages of children that initially had quotient scores below 1 SD and improved to scores within 1 SD of the mean at T1, implicating that they achieved normal functioning according to the language test. We did this for both the expressive and the receptive language tests. Table 5 shows that for all tests, except expressive morphosyntax, 26-36% of the children with scores < 85 at T0 had scores within the age-normed means at T1. For expressive morphosyntax this applies to only 6% of the children. There were 10 children with scores ≥ 85 on all language tests at T1, indicating that they no longer met our criteria for DLD.

Table 5. Shift from scores below mean at T0 to mean or higher at T1

***N* = 154**	**Quotient scores < 85 on T0** **n**	**Quotient scores ≥ 85 on T1** ***n (%)*[a]**
Expressive morphosyntax	143	9 (6.3%)
Expressive vocabulary	78	25 (32.0%)
Language comprehension	90	23 (25.6%)
Receptive vocabulary	39	14 (35.9%)

[a] Percentage of children with quotient scores < 85 (first column).

Relation between language gains and language profile, severity, multilingualism and non-verbal cognition

Receptive-expressive and expressive disorders

Our tests for differences between the two subgroups at T0 revealed no significant effect for morphosyntax ($t(111) = 1.462, p = 0.144$). By contrast, on expressive vocabulary children with expressive disorders scored significantly better at T0 than children with receptive-expressive disorders ($t(122) = 5.245, p < 0.001$).

Paired samples t-tests showed significant improvement from T0 to T1 for both subgroups on expressive morphosyntax ($t(48) = -2.356, p = 0.019$ for expressive disorders; $t(56) = -2.246, p = 0.026$ for receptive-expressive disorders) and on expressive vocabulary ($t(46) = -2.561, p = 0.011$ for expressive disorders; $t(60) = -3.812, p = < 0.001$ for receptive-expressive disorders). It is interesting that expressive vocabulary of children with expressive disorders was within the normal range at T0 but nonetheless improved significantly. Factorial repeated measures ANOVA showed no significant Time * Subgroup interaction, meaning that there was no difference in growth evident between the subgroups ($F(1.51) = 0.839, p = 0.445$ for expressive morphosyntax; $F(1.151) = 0.189, p = 0.715$ for expressive vocabulary).

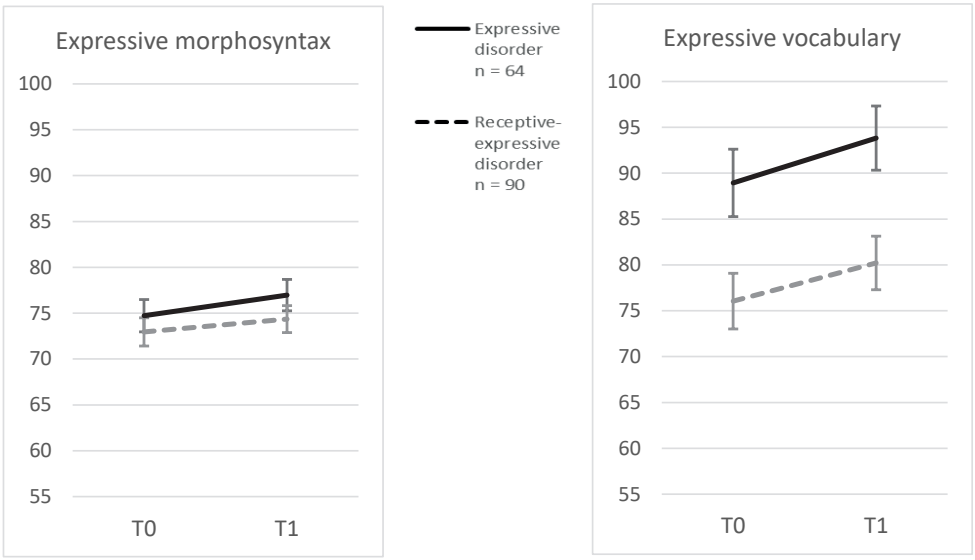


Figure 4. Quotient scores for the subgroup with expressive and with receptive-expressive disorders on expressive morphosyntax and expressive vocabulary at T0 and T1

Note. Error bars for 95% confidence intervals

Improvement related to severity of the disorder

We took the standard language scores at T0 for each subtest as a measure for the severity of the delay in that particular language domain and calculated the correlation between the score at T0 and the difference score between T0 and T1. Children with quotient scores within the normal range (≥ 85) at T0 were excluded for this analysis. There was a significant negative correlation between score at T0 and difference score on the same subtest for the expressive language tests: r = -.372, p < 0.001 for expressive morphosyntax (n = 143); r = -0.365, p = 0.001 for expressive vocabulary (n = 78). This indicates that a more severe delay was related to more improvement. There was no correlation for the receptive language tests: r = -0.95, p = 0.404 for language comprehension (n = 90); r = -0.269, p = 0.130 for receptive vocabulary (n = 39). Also, magnitude of delay in one language domain did not correlate with differences in scores in other language domains.

Mono- versus multilingual children

About 25% of the children were multilingual (n = 36), and almost all of them had a receptive-expressive disorder (n = 31). We divided the participants in four groups: monolingual children with expressive disorders; monolingual children with receptive-expressive disorders; multilingual children with expressive disorders; and multilingual children with receptive-expressive disorders. We had to exclude multilingual children with expressive disorders from the analysis because the group was too small (n = 5). Figure 5 shows the scores at T0 and T1 on expressive morphosyntax and expressive vocabulary for

the three remaining groups, and the scores on language comprehension and receptive vocabulary for mono- and multilingual children with receptive-expressive disorders.

With one-way ANOVA we compared the scores of the groups at T0 for both expressive morphosyntax and vocabulary. For morphosyntax Levene's test showed that there was no homogeneity of variance. Therefore, we used Welch's test which showed a significant difference between the groups ($F(2.88) = 4.870$, $p = 0.026$). Post-hoc analysis with Games-Howell revealed that monolingual children with expressive disorders scored significantly higher than multilingual children with receptive-expressive disorders ($p = 0.023$). Differences between the other groups were not significant. For expressive vocabulary there was homogeneity of variance, and ANOVA showed a significant difference between the groups ($F(2.148) = 31.074$, $p < 0.001$). Post-hoc test (with Hochberg's GT2 because of the differences in group size) showed that monolingual children with expressive disorders scored significantly higher on expressive vocabulary than monolingual children with receptive-expressive disorders ($p = 0.005$), and the last group scored significantly higher than multilingual children with receptive-expressive disorders ($p < 0.001$).

Paired samples t-tests showed significant improvement from T0 – T1 in expressive morphosyntax for multilingual children with receptive-expressive disorders ($t(21) = -2.083$, $p = 0.038$). For monolingual children there was no significant improvement between T0 and T1 (monolingual with expressive disorders: $t(39) = -1.920$, $p = 0.056$; and with receptive-expressive disorders $t(33) = -1.441$, $p = 0.152$). In expressive vocabulary there was a significant improvement for monolingual children with expressive disorders ($t(41) = -2.494$, $p = 0.013$) and for multilingual children with receptive-expressive disorders ($t(21) = -4.602$, $p < 0.001$). There was no significant improvement for monolingual children with receptive-expressive disorders ($t(34) = -1.461$, $p = 0.146$).

Finally, factorial repeated measures ANOVA showed no significant Time * Group interaction for expressive morphosyntax, meaning that differences in growth between the three groups were not significant ($F(2.146) = 0.265$, $p = 0.798$). For expressive vocabulary, however, there was a significant Time * Group interaction ($F(2.146) = 3.709$, $p = 0.033$). We did a one-way ANOVA of the different scores T0-T1, and Levene's test showed that there was no homogeneity of variances. Therefore, we used Welch's test ($F(2.148) = 5.422$, $p = 0.010$). Post-hoc Games-Howell tests showed that the multilingual children with receptive-expressive disorders showed significantly more growth than monolingual children with receptive-expressive disorders ($p = 0.010$). There were no significant differences in growth between the other groups.

For the receptive tests, we compared the scores of the mono- and multilingual children with receptive-expressive disorders. For both language comprehension and receptive vocabulary monolingual children had a higher quotient score than multilingual children (language comprehension: $t(72) = 2.659$, $p = 0.008$; receptive vocabulary $t(74) = 3.684$, $p < 0.001$). Subsequently paired samples t-tests revealed that there

was a significant improvement for both groups in language comprehension (monolingual children: $t(26) = -4.833$, $p < 0.001$; multilingual children: $t(21) = -3.160$, $p = 0.002$). There was no significant improvement in receptive vocabulary (monolingual children: $t(22) = -0.726$, $p = 0.471$; multilingual children: $t(19) = -1.025$, $p = 0.307$). Finally, independent t-tests showed no significant differences between the groups in amount of improvement.

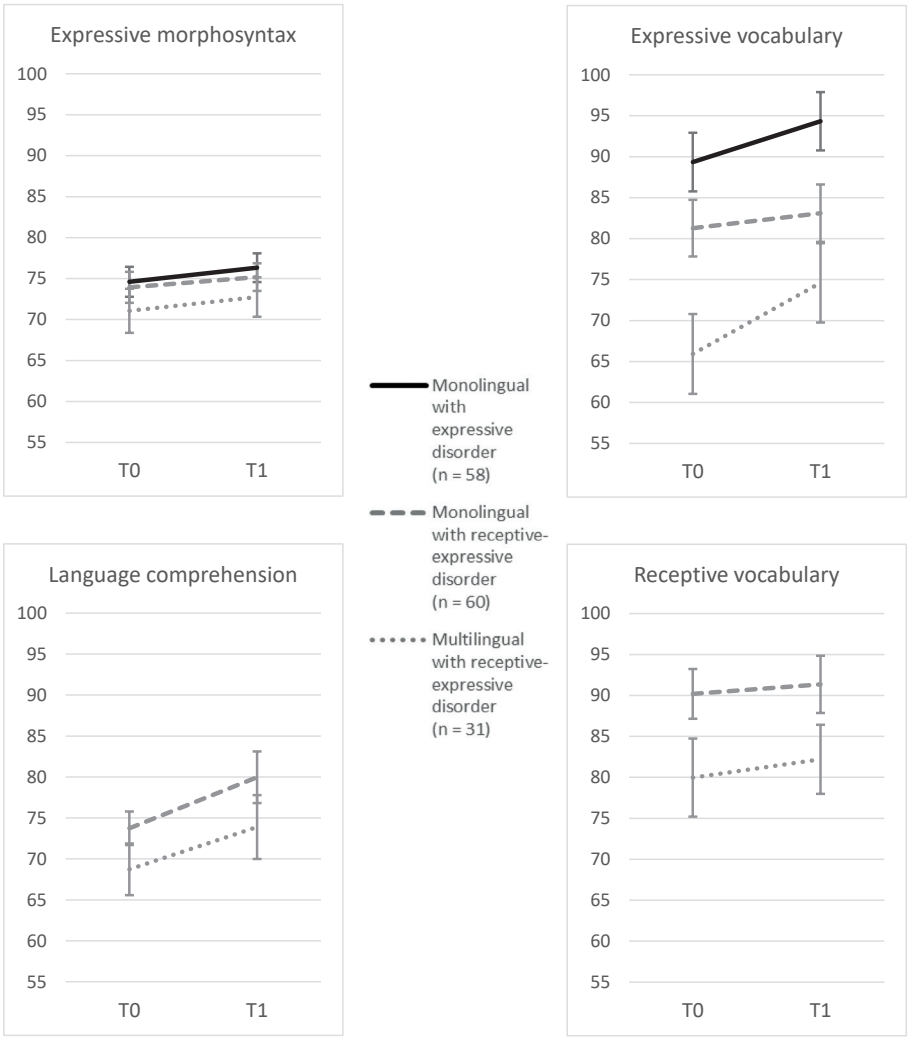


Figure 5. Quotient scores of mono- and multilingual children on all language tests at T0 and T1

Notes. Scores of multilingual children with expressive disorders are not included, because of the limited group size (n = 5). Scores on language comprehension and receptive vocabulary are shown for children with receptive-expressive disorders only.

Error bars for 95% confidence intervals

Improvement related to non-verbal cognition

Table 6 shows the non-verbal IQ scores for the total group, for monolingual children with expressive disorders and receptive-expressive disorders separately, and multilingual children with expressive disorders and receptive-expressive disorders separately. Again, the multilingual children with expressive disorders were excluded from the analysis, because of the small group size. There was a significant difference between the subgroups ($F(2.146) = 7.358$, $p = 0.001$), and post-hoc tests (Hochberg's GT2) revealed that the scores of monolingual children with expressive disorders were higher than the other two groups ($p = 0.002$ compared with monolingual children with receptive-expressive disorders; $p = 0.033$ compared with multilingual children with receptive-expressive disorders).

T0-scores on all tests correlated significantly with non-verbal IQ: $r = 0.277$ ($p = 0.001$) for morphosyntax; $r = 0.337$ ($p < 0.001$) for expressive vocabulary; $r = 0.451$ ($p < 0.001$) for language comprehension; $r = 0.365$ ($p < 0.001$) for receptive vocabulary. There was no significant correlation between non-verbal IQ and the difference score between T0 and T1 ($r = -0.001$ ($p = 0.988$) for expressive morphosyntax; $r = 0.069$ ($p = 0.427$) for expressive vocabulary; $r = 0.059$ ($p = 0.549$) for language comprehension; and $r = 0.038$ ($p = 0.662$) for receptive vocabulary). We also looked at the subgroups: monolingual children with expressive disorders; monolingual children with receptive-expressive disorders; and multilingual children with receptive-expressive disorders. There was no significant correlation between non-verbal IQ and difference scores at language tests for any of the groups. So, although there was a correlation between initial scores on language tests and non-verbal IQ, non-verbal IQ was not a factor that is correlated to improvement.

Table 6. Non-verbal IQ scores for the total group, for monolingual children with expressive and receptive-expressive disorders and multilingual children with expressive and receptive-expressive disorders

	N	***M***	***SD***	**Range**
Total group	154	98.9	12.67	71-129
Monolingual:				
Expressive disorder	58	103.7	11.06	83-129
Receptive-expressive disorder	60	95.5	13.52	71-128
Multilingual:				
Expressive disorder	5	99.4	10.70	88-114
Receptive-expressive disorder	31	96.5	11.76	72-119

DISCUSSION

In this cohort study, we collected data from school records to measure changes within one school year in different language domains of 4-5-year-old children with DLD in special needs education. We related these changes to child characteristics which are important modulators of language growth both in research and in clinical practice: language profile and severity of the disorder, growing up mono- or multilingual, and non-verbal cognition.

Our findings show that, on average, children's performance improved on tests for expressive vocabulary, expressive morphosyntax, and language comprehension. Both raw scores and standard scores increased, the latter indicating an acceleration in language growth compared with typically developing peers, that is they caught up. Gains in morphosyntax were smaller than in other language domains. Language gains between children with receptive-expressive and expressive-only language disorders were not significantly different. Children with more severe delays showed more improvement in language scores than children with milder delays, and multilingual children showed more gains in expressive vocabulary than monolingual children. There was no effect of non-verbal IQ on change in language scores.

Gains in different language domains

There were significant gains in expressive morphosyntax, expressive vocabulary and language comprehension, but not in receptive vocabulary, which already was within the normal range at baseline. The increase in raw scores is in line with previous studies that found improvement in absolute levels of language skills (Justice et al., 2017; Norbury et al., 2017). This shows that children with DLD do show growth in language skills at the ages of 4-6 years. The gains in standard scores in our cohort show accelerated growth and this seems to differ with previous studies that consistently show stable language trajectories once children enter school (Bornstein et al., 2016; Law et al., 2008; Rescorla, 2011) and suggest that accelerated growth might be limited to young (preschool) children. Our results, however, suggest that a change in language trajectory is still possible at an older age, which is encouraging, especially when we keep in mind that we included a group of children with severe language disorders, who had been receiving intervention for one or more years. A follow-up study on this cohort in the future would be extremely valuable to determine how this pattern of accelerated growth continues. We found accelerated growth both in expressive and in receptive outcomes. As a group, children's standard language scores improved but gains were relatively small and varied substantially between children. A total of 26-36% of the children with low language comprehension and low receptive and expressive vocabulary at baseline shifted to the normal range at T1. This was only 6% for expressive morphosyntax, indicating that most of the children had persistent difficulty in this domain. We had the unique possibility to compare growth in morphosyntax, vocabulary, and language comprehension, because of the co-normed tests we used. Previous studies have shown persistence of problems in morphosyntax, but until now it has not been clearly shown that children experience much lower growth in morphosyntax than in the other language domains. This, again, confirms that poor morphosyntactic skills are a defining

characteristic of children with DLD, and seem to be resistant to intervention (Blom et al., 2013; Leonard, 2014). While all children in our cohort had low scores on morphosyntax, they differed in the extent to which other language domains were affected. Our results implicate that there is no cross-domain transfer from progress in different language domains to morphosyntax.

Differences in change in different language domains warrant a careful use of composite measures as outcomes and might explain differences across intervention studies. Taking vocabulary and morphosyntax outcomes together in a composite measure might underestimate effects on vocabulary and overestimate effects on morphosyntax. (Broomfield & Dodd, 2011) for instance, used composite measures for expressive language, and a composite measure for receptive language, comparing effects of 6-month clinic-based language intervention in children with DLD to improvement of a waiting list control group. The gains in expressive vocabulary and language comprehension we observed are intermediate between Broomfield and Dodd's control and intervention groups, but the gains in expressive morphosyntax were even lower than the control group's gains in a composite measure of vocabulary and morphosyntax in Broomfield and Dodd's study. Justice et al. (2017) used the core language score of the CELF-4, which consists of subtests that mainly measure receptive and expressive grammatical competence. This is an adequate measure to identify language disorders, but it possibly underestimates overall language growth.

Justice et al. (2017) measured language gains in public schools with a similar study design and time interval as in our study. Raw scores gained about 0.55 SD compared with more than 1 SD in our study. The special needs school setting and higher dosage of speech and language therapy (in total 70 sessions compared to 45 in Justice et al.) could possibly explain these differences.

Relation with language profile, severity, multilingualism, and non-verbal cognition

Our results show that language gains vary between children. To explain this variation, we studied the relationship between language change and children's individual characteristics: language profile, severity of the disorder, growing up mono- or multilingually, and non-verbal cognition.

The effect of language profile was operationalized as the distinction between children with receptive-expressive disorders, and children with expressive disorders only. Both groups showed positive changes in expressive language, both in morphosyntax and vocabulary, and there were no differences in gains. Children with receptive-expressive disorders also showed progress in language comprehension. These relatively favourable results are in contrast to what has been found in several other studies reporting that children with receptive-expressive disorders show less progress than children with expressive-only disorders in all language domains (Boyle et al., 2010; Cirrin & Gillam, 2008; Law et al., 2004) and also in contrast with the assumption that problems in language comprehension are related to poor prognosis (Leonard, 2014).

Severity of the disorder was correlated to language gains: children with lowest scores showed more improvement on expressive language tests than children with higher scores. This correlation was not found for receptive tests. This implicates that the gap between the lowest and better performing children in our cohort did not get bigger over the school year, and thus that there was no "Matthew" effect as reported in previous studies with children with typical development (Penno et al., 2002). It could be argued that regression to the mean interferes with our results, because the baseline scores of our cohort fell within the lowest 5% of the age norms, and can be considered as "extreme" scores, which are likely to be closer to the mean when the same measure is repeated. Baseline scores, however, were not just random indications of the children's language skills: according to Dutch guidelines and school laws children with DLD are repeatedly tested after their first diagnosis, usually when they are about age 3 (Wiefferink et al., 2020). Another explanation for the finding that children with larger delays showed more improvement could be that they had more possibilities to improve, but in that case, we would also expect a relation between severity and language gains on receptive tests. Finally, it is also conceivable that teachers and SLTs unconsciously pay more attention to children with severe disorders, resulting in fewer learning opportunities for children with mild disorders. In future research, the relation between severity and progress should be studied more extensively.

Differences between mono- and multilingual children were already present at baseline, with significantly lower scores on all tests for multilingual children. Because of the lower baseline scores there might have been more room for improvement, but we only saw more growth in expressive vocabulary in multilingual children and not in other language skills. It is remarkable that the faster growth in expressive vocabulary was not associated with more growth in receptive vocabulary and language comprehension. A better ability to name pictures on an expressive vocabulary test implies better understanding of words. Moreover, there is a strong correlation between vocabulary and language comprehension (for example Hagen et al., 2017). However, no longitudinal research has been done into this relation in multilingual children with DLD. Apparently, for the multilingual children with receptive-expressive disorders, an increased vocabulary does not lead to growth in language comprehension. In the Schlichting Test for Language Comprehension morphosyntax and semantic knowledge are also addressed. It is possible that limitations in morphosyntax caused the limited progress on this test. It is also possible that the vocabulary intervention in schools for special education mainly stimulates access to words in the mental lexicon that were already familiar to the child. In any case, it is important not to overestimate language comprehension of multilingual children who seem to learn new words quickly.

Of course, findings for multilingual children must be interpreted with caution, because the language tests used were designed and standardized for monolingual children. However, the initial diagnosis of these children is based on assessment of all languages spoken at home, often using (trained) language interpreters (see Wiefferink et al., 2020). In some cases, information on the home language situation of the child was missing. We considered only children for whom multilingualism was explicitly mentioned in the school records and thus might have missed some. Like Crutchley et al. (1997), we found that

almost all multilingual children had receptive-expressive disorders. Our results confirm the findings of Wiefferink et al. (2020) who show that multilingual children have more severe delays than monolingual children when referred to diagnostic centres and admitted to special needs education; multilingual children with milder problems seem to be missed.

In line with several other studies, there was no relation between non-verbal cognition and language change (Bishop et al., 2016; Gallinat & Spaulding, 2014; Justice et al., 2017). Non-verbal intelligence was not related to growth in language skills, in our cohort of children with severe DLD and non-verbal IQs ranging from 71 to 129. This is convincing evidence against excluding children with below average IQ from special care for children with DLD: both children with language disorders with low non-verbal IQ and children with higher IQs can benefit from special care and education. This provides guidance to professionals, who still tend to attribute low progress to limited cognitive ability and therefore to have lower expectations. Our results can contribute to the debate on the role of non-verbal cognition in admittance and maintenance of special care and education and will hopefully make it easier for children with below average IQ scores (70-85) to receive the care they need.

Strengths and limitations

In this study we had the opportunity to use data from school records, at two time points for every child. This had the advantage that we were able answer our research questions without performing extra tests and hence without placing a burden on the children. We used the schools' admission criteria for selection of the children which means that our cohort includes the wide range of children with DLD seen in clinical practice, including multilingual children with DLD and children with below average non-verbal cognition. However, we were not able to rule out selection bias, since there was no information in the school records on parent's socio-economic status (SES) and it is plausible that particularly families of high SES gave their informed consent to use the school data. Norbury et al. (2017) found that SES of parents of children with DLD is lower than average but did not predict growth in language performance. This suggests that it might also be unrelated to the changes in language skills in our study. One of the indicators of SES is parental education, which does have a relation with language level of young children (for example Justice et al., 2020). Data on parental education was also lacking in our cohort but should certainly be included in future research.

Although the study was not designed to measure effects of intervention, the increase in standard scores suggests that the improvement in scores on language tests is not only spontaneous growth but also related to the intervention the children received. We even saw progress in expressive vocabulary in children who already had scores within the mean range at T0. These children apparently benefited from special education in general, because vocabulary was not a specific therapy goal for them. The design did not allow us to collect detailed information about individual intervention and relate treatment factors such as amount and quality of intervention and language stimulating activities to language change. The special education setting might also be a limitation since it is a specific context and intervention

model; most countries strive for inclusive education for children with DLD (Law et al., 2019). In 2014, the Netherlands adopted a law that regulates more inclusive education for children with special needs. A subject for future research is how interventions in inclusive school settings ideally should be designed. Our study can serve as a benchmark for future studies with cohorts in mainstream education.

We have some concerns about the tests that were used to monitor the children. The Schlichting test of expressive morphosyntax does not measure spontaneous language, but elicited structures. There is resemblance with a sentence imitation task, with the difference being that the Schlichting test provides a meaningful context for each sentence and uses different elicitation techniques. This highly supportive context may overestimate children's abilities. On the PPVT children had relatively high, within age norm, receptive vocabulary scores that did not significantly change between baseline and T1. This might be due to old norms in the version of the PPVT that is available for Dutch. We also have to mention that the PPVT-III-NL turned out not to be useful to measure growth.

Finally, we are aware that gains on language tests do not necessarily mean improvement in daily communicative functioning and spontaneous language use (Singer et al., 2020; Westby & Washington, 2017). There were no systematic data on communicative functioning available in the school records.

Implications

Our results highlight the importance of including all children with DLD in intervention: mono- and multilingual children; children with receptive-expressive and expressive disorders; and children with high, average and low non-verbal IQ scores. We did not find negative relations between these child factors and changes in language skills.

The results also confirm that the problems in morphosyntax of children with DLD are persistent, although the children did show gains and even a small percentage shifted from the disordered to the normal range. An important finding is that the slow growth rate in morphosyntax was independent of receptive language ability, and also independent of being mono- or multilingual. This indicates that growth rate in morphosyntax over a period of time is a more significant diagnostic indicator than morphosyntactic abilities at a given moment. This can be very useful in the distinction between DLD and a language delay due to insufficient exposure in a second language. It also raises the question whether children with receptive disorders are a separate group of children with DLD, and if so, in what they differ from children with expressive disorders, except from their difficulties with language comprehension. Apparently, growth in expressive language is not a distinguishing factor.

Although there is growing insight into elements of effective intervention on morphosyntax, the limited growth in morphosyntax compared with other linguistic areas warrants more research, with particular attention for implementation of findings. There is a substantial focus on implementing evidence-based methods aiming at vocabulary, from both SLTs and teachers, but less focus on morphosyntax (Bruinsma

et al., 2020). It is advisable to support SLTs with manuals, and training and coaching with regard to morphosyntax intervention. Several studies have shown that it is worthwhile to investigate if teachers and other professionals also could play a role in grammar intervention (Cirrin & Gillam, 2008; Zwitserlood, 2019).

The differences in scores between the test for expressive morphosyntax and the other language tests raise the question if eligibility criteria for special needs education should rely more heavily on morphosyntax, and on growth in morphosyntax. At present, the criterion used in Dutch schools is a score of more than 1.5 SD below the mean on at least two language domains, and for each domain this needs to be demonstrated with two subtests. More focus on development in morphosyntax over time could simplify eligibility procedures. The challenge is to find reliable and efficient measures, which are not as time consuming as spontaneous language analysis but do measure morphosyntax soundly. Subsequently, for determining therapy plans and monitoring, other language domains should of course be assessed thoroughly.

We found that consistent monitoring of language performance offers valuable data for both research and clinical evaluation of intervention. Individual variation in language profile and gains warrants a monitoring system that considers language domains separately, focussing on expressive language for all children, with ample attention to morphosyntax, supplemented by receptive language skills for children with receptive-expressive disorders. In addition, measures of communicative functioning should be included, for instance with the Focus on the Outcomes of Communication Under Six (Singer et al., 2016; Thomas-Stonell et al., 2010).

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CHAPTER 4

Focused stimulation intervention in 4- and 5-year-old children with DLD: exploring implementation in clinical practice

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Bruinsma, G., Wijnen, F., & Gerrits, E. (2020). Focused stimulation intervention in 4-and 5-year-old children with developmental language disorder: Exploring implementation in clinical practice. *Language, Speech, and Hearing Services in Schools*, *51*(2), 247–269. doi.org/10.1044/2020_LSHSS-19-00069

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ABSTRACT

Purpose

Applying evidence-based grammar intervention can be challenging for Speech and Language Therapists (SLT). Language in Interaction Therapy (LIT) is a focused stimulation intervention for children with weak morphosyntactic skills, which was developed to support SLTs in incorporating results from effect studies in daily practice. The aims of this Clinical Focus are (a) to explain the principles and elements of LIT and stimulate use in daily SLT practice and (b) to describe the effects of LIT on morphosyntactic skills of 4- to 5-year-olds in special education, compared to usual care.

Method

With a description of LIT, we provide guidance to implement evidence-based intervention. Important elements are as follows: proper selection of therapy goals; language facilitating techniques; child-centred and clinician-directed elements; and the use of scripts. Our focus in the description is on the support and practical solutions LIT tries to provide to SLTs.

We also explored the implementation of LIT in special education, to improve morphosyntax in 4- and 5-year-old children. We provided SLTs with training, and designed protocols for each therapy session. The effects of LIT were measured in a single case A-B design, repeated in five children with Developmental Language Disorders (4;2-5;7 [years;months]).

Conclusion

We conclude that implementation of LIT is possible if LIT is enriched with support in goal selection, protocols to guide therapy sessions, and training and coaching. In the single case study, four children showed more growth in MLU during and directly following the LIT intervention phase, compared to the baseline phase with usual care, and in two of them this difference was significant. The grammatical complexity measure "TARSP-P" showed an overall significantly higher score at group level during LIT, but limited effects on an individual level.

INTRODUCTION

Although the language and communication problems of young children with Developmental Language Disorder (DLD; Bishop et al., 2016) can vary widely, these children have one thing in common: impaired morphosyntactic development. Most children with DLD have serious difficulties in learning and applying grammatical rules (Leonard, 2014), and as a result, they produce short, simple sentences with grammatical errors and missing elements. Moreover, most of them experience limitations in understanding longer and more complex sentences. Difficulties in morphosyntax are persistent and often continue into school age and adolescence (De Jong, 1999; Johnson et al., 2014; Marinellie, 2004). They impede daily communication, participation in educational settings, and consequently the overall development of children with DLD.

Thus, early and effective intervention is important, and a fair and growing body of research has testified to the effectiveness of intervention aiming at morphosyntax. Several well-controlled, high-quality studies contain evidence that justifies the use of intervention techniques such as focused stimulation and recasting. These studies can be classified as efficacy studies, as their results were obtained under optimal conditions, with a limited group of children with DLD, and strict treatment protocols. Interventions were provided by researchers or protocol-trained Speech and Language Pathologists (for example Leonard et al., 2004; Nelson et al., 1996; Plante et al., 2014). This high level of control is necessary to provide sufficiently strong evidence but can make it challenging for Speech and Language Therapists (SLTs) to apply the findings in everyday practice. To encourage the use of effective elements of grammar intervention for Dutch-speaking children, Van den Dungen (2007) designed "Language in Interaction Therapy" (LIT). LIT incorporates evidence-based elements of morphosyntax training and translates these elements into goals and activities for daily practice. Even though most SLTs in the Netherlands became familiarized with LIT in their training, their use of it in clinical settings is not yet a matter of course, and its effects have not been studied systematically. The aim of the present study was twofold: 1. to promote the actual use of LIT in daily SLT practice, and 2. to compare the effects on morphosyntactic skills of 4- to 5-year-olds in special education to the effects of their usual care.

In this Clinical Focus we share our experiences in the hope that we can inspire clinicians to apply evidence-based grammar intervention in their own practice while critically reflecting on their effects. First, we explain why findings from efficacy studies on morphosyntax are not easily applicable to the everyday clinical practice of SLTs. We subsequently describe the principles and the evidence-based techniques and procedures incorporated in LIT: proper selection of therapy goals; use of language facilitating techniques; use of an intervention approach with child-centred and clinician-directed elements, and the design of scripts that will help to realize this approach. For each element we focus on challenges SLTs face when trying to incorporate it into their daily clinical practice, and the support and practical solutions LIT tries to provide. The elements of the LIT approach are similar to those described in handbooks on intervention by Paul et al. (2017), who dedicated several chapters of their comprehensive

work to language facilitating techniques, and McCauley et al. (2017), who lucidly described focused stimulation and recasting. Their descriptions not only concern morphosyntax but also other language aspects, in line with the intention of LIT, which is also designed to stimulate different language aspects. In this paper we focus on morphosyntax, and add to previous descriptions of focused stimulation a detailed and practical instruction on how to use LIT to improve morphosyntax in 4- and 5-year-olds, within a broad developmental range, starting with the first appearance of verb inflections up to the emergence of complex sentences (Brown's stages III to V for the English language; Brown, 1973). These ages are relevant in the Dutch context, because education is compulsory from age five, but most children already enroll in primary school aged four. We have attempted to make LIT as ready-to-use as possible for the SLTs in our implementation study, who had little experience with LIT. We will also generalize our description for SLTs working with other languages than Dutch.

In the second part of this article, we report the results of a trial run of LIT with five children in the clinical setting of schools for special education. We used a single-subject design to compare the effects of LIT to the usual care the SLTs in this setting provided.

The gap between efficacy studies and clinical practice

From efficacy studies we know that important elements of effective intervention approaches are the following:

- Proper selection of well-defined therapy goals (Fey et al., 2014; Leonard & Kueser, 2019)
- An "implicit learning approach" (Ebbels, 2014), based on the hypothesis that listening to frequent presentations of target forms and practicing their production will help the child to identify grammatical rules
- Embedding intervention in a naturalistic, interactive context, with numerous possibilities for the child to take the initiative, but also ample possibilities for the therapist to control the situation. Fey has called this approach "hybrid", that is intermediate between "child-centred" and "clinician-directed" approaches, incorporating elements of both (McCauley et al., 2017)
- The use of focused stimulation, and the language facilitating techniques modelling and recasting (McCauley et al., 2017)

It can be difficult to directly translate the approaches from efficacy studies to clinical practice. First of all, participants in controlled intervention studies do not always represent the population found in schools and clinics for children with DLD, specifically because these participants often are children with mainly expressive language disorders (for example Fey et al., 1993; Plante et al., 2014). A large proportion of the children seen by SLTs, however, also has receptive language disorders. In an analysis of 145 4- to 5-year-old children with DLD in special education in the Netherlands, we found that 58% of the children had a receptive-expressive disorder (Bruinsma et al., 2019). Data of the American Speech-Language-Hearing Association's (ASHA's) National Outcomes Measurement System (NOMS) also indicate that a considerable number of children seen by SLTs has receptive disorders. Scores on Functional Communication Measures (FCMs) revealed that, in Pre-Kindergarten, disorders in "Spoken language comprehension" applied to 42%

of the caseload (Mullen & Schooling, 2010). Research on the effectiveness of interventions in children with receptive language disorders, however, is scarce, and the evidence it has yielded is inconclusive (Boyle et al., 2010; Cirrin & Gillam, 2008; Ebbels, 2014; Law et al., 2004). In addition, in most efficacy studies children are monolingual and come from middle class or upper-class families, which is also not a reflection of everyday practice.

Another limitation in the applicability of efficacy studies is that they often concentrate on a limited number of target structures, for instance "auxiliary "is/was/are" or "third-person singular –s" (for example Leonard et al., 2004; Meyers-Denman & Plante, 2016). In actual practice, however, SLTs normally target a range of syntactic and morphological goals that will help the child communicate successfully.

Thirdly, efficacy studies usually focus on one specific facilitating technique or several variations of that technique, so as to determine its effect, establish the most effective application, and expand knowledge on active ingredients of the intervention (for example Camarata et al., 1994; Plante et al., 2014). It can be complicated for SLTs to bring together effective elements from separate studies into one integrated therapy approach, with suitable materials and activities. In addition, it may be difficult to apply language facilitating techniques in a naturalistic context, because grammar intervention for young children requires an adaptive application of the key principles. Having knowledge of different effective elements, and recognizing the importance of carefully selected goals, use of focused stimulation, and applying recasts, does not necessarily mean that one is able to actually use it with different children, with varying language levels. It is not a "one-size-fits-all" matter, and SLTs should also be able to respond to the needs, interests and learning curves of individual children. This means they will have to be able to apply a range of techniques flexibly, which can be challenging to both novice and experienced SLTs.

Lastly, dosages chosen in controlled studies are typically much higher than what is feasible in clinical practice. Two to four 60-minute sessions per week are not unusual in such studies, and some do even more (Plante et al., 2014; Fey et al., 1993). Due to funding and practical limitations, such high dosages are often unattainable in clinical practice. Frequencies of one or two weekly sessions of 20-30 minutes are common, in Europe as well as in the USA (Brandel & Loeb, 2011; Law et al., 2019; Mullen & Schooling, 2010). These sessions are usually not exclusively dedicated to morphosyntax: intelligibility, enlarging vocabulary, and growth in pragmatic skills are also deemed important.

Language in Interaction Therapy

Although SLTs recognize the importance of evidence-based practice (EBP), it is difficult for them to transfer the findings of intervention studies to everyday clinical practice. This is in line with Kamhi's (2014) observation that there are "gaps between current knowledge about learning, language development, and clinical practice" (p. 92). To help bridge these gaps, Van den Dungen (2007) created Dutch Language in Interaction Therapy (LIT), and she described in a clear and accessible way how to apply this intervention. LIT uses focused stimulation, modelling and recasting, combined with recurrent elicitation of target

sentence structures (evoked production). LIT also encourages SLTs to choose well-defined therapy goals. The LIT approach builds on functional language use, during interaction in a naturalistic context, usually play situations, according to scripts (Olswang & Bain, 1991). LIT can be used to stimulate all language aspects in children from the prelinguistic phase up to the level that is normally achieved around five to six years of age, but here we focus on morphosyntax for language levels ranging from the appearance of verb inflections up to the use of complex sentences. This part of LIT draws heavily upon the explanations and instructions in the "ten principles of grammar facilitation" of Fey et al. (2003), which is an excellent starting point for translating findings of efficacy studies to everyday practice.

LIT was conceived as a very practical, "ready-to-use" approach, but still most SLTs in the Netherlands prefer "clinician directed" interventions to improve morphosyntax in children with DLD (Scheider et al., 2014). We do not know exactly why SLTs have this preference, but Scheider et al. found that SLTs based their decisions in intervention mostly on their own clinical experience, what they had learned in their initial SLT education, post-bachelor education[1] , and consultation of colleagues. This is similar to findings of a survey among SLTs in the USA by Zipoli and Kennedy (2005). They found that clinical experience and opinions of colleagues were used to guide clinical decision making more frequently than research studies or clinical practice guidelines. Based on the results of efficacy studies, it seems warranted to implement LIT on a large scale. That is why we made the best effort to support SLTs by elaborating the principles and elements of LIT into concrete protocols for therapy sessions and studied the effects. After the explanation of the elements of LIT in the next paragraphs, we describe the protocols we designed for our study, in which we explored implementation of LIT.

Goal selection

The selection of therapy goals and target structures in grammar intervention stimulation is vital and deserves particular attention, to ensure that goals are well-adjusted and tailored to the child's needs. Goal selection in LIT is based on the principles of Fey et al. (2003).

The first two principles of Fey et al. emphasize that intervention should facilitate the child's use of grammatical targets in meaningful communication activities, and that morphosyntax should never be the only, isolated goal in language intervention. In line with this guideline, goal selection in LIT is based on the ICF model (WHO, 2001), which entails that intervention does not only focus on delays and mistakes, but also takes into account which grammatical problems are hampering daily communication of an individual child. For example, when a child does not answer questions about their weekend activities, it is possible that the necessary grammatical structures such as past tense, or complex sentences, are stumbling blocks. A child that never takes an initiative in verbal interactions towards peers, and never proposes to undertake something together, might not be able to ask complex questions, such as "Do you want to play with me in the sandbox?" In both cases grammar should receive attention, but narrative

1 In the Netherlands, a bachelor's degree is the standard for SLTs; a master's degree is optional.

skills and communicative competence should be monitored closely as well. In LIT, grammatical targets are based on the delays and language level of the child, but also on the impact of the grammatical structures on the communication between the child and their environment. This is in line with another principle of Fey et al, that intervention goals should focus on forms that are either partially mastered by the child, or still unused, but within his or her cognitive and linguistic readiness and functional need.

The last principle of Fey et al. concerning goal selection, deals with intermediate and specific goals. Fey et al. view therapy goals as hierarchically ordered, starting with basic general goals, which in the case of grammar intervention can be formulated as "acquiring grammatical forms that are not yet mastered by the child". Within this overarching goal, specific linguistic goals have to be formulated, and Fey et al. argue that these should be broadly formulated goals, reflecting grammatical categories, principles, and operations. Such "intermediate goals" are more helpful for the child to discover grammatical rules from linguistic input provided by the SLT and other conversation partners than specific language examples would be. To reach the intermediate goals, the SLT selects a range of specific exemplars the intermediate goal is composed of, the "specific goals", to focus on in a therapy session. An example of an intermediate goal in LIT for the Dutch language is "producing sentences with an auxiliary and an infinitive main verb, and two other constituents". This specific example is an intermediate step in learning verb inflection, predicate-argument structures, and using nominative case pronouns correctly, and is more helpful than the specific forms "using the auxiliaries "gaan" ("going to") and "willen" ("want to") correctly". LIT provides a range of intermediate goals for the Dutch language, that can be adopted to the treatment plan and adjusted to the needs of an individual child.

Challenges in goal selection and support by LIT

In conversations with SLTs in our postgraduate courses, we learned that SLTs are insecure about their own knowledge of grammar, which would seem necessary for selecting and defining therapy goals. We also noticed that our SLT-students are not always able to apply basic linguistic knowledge such as parsing a sentence, classifying verbs and making a distinction between dependent and independent clauses. This is in line with the observation of Schuele (2013) that "Faculty in communication sciences and disorders who teach language development and language disorders courses collectively bemoan the lack of grammatical knowledge of far too many undergraduate and graduate students in speech–language pathology" (p. 122). Brimo and Melamed (2017) studied the explicit knowledge of syntax of a group of 30 SLT students, and found it to be not satisfactory, because the SLT students did not perform better than students in other programs, despite the coursework on language development the SLT students had taken. In addition to shortcomings in linguistic knowledge, adequate selection of goals is also impeded by time-constraints, such as lack of time to conduct a spontaneous language analysis, which is essential to determine intermediate goals, as well as specific targets. Examples of goals from effect studies are not always helpful, because these goals are limited, do not always fit the language level and functional needs of a child, and are not easily applicable to languages other than English.

To help SLTs in selecting therapy goals, LIT provides an overview of possible intermediate goals for morphology and syntax. Intermediate goals are derived from studies on typical language acquisition in Dutch, as well as studies on characteristics of Dutch-speaking children with DLD. For goals derived from typical acquisition, an indication of age of emergence is provided. These goals and ages of emergence are to a large extent based on TARSP (Schlichting, 2013), the Dutch version of LARSP (Crystal et al., 1976). Most Dutch SLTs know TARSP, although only few use it. Not all grammatical structures identified in the TARSP profile chart are designated as intermediate goals in LIT, only the syntactic and morphological structures that are regarded as milestones in language development (Luinge et al., 2006), as well as those that are important in functional communication. SLTs are free to add other TARSP-structures, if they consider them relevant for a specific child. Goals based on characteristics of Dutch-speaking children with DLD concern obligatory arguments, subject-verb agreement and verb tense. De Jong (1999) found that children with DLD often omit obligatory arguments. For young children, the intermediate goal focuses on production of at least the subject as argument. This goal can be followed by syntactic goals from typical language acquisition. Another important characteristic of Dutch-speaking children with DLD is defective subject-verb agreement and the use of present tense while talking about the past (De Jong, 1999). This justifies the selection of several intermediate goals on subject-verb agreement, and a goal on past tense.

Focusing on the set of intermediate goals LIT proposes helps SLTs, as it stimulates them to pay special attention to these particular structures in the child's spontaneous language samples, and can, for some children, save them the time of a complete TARSP profile analysis. A complete analysis can be done if a grammatical pattern remains unclear after observation of the structures of the intermediate goals. Table 1 provides an overview of the goals in LIT for children with language levels ranging from telegraphic utterances to complex sentences.

Table 1. Intermediate goals in Dutch LIT

Goals based on typical development	**Age of emergence in typical language acquisition[a]**
Syntactic goals	
Simple declarative sentences	
Simple declarative sentences with a subject + finite verb + one other constituent (argument and/or any adjunct) Example: *ik wil een koekje* I want.1SG a cookie "I want a cookie"	2;6 – 3 yrs
Simple declarative sentences with a subject + finite verb + two other constituents (arguments and/or any adjuncts) Example: *die moet ook op de tafel* that shall.be.PST.3SG also on the table "that one should also be on the table"	2;6 – 3;6 yrs
Simple declarative sentences with a subject + finite verb + more than two other constituents (arguments and any adjuncts) Example: *nu ga ik mama een hand geven* now go.1SG I mummy a hand give.INF "now I am going to hold hands with mummy"	3 – 4 yrs
Questions	
Wh- questions *"Wat doe(t) X"* ("What is X doing?") and *"Wat is X?"* ("What is X?" as identifying question) Example: *wat is dat?* what be.COP.3SG that? "what is that?"	2;6 – 3 yrs
Wh- questions with *wat, waar en wie* (what, where, who) + finite verb, and a complete argument structure Example: *wat ga je maken?* what go.2SG you make.INF? "what are you going to make?"	2;6 – 3;6 yrs
Yes/no questions starting with finite verb + subject, and a complete argument structure Example: *heb jij een potlood?* have.got.2SG you a pencil? "have you got a pencil?"	2;6 – 4 yrs
Wh- questions with *hoe, waarom, hoeveel, welke, wanneer* (how, why, how much, which, when) + finite verb and a complete argument structure Example: *waarom heb je die tekening weg-ge-gooi-d?* why have.2SB you that drawing away-PTCP-throw-PTCP "why have you thrown away that drawing?"	3;6 – 5 yrs
Commands	
Commands starting with a finite verb, and containing at least one other element Example: *haal het blok-je er maar uit!* take.IMP the block-DIM there just out "just take out the little block!"	2 – 3 yrs

Table 1. Continued

Goals based on typical development	**Age of emergence in typical language acquisition[a]**
Coordinate clauses and conjunctions	
Coordinate clauses with conjunction *en* (and) Example: *we gaan eerst Sesamstraat kijken en dan gaan we naar bed* we go.1PL first Sesame Street watch and then go.1PL we to bed "first we are going to watch Sesame Street and then we are going to bed"	3;6 – 4 yrs
Sentences starting with conjunction *maar* (but) Example: *maar de hond is weg-ge-lopen* but the dog be.3SG away-PTCP-run. "but the dog has run away" Coordinate clauses with conjunction *maar* (but) Example: *de hond wil chocola, maar dat mag niet van papa* the dog want.3SG chocolate, but that allow.3SG not daddy "the dog wants chocolate, but daddy won't allow that"	4 – 6 yrs
Sentences starting with conjunction *want* (because) Example: *want dat is gemakkelijk* because that be.COP.3SG easy "because that is easy" Complete coordinate clauses with conjunction *want* (because) Example: *we moet-en dier-en hebben, want het wordt een dierentuin* we need.to.1PL animal-PL have.INF, because it go.3SG.to.be a zoo "we need to have animals, because it is going to be a zoo"	4 – 6 yrs
Subordinate clauses and conjunctions	
Adverbial clauses with conjunctions *als, toen, omdat* (if, when, because) Example: *als ik op het knopje druk, hoor ik een geluid* if I on the button push.1SG, hear.1SG I a sound "if I push the button, I will hear a sound"	3;6 – 5 yrs
Object complements with conjunctions *dat, of* (that, if/wether), and question words Example: *ik denk dat die erbij hoort* I think.1SG that that.one to.it belong.3SG "I think that one belongs to it"	3;6 – 5 yrs
Relative clauses Example: *ik zoek een bakje waar de snoepjes in kunnen* I look.1SG a box.DIM where the candy.PL in can.3PL "I am looking for a little box the candy can be put into"	4 – 6 yrs
Morphological goals	
Verb inflection	
Placement of a finite verb at the second position of the clause (or at the first position in a yes/no-question) Example: *de auto is rood* the car be.COP.3SG red "the car is red"	2 – 3 yrs
Past participle Example: *de beker is ge-val-len* the cup have.be.AUX.3SG PTCP-drop-PTCP "the cup has been dropped"	2 – 3;6 yrs

Table 1. Continued

Goals based on typical development	**Age of emergence in typical language acquisition[a]**
Correct verb inflection for plural subjects Example: *de jongen-s spelen met de bal* the boys-PL play.3PL with the ball "the boys play/are playing with the ball"	3;6 yrs
Past tense Example: *Jan lag in zijn bed* Jan lie.PST.3SG in his bed "Jan lay/was lying in his bed"	3;6 – 4;6 yrs
Syntactic and morphological goals based on characteristics of DLD for Dutch language[b]	
Obligatory arguments	
Clauses with at least a subject and a verb Example: *die huil-t weer* that.one cry-3SG again "that one cries/is crying again" (characteristic of Dutch DLD: *ø huil-t weer*) ø cry-3SG again "cries/is crying again"	
Noun phrases and personal pronouns as sentence subject Example: *het kleine kindje kruip- t* the little child crawl-3SG "the little child crawls/is crawling" (characteristic of Dutch DLD: *die kruipt*) that one crawl-3SG) "that one crawls/is crawling"	
Syntactic and morphological goals based on characteristics of DLD for Dutch language[b]	
Subject-verb agreement	
Production of auxiliaries and copula Example: Susan wil met water spelen Susan want.AUX.3SG with water play.INF "Susan wants to play with water" (characteristic of Dutch DLD: *Susan met water spelen*) Susan with water play. INF "Susan play with water"	
Correct subject-verb agreement for singular subjects (bare stem for first person singular, bare stem + t for second and third person singular) Example: mama kijk-t naar de kast mummy look-3SG at the cupboard "mummy looks/is looking at the cupboard" (characteristic of Dutch DLD: mama kijk-ø naar de kast) mummy look-ø at the cupboard "mummy look/is looking at the cupboard"	

Table 1. Continued

Syntactic and morphological goals based on characteristics of DLD for Dutch language[b]
Correct subject-verb agreement for plural subjects (bare stem + -en; homophonous with infinitive) Example: alle boeken val-len naar beneden all books fall.down-3PL "all books fall down/are falling down" (characteristic of Dutch DLD: alle boeken val-t naar beneden) all books fall.down-3SG) "all books falls down/is falling down"
Verb tenses
Use of past tense when talking about the past Example: gisteren liep de hond op straat yesterday walk-PST.3SG the dog on.the street "yesterday the dog walked on the street" (characteristic of Dutch DLD: gisteren liep de hond op straat) yesterday walk-PRS.3SG the dog on.the street "yesterday the dog walks on the street"

Note. Examples are Dutch, with glossing according to the Leipzig Glossing Rules (University of Leipzig, 2015)

[a] Age of acquisition based on: (Bol & Kuiken, 1989; Gillis & De Houwer, 1998; Gillis & Schaerlaekens, 2000; Schlichting, 1996; Van den Dungen & Verbeek, 1999). For some structures findings vary widely, resulting in broad age ranges.

[b] For goals based on characteristics of DLD for the Dutch language, no age can be given, because these characteristics hardly exist in typical development

Although the Dutch language has noun inflection for the plural and diminutives, morphological goals focus only on verb inflection, because plural and diminutives are acquired very early in language acquisition (Schlichting, 1996), and, although it has not been studied in detail, in our experience, children with DLD do not show difficulties with noun inflection. In Dutch there is also adjective inflection, and Van den Dungen originally formulated goals concerning adjective inflection, but simple adjective inflection does not seem to be a problem for children with DLD, and complicated adjective inflection is acquired relatively late (after age 4; Schlichting, 1996), and is not very functional in everyday communication for young children, although it is important for older children with DLD. There are no intermediate goals for noun phrase elaboration and pronouns. These can be incorporated in the process of learning a sentence structure: an SLT can start with simple phrases and elaborate them with longer phrases as she observes more adequate productions in the child.

Language facilitating techniques

Besides goal selection, an important element of LIT is the use of language facilitating techniques to stimulate production of the selected grammatical structures by the child. Focused stimulation, modelling and recasting are key elements of LIT, as well as elicited production. Focused stimulation means that frequent presentations of target forms are provided in a meaningful communicative context. The focus on specific targets distinguishes this approach from more general language stimulating approaches (Fey et al., 1993). Target forms can be specific linguistic forms, such as of vocabulary items, or, as in

this Clinical Focus, grammatical structures, for example "singular lexical verb" or "coordinate clause". The technique of manifest and salient usage of examples of the target form by the SLT is called "modelling" (McCauley et al., 2017). LIT uses play activities that are structured in such a way that frequent use of the target forms is natural and adequate in the physical and social context for both SLT and child. This increases the likelihood that communication will be successful, which is a powerful intrinsic reward, encouraging the child to use the newly learned structures spontaneously (Paul et al., 2017). Using the target forms in a naturalistic context is in agreement with social theories of language learning, that assume that language is typically learned within the natural social context of a child. This is also the optimal context for children with DLD to learn language, with the difference that the adult input should be more structured, simplified and enriched. Enriched input also fits within statistical learning theories and information processing models, because an adjusted adult input, with more repetitions, might support learning the rules and regularities in language, and could enhance the child's ability to process and store the linguistic information (McCauley et al., 2017).

LIT combines focused stimulation intervention with the technique of sentence recasting or conversational recasting, meaning that the SLT replies to the incomplete or immature utterance of the child with an endorsing repetition in a more mature version, in a relevant conversational turn. The meaning of the recast is identical to that of the child's original utterance, but the structure of the sentence is changed into a target structure. Several studies support recasting as an effective technique. A meta-analysis of Cleave et al. (2015) showed that recasting is effective in children with DLD, although the evidential value of the separate studies varied, and was limited for some studies. Benefits were found both for intervention targets, and more general language measures. Camarata et al. (1994) and Nelson et al. (1996) compared conversational recasts to imitation procedures in children with DLD of 4-6 years, and concluded that recasting leads to more generalization to spontaneous language. In two intervention studies, focused stimulation was combined with conversational recasts: Fey et al. (1993) found more growth on the general language measure Developmental Sentence Scoring (DSS; Lee, 1970) in two treatment groups of preschool-age children with DLD than in non-treated controls; Leonard et al. (2004) found more gains of the trained morphemes 3rd-person singular -s and auxiliary is/are/was than of untrained developmentally comparable control forms in children with DLD of 3-4 years. Recently the optimal intensity and character of conversational recasts have been studied. Plante et al. (2014) found that highly variable input in the recasts, meaning that the target structure was used with 24 different verbs, was effective in learning the targeted structures by preschool children, opposite to a low variability condition, in which only 12 different verbs were used. They called this type of recasting "enhanced conversational recasting". These results are not yet included in LIT, but our protocols used a variety of different verbs and sentences for the target structures.

In LIT, "elicited production" is used, to elicit utterances that can be a platform for recasts by the SLT (Camarata et al., 1994). Elicited production also increases the chances on successful communication,

as we mentioned above. Besides manipulation of the situation, in LIT the SLT also uses the language techniques pausing, asking questions and imitation to elicit production.

Challenges in using techniques and support by LIT

Applying focused stimulation, recasting and elicited production is quite complicated. A thorough preparation is essential, and most SLTs plan and prepare their therapy sessions, choosing target structures and selecting specific sentences. Following this preset plan, however, can be challenging, because of the hybrid character of LIT, in which the SLT tries to follow the child's lead, whenever possible. A session can take a slightly different path than intended, making not all prepared sentences usable. Also recasting can be demanding, because the SLT has to listen to the child's utterance and immediately have an adequate recast ready, using the target structure. In addition to this, the SLT also has to use techniques to elicit production in the child, which requires manipulation of the situation and adjustment of her own language. It is a real art not to drown in the situation, messing up target structures, and using techniques inadequately.

To support SLTs in using facilitating techniques effectively, LIT provides structure, by classifying the techniques and order them in techniques that should more frequently be used at the start of the therapy, and techniques that are mainly used later on. This is similar to the session plan Eisenberg (2014) proposes, although the activities in LIT are less structured and based on play, instead of storybooks. In the protocols, that will be discussed later on, this is elaborated for separate therapy sessions. LIT classifies techniques into ones that are meant to boost the input of target structures, techniques that elicit production, and techniques that give feedback on the attempts of the child to produce the target structures. Table 2 shows an overview of these techniques.

Table 2. Overview of language facilitating techniques

Function	Timing	Techniques
Boost input	Frequent at the start of the therapy session	Focused stimulation and modelling: • Reduced speech rate • Stress • Repetition
Elicit production	After having modelled the target structure several times	Pauses Questions Imitation
Provide feedback	After an attempt of the child to produce the target structure	Recasting Expanded recasting Simplified recasting

At the start of a therapy session, the SLT mainly uses techniques to boost input by presenting clear models of the target structure and making them more salient. One way to do so is by reducing the speech rate, which is based on the assumption that children with DLD process spoken language more slowly than typically developing children, and reducing the input rate helps them to process language (Ellis Weismer, 1996; Montgomery, 2004; Montgomery & Leonard, 1998). The SLT also highlights and stresses the target structures, by manipulating the prosodic features of a sentence, making the target structures longer and louder and producing them with more dynamic pitch changes (Fey et al., 2003; Weismer & Hesketh, 1998). Salience is also achieved by repeating the target structure in a meaningful context (Fey et al., 2003).

After having modelled a target structure several times, the SLT starts to elicit production of the target structure. This can be done by creating pauses in the interaction, and waiting expectantly, to make clear that it is the child's turn to say something. The Hanen method also uses pausing in the "Observe, Wait and Listen" strategy (Weitzman, 2017), and also the "Parent-Child Interaction Therapy" (Falkus et al., 2016). Manipulation of the physical and linguistic context can guide the child towards production of the target structure. Fey et al. (2003) provided examples of ways to manipulate activities or to give conversations an unexpected twist, so as to cue the child to produce a target structure. Also asking questions can invite the child to produce target utterances. This should be encouraging questions that fit within the conversation between SLT and child, meaning that the SLT should avoid asking obvious or "knowledge testing" questions (Van den Dungen, 2007). Questions should correspond with the language level of the child, be formulated in a way that stimulates the use of the target structure (Leonard, 2014), and be preferably open ended (Proctor-Williams, 2014). A final technique that can be used to make the child produce the target structure is elicited imitation. As Fey et al (2003) argue, imitation can be helpful in producing target structures that are difficult for the child, but it should be used carefully. The value of imitation has been questioned, but when imitation is regarded as an aid to direct the child's attention to grammatical features, it can be useful in supporting production of target structures. Imitation should preferably be elicited in an meaningful way, fitting in the context of the activities, and avoiding as much

as possible an "exercise-like" character. An example is playing with a bus, making puppets get on the bus one by one, in turn, while saying "The man is getting on the bus" "The girl is getting on the bus" (target structure "-ing"). The above-mentioned techniques can be used in a hierarchy, to provide the child with increasing support for production (Proctor-Williams, 2014). An SLT can start with time delay (pausing) and use modelling and asking questions when pausing does not induce the child to produce a target structure. As a final technique, if the other techniques are not effective, requesting imitation can be used.

Once the child has attempted to produce the target structure, the SLT can provide feedback by a conversational recast, depending on the correctness of the child's production. This technique has been described frequently and is well known to most SLTs. In our experience, once the SLT knows what the target structure is, and understands its critical features, it is easy for them to provide recasts. The protocols we used (see separate paragraph on protocols below) help the SLT by providing examples and explanations on how to recast.

LIT also uses "expanded recasts", which are recasts with more complex morphosyntactic structures than the child used. This is sometimes called "expansion", although there are different definitions of what expansion is. LIT uses it in the way Bradshaw et al. (1998) described: semantically contingent repeating a child's apparent semantic intention using a more complex morphosyntactic structure. Because expansion is used in different ways, and can be confused with recasting, we use the term "expanded recasts". If a child succeeds in producing the target structure correctly several times, the SLT can respond with a slightly more difficult repetition, for instance by introducing more phrases, or more complex phrases. We give an example using an activity around "going to the zoo". A target structure could be "Simple declarative sentences with a subject + verb + one other constituent", and an example of a specific sentence is "The monkey is eating a banana". If the child produces this sentence correctly, the SLT could answer with an expanded recast, for example "Yes, the monkey is eating a banana very fast" (more phrases), or "Yes, the monkey is eating a tasty banana" (more complex phrase).

The opposite of expanded recasts are "simplified recasts", to be used in case production of a target structures turns out to be very difficult for the child. To help the child to experience successful attempts, the SLT can use recasting with a slightly simplified sentence, which still contains the target structure, by using fewer or less complex phrases, or by changing the target structure into a structure that is earlier acquired in normal language acquisition. An example of a simplified recast in the zoo activity we mentioned above, could be "Yes, the monkey is eating". The target structure "Simple declarative sentences with a subject + verb + 1 other constituent" is simplified into a subject + verb structure. Once the child produces these simplified sentences, the SLT can use expanded recasts again, to support the child to eventually produce the target structure.

Hybrid approach

The therapy approach in LIT is what Fey refers to as "hybrid" (McCauley et al., 2017). The situations are designed by the SLT, and the activities are manipulated to a large extent. This is the clinician-directed element of LIT, but LIT is not clinician-directed in the sense that it uses drilling exercises. During the activities there are numerous opportunities for the child to take the initiative, and when it fits into the therapy goal, the SLT follows the child's lead. This is the child centred element of LIT. When the choices of the child are floating away too much from the therapy goal, the SLT gently pushes the child back to the planned activities. This approach offers multiple opportunities for the child to be actively engaged, and on the other hand sufficient opportunities for hearing the target structures and producing them. Active engagement and fun are important to keep children motivated, as children with DLD often need long periods of intervention and it should be avoided that the child gets tired of therapy. That is why most activities in LIT are play activities.

As Paul et al. (2017) suggest, it is possible to move back and forth on the continuum of naturalness between child centred and clinician directed. Some children do well on minimally structured activities, while others have a need for more guidance. Some target structures are easily elicited by manipulating the situation, while others need prompts to make the children imitate them.

The hybrid approach in LIT is based on "script therapy", as proposed by Olswang and Bain (1991) for children with lower language levels (Brown's stage I – III). In LIT, the scripts are designed for role play and participating in engaging play situations, which is appropriate for the capabilities and interests of 4-5-year-old children. The SLT and the child play the roles in the script, and this offers possibilities to repeat the target structures and can help in eliciting production by changing roles and introducing unexpected events in the script. Van den Dungen chose scripts, because they are supposed to limit the cognitive load for children, making it easier for them to focus on language. The realistic and naturalistic character of a script is supposed to support generalization of the target structures. An important advantage of scripts is that they can facilitate parental support. With scripts or parts of scripts parents can repeat target structures at home (Olswang & Bain, 1991).

Challenges in the hybrid approach and support by LIT

To apply a hybrid approach demands "multitasking", because the SLT has to participate actively in the play situation, direct the activity, keep the target structures constantly in mind, and in the meantime listen to the child and react with appropriate facilitating techniques. A hybrid approach requires more flexibility than a clinician-directed approach and can be more complicated and effortful. Using LIT also asks a lot of preparation time. We know that for Dutch SLTs in special education, this time is very limited: a survey by Apeldoorn et al. (2011) found that the average was 1-5 minutes to prepare a therapy session.

In the Netherlands, there seems to be a barrier in using hybrid approaches. A survey by Scheider et al. (2014) found that Dutch SLTs generally consider clinician-directed interventions as best practices

for therapy aiming at morphosyntax. Activities they mention are mostly imitation exercises, supported by pictures, or supported by a concomitant action, as is done in the Dutch intervention "Functional Imitation Therapy (FIT)" (Schlichting & De Koning, 2015; Zwitserlood et al., 2015). In this intervention, a turn taking activity is used to repeat a particular sentence frequently.

The scripts LIT provides can support SLTs in creating a linguistic and play environment that enhances learning of the target structure. LIT provides suggestions for scripts to use specific target structures in an obvious, communicative context. Activities are easy to carry out in the SLT's office, with toys and props that most SLTs possess. The suggestions for scripts are incorporated in protocols, to assist SLTs in the complicated, multitasking activity of using LIT. The protocols can also save time in preparing therapy sessions.

LIT therapy sessions, protocols and training of SLTs

As we mentioned, LIT provides intermediate goals and suggestions on specific structures and sentences. Shaping the intermediate goals into specific sentences for one therapy session requires considerable thought. Recent studies point out factors to take into account when selecting specific sentences for a therapy session. Plante et al. (2014) showed that it is recommendable to expose children to a high variability of verbs with the target grammatical structure to increase the correct use of grammatical morphemes. Leonard and Kueser (2019) described five factors that can make grammatical targets more, or less, challenging to learn, and formulated implications for the selection of specific target sentences in English. Some of these implications also apply to Dutch, namely the ones that are concerned with tense/agreement morphology, and the ones that take phonological context of verb morphology into account. In Dutch, singular verbs are inflected with bare stem (first person singular) and bare stem + t (second- and third-person singular), and confusion of these inflections is a characteristic of children with DLD. Therefore, in intervention, it is important to use sentences in which overt tense/agreement morphology is emphasized (Blom et al., 2013). Choosing structures with the second person singular in an inverted sentence should be avoided initially, because, instead of the general inflection bare stem + t, in an inversion bare stem is used. Besides sentence structure, also the phonological context of verb morphology in target structures is important, because it determines the degree of complexity of verb inflection. Blom et al. (2014) showed that Dutch children with DLD are more likely to produce third-person singular (bare stem +t) inflections when verb stems end in sonorants than when they end in fricatives or plosives. Because it is not easy to meet all these requirements, we designed protocols for therapy sessions in our study.

Protocols and training

Our study aimed at implementation of LIT in clinical practice, and to help SLTs to overcome their hesitance in using LIT, we elaborated the principles, assumptions and ideas into concrete protocols for therapy sessions, to accommodate SLTs working in schools.

The protocols contain:

- Session goals: target structures
- Materials and preparation
- Target specific sentences, taking into account the particular characteristics of Dutch grammar
- Suggestions and examples for recasting, and instructions on expanded and simplified recasting
- A script for play activities, with suggestions how to incorporate modelling and elicitation
- Instructions for parents

In designing the protocols, we created scripts and thought of possible sentences for the target structure simultaneously. When the script and matching sentences were ready, we formulated suggestions on how to incorporate modelling and elicitation, suggestions and examples for recasting, and instructions on expanded and simplified recasting. To complete the scripts, we added a "home task": instructions for parents to use target structures in a short play activity, or other daily activity, because generalization of a target structure will be more easily accomplished if the structure is frequently used in daily life (Camarata et al., 1994). We translated and adapted one protocol into English, see Appendix A.

To support the SLTs in our study in how to use the protocols, we organized two training sessions of 2½ hour each, for small groups of SLTs, in which we explained the principles of LIT and the implementation by means of protocols. Topics in the training were:

- Refreshing knowledge on language development
- Applying that knowledge to spontaneous language of children with DLD, in order to recognize delays and abnormalities
- Goal selection based on observations of spontaneous language, normal development and ICF
- Principles, assumptions and ideas of LIT
- Working with the protocols
- Practicing with modelling, recasting, expanded recasting and simplified recasting

During the LIT intervention period of the study, two sessions were video recorded, to optimize treatment fidelity, but also to provide feedback and coaching.

In the previous paragraphs, we described the disparity between interventions in efficacy studies and everyday clinical practice, and the support LIT offers to SLTs for implementing evidence from efficacy studies in their interventions. In the next part, we present a first investigation of the effects of LIT. We studied the effects of LIT when used in everyday practice, with limited dosages, by SLTs who are used to other intervention methods, and compared it to the effects of the care usually provided in this setting.

DOES LIT IMPROVE MORPHOSYNTAX?

We used a single case methodology to explore the effects of LIT in the clinical setting and compared the effects on morphosyntax to the effects of the care usually provided in this setting with an A-B design (Tate & Perdices, 2019). Participants were 5 children with DLD between 4;2 and 5;7 years old at the start of the study (T1). The children were recruited in 4 schools for special education for children with language disorders. They all met eligibility criteria for this type of education, which include non-verbal IQ > 70 and normal hearing. None of the children had diagnosed co-occurring disorders, although the psychologist and teachers mentioned attention problems for James, and noted serious behavioural problems for Milan. Characteristics of the children are shown in table 3 and scores on language tests are shown in Table 4. The research proposal was approved by the Ethics Review Board (METC) of the University Medical Centre Utrecht (protocol number NL58167.041.16) and parents signed informed consent.

Table 3. Characteristics of participants

Participant	School	Sex	Age (years; months)	Special treatment group + Special education[a] (months)	Languages	Language disorder	Non-verbal IQ
Finn	1	M	5;1	11 + 12	Dutch	Expressive	105
Hailey	2	F	5;2	9 + 12	Dutch	Expressive	99
Saya	3	F	5;7	10 + 18	Kurdish and Dutch[b]	Receptive-expressive	87
James	4	M	4;2	7 + 2	Dutch	Receptive-expressive	86
Milan	4	M	4;10	14 + 0	English and Dutch[c]	Expressive	101

Note. Participants names are aliases; schools are numbered randomly.

[a]Period that children were already receiving multidisciplinary speech and language therapy in day care and special education before the start of the study. All children were enrolled in multidisciplinary Special Treatment Groups for toddlers with DLD before they enrolled in special education.

[b]Sequentially bilingual. Assessment was done in Kurdish and Dutch, and DLD diagnosis confirmed.

[c]Milan has a Dutch father and an English mother. He was raised primarily in Dutch, and this is his dominant language.

Table 4. Scores on standardized language tests

Participant	Language comprehension	Receptive vocabulary	Expressive vocabulary	Expressive morphosyntax
Finn	94	114	92	69
Hailey	90	110	96	76
Saya	81	90	79	78
James	80	86	83	72
Milan	77	80	79	74

Notes. Quotient scores on Dutch Schlichting Tests (Language comprehension, expressive vocabulary and expressive morphosyntax, Schlichting & Lutje Spelberg, 2010b, 2010a) and the Peabody Picture Vocabulary Test Dutch Version (receptive vocabulary, Dunn & Dunn, 2005). Mean quotient score = 100, standard deviation = 15.

The study used an A-B design, with the control condition (A) as a baseline phase of 20 weeks, in which SLTs provided their usual care, followed by an intervention period of 12 weeks (B). Following the intervention phase, there was a post intervention phase of 8 weeks, in which the children received usual care again, with probably some differences, due to LIT training and coaching. The time span of the study was exactly one school year (46 weeks minus holidays), and assessments were scheduled every 4-6 weeks. James and Milan had only 9 assessments, because they were included in the study at a later point in time than the other children. The outcome measure was morphosyntactic complexity in a spontaneous language sample during play and a story retelling task. Figure 1 shows the timeline of the study, with phases and assessments (T1-T10).

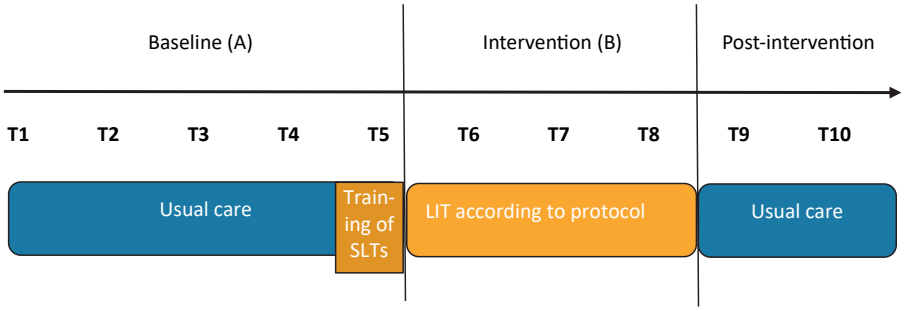


Figure 1. Timeline with different phases and assessments (T1-T10)
Notes. LIT = Language in Interaction Therapy; SLTs = speech and language therapists

All children received individual therapy from their own SLT. These were different SLTs, except for James and Milan, who had the same SLT. Prior to the LIT intervention period, the SLTs received two training sessions of 2½ hours in LIT by the first author. During the LIT intervention they were coached by the first author and made two video recordings of LIT sessions, which served as the basis for further coaching.

All children were tested individually by the first author and a research assistant in a quiet room at their respective schools. Transcription and analyses of the data were done blindly by research assistants. Participating children and their parents or caretakers were not informed about the onset of the LIT intervention.

Intervention

In the usual care period (UC) the SLTs provided therapy in the way they usually do, with a frequency and number of minutes that was agreed upon in a multidisciplinary consultation with the teacher, SLT and coordinator. Frequency varied between 2-3 times a week, and length of sessions was determined at 20 minutes. Therapy was mostly individual and sometimes in small groups, in the SLT's office ("pull-out" service delivery model). SLTs decided at their own discretion at which language domain the intervention was aimed, the proportion of therapy aiming at morphosyntax and if parents were involved. For the morphosyntax part of the intervention, the SLTs chose independently the target structures and methods and materials. We asked the SLTs to register information on the number of sessions aiming at morphosyntax, methods and materials, and homework activities.

During the intervention phase LIT was carried out once a week for 20 minutes by the children's own SLTs, during 12 weeks. This was also done individually, in a "pull-out model". It was possible for the SLT to schedule another weekly therapy session, aiming at different language domains than morphosyntax. We provided the SLTs with a protocol for each LIT session, as described above. The protocols were adaptive, so they differed across children, and were determined on the basis of their language level. The SLTs reflected on the children's play activities in weekly email contact, which was to shape the protocols, thus ensuring that the activities were appealing for each child. For each session, the SLTs registered how often the child produced the target structure, if the task for the parents was actually handed to them, and any relevant details. If a target structure was produced two times or more correctly during one session, it was considered that the child was starting to master the structure, and the target structure was dropped temporarily. For the next session another structure was chosen as a target, or a previous structure was repeated and expanded. This is a "cyclical goal attack strategy" (Fey et al, 1993). Adherence of the SLTs to the protocols was secured by their registrations and by the video recordings the SLTs made and the coaching the first author provided. There was weekly email contact between the SLTs and the first author, to exchange protocols and registration forms, but also to provide feedback, answer questions and share experiences.

Outcome measures and analysis

The outcome measure was morphosyntactic complexity as measured in a spontaneous language sample during play and a story retelling task. Because the situation in which language is elicited influences morphosyntactic complexity (Sealy & Gilmore, 2008), we used two different tasks:

- Spontaneous language: language during play, using different Playmobil® toys
- Story retelling: we showed the children a sequence of six full-color images on a tablet computer and told them the accompanying story. Afterwards we asked the children to tell the story to a soft toy of the Dutch cartoon character "smurf". When the children were not able to tell a specific passage associated with one of the pictures, we provided a cue, consisting of the first one to three words of the sentence. To avoid too much familiarity with the stories because of the repeated measurements, there were six different stories, and each story was used at two successive time points. The stories were standardized, controlled for linguistic complexity and had comparable macrostructures.

Recording of the play sessions started after 2-3 minutes, when the child had started to play and appeared to be at ease. The first 40 T-units of the child during play and all T-units during narratives were transcribed in CHAT (MacWhinney, 2000). They were analysed according to TARSP (Schlichting, 2013), a Dutch version of LARSP (Crystal et al., 1976). Because treatment goals varied across children, in relation to their overall language levels, we used general measures of grammatical development and morphosyntactic complexity to determine the differences between baseline and LIT. We calculated MLU in words, which is preferable to MLU in morphemes, because it is easier to calculate and more reliable (M. D. Parker & Brorson, 2005). In Dutch, as in English, there is a very strong correlation between MLU in words and MLU in morphemes. In the absence of Dutch equivalents of DSS (Lee, 1970) and IpSYN (Scarborough, 1990), we designed a scoring system, based on the developmental stages of TARSP, to determine the complexity of the utterances. Similar to LARSP, TARSP has seven developmental stages, and analyses utterances on clause, phrase and word (morphology) level. We expected the stages not to be sensitive enough to detect the small changes we hypothesized in this study. That is why we added a scoring system, which we called "TARSP-P". Structures were graded according to TARSP stage, so a stage IV clause, containing a stage III phrase and stage IV verb morphology, received 4 + 3 + 4 = 11 points. This was done for each of the 40 T-units during play, and also for the first 10 T-units during narratives, to get an equal amount of T-units for each child, and a representative selection of the complexity of spontaneous language and language in narratives.

Scoring and analysing were done by research assistants and trained master students. To improve interrater reliability of spontaneous language, we held consensus meetings with the transcribers regularly. Also 10% of the samples was transcribed by two research assistants. Interrater reliability for MLU and TARSP-P was good (Cronbach's alpha = 0.886; p = 0.002 for MLU, and 0.852; p =0.002 for TARSP-P).

RESULTS

Service delivery in usual care and LIT

The SLTs reported about each usual care (UC) session on registration forms. We counted the sessions in general, and the sessions aiming at morphosyntax and divided them by the weeks the children actually went to school, so without holidays. Table 5 shows a summary, with mean amount of UC per week and the mean number of sessions aiming at morphosyntax. The children mostly received individual therapy sessions of 20 minutes, as is common practice in the Netherlands. Only SLTs of Finn and Hailey provided homework or instructions for parents; they informed the parents about the structures they had practiced, and Finn's SLT also gave advice to parents about practicing at home. Frequency of therapy was highest for Finn and his SLT also had chosen to dedicate a high number of sessions to morphosyntax, while for the other children this was only 1 session per 2-3 weeks. For each child the two methods that the SLTs mentioned most frequently are shown, and for all SLTs this were imitation exercises, with pictures or in play. Goals were broad, for example "producing complete sentences", or "producing longer sentences".

During the LIT phase all children received the planned 12 weekly sessions of 20 minutes. Some children missed one or two sessions, due to illness or other circumstances, and in these cases the LIT phase continued, until 12 sessions were given. Although all SLTs had planned to schedule a second weekly session aiming at other therapy goals, this turned out to be difficult to achieve. Occasionally, some children had an additional individual or group session, approximately 1 session per 2-3 weeks.

MLU

MLU in words was calculated for the 50 utterances we collected from spontaneous language during play and retelling a picture story, using a pooled mean of both situations. Figure 2 shows the graphs of MLU against time points for each child. Initial MLU's were low, with a range of 2.9 to 4.04 at the first time point for MLU, which is, according to Dutch norms ≥ 2 SD below mean (Van den Dungen & Verbeek, 1999). As can be seen, MLU was increasing for Finn, Hailey and Saya over time, with higher MLU's in the LIT period and afterwards. For James and Milan the pattern is less clear, although Milan had an increase in MLU during the LIT phase.

We analysed the data with TAU-U analysis, which combines non-overlap between phases with trend from within the intervention phase, and provides the option of controlling undesirable baseline phase trend. TAU-U analysis uses pairwise comparisons in a "time-forward" direction, and the number of pairs that improve over time is calculated as a proportion of all possible pairs (R.I. Parker et al., 2011). We used this analysis to determine trends in the UC as well as in the LIT period. Because visual inspection suggested that effects continued into the post-intervention phase T9 and T10, we included these data in the LIT phase. Subsequently we calculated the proportion of non-overlapping data between baseline (T1 – T5) and LIT (T6 – T10). If there was a trend of 0.40 or more in the baseline phase, we corrected for

this trend, as Parker et al. proposed. Table 6 shows the trends in the baseline phase, in the LIT period, and the proportion of pairwise comparisons that improve from baseline to LIT. Most positive trends are seen in the LIT phase, except for Finn, who also showed a strong improvement in de UC period. All children, except James, showed more improvement in the LIT phase than in the baseline phase, and for Saya and Milan this improvement is significant. We also calculated an overall effect size for the 5 children, as a weighted average of individual effects, and this was 0.58, $p = 0.0011$.

Table 5. Dosage, methods and parent involvement in UC and in LIT

	Individual sessions (mean number per week)	Group session (mean number per week)	Length of sessions	Sessions aiming at expressive morphosyntax (mean number per week)	Methods aiming at expressive morphosyntax	Homework or instructions to parents on morphosyntax (percent of sessions on morphosyntax)
Usual care:						
Finn	1.7	0	20 min.	1.1	Imitations with pictures FIT[a]	52%
Hailey	0.7	0.4	20 min.	0.4	Imitations in play Metalinguistic intervention	42%
Saya	1.2	0.1	20 min.	0.3	Imitations with pictures Imitations in play	0
James	1.1	0.4	20 min.	0.4	Imitations with pictures	0
Milan	1.2	0.4	20 min.	0.5	Imitations with pictures	0
LIT:						
All children	1 session LIT and on average 0.4 additional sessions UC	0	20 min.	1	LIT	100%

[a] FIT = Functional Imitation Therapy (Schlichting & De Koning, 2015)

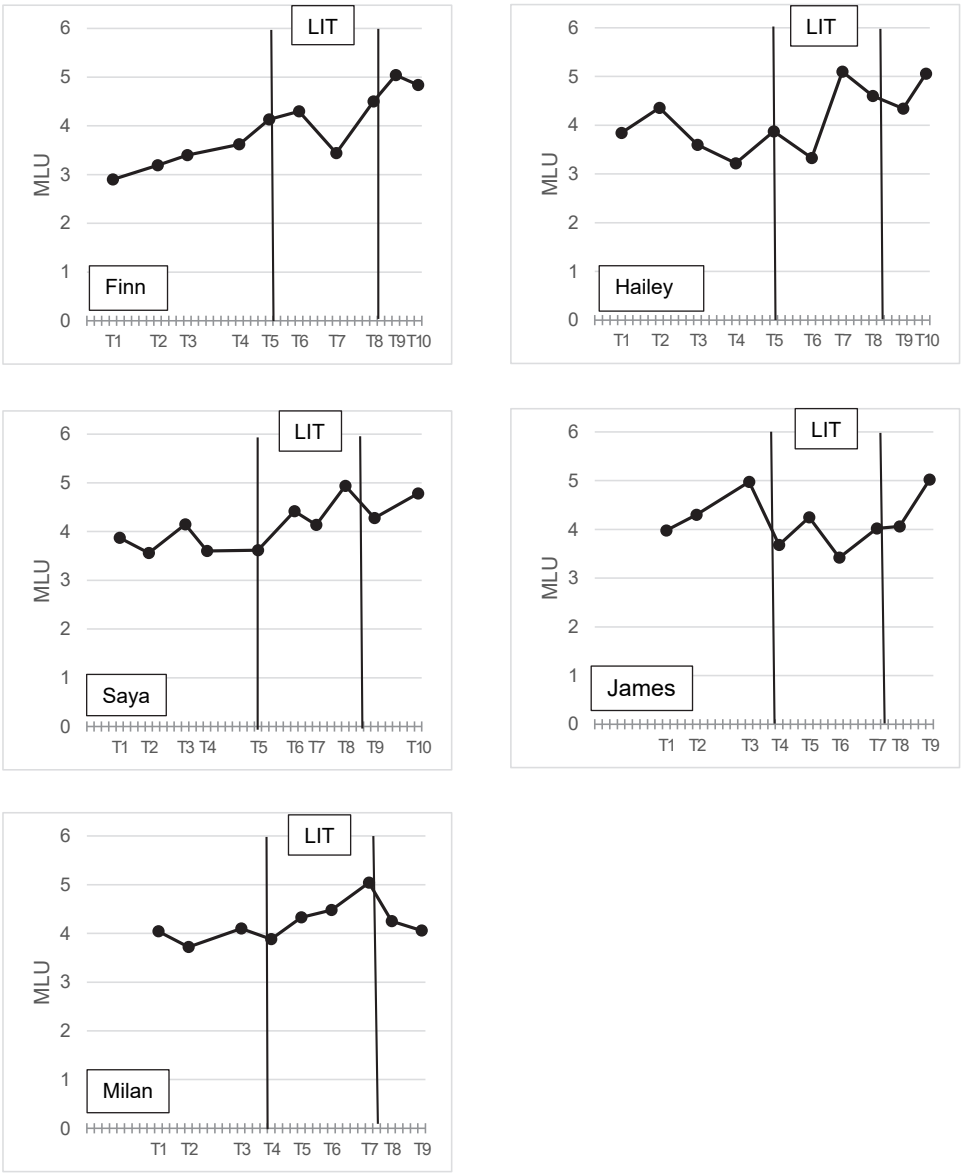


Figure 2. MLU in words for each child at each time point

Notes. The X-axes represent weeks in minor tick marks, starting at the beginning of the school year, and ending at the end of the school year.

LIT = Language in Interaction

Table 6. TAU-U analysis for trends in MLU in UC and LIT phase, and TAU-U comparison of UC and LIT

	TAU_{UC}	*p*	TAU_{LIT}	*p*	$TAU_{UC\ vs\ LIT}$	*p*
Finn	1	0.014	0.6	n.s.	0.44[a]	n.s.
Hailey	-0.2	n.s.	0.2	n.s.	0.60	n.s.
Saya	0	n.s.	0.2	n.s.	0.92*	0.016
James	0	n.s.	0.4	n.s.	0	n.s.
Milan	0	n.s.	-0.4	n.s.	0.9*	0.028

Note. TAU_{UC} = TAU Usual care phase; TAU_{LIT} = TAU LIT phase; $TAU_{UCvsLIT}$= proportion of pairwise comparisons that improve from UC to LIT

[a] corrected for baseline trend

*$p < 0.05$

Grammatical complexity

We used TARSP-P as a measure for grammatical complexity: higher TARSP-P scores mean that a child uses more grammatical structures from higher developmental stages of TARSP. TARSP-P was calculated for the pooled mean of the 50 utterances in the language samples. The graphs in Figure 3 show higher TARSP-P scores in the LIT phase for Finn, Saya and Milan. For Finn and Saya the scores remained high in the post-intervention phase. Trends in TARSP-P in UC and LIT, and comparison of UC and LIT are shown in Table 7. For all children we calculated higher TARSP-P scores during LIT than during UC, with $TAU\text{-}U_{UCvsLIT}$ varying from 0.40 to 0.68, but for none of them this was significant. Yet, the overall weighted effect size was significant (0.56, $p = 0.0014$).

Table 7. TAU-U analysis for trends in TARSP-P in UC and LIT phase, and TAU-U comparison of UC and LIT

	TAU_{UC}	*p*	TAU_{LIT}	*p*	$TAU_{UC\ vs\ LIT}$	*p*
Finn	0.6	n.s.	0.4	n.s.	0.68[a]	n.s.
Hailey	-0.4	n.s.	0	n.s.	0.52	n.s.
Saya	0.2	n.s.	0.4	n.s.	0.6	n.s.
James	0.3	n.s.	0.6	n.s.	0.4	n.s.
Milan	0.3	n.s.	0	n.s.	0.6	n.s.

Note. TAU_{UC} = TAU-U Usual care phase; TAU_{LIT} = TAU-U LIT phase; $TAU_{UCvsLIT}$= proportion of pairwise comparisons that improve from UC to LIT

[a] corrected for baseline trend

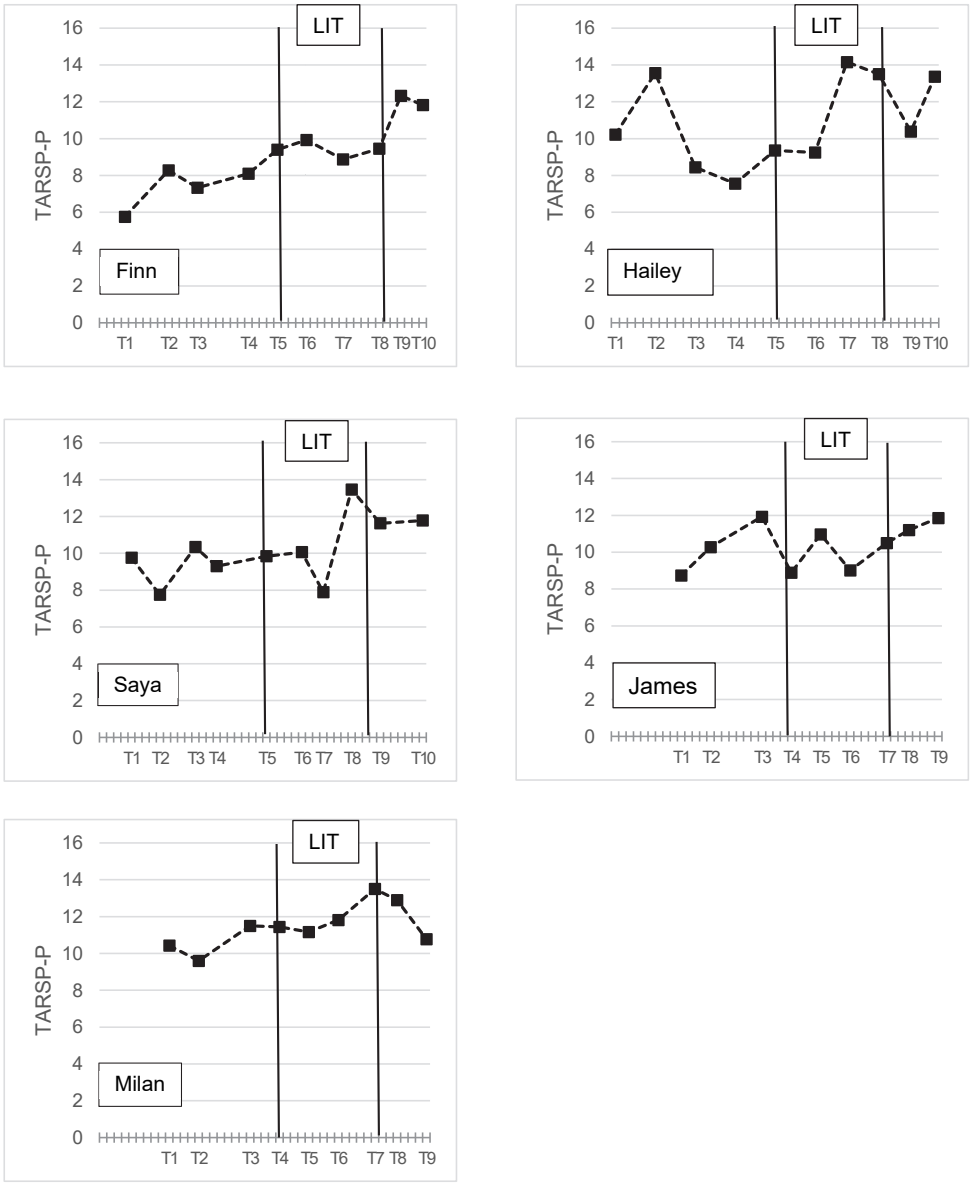


Figure 3. Grammatical complexity score TARSP-P for each child at each time point

Notes. The X-axes represent weeks in minor tick marks, starting at the beginning of the school year, and ending at the end of the school year.

LIT = Language in Interaction Therapy

DISCUSSION

In this Clinical Focus we described an exploration of how to implement a focused stimulation intervention, aimed at morphosyntax, in clinical practice. We developed Van den Dungen's "Language in Interaction Therapy" (LIT; Van den Dungen, 2007), a focused stimulation intervention that combines several effective elements, into an integrated intervention, with the intention to facilitate its use in daily practice. Although SLTs can find descriptions of grammar interventions in efficacy studies, experience has shown us that it is generally outside the scope of an average practitioner to transfer and adapt such interventions to their own practice. LIT is meant to build a bridge between research and clinical practice and we assumed that LIT would lower the barrier for SLTs to actually use effective intervention techniques in the treatment of morphosyntactic difficulties in children with DLD. We can conclude that this is, indeed, true for the SLTs in our study, with the provision that LIT is enriched with support in goal selection, detailed protocols to guide therapy sessions, and training and coaching. During the study, we judged some parts of LIT as successful right away, while other aspects still need improvement. We describe these "lessons for implementation" in the next paragraph. Subsequently, we will share our thoughts on the results of our single-subject study. Finally, we will discuss the strengths and limitations of our design and of a study that was carried out in clinical practice, with a focus on morphosyntax.

LIT: lessons for implementation

LIT uses a play situation, with some control of the SLT, and ample opportunities for the child to determine the direction of the activities. From conversations with the SLTs during coaching sessions, and from email contact, we learned that all four of them experienced LIT as a breath of fresh air, compared to the imitation exercises they were used to in their usual care. They also mentioned that the children were enthusiastic and engaged during LIT. This is a strength of LIT: if children are enjoying play, this enhances learning and development (Eisenberg, 2014; Perry, 2001). A major benefit of our close cooperation with SLTs, was the ability to tailor the protocols to the preferences and needs of the individual children. This suggests that close cooperation between SLTs and researchers is needed in the further development and implementation of LIT.

As a consequence of the free-play-situation in LIT, the amount of modelling and recasting varies, depending on the initiatives of the child and the course of the play. The SLTs reported that they found it difficult to take advantage of situations that occur in a therapy session, and to react to them in a flexible manner, with enough adequate models and recasts. The SLTs in this study were highly motivated and dedicated to provide the intervention to the best of their ability, and they did find the protocols very helpful and useful. Nonetheless, they needed extensive training and coaching to bring their skills to the desired level. From the coaching sessions and registration forms we learned that they had not always carried out our protocols as intended, and consequently we have had to accept that it is complex for SLTs to do so. Based on these experiences, we can sympathize with clinicians who are inclined to choose more clinician-directed interventions. Our protocols for the LIT sessions could have been more directive. However, it would not have been in line with LIT to control the situation too tightly. This would restrict

the child and reduce their opportunities to take the initiative. According to LIT, the child's motivation and focus, and generalization, may be influenced negatively when the intervention strays too far from natural conversation. Future research should focus on the quantity and quality of modelling and recasting in LIT, and on the ongoing search for the optimal balance between the amount of freedom and control in the program. The tentative effects of this study indicate that SLTs need support to provide LIT and an investment in this type of support is worthwhile. We can imagine this to be an ongoing development process for SLTs, with regular video coaching as a supportive tool. In future studies it is important to systematically collect data on the experiences of SLTs, both quantitatively (using observations of modelling and recasting in therapy sessions), and qualitatively (to gain better insight into the difficulties they encounter and their need for support).

Moreover, experiences of the SLTs in our study show that it can be difficult to elicit production in LIT. For some children, the efforts of the SLT to manipulate the situation, to pause, to ask questions, intending to elicit a target structure or at least an attempt that can be used for a recast, were not enough. Even an explicit request to imitate sometimes remained unanswered by the child, particularly if they were shy or introverted or tended to be totally absorbed by the play situation. For these children, a more clinician-directed approach might be appropriate. Eisenberg (2014) has written on how to manage a therapy session, and her insights might be particularly beneficial to SLTs working with children not easily induced to produce target structures. Eisenberg proposed the use of different activity types within therapy sessions, including structured imitation exercises, for instance with sentences about pictures, using "priming". Priming is activated when a child hears a model sentence several times. Studies have shown that priming positively influences the sentence structure the child produces (Leonard et al., 2000; Savage et al., 2009). Priming activities might increase attempts of the child to produce the target structure in play activities in the same therapy session. We might, therefore, want to alternate structured activities and play activities within a therapy session, to be able to highlight target structures in an imitation activity that can subsequently be used in a meaningful situation.

During the LIT intervention period, questions about goal selection arose. Probably, goal selection in LIT relies too heavily on intuition and clinical judgement, given the sparseness of research on goal selection in grammar intervention. Goal selection for separate therapy sessions is not elaborated in detail yet in LIT. We chose a cyclical goal strategy, as Fey et al. (1993) proposed. Consequently, we moved rather quickly from one goal to the next or added more complex noun or verb phrases to a target structure. Based on TARSP guidelines, we assumed that when a child used a target structure twice or more in their spontaneous language, they had started to master it, and spontaneous development of that particular structure was possible. If spontaneous development was insufficient, we returned to the structure later on. McCauley et al. (2017) hypothesize that a child will acquire more language forms with a cyclical approach than with the more traditional vertical approach, in which a new target is only introduced after full mastery of a previous target. In the future we should search for more structured ways of selecting goals, and study how goal selection affects outcomes of intervention, as a continuation of Fey et al. (1993).

Is LIT effective?

As a first exploration of LIT's potential, we measured the improvement in morphosyntax in children who were treated by SLTs in special schools in accordance with the instructions and protocols we had provided. To this end, we used a single-subject A-B design, which allowed us to compare LIT (intervention phase; B) with usual care (baseline phase; A). Our results show that MLU significantly increased in 2 out of 5 children during the LIT phase and after, during the follow-up phase, when compared to the baseline condition with usual care with clinician-directed imitation therapy. One child, James, seemed to have grown more in the baseline phase than in the intervention phase, although the overall baseline trend was not significant. His language scores varied during the entire study period, maybe due to his suspected attention deficit disorder. The initial growth in the baseline phase might be explained by a change in clinical setting from a special treatment toddler group to the more structured, and perhaps the more challenging special school environment.

At group level, in both MLU and TARSP-P there was a greater increase in the intervention phase than in the baseline phase. The effects on these general measures of morphosyntax are small but may indicate improvement in the communicative functioning of these children. Visual inspection of the effects of the two conditions showed that increases in MLU and TARSP-P were not immediately present at the start of LIT but emerged slightly later. In view of this fact, we assume that the process of discovering grammatical rules that LIT tries to facilitate might take some time. An additional explanation is that SLTs gradually increased their mastery of LIT over time.

An unexpected, and worrying, finding was that there was no progress in the baseline phase, and in some children, there were even negative trends for MLU and TARSP-P during UC. We expected the children to show at least some improvement during the five months of the baseline phase, due to maturation, usual speech and language therapy, and their enrolment in a special school, which offers a rich and stimulating language environment. We cannot be certain if these findings in our small-scale study can be replicated and generalized, but they might indicate that language stimulation in usual care is too broad, with not enough focus on morphosyntax. The latter might be adequate to facilitate growth in vocabulary and pragmatic skills, but not sufficient for improving morphosyntax. In any case, there seems to be room for improvement if intervention focuses more specifically on morphosyntax.

Crucially, the amount of therapy aiming at morphosyntax is very important here. It is not unlikely that a difference in the number of morphosyntax-focused therapy sessions between the baseline and intervention phase by itself can explain the difference in outcomes. Although the overall intensity of therapy in the baseline phase was estimated by the SLTs to be 2-3 times a week, our data indicate that the actual frequency of treatment sessions was 1.1 – 1.7 times a week. Also, the planned weekly second session in the LIT phase was not always realized, due to, among other things, illness of the child, high workload, or calendar conflicts with school activities. We had expected that the SLTs would spend a considerable amount of time on grammatical targets in their usual care, but this time turned out to be

minimal. This resulted in a frequency of one session of 20 minutes per 2-3 weeks aiming at grammar of in the baseline phase, compared to one 20-minute session per week during the intervention phase. Only one child, Finn, received specific grammar intervention every week. Since he was the only child showing improvement in the baseline period, this confirms our suggestion that dosage is a critical factor.

Single case experimental design: strengths and limitations

We chose a single case methodology, because it is easy to conduct in a clinical practice setting, and neutralizes some uncontrollable factors, because each child serves as their own control. It also allowed us to study individual patterns of development and growth trends that occur during both baseline and intervention. However, carrying out a study in a clinical setting also posed challenges in controlling variables and selecting outcomes.

First, we were not able to provide sufficient experimental control. One way to enhance experimental control is the withdrawal of an intervention. Effectiveness is shown when there is a significant difference between scores at baseline and in the withdrawal phase on the one hand, and in the intervention phase on the other hand. This is only possible if an intervention has immediate, short-lasting effects, that disappear after the intervention ends. In language intervention it is almost impossible to build in experimental control through withdrawal, due to continuing spontaneous maturation, and as a delayed effect of the intervention. Although our study had a post-intervention phase with usual care, this cannot be viewed as true withdrawal, as the SLTs could not ignore or forget the knowledge and skills they had acquired during the LIT intervention. Another way to strengthen experimental control is the use of a multiple baseline, meaning that the start of the intervention phase B is different for each participant. Because the study had to be completed within one school year, it was impossible for us to vary the timing of the baseline, and the intervention and post-intervention phase between the children. This might have introduced confounding factors: for instance, the period in the school year we chose for the intervention, from February until May, might have been favourable to developmental growth in young children.

Single-subject designs require frequently repeated measures, but these are not easy to apply in a study on grammatical development. More power is reached with more measurements during all phases, which also makes it easier to see trends and differences. In our study, this would also have diminished within-child fluctuations in spontaneous language outcomes. Planning more measurements, however, was not possible in the limited time of one school year, and the time-consuming data analysis of spontaneous language. We also explored the possibility of using the standardized Recalling Sentences Task of CELF-Preschool-2-NL (De Jong, 2012), which is less time-consuming. As a consequence of the frequent measurements, we had to create two different versions to diminish learning effects. A pilot study did not show a significant difference between the two versions, but in the present study the scores indicated that the versions were not sufficiently similar. Moreover, in the Recalling Sentences Task the structures of the sentences are not related to the target structures used in LIT, and the test does not only measure grammatical competence, but also relies on auditory memory and concentration.

Our narrative task was the most feasible and probably the most reliable measure. It provided information about the ability of the children to use structures with increasing complexity. Although the task is not informative on the generalization of trained structures to the children's everyday lives, it is a useful instrument in effect studies using a single subject design.

Concluding remarks

In this article, we explored how to implement findings from scientific research on effective intervention aiming at morphosyntax into clinical practice. In the footsteps of Van den Dungen, we continued the search for the best possible intervention to help children with DLD who struggle with morphosyntax. Our effect study shows that the implementation of LIT requires ample efforts from SLTs, and the provision of support and guidance. We hope to have inspired SLTs and researchers to cooperate in implementing evidence-based intervention methods and techniques. The description of our single-subject study and of the questions and problems we encountered, might serve as an example of how SLTs can systematically evaluate their care and the effects of changes in that care.

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APPENDIX A. PROTOCOL ON PRESENT CONTINUOUS WITH 2 CONSTITUENTS

Session goals

- The child produces complete sentences with verb "is + -ing", subject and 1 other constituent.
- The child uses noun phrase with articles

Materials

- Washing-up bowl or tub with water
- Board
- Toy boats
- Plastic figures
- Floating objects (cork, pencil, plastic bottle etc.)
- Sinking objects (wood block, toy car, pen etc.)

Preparation

Put the bowl with water ready and gather the materials.

Target sentences

The boat is sailing under the bridge
Now the boat is bumping
The car is driving on the bridge
The boat is sailing again
It is sailing under the bridge
The boy is falling into the water
The girl is swimming in the water
The boy is also swimming
The pen is sinking fast
The cork is floating on the water
The car is not floating on the water
The wood block is sinking too

Recasting

- If the child omits "is" (*The cork floating on the water*), provide a recast with emphasized "is" (*The cork **is** floating on the water*).
- If the child omits the article (*Boy is also swimming*), provide a recast with emphasized article (***The** boy's also swimming*).
- If the child omits a constituent (*The wood block is sinking*), provide a recast with emphasis on the missing constituent (*The wood block is sinking **too***).

Simplified recasts

- Simplify noun phrases, for instance by replacing *the boat* by *it*
- Reduce sentences to Subject – Verb clauses, for instance by replacing *The cork is floating on the water* by *The cork is floating*

Expanded recasts

- Expand phrases:
  The wood block is sinking too becomes *The blue wood block is sinking too*
  The boy is also swimming becomes *The boy with red hair is also swimming*
- Conjugate "to be" for different persons:
  The boy is falling into the water becomes *The boys are falling into the water*
  The boat is sailing again becomes *I am sailing the boat*
- Add a constituent:
  The car is driving on the bridge becomes *The car is driving on the bridge very fast*
  The boy is also swimming becomes *The boy is also swimming in the water*

Activity

You and the child are going to sail with the boats in the tub. By putting a board or something similar across the tub, you can create a bridge. The boats can sail under the bridge, and cars can drive over it. You can introduce different things to happen, such as a puppet falling into the water. You can also put different objects into the water that are floating or sinking.

Introduction to the child

We are going to play with water and boats. The boats are going to sail. There is also a bridge across the water. The cars can drive over the bridge. And do you see the boys and girls? They are going to swim.

Script

Have the child play with the boats, cars and figures and follow the child's play. Phrase what is happening, using the target sentences, for instance *The boat is sailing under the bridge; Now the boat is bumping*

- You can introduce something to happen, such as dropping a figure into the water, or driving a car into the water, to elicit production. Use pauses, or questions to elicit production.
- Try floating and sinking of objects, and phrase: *The cork is floating on the water. The car is not floating on the water.* Ask the child to try objects, and to tell what is happening.

Instructions for parents

Required:
A story picture of the zoo

Dear parent,
This is a home task for this week. You can carry out this task with your child several times. The goal is to support your child to use longer sentences.
You can use sentences as below and repeat them many times.

Activity Look at the picture together. Tell your child: "Look, here is a nice picture of the zoo. Shall we have a look what is happening?"

Sentences
The sea lion is splashing the water
The hippo is eating salad
The monkey is climbing the tree
Daddy is walking to the ice-cream man
The man is taking a photo

Wrong sentence?
If your child leaves out the word "is" *(The sea lion splashing the water),* you can answer with a correct sentence, emphasizing "is" (*The sea lion **is** splashing the water).*



CHAPTER 5

Effect of a focused stimulation intervention on morphosyntactic skills of children with Developmental Language Disorder

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ABSTRACT

Children with Developmental Language Disorder (DLD) experience persistent morphosyntactic difficulties, affecting their ability to communicate effectively. Although interventions targeting morphosyntax, such as focused stimulation and recasting, have shown efficacy in controlled studies, evidence for their effectiveness in routine clinical practice is limited. This study evaluates the effectiveness of Language in Interaction Therapy (LIT), a naturalistic, play-based intervention that integrates techniques shown to be efficacious for improving morphosyntax.

Method

Using a single-case design with a baseline, intervention, and post-intervention phase, the progress of 14 children (ages 4;0– 5;9) with DLD in special education was monitored over one school year. The children received 12 weeks of LIT, following a 20-week usual care (UC) baseline phase. An inequivalent control group of 14 children of the same age received only UC throughout the study. Assessments were conducted every 4-6 weeks, and outcome measures included Mean Length of Utterances in words (MLU-w), TARSP-P scores (morphosyntactic complexity), and sentence repetition accuracy. TAU-U analysis was used to evaluate individual growth.

Results

Substantial variability was observed across children. All children showed improvement over time on all outcome measures. Seven out of fourteen children demonstrated significantly greater gains in morphosyntactic complexity during the LIT phase than during the UC phase in a story retelling context. No significant differences between the LIT and UC phases were found for growth in play-based language samples or sentence repetition.

Differences in outcomes between LIT and UC could not be explained by the respective periods of the school year during which the interventions were administered nor by child characteristics, such as disorder profile or being mono- or multilingual. Notably two SLTs achieved consistently greater gains across all their cases during the LIT phase, suggesting an influence of therapist-related factors such as fidelity and dose.

Conclusion

LIT shows promise as a naturalistic, play-based approach for supporting morphosyntactic development in children with DLD, particularly when implemented with high fidelity. However, meaningful progress also occurred during UC, likely reflecting the strong language-supportive environment in special education. The variability in treatment response underscores the need for realistic expectations about the impact of individual therapy and for intervention strategies that extend beyond the therapy room. Future research should refine LIT protocols, establish clear mastery criteria, and further explore optimal dosage and contextual influences.

INTRODUCTION

Children with Developmental Language Disorder (DLD) have difficulties in language development that may affect all linguistic domains: phonology, morphosyntax, semantics, and pragmatics. Although the specific domains affected vary from child to child, almost all children have difficulty acquiring morphosyntax (Bruinsma et al., 2022; Leonard, 2014). Children with DLD begin using sentences and grammatical structures at a later age than typically developing peers and have persistent difficulties in learning and applying morphosyntactic rules. They struggle with language-specific morphological and syntactic details throughout their adolescence years. Common challenges include omitting obligatory arguments, preferring verbs with simple argument structures, and producing incorrect verb inflection. Difficulties also extend to noun inflection and the correct use of pronouns and articles (Leonard, 2014; Leonard & Kueser, 2019).

Morphosyntactic difficulties have far-reaching consequences for children's communication and overall development. They limit children's ability to express themselves. Simple, incomplete and incorrect sentences are not adequate to convey communicative messages and are also difficult for others to understand (Bloom & Lahey, 1978; Rescorla & Mirak, 1997). Young children with DLD frequently omit function words, resulting in "telegraphic" sentences that can express only basic semantic relations. More complex relations, such as temporal and causal ones, require accurate and sophisticated sentence structures. Moreover, morphosyntax supports other language domains. It contributes to the acquisition of new words through a process known as "syntactic bootstrapping" (Jackson et al., 2019). Furthermore, the ability to understand and use complex sentence structures boosts the development of language comprehension and narrative skills, essential for social interaction (Bishop, 2014; Bishop & Donlan, 2005). Morphosyntactic skills are also important in literacy development and reading comprehension (Buil-Legaz et al., 2016; Casani et al., 2022; Verhoeven & Perfetti, 2011). These cascading effects underscore the need for early, targeted intervention to improve morphosyntax and mitigate long-term risks.

Even when children receive targeted intervention in early intervention groups or special education, they tend to make less progress in morphosyntax than in other language domains (Bruinsma et al., 2023; Vermeij et al., 2023). This raises a key question: is current progress the best achievable outcome, or can intervention be optimised? Systematic reviews suggest that interventions targeting morphosyntax can be effective, but findings are inconsistent (Law et al., 2004; Rinaldi et al., 2021). Law et al. reported positive effects in studies with two- to three-year-olds. However, this effect was only found if studies with children with severe language comprehension difficulties were excluded. The evidence reported in Rinaldi et al. shows gains in morphosyntax among three- to five-year-olds, yet variability across studies remains unexplained. Contrary to Law et al., no differentiation was made between different language profiles.

Understanding speech and language therapy as a complex intervention is essential for designing research approaches. The UK Medical Research Council has developed guidelines for the evaluation of complex interventions and recommends studying such interventions from multiple perspectives: efficacy, effectiveness, theory based, and systems perspective (Skivington et al., 2021). Most existing studies have adopted an efficacy perspective. They were designed to study the intended outcomes in highly controlled settings, often in university clinics, thereby ensuring a high degree of internal validity. They provide information on important components of an effective intervention, such as selecting developmentally appropriate therapy goals and using language facilitating techniques, including focused stimulation and recasting (Fey et al., 2003; Leonard, 2014; Leonard & Kueser, 2019). Focused stimulation involves frequent, emphasised modelling of target structures in natural, interactive contexts. Recasting is the response to a child's grammatically incorrect utterance by repeating it in a correct form (Camarata et al., 1994; Leonard et al., 2006). These strategies are well-supported in research but may not translate directly to everyday practice.

Studies designed from an effectiveness perspective, which examine outcomes in real-world settings, are scarce. Smith-Lock et al. (2013) examined the effects of an eight-week treatment programme combining focused stimulation, recasting and imitation with direct instruction in five-year-old children with DLD in a special education setting in Australia. In the treatment programme one tailored grammatical structure was intensively trained. A significant improvement in performance on an elicitation test for the target structure was observed for children in the intervention group, but not for children receiving a control intervention focusing on language comprehension. Duinmeijer et al. (2024) studied the effects of a scripted, group-based intervention in two- to three-year old children with (presumed) DLD within early intervention groups. The scripts were based on the principles of Language in Interaction Therapy (LIT), which are also used in the current study. These principles include the use of the language facilitation techniques modelling, imitation, recasting and elicitation. There was more growth in the production of target structures in the 8 weeks intervention period compared to 8 weeks usual care, as measured by a grammar elicitation task and language sample analysis. There were no significant differences between the two conditions in general morphosyntactic measures in language sample analysis, such as MLU. Although both studies took place in clinical practice, there was some experimental control. For instance, a limited number of target structures was selected in both studies. This limits the generalisability to routine clinical contexts.

Beyond effectiveness, theory-based research explores what works for whom and under which conditions. Factors such as language profile, and multilingualism may influence outcomes, yet these variables are rarely addressed. Morphosyntax interventions also operate within broader systems, such as family and school. Therefore, a system perspective is important to examine how these systems influence and adapt to each other. From this perspective we need to consider the feasibility of an intervention and the opportunities it offers for collaboration.

The current effectiveness study aims to investigate whether the effectiveness of interventions currently used to improve morphosyntax can be enhanced, using insights from efficacy research. We evaluated a focused stimulation intervention for children with DLD (aged 4–6) in a special education setting in the Netherlands. In addition, we explored contextual factors that may shape intervention outcomes, such as age, gender, being mono- or multilingual, language profile, non-verbal IQ, and the role of the therapist.

Translating techniques and elements identified as effective in controlled efficacy studies into feasible interventions for every day practice is challenging. Efficacy research typically involves narrowly defined participant groups and highly trained master's degree therapists, who adhere to strict study protocols, focusing on a limited set of morphosyntactic targets (Frizelle et al., 2021a). These conditions differ considerably from routine clinical practice. Moreover, efficacy studies often focus on a single technique, whereas in clinical practice, SLTs commonly combine approaches. Also, intensive treatment schedules with high-frequency sessions and tightly controlled dosage are required to demonstrate efficacy but are difficult to implement in clinical settings. As a result, interventions shown to be effective under controlled conditions may not yield the same results in routine practice.

Additional challenges arise for languages other than English. Most intervention research has been conducted in English. The targets reflect the morphosyntactic structures that are problematic for English-speaking children with DLD (Rinaldi et al., 2021). However, as morphosyntactic difficulties vary across languages, English-based targets cannot be applied universally (Leonard & Kueser, 2019). Furthermore, it remains unclear whether techniques proven effective in English will generalise to other linguistic contexts.

To address the gap between efficacy studies and clinical practice, the Dutch intervention "Language in Interaction Therapy" (LIT) integrates components identified in efficacy studies into a practical approach (Bruinsma et al., 2020; Van den Dungen, 2007). The main characteristics of LIT are well-defined therapy goals, functional language use during interaction in a naturalistic context, and implicit learning through focused stimulation, recasting and elicitation techniques. Further details are provided in our previous paper, which demonstrates that LIT is feasible in special education settings and may enhance morphosyntactic development. In a single case AB design, four out of five children (4-6 years) showed greater progress in Mean Length of Utterance across 12 weeks of LIT intervention compared to usual care (Bruinsma et al., 2020).

The current study

Building on these previous findings, the current study investigated the effects of LIT in a larger group of children with DLD. The study was conducted in schools for special education for children with DLD in the Netherlands, where substantial variation exists in cultural, linguistic and socio-economic backgrounds, as well as in language profiles and non-verbal IQ (Bruinsma et al., 2023). To investigate

whether interventions focusing on morphosyntax could be improved, we compared outcomes of LIT with usual care, as most Dutch SLTs do not yet use LIT in their usual care (Scheider et al., 2014).

We used a single-case design with a baseline, an intervention and a post-intervention phase (Kratochwill et al., 2013), allowing us to evaluate individual progress during LIT relative to usual care and to explore variability in response to intervention. This design was appropriate given the heterogeneity of participants and practical constraints, such as different schools and SLTs and limited control over classroom language stimulation. The multiple baselines that are typically used in single-case studies were impractical in this context, due to school-year transitions which introduce uncontrollable variability. To account for potential seasonal effects, we included a non-equivalent control group, as the LIT phase was in the second half of the school year, a period typically characterised by more stable and potentially favourable conditions for language growth.

Outcome measures were utterance length and grammatical complexity in spontaneous language, providing ecologically valid insights into children's functional use of morphosyntax. Interventions are only meaningful if gains generalise to everyday contexts (Smith-Lock et al., 2013). We therefore selected spontaneous language measures rather than elicitation tasks targeting specific structures, also because the treatment goals differed between children. We also included a sentence repetition task, a generic measure, that reliably reflects mastery of morphosyntax (Polišenská et al., 2015)

Research questions:

1. What is the effect of Language in Interaction Therapy compared to usual care speech and language therapy on morphosyntactic complexity in children with DLD aged 4-6 years enrolled in special education?
2. How do child, school, and therapist characteristics relate to variability in treatment response?

METHODS

Participants

Participants were 32 children with DLD aged between 4;1 and 5;9 (yrs; months) at the start of the study (T1). The children were recruited through SLTs in 4 schools for special education of a national organization in the Netherlands that provides care and educational services for children with language difficulties. Admission criteria for special education for children with DLD in the Netherlands are (Simea, 2014):

- Scores of at least 1.5 SD below the mean at standardized language (sub)tests addressing at least two out of four speech-language domains: speech sound production, auditory processing, receptive and expressive morphosyntactic development, and receptive and expressive lexical-semantic development, or a score of 2 SD or more below the mean on a standardized approved general language test.
- Normal hearing
- Non-verbal IQ of at least 70

Additionally, all children scored 1.5 SD or more below the population mean on the sub-test for expressive morphosyntax of the Schlichting Expressive Language Test-II (Schlichting & Lutje Spelberg, 2010a). None had co-occurring disorders, as confirmed by school records. Ethical approval was obtained from the University Medical Centre Utrecht (protocol number NL58167.041.16), and parents signed informed consent.

A total of 27 children were enrolled at the start of the study, and an additional five were recruited at measurement T2. Four children were excluded during the study: three due to repeated absences during measurement sessions and one due to severe speech sound disorders that made spontaneous language analyses impossible. In total, 28 children completed the study. These participants were randomly assigned to either the experimental group or the control group. The experimental group received usual care and Language in Interaction Therapy in alternating phases (LIT group), whereas the control group received usual care for the entire duration of the study (UC group).

Characteristics of the participants are summarised in Table 1. Table 2 presents clinical measures of language and non-verbal IQ prior to T1, as obtained from school records. Children scoring > 1.5 SD below the mean on the Schlichting Language Comprehension Test (Schlichting & Lutje Spelberg, 2010b) were classified as having a receptive-expressive disorder, others as having an expressive disorder. All children had mild to moderate speech sound disorders, mostly phonological in nature.

Table 1. Participants' age, gender, mono-/multilingual background and disorder profile in the experimental (LIT) and control (UC) group

	Experimental group (LIT) (*n* = 14)	**Control group (UC) (*n* = 14)**
Age at T1 (months):		
M (SD)	60 (5.9)	60 (6.0)
Range, min-max	49-68	49-67
Boys/girls	10/4	7/7
Monolingual/multilingual	8/6	10/4
Disorder: receptive-expressive/ expressive	8/6	4/10

Table 2. Clinical test scores (mean, SD and range) before T1 on standardised tests for non-verbal IQ, language comprehension and language production

Test	**Experimental group (LIT)**				**Control group (UC)**			
	n	***M***	***SD***	**Range**	***n***	***M***	***SD***	**Range**
Non-verbal IQ[a]	12	94	10.6	82-110	12	97	7.5	75-110
Language comprehension[b]	13	81	11.5	64-98	10	75	16.1	55-104
Receptive vocabulary[c]	14	95	19.1	64-127	8	95	14.5	74-116
Expressive vocabulary[d]	13	82	14.8	55-107	10	77	13.7	55-98
Expressive morphosyntax[d]	13	72	3.9	65-78	10	73	4.8	64-79

Note. Scores are quotient scores (M = 100; SD = 15)

Instruments used:

[a]SON-R 2 ½ - 7 (Tellegen et al., 2005)

[b]Schlichting Test for Language Comprehension II (Schlichting & Lutje Spelberg, 2010b)

[c]Dutch Peabody Picture Vocabulary Test (PPVT-III-NL; Dunn & Dunn, 2005)

[d]Schlichting Expressive Language Test II (Schlichting & Lutje Spelberg, 2010a)

Procedure

The study spanned one full school year (40 weeks). To obtain a stable estimate of each child's baseline development during usual care, all participants first received 20 weeks of usual care. For the intervention group (LIT group), this period was followed by a 12-week LIT phase, and an 8-week post intervention phase, during which usual care was resumed. The control group (UC group) received usual care for the entire duration of the study. Children and parents were not informed of the onset of the LIT phase. Assessments (T1-T10) were scheduled every 4-6 weeks. A follow up measurement (T11) was conducted 8-10 weeks after the post intervention phase. Figure 1 illustrates the timeline.

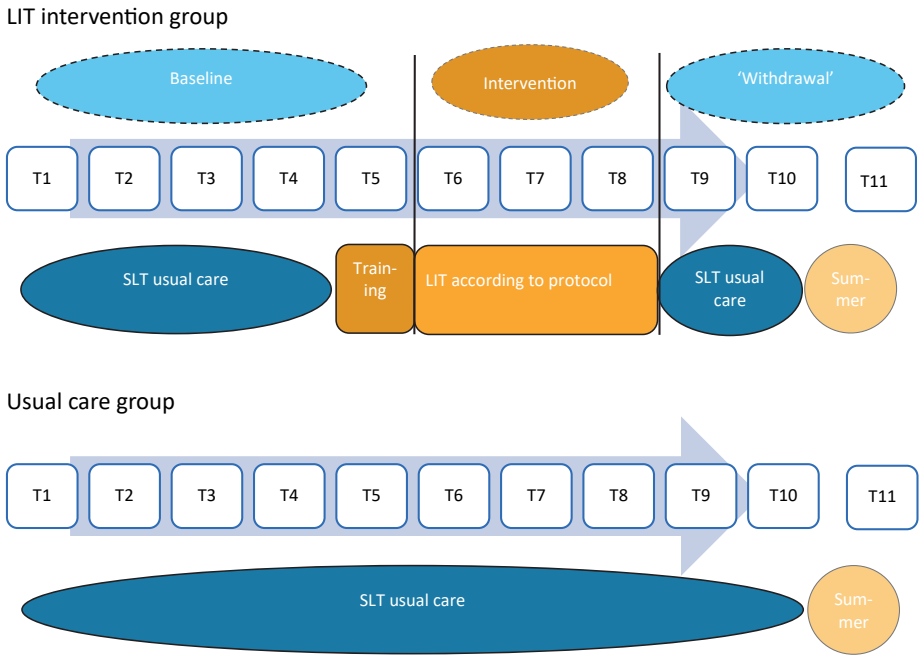


Figure 1. Timeline of interventions and assessments

Group allocation

Randomisation occurred at the therapist level: five SLTs were assigned to deliver the LIT intervention, resulting in 14 children receiving LIT; six SLTs continued usual care with 14 children. The SLTs treated two to five children each. To prevent contamination, LIT-trained SLTs did not share details of LIT with colleagues. The SLTs in the control group also received LIT training, but only after the study period had ended.

Intervention

All children received therapy from their own SLTs in the baseline, intervention and post-intervention phases. All SLTs had a four-year bachelor's degree in speech and language therapy and had over five years experience with children with DLD. Therapy sessions were scheduled one or two times a week and delivered individually or in small groups (2-3 children) in the SLT's office ("pull-out" service delivery model).

Usual care

In the UC phases (T1-T5 and T9-T10 for the LIT group; T1-T10 for the UC group) SLT provided therapy as usual, without researcher involvement. To gain insight into the dosage and content of usual care, we asked the SLTs to systematically document the frequency, session length, and methods used for

each session. Although usual care was not standardised, we assessed method characteristics to evaluate potential overlap between conditions (program differentiation). This strengthens the internal validity of the study and improves the interpretability results.

LIT Intervention

During the 12-week LIT phase, SLTs provided one individual session of 20 minutes per week. Missed sessions were rescheduled to ensure that each child received all 12 LIT sessions. SLTs occasionally also scheduled a UC session.

Target structures were individually determined. Based on baseline language samples, the first author identified morphosyntactic structures that were not yet produced consistently but were developmentally appropriate and clinically relevant. The proposed targets were subsequently discussed and refined in collaboration with the children's SLTs, ensuring both theoretical consistency and clinical feasibility. Consequently, target structures varied across children, reflecting their individual language profiles while remaining aligned with the underlying principles of the intervention. Appendix A provides an overview of target structures used in LIT.

A "cyclical goal attack strategy" was applied (Fey et al., 1993): if a target structure was produced correctly two or more times within a session, the child was considered to have started to master the structure. For the next session, either a new structure was selected, or a previous target was repeated and expanded. To support target selection and monitoring, SLTs documented children's production of target structures on session checklists.

SLTs delivered the LIT intervention using session protocols developed by the first author. These protocols included play scripts, target specific sentences, modelling and elicitation strategies, and recasting guidelines. They also provided information for parents with examples of target sentences and suggestions for home activities in which these sentences could be used. SLTs ensured that this written information was provided to parents. An example of a session protocol can be found in Appendix B.

Additional details about the LIT intervention can be found in Bruinsma et al. (2020).

Treatment fidelity LIT intervention

Fidelity to the LIT intervention was facilitated and monitored throughout the study using multiple complementary procedures:

- *SLT Training:*

  Prior to the LIT intervention phase, participating SLTs completed a 5-hour training delivered by the first author, an experienced SLT and LIT trainer with over 30 years of clinical expertise in DLD. The training covered theoretical foundations of morphosyntactic development, detailed instruction on

the session protocols, and practical exercises focusing on key intervention techniques, including modelling, elicitation, and recasting.

- *Session protocols:*
  To ensure consistent implementation of LIT and accurate modelling and elicitation of the target structures, each session was guided by a detailed protocol. These protocols are described above and illustrated in Appendix B.
- *Session checklists:*
  SLTs completed structured checklists on each session to document how the intervention was delivered and whether they had been able to adhere to the protocol.
- *Video recordings:*
  Two sessions per SLT were video recorded to evaluate adherence and quality of delivery. From each recording, five minutes were randomly selected and transcribed by the first author, who counted the number of target structures modelled by the SLTs.
- *Individual coaching:*
  To support implementation and strengthen treatment fidelity, two individual coaching sessions were provided during the intervention period. These sessions were based on video recordings and session checklists and included structured feedback aimed at optimising accurate and consistent application of LIT principles.
- *Telephone and email contact:*
  To further support and monitor fidelity, weekly email contact and regular telephone communication with the SLTs were maintained throughout the intervention period.

Measurement procedure

Morphosyntactic development was assessed every 4-6 weeks using language sample analysis and a sentence repetition task. To capture complexity across contexts, samples were elicited during play and story retelling (see also Dubbeld et al., 2024; Sealey & Gilmore, 2008). All sessions were conducted individually in quiet rooms by the first author and a blinded research assistant, both trained SLTs with master's degrees. For the play sessions varying Playmobil® toys were used. They lasted 10-12 minutes; recording began after acclimatisation. Story retelling involved six standardised picture sequences, controlled for linguistic complexity. The researchers told the story, after which the children were asked to recount it to a "Smurf" toy. Cues consisting of the first words of a sentence were provided when necessary. Six stories were rotated to avoid familiarity effects.

Language samples were transcribed in CHAT (MacWhinney, 2000) by trained assistants and interns, blind to the intervention. All had a master's degree or were in a study program of linguistics or speech-language pathology. The first forty T-units from play and ten from narratives were transcribed per child. Reliability was ensured through an LSA guide, consensus meetings, automated error correction, and double transcription and analysis of 5% of the samples. This resulted in 75-80% agreement between transcribers.

Sentence repetition was measured with the "Recalling Sentences" subtest of the Dutch CELF-Preschool-2 (De Jong, 2012). A woman's voice presented a sentence through a laptop computer's speaker, and the child was asked to repeat it. In this test, sentences become increasingly longer and complex. Odd and even items were alternated across sessions to minimize learning effects.

Outcome measures

Primary outcome measures were Mean Length of Utterances in words (MLU-w) and TARSP-P scores, a measure of morphosyntactic complexity (Bruinsma et al., 2020). MLU-w was determined using CLAN (Childes; MacWhinney, 2000) and the TARSP-P score was calculated using the digital tools SASTA and Stamper (Odijk, 2021; Odijk et al., 2025; Scheffer, 2025). The secondary outcome measure was the percentage of words correctly repeated on the CELF Preschool-2 Recalling Sentences subtest. Due to frequent errors by the participants, scoring was adapted to reflect word-level accuracy rather than the standard sentence-level points used in this test.

Statistical analysis

Changes in outcome measures were examined through visual inspection and TAU-U analysis, a nonparametric index for single-case designs that combines non-overlap between baseline and intervention data and accounts for baseline trends (Parker et al., 2011). The TAU-U analysis uses pairwise comparisons in a "time-forward" direction. The number of pairs that improve over time is calculated as a subset of all possible pairs. TAU-U was calculated using the online Single Case Research™ calculator (www.singlecaseresearch.org). The baseline phase (T1-T5) was compared with the LIT phase, which consisted of measurements during the intervention and immediately afterwards (T6-T10). The retention measurement T11, following an 8-week summer period without school and speech and language therapy, was excluded. Non-overlap was corrected for baseline trend when significant.

To determine the differences between T10 and T11, the average standard deviation of the outcome for all measurement points was calculated. A change of more than 0.5 SD indicated improvement or decline.

RESULTS

Characteristics of Usual Care and Language in Interaction Therapy

Usual care

During the UC phases, SLTs systematically documented the content of the therapy, its frequency and parent involvement. In the LIT group, this was done during T1–T5 and T9–T10 (LIT group UC), whereas in the UC group, documentation was collected across the entire study period (UC group UC; T1–T10). Table 3 summarises dosage and parent involvement for UC and LIT.

To determine intervention dosage, we counted all therapy sessions and divided the total by the number of school weeks, excluding holidays. Children received individual therapy sessions of 15–23 minutes, typically once a week. In some cases, these sessions were supplemented with small group sessions involving two or three children. Dosage patterns were comparable between the LIT group and UC group.

Differences emerged, however, in the proportion of sessions focused on morphosyntax. During the UC phases of the LIT group approximately 50% of sessions targeted morphosyntax; in the UC group this was 65% across the entire study period. Because all LIT sessions concentrated on morphosyntax, the overall number of sessions focusing on morphosyntax across the entire year did not differ substantially between groups.

Parents were involved in roughly half of the sessions focusing on morphosyntax. The instructions provided to them ranged from brief summaries of the target structures to more detailed guidance on how to support morphosyntax at home.

Table 4 summarises the methods used to enhance morphosyntax during UC. Imitation was frequently reported, typically supported by pictures, play activities, or repeated actions (FIT; Schlichting & De Koning, 2015). Metalinguistic intervention was also common, often taking the form of visual sentence representations. The SLTs reported already using some elements of LIT with 10 children in the LIT group and 8 in the UC group, though these accounted for only a small proportion of total treatment time. This finding confirms that LIT was not routinely incorporated into UC.

LIT intervention

Table 3 also presents information about the LIT phase (LIT group LIT). The children received one twenty-minute individual LIT session per week, supplemented by an average of 0.16 additional individual sessions ($SD = 0.205$) and 0.10 group sessions ($SD = 0.092$). In many cases, these supplementary sessions also focused on morphosyntax and often involved repetition of LIT session activities. No additional parent information was provided after these supplementary sessions. Overall, 87% of all sessions during the LIT phase targeted morphosyntax.

On the session checklists, SLTs indicated that they had been able to adhere to the protocol for virtually all sessions. From the five-minute transcriptions of the video recordings, the number of attempts to model the target structure was counted, as well as the number of correct models. Table 5 presents the results for each SLT. They attempted to model a target structure on average 4.7 times per minute ($SD = 1.18$) and correctly modelled it 2.6 times per minute ($SD = 0.81$).

Table 3. Dosage, sessions aiming at expressive morphosyntax and parent involvement in UC and LIT

	LIT group UC			LIT group LIT			UC group UC		
	M	***SD***	**Range**	***M***	***SD***	**Range**	***M***	***SD***	**Range**
Number of individual sessions per week	0.93	0.301	0.60-1.67	1.16[a]	0.205	1.00-1.50	0.94	0.240	0.58-1.33
Number of group sessions per week	0.20	0.200	0-0.48	0.10	0.092	0-0.25	0.13	0.212	0-0.74
Length of sessions (minutes)	19.11	2.705	15.00-22.50	20	0	-	18.93	1.283	17.50-20.00
Number of sessions aiming at expressive morphosyntax per week	0.56	0.314	0.17-1.08	1.10	0.130	1.00-1.42	0.69	0.392	0-1.25
Number of sessions per week in which information on morphosyntax is provided to parents	0.48	0.371	0-1.00	1.0	0	-	0.44	0.419	0-1.00

Notes.

LIT group UC: T1-T5 and T9-T10

UC group UC: T1-T10

[a] 1 session LIT and on average 0.16 additional sessions

Table 4. Methods in UC aiming at expressive morphosyntax

Method	Number of children		% of sessions per child[a]			
	LIT group UC	UC group UC	LIT group UC		UC group UC	
			M	*SD*	*M*	*SD*
LIT	10	8	12.7	7.04	23.6	13.70
Other methods:						
Imitations with pictures	13	13	41.8	24.10	39.1	26.50
Imitations in play	10	8	20.6	11.16	8.4	5.76
Metalinguistic intervention	8	7	29.8	21.69	40.1	21.82
FIT	4	9	19.1	7.78	24.6	19.16
Other	6	3	29.8	25.07	9.6	7.71

Notes. FIT = Functional Imitation Therapy (Schlichting & De Koning, 2015)
LIT group UC: T1-T5 and T9-T10
UC group UC: T1-T10
[a] Multiple methods could be used in a single session

Table 5. Number of target structures modelled by the SLTs during the LIT intervention

SLT	Children	Modelling attempts (number per minute)		Correctly modelled target structures (number per minute)	
		M	*SD*	*M*	*SD*
SLT 1	LIT-1, LIT-2	4.2	1.03	2.8	1.18
SLT 2	LIT-3, LIT-4, LIT-5, LIT-6, LIT-7	4.6	0.75	2.3	0.41
SLT 3	LIT-8, LIT-9	6.7	0.93	4.0	1.93
SLT 4	LIT-10, LIT-11	3.4	0.89	2.0	0.94
SLT 5	LIT-12, LIT-13, LIT-14	4.6	1.12	2.0	0.64

Individual growth patterns

Visual inspection of individual growth curves for all outcomes (MLU-w, TARSP-P and correctly repeated words on sentence repetition) reveals substantial variability across children. Most trajectories fluctuate over time, though a slight positive trend is observed for the majority of participants throughout the study period.

LIT group: comparison between Phase 1 (UC) and Phase 2 (LIT)

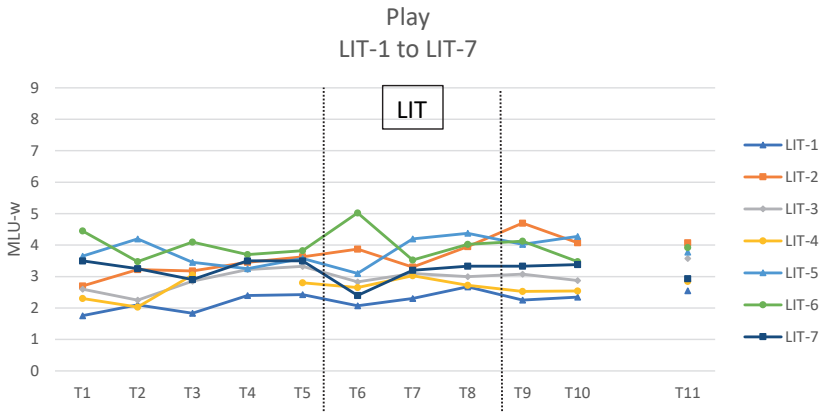
MLU in words

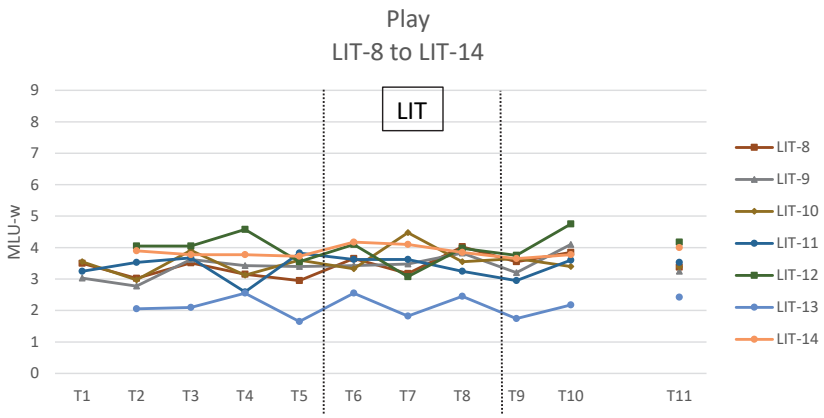
We calculated MLU in words from spontaneous language samples during play and story retelling. Figure 2 shows the individual trajectories of the LIT group. For clarity, the dataset is presented in two charts for play and two for story retelling. Visual inspection did not indicate any consistent acceleration during the

LIT phase compared to the UC phase. However, TAU-U analysis revealed a significantly greater increase during LIT for one child in play (LIT-8) and six children in story retelling (LIT-3, LIT-8, LIT-9, LIT-10, LIT-11 and LIT-13). See Table 6.

Between T10 and T11, MLU-w in play increased for one child (LIT-3) and decreased for five children (LIT-5, LIT-7, LIT-8, LIT-9, and LIT-12). In story retelling, MLU-w increased for four children (LIT-3, LIT-4, LIT-7, and LIT-14) and decreased for four children (LIT-2, LIT-5, LIT-8, and LIT-9). For the other children, MLU-w remained stable during the summer holidays.

In summary, a minority demonstrated a significantly higher increase in MLU-w during LIT than during UC, primarily in story retelling. Some children showed a decline in MLU-w after the summer holidays.





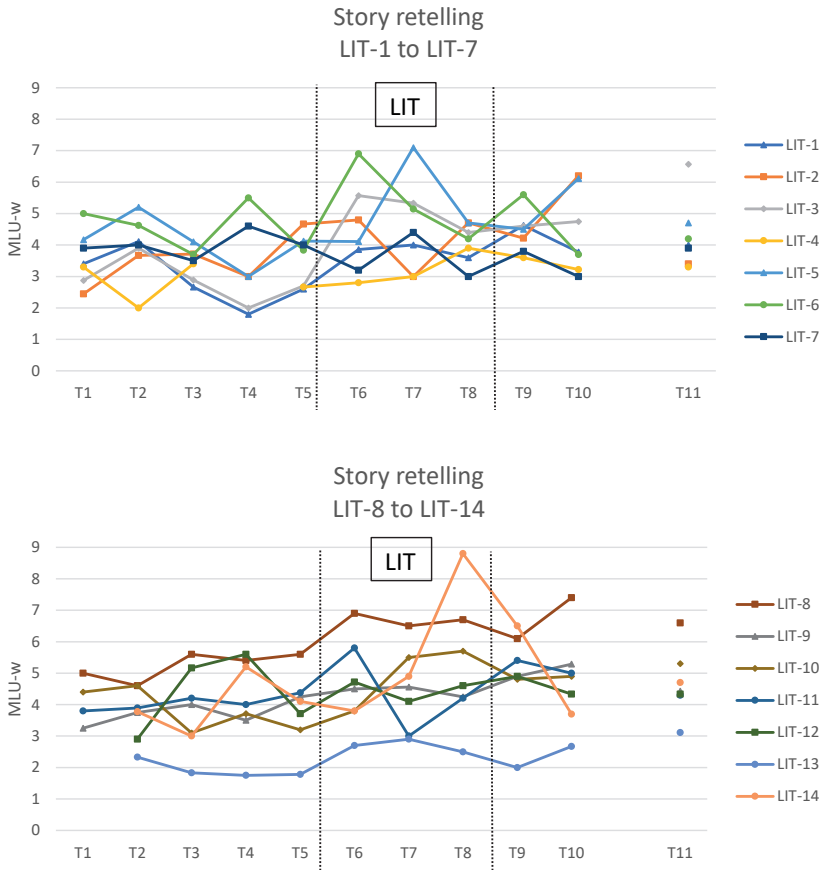


Figure 2. MLU-w in language during play and story retelling for the individual children in the LIT group

Note. T1 – T5 = baseline, T6-T8 = LIT, T9-T10 = post-intervention, T11 = retention

Table 6. TAU-U of MLU-w for language during play and story retelling for the individual children in the LIT group

Participant	Play	Story retelling
	TAU Phase 1 vs Phase 2	TAU Phase 1 vs Phase 2
LIT-1	0.04[a]	0.68
LIT-2	0.52[a]	0.64
LIT-3	-0.20[a]	**1***
LIT-4	0.10	0.4
LIT-5	0.48	0.6
LIT-6	0.08	0.32
LIT-7	-0.44	-0.6
LIT-8	**0.84***	**1***
LIT-9	0.56	**0.96***
LIT-10	0.24	**0.84***
LIT-11	-0.08	**0.16[a]***
LIT-12	-0.1	0
LIT-13	0.15	**0.9***
LIT-14	0.3	0.4

Note. Phase 1 (UC) is T1-T5, Phase 2 (LIT) is T6-T10.

[a] corrected for baseline trend

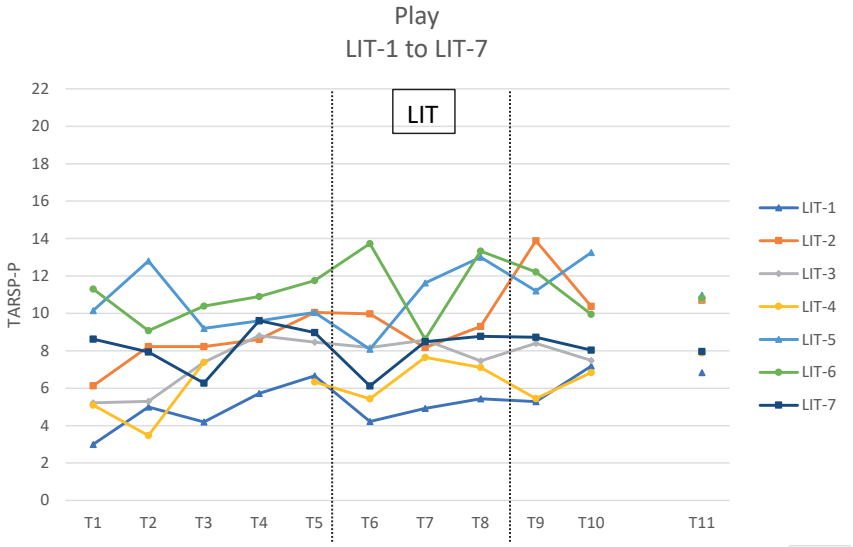
* $p \leq 0.05$

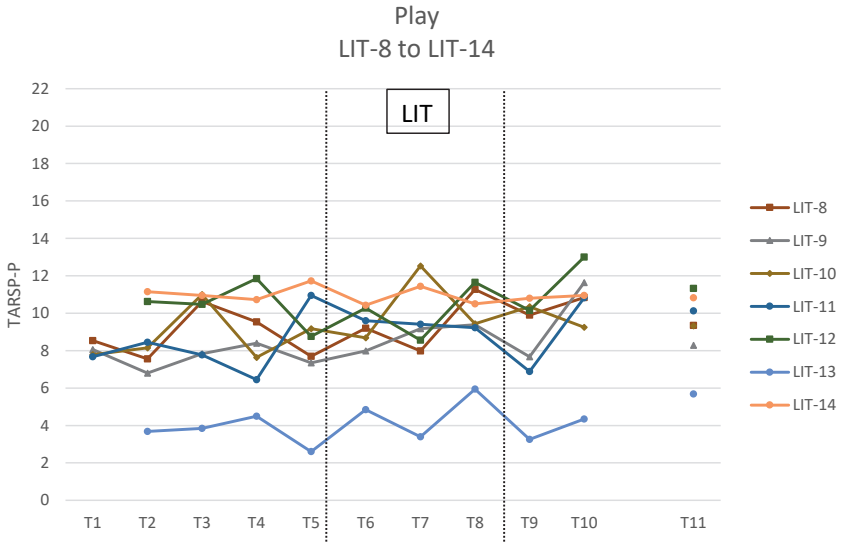
TARSP-P

TARSP-P scores were derived from the same language samples as MLU-w. Individual graphs (Figure 3) showed no clear trend for play, but several children showed acceleration in story retelling during LIT. For clarity, the dataset is presented in two charts for play and two for story retelling. TAU-U confirms the pattern: five children (LIT-2, LIT-3, LIT-8, LIT-10 and LIT-13) showed significantly higher increase in TARSP-P during LIT than UC in story retelling (Table 7). Four of these children had also shown enhanced MLU-w gains in story retelling.

Between T10 and T11, MLU-w in play increased for one child (LIT-3 and LIT-13) and decreased for four children (LIT-5, LIT-8, LIT-9, and LIT-12) in play. In story retelling, MLU-w increased for four children (LIT-1, LIT-3, LIT-4, LIT-7, LIT-12, and LIT-13) and decreased for three children (LIT-2, LIT-6, and LIT-9). For the other children, TARSP-P remained stable during the summer holidays.

In summary, a subset of children demonstrated a significantly higher increase in TARSP-P during LIT than during UC, primarily in story retelling. Some children showed a decline in TARSP-P after the summer holidays.





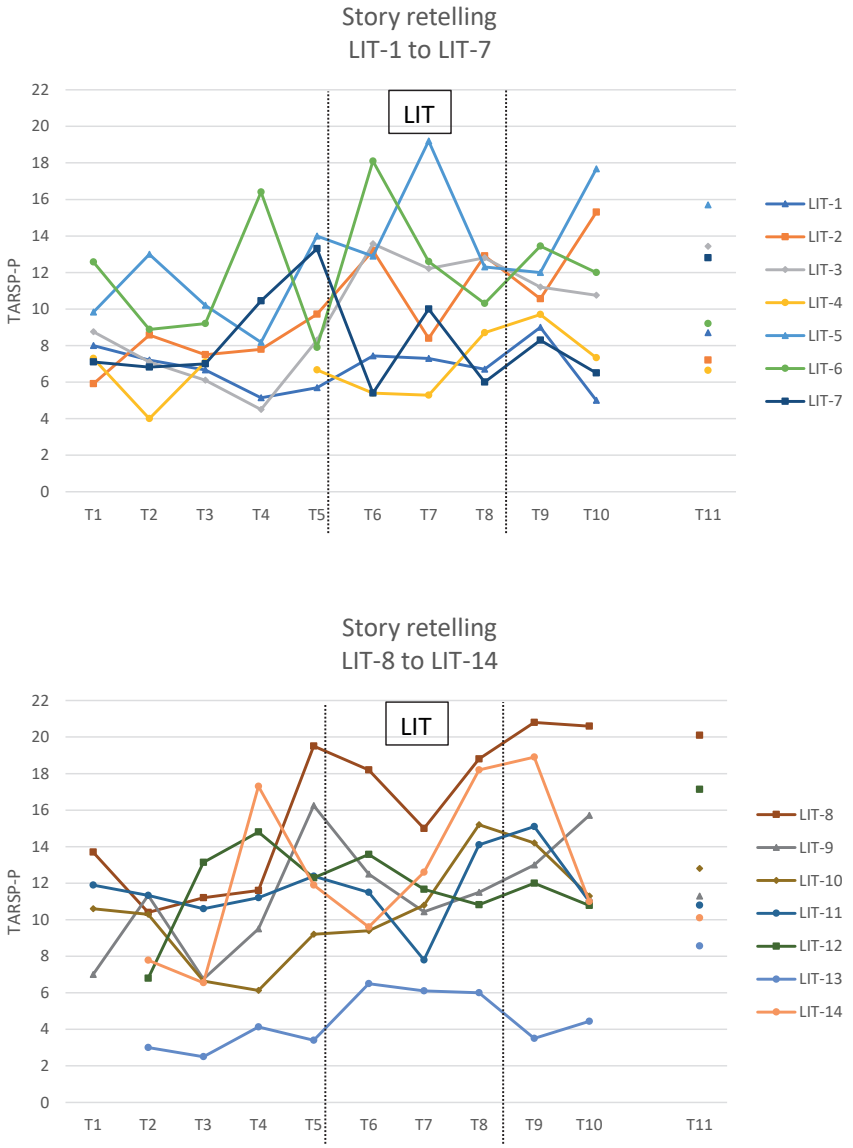


Figure 3. TARSP-P in language during play and story retelling for the individual children in the LIT group

Note. T1 – T5 = baseline, T6-T8 = LIT, T9-T10 = post-intervention, T11 = retention

Table 7. TAU-U of TARSP-P for language during play and story retelling for the individual children in the LIT group

Participant	Play	Story retelling
	TAU Phase 1 vs Phase 2	TAU Phase 1 vs Phase 2
LIT-1	-0.12[a]	0.28
LIT-2	0.16[a]	**0.84***
LIT-3	-0.04[a]	**1***
LIT-4	0.4	0.4
LIT-5	0.44	0.52
LIT-6	0.28	0.52
LIT-7	-0.2	-0.52
LIT-8	0.52	**0.76***
LIT-9	0.6	0.52
LIT-10	0.6	**0.84***
LIT-11	0.36	0.12
LIT-12	-0.1	-0.3
LIT-13	0.3	**0.9***
LIT-14	-0.45	0.6

Note. Phase 1 (UC) is T1-T5, Phase 2 (LIT) is T6-T10.

[a] corrected for baseline trend

* $p \leq 0.05$

Sentence repetition

Sentence repetition was scored as percentage of correctly repeated words in sentences. Version 1 (odd items) turned out to be easier than Version 2 (even items), complicating visual interpretation of the individual graphs. TAU-U analyses indicate that only one child (LIT-10) improved significantly more during LIT than UC.

For retention, T9 and T11 were compared, as the same versions of the test were used at these measurement points. The performance of five children improved between T9 and T11 (LIT-3, LIT-4, LIT-5, LIT-7, and LIT-11). The performance of three children declined (LIT-1, LIT-10, and LIT-12). For one child (LIT-13) data were missing for T11. There were no significant differences between T9 en T11 for the remaining children.

UC group: comparison between Phase 1 (T1-T5) and Phase 2 (T6-T10)

To contextualize findings, TAU-U analyses were also applied to the UC group across the same phases (Phase 1: T1–T5; Phase 2: T6–T10). Three children improved significantly more in MLU-w during play in Phase 2 compared to Phase 1 (UC-2, UC-8, and UC-11), and four others during story retelling (UC-6, UC-10, UC-12, and UC-14). For TARSP-P one child made significantly more progress in play in Phase 2 (UC-8),

one child in story retelling (UC-9), and one in both (UC-11). One child made significantly more progress in sentence repetition (UC-5). These patterns are inconsistent and do not suggest that Phase 2 was inherently more favourable for morphosyntactic development.

Comparison between LIT and UC-group

Group level means for MLU-w (Figure 4) show no clear differences between LIT and UC due to high interindividual variability. Group level trends for TARSP-P (Figure 5) and sentence repetition (Figure 6) also revealed no distinct differences between conditions.

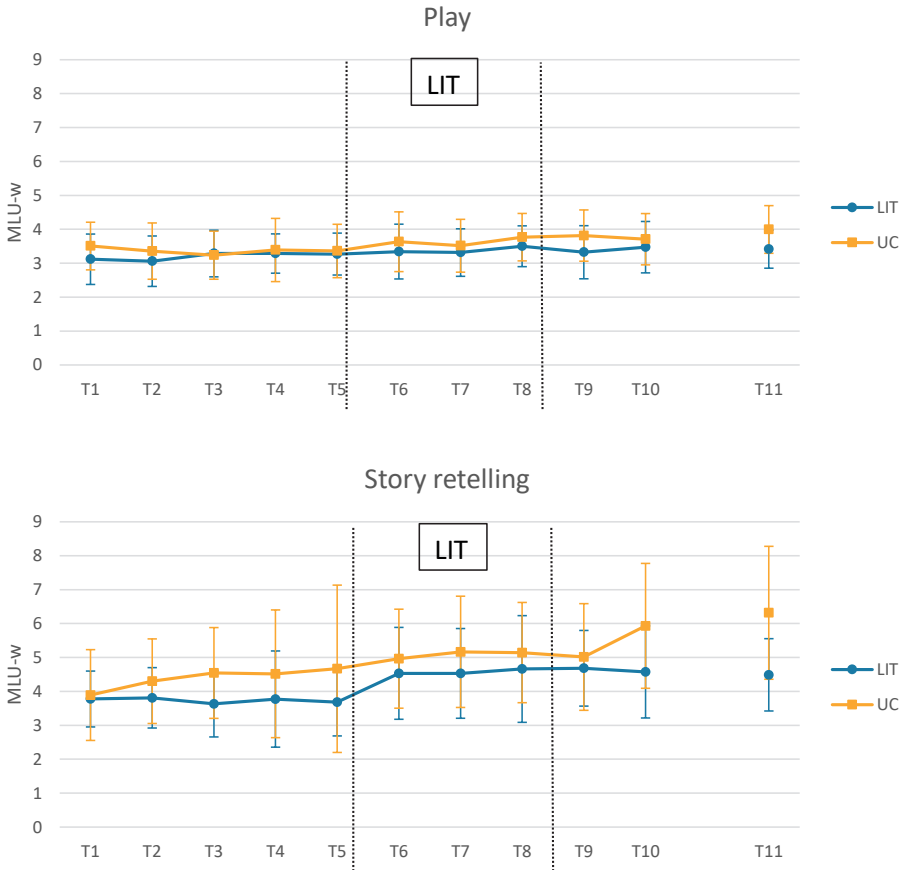


Figure 4. Means and standard deviations of MLU-w in language during play and during story retelling for the LIT group and the UC group

Note. T1 – T5 is the baseline phase, T6-T8 is the LIT-intervention phase, T9-T10 is the post-intervention phase, T11 is the retention measurement

Table 8 shows the number of children with stable scores, improvement or decline between T10 and T11. Most children in both groups had the same outcomes or improved. For MLU-w in play and story retelling and TARSP-P in play more children in the UC group showed improvement, whereas for TARSP-P in story retelling more children in the LIT group showed improvement during the summer holidays.

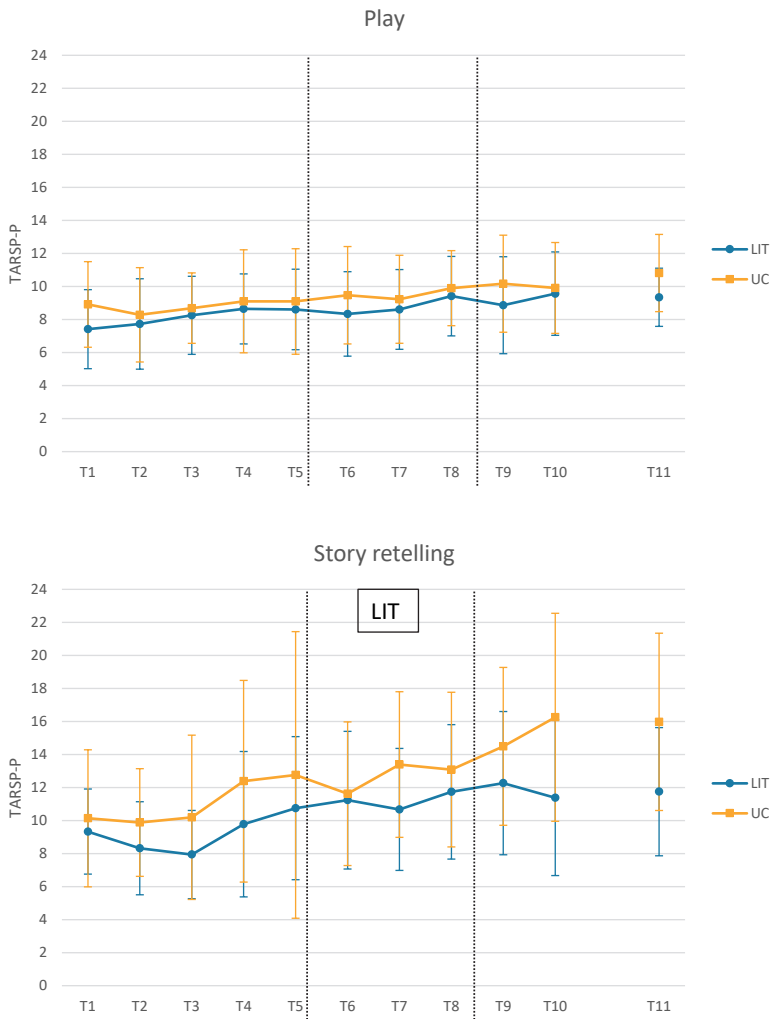


Figure 5. Means and standard deviations of TARSP-P in language during play and during story retelling for the LIT group and the UC group

Note. T1 – T5 is the baseline phase, T6-T8 is the LIT-intervention phase, T9-T10 is the post-intervention phase, T11 is the retention measurement

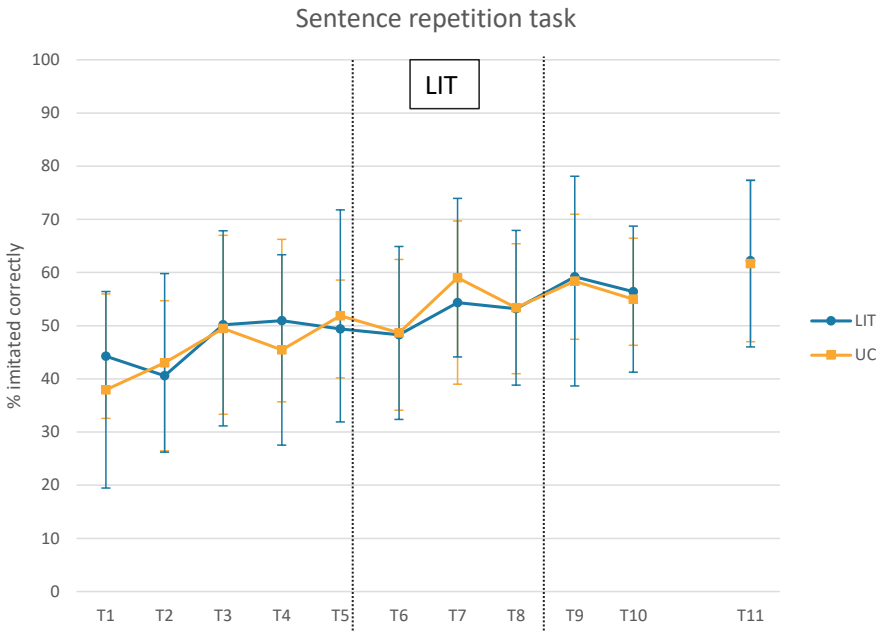


Figure 6. Means and standard deviations of the percentage imitated correctly on the sentence repetition task for the LIT group and the UC group

Note. T1 – T5 is the baseline phase, T6-T8 is the LIT-intervention phase, T9-T10 is the post-intervention phase, T11 is the retention measurement

Table 8. Number of children with stable scores, improvement or decline between T10 and T11 in the LIT and the UC group

Outcome	Stable scores		Improvement		Decline	
	LIT	UC	LIT	UC	LIT	UC
MLU-w play	7	4	2	7	5	2
MLU-w story retelling	6	5	4	7	4	2
TARSP-P play	8	5	2	6	4	2
TARSP-P story retelling	6	8	5	2	3	4
Sentence repetition[a]	5	8	5	3	3	0

[a] For sentence repetition data from T9 and T11 were compared, because at these measurements the same versions were used.

Child and contextual factors

Seven of fourteen children in the LIT group showed significantly greater progress during LIT on at least one measure. Examination of age, gender, being mono- or multilingual, language profile, and non-verbal IQ revealed no clear associations (Table 9). School and therapist factors appeared more relevant: all children at School 3 (SLT 4) and School 4 (SLT 5) improved more during LIT than UC (Table 10).

Table 9. Characteristics of children in the LIT group with greater progress during LIT than during UC in multiple outcome measures and with no difference in progress during LIT and UC

	Greater progress during LIT than UC (*n* = 7)		**No difference in progress during LIT and UC (*n* = 7)**	
Age at T1 (months)	*M* = 59, *SD* = 6.8		*M* = 59, *SD* = 5.4	
Female	*n* = 3		*n* = 2	
Multilingual	*n* = 3		*n* = 2	
Receptive-expressive disorder	*n* = 5		*n* = 3	
Testscores (Q-scores)	**M**	**SD**	**M**	**SD**
Non-verbal IQ	96	7.7	97	7.3
Language comprehension	80	11.8	83	10.8
Receptive vocabulary	88	17.0	101	17.7
Expressive vocabulary	79	17.5	85	10.8
Expressive morphosyntax	72	4.7	72	3.0

Table 10. The distribution of children in the LIT group, with and without more progress during LIT than during UC across schools and SLTs

School	**SLT**	**More progress during LIT than UC**	**No difference in progress during LIT and UC**
School 1a[a]	SLT 1	LIT-2	LIT-1
School 1b[a]	SLT 2	LIT-13	LIT-12
			LIT-14
School 2	SLT 3	LIT-3	LIT-4
			LIT-5
			LIT-6
			LIT-7
School 3	SLT 4	LIT-8	
		LIT-9	
School 4	SLT 5	LIT-10	
		LIT-11	

[a] School 1a and school 1b are different locations of the same school

DISCUSSION

The study investigated the effects of Language in Interaction Therapy (LIT) on morphosyntactic skills in 4–6-year-old children with DLD enrolled in Dutch special education. LIT was compared with usual care speech and language therapy (UC). Children received UC during the first half of the school year and LIT during the second half. Across both phases, children showed overall gains in sentence length (MLU-w), morphosyntactic complexity (TARSP-P) and sentence repetition, reflecting ongoing developmental progress over the school year. Despite this general upward trend, the single-case analyses revealed meaningful individual differences in response to the two intervention phases. TAU-U analyses indicated that seven of the fourteen children demonstrated larger gains during the LIT phase than during the UC phase, predominantly in the context of story retelling.

To rule out seasonal effects, we included a control group that received UC throughout the full school year. Although several children in the control group also showed greater gains in the second half of the year, this pattern was inconsistent and does not indicate that the latter period was inherently more favourable for morphosyntactic growth. Therefore, the additional progress observed in seven children during the LIT phase cannot be attributed solely to timing within the school year.

Taken together, our findings suggest that LIT may provide an additional benefit for a subset of children beyond the progress typically achieved through usual care. However, the evidence remains preliminary. Children in both groups improved across phases, which might reflect the strong language support provided by all professionals in Dutch special education (see also Bruinsma et al., 2023). Across the entire study period, mean increases of 0.31 words in MLU-w for play-based samples and 1.1 words for story retelling were observed. These gains are comparable to those reported for English-speaking children with DLD in similar age ranges (e.g. Rice et al.; 2010). Such findings suggest that modifying only the individual therapy method in an already strong language-supportive context may not be sufficient to produce large group-level differences in outcomes.

Our findings partly align with previous studies on morphosyntax interventions in clinical practice. Smith-Lock et al. (2013) reported significant gains for ten of nineteen five-year-old children following an intervention combining focused stimulation, recasting and imitation in a special education setting. However, their outcomes were based on elicited production of pre-selected target structures, which typically yields larger gains than general measures derived from spontaneous language. In this light, greater improvements than those observed in the present study would be expected. Closer parallels can be drawn with Duinmeijer et al. (2024), who compared a scripted, group-based intervention with usual care, using general morphosyntactic measures. Although their participants were younger and the intervention was not delivered by SLTs but by pedagogical practitioners, they similarly found improvement in broad morphosyntactic measures across both phases, with larger gains specifically for

the targeted structures during intervention. This pattern resembles the current study, where general progress was observed throughout the year, but a subset of children showed additional gains during LIT.

Direct comparison with many published studies remains challenging. In the systematic review of Rinaldi et al. (2021), for instance, most studies with morphosyntactic outcome measures were efficacy studies, conducted under controlled conditions. These studies used different therapeutic techniques or target selection methods, such as contrasting high-variability versus low-variability verb input (Plante et al., 2014) or teaching novel grammatical forms (Finestack, 2018; Finestack & Fey, 2009). Even within these controlled designs, results are inconsistent, and not all children with DLD demonstrate clear gains (Law et al., 2004; Rinaldi et al., 2021). The variability observed in our study is therefore consistent with the broader literature, underscoring the heterogeneity of treatment response in children with DLD.

No clear child characteristics emerged that predicted LIT effectiveness. Age, gender, being mono- or multilingual, baseline test scores, language profile, and non-verbal IQ did not differentiate children who showed greater progress during LIT, consistent with our earlier findings (Bruinsma et al., 2023). This contrasts with studies by Law et al. (2004) and Vermeij et al. (2022), which reported greater gains in morphosyntax for children with expressive-only disorders. These discrepancies may reflect differences in participant characteristics. Law et al. included children with receptive–expressive disorders within a broader group of children with complex developmental difficulties, whereas Vermeij et al. focused on younger children than those in the present study. Such variations make direct comparison challenging and may partly explain the absence of clear child-level predictors in our data.

In contrast, therapist-related factors appear to play a more substantial role. Two SLTs achieved consistently greater gains across all their cases during the LIT phase compared to UC. Their outcomes are likely linked to differences in fidelity and dosage. Video analyses showed that these SLTs provided a substantial number of correctly modelled target structures, suggesting more precise and intensive implementation of LIT's core techniques.

Treatment fidelity and dosage

Delivering LIT through a structured, protocol-based approach may have posed challenges for SLTs, potentially affecting treatment fidelity. While protocols help standardise the intervention across participants, they can also limit therapists' ability to adapt flexibly to moment-to-moment needs. The SLTs' documentation from UC sessions showed that they frequently combined elements of different approaches rather than adhering to a single method. This pattern is consistent with earlier descriptions of eclectic clinical practice (Scheider et al., 2014; Zipoli & Kennedy, 2005). While such flexibility reflects professional judgment and experience, it may reduce fidelity to the principles underpinning an intervention (Morgan et al., 2019).

Despite these constraints, the dose (defined as the number of correctly administered teaching episodes during a therapy session; Frizelle et al., 2021b) was relatively high. Video analysis showed that SLTs modelled target structures correctly an average of three times per minute, a level comparable to high-dose interventions in the literature (Frizelle et al., 2021b). It is important to note, however, that while Frizelle et al. examined the number of recasts, we counted the number of models of the target structure; these are related but not identical indices of linguistic input. In contrast, the dose frequency (number of sessions per week) in the present study was lower than that used in most studies. Frizelle et al. suggest that low-dose frequency interventions can still be effective if individual sessions provide a high number of learning episodes, but the optimal balance between dose and dose frequency remains unclear. Further research is needed to establish dosage parameters that maximize outcomes for children with DLD.

Outcome measures and sensitivity

Detecting small changes in morphosyntactic ability remains challenging. General outcome measures derived from language samples were chosen for their ecological validity and relevance to clinical practice, but they may lack the sensitivity needed to detect subtle improvements over relatively short intervention periods. To address this limitation, we introduced TARSP-P, a measure designed to provide a more fine-grained index of morphosyntactic complexity. Although our findings suggest that TARSP-P has potential, further refinement and validation are needed before it can be considered a robust clinical or research tool.

Our findings also highlight the importance of elicitation context. Progress was more evident in story retelling, than in play-based samples, suggesting that improvements may not fully generalise to less structured, spontaneous language use. This aligns with previous recommendations to use multiple contexts for assessment, since children do not demonstrate their full linguistic potential during play, whereas storytelling elicits more complex grammatical structures (Dubbeld et al., 2024). Combining language sample analysis with structured grammatical production tasks may also provide a more comprehensive and sensitive picture of children's progress (De Heer, 2021). Additionally, in future research measures should be developed that capture functional communication in natural settings, such as home and classroom environments, to better understand how intervention effects translate into everyday communication.

Methodological considerations

Several limitations of the study design should be considered when interpreting the findings. First, the design did not allow for a direct comparison of treated versus untreated structures. Target structures were individualised based on developmental appropriateness and communicative relevance, resulting in substantial variability across children. Because it was not possible to find a comparable control structure for each target, we relied on general outcome measures rather than target-specific measures. While individualising targets enhanced clinical relevance, it also prevented the use of more sensitive,

structure-specific measures. Future research should explore whether treated structures improve more than untreated ones, although this requires a more detailed understanding of Dutch morphosyntax to identify appropriate control items.

Second, some contamination between conditions may have occurred. SLTs reported using elements of LIT during UC, both for children in the UC group and for those in the LIT group prior to the LIT phase. This overlap may have reduced contrasts between interventions.

Finally, treatment fidelity and protocol adherence posed challenges. Although efficacy studies have identified key components of effective morphosyntax intervention, they often provide limited detail on implementation contexts, such as specific activities and linguistic environments (Frizelle et al., 2021a). Our operationalisation of LIT, based on Van den Dungen (2007), may not have been optimal. For example, criteria for determining mastery of a target structure are not well defined. SLTs advanced to new target structures when a child produced a structure spontaneously several times, which may have occurred before full mastery. This could have limited cumulative learning and reduced overall intervention effects.

Future directions

The findings of this study highlight the multifaceted interplay of factors that contribute to morphosyntactic development. In the present design, we modified only one component of children's language-learning environment, namely the method used in individual speech and language therapy, which was provided once a week. Other influences, such as the language stimulation provided in the classroom and within the home environment, likely have a stronger impact on children's progress. Future research should therefore adopt a broader ecological perspective, examining how child characteristics, SLT expertise, intervention techniques and contextual influences interact to shape outcomes. The substantial individual variability observed in this study suggests that systematic monitoring of treatment fidelity, intervention dose, and responsiveness is essential for understanding which children benefit most and under what conditions.

The ability of SLTs to tailor their interventions to individual needs is an important factor in treatment success. In our study, SLTs could optimally tailor UC to meet children's needs, whereas LIT required adherence to a predefined protocol, potentially limiting responsiveness. Although protocolising UC would reduce potential bias, it may also restrict clinical judgement and adaptability, thereby diminishing therapeutic effectiveness in both conditions. Striking the right balance between standardisation through protocols and the flexibility needed to respond to individual children's needs remains essential.

Further refinement of LIT is warranted. Establishing clearer and more operationalised criteria for mastery of target structures would help to guide progression towards more complex goals. Additionally, given that most efficacy research has been conducted in English, future studies should examine how linguistic differences between English and Dutch affect the selection of target structures and the use of techniques

such as recasting. Further research is also needed to identify the optimal dosage parameters, both dose and dose frequency, and to develop outcome measures that capture functional communication across diverse contexts. These measures will be essential for determining whether intervention gains translate into meaningful enhancements in children's communicative functioning at home and at school.

Practical implications

The findings of our study underscore the need for realistic expectations when targeting morphosyntactic development in children with DLD. While intervention can be effective, effect sizes are typically small to moderate, and not all children benefit equally. The progress in MLU in our study was noteworthy but not sufficient to reduce the gap with typically developing peers. Therapy goals should therefore balance skill development with communicative support and compensatory strategies (Denman et al., 2021).

LIT offers opportunities for such integration, because it emphasises naturalistic interaction rather than isolated grammar drills. Its play-based format aligns with recommendations to prioritise motivation and engagement, which are essential for long-term intervention (Fourie et al., 2011; Van Poucke et al., 2025). SLTs in this study reported that children preferred LIT over UC, suggesting that play-based approaches enhance participation. However, the analysis of UC revealed a tendency toward exercise-based activities, which may limit engagement and context-rich learning. Future practice should consider shifting toward interventions that incorporate play and functional communication.

Collaboration between professionals, parents, and children is critical in integrating skill development with communicative support and compensatory strategies. Rather than relying solely on high-intensity specialist therapy, a coordinated approach that embeds language stimulation across settings may yield greater benefits. LIT is well suited for this purpose because it can be delivered by trained professionals other than SLTs, increasing both feasibility and accessibility (Duinmeijer et al., 2024).

CONCLUSION

Although LIT was not consistently superior to UC, the findings indicate that it holds promise as a naturalistic, play-based approach for supporting morphosyntactic development in children with DLD. The variability in individual responses underscores the need for realistic expectations and for intervention strategies that extend beyond the therapy room. Rather than relying solely on changes in therapy methods, effective support should integrate targeted morphosyntax intervention with broader communicative strategies, embedded language stimulation and collaboration across home, school, and clinical settings. Future research should continue refining LIT protocols, establishing clear criteria for mastery of target structures, and determine optimal dosage parameters while continuing to explore contextual factors that influence outcomes. Long-term, child-centred approaches that

combine targeted morphosyntactic intervention with functional communication strategies and high engagement are essential for supporting meaningful language development in children with DLD.

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APPENDIX A TARGET STRUCTURES IN LANGUAGE IN INTERACTION THERAPY

Target structures used in LIT were determined by the first author, in collaboration with the SLTs of the participants. In most therapy sessions, a syntactic goal was combined with one or two morphological goals, for example "a declarative sentence consisting of three constituents" was combined with "auxiliary verb singular present tense form" and "noun phrase containing an article".

Syntactic goals

- Declarative sentence consisting of three constituents
- Declarative sentence consisting of four constituents
- Declarative sentence consisting of five constituents
- Coordinate clauses with conjuctions *en, maar, want, of* (and, but, because, or)
- Subordinate clause with conjunctions *dat, of* (that, if/wether)
- Subordinate clause with conjunctions *als, toen, omdat* (if, when, because)
- Question consisting of three constituents
- Question consisting of four constituents

Morphological goals

- Auxiliary verb singular present tense form
- Auxiliary verb + infinitive
- Auxiliary verb + past participle
- Verb singular present tense form
- Verb plural present tense form
- Verb simple past tense
- Plural noun
- Noun phrase containing an article
- Personal pronouns *ik, jij, hij* (I, you, he)
- Personal pronoun *wij* (we)
- Personal pronoun *zij* (they)
- Personal pronouns *hij, zij* (he, she)
- Noun phrase consisting of two words
- Noun phrase consisting of three words
- Negative noun phrase with *geen* (no)
- Clitic *er* (there)

APPENDIX B THERAPY PROTOCOL FOR PRESENT PERFECT WITH 3 CONSTITUENTS

Session goals

- The child produces complete sentences with "have + past participle", subject and two other constituents
- The sentences contain noun phrases consisting of two or three words

Materials

- Paint in red, yellow, blue, and white
- Brushes
- Plates for mixing paint
- Art smock
- Water
- Paper
- Corks or other materials for painting

Preparation

Set up the materials.

Target sentences

I have put red paint on the plate.
I have put yellow paint on the plate.
You have made orange paint now.
I have put blue paint on the plate.
I have put yellow paint on the plate.
Now I have made green paint.
I have added white paint to the green paint.
I have made the paint lighter.
I have added blue paint to the green paint.
I have made the paint darker.
I have made beautiful colors with my brush.
I have made a stripe with the brush.
I have made a circle with the cork.
I have chosen blue paint now
I have cleaned the brush with water.
I have put the drawing here.
I have rinsed the brush well.

Note

- The form of the past participle does not need to be correct at this stage. When discovering the rules for past participles, children often apply the rules of regular verbs. Do not correct if the child says *gekiest* (chosed) instead of *gekozen* (chosen).
- Pronunciation of the past participle can be difficult for children with phonological disorders. Do not correct if the child says *maakt* or ***ə****maakt* instead of *gemaakt* (made).

Recasting

- If the child uses a different verb tense (*I put yellow paint on the plate*), repeat the sentence using a past participle with emphasized "have" (*I* ***have*** *put yellow paint on the plate).*
- If the child omits a noun phrase or part of a noun phrase (*I have made lighter),* repeat the sentence with emphasis on the missing part *(I have made* ***the paint*** *lighter).*

Simplified recasts

- Reduce the number of constituents:

  I have added blue paint to the green paint becomes *I have added blue paint.*

  I have made beautiful colors with my brush becomes *I have made beautiful colors.*

Expanded recasts:

- Expand phrases:

  I have made a stripe with the brush becomes *I have made a small stripe with the brush.*

- Add a constituent:

  I have made the paint lighter becomes *Now I have made the paint lighter.*

  I have added blue paint to the green paint becomes *I have just added blue paint to the green paint.*

Activity

You are going to mix colors with the child. When you are satisfied with the colors, you are going to make a painting.

Introduction to the child

I have different colors of paint here. We are going to make new colors and then we are going to paint.

Script

- Put some red and yellow paint on the plate. Phrase:
  I have put red paint on the plate. I have put yellow paint on the plate.
- Let the child mix the paint and phrase:
  You have made orange paint now.
- Ask the child which colors they want to mix next. Let the child put the paint on the plate and encourage them to say what they have done:
  I have put blue paint on the plate. I have put yellow paint on the plate.
- Ask: What have you done now? Encourage the child to say:
  Now I have made green paint. Use a prompt if needed:
  Now… (I have made green paint). Use recasting.
- Continue mixing colors and phasing what you have done. Use recasting.
- Discuss whether you like the colors or if they need to be lighter or darker. Encourage the child to describe what they have done while mixing. Sentences to use:
  I have added white paint to the blue paint.
  I have made the paint lighter.
  I have added blue paint to the green paint.
- When the child produces a sentence correctly several times, expand it. For example:
  Now I have made the paint lighter.
  I have just added blue paint to the green paint.
- Make a painting with brushes and other materials and discuss what you have done:
  I have made a stripe with the brush.
  I have made a circle with the cork.
- When it's time to clean up, use sentences like:
  I have cleaned the brush with water.
  I have put the drawing here.

Instructions for parents

Dear Parent,
Here is this week's assignment. You can do this activity with your child several times. The goal is to support your child to use longer sentences.
You can use the sentences below. Repeat them many times.
If you speak another language at home, feel free to use that language.
Activity
Play a memory game with your child. Each time, talk about which picture you picked.

Material
Memorycards

Sentences
I have picked the bird.
Now I have picked the flower.
Now I have picked the car.
You have turned the other one too.
I have not picked the same one.
I have already seen the cat.

Feedback
If the child says a sentence incorrectly (e.g., *Now has I picked the flower*), respond with the correct sentence (*Now you have picked the flower*).



CHAPTER 6

General discussion







This thesis investigated the language development and communicative abilities of children aged 4 to 6 with Developmental Language Disorder (DLD) who attend schools for special education and receive speech and language therapy. The study explored the challenges of these children in their everyday communication and examined their language growth, with particular attention to child-specific characteristics that may influence developmental trajectories. Given the persistent morphosyntactic difficulties associated with DLD and their impact on communication, the thesis also evaluated the effectiveness of an intervention aimed at improving morphosyntactic skills.

The central research questions were:

1. What limitations in communication do children with DLD (aged 4-6 years) experience in daily life according to their parents? How do teachers perceive these children's communicative abilities and social functioning in the classroom?
2. What changes occur in language comprehension, vocabulary and morphosyntax after one year of special education? How are these changes related to child characteristics, such as language profile, cognitive abilities and being raised mono- or multilingual?
3. What is the effect of the evidence-based, protocolised intervention Language in Interaction Therapy compared to usual care speech and language therapy on morphosyntactic complexity?

This chapter starts with a synopsis of the main findings, followed by a reflection on these results in relation to existing literature and emerging theoretical insights. The chapter then discusses methodological considerations and outlines directions for future research. It concludes with implications for clinical practice and policy.

MAIN FINDINGS

The research project involved two samples of children with DLD. Chapters 2 and 3 report findings from a sample of 154 children, while Chapters 4 and 5 are based on a separate sample of 28 children.

Chapter 2 addresses the first research question by describing communication difficulties in daily life, as reported by parents and teachers. Parents noted limitations across a range of communicative situations. Most frequently mentioned were limitations in the ability to express themselves, be understood, and speak intelligibly, particularly in interaction with unfamiliar individuals. Children's stress and emotional states were found to have a significant negative impact on their communicative functioning. Teachers rated the children's communicative competence as inadequate but reported that social skills and the quality of student–teacher relationships were comparable to those of typical developing children. Notably, limitations in communication in daily life were more pronounced in children with both receptive and expressive delays than in those with expressive delays only.

Chapter 3 explores the second research question, focusing on language development over one school year and the role of child characteristics. Children demonstrated growth in language comprehension, expressive vocabulary, and expressive morphosyntax, with some narrowing the gap with their typically developing peers. The smallest amount of growth was seen in morphosyntax. There were no differences in progress between children with receptive-expressive delays and expressive-only delays, or between monolingual and multilingual children. Furthermore, progress was unrelated to non-verbal IQ. However, children with lower initial language test scores made more substantial gains than those with higher initial scores.

Chapters 4 and 5 address the third research question, evaluating the effects of Language in Interaction Therapy (LIT) on morphosyntactic complexity. **Chapter 4** introduces the intervention, detailing its evidence-based components: targeted selection of therapy goals, structured play scripts and techniques such as focused stimulation and recasting. The chapter also describes the support and practical solutions LIT provides to SLTs to implement these elements and the protocols that are designed for the study. SLTs were able to deliver the intervention as intended, supported by the training and guidance they received. Subsequently, progress in morphosyntactic complexity of five children during a LIT intervention phase and a Usual Care (UC) phase was compared. Two children showed significantly more progress in morphosyntactic complexity during the LIT intervention phase compared to UC.

Chapter 5 expands the analysis to 14 children who received LIT and UC, including the five children from Chapter 4, and a control group of 14 children receiving only UC. While improvements in sentence length and morphosyntactic complexity were observed with both UC and LIT, these were not consistent across all children. Considerable variability was noted in all outcome measures. Half of the children in the LIT group demonstrated greater progress during the LIT phase than the UC phase, mainly in story retelling, indicating potential benefits of the intervention in specific contexts.

REFLECTIONS ON THE RESULTS

In the reflections, focus is given to communication in the daily lives of children with DLD, their potential for language development, the impact of morphosyntax-focused interventions, the interplay between disorder- and participation-focused approaches, and the setting in which the research was conducted.

Communication in daily life of children with DLD

Limitations in communication pose a significant risk to children's social-emotional development and quality of life (for example Duinmeijer et al., 2025). Until recently, research into communicative participation in young children with DLD has been limited (Alons et al., 2024; Cunningham et al., 2017; Darling-White, 2017). Our findings, based on reports from a large group of parents and teachers, confirm that young children with DLD experience substantial communication difficulties in their daily lives (see

Chapter 2). The situations described by the parents align closely with the activity and participation domains in the International Classification of Functioning, Disability and Health (ICF; World Health Organization, 2001). For example, difficulties communicating with unfamiliar adults correspond to the ICF categories "communication" and "support and relationships — subcategory strangers". Parents also highlighted the role of emotional states and stress, which strongly influenced communicative functioning. These factors are not explicitly represented in the ICF framework, likely because they fluctuate and are context dependent. As a result, they are easily overlooked, despite their relevance in providing appropriate support.

Teachers' assessments of social skills and the student-teacher relationship were encouraging and are consistent with research showing that children with DLD are able to demonstrate prosocial behaviour (McGregor et al., 2023). Such behaviours, including friendliness, caring and helpfulness, are often viewed as protective factors, although their role is complex and not always sufficient to prevent social difficulties (Forrest et al., 2021; Singer et al., 2023; Toseeb et al., 2020; Toseeb & St Clair, 2020; Washington et al., 2015). Nonetheless, the quality of the student-teacher relationship remains an important factor of children's engagement and participation in the classroom (Rhoad-Drogalis et al., 2018).

Unexpectedly, we found that lower language test scores were associated with teachers' lower ratings of communicative functioning. Additionally, we found that children with both receptive and expressive language difficulties experienced greater challenges in everyday communication than children with expressive-only difficulties. Although clinicians frequently observe this pattern in practice, previous studies did not identify a clear link between language profile and communicative participation (Cunningham et al., 2019; Gerber et al., 2012). The findings underscore the complex relationship between linguistic abilities and communication in daily life (Duinmeijer et al., 2025; McGregor et al., 2023).

Taken together, these insights emphasise the importance of including communication in daily life when supporting children with DLD (Kwok et al., 2022; Leitão et al., 2025; Lyons & Roulstone, 2018). They also highlight the value of parents and teachers as key informants in assessing communicative functioning (see also Kwok et al., 2022; Singer et al., 2022). The open-ended questions posed to parents in this study proved a valuable addition to existing measurement instruments. When used alongside relevant items of the FOCUS (Thomas-Stonell et al., 2010) and the recently developed PROM MyCommunication Children (Alons et al., 2025), they offer a meaningful starting point for shared discussions with parents and children about communicative participation. Teacher questionnaires also provided relevant insights, although their responses tended to be more general. Further development of teacher-reported instruments for young children is highly recommended.

Language gains

In our cohort study, children demonstrated progress in all language domains over the course of one school year. Some children even narrowed the gap with typically developing peers (see Chapter 3).

The cohort reflected the heterogeneity commonly seen in clinical practice, with variation in language profiles, cognitive abilities and multilingual backgrounds. Importantly, none of these characteristics were associated with language progress or catch-up growth, suggesting that targeted support can benefit all children.

Absolute gains (in raw scores on language tests) are consistent with prior studies, while relative gains (in standard scores) appear to be larger, possibly reflecting the younger age of the children in our sample (Law et al., 2008; Norbury et al., 2017). Similar outcomes were observed by Vermeij et al. (2023) in early intervention groups for two- to three-year-olds with or at risk of DLD. Together, these findings support the notion that language development in children with DLD under the age of six is not linear and does not parallel the developmental trajectories of typically developing peers (Rice & Hoffman, 2015; Tomblin et al., 2003). The precise relationship between age and the ability to catch up remains unclear. The intensive language support, such as in our study and in Vermeij et al.'s early intervention groups, may be a contributing factor. However, many previous studies lack detailed descriptions of the interventions provided. For example, Norbury et al. (2017) reported a wide range of interventions, from assessment-only to direct intervention by SLTs, while Law et al. (2008) studied children attending "language units" for half of the school week. Despite this variability, our findings reinforce that early intervention can facilitate catch-up growth, even if only partial.

Although children made progress overall, gains differed between language domains. Vocabulary and language comprehension showed the strongest improvement, whereas growth in expressive morphosyntax was limited. This pattern is consistent with findings of Vermeij et al. (2023) and confirms that morphosyntax is a core issue for children with DLD. It appears difficult to influence development in this area effectively (Blom et al., 2013; Leonard, 2014).

Intervention aiming at morphosyntax

To investigate how interventions targeting morphosyntax could be improved, we introduced Language in Interaction Therapy (LIT). This intervention integrates elements shown to be effective in efficacy studies and offers a structured and feasible method for SLTs (Van den Dungen, 2007). Chapter 4 provides a detailed description of LIT, mapped onto all components of the proposed taxonomy of dose forms, thereby providing a comprehensive framework for implementation (Frizelle et al., 2021). We found preliminary evidence that LIT can outperform usual care (UC), which was eclectic in nature and consisted primarily of imitation and elicitation of sentence structures using pictures (see Chapters 4 and 5).

How easily SLTs were able to apply LIT emerged as an important factor. Intervention outcomes differed between SLTs (Chapter 5), suggesting variation in fidelity or implementation skills. Delivering LIT requires considerable multitasking: SLTs must simultaneously vary linguistic models, guide play-based activities to elicit functional use of target structures, and apply language-facilitating techniques. This complexity may require extensive supervision and a longer learning curve to ensure consistent delivery.

A further challenge concerns the structured protocols used in LIT. Although they allowed some flexibility, they may have constrained the SLTs' clinical intuition, making the approach overly rigid. In contrast, UC may have afforded SLTs more freedom to tailor their approach to individual children, which might help explain why UC produced comparable outcomes for some children. This aligns with previous studies indicating that SLTs frequently rely on clinical experience and tacit knowledge when making therapeutic decisions (Durgungoz & Emerson, 2023; Morgan et al., 2019). Integrating scientific evidence with the tacit knowledge of SLTs to gain more insight into "what works for whom" remains a challenge. Collaboration between researchers and SLTs is necessary to design interventions that achieve an effective balance between structure and adaptability.

An important contribution of the effect study was the development of appropriate outcome measures. To assess growth in morphosyntactic complexity in spontaneous language, we developed TARSP-P as no reliable and valid Dutch measures were available. While Mean Length of Utterances (MLU) is a reliable measure of sentence length, it does not capture grammatical accuracy. TARSP-P is the first attempt to develop a measures similar to DSS or IPSyn, which are specific to English child language (Lee, 1970; Scarborough, 1990). Although further validation is needed, TARSP-P provides a promising foundation for future work on measuring change in morphosyntax in spontaneous language.

Improving morphosyntax in children with DLD remains an important research topic. Recent studies have highlighted links between expressive morphosyntax and communicative participation as well as social-emotional functioning (Duinmeijer et al., 2025; Verbeek et al., 2023). An disorder-orientated intervention such as LIT may contribute to these broader domains, as it is closely related to everyday, functional communication. Combining elements of UC and LIT, and incorporating explicit instruction and visual support, may further enhance outcomes (Baron & Arbel, 2022; Finestack et al., 2024).

Balancing between disorder-oriented and participation-focused intervention

Effective intervention for children with DLD requires a careful balance between two approaches: reducing linguistic impairments (disorder-oriented) and supporting communicative participation (participation-focused). Although these approaches are sometimes seen as competing priorities in both research and clinical practice, the central question is how they intersect and strengthen. A common assumption is that reducing linguistic impairments will automatically lead to improved communicative participation. However, research does not support this view (Singer et al., 2020; Westby & Washington, 2017).

As outlined in Chapter 2, Baylor & Darling-White (2020) proposed a reorganisation of the elements of the International Classification of Functioning, Disability and Health (ICF) into a participation-centred framework (see Figure 1). This model emphasizes three interconnected elements: communication skills, personal perspectives, and the communication environment, all of which contribute to communicative participation. Improving morphosyntax falls within communication skills. Stronger morphosyntactic

abilities can help children express themselves more clearly and support their comprehension of spoken and written language. Yet improvements in morphosyntax do not automatically lead to better participation outcomes (Bishop, 2014; Buil-Legaz et al., 2016; Duinmeijer et al., 2025; Singer et al., 2020; Verbeek et al., 2023; Verhoeven & Perfetti, 2011; Westby & Washington, 2017).

In clinical practice, where therapy time is limited, professionals often prioritise disorder-oriented goals (Gallagher et al., 2019). In our cohort study, children showed only modest growth in morphosyntax. Our effectiveness study also revealed large individual variability in progress. These findings are consistent with research showing that morphosyntax interventions often yield modest or inconsistent effects, are not universally effective, or require high intensity treatment (Berkman et al., 2015; Law et al., 2004; Rinaldi et al., 2021). Setting realistic expectations for potential growth is therefore essential, and therapy should avoid overemphasising the reduction of morphosyntactic impairments alone.

Enhancing communicative participation also requires attention to personal perspectives and the communication environment. Personal perspectives include children's ability to manage frustration and emotional responses related to communication challenges (see Chapter 2). Adapting compensatory strategies and counselling approaches, commonly used with teenagers and adolescents, to younger children is a promising direction. Age-appropriate interventions that build insight into language and communication challenges and enhance self-awareness and self-efficacy can be beneficial (Botting et al., 2016; Collins & Wolter, 2018). Creating an inclusive communication environment is equally important. Such environments should offer children opportunities to connect, contribute, and participate fully (Gallagher et al., 2019). This requires fostering safety for taking communicative risks, providing rich opportunities to practice language, and encouraging positive peer relationships.

In conclusion, disorder-oriented and participation-focused approaches should be viewed as complementary, rather than competing. Collaboration between professionals, children and their parents is essential to support both aspects (Gallagher et al., 2019), in line with the principles of family-centred care (McCarthy & Guerin, 2022). Although this approach is widely endorsed, its implementation in practice remains challenging (McCarthy & Guerin, 2022; Ryan et al., 2025). This is particularly true in the special education settings in our studies. Children often live far from school, resulting in limited involvement of parents. As a result, the school environment rather than the home environment becomes the primary context for intervention. SLTs can play a pivotal role in family-centred care by linking morphosyntactic characteristics to communication difficulties observed at school and at home. Making these connections explicit can help set meaningful, shared goals that support both morphosyntax and communicative participation.

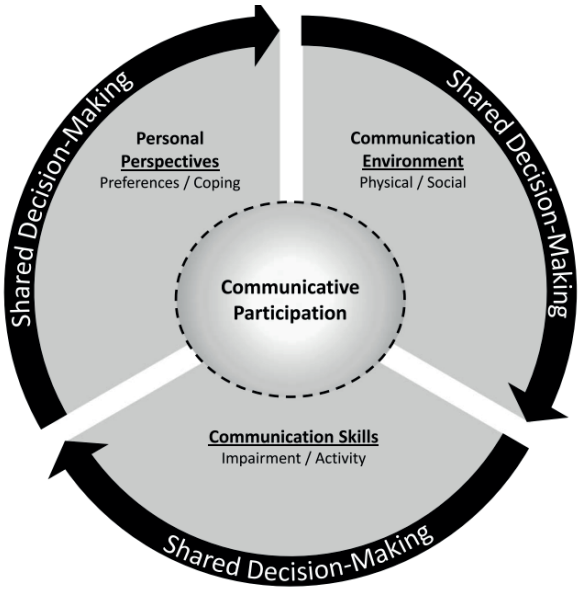


Figure 1. The participation focused framework as proposed by Baylor & Darling-White (2020)

Educational setting

The special education setting in which this research was conducted may have contributed to the observed improvements in language skills, as well as the adequate social skills reported by teachers. However, our research design does not allow us to attribute these outcomes conclusively to the educational setting itself.

Research comparing different educational environments for children with DLD is scarce. In many countries, children with DLD attend mainstream primary schools within the broader aim of inclusive education (Law, 2019). Similar efforts are underway in the Netherlands (Ministerie van Onderwijs, Cultuur en Wetenschap, 2023, 2024). The goal of inclusive education is to ensure that all children can learn, develop, and participate together in accessible learning environments close to home (UNESCO, 2017). To improve inclusive education for children with communication needs, it is essential to understand which elements of special educational provision are most effective for children with DLD.

Although inclusive education has many advantages for children with disabilities (Oh-Young & Filler, 2015), few studies have examined its specific impact on children with DLD. Limited evidence suggests that academic achievement may be similar across settings, but data on language and social-emotional development are lacking. The progress observed in our study, together with the positive social competence ratings, may be associated with the involvement of specialised professionals with extensive knowledge of DLD. As Dockrell and Lindsay (2001) noted, inclusive education for children with DLD

requires specialist expertise. Such professionals can create safe and supportive environments, that foster language development, coping strategies, and resilience (Leitão et al., 2025; McGregor, 2020).

Collaboration between specialist professionals may also have contributed to the positive outcomes in our study. In special education in the Netherlands, SLTs are employed directly by schools, enabling frequent and meaningful collaboration with teachers. In other settings in the Netherlands, speech and language therapy is typically provided externally, limiting opportunities for daily coordination. Before entering special education, children undergo comprehensive multidisciplinary assessment, giving SLTs a thorough understanding of each child's language profile. This facilitates integrated support that combines disorder-orientated and participation-focused strategies. Such collaboration helps bridge the gap between diagnostic labels and the practical educational needs of children with DLD (McGregor, 2020).

Understanding the strengths and limitations of different educational settings is essential for optimising support. Insights gained here may benefit not only children with DLD but also those with communication difficulties associated with other developmental disorders, socio-economic disadvantages, or multilingual backgrounds. Although considerable resources are already allocated to early childhood interventions, their effectiveness is not consistently established (Fukkink et al., 2017; Leseman & Veen, 2022). Investment in effective early interventions and inclusive practices is therefore a broader societal responsibility. A clearer understanding of what makes special education effective for children with DLD can inform both educational policy and clinical practice.

METHODOLOGICAL CONSIDERATIONS AND FUTURE DIRECTIONS

Both the cohort study and the intervention study faced methodological constraints that need to be considered when interpreting the findings.

A key limitation of the cohort study was the absence of a comparison group, which makes it impossible to attribute the observed improvements directly to the support provided in special education. Ethical constraints prevented the inclusion of a control group that did not receive additional educational support. Although the original research proposal aimed to compare children with DLD in special versus mainstream settings, the number of participants from mainstream education proved too small, and their available data, particularly language test results and intervention details, were often incomplete. As a result, these data could not be included in the analyses.

The generalisability of findings from the cohort study is also limited. The sample consisted of children who met the Dutch criteria for admission to special educational needs, meaning that they had low language tests scores and severe limitations in educational participation. This group represents children

with severe DLD. Furthermore, not all parents consented to the access of school records, and only a proportion of the parents and teachers completed the questionnaires. The exact consequences for representativeness are unclear, although lower response rates were noticeable among multilingual families.

The effect study faced methodological challenges inherent to the evaluating a complex intervention in clinical practice. LIT fits the UK Medical Research Council's (MRC) definition of a complex intervention because it consists of multiple components, such as selecting target structures, using scripts, and applying various language therapy techniques (Skivington et al., 2021). Although a single-subject design was used to minimise external influences, uncontrolled factors within the intervention and the children's environment may still have affected outcomes. Monitoring treatment fidelity was challenging. Despite using protocols that balanced between a tailor-made intervention and treatment control, more insight into SLTs' intervention practices is needed to find an appropriate approach. In addition, there is a need for better tools to monitor treatment compliance. Differences in language support at home and in the classroom may also have influenced the effects of both LIT and UC, but insufficient data were available to examine these effects.

Another methodological issue is the adaptation of intervention components from English-language studies. Many elements, particularly those involving target selection and recasting have not yet been validated for Dutch. English and Dutch differ substantially in morphology and sentence structure. Dutch has richer verb conjugation, more variation in word order, including subject-verb inversion, and specific prosodic features. These linguistic characteristics can affect how easily morphosyntactic patterns can be highlighted or contrasted (Leonard & Kueser, 2019). For example, the strong-weak stress pattern common in Dutch words (e.g. *pakken, koken, keuken*) contrasts with the weak-strong pattern in many past participles (e.g. *gepakt, gekookt*), which can make it difficult to emphasise correct forms. Future research should explore how the linguistic characteristics of Dutch can be considered in target selection, recasts and other techniques, drawing on work by Fey et al. (2003), Finestack et al. (2024), and the overarching principles of grammatical learning outlined by Leonard & Kueser (2019).

Outcome measures also posed challenges. In the cohort study standardised language tests were used, which are primarily designed for diagnostic procedures rather than for measuring language growth. While these instruments generally demonstrate good reliability and validity, their ability to measure change over time, i.e. their responsiveness, is less well understood (Betz et al., 2013; Mokkink et al., 2010; Pereira & Lousada, 2022). Despite these limitations, they are often used to monitor growth due to the lack of alternative instruments (Ziegenfusz et al., 2018; Pereira & Lousada, 2022). Measuring growth in morphosyntax is particularly difficult. Language sample analysis is considered the gold standard, but is time consuming, and existing Dutch methods lack the sensitivity to capture small improvements. To address this gap, we developed TARSP-P, a promising measure for assessing morphosyntactic complexity in Dutch, but further refinement is needed.

Ideally, outcome measures should also capture communicative participation. At the time of the study, however, no suitable instruments were available for this age group. We used existing teacher questionnaires, but they require further development. Recently, new tools have been introduced to assess communicative participation for children from the age of six onwards (Alons et al., 2024, 2025). Future research should integrate such measures to better evaluate how interventions affect children's communicative participation.

IMPLICATIONS FOR PRACTICE AND POLICY

The findings of the study lead to several recommendations for improving the education and care of children with DLD.

- *Inclusion and support:*
  All children with DLD should have access to support, regardless of their language profile, multilingual background, or non-verbal IQ. The practice of "cognitive referencing", that is, evaluating children's eligibility for services by comparing language skills to non-verbal cognitive level, is inappropriate and carries the risk of excluding children with clear communication needs. Eligibility criteria for speech and language therapy and educational support should instead be grounded in children's communicative needs and experienced barriers in communicative participation. This calls for a critical reassessment of current admission criteria.
- *Monitoring language and communication development:*
  Structured and consistent monitoring is essential for both effective support and for meaningful research. It enables professionals and researchers to follow short- and long-term development and evaluate the effectiveness of interventions. In our study, school records were used for monitoring, but data were often incomplete. To improve practice, standardised protocols for data collection should be implemented, including agreed-upon instruments and regular assessment intervals.
- *Measuring communication in daily life:*
  Assessing communication in daily life should be a routine part of diagnostics and progress monitoring. Language sample analysis and measures of communicative participation are both important. Spontaneous language analysis provides insight into how children apply their language skills in real-life situations and can inform both goal setting and evaluation. This is labour-intensive, but technological developments are making language analysis increasingly feasible. Measures of communicative participation are equally important. Both measures should be integrated in training programmes for SLT students, to ensure future professionals are equipped to use them effectively.
- *Enhancing morphosyntax-focused interventions:*
  Morphosyntax-focused interventions are complex and require training and sustained support for SLTs. Effective intervention depends on selecting appropriate targets, designing meaningful activities, and applying effective techniques. To further improve evidence-based practice, we need a deeper understanding of what works for whom. SLTs, who intuitively tailor their approaches,

play a central role in generating this knowledge. Making their tacit reasoning explicit, for example through knowledge-elicitation research approaches, can strengthen intervention design. SLT students can contribute by reflecting on treatment decisions with their supervisors during internships.

- *Promoting interprofessional collaboration:*
  Morphosyntactic development should be viewed as a shared responsibility among all professionals involved in the education and care of children with DLD. Training programmes developed in collaboration with SLTs can help educators and other professionals better understand morphosyntactic difficulties and support children more effectively.
- *Providing holistic support based on the ICF framework:*
  Support should extend beyond improving morphosyntax (the impairment component of the ICF) to include strategies that to support children and their environments to communicate effectively despite limitations (the activity and participation components of the ICF). This requires awareness of the challenges faced by children and their families, and a collaborative search for creative, functional communication solutions.

CONCLUDING REMARKS

This dissertation underscores the importance of an inclusive, multidisciplinary approach to care and education for children with DLD to strengthen their language development while also supporting broader communicative participation and well-being. Achieving this requires investment in tools that enable systematic monitoring of both language skills and communicative participation outcomes, as well as continued research into the effective elements of special education for children with DLD.

Eligibility criteria for specialized education and support should reflect the diversity of children with DLD and include multilingual children and those with lower non-verbal IQ scores. Moreover, targeted interventions, particularly those focusing on morphosyntax require continued investigation, as progress in this domain is more difficult to achieve than in other language domains. Future interventions should integrate disorder-oriented and participation-focused strategies to provide support that is both comprehensive and meaningful.

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ADDENDA

Nederlandse samenvatting

About the author

List of publications

Dankwoord







NEDERLANDSE SAMENVATTING

Kinderen met een taalontwikkelingsstoornis (TOS) hebben grote moeite met het verwerven en gebruiken van taal. Hierdoor ervaren zij ernstige problemen in de dagelijkse communicatie en interactie. TOS is een neurobiologische ontwikkelingsstoornis die voorkomt bij 7-10% van de kinderen en gevolgen heeft voor hun sociaal-emotionele ontwikkeling, schoolprestaties en kwaliteit van leven (Bishop et al., 2017; Norbury et al., 2016). De taal- en communicatieproblemen blijven vaak bestaan tot in de volwassenheid. Tijdige, effectieve interventie is daarom belangrijk.

De diagnose TOS wordt gesteld wanneer kinderen duidelijke en blijvende beperkingen laten zien in hun taalontwikkeling, die het communicatieve functioneren thuis en op school belemmeren. Er worden doorgaans twee taalprofielen onderscheiden: 1. receptief-expressieve TOS, met problemen in het begrijpen én het produceren van taal; 2. expressieve TOS, met voornamelijk problemen in het produceren van taal (ICD-11, World Health Organisation, 2021). Kinderen met TOS kunnen moeilijkheden ondervinden op het gebied van fonologie, morfosyntaxis, semantiek en woordvinding, en pragmatiek. Problemen in de morfosyntaxis komen het meeste voor en worden gezien als het kernprobleem (Leonard, 2014).

In Nederland volgen veel kinderen met TOS 'cluster-2-onderwijs', speciale scholen voor kinderen met TOS. De reden hiervoor is dat het reguliere onderwijs hoge eisen stelt aan taalvaardigheid. Beperkingen in taalbegrip, morfosyntaxis, woordenschat en verbaal werkgeheugen maken het voor kinderen met TOS moeilijk om instructies te volgen, opdrachten te begrijpen en hun kennis te verwoorden. Cluster-2-onderwijs beoogt deze belemmeringen te compenseren en onderwijsparticipatie te versterken door kleinere klassen, geïntegreerde logopedische behandeling en een onderwijsaanbod dat expliciet gericht is op het versterken van communicatieve vaardigheden. Daarbij werken logopedisten, leerkrachten en andere onderwijs- en zorgprofessionals intensief samen.

Hoewel alle kinderen met TOS communicatieve beperkingen ervaren is nog weinig bekend over de aard en omvang hiervan bij jonge kinderen. Er is ook nog weinig bekend over de mogelijkheden tot groei en inhalen van achterstanden bij jonge kinderen met TOS. Eerder onderzoek wijst uit dat sommige kinderen vooruitgang laten zien, terwijl andere dat niet doen, maar een verklaring daarvoor ontbreekt tot nu toe.

Gezien de hardnekkige moeilijkheden in de morfosyntaxis waar kinderen met
TOS mee kampen en de invloed daarvan op de communicatie, zijn effectieve interventies belangrijk. Hoewel interventies zoals focused stimulation en recasting in sterk gecontroleerde studies effectief zijn gebleken, is hun effectiviteit in de klinische praktijk onduidelijk.

Dit proefschrift heeft drie doelen:

1. inzicht krijgen in de communicatie in het dagelijks leven van jonge kinderen met TOS
2. hun taalontwikkeling gedurende één schooljaar in het cluster-2-onderwijs in kaart brengen, inclusief factoren die deze ontwikkeling beïnvloeden
3. de effectiviteit evalueren van Communicatieve Taaltherapie (CTT; Van den Dungen, 2007), een op evidentie gebaseerde, functionele interventie in spelsituaties, gericht op het stimuleren van de morfosyntaxis

Om deze vragen te beantwoorden werden drie deelstudies uitgevoerd bij twee verschillende groepen participanten in de leeftijd van 4 tot 6 jaar. Eén groep bestond uit 154 kinderen van 18 scholen voor special onderwijs (studie 1 en 2), en de andere uit 28 kinderen van 6 scholen (studie 3).

Hoofdstuk 2 beschrijft de beperkingen in de communicatie in het dagelijks leven van kinderen met TOS. Ouders rapporteerden dat hun kinderen in verschillende situaties beperkingen ondervonden. De meest genoemde waren: beperkingen in het vermogen om zich uit te drukken, begrepen te worden en verstaanbaar te spreken, vooral in contact met onbekende personen. Emoties en stress bij de kinderen bleken een belangrijke negatieve invloed te hebben op het communicatieve functioneren. Leerkrachten beoordeelden de communicatieve vaardigheden als onvoldoende, maar vonden de sociale vaardigheden en de kwaliteit van de leerling-leerkrachtrelaties vergelijkbaar met die van zich normaal ontwikkelende kinderen. Kinderen met een receptief-expressieve TOS ervaarden meer en bredere beperkingen dan kinderen met een expressieve TOS.

In **Hoofdstuk 3** is de vooruitgang in morfosyntaxis, woordenschat en taalbegrip gedurende één schooljaar onderzocht met behulp van een cohortstudie onder 154 kinderen. De kinderen lieten vooruitgang zien in taalbegrip, expressieve woordenschat en expressieve morfosyntaxis, waarbij sommigen hun achterstand ten opzichte van zich normaal ontwikkelende leeftijdsgenoten verkleinden. In de morfosyntaxis waren de scores bij aanvang het laagst en was de vooruitgang het kleinst, wat past bij het hardnekkige karakter van de problemen in dit domein. De mate van vooruitgang hing niet samen met taalprofiel, meertaligheid of non-verbaal IQ. Wel lieten kinderen met lagere aanvangsscores meer vooruitgang zien dan kinderen die bij aanvang hogere scores hadden.

Hoofdstukken 4 en 5 evalueren de effecten van de interventie 'Communicatieve Taaltherapie' (CTT) op morfosyntactische complexiteit.

Hoofdstuk 4 introduceert CTT en beschrijft de principes en technieken: afgebakende therapiedoelen, gestructureerde speelscripts en de taaltherapeutische technieken modelling, focused stimulation en recasting. In het hoofdstuk wordt beschreven hoe CTT logopedisten ondersteunt bij het implementeren van deze elementen in de interventie gericht op morfosyntaxis. Daarnaast worden de protocollen beschreven die voor de studie zijn ontworpen. Logopedisten konden interventie volgens de protocollen

toepassen wanneer ze training en begeleiding kregen. In een eerste kleine studie (n=5) lieten twee kinderen grotere vooruitgang zien tijdens de CTT-fase dan tijdens gebruikelijke logopedie (UC). De uitkomstmaten waren gemiddelde uitingslengte in aantal woorden (MLU-w) en TARSP-P, een voor dit onderzoek ontwikkelde maat voor morfosyntactische complexiteit.

Hoofdstuk 5 beschrijft een grotere studie met 14 kinderen die CTT en UC kregen en een niet-equivalente controlegroep van eveneens 14 kinderen, die alleen UC kregen. Bij alle kinderen was er vooruitgang tijdens UC en CTT, maar met grote individuele variatie. Ongeveer de helft van de kinderen in de CTT-groep liet meer vooruitgang zien tijdens de CTT-fase, voornamelijk bij het navertellen van verhalen. Er werden geen duidelijke verschillen gevonden in spontane taal tijdens spel en zinnen herhalen. Verschillen tussen CTT en UC konden niet worden verklaard door de respectievelijke periodes van het schooljaar waarin de interventies werden uitgevoerd, taalprofiel, of meertaligheid. Verschillen tussen de logopedisten suggereren dat de uitvoeringskwaliteit een belangrijke factor is.

In **Hoofdstuk 6** worden methodologische overwegingen bij de cohortstudie en de studie naar de effecten van CTT beschreven. In de cohortstudie kon vanwege ethische overwegingen geen controlegroep zonder interventie worden geïncludeerd, waardoor de vooruitgang in taalvaardigheid niet zonder meer kan worden toegeschreven aan de speciale onderwijssetting. De methodologische overwegingen bij de studie naar de effecten van CTT hangen samen met het evalueren van een complexe interventie in een praktijksetting. Er was er sprake van variatie in uitvoering en oncontroleerbare beïnvloedende factoren, zoals taalstimulatie thuis en in de klas. Uitkomstmaten voor morfosyntactische groei, zoals de voor deze studie ontwikkelde maat TARSP-P, vragen verdere verfijning.

Dit proefschrift laat zien dat jonge kinderen met TOS aanzienlijke beperkingen ervaren in hun dagelijkse communicatie, vooral in onbekende situaties of bij stress. Tegelijkertijd laten veel kinderen vooruitgang zien in taalvaardigheid, ongeacht taalprofiel, meertaligheid of non-verbaal IQ. Morfosyntaxis blijft het meest hardnekkige domein en vraagt om gerichte, goed uitgevoerde interventies. CTT toont potentieel, maar de variabiliteit onder kinderen en logopedisten benadrukt de noodzaak van verdere ontwikkeling en professionalisering.

Voor de praktijk betekent dit dat alle kinderen met TOS ondersteuning moeten kunnen krijgen, ongeacht taalprofiel, non-verbaal IQ of meertaligheid. Die ondersteuning zou moeten bestaan uit geïntegreerde strategieën om de taalvaardigheid te versterken en communicatieve participatie te bevorderen, waarbij de ontwikkeling systematisch wordt gemonitord. Samenwerking tussen logopedisten, leerkrachten en ouders is daarvoor cruciaal.

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ABOUT THE AUTHOR



Gerda Bruinsma was born on September 23, 1965, in Groningen, the Netherlands. She completed her secondary education (Gymnasium) in 1983 at the *Nijmeegse Scholengemeenschap* in Nijmegen. She subsequently studied Speech and Language Therapy in Nijmegen, graduating in 1987.

She worked as a speech and language therapist in a range of settings, including mainstream education, specialized medical daycare, and several schools for special education, including special education for children with Developmental Language Disorders (DLD). She also served as a member of the admissions board for special educational needs.

To deepen her understanding of the evidence base for speech and language therapy, she began a master's degree in Clinical Language, Speech and Hearing Sciences, which she completed in 2009. During this period, she joined the Speech and Language Therapy programme at HU University of Applied Sciences Utrecht as a lecturer, where she still teaches undergraduate and postgraduate courses in DLD and coordinates the final stage of the degree programme. She also served as a lecturer on the master's programme in Clinical Health Sciences. For several years, she was actively involved in the board of *Logoscientia*, the Dutch academic SLT network.

In 2014, she began her PhD research as an externally funded PhD candidate at Utrecht University, supported by the Netherlands Organisation for Scientific Research (NWO) and a HU PhD voucher. As part of her doctoral training, she completed several courses, including *Basic Course on Regulations and Organization of Clinical Trials (BROK®)*, *Regression Analysis*, and *Research Methods to Measure Intervention Efficacy*.

Gerda currently continues her work as a lecturer in Speech and Language Therapy at HU University of Applied Sciences Utrecht.

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