Cross-Sectional and Longitudinal Associations Between Quality þÿ of Parent Child Interaction and Language Abilit Preschool-Age Children With Developmental Language Disorder

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Cross-sectional and longitudinal associations between quality of parent-child interaction and language ability in pre-school-aged children with developmental language disorder

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Abstract

Purpose: This study explores whether the quality of parent-child interaction is associated with language abilities cross-sectionally and longitudinally up to preschool-age among children with developmental language disorder (DLD).

Method: Participants were 97 monolingual children with DLD and their parents from the Helsinki Longitudinal SLI study, HelSLI (baseline, age in years; months, mean (M) = 4;3, standard deviation (SD) = 0;10), of which 71 pairs were followed longitudinally (age in years; months M = 6;6, SD = 0;5). Video recordings from three play sessions were scored for child, parent, and dyadic behavior using Erickson's sensitivity scale protocol and mutually responsive orientation at baseline. Children's expressive and receptive language and language reasoning ability were assessed at baseline, and expressive and receptive language were assessed at follow-up.

Results: At baseline, engaged child behavior, parent's supportive guidance, and fluent and attuned dyadic behavior were associated with better receptive language ability, and engaged child behavior and dyadic synchrony were positively associated with language reasoning ability in 3-6-year-olds. The child's positive engagement, and fluent and attuned dyadic behavior at baseline, were associated with better expressive and receptive language abilities at follow-up, in 6-7-year-olds, respectively.

Conclusions: Fluent and attuned dyadic behavior is associated with better receptive language ability in preschool-aged children. Parent behavior alone was not associated with language ability. A connected and mutually attuned parent-child relationship could be a protective factor for language development for children with DLD.

Keywords: parent-child interaction, engagement, supportive guidance, dyadic behavior, developmental language disorder, specific language impairment, pre-school age

A wealth of research on typically-developing children illustrates that interactions between caregiver and child shape language development in a fundamental manner (Blinkoff et al., 2016). Much of the available research on parent-child interaction and language development has focused on parent-child language use (Rowe & Snow, 2020), and less on the emotional quality of interaction. Moreover, little research exists on the role of the emotional quality of caregiver-child interaction on language development in populations with developmental challenges in language acquisition. Considering the importance of parent-child interaction to language development, research with these children could open new avenues of intervention, and provide further support for existing ones (e.g., parent-child interaction therapy, Falkus et al., 2016). The current study will focus on the association between parent-child interaction and language development in children with developmental language disorder (DLD).

Parent-child interaction and language development

Language development is influenced by a complex combination of biological and environmental factors (Dale et al., 2015; Hayiou-Thomas, 2008; Spinath et al., 2004). Central among the environmental factors on language development is parent-child interaction (Rowe & Weisleder, 2020). An important feature of caregiver input for a child's language development, in addition to linguistic and conceptual input, is interactive input. (Rowe & Snow, 2020). Interactive input refers to the back-and-forth nature of parent-child interaction and is founded on features such as parent responsiveness and sensitivity (Rowe & Snow, 2020). Parents build on early episodes of caregiver-infant joint attention, by offering sensitive, timely and contingent responses (Blinkoff et al., 2016). As the child grows parent and child eventually cocreate connected, fluent interactional exchanges (Rowe & Snow, 2020). Sensitive, fluent, and connected parent-child interaction has been associated with several positive language outcomes, like larger vocabulary in toddlerhood larger vocabulary in toddlerhood (Brooks &

Meltzoff, 2008; Farrant & Zubrick, 2012; Todd, 1983), and greater communicative competence (Rocissano & Yatchmink, 1983; Tomasello & Farrar, 1986).

Research on parent-child interaction and language development particularly with children aged 3-5 years old has focused mostly on language use (Rowe & Snow, 2020), and less on the role of emotional expressiveness and matching (Harrist & Waugh, 2002). Some studies have extended the above findings to examine how the quality of parent-child interaction can encourage or impede language development. The quality of parent-child interaction is quantified through rating scales designed to measure different features of interaction, which are thought to contribute to the emotional quality of parent-child interaction. For the purposes of this study, parent-child interaction is operationalized using Erickson's sensitivity scales (Egeland et al., 1990; Erickson et al., 1985), an observational schedule which includes measures of child (e.g., enthusiasm, persistence), parent (e.g., supportiveness, sensitivity and timing and clarity of instruction) and dyadic behaviors (e.g., quality of the relationship, diffusion of boundaries).

Parent sensitivity is a key feature of parent-child interaction often examined in the context parent-child interaction. Sensitivity refers to the extent to which a parent is attentive to their child's needs, affect, arousal, and capability. A considerable amount of evidence suggests that parenting sensitivity is associated with better expressive and receptive language ability in toddlers (Barnett et al., 2012; Loi et al., 2017; Pungello et al., 2009; Stanton-Chapman et al., 2002), even when controlling for earlier language ability (Loi et al., 2017).

Another feature of parent-child interaction that has been examined in relation to language development is dyadic synchrony, which is defined as a pattern of interaction that is regulated by both parent and child in cooperation, that is reciprocal in orientation and responsiveness, and where communication is harmonious and smooth-flowing (Harrist & Waugh, 2002). Dyadic synchrony has also been associated with greater communicative

competence in toddlers (Rocissano & Yatchmink, 1983; Tomasello & Farrar, 1986). Specifically, shared affect during parent-child interaction has been associated with the earlier achievement of expressive language milestones, such as vocabulary size and the use of combinatorial speech, in toddler-aged children (Nicely et al., 1999) and greater expressive language skills at 3 years (Lindsey et al., 2009). Nicely et al. (1999) hypothesize, that shared affect may serve to make parent utterances more salient to toddlers or serve to motivate longer episodes of joint attention.

Parent-child interaction and children with DLD

Interaction in dyads with children who have language impairment is characterized by several features, which may pose additional challenges to creating the kind of smooth-flowing and connected episodes of interaction that are associated with greater language competence. Children with language impairment may be less compliant and persistent during interaction with parents than typically-developing (TD) children (Skibbe et al., 2010). Moreover, Skibbe et al. (2010) found that children with language impairment participate more actively in storybook reading, when their mothers showed a high level of sensitivity. Thus, children with language impairment may be more dependent on the emotional support provided by their caregiver (Skibbe et al., 2010). Research suggests that linguistic and pragmatic difficulties of children with developmental language disorder (DLD) may result in more frequent breakdowns of communication (Bishop et al., 2000; Rescorla et al., 2001; Rescorla & Fechnay, 1996). Furthermore, children with DLD may give less input for parents to respond or attune their communication to than typically-developing children, thus resulting in an impoverished conversational context, which could negatively impact language development (Bishop et al., 2000; Paul & Shiffer, 1991; Rescorla et al., 2001; Rescorla & Fechnay, 1996; van Balkom et al., 2010).

Findings on the behavior of parent with children who have language impairment are somewhat contradictory. Research has shown on one hand, that parents of children with DLD may be less responsive (Hoffer & Bliss, 1990; Schodorf & Edwards, 1983), and use shorter utterances and provide less input (Schodorf & Edwards, 1983). On the other hand, parents of children with language impairment may also appear more controlling and directive (Blackwell et al., 2015; Conti-Ramsden et al., 1995; Hammer et al., 2001; Hoffer Corbett & Bliss, 1990; Kloth et al., 1998). Parents of language-impaired children may also be less emotionally supportive during interactions than parents of typically-developing children (Skibbe et al., 2010). There is agreement among researchers examining parent-child interaction from a linguistic perspective, that parents are likely attuning their language use and level of responsiveness to the child's language ability and output (Blackwell et al., 2015; Conti-Ramsden et al., 1995; Majorano & Lavelli, 2014; Paul & Elwood, 1991). Given that DLD has a clear genetic component (Bishop, 2006) parents of children with DLD may have language difficulties themselves (Hammer et al., 2001), which may limit their ability to manage the child's non-compliance and lack of persistence during interactions.

Only one study was identified examining parent-child dyadic synchrony with children who have impaired language development. In a study with late-talkers, Rescorla and Fechnay (1996) found that dyads with late-talkers did not differ in dyadic synchrony from dyads with TD children. However, results also indicated that controlling mothers had lower levels of synchrony. Taken together, parents of children with DLD who have more directive and controlling parenting styles might have lower levels of dyadic synchrony and in turn, less of the kind of smooth-flowing and connected interaction, which has been shown to play a significant role in language development. Notably, the participants for this study were identified as late-talkers, and thus generalizations to children with DLD should be viewed with caution. Thus, no research was identified examining dyadic synchrony in children with

DLD. Moreover, a paucity of information exists on how dyadic synchrony might be associated with language development in children with developmental challenges in language ability, and thus more research is needed to clarify the associations between dyadic synchrony and language impairment.

In summary, existing research has examined how children with DLD and their parents may differ individually and in terms of their dyadic functioning from children with typically-developing language. However, no research was identified examining the associations between different facets of parent-child interaction (child, parent, and dyadic behaviors) and language development in children with DLD. This is a significant gap in the existing literature. Moreover, few studies have examined receptive language comprehensively with relation to parent-child interaction, as the majority of the research has focused on expressive language impairment (Blackwell et al., 2015; Conti-Ramsden & Friel-Patti, 1984; Rescorla & Fechnay, 1996). Considering that children with receptive language impairment are at greater risk for negative outcomes than children with expressive language impairment, and that less is known about treating receptive language impairment, more information on potential protective and risk factors for receptive language development is needed (Boyle et al., 2010).

Current study

The evidence on the emotional features of parent-child interaction with children who have DLD is scarce. Furthermore, no studies were found examining how the quality of parent-child interaction is longitudinally associated with language development in children with DLD. Moreover, few studies have examined the association between receptive and parent-child interaction in children with language impairment (Blackwell et al., 2015; Conti-Ramsden & Friel-Patti, 1984; Rescorla & Fechnay, 1996). This study will focus on children with DLD, which is the current label used to categorize children who have lasting language difficulties, which are not caused by any known biomedical issue or intellectual disability

(Bishop, 2017). This study aims to address the gaps within the existing literature by exploring first how the quality of parent-child interaction might be associated with language ability in 3-6-year-old children with DLD. This study will examine child, parent, and dyadic behaviors to gain a multidimensional understanding of the emotional quality of parent-child interaction in children with DLD. Measures of expressive and receptive language and language reasoning ability will be included to enable a comprehensive examination of the associations between the quality of parent-child interaction and different facets of language ability. This study will then use a longitudinal approach to examine whether these features of parent-child interaction in 3–6-year-old children are longitudinally associated to the language development of pre-school-aged children with DLD.

Method

Participants

Participants were Finnish monolingual children from the Helsinki Longitudinal SLI study (HelSLI, see Laasonen et al., 2018, for a protocol and comprehensive description of participants). Participants were recruited from the initial clinical assessment at the children's audiophoniatric ward at the Helsinki University Hospital (HUH) during 2013-2015. Inclusion criteria for the HelSLI study were a referral to the audiophoniatric ward for an enduring concern in language development, without any known biomedical etiology. Children had been assessed by speech-language therapists and had received speech-language therapy prior to referral to the audiophoniatric ward. All children in the sample had been diagnosed with a language disorder as per the criteria set out in the Finnish ICD-10 (WHO, 2010). Out of the monolingual children with language impairment participating in the HelSLI study (n = 136), written informed consent was obtained from parents, and video recording and cognitive testing were conducted, for 120 children. Exclusion criteria were hearing defects, intellectual disability, autism spectrum disorders, diagnosed neurological defects or disorders (e.g.,

epilepsy, XYY syndrome), oral anomalies, and performance intelligence quotient below 70 (n = 98). Further, one child was excluded because they participated in the video recording with a grandparent. The final sample at baseline after exclusions consisted of 97 parent-child pairs (children's age in years; months, mean (M) = 4;3, standard deviation (SD) = 0;10), range = 2;10 – 6;10), and 71 pairs at follow-up (children's age in years; months M = 6;6, SD = 0;5, range = 5;6 – 7;5) (Table 1). Parents participating included both mothers and fathers, and the ratio of mothers to fathers was approximately 3:1 at both baseline and follow-up. The median maternal level of education was primary or secondary-level education. The sample in this study consisted of monolingual, mother-tongue Finnish speakers. The follow-up was conducted during the academic year when the children were due to begin pre-school or had begun preschool (from August to June the following year). The study was approved by the HUH Ethics committee (§ 248/2012).

Measures

Child, parent, and dyadic behaviors

Video recording of interactional sequences was conducted in an examination room on the ward. Parent-child interaction was examined in three different situations - drawing, free-play, and assembling a puzzle, with a target timing of 5-minutes per task. Both the drawing and puzzle tasks were goal-oriented, while the free play task was less structured. The videos were scored using the Erickson scales (Egeland et al., 1990; Erickson et al., 1985) and the scale for mutually responsive orientation (Aksan et al., 2006). The Erickson scales are a commonly used measure for sensitivity (Mesman & Emmen, 2013), and are grounded in attachment theory (Mesman & Emmen, 2013). The scales are used to code interactions during teaching tasks with toddlers and preschoolers and include measures for child, parent, and dyadic behavior (Mesman & Emmen, 2013). The sensitivity construct measured by the

Erickson scales is sensitive to changes in maternal sensitivity following intervention (Stams et al., 2001). The Erickson scales were selected as they allowed for the examination of interactional sequences from child, parent, and dyadic perspectives, and were suitable for use with children up to preschool age (Mesman & Emmen, 2013). The scale for mutually responsive orientation (MRO) is also founded in attachment theory and is based on four theoretical components (coordinated routines, mutual cooperation, harmonious communication, emotional ambiance) (Aksan et al., 2006). Aksan et al. (2006) have explored the psychometric properties of MRO and conclude that their findings suggest that the MRO is sensitive to changes in the dyadic relationship, has good discriminant validity when compared to individual measures, and shows structural stability over time and across mother-child and father-child relationships (please see Aksan et al., 2006, for a detailed description of the psychometric properties of this scale). MRO was included as it allows for the assessment different aspects of the dyad specifically, and not individual features of parent and child.

Two research assistants with training in the use of the Erickson scales coded the videotaped interactional sequences for child, parent, and dyadic behavior (Egeland et al., 1990; Erickson et al., 1985) drawing and puzzle completion tasks on seven-point scales. Children were evaluated on enthusiasm, persistence, negativity, compliance, experience of the session, avoidance, and affection towards the parent. Parents were evaluated on supportive presence, hostility, intrusiveness, clarity of instruction, sensitivity, timing of instruction, and confidence. Dyads were assessed on the quality of the relationship and dissolution of physical/psychological parent-child boundaries. During drawing, puzzle-making, and free play dyads were also assessed on mutually responsive orientation (MRO) (Aksan, Kochanska, & Ortmann, 2006), on five dimensions: harmonious communication,

coordinated routines, mutual cooperation, and emotional ambiance. (Please see Supplemental tables 2 and 3 for short descriptions of the variables described above).

Inter-rater reliability was evaluated using a two-way mixed model, consistency, average-measures intra-class correlation (ICC) for child, parent, and dyadic factors in the drawing and puzzle-completion tasks. ICCs indicated good (0.74 – 0.90) to excellent (above 0.90) reliability for all factors (Koo & Li, 2016).

Language ability (baseline and follow-up)

Cognitive and language performance was assessed at visits to the audiophoniatric ward by neuropsychologists and speech and language therapists. Measures used to assess cognitive and language performance were limited to those available in Finnish. The following subtests were used from Wechsler Preschool and Primary Scale of Intelligence - Third Edition (WPPSI-III) (Wechsler, 2009): Picture Naming, Receptive Vocabulary, Information, Vocabulary, Word Reasoning. From Nepsy-II (Korkman et al., 2008), Comprehension of Instructions was used. The Expressive and Comprehension scales from Reynell Developmental Language Scales III (Edwards et al., 1997) were also used, as well as the Expressive (EOWPVT) and Receptive (ROWPVT) One-Word Picture Vocabulary Tests (Martin & Brownell, 2010, 2011) and the Boston Naming Test (BNT) (Kaplan et al., 1983). At baseline, all 11 measures of language were used. At follow-up, only measures used by clinical speech and language therapists were evaluated, and thus measures from WPPSI-III and Nepsy-II were not available at follow-up. (Table 1)

Confounding variables

Child's age, as well as mother's age and education, were selected as covariates (Table 1). Age influences the child's language skills, with higher skill-level associated with more advanced development. Mother's age (years) was controlled for to account for biological risk factors to child development associated with giving birth at a later age on the one hand

(Frederiksen et al., 2018), and the protective effect of advanced maternal age on development, including language development, on the other (Sutcliffe et al., 2012). Maternal educational attainment ((1) secondary-level education or less, (2) bachelor's degree or above) was also controlled for, as maternal educational attainment is associated with (1) children's language development (Pungello et al., 2009; Zambrana et al., 2012) and is also (2) indicative of maternal socioeconomic status, which also has strong associations to children's language development (Jalovaara & Andersson, 2018; Pungello et al., 2009). (Table 1).

Analysis

Data was analyzed using IBM SPSS Statistics v27. Missing values were identified in maternal education, maternal age at childbirth, and language outcome variables (Table 1). Of the confounding variables, 19.7% of cases were missing either maternal age at childbirth or maternal education level. At baseline 17.5% and at follow-up 29.6% of cases had missing values in at least one language outcome variable. The missing values were analyzed using Little's test and determined as missing completely at random at baseline ($\chi^2 = 63.40$, df = 60, p = .358) and follow-up ($\chi^2 = 19.31$, df = 17, p = .278) as the probability values for both exceeded 0.05 (Little, 1988). The missing data were then imputed using the expectation-maximization algorithm (Dempster et al., 1977).

Factor analysis was conducted to identify underlying factors among the behavioral variables to reduce the number of subsequent analyses, in order to avoid increased likelihood of type I error associated with conducting a large number of statistical tests. Although larger sample sizes are generally preferred for factor analysis, a smaller sample as in this study (n=97) can be considered sufficient (Bryant & Yarnold, 1995; Hair et al., 1998; Osborne, 2014). Examination of distributions behavioral variables showed four variables with highly skewed distributions (child's avoidance, child's negativity, parent's hostility, and parent's intrusiveness); these variables were removed as containing little information, and as

problematic in terms of the assumptions of exploratory factor analysis. The child's affection towards their parent was also removed, as the content of the variable was more dyadic in nature (see the description of Erickson scales in Supplemental table 1), and thus had low factor loadings on the child behavior factor. Following this, an exploratory factor analysis with the remaining interactional variables in one model was conducted. Parallel analysis, (O'Connor, 2000), where eigenvalues from the real data set were compared with eigenvalues from a randomly generated dataset with the same number of cases and variables (Tabachnik et al., 2007), was used to determine the number of factors to be retained and suggested a three-factor solution (Supplemental table 3 and Supplemental Figure 2). The three factors identified encapsulated child, parent, and dyadic behaviors (Supplemental table 3). The factor structure was parallel to the structure of the Erickson scales and theoretically justified (Erickson et al., 1985). Mutually responsive orientation also fit in well with this factor solution (Aksan et al., 2006). Confirmatory factor analyses were conducted, inputting child, parent, and dyadic variables in to separate factor analyses, to confirm the factor solution (Supplemental table 4). The series of factor analyses described above was conducted for interaction variables in both drawing and puzzle completion tasks. As the results were similar, results are presented for the drawing task only

The child factor encapsulated the child's enthusiasm, persistence, experience of the session, and compliance, and can be described as ***the child's positive engagement***. The parent factor comprised the parent's sensitivity, supportiveness, clarity, and confidence, and can be described as ***the parent's supportive guidance***. The dyadic factor comprised the quality of the relationship, mutually responsive orientation, and diffusion of psychological/physical boundaries and refers to the level of ***fluent and attuned dyadic behavior***. This three-factor solution was used to calculate composite scores of child, parent, and dyadic behavior using sample-standardized z-scores from the ratings derived from the video-recorded play sessions.

For language variables, sample standardized z-scores were calculated from raw scores of the 11 language measures used. Expressive, receptive, and complex language reasoning composites were formed as averages of these z-scores, as per the hierarchical three-factor model outlined in a previous publication (Lahti-Nuuttila et al., 2021) (Supplemental figure 1). A complex language reasoning composite was only formed for children above 4 years old (n=54) as two of the subtests required for calculating the complex language reasoning composite (WPPSI-III Vocabulary, Word Reasoning), were not available for younger children. At follow-up, expressive and receptive language composites were formed from the five available measures (RDLS Expressive and Comprehension scales, EOWPVT, ROWVPT, BNT) (see Table 1).

Hierarchical linear regression models were used to test (1) the cross-sectional associations between child, parent, and dyadic behavioral factors and child's expressive and receptive language, and language reasoning ability in 3-6-year-olds, at the baseline, and (2) the longitudinal associations between child, parent, and dyadic behavioral factors measured in 3-6-year-olds at the baseline, and the child's expressive and receptive language ability measured in 6-7-year-olds at follow-up, after controlling for corresponding language ability composites measured at baseline. The child's age, maternal education level, and maternal age at childbirth were controlled for in all models.

Results

Correlations between main research variables and covariates showed that child's age was positively and significantly associated with language composite scores at baseline and follow-up. Maternal education level and age at childbirth were significantly and positively associated with parent and dyad behaviors in both tasks. Child, parent, and dyad behaviors in the two different tasks were strongly intercorrelated. (Table 2)

Parent-child interaction and language ability at baseline

In the drawing task, the child's positive engagement was positively associated with better receptive language and complex language reasoning at baseline. The parent's supportive guidance was also positively associated with better receptive language ability. Fluent and attuned dyadic behavior was positively associated with receptive language and complex language reasoning ability. In the puzzle-completion task, fluent and attuned dyadic behavior was positively associated with receptive language and complex language reasoning ability. In the free play task, mutually responsive orientation was positively associated with receptive language ability. (Table 3).

Parent-child interaction at baseline and language ability at pre-school follow-up

The child's positive engagement in the puzzle task at baseline was positively associated with better expressive language ability at pre-school follow-up. Fluent and attuned dyadic behavior in the puzzle task was positively associated with better receptive language ability at pre-school follow-up. Notably significant associations were not found between behavioral variables measured during the drawing task and language ability in pre-school aged children with DLD. (Table 4).

Discussion

This study examined (1) how the quality of parent-child interaction, i.e., the child's positive engagement, the parent's supportive guidance, and fluent and attuned dyadic behavior, is associated with expressive and receptive language, and complex language reasoning ability for 3–6-year-old children with DLD, and (2) whether the quality of parent-child interaction in 3–6-year-old children with DLD is associated with the child's expressive and receptive language ability at pre-school follow-up. In 3–6-year-old children, parent-child interaction characterized by the child's positive engagement, supportive parental guidance, and attuned dyadic behavior were cross-sectionally associated with better receptive language ability. The

child's positive engagement, as well as fluent and attuned dyadic behavior, were also associated with better complex language reasoning ability. The child's positive engagement during play sessions with their parent in 3–6-year-old children, was longitudinally associated with better expressive language ability at pre-school age. Moreover, fluent, and attuned dyadic behavior during parent-child play sessions in 3–6-year-old children, was longitudinally associated with better receptive language ability at pre-school age.

The findings of the current study suggest that parent-child interaction is associated with language ability in children who have DLD, as several significant associations were identified at the cross-sectional phase of the study. Moreover, they suggest that the quality of parent-child interaction is longitudinally associated with language outcomes in pre-school-aged children. These findings are in accordance with the wealth of research highlighting the importance of smooth-flowing, connected, and engaged parent-child interaction to language development (McGillion et al., 2013; Romeo et al., 2018; Rowe & Snow, 2020; Tamis-Lemonda et al., 1998, 2001). Earlier research has illustrated the importance of parent responsiveness, and connectedness between parent and infant, to early features of linguistic ability, such as first words, and vocabulary growth in typically-developing children (Donnellan et al., 2020; Hirsh-Pasek et al., 2015). The findings of the current study extend those results, showing that the quality of the parent-child relationship is important to language development beyond infancy and toddlerhood (Rocissano & Yatchmink, 1983; Rowe & Snow, 2020) for children with DLD. These findings support earlier research highlighting the role of engaged, connected episodes of interaction, as opposed to a focus on parent or child behaviors separately (Ford et al., 2020; Rowe & Snow, 2020). Furthermore, they highlight the potential importance that the emotional quality of parent-child interaction might have for language development. These findings echo earlier findings and suggest that over and above individual parent behaviors like sensitivity and responsiveness, which are often the focus of research, it may be the general patterns of

interaction and the emotional atmosphere that forms between parent and child that could be salient for language development (Lindsey et al., 2009; Nicely et al., 1999).

The reason for the significance of dyadic synchrony may be that it supports the kind of atmosphere that is conducive to long bouts of engaged interaction between parent and child, which in turn are beneficial for language development (Romeo et al., 2018). A high level of dyadic synchrony also means fewer breakdowns and faster repair of breakdowns when they do occur. This could simply free up cognitive resources to language development, which in the context of a more precarious and less predictable parent-child relationship might be dedicated to attempts at re-establishing connection, acceptance, and affection after a breakdown. The findings of the current study could suggest that an emotional atmosphere characterized by shared positive affect, connectedness, mutual attunement, and fluent, harmonic interaction where parent and child boundaries are maintained, facilitates a higher level of shared attention and prolonged episodes of shared attention, which in turn might facilitate orientation toward salient objects in the environment (Lindsey et al., 2009; Rocissano & Yatchmink, 1983; Romeo et al., 2018; Tomasello & Farrar, 1986) allowing for more efficient accumulation of receptive language ability.

Notably, the only significant association for expressive language ability was that between the child's positive engagement and expressive language in 6-7-year-old children. As there is less research on the association between parent-child interaction and receptive language ability, as measures for expressive language development are included more often than receptive measures (Blackwell et al., 2015), there is little to compare this result to in the literature on parent-child interaction and language development. The association between positive child engagement and better expressive language ability in 6-7-year-olds is, however, in line with findings from research on language development and temperament, which show that more outgoing children have better expressive language ability (Paul &

Kellogg, 1997; Pérez-Pereira et al., 2016; Prior et al., 2008). This association between higher surgency and expressive language ability has been found in TD children and children with language impairment. This study adds to the existing knowledge base providing support for the notion, that children who are more engaged in interaction actively and in a positive manner, may develop better expressive language ability.

Limitations

The lack of a typically-developing control group is a limitation of the current study and prevents conclusions from being drawn concerning the role of parent-child interaction in language development overall. The lack of balancing in the order of interactional tasks provides uniformity in the administration of these tasks but could also bias results. It should also be noted that the sample size of the current study was, though sufficient, on the modest side for the use of factor analysis as a statistical technique. Moreover, though the Erickson scales are widely used to assess parenting sensitivity (Mesman & Emmen, 2013), there is no comprehensive resource widely available addressing the psychometric properties of this instrument, and therefore results and generalizations are preliminary.

Conclusions

The results of this study add to the current literature on language development in children with DLD by illustrating that the emotional quality of the parent-child interaction is significantly associated to language development for preschool-aged children with DLD. These findings point towards important protective factors for language development for children with DLD. Particularly, a parent-child relationship characterized by connectedness, belonging, and shared positive affect, despite significant language impairment can serve to encourage receptive language development. Moreover, parent behavior alone was not longitudinally associated with a child's language development, but rather the quality of the

interactive relationship, to which their child's temperament and cognitive abilities also have bearing.

The findings of this study provide potential directions for treatment. In addition to speech and language therapy and interventions focused on parent behaviors like responsiveness, treatment could also consider the level of connectedness between parent and child during interaction. Treatment for children with DLD could perhaps include the option of interventions to foster more attuned, cohesive and positive interactions between parents and children.

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Tables

Table 1

Descriptive statistics for unimputed gender, age, maternal education level, maternal age at childbirth, and language variables at baseline and follow-up

Table 2

Correlations (Pearson's r, two-tailed) between child's age, maternal education, maternal age, child, parent and dyad behaviors and language composites

Table 3

Results from hierarchical regression analyses testing the relationship between parent-child interaction during drawing and puzzle-completion and language ability at baseline

Table 4

Results from hierarchical regression analyses testing the relationship between parent-child interaction during drawing and puzzle-completion at baseline, and language ability at preschool follow-up

Supplemental Material

Supplemental table 1

Descriptions of Erickson's sensitivity scales (Egeland et al., 1990; Erickson et al., 1985) and mutually responsive orientation (Aksan, Kochanska, & Ortmann, 2006).

Supplemental table 2

Descriptions of the aspects assessed when scoring mutually responsive orientation (MRO) (Aksan, Kochanska & Ortmann, 2006).

Supplemental table 3

Factor loadings from an exploratory factor analysis of parent, child, and dyadic variables measured during the drawing task.

Supplemental table 4

Factor loadings from three separate one-factor factor analyses of child, parent, and dyadic behavioral variables measured during the drawing task.

Supplemental Figure 1

Hierarchical three-factor model of language, originally published in Lahti-Nuuttila et al., (2021), reproduced with the author's permission.

Supplemental Figure 2

Parallel analysis for the exploratory factor analysis of parent, child and dyadic variables measured during the drawing task (see Supplemental table 3 for loadings).