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Joint Engagement of Toddlers With a Developmental Language Disorder During Daily Parent-Child Interactions

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Abstract

This study is the first to examine joint engagement (JE) among parents and their toddlers with a developmental language disorder (DLD) during both storybook reading and play. JE are moments of shared interest between parent and child, during which the parent can sensitively match the level of the child, so that the child can develop language and learn to interact with others. The sample consisted of a total of 25 toddlers, with and without a DLD, aged 24 to 48 months ($M = 42.08$; $SD = 5.6$) and one of their parents. The parent-child duos were filmed during five minutes of play and while reading a storybook. The Schlichting Receptive Language Test (SRLT) and Schlichting Expressive Language Test (SELT) were administered to examine the children's language abilities. Parents and their toddlers with and without a DLD did not differ in their time spent in different engagement states during both storybook reading and play. A preliminary finding, which should be interpreted with caution, is that parents and their toddlers with a DLD did have briefer moments of coordinated JE during play compared to the typical developing toddlers. Additionally, parents and their toddlers with a DLD did not have briefer moments of coordinated JE during storybook reading compared to play. The results add on to the importance of well attuned early interventions, as shown in previous research. For future research it is recommended, among other things, to include and transcribe the linguistic interpretation of engagement states.

Keywords: Developmental language disorder, joint engagement, parent-child interaction, play, storybook reading, toddlers.

Language is crucial for children to interact with others, communicate and express feelings. Children also use language to explore and learn from their environment (Leman et al., 2012). Problems in the development of language can be a risk for developing social-emotional problems and learning difficulties (St Clair et al., 2019). Unfortunately, five to seven percent of all children have a developmental language disorder (DLD) (Tomblin et al., 1997). Children with a DLD have difficulties in the acquisition and use of language due to a lack of comprehension and production of language which can't be explained by understimulation from the environment or from other causes such as a cognitive delay, psychiatric problems, neurological abnormalities, or abnormalities in speech organs and/or reduced hearing (American Psychiatric Association, 2013). This may hinder them to fully participate in social interactions. Parents play a crucial role in their children's language development and the child's emerging social and cognitive competencies (Dodici et al., 2003; Roberts & Kaiser, 2011). During daily parent-child interactions, parents promote their children's language, social and cognitive development (Vandermaas-Peeler et al., 2009).

A child learns best within their zone of proximal development (Vygotsky, 1987), which in this case would be the distance between the child's current language level and their potential to develop their language. In practice this means that parents must be aware of their children's language ability, know the child's potential and how to help them develop their language. In general, the communication between parents and children with a DLD is often difficult because these children have both difficulties with understanding others and to communicate their own thoughts and desires (Isarin et al., 2017). The relation between the parent-child interaction and the child's language development is of bidirectional nature (Drenthen & Riksen Walraven, 1997). It is known that children with a DLD in general take fewer communication initiatives and understand less of what is said to them or are more difficult to understand for others (Isarin et al., 2017). When a child gives unclear communicative signals, it is hard for parents to interpret and respond to them correctly. This often means that these children are misunderstood, which can lead to withdrawn behaviour by the child and uncertainty on how to act by the parent (Baxendale & Hesketh, 2003). However, for children with a DLD it is of utter importance that parents give them the opportunity to practice their language. To stimulate the language development of children with a DLD it is therefore necessary that parents provide their children with language and communication in sensitively attuned social interactions. Daily parent-child activities where children can benefit from their parent's linguistic input are particularly suitable for this, such as storybook reading and play (Fletcher & Reese, 2004; Wasik & Jacobi-Vessels, 2017). In these different activities, children are exposed to diverse kinds of language and can practice various language skills (Stich et al., 2015). During storybook reading they learn new words and gain morphosyntactic skills, whereas play is more child-driven and gives them the opportunity to practice new learned vocabulary and develop their pragmatic competencies (Stich et al., 2015; Vandermaas-Peeler et al., 2009; Wasik & Jacobi-Vessels, 2017).

Both storybook reading and play are characterized by moments of shared interest between parent and child. This is known as joint engagement (JE; Bakeman & Adamson, 1984). JE is associated to

children's language development (Cejas et al., 2014). During JE a situation is created in which the parent can sensitively match the level of the child so that the child can develop language and learn to interact with others. If such a moment of JE is short, this limits the possibilities to create an optimal learning environment. Engagement can fluctuate qualitatively between unengagement, a more passive and active JE. In the current study, in a period of JE, we make a distinction between supported (i.e. passive) and coordinated (i.e. active) JE (Adamson et al., 2004). During a period of supported JE, children are not explicitly acknowledging the parent, however children are engaged in a shared activity that they built with the parent. In coordinated JE, children and the parent are actively involved with the same object, additionally children are actively acknowledging the adult's participation. Coordinated JE is the ideal condition to stimulate children's language development and give them the opportunity to apply or practice it immediately.

It is known that language is an important factor in the initiation, quality, and duration of JE (Dirks & Rieffe, 2019). Yet, no research has been conducted on JE during storybook reading or play among parents and their toddlers with a DLD. However, during a descriptive study Fleury and Hugh (2018) looked into JE during shared book reading practices between parents and toddlers with and without autism spectrum disorder (ASD). The children with ASD showed lower levels of passive engagement (e.g. solely looking at the book) but had higher levels of non-engaged behaviour (e.g. disruptive behaviour which hinders the reading by the parent). Because children with ASD and children with a DLD both have problems in their communication, it can be expected that this will also be the case for children with a DLD. However, it is important to keep in mind that the underlying mechanism for the language and communication problems may be different (Bean et al., 2020). Another research examined JE during play (Dirks & Rieffe, 2019). They investigated JE of parent-child interactions for toddlers with moderate hearing loss (MHL) and toddlers with normal hearing (NH). It appeared that children with MHL and their parents were less successful in establishing JE and had briefer episodes of JE. Children's language abilities were positive related to the duration of JE. Since children with MHL have similar language difficulties, it may be the case that parents and toddlers with a DLD will also have briefer moments of JE during both storybook reading and play.

Although no research has been conducted into JE during play or storybook reading in toddlers with a DLD, some studies examined other aspects of parent-child interactions in children with language difficulties. Kaderavek and colleagues (2014) examined communicative behaviours of parent-child duos during storybook reading. Parents of a child with a communication impairment (CI) produced fewer elaborations or other language-facilitating strategies. This may be because children with CI themselves produced fewer utterances. Parental language input to late-talking toddlers during play has been examined by Vigil and colleagues (2005). In their research, parents of children with a normal language development responded more to their children and took more conversational turns compared to parents of children with a language delay. Possibly this is the same for children with a DLD.

Stich and colleagues (2015) observed twenty-four mothers and their pre-school children, aged four to five years, with a language impairment (LI) during toy play and book reading to examine the utterances of both mother and child and the interaction style of the mothers. During toy play, interaction was more provoking, which was seen in a more balanced utterance ratio for both mother and child. This may be because children with LI are more passive during book reading or do not have that much interest. These results are relevant for the current study because both forms of language difficulties show similarities, although children with a DLD have more severe problems. Additionally, it is important to examine this among younger children because of the pre-lingual and differentiation phase they go through at an age of two to five years. In general, during these phases, a child begins to use more meaningful language and the vocabulary expands. This is therefore an important period for identifying problems in the language development (Leman et al., 2012). Based on the research of Stich and colleagues (2015), parents and children with a DLD will possibly have briefer moments of coordinated JE during storybook reading compared to play.

Given that no research has yet been done on JE during both storybook reading and play among parents and their young children with a DLD, we want to fill this gap in the literature. Especially since both storybook reading and play are two important contexts to promote children's learning and language development (Vandermaas-Peeler et al., 2009). Because parents expose their children to different kind of language input in both contexts, this can influence the establishment, quality, and duration of JE (Stich et al., 2015; Wasik & Jacobi-Vessels, 2017). Gaining more insight in this among parents and their children with a DLD would give valuable information about their parent-child communication patterns, which in turn gives the opportunity to think of suitable ways to improve this, seen the bidirectional nature between the parent-child interaction and the child's DLD (Drenthen & Riksen Walraven, 1997).

In the present study we will examine whether there is a difference in JE between parents and their toddlers with and without a DLD. We will examine differences in JE during two different types of activities, and whether JE differs between and within groups. It is expected that parents and their toddlers with a DLD will differ in their time spent in the different engagement states during both storybook reading and play compared to the typical developing toddlers. More precisely, it is expected that this difference can be seen in their time spent in coordinated JE. Additionally, the expectation is that parents and their toddlers with a DLD will have briefer moments of coordinated JE during storybook reading compared to play.

Method

Participants

A total of 30 toddlers and one of their parents participated in this study. After careful consideration, we decided not to include five of the typical developing toddlers in the analysis because of unsuitable videos, and language scores that were very low compared to the other toddlers from the typical developing group. This means that our sample consisted of 25 toddlers aged 24 to 48 months (*M*

= 42.08; $SD = 5.6$) and one of their parents. The group of 11 toddlers with a Developmental Language Disorder (DLD) was compared with a group of 14 typical developing toddlers. Seven of the toddlers with a DLD have a phonological disorder as a sub-form of DLD, which manifests itself in poorer intelligibility. The other four toddlers with a DLD have problems in language comprehension and production. Characteristics of the sample are reported in Table 1, unfortunately one parent did not fill out the questionnaire. The toddlers did significantly differ in terms of age, with typical developing toddlers being significantly younger than toddlers with a DLD. The toddlers with a DLD are enrolled in the early intervention program of the Nederlandse Stichting voor het Dove en Slechthorende Kind (NSDSK). At the NSDSK the toddlers are diagnosed with a (suspicion of) DLD. Because of this, it can be assumed that there is no comorbid diagnosis or other developmental difficulties. The typical developing toddlers were recruited from regular daycare. The typical developing toddlers were included when there was no history with speech and language therapy, and when there were no concerns about their language development.

Procedure

For the parent-child duos from the DLD group (18.2% father; 81.8% mother) the research procedure took place at a location of the NSDSK. The parent-child duos from the typical developing group (7.1% father; 92.9% mother) were visited at their own daycare center or at home by one of the researchers. The parent was asked to fill in the consent form whereafter the data collection began. The toddlers and one of their parents were videotaped during play and while reading a storybook. First, the parent-child duo was asked to play for six minutes, however only five minutes of play are being coded. The first minute of the recording was fast-forwarded because of the unpacking of the bag. The following instructions were given by the researcher: "I have a bag of toys for you here. Open it together and start playing the way you always do. You can choose one toy, but you can also play with everything. I will not play with you and will say so when you can stop. It takes about five minutes." The bag of toys was provided by the researcher and included farm animals, a pretend play cookware set and puzzle blocks. After the five minutes of play the following instruction was given by the researcher: "You can put the toys back in the bag. Here I have a storybook. You can look in it together and talk about it." The storybook is called 'Zo moe en toch klaarwakker' and was provided by the researcher. After they finished the storybook, the researcher asked the parent to fill in the online questionnaire about their background. In the meantime, the researcher took the Schlichting Expressive and Receptive Language Test with the toddlers from the control group. For the toddlers in the experimental group, the language scores are already known because of the monitoring system of their treatment at the NSDSK. Afterwards, the toddlers and parents received a small book thanking them for their participation.

Table 1

Characteristics of participants.

| | DLD (<i>n</i> = 11) | | TD (<i>n</i> = 14) | |
|---|------------------------|----------|------------------------|----------|
| | <i>M</i> (<i>SD</i>) | Range | <i>M</i> (<i>SD</i>) | Range |
| Age (months)* | 44.91 (1.4) | 42 – 47 | 39.79 (6.7) | 29 - 48 |
| Sex [<i>n</i> (%)] | | | | |
| Male | 5 (45.5) | - | 5 (35.7) | - |
| Female | 6 (54.5) | - | 9 (64.3) | - |
| Language scores | | | | |
| Language comprehension | 102.81 (21.7) | 55 - 130 | 101.21 (13.8) | 70 – 125 |
| Word production | 103.18 (20.7) | 55 - 130 | 103.79 (21.8) | 55 – 130 |
| Sentence production | 89.5 (14.10) | 68 - 112 | 98.57 (16.1) | 77 - 137 |
| Maternal educational level ^a | 6.2 (.79) | 5 – 7 | 5.6 (1.4) | 2 – 7 |
| Born in the Netherlands [<i>n</i> (%)] | | | | |
| Yes, and my parents too | 10 (90.9) | - | 9 (64.3) | - |
| Yes, but my parents did not | 0 (0) | - | 3 (21.4) | - |
| No, but my parents did | 0 (0) | - | 1 (7.1) | - |
| No, and neither my parents | 0 (0) | - | 1 (7.1) | - |

Note. DLD, Developmental Language Disorder; TD, Typical Developing.

**p* < .05

^a1 = primary education, 2 = LBO/VMBO, 3 = Mavo, 4 = Havo/VWO, 5 = MBO, 6 = HBO, and 7 = University

Measures

Language

To measure the toddler's language abilities the Schlichting Receptive Language Test (SRLT; Schlichting & Lutje Spelberg, 2010b) and the Schlichting Expressive Language Test (SELT; Schlichting & Lutje Spelberg, 2010a) were administered. The SRLT and SELT are standardized language tests for children between two and five years of age. The SRLT measures the receptive language ability, or in other words the language comprehension, of the toddlers. This is measured by asking the toddlers "Where is the [object]?" after which they have to point to the correct picture the object is in. They also

have to perform specific tasks in which they have to complete an assignment after hearing an instruction. The SRLT consists of 86 items which were scored with '1' if the toddler responded correct and with '0' if the toddler responded incorrect, this makes the range of the total score 0 – 86. The test administration was stopped if the toddler made five consecutive incorrect answers. The internal consistency of the SRLT is 0.93 (lambda-2; Schlichting & Lutje Spelberg, 2010b). The SELT measures the expressive language ability, or in other words the active language development or language production of the toddlers. We only administered the subtest 'syntax' of the SELT in which the toddlers had to imitate and complete 40 sentences of increasing grammatical complexity. The SELT consists of 40 items which were scored with '1' if the toddler responded correct and with '0' if the toddler responded incorrect, this makes the range of the total score 0 – 40. The test administration was stopped if the toddler made five consecutive incorrect answers. The internal consistency of the subtest 'syntax' from the SELT is 0.90 (lambda-2; Schlichting & Lutje Spelberg, 2010a).

Joint engagement

A coding procedure based on Adamson et al. (2004) and Fleury and Hugh (2018) was used to analyse the quality and duration (in milliseconds) of engagement states during storybook reading and play. The video-recordings of the storybook reading and play sessions were coded using the INTERACT software package (Mangold, 2020). The main task for the coder was to determine whether the child and adult were involved with the same object or event. If this was the case, the engagement state was characterized as joint. In addition, joint engagement (JE) was either coded as supported (i.e. passive), or coordinated (i.e. active). An engagement state is defined as a period of at least three seconds that is characterized by the child's active interest in people and/or in objects after either no engagement or another state of engagement occurred. The coder viewed the interaction between the child and the adult from the child's perspective, this means that the focus is on the child's behaviour. However, the child's engagement is connected to the adult's engagement because JE involves shared attention. During the video-recordings the coder segmented the child's engagement into one of the mutually exclusive and exhaustive states. Continuous moments or breakpoints (Newtson, 1973) were identified in behaviour between the different engagement states as presented in Table 2 (the complete coding scheme can be found in Appendix A). The coder watched the recording and determined in which engagement state the child started. When the engagement state shifted, this moment was coded with a different label. This continued until the time for either the storybook reading or play was up. As a result, a proportion of the total time a child spent in each engagement state was then calculated. To measure the degree that the two coders agreed in their ratings of JE, the interrater reliability was calculated using an interclass correlation (ICC; Koo & Li, 2016). The two coders independently coded 20% of the videos. The ICC was in the good range (ICC = .89).

Table 2

Behaviours coded during both storybook reading and play

| | Storybook reading | Play |
|----------------------------|---|---|
| Disruptive | The child is engaging in behaviour that impacts his/her ability to attend and engage in the storybook reading. It should affect the adult's behaviour and stop them from reading the book. | The child is engaging in behaviour that impacts his/her ability to attend and engage in the play. It should affect the adult's behaviour and stop them from playing. |
| Unengaged | The child is not attending to the reading activity. The child does not focus his/her attention to the book or the adult reader. | The child appears uninvolved with the adult, objects, or activity. |
| Supported Joint (passive) | The child looks at the book and/or the adult reader as he/she reads the book, but no interaction with the adult occurs. The adult reads the text but does not encourage the child to participate verbally or nonverbally. | *In any case, the adult must be involved with the same object as the child. The child and adult are actively involved with the same object, but the child is making no clear acknowledgment of the adult's participation. |
| Coordinated Joint (active) | The child is actively involved with the book reading and coordinates his/her attention to both the adult reader and the book. Communication may be initiated verbally or nonverbally. | **The child and adult are actively involved with the same object, and the child is actively and repeatedly acknowledging the adult's participation. |

* Because states are being coded, an isolated act directed toward the partner, such as a single brief glance or a short confirmation ("yes..."), may occur during this state.

** For an episode to be characterized as coordinated, there must be clear evidence that the child is constantly showing active interest in the adult (repeated or sustained visual regard/glances is the most common indicator of such interest).

Statistical Analyses

For our data-analyses we used *IBM SPSS Statistics 26* (IBM Corp., 2019). A multivariate analysis of variance (MANOVA) was used to examine the differences in the engagement states in the DLD and typical developing group. Additionally, a one-way repeated analysis of variance (ANOVA) was used to test for differences in the engagement states in the DLD and typical developing group during storybook reading and play. The alpha used for the analyses was $\alpha = .05$.

To conduct a MANOVA and a repeated measures ANOVA with two groups in two settings, we need a sample size of 64 participants per group, which adds up to a total of 128 participants (alpha .05, effect size .25 and power .80). Unfortunately, due to the measures for COVID-19 in the Netherlands we were unable to collect enough participants for the study and therefore the current study was underpowered. Nonetheless, we decided to proceed because of the educational purpose of the study.

Results

Pre-analyses

Prior to the analyses we checked for outliers to make sure they did not have an influence on the results. Outliers were detected; however, it was decided to keep them included in the sample because of the small sample size and the educational purposes of the study. Additionally, we controlled for the assumptions of a multivariate analysis of variance (MANOVA) and a one-way repeated analysis of variance (ANOVA). Boxplots, Shapiro-Wilk statistics, and the presence of multivariate outliers indicated that the assumption of univariate and multivariate normality was not supported, also the assumption of homogeneity of variances was not satisfied. Correlations between the dependent variables were not excessive indicating that multicollinearity was not of concern. Since we have a repeated-measures variable that only has two levels, the assumption of sphericity was not violated. Although not all assumptions were met, it was decided to conduct the analyses because of the educational purposes of the study.

Engagement during storybook reading and play

To examine the overall differences in engagement states in the DLD and typical developing group during storybook reading and play, a multivariate analysis of variance (MANOVA) was conducted. The results of the MANOVA analyses are shown in Table 3 and Table 4. Findings showed that overall during play parents and their toddlers with a DLD did not significantly differ from parents and their typical developing toddlers in their time spent in the different engagement states, $F(3, 21) = 2.40$, $p = .097$, $\eta^2 = .25$. However, because it reached significance, and we expected a difference in coordinated JE between parents and their toddlers with and without a DLD, we conducted follow-up analyses. These findings showed that parents and their toddlers with a DLD spent less time in coordinated JE compared to parents and their typical developing toddlers.

Further, the findings showed that overall during storybook reading parents and their toddlers with a DLD did not significantly differ from parents and their typical developing toddlers in their time spent in the different engagement states, $F(4, 20) = .93$, $p = .467$, $\eta^2 = .16$.

Since we found significant differences between the groups for age, we performed all analyses again with age as a covariate. All results remained the same. In order to examine the possible effect of language ability, all analyses were performed again with language as a covariate. Again, the results remained the same.

Table 3

Summary scores for the proportion of joint engagement (JE) during storybook reading

| | DLD | TD | | | |
|----------------|---------------|---------------|-----------------|-----------------|----------|
| | <i>M (SD)</i> | <i>M (SD)</i> | <i>F scores</i> | <i>p values</i> | η^2 |
| Disruptive | 4.56 (12.52) | 1.79 (3.17) | .64 | .433 | .03 |
| Unengaged | .26 (.58) | 3.36 (8.72) | 1.37 | .254 | .06 |
| Supported JE | 62.78 (24.08) | 56.34 (25.38) | .42 | .526 | .02 |
| Coordinated JE | 32.32 (22.58) | 38.52 (22.47) | .47 | .502 | .02 |

Note. DLD, Developmental Language Disorder; TD, Typical Developing

Table 4

Summary scores for the proportion of joint engagement (JE) during play

| | DLD | TD | | | |
|----------------|---------------|---------------|-----------------|-----------------|----------|
| | <i>M (SD)</i> | <i>M (SD)</i> | <i>F scores</i> | <i>p values</i> | η^2 |
| Disruptive | .79 (2.62) | .13 (.50) | .85 | .367 | .04 |
| Unengaged | 2.06 (3.83) | .07 (.28) | 3.77 | .065 | .14 |
| Supported JE | 63.88 (21.09) | 42.55 (22.03) | 5.99 | .022 | .21 |
| Coordinated JE | 33.27 (23.55) | 57.24 (22.24) | 6.80 | .016 | .23 |

Note. DLD, Developmental Language Disorder; TD, Typical Developing**Effect setting on engagement states**

To examine the whether the setting, either storybook reading or play, had an effect on time spent in the different engagement states and if this differed by group, a one-way repeated analysis of variance (ANOVA) was conducted. The results showed no main effect of setting and no interaction effect between setting and group. This indicates that parents and their toddlers with a DLD did not have briefer moments of coordinated JE during storybook reading compared to play, and this was the same for the typical developing toddlers.

Discussion

In moments of joint engagement (JE) during daily parent-child interactions children can benefit from their parent's linguistic input (Fletcher & Reese, 2004; Wasik & Jacobi-Vessels, 2017).

Coordinated JE is the ideal condition to stimulate children's language development and give them the opportunity to apply or practice it immediately. Especially for children with a developmental language disorder (DLD) this is of utter importance for their language development, which is essential for their social-emotional development and to prevent learning difficulties later in life (St Clair et al., 2019). To the best of our knowledge, this is the first study to examine whether JE differs between parents and their toddlers, aged 24 to 48 months, with a DLD compared to typical developing toddlers, during both storybook reading and play. Contrary to our expectations, the outcomes of the current study revealed that parents and their toddlers with a DLD did not differ in their time spent in the different engagement states during both storybook reading and play compared to the typical developing toddlers. However, a preliminary finding is that parents and their toddlers with a DLD did have briefer moments of coordinated JE during play compared to the typical developing toddlers. Yet, we must be cautious about this, considering our small sample size. Additionally, also against our expectations, parents and their toddlers with a DLD did not have briefer moments of coordinated JE during storybook reading compared to play.

The finding that parents and their toddlers with a DLD do not differ from parents and typical developing toddlers in their time spent in the different engagement states during both storybook reading and play is unexpected, since children's language abilities are positive related to the duration of JE (Dirks & Rieffe, 2019). A possible explanation may be found in the fact that parents alter their behaviours in response to their children's abilities (Hammer et al., 2001). Parents and their toddlers with a DLD may have built their JE in a way that is less linguistically demanding compared to parents and their typical developing toddlers. For example, in play parents and their toddlers with a DLD had moments of JE with the pretend play cookware set that mainly consisted of eye contact and a few simple words, while parents and their typical developing toddlers played out an entire tea moment. Thus, the parents and their toddlers with a DLD succeeded in being engaged with one another, yet used different strategies based on the parent's knowledge of the child's current communicative capacities (Bakeman & Adamson, 1984). This way parents and their toddlers with and without a DLD can have the same proportion of time spent in the different engagement states. However, it's important to keep in mind that they may not learn the same amount. When looking at the zone of proximal development, parents must be aware of their children's language ability, know the child's potential and how to help them develop their language (Vygotsky, 1987). Indeed, parents may adjust their behaviours in response to their children's abilities, but this does not necessarily mean that they are helping the development of their children's language, because of the less linguistically demanding interpretation of JE.

In addition, the sample of the current study differed in age, yet this made no difference in the findings. The toddlers with a DLD were on average approximately five months older than the typical developing toddlers. However, since children with a DLD experience severe difficulties in their language development, they may lag behind. Therefore, it could be that they were on the same language level as the typical developing toddlers. Additionally, parents of the toddlers with a DLD possibly used

strategies that are actually more appropriate for a younger age, like the group of typical developing toddlers. This could explain that no difference was found with regard to age.

The fact that we found that parents and their toddlers with a DLD did have briefer moments of coordinated JE during play compared to the typical developing toddlers was in line with our expectations and previous research by Vigil and colleagues (2005). In their study it appeared as if parents of children with a language delay were less likely to respond to their child and maintain the same topics, but instead kept on introducing new topics to engage their child in more talk. However, in this way a child needs to continually reprocess what is being said and formulate a new response. This may have also happened with our parent-child duos and therefore moments of coordinated JE were often interrupted or not created at all.

In contrast with our expectations and previous research (Stich et al. 2015), parents and their toddlers with a DLD did not have briefer moments of coordinated JE during storybook reading compared to play. First, it is important to note that Stich and colleagues (2015) examined how interactive context influenced interactions of mothers and their children with a language impairment (LI), with a focus on the maternal language input and mean length of utterances of both mother and child. However, JE includes more factors by which it can be established, such as eye contact, pointing or showing something to each other. It may be because of this that no difference between storybook reading and play has been found in the current study.

A second possible explanation may be found in the nature of the setting. The play was not structured, meaning it did not involve a specific activity and did not have rules or specific objectives (Wasik & Jacobi-Vessels, 2017). The parent-child duos were free to choose which activity they would like to do (play with farm animals, a pretend play cookware set and/or puzzle blocks) and how to shape it according to their desires. Storybook reading is a somewhat more structured setting where a parent and toddler are automatically focused on the same object and in which parents have more pointers to build engagement upon with the child. Book type is also of influence on how parents and children interact with each other (Stadler & McEvoy, 2003). A narrative text, or storybook as in the current study, provokes more interactive behaviours such as talking about the pictures. Besides these differences, both the play and storybook setting included factors of repetition (e.g. pouring a cup of tea several times and asking accompanying questions, or the returning phrase "door open, door closed" in the storybook). These repetitive situations evoke a response by the toddlers, which is coded as a coordinated JE behaviour. So, although there are differences in the nature of the setting, there are also commonalities which may explain the fact that no differences in JE were found during storybook reading and play.

Lastly, the parents of the toddlers with a DLD are well aware of their children's language problems since they are enrolled in the early intervention program of the Nederlandse Stichting voor het Dove en Slechthorende Kind (NSDSK). In this intervention program parents receive guidance to stimulate language development during activities such as play and storybook reading. Because of this,

parents may put in some extra effort in both settings which may have resulted in the same amount of time spent in coordinated JE.

Strength, limitations, and recommendations

The strength of the current study is that, to our knowledge, we are the first to examine JE during both storybook reading and play among parents and their toddlers with a DLD and therefore fill a gap in the existing literature (Dirks & Rieffe, 2019; Fleury & Hugh, 2018; Kaderavek et al., 2014; Stich et al., 2015; Vigil et al., 2005). Seen the prevalence of a DLD among children and the communicative problems within their families, it is important to gain knowledge in this topic. The current study offers preliminary information about JE among parents and their toddlers with a DLD during storybook reading and play. However, there are a few limitations that should be considered. First, our sample was small because we were unable to collect enough participants due to the measures for COVID-19 in the Netherlands. Therefore, the results and associated statements should be interpreted with caution. For future research a larger sample size is recommended (Hallahan & Rosenthal, 1996). Second, our sample consisted mainly of mothers and their toddlers with and without a DLD. Previous research is inconsistent when it comes to the influence of parent's gender on children's engagement and the language used by both parent and child during parent-child interactions (Kwon et al., 2013; Tamis-LeMonda et al., 2004). Future research should include an equal proportion of mothers and fathers in their sample to rule this out. Third, the current study only investigated the proportion of time parents and their toddlers spent in the different engagement states, in particular coordinated JE. The coding scheme however did not include the linguistic interpretation of the engagement states. The combination of both duration and linguistic interpretation may be essential. The longer the moments of JE, the more language and depth can be offered, which means that children can benefit to a larger extent. To examine the quality of the linguistic input in engagement states more research is needed. Therefore, it might be an interesting recommendation to add the linguistic interpretation of engagement states, especially coordinated JE, to the coding scheme and transcribe as well. Last, even though our sample differed significantly in age, it made no difference to our results. As mentioned earlier, possibly toddlers with a DLD more or less matched the language level of the younger typical developing toddlers. It is therefore recommended for future research to include both a language matched control group and a chronological age group.

Clinical implications

Although no differences were found between the parents and their toddlers with and without a DLD, as previously said, it may be possible that in the current study parents of the toddlers with a DLD built less linguistically demanding moments of coordinated JE and therefore the toddlers do not have enough optimal access to a language learning environment. In that case, the current study adds on to the importance of early intervention as shown in previous research (Roberts et al., 2019), given the bidirectional relationship between parent-child interaction and the child's language development

(Drenthen & Riksen Walraven, 1997). Results from a study into the effectiveness of the Hanen Parent Program, a program concerned with the early reciprocal interactions between parents and their children with language impairments, suggest that there are several parent and child factors that need to be considered when choosing a suiting intervention for such families, such as the existing parent-child interaction and the level of the child's language (Baxendale & Hesketh, 2003). It is necessary to ensure that a program can be adapted to individual needs. Since toddlers with a DLD may be in higher need of longer moments of coordinated JE with enriching language input, an intervention that focuses on these aspects is recommendable (Cejas et al., 2014).

Conclusion

The current study shows that parents and their toddlers with and without a DLD do not differ in their time spent in the different engagement states during both storybook reading and play. However, a preliminary finding is that parents and their toddlers with a DLD do differ in their time spent in coordinated JE during play. Yet, we must be cautious about this finding. Additionally, it appeared parents and their toddlers with a DLD did not have briefer moments of coordinated JE during storybook reading compared to play. For future research it is recommended to use a larger sample size, with a better proportion between the number of fathers and mothers and to include both a language matched control group and a chronological age group. Additionally, it would be interesting to include the linguistic interpretation of engagement states, especially coordinated JE, in the coding scheme and transcribe as well. The current study offers preliminary information about JE among parents and their toddlers with a DLD during storybook reading and play. We created the start into gaining more insight in this topic, now it's time to build upon this and gather more knowledge. So, join in on the research into JE among parents and their toddlers with a DLD.

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Appendix A

Complete coding scheme

Joint Engagement – Book reading

Disruptive:

The child is engaging in behaviour that impacts his/her ability to attend and engage in book reading (e.g. turning page too soon, flipping through the book, walking away, sitting upside down). It should affect the adult reader's behaviour and stop them from reading the book. Parent redirective behaviours (e.g. "not in your mouth"; "let's not do that"; "stop that"; shushing the child) can be a cue that the child's behaviour is disruptive to the book reading.

Unengaged:

The child is not attending to the reading activity. The child does not focus his or her attention to the book or the adult reader.

- Looking around the room
- Talking or singing to self in a repetitive and non-purposeful manner
- Behaviours that are unrelated to the reading but not disruptive to the book reading (e.g. cuddling, tickling, or playing with jewellery or another object)

Supported joint engagement:

The child looks at the book and/or the adult reader as she reads the book. Although the child is sitting and appears to be attending appropriately, no interaction with the adult occurs. The adult reads the text but does **not** encourage the child to participate verbally or nonverbally.

- The child is silently looking and/or listening to the book reading
- The child is not responding to questions or requests of the adult

Coordinated joint engagement:

The child is actively involved with the book reading and coordinates his/her attention to both the adult reader **and** the book (e.g. responding to a question, complete sentences, pointing). Either adult or child may be directing or initiating the interaction.

Communication may be initiated verbally (e.g. make comments, responds to vocalizations or answer questions) or nonverbally (e.g. give the child the opportunity to point, hold the book or turn the pages) with the reading partner, regarding the book.

In either case, the child is sharing attention to another person **and** to an object.

Joint Engagement – Play

Disruptive:

The child is engaging in behaviour that impacts his/her ability to attend and engage in play (e.g. walking away). It should affect the adult's behaviour and stop them from playing. Parent redirective behaviours (e.g. "not in your mouth"; "let's not do that"; "stop that"; "come back"; shushing the child) can be a cue that the child's behaviour is disruptive to the play.

Unengaged:

The child appears uninvolved with the adult, objects or activity. The child may be scanning the room as if he or she is looking for something to do or looking away.

***Supported joint engagement:**

In any case, the adult must be involved with the same object as the child. This involvement may be minimal (e.g. handing the child blocks to insert in its slots) or active (e.g. animating a block to gain attention, demonstrating how to insert it, naming the shape, and applauding the child's success).

The child and parent are actively involved with the same object, but the child is making no clear acknowledgment of the adult's participation.

- The child and parent are able to be involved with the same object if the parent scaffolds the interaction in a way that allows the child to focus his or her attention mostly on the object.
- The child may appear aware of the adult's activity (e.g. the child pauses to allow the adult to take a turn or place a puzzle piece, but he or she does not display lasting interest in the adult as would be displayed by repeated glances or more extensive vocal reactions).
- The balance of interpersonal attention during this state is clearly asymmetrical because the child is focused almost exclusively on the object.

Because states are being coded, an isolated act directed toward the partner, such as a single brief glance or a short confirmation ('yes...'), may occur during this state.

***Coordinated joint engagement:**

The child and adult are actively involved with the same object, and the child is actively and repeatedly acknowledging the adult's participation. In other words, the child is coordinating his or her attention to both another person and an object they are sharing.

- Having a conversation (e.g. asking questions back and forth, naming game, repeating a word after a correction by the parent).
 - Looking at each other (e.g. repeated glances, looking at the other while saying something)
 - Showing something to parent (and looking at them)
 - Singing together
-

* For an episode to be characterized as **coordinated**, there must be clear evidence that the child is constantly showing active interest in the adult (repeated or sustained visual regard/glances is the most common indicator of such interest). Thus, if a child punctuates a 20 second episode of sharing an object with the adult with two or more looks directed toward the adult, the episode would be coded as coordinated. However, if the child only directed one brief glance toward the adult, the entire episode would be coded as supported joint engagement.