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Association of language, behavior, and parental stress in young children with a language disorder

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ABSTRACT

Background: Several studies show that language problems, child behavior problems, and parental stress can co-occur in children. Still, little is known about how these domains are related in toddlers with a language disorder (LD).

Aims: This study examined relations between language problems, child behaviour problems, and parental stress in toddlers with LD and if these relations differ for children with different types of LD.

Method: Data of 185 children with LD (mean age 38 months) were collected using Routine Outcome Monitoring. Children were divided into two groups: presence of receptive and expressive problems (REP) and expressive problems only (EP). Relations were analyzed using Structural Equation Modeling.

Results: A better receptive language was associated with less teacher-reported internalizing and externalizing problems. A better expressive vocabulary was associated with more parent-reported internalizing problems and more teacher-reported externalizing problems. No relation was found between language and parental stress. Associations between language, behavior, and parental stress did not differ for children with REP or children with EP.

Conclusions: Our study shows that when specific language domains are examined, the pattern of associations between language and behavior becomes more complex, because relations exist between specific language domains and behavior, but not between all of them.

What this paper adds?

This paper addresses the associations between language problems, behaviour problems, and parental stress in toddlers with a language disorder. The results of our study show that the pattern of associations between language domains and behavior problems is complex, because relations exist between some language domains and behavior problems, but certainly not between all of them. Furthermore, we found no relations between language domains and parental stress. This study also examined if these relations differ between children with receptive and expressive language problems and children with expressive problems only. Previous studies in older children reported that children with receptive and expressive problems are more at risk for behavior problems and parental

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stress compared to children with expressive language problems only. In the present study, no differences in relations were found between these two groups of children, which suggests that differences between these children are not present at this young age.

1. Introduction

Children with a language disorder (LD) early in life are at risk of developmental and behavior problems, including disturbed communication with their parents (Sylvestre, Brisson, Lepage, Nadeau, & Deaudelin, 2016). The child's language, in combination with child behavior, influences parental responses. In turn, parental responses influence child behavior, reflecting the reciprocal nature of early child development. Children's language problems can influence this process, leading to frustration in both the child and the parent, and consequently to behavior problems in children (Petersen et al., 2013; Redmond & Rice, 1998) and elevated levels of stress in parents (Sylvestre et al., 2016). Although several studies indicated that children with LD more often have behavior problems (Charman, Ricketts, Dockrell, Lindsay, & Palikara, 2015; Prior, Bavin, Cini, Eadie, & Reilly, 2011; Van Daal, Verhoeven, & Van Balkom, 2007; Yew & O'Kearney, 2013) and that their parents have elevated stress levels (Schaunig et al., 2004; Sylvestre et al., 2016), the precise relations have rarely been studied in two- and three-year-old toddlers with LD, and existing findings are contradictory. Knowledge about these relations is, however, important for intervention. For instance, if language problems cause behavior problems in toddlers and stress in parents, intervention should be directed mainly on language development. On the contrary, if no such relation exists, intervention should be directed not only at stimulating language development, but should also focus on reducing behavior problems and parental stress.

LD is defined as serious delays in the acquisition and use of language that cannot be explained by conditions such as a hearing disorder or an intellectual disability and can lead to problems in the reception and expression of language (DSM-5, 2013). Considerable variation has been found in the linguistic profiles of children with LD, leading to a number of attempts to classify subtypes (Van Daal, Verhoeven, & Van Balkom, 2004; Van Weerdenburg, Verhoeven, & Van Balkom, 2006). Since both the DSM-5 (2013) and the ICD-10 (1993) emphasize that expressive and receptive language problems can differ in severity within an individual, several studies make a distinction between subtypes of LD (Law, Garrett, & Nye, 2004; Leonard, 2014; Rescorla, Ross, & McClure, 2007): children with both receptive and expressive language problems in various language domains (REP), and children with problems in expressive language domains (EP) only. Children with LD are thus a heterogeneous group with different developmental perspectives. For example, language problems are generally more persistent in children with REP compared to children with EP (Law et al., 2004).

Several studies indicate that children with LD are more at risk of displaying behavior problems than typically developing children (Charman et al., 2015; Keegstra, Post, & Goorhuis-Brouwer, 2010; Maggio et al., 2014; Van Daal et al., 2007; Yew & O'Kearney, 2013). Most studies distinguish between externalizing problems, such as aggression, and internalizing problems, such as withdrawn behavior and depression. While some studies reported more behavior problems on both domains (Maggio et al., 2014; Van Daal et al., 2007; Yew & O'Kearney, 2013), others have found that children with LD only displayed more internalizing problems than their typically developing peers (Keegstra et al., 2010; McCabe & Meller, 2004; Stanton-Chapman, Justice, Skibbe, & Grant, 2007). Although most studies were conducted among children aged four years and older, the few studies that have been conducted among toddlers largely showed the same pattern (Keegstra et al., 2010; Maggio et al., 2014; McCabe, 2005). However, one study by Rescorla et al. (2007) found no elevated levels of internalizing or externalizing behavior problems in 18- to 35-month-old children with LD. Behavior problems were mostly assessed by means of parent reports (Horwitz et al., 2003; Keegstra et al., 2010; Maggio et al., 2014; Rescorla et al., 2007), yet studies that used teacher reports also found elevated levels of behavior problems (McCabe, 2005; Qi & Kaiser, 2004). Lindsay, Dockrell, and Strand (2007) used parent as well as teacher reports and their study showed that parents observed more problem behavior than teachers. Since the dynamics of the situation in which a child with LD has to function may differ between home and a group setting (Lindsay et al., 2007; Redmond & Rice, 1998), it might be important to study behavior problems from different perspectives.

There are contrasting findings about whether the type of LD influences the presence and complexity of behavior problems. Maggio et al. (2014), Snowling, Bishop, Stothard, Chipchase, & Kaplan (2006) and Tervo (2007) all found indications that children with REP displayed behavior problems more often than children with EP. However, Rescorla et al. (2007) found no differences between children with REP and children with EP on the internalizing and externalizing scale of the *Child Behavior Checklist* (CBCL). Given these contrasting findings, more research is needed.

Looking in more detail, some studies have assessed relations between specific language domains, such as expressive syntax or receptive vocabulary, and behavior problems. This is of interest because of the heterogeneity of LD, and because behavior problems may be related to specific language domains. Qi and Kaiser (2004) for example, found no relations between receptive vocabulary and behavior problems in toddlers, but found problems on the receptive language domain to be related to externalizing behavior problems, and expressive syntax problems to internalizing behavior problems. Another study by Rescorla et al. (2007) did not find a relation between expressive vocabulary and internalizing and externalizing behavior in 18- to 35-month-old children.

Since LD can disturb communication between parent and child, raising children with LD can cause stress in parents. Research concerning the interaction between parents and their three- or four-year-old children with LD suggests that parents can feel helpless and insecure in parenting (Drenthen & Riksen Walraven, 1997), which can lead to parental stress arising from feelings of incompetence and a lack of confidence about how to communicate with their child with LD (Sylvestre et al., 2016). Schaunig et al. (2004) found that mothers of children between three and six-and-a-half-years with LD experienced more stress than mothers of typically developing children: 68% of the mothers showed above-average stress scores compared to 1.5% of the control group. Prior et al. (2011), however, did not find more parental stress in parents of four-year-old children with LD compared to children with a typical development.

In summary, most previous studies suggest that children with LD are at risk of having behavior problems, and that their parents may experience more stress. The question that arises is what is the exact nature of the relations between language problems, behavior problems, and parental stress in toddlers with LD? Some studies suggest that language problems influence behavior problems (Petersen et al., 2013; Peyre et al., 2016; Redmond & Rice, 1998). Redmond and Rice (1998) for example, found empirical evidence for their Social Adaptation Model, which postulates that behavior problems are a reflection of language problems rather than of an impaired psychosocial mechanism. A longitudinal study by Petersen et al. (2013) confirms this, finding that language predicted behavior problems more strongly than vice versa in children aged four to twelve. With regard to the direction of the relation between language problems and parental stress there is no firm evidence, although Robertson and Weismer (1999) did find that parental stress was reduced as a result of effective language intervention.

These contradictory findings, paucity of research among toddlers with LD, and a lack of comprehensive studies that simultaneously took into account (various types of) language problems, behavior problems, and parental stress provided the rationale for this study. The first aim was to study whether problems in four language domains were directly associated with prevalence of behavior problems (both externalizing and internalizing) and increased levels of parental stress in toddlers with LD. The four language domains included were: receptive language, receptive vocabulary, expressive syntax, and expressive vocabulary. The second aim of this study was to explore whether the type of language problem influenced the strength of the relations between the language domains, behavior problems, and parental stress. Since language problems of children with REP appear to be more severe compared to children with EP, they may have more negative influence on child behavior problems and parental stress than in children with EP. Drawing on previous work, we tested two hypotheses:

- 1 We expected a significant negative relation between receptive vocabulary, receptive language, expressive vocabulary, and expressive syntax on the one hand and internalizing behavior problems, externalizing behavior problems, and parental stress on the other. However, we had no specific hypothesis about which language domains would be related to child behavior problems and parental stress, this part of the study is explorative.
- 2 We expected significant differences in the strength of the relations between language problems, child behavior, and parental stress for children with REP and children with EP, with stronger relations expected in children with REP.

2. Method

2.1. Design

Children with LD who participated in this study visited an early language intervention center, where professionals used Routine Outcome Monitoring (ROM) (Bickman, Lyon, & Wolpert, 2016; De Beurs et al., 2011; Duncan, Miller, Wampold, & Hubble, 2010; Van Sonsbeek, Hutschemaekers, Veerman, & Tiemens, 2014) to monitor the children's development during intervention. The ROM method systematically and repeatedly collects data on treatment outcomes in clinical practice, in order to evaluate and, if necessary, adapt interventions. In the Netherlands, ROM is standard practice in the intervention for toddlers with LD and contributes to its quality. Researchers use ROM to study intervention effects and the associations between relevant aspects of treatment or participants (De Beurs et al., 2011; Van Sonsbeek et al., 2014). This study analyzed ROM data gathered by professionals around the time toddlers with LD started at the intervention center.

2.2. Participants

Multidisciplinary teams from Audiology Centers diagnosed the participating children with LD. This was a tentative diagnosis because, in children younger than four, establishing whether delays in language proficiency are linked to LD is difficult because of natural fluctuations in language proficiency at this age. Diagnosed children were referred to an early language intervention center, where they received individual and group language therapy. Four language tests measuring receptive and expressive language development were administered by a speech therapist around the start of the intervention. Children were included in the study if they had a score of one standard deviation or more below the mean of the norm group on at least one language test, indicating LD. Multilingual children and children with multiple disabilities were excluded.

The participants consisted of 185 toddlers in a clinical setting (150 boys, 35 girls) aged between 26 and 45 months, with a mean age of 38 months (SD: 4.1). All children had normal nonverbal development, i.e. a nonverbal IQ of at least 80, measured with a Dutch nonverbal intelligence test, the *SON-R* (Tellegen, Winkel, Wijnberg-Williams, & Laros, 1998). Table 1 shows the children's gender and their parent's educational level. Nineteen children were being raised in a family with one parent.

All children had expressive language problems, a substantial subgroup also had receptive problems. Because receptive language problems seem to be less malleable and thus more severe (Law et al., 2004), we distinguished in line with other studies between children with REP and children with EP (Law et al., 2004; Leonard, 2014; Maggio et al., 2014; Rescorla et al., 2007). The group of children with REP (N = 90) consisted of children with a score of more than one standard deviation below the mean (< 85) of the norm group on the *Schlichting Test for Language Reception* (Schlichting & Lutje Spelberg, 2010b), meaning that all children with REP had a receptive language score below normal range. All the other children were assigned to the group of children with EP problems (N = 95), meaning that the receptive language of these children was in or above the normal range.

Table 1
Participants characteristics: Gender and education level of the parents.

	%
Gender (N = 185)	
Boys	81%
Girls	19%
Education mother (N = 165)	
Low	4%
Mean	52%
High	44%
Education father (N = 150)	
Low	2%
Mean	53%
High	45%

2.3. Instruments

All tests are included in the standard protocol of the ROM intervention for toddlers with LD and thus being used routinely. Receptive and expressive language proficiency were assessed with four tests, all age-appropriate, with age-dependent entry levels. To enable comparison with the test norms, raw scores were transformed into standardized Q-scores with a mean score of 100 (SD = 15; normal range 85–115), based on norm data per age group. Child behavior was assessed with two different instruments, one parent and one teacher questionnaire. Using both questionnaires yields extra information about child behavior in different contexts.

Receptive language proficiency was assessed with two different tests, the “*Schlichting Receptive Language Test*” (SRLT) (Schlichting & Lutje Spelberg, 2010b), and the “*Peabody Picture Vocabulary Test-III-NL*” (PPVT-III-NL) (Dunn, Dunn, & Schlichting, 2005). In the SRLT children were asked to point at pictures of objects, like “where is the car”, and to carry out tasks such as “put the monkey on the house”. The test consists of 86 items which were positively scored when a child responded adequately (range total score is 0–86). When a child made five consecutive mistakes, the test was stopped. Internal consistency of the test is 0.93 (lambda-2) (Schlichting & Lutje Spelberg, 2010b).

To assess receptive vocabulary (PPVT-III-NL), children were asked to identify pictures that matched spoken words. Recognition of the target word out of four pictures received a positive score. The test consists of 17 sets of words, each set containing 12 items (range total score is 0–204). The test ended when the identification of nine items within a set was wrong. Internal consistency of the test ranges from 0.89 till .92, depending on age (lambda-2) (Dunn et al., 2005). We used the most recent Dutch version of the PPVT.

Expressive language was measured with the “*Schlichting Expressive Language Test*” (SELT) (Schlichting & Lutje Spelberg, 2010a). Both syntax and vocabulary were assessed. In the subtest for expressive syntax, children were required to imitate and complete 40 sentences of increasing grammatical complexity. Items were positively scored when a child produced an adequate imitation or completion of a sentence (range total score 0–40). After five consecutive mistakes, the test was stopped. Internal consistency of the test is 0.90 (Schlichting & Lutje Spelberg, 2010a). In the subtest for expressive vocabulary, children had to name pictures shown to them. The test consists of 70 items that had to be named correctly for a positive score (range total score is 0–70). The test ended when five successive items were wrong. Internal consistency of the test is 0.89 (lambda-2) (Schlichting & Lutje Spelberg, 2010a).

Problem behavior of the children was measured with two comparable questionnaires, one for parents (*Child Behavior Checklist 1,5–5*, CBCL) (Verhulst & Van der Ende, 2001) and one for preschool teachers (*Caregiver-Teacher Report Form 1,5–5*, C-TRF) (Verhulst & Van der Ende, 1997). Both questionnaires consist of 99 questions about the behavior of the child, for example, “easily frustrated”, “gets into many fights” and “disobedient”. Parents and preschool teachers rated each item on a three-point scale (range 0–2): “never”, “sometimes”, “often”. Both questionnaires were divided into two subscales: internalizing problems (e.g. withdrawn, anxious or depressed behavior) and externalizing problems (e.g. aggression, attention deficits). Scores for internalizing and externalizing behavior were summed up into a total raw score and converted into t-scores, with a mean of 50 and a standard deviation of 10. Cronbach’s Alpha for the CBCL and C-TRF internalizing and externalizing scales ranges between 0.89 and .96 (Achenbach & Rescorla, 2000).

Parental stress was assessed using the “*Parenting Stress Questionnaire*” (PSQ) (Vermulst, Kroes, De Meyer, Nguyen, & Veerman, 2015), specially designed for parents of children visiting youth health care institutions or special education, and consisting of 34 questions on parent-child relationship problems, parenting problems, depressive mood, parental role restriction and physical health problems. Examples of questions that parents had to answer are “I feel satisfied with my child”, “Raising my child leaves me with too little personal time” and “I feel sleepy or drowsy”. Parents rated the degree to which each item was true on a four-point scale: “not true”, “somewhat true”, “quite true”, “very true” (range 1–4). The total score for parental stress was converted into a t-score, with a mean of 50 and a standard deviation of 10. Cronbach’s Alpha of the test ranges between 0.89 and .91.

Finally, social demographic characteristics were assessed using the “*Social Demographic Questionnaire*” for Parents (De Meyer, Kroes, & Veerman, 2005), such as presence of the biological parents, educational level of the parents and multilingualism.

2.4. Procedure

Tests were conducted by experienced and certified speech therapists and psychologists who carried out assessments according to national protocols. Parents consented to the use of the data of their child anonymously for scientific research. Data on language were collected within a time period ranging from three months before to three months after the start at the intervention center. Receptive language, receptive vocabulary, expressive syntax, and expressive vocabulary scores were usually obtained from the speech therapist of the Audiology Center. If language scores on one or more of these language domains were missing at the start of the intervention, they were assessed by the speech therapist of the intervention center. At the start of treatment, parents completed the CBCL and the PSQ. Furthermore, preschool teachers completed the C-TRF. Nonverbal development was assessed with the SON-R by a psychologist within six months before or after the start at the intervention center. In addition, the psychologist also completed the Social Demographic Questionnaire for Parents after interviewing the parents.

The speech therapists and psychologists entered test scores into a web-based database, the BergOp system, version 4.0.8. (Praktikon, 2016). Parents and preschool teachers completed the questionnaires also directly in BergOp. Data were not entered twice, but reliability was ensured through qualitative data checks. These were conducted by the researchers with regard to data that were entered by the professionals, such as age of participants, calculated standardized scores and date of assessment. Irregularities were checked and corrected.

2.5. Data analysis

Structural Equation Modeling (SEM) using R version 3.2.3 ("R," 2015) was done to assess the relations between language domains, behavior problems, and parental stress. SEM is a technique that examines relations between multiple independent and dependent variables. The advantage of SEM is that complex associations can be examined, it allows complete and simultaneous testing of all hypothesized relations, accounting for other variables. Our model included receptive language, receptive vocabulary, expressive syntax, and expressive vocabulary as predictors and internalizing behavior, externalizing behavior, and parental stress as dependent variables. Since internalizing and externalizing behavior problems were reported by parents and by teachers separately, the model was run twice, once with the CBCL and once with the C-TRF. All variables in the model were observed variables. Regression was used to estimate relations. Full information maximum likelihood (FIML) (Enders & Bandalos, 2001), an estimation method when data are missing completely at random, was used to deal with missing data. The Little MCAR test was non-significant ($p = .441$), meaning that data were completely randomly missing. Table 2 shows the number of missing scores for each domain tested. Most children (74%) had no missing scores, and only two had more than three missing (four and five respectively).

The SEM model was run again, entering the type of LD to the model as a moderator in order to test differences in relations between children with REP and children with EP. Consequently, Betas of both LD groups were compared, using Chi-square tests. As receptive language was used to assign children to having REP or EP, this variable was not included in the model. Again, the model was run once with CBCL and once with C-TRF scores. While analyzing both research questions no additional analyses were conducted.

3. Results

Table 3 presents the means and standard deviations of the language domains, behavior domains, and parental stress. In general, children with LD were less-well developed in receptive and expressive language than children with a typical development, who had mean scores of 100 ($SD = 15$) on these tests. As expected, receptive language ($X = 95.5$) and receptive vocabulary ($X = 99.9$) of children with EP was comparable to that of typically developing children. The mean scores for all problem behavior domains and parental stress were within normal range. However, taking the percentage clinical scores into account, children with LD seemed to show elevated levels of problem behavior (ranging from 12% to 23% across the four domains in our study, compared to 10% across

Table 2
Number of missing scores for each domain.

	Number of missing scores
Language domains	
Receptive language	0
Receptive vocabulary	16
Expressive syntax	3
Expressive vocabulary	3
Behavioral domains	
CBCL internalizing	13
CBCL externalizing	13
C-TRF internalizing	4
C-TRF externalizing	4
Stress domain	
Parental stress	27

Table 3

Mean scores of language domains, behavioral domains and parental stress for the total LD group, REP group and EP group.

	Total LD group		REP group		EP group	
	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range
Receptive language Q-score***	84.4 (14.1)	55–112	72.7 (8.9)	55–84	95.5 (7.5)	85–112
Receptive vocabulary Q-scores***	93.1 (14.1)	58–129	86.3 (11.9)	60–112	99.9 (12.8)	58–129
Expressive syntax Q-score	72.9 (7.1)	55–91	72.3 (7.6)	55–91	73.4 (6.6)	55–86
Expressive vocabulary Q-score***	71.0 (13.7)	55–106	66.5 (9.9)	55–98	75.3 (15.4)	55–106
CBCL internalizing t-score	49.5 (10.0)	29–75	50.2 (8.7)	33–67	48.8 (10.5)	29–75
CBCL externalizing t-score	51.1(10.3)	28–80	50.8 (11.2)	28–77	51.4 (9.4)	32–80
C-TRF internalizing t-score***	50.0 (7.5)	34–68	51.9 (6.8)	34–68	48.1 (7.8)	34–65
C-TRF externalizing t-score***	51.3 (8.1)	36–73	53.5 (6.9)	38–73	49.1 (8.5)	36–68
Parental stress t-score	51.9 (10.2)	30–79	52.1 (10.0)	30–71	51.7 (10.4)	30–79

*** $p \leq 0.001$: significant differences between the means of the REP and EP group.

these domains in the general population) (Achenbach & Rescorla, 2000) and their parents experienced elevated levels of stress (24% compared to 18% in the general population) (Vermulst et al., 2015).

Comparing the two types (REP and EP) of LD, we found differences on three of the four language domains. As expected, children with EP had better language scores for receptive language ($t[174] = -18.739, p < .001$) and receptive vocabulary ($t[167] = -7.154, p < .001$), but also for expressive vocabulary ($t[158] = -4.628, p < .001$) compared to children with REP. The two LD types also differed on teacher-reported internalizing problems ($t[179] = 3.471, p = .001$) and externalizing problems ($t[174] = 3.785, p < .001$). Children with REP had higher scores on both C-TRF domains, meaning that preschool teachers observed more behavior problems in children with REP compared to children with EP. Both LD types did not differ on parent-reported behavior problems and the stress their parents experienced.

3.1. Relations between language, child behavior, and parental stress

Pearson correlations between the variables were calculated for the entire group of children (Table 4). All language measures showed positive relations with each other, except for expressive syntax, which correlated only with expressive vocabulary, not with the receptive domains. Parent-reported internalizing and externalizing behavior was positively correlated with each other, as was teacher-reported internalizing and externalizing behavior. Furthermore, parent-reported internalizing behavior was correlated with teacher-reported internalizing behavior, and parent-reported externalizing behavior with teacher-reported externalizing behavior. Parental stress was only related to parent-reported internalizing and externalizing behavior, not to teacher-reported behavior.

Receptive language was negatively correlated with teacher-reported internalizing and externalizing behavior and receptive vocabulary showed a negative correlation with teacher-reported internalizing behavior (Table 4), meaning that children with poorer receptive language showed more internalizing and externalizing behavior problems according to the preschool teachers. No significant relations were found between expressive language and teacher-reported behavior problems. Moreover, no relations were found between the language domains and parent-reported behavior, and the language domains and parental stress.

Next, to address the first research question, we examined the relations between language problems of toddlers with LD on one or more language domains, their behavior and parental stress by testing the model using SEM. The SEM model included receptive language, receptive vocabulary, expressive syntax and expressive vocabulary as predictors and internalizing and externalizing behavior and parental stress as the three dependent variables. The model was examined for parent-reported behavior (Fig. 1) and teacher-reported behavior (Fig. 2).

Fig. 1 shows that better expressive vocabulary was associated with more parent-reported internalizing problems ($b^* = .263$). The

Table 4

Correlations between all variables for the entire LD group.

	Receptive		Expressive		CBCL		C-TRF		Parental stress
	Language	Vocabulary	Syntax	Vocabulary	Internalizing	Externalizing	Internalizing	Externalizing	
Receptive language	–	.64***	.07	.37***	–.12	–.05	–.28***	–.24***	–.10
Receptive vocabulary	–	–	.02	.35***	–.15	–.09	–.19*	–.08	–.15
Expressive syntax			–	.45***	.00	.04	.05	.04	.05
Expressive vocabulary				–	.13	.03	–.02	.10	–.07
CBCL internalizing					–	.62***	.17*	.10	.46***
CBCL externalizing						–	.06	.27***	.56***
C-TRF internalizing							–	.39***	.05
C-TRF externalizing								–	.00

* $p \leq .05$.

*** $p \leq .001$.

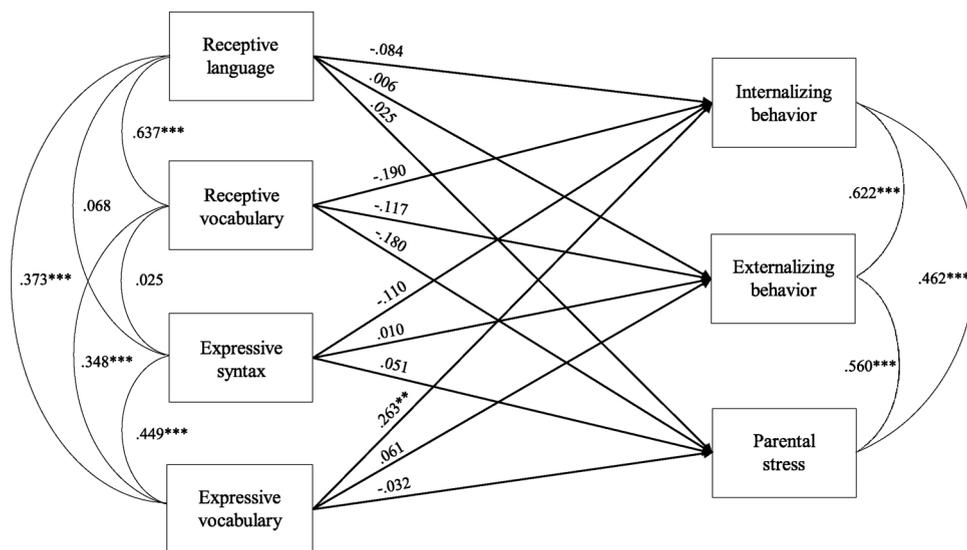


Fig. 1. Structural Equation Modeling predicting parent-reported behavior and parental stress. Results from this SEM analysis include CBCL scores and PSQ scores of the total LD group. * $p \leq .05$, ** $p \leq 0.01$, *** $p \leq .001$.

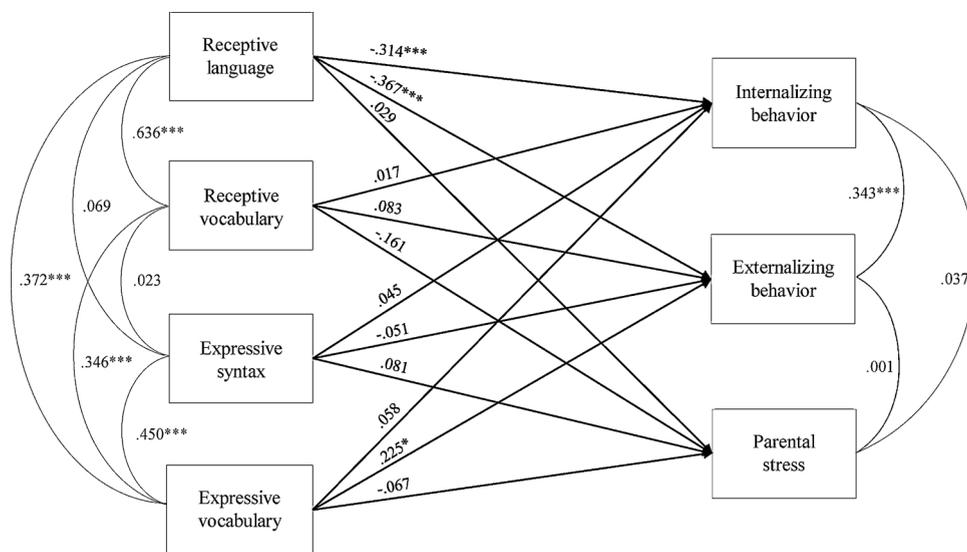


Fig. 2. Structural Equation Modeling predicting teacher-reported behavior and parental stress. Results from this SEM analysis include C-TRF scores and PSQ scores of the total LD group. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

predictors explained 12% of the variance on internalizing behavior, externalizing behavior and parental stress (Table 5).

The model was also run for problem behavior as reported by the preschool teachers. Fig. 2 shows a negative relation between receptive language and internalizing problems ($b^* = -.314$)– and receptive language and externalizing problems ($b^* = -.367$),

Table 5
Explained variance in SEM model for CBCL and C-TRF results.

	R-square CBCL	R-square C-TRF
Internalizing behavior	.070	.085
Externalizing behavior	.012	.100
Parental stress	.033	.033
Total variance	.115	.218

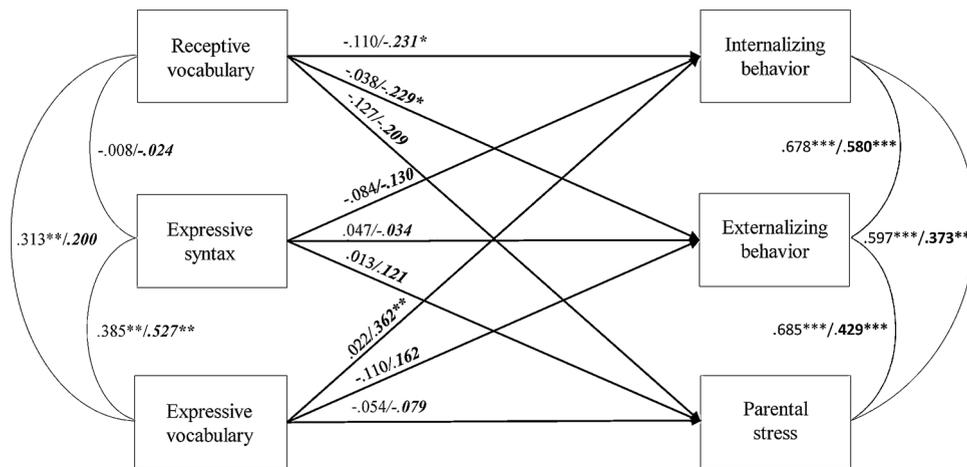


Fig. 3. Structural Equation Modeling predicting parent-reported behavior and parental stress for REP/EP children. Results from the SEM analysis include CBCL scores and PSQ scores for both REP and EP children. The asterisk means that the relation for the REP or EP group is significant, not that the relation differs between REP or EP children. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

meaning that a better score on receptive language was associated with less internalizing and externalizing problems. Expressive vocabulary also showed a positive relation with externalizing behavior ($b^* = .225$), meaning that a better expressive vocabulary was associated with more externalizing problems. For this model, the four language domains explained 22% of the variance on behavior problems and parental stress (Table 5).

3.2. Differences in relations between the LD types

To address the second research question, we examined whether the type of LD (REP or EP) influenced the strength of the associations between the language problems, behavior problems, and parental stress. Pearson correlations were calculated for all variables separately for children with REP and children with EP. Comparing the correlations between the two groups of children revealed no significant differences, meaning that bivariate correlations were the same in both groups.

Next, we ran the SEM model for parent reports (Fig. 3) and for teacher reports (Fig. 4) separately, adding the moderator LD type. For children with REP, both models showed no significant relations between the language domains, behavior problems and parental stress. For children with EP, relations between receptive vocabulary and internalizing behavior, receptive vocabulary and externalizing behavior, and expressive vocabulary and internalizing behavior were significant, but only for parent reports. For teacher reports, no significant relations were found. Comparing the two LD types in terms of the relations for both parent- and teacher reports, no significant differences were found between the Beta's of both groups, meaning that the pattern of relations between the language domains and behavior problems, and the language domains and parental stress was the same in both LD groups.

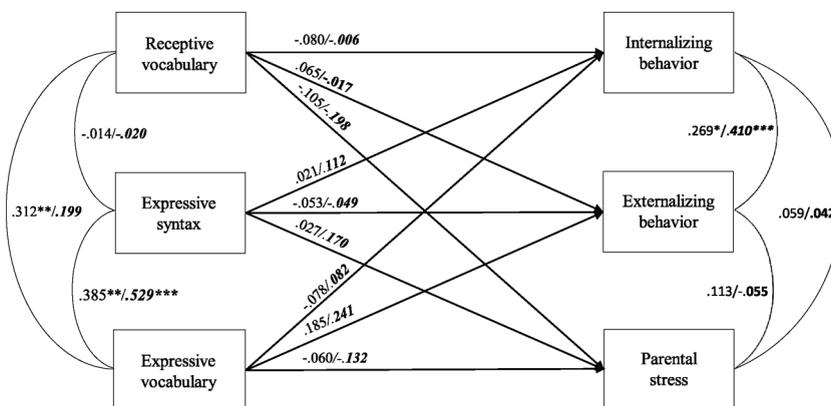


Fig. 4. Structural Equation Modeling predicting teacher-reported behavior and parental stress for REP/EP children. Results from the SEM analysis include C-TRF scores and PSQ scores for both REP and EP children. The asterisk means that the relation for the REP or EP group is significant, not that the relation differs between REP or EP children. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

4. Discussion

This study examined the relations between language problems, behavior problems, and parental stress of toddlers with LD, and whether the type of language problem influenced the strength of the associations between these variables. The first hypothesis was partly confirmed: better receptive language was associated with less teacher-reported internalizing and externalizing problems. However, we also found some relations that were not expected: better expressive vocabulary was associated with more parent-reported internalizing problems and more teacher-reported externalizing problems. No relations with problem behavior were found for receptive vocabulary and expressive syntax. Furthermore, contrary to our hypothesis, no relations were found between language problems and parental stress, implying that language problems in toddlers with LD do not influence parental stress directly, at least not at this age. Concerning the second hypothesis: the strength of the associations between language problems, behavior problems, and parental stress in toddlers did not differ between children with REP or children with EP, so this hypothesis was rejected.

This study is one of the first to examine the relations between behavior problems and language proficiency in various language domains in toddlers and shows that when various specific language domains are included in one model, the pattern of associations between language problems and behavior problems becomes more complex, because relations are found for some specific language domains with child behavior, but not for all of them. One possible explanation for finding only some relations is that a combination of affected language domains might have a more significant impact on behavior problems than a single language domain. If a toddler has a problem on just one language domain, he or she might be able to compensate with the other language domains, while having problems on multiple language domains might have more negative consequences for their social-emotional development, resulting in behavior problems.

The negative association between receptive language and teacher-reported internalizing and externalizing problems was present in bivariate correlations as well as in the multivariate SEM model, meaning that toddlers with better receptive language skills demonstrated less disruptive behavior, and were less withdrawn and anxious than their age mates who were less proficient in receptive language. This result is partly in line with Qi and Kaiser (2004), the only study that included receptive language as a specific language domain similar to our study. They also found that receptive language was related to teacher-reported externalizing behavior problems. However, they did not find a relation with teacher-reported internalizing behavior problems. This discrepancy might be explained by differences between the study populations on several aspects. First, children in the Qi and Kaiser study were, on average, 14 months older. Second, we included only children with LD, while they included children with and without LD in their sample. Different relations may be present in a combined group of children with and without language problems compared to a group of children who all have language problems. Third, the Qi and Kaiser study included mainly low income families, whereas the mean education level of parents of children in our study was high.

Although we expected to only find negative relations between language domains and behavior problems, positive relations were also present: a better expressive vocabulary was associated with more parent-reported internalizing problems and more teacher-reported externalizing problems, although only in the multivariate SEM analysis, not in the correlational analyses. This finding contrasts with other studies among toddlers with LD, that found either negative (Qi & Kaiser, 2004) or no relations (Rescorla et al., 2007) between expressive language and behavior problems. Note that, unlike these two studies, our study involved multidimensional analyses, which may explain the different results. Our study implies that children with LD with a relatively strong expressive vocabulary compared to their other linguistic skills are perceived by parents as having internalizing problems, and by teachers as showing externalizing behavior problems. To be able to interpret this puzzling result, the present study needs to be replicated, including observations of child behavior in the family and in the intervention setting.

Finally, in contrast to our expectation, no relations between language problems in toddlers and parental stress were found. This might be explained by the fact that a general stress measure, used in this study, cannot assess parental stress that is a result of the child's communication problems. Cejas and Quittner (in press) have examined possible parenting stress measures in children with hearing loss. They emphasize the importance of examining parental stress with context-specific stress measures. The distinction between general stress and context-specific stress was also made by Smith, Ronski, Sevcik, Adamson, and Bakeman (2011), who examined children with developmental disabilities. However, in this study, neither general stress nor context-specific stress decreased as a result of increased communication abilities. For future research it might be interesting to study context-specific stress.

Alternatively, the presence of parental stress may not be related to the presence of language problems, but to the presence of behavior problems. Our results showed significant correlations between parent-reported behavior problems and parental stress. Previous research among children with other disabilities also found that behavior problems and parental stress are related (Baker et al., 2003; Neece, Green, & Baker, 2012). Baker et al. (2003) for example, found that parental stress was related to the extent of behavior problems of the child rather than to the child's intellectual disability.

The second hypothesis focused on the potential influence of the type of language problem on the associations between language problems, behavior problems, and parental stress. Contrary to expectations, no differences in the strength of relations were found between language problems and child behavior in children with REP and children with EP. This is in line with Maggio et al. (2014) and Rescorla et al. (2007), who also did not find children with REP displaying behavior problems more often compared to children with EP. However, Maggio et al. (2014) did find that children with REP displayed more complex behavior problems. An explanation for the lack of group differences might be the use of cut-off scores for defining children with REP and children with EP, which may have led to children with little difference in receptive language being placed into different groups. On the other hand, it is unlikely that this caused the groups to be too similar, because the mean scores of both groups for receptive language differed significantly.

Finally, results showed different patterns for parents and preschool teachers. For example, teacher-reported internalizing and externalizing behavior was related to receptive language, but this pattern was not found for parent reports. The perspectives of

parents and preschool teachers may differ because they observe the child in different contexts (Lindsay et al., 2007; Redmond & Rice, 1998), which was confirmed in this study by correlations below .30 between corresponding scales of the CBCL and C-TRF. Being in a group setting with many other children demands different skills in communication and behavior of the child, compared to being at home with their parents.

4.1. Limitations of the study

Some limitations of this study should be noted. First, some children in this study might be late talkers (Hammer et al., 2017) instead of suffering from LD. The language development of late talkers is not impaired but develops more slowly compared to the language development of their peers. The language problems of late talkers may be less severe compared to the language problems of children with LD, potentially influencing our results. Discriminating between children with LD and late talkers often is, however, not possible at this young age.

Second, using ROM data for research has its strengths and its limitations. One of these limitations is that an existing database was used, that was not designed for this study. To acquire more robust results about the associations between language problems, behavior problems, and parental stress, an experimental design might be more preferable for future research.

Third, since this study had a cross-sectional design, we cannot draw conclusions about the causality of the relations. Longitudinal research is needed to shed light on this.

4.2. Implications

This study highlights the complex pattern of relations between language domains, behavior problems, and parental stress in young children with LD. The presence of relations between language domains and behavior problems may suggest that a change in language proficiency may lead to a change in behavior problems. However, relations were found between some language domains and behavior problems, but not between all of them. The complexity of relations makes it difficult to give clear recommendations for clinical practice. Future research is therefore necessary to further study these associations. Furthermore, the absence of a relation between language domains and parental stress could mean that intervention should not only focus on improving language proficiency, but also on reducing parental stress. Twenty-four percent of the parents in this study experienced elevated levels of parental stress.

This study raises several questions that may be answered in future research. First, like this study, most studies examine the associations between language problems, behavior problems, and parental stress using cross-sectional data. More studies should focus on longitudinal data, which could also offer the opportunity to study questions such as: do language problems predict behavior problems and parental stress in children with LD? ROM of children with LD would be a helpful method to acquire longitudinal data. Second, because little is known about the direction, future studies should also examine if the direction of the relation between language problems, behavior problems, and parental stress might be the other way around: does the presence of behavior problems and parental stress predict language problems in children with LD?

Conflict of interest

The authors declare that there are no conflicts of interest.

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