



Social-Emotional/Behavioural Problems and Competencies in Toddlers: Relationships with Early Vocabulary Development

**Leila Paavola-Ruotsalainen^a, Katariina Rantalainen^{a,b}, Jaana Alakortes^c,
^d, Alice C. Carter^e, Hanna E. Ebeling^{c,f} & Sari Kunnari^a**

^aFaculty of Humanities, Logopedics, Child Language Research Center, University of Oulu, Oulu, Finland, corresponding author, e-mail: leila.paavola-ruotsalainen@oulu.fi

^bCoronaria Oy Ltd, Therapy Center, Kotka, Finland

^cPEDEGO Research Unit, Clinic of Child Psychiatry, University of Oulu, Oulu, Finland

^dUnit of Child Psychiatry, Health Care Services for Families with Children, Family Services, Kainuu Social and Health Care Joint Authority, Kajaani, Finland

^eDepartment of Psychology, University of Massachusetts, Boston, USA

^fClinic of Child Psychiatry, Oulu University Hospital, Oulu, Finland

ABSTRACT: This longitudinal study aimed at showing the effect of early social-emotional/behavioural problems and competencies on vocabulary development in toddlers. The participants were 60 native Finnish-speaking healthy children (30 boys and 30 girls). Parental reports on the Brief Infant-Toddler Social and Emotional Assessment (BITSEA) were gathered at the children's age of 18 months. The Problem Total and Competence Total, as well as externalizing, internalizing and dysregulation problem domain, scores were calculated. Vocabulary development was assessed by a certified speech and language therapist at ages 24 and 30 months using the Receptive and Expressive One-Word Picture Vocabulary Tests (ROWPVT-4 and EOWPVT-4). Compared to boys, girls obtained higher Competence Total scores and scored considerably higher in all the vocabulary measures. With regard to the relationships between early social-emotional/behavioural problems and vocabulary measures, Problem Total scores correlated negatively with receptive vocabulary scores at 24 months and expressive vocabulary scores at 30 months. Further analyses indicated that particularly externalizing problems were associated with slower vocabulary development. By contrast, Competence Total scores correlated positively with

expressive vocabulary at 30 months. The same analyses were carried out separately for boys and girls. Mostly, the separate findings were in line with the results for the whole group of children.

Keywords: *expressive vocabulary, individual variation, receptive vocabulary, social-emotional development*

Introduction

Social environmental factors together with various genetic and biological factors influence the acquisition of language (Harrison & McLeod, 2010). According to the social-pragmatic view of language development, children acquire language as an integral part of their social interactions with other persons (Bruner, 1983). In fact, investigations on the relationships between early social-emotional and language development among toddlers have indicated that early problems particularly in expressive language may be associated with poor social-emotional functioning (for reviews see Desmarais, Sylvestre, Meyer, Bairati, & Rouleau, 2008; Hawa & Spanoudis, 2014). Many of these earlier studies have examined concurrent associations. This paper reports a longitudinal study that aims at showing the effect of early social-emotional/behavioural (SEB) problems and competencies on later language development.

Usually well before the end of their first year, children begin to show signs of understanding some of the language that they hear. As a general rule, word comprehension emerges between the ages of 7 and 10 months (Fenson et al., 1994; Harris, Yeeles, Chasin, & Oakley, 1995; Kuhl, 2007), or even earlier (Bergelson & Swingley, 2012). Typically, there is a lag of a few months between comprehension and production. On average, children are expected to produce their first words around the age of 12 months, although individual variation is considerable (Clark, 2009; Fenson et al., 1994; Kunnari, 2000; Stoel-Gammon, 2011; Stolt, Haataja, Lapinleimu, & Lehtonen, 2008). Some children require more time to begin talking, even if otherwise healthy and showing normal development. About 15% of 24-month-old children present slow onset and progression of expressive language (Desmarais et al., 2008; Horwitz et al., 2003). In the literature, these children have been labelled as late talkers (Horwitz et al., 2003; Rescorla, 1989). Late talking is typically benchmarked at the 24-month age level, with a criterion of fewer than 50 words in productive vocabulary and no word combinations used (Klee et al., 1998; Rescorla, 1989; Rescorla & Achenbach, 2002; Rescorla, Hadick-Wiley, & Escarce, 1993). It appears that among these children there are more boys than girls (Horwitz et al., 2003; Rescorla, 1989; Zubrick, Taylor, Rice, & Slegers, 2007). In general as well, at least during the early stages of development girls tend to produce more words than boys (e.g., Fenson et al., 1994; Gram Simonsen, Kristoffersen,

Bleses, Wehberg, & Jørgensen, 2014; Stolt et al., 2008). Late-talking toddlers are at risk of continuing to experience language-learning difficulties at school age (e.g., Rescorla, 2002; Rice, Taylor, & Zubrick, 2008). However, Desmarais et al. (2008) have pointed out that these children are not likely to constitute a homogenous group – even when children with hearing impairment, global developmental delay, and autism spectrum disorders are excluded. Due to heterogeneity among these children, some are likely to be more at risk than others. For example, some late talkers have an expressive delay only, while others also have receptive delay (Dale, Price, Bishop, & Plomin, 2003; Desmarais et al., 2008; Fischel, Whitehurst, Caulfield, & Debaryshe, 1989). Hence, a better understanding of the characteristics of late talking is critical. In addition to including the measures of both expressive and receptive language in the investigations of late talkers, studies on the relationship between language and early social-emotional development might shed light on the profiles and even prognoses of these children as well as children with early SEB problems and delays/deficits in social competencies.

SEB problems in young children are often conceptualized as falling into the domains of externalizing, internalizing and dysregulation (e.g., Boyle & Jones, 1985; Briggs-Gowan & Carter, 2006; Briggs-Gowan, Carter, Bossom-Heenan, Guyer, & Horwitz, 2006; Campbell, 1995). Externalizing problems include e.g. aggression, overactivity and impulsivity. Included in internalizing problems are difficulties associated with anxiety, depression/withdrawal, fears and shyness/inhibition. The dysregulation domain refers to problems with regulation of state, affect and sensory processes across the areas of negative emotionality, eating, sleeping and sensory sensitivities. Briggs-Gowan and others (2006) pointed out that SEB problems refer to dimensionally measured problem behaviours that include both atypical and normal ranges of behaviour. With regard to SEB competencies, they can be considered to encompass many related interpersonal skills (Bornstein, Hahn, & Haynes, 2010). They manifest in emotional self-regulation, social cognition, positive communication and prosocial relationships with others.

On the basis of earlier research, there is convincing evidence that elevated SEB problems already exist in some 1- to 3-year-olds. Möricke, Lappenschaar, Swinkels, Rommelse and Buitelaar (2013) examined a large sample (N = 6330) of parental ratings of 14- to 15-month-old children and found that 33% of the infants had moderate-to-severe SEB problems, including communication and social interaction problems and also negative and demanding behaviour. Skovgaard et al. (2007) diagnosed mental health problems in 16–18% of 18-month-old children. Furthermore, the findings of Briggs-Gowan and others (2006) suggested that a substantial proportion of early SEB problems are not transient. This argument is further supported by another study by Briggs-Gowan and Carter (2008). They screened SEB problems and competencies of children (N = 1004) between the ages of 12 and 36 months, and again when the children were in early

elementary school. Early screening identified 49.0% of children who subsequently exhibited subclinical/clinical symptoms according to teachers, and 67.9% of children who later met the criteria for a psychiatric disorder. Similarly to language development, the possible role of child gender is an interesting question also with regard to SEB development. Alakortes, Fyrstén, Carter, Moilanen and Ebeling (2015) found in their study of toddlers (mean age 19.3 months) that girls tended to obtain lower SEB problem scores and higher SEB competence scores than boys. Baillargeon and others (2007) found that at 17 months, boys were more inattentive and hyperactive than girls and they also showed more physical aggression towards peers than girls. Similarly, Beernink, Swinkels and Buitelaar (2007) found that at 14 and 19 months boys had more externalizing problem behaviours than girls. By contrast, they found no significant gender differences in inhibition and dysregulation. There are also some studies in which significant gender differences have not been found among children younger than 24 months (e.g., Baillargeon, Sward, Keenan, & Cao, 2011; Briggs-Gowan, Carter, Skuban, & Horwitz, 2001; Skovgaard et al., 2007).

With regard to SEB problems and competencies and language development, Sim and others (2013) screened a community sample of 30-month-old children (N = 486) for social and emotional development as well as language development. They found that about two thirds of children with expressive language delay also had co-occurring social-emotional difficulties. The language delay was identified using parental reports on early expressive as well as receptive vocabulary. Significant correlations were found between low productive vocabulary (fewer than 50 words) and elevated scores in emotional symptoms, hyperactivity and peer problems. Many other earlier studies of the relationships between social-emotional and vocabulary development among toddlers have also indicated that early problems particularly in expressive language may be associated with poor social-emotional functioning (Desmarais et al., 2008; Hawa & Spanoudis, 2014). Rescorla, Ross and McClure (2007) found in their investigations of samples of 18- to 35-month-old children that toddlers with low expressive vocabulary scores showed elevated social withdrawal in comparison to their typically developing peers. Only expressive language skills were evaluated in this study. In an earlier study by Irwin, Carter and Briggs-Gowan (2002) it was also found that compared to children with typical language development, late talkers (mean age 26.9 months) were rated higher in depression/withdrawal (see also Carson, Klee, Perry, Muskina, & Donaghy, 1998). Late talkers also had lower scores in social competence (e.g. compliance, imitation/pretend play). The selection of children to the group of late talkers was based on using a relatively multifaceted set of assessment methods for early language skills. The primary deficit for all the late-talking children in this study was expressive language production. Their receptive language and expressive language standard scores had to

differ by at least 1 SD. In turn, Horwitz and others (2003) assessed expressive vocabulary only. They found that by 18 to 23 months, children with low expressive language had poor attention, were noncompliant, and scored low in the overall social competence domain.

The findings concerning externalizing behaviour problems were somewhat inconsistent (Horwitz et al., 2003; Rescorla et al., 2007; Whitehouse, Robinson, & Zubrik, 2011). Rescorla and others (2007) did not find significant associations between externalizing behaviour problems and language skills. By contrast, Horwitz and others (2003) found a correlation between externalizing behaviour problems and expressive language delays by 30 months, but not earlier. The authors suggested that inability to interact efficiently with others, as well as difficulties in making one's needs known, may have been driving the relationship between behaviour problems and low expressive language. However, based on the multivariable model that was constructed as a further analysis of the data, Horwitz and others concluded that poor social competence may be more critical as a correlate of low expressive language development than behaviour problems. Whitehouse and others (2011) carried out a prospective study of behavioural and emotional development of late talkers up to the age of 17 years, using a population-based cohort. The children were defined as late talkers on the basis of expressive language only. At 24 months, late talkers exhibited more externalizing and also internalizing problems than control toddlers. However, regression models revealed no association between late-talking status at 24 months and SEB problems at the 5-, 8-, 10-, 14- and 17-year follow-ups. The authors suggested that this may be due to the fact that a large number of late talkers with isolated expressive vocabulary delay catch up with their peers by age 5. As language skills of late-talking toddlers improve with age, their SEB problems may mostly be resolved. On the basis of these observations, it was concluded that among these children SEB problems may occur primarily as a result of difficulties in communicating effectively.

All in all, it appears that from an early stage there are associations between SEB problems and competencies and expressive language skills. However, given the data available, the causal link cannot be identified precisely. Because most of the earlier studies were cross-sectional, in order to further examine the relationship between early SEB and language development, the present study was designed to investigate a community sample of healthy children longitudinally. Furthermore, early SEB problems and competencies were set as predictors of later vocabulary development, because previous studies suggest that they can be identified even as early as in the beginning of the second year of the children's lives i.e. much earlier than late talking. Hence, the aim was set at showing the effect of early social-emotional/behavioural SEB problems and competencies on later language development. Parental ratings of the SEB problems and

competencies of their children were gathered at the children's age of 18 months. Children's vocabulary skills were assessed at ages 24 and 30 months. Unlike in many of the earlier studies, not only expressive but also receptive vocabulary skills were examined. Furthermore, relationships between vocabulary skills at different age points were examined. The possible effects of child gender on the ratings of SEB problems and competencies, vocabulary skills as well as on their relationships were also considered.

Specifically, we sought to answer the following questions:

1. *Are there gender differences in SEB problems and competencies at age 18 months or in vocabulary at ages 24 and 30 months or in vocabulary development between the two age points?*
2. *Do SEB problems and competencies predict subsequent vocabulary skills in the whole group of children or in the groups of boys or girls?*

Methods

Participants

The participants were 60 healthy children (30 boys and 30 girls), who were recruited either from child health clinics during the 18-month check-up, from open family clubs or via the social media. The children had to fulfil the following inclusion criteria: (1) full-term birth (gestational weeks 38+) after normal pregnancy and delivery, (2) no diagnosed mental or physical disability or major disorder, (3) no suspicion of autism spectrum disorders, (4) neither diagnosed nor suspected hearing impairment, (5) no malformations in the oral or facial area (e.g. cleft palate). In addition, all of the children were living in native Finnish-speaking families with both of their biological parents or at least with their biological mother.

Based on the International Standard Classification of Education (ISCED, 2011), mothers of the present sample had attained considerably higher education than all the 25- to 34-year-old women in Finland in 2016: tertiary education (e.g. polytechnic, university) 72 vs. 43%, post-secondary non-tertiary education (e.g. college) 5 vs. <1%, upper secondary education (e.g. senior secondary school, vocational educational institutions) 22 vs. 43%, and lower secondary education (a comprehensive school) 2 vs. 13% (Statistics Finland's PX-Web databases, 2016). The same was true among the fathers: tertiary education 62 vs. 28%, post-secondary non-tertiary education 5 vs. <1%, upper secondary education 32 vs. 52%, and lower secondary education 2 vs. 19%.

Procedure

The data collection of the present study was part of a wider research project concerning factors that may have a role in explaining variation in early language acquisition. The data collection took place in the cities of Oulu and Kouvola, Finland, or in their vicinity. The study design was approved by the Regional Ethics Committee of the Northern Ostrobothnia Hospital District, Oulu, Finland. A written informed consent to participate was obtained from the parents.

Immediately after recruitment, when the child was aged 18 months, the Brief Infant-Toddler Social and Emotional Assessment (BITSEA; Briggs-Gowan & Carter, 2006) and background information questionnaires were sent to parents. Thereafter, they mailed completed questionnaires to researchers in a pre-paid envelope. At the children's ages of 24 and 30 months, the participants were visited in their homes either by the first or the second author. During the home visit, children's vocabulary was assessed using the Receptive and Expressive One-Word Picture Vocabulary Tests (ROWPVT-4 and EOWPVT-4; Martin & Brownell, 2010ab).

Measures

The BITSEA

The BITSEA (Briggs-Gowan & Carter, 2006) is one of the most evidence-based parent-report screening measures for the detection of possible SEB problems and delays/deficits in SEB competencies in 1- to 3-year-old children (e.g., Bagner, Rodríguez, Blake, Linares, & Carter, 2012; Szaniecki & Barnes, 2016). The questionnaire was originally translated into Finnish for a pilot study by Haapsamo et al. (2009). Subsequently, the original and back-translated versions were compared and minor corrections were made to the final Finnish translations before the current data collection (see also Alakortes et al., 2017). The BITSEA questionnaire consists of 42 items. Altogether 31 items address problematic behaviour in externalizing (e.g. impulsivity, defiance, peer aggression), internalizing (e.g. fearfulness, worry, anxiety, sadness) and dysregulation (e.g. sleep and eating problems, negative emotionality, sensory sensitivities) domains, and also behaviours that may be early markers of autism spectrum disorders or other serious psychopathology. The 11 competence items rate attention, compliance, mastery motivation, prosocial peer relations, empathy, imitation/play and social relatedness. Response alternatives for each item are: Not true/rarely (= 0), Somewhat true/sometimes (= 1), and Very true/often (= 2). For the purposes of the present study the Problem Total (range 0–62) and Competence Total (range 0–22), as well as externalizing (range 0–12), internalizing (range 0–16) and

dysregulation (range 0–16) problem domain, scores were calculated. Problem Total, Competence Total as well as externalizing problem domain scores had acceptable or at least marginal internal consistency: Cronbach's alphas were 0.72, 0.71 and 0.62, respectively. By contrast, alphas for internalizing and dysregulation problem domain scores indicated low internal consistency: 0.34 and 0.47, respectively.

Child vocabulary measures

The Receptive and Expressive One-Word Picture Vocabulary Tests (ROWPVT-4 and EOWPVT-4; Martin & Brownell, 2010ab) were used at the children's ages of 24 and 30 months in order to obtain measures of vocabulary skills. Both tests were originally standardized on English-speaking individuals in the United States. Nowadays they are widely used in the fields of education, speech and language therapy and psychology. Finnish versions were used in the present study. They are currently under validation (see Kunnari & Välimaa, 2011). Raw scores were used in the analyses of the present study.

The ROWPVT-4 includes 190 pages of full-colour illustrations, four per page. On hearing the word spoken, an individual is asked to choose the one of four illustrations that matches the word. Test items are presented in a developmental sequence. Based on the examinee's age, differential starting points are used, although children at the ages of 24 and 30 months all start from the beginning. The ROWPVT-4 defines the basal as eight consecutive correct responses and the ceiling as six errors within eight consecutive items. The raw score is the number of correct responses up to the ceiling item.

The EOWPVT-4 is an assessment of an individual's ability to name objects, actions and concepts. The test includes altogether 190 full-colour illustrations that are presented to the examinee in a developmental sequence. Similarly to the ROWPVT-4, age-related critical-range testing is utilized. Children at ages 24 and 30 months start from the first item. The EOWPVT-4 defines the basal as eight consecutive correct responses and the ceiling as six consecutive errors. The raw score is the number of correct responses up to the ceiling item.

In addition to the raw scores of the tests, gain scores both for the receptive and expressive vocabulary skills were calculated. This was done for each individual by subtracting the 24-month raw score from the corresponding 30-month raw score.

Statistical analyses

Statistical analyses were produced with SPSS version 25.0 for Windows. Mean (M), median (md), standard deviation (SD) and ranges were chosen to describe the

distribution and amount of variation in the data. The Kolmogorov-Smirnov test was used to examine the distributions of the variables. According to the test, several variables deviated from normal distribution. However, histograms with normal curves indicated that the distributions of all the variables were at least close to normal. Hence, parametric tests were chosen for the statistical analyses of the data. Statistical comparisons of the separate groups of boys and girls were carried out using Student's *t*-test for two independent samples. Student's *t*-test for paired samples was used to investigate possible developmental changes in the children's vocabulary measures from age 24 months to age 30 months. Cohen's *d* was used as a measure of effect size. According to Cohen (1988), *d* at around 0.8 can be considered as a large effect, whereas *d* at around 0.5 reflects a medium and 0.2 a small effect. Pearson product-moment correlations were used to examine the relationships between the children's SEB problems and competencies at 18 months and vocabulary measures at 24 and 30 months as well as the vocabulary gain scores. In all of the analyses, *p* values <.05 were considered statistically significant. In addition, *p* values <.10 were recognized as trends because of relatively small sample size.

Results

The results are reported in two sections according to the research questions. First, we report descriptive statistics and also the results of the analyses of possible gender differences in SEB problems and competencies as well as in vocabulary development. We also investigate the relationships between the vocabulary measures. Second, we investigate the relationships between children's SEB problems and competencies and subsequent vocabulary development. These results are presented for the whole group of children and also separately for the subgroups of boys and girls.

Descriptive statistics and gender differences

Table 1 presents the descriptive statistics for the ratings of SEB problems and competencies (BITSEA) in the whole group of children and also in the groups of boys and girls. The variation in all the variables was considerable.

TABLE 1 Descriptive statistics for the Brief Infant-Toddler Social and Emotional Assessment (BITSEA) at 18 months

<i>BITSEA</i>	<i>ALL (N = 60)</i> <i>Mean (SD)</i> <i>Median</i> <i>Range</i>	<i>BOYS (n = 30)</i> <i>Mean (SD)</i> <i>Median</i> <i>Range</i>	<i>GIRLS (n = 30)</i> <i>Mean (SD)</i> <i>Median</i> <i>Range</i>
Problem Total ^a	7.55 (4.22) 7.00 0-22	8.17 (4.31) 7.50 1-22	6.93 (4.12) 6.00 0-18
Externalizing ^b	2.58 (2.02) 2.00 0-9	2.97 (2.39) 2.00 0-9	2.20 (1.52) 2.00 0-6
Internalizing ^c	1.22 (1.14) 1.00 0-4	1.20 (1.16) 1.00 0-4	1.23 (1.14) 1.00 0-3
Dysregulation ^d	2.50 (1.83) 2.00 0-8	2.73 (1.51) 3.00 0-6	2.27 (2.10) 2.00 0-8
Competence Total ^e	16.87 (3.06) 17.00 8-22	15.90 (3.38) 16.00 8-22	17.83 (2.38) 18.00 12-22

Note. Student's *t*-test for two independent samples was used.

Significance of the difference between the scores in the groups of boys and girls: ^a $t(58) = 1.13, p = .262, 95\% \text{ CI } -0.95-3.41, d = 0.29$; ^b $t(58) = 1.49, p = .143, 95\% \text{ CI } -0.27-1.80, d = 0.38$; ^c $t(58) = -0.11, p = .911, 95\% \text{ CI } -0.63-0.56, d = 0.03$; ^d $t(58) = 0.99, p = .327, 95\% \text{ CI } -0.48-1.41, d = 0.26$; ^e $t(58) = -2.56, p = .013, 95\% \text{ CI } -3.44-(-0.42), d = 0.66$.

On average, boys tended to get somewhat higher Problem Total scores than girls, although the difference was not statistically significant. The Student's *t*-test indicated that girls obtained significantly higher Competence Total scores than boys. The effect size was moderate.

Table 2 presents the descriptive statistics for the vocabulary measures at the children's ages of 24 and 30 months as well as the gain scores. Again, the descriptives of both the whole group and also the groups of boys and girls separately are presented. The variation in all the vocabulary measures was considerable.

TABLE 2 Descriptive statistics for receptive (ROWPVT-4) and expressive (EOWPVT-4) vocabulary at 24 and 30 months as well as the vocabulary gain scores

VOCABULARY MEASURE	ALL (N = 60) Mean (SD) Median Range	BOYS (n = 30) Mean (SD) Median Range	GIRLS (n = 30) Mean (SD) Median Range
24 months			
ROWPVT-4 ^a	25.80 (8.30) 23.00 14-50	22.73 (6.38) 21.00 14-37	28.87 (8.95) 27.50 17-50
EOWPVT-4 ^b	13.65 (9.39) 13.50 0-33	9.90 (8.39) 10.00 0-23	17.40 (8.94) 18.00 0-33
30 months			
ROWPVT-4 ^c	40.32 (9.27) 39.50 23-61	36.53 (8.60) 35.50 23-53	44.10 (8.45) 42.00 32-61
EOWPVT-4 ^d	27.82 (12.58) 28.00 0-56	21.67 (12.00) 25.00 0-38	33.97 (10.00) 30.00 19-56
Gain scores			
ROWPVT-4 ^e	14.62 (6.79) 14.50 0-31	14.00 (7.92) 14.00 0-30	15.97 (6.32) 15.50 5-33
EOWPVT-4 ^f	14.65 (8.95) 15.00 0-36	12.53 (9.54) 12.00 0-36	16.57 (8.01) 16.50 4-30

Note. Student's *t*-test for two independent samples was used.

Significance of the difference between the scores in the groups of boys and girls: ^a*t*(58) = -3.06, *p* = .003, 95% CI -10.15-(-2.12), *d* = 0.79; ^b*t*(58) = -3.35, *p* < .001, 95% CI -11.98-(-3.02), *d* = 0.87; ^c*t*(58) = -3.44, *p* < .001, 95% CI -11.97-(-3.16), *d* = 0.89; ^d*t*(58) = -4.31, *p* < .001, 95% CI -18.01-(-6.59), *d* = 1.11; ^e*t*(58) = -0.70, *p* = .486, 95% CI -4.76-2.29, *d* = 0.27; ^f*t*(58) = -1.69, *p* = .097, 95% CI -8.39-0.73, *d* = 0.46.

On average, the girls had higher scores in all vocabulary measures than the boys. The differences were statistically significant both at the age of 24 months and at 30 months.

With regard to the gain scores, only a slight trend was found that girls progressed more rapidly in expressive vocabulary than boys. Nevertheless, the effect size was moderate.

Student's *t*-test for paired samples was used to investigate the possible change in the vocabulary scores over time. Consistently with developmental expectations, vocabulary skills increased significantly between the ages of 24 and 30 months. For the whole group of children, statistically significant changes were found with regard to the measures of both receptive vocabulary [$t(59) = -16.88$, 95% CI -16.24 – (-12.77) , $p < .001$, $d = 2.18$] and expressive vocabulary [$t(59) = -11.39$, 95% CI -16.66 – (-11.68) , $p < .001$, $d = 1.47$]. Effect sizes were large. In addition, the relationships between the vocabulary measures were examined using the Pearson product-moment correlations. Statistically significant correlations were found between receptive vocabulary at 24 and 30 months ($r = 0.72$, $p < .001$) and also between expressive vocabulary at 24 and 30 months ($r = 0.65$, $p < .001$).

Predictive validity of social-emotional/behavioural problems and competencies for vocabulary outcomes

Possible relationships between the children's SEB problems and competencies (BITSEA) at the age of 18 months and the measures of receptive (ROWPVT-4) and expressive (EOWPVT-4) vocabulary at 24 and 30 months as well as the gain scores were investigated using Pearson product-moment correlations. The correlational analyses were carried out first for the whole group of children and then for boys and girls separately. The results for the whole group can be seen in Tables 3 and 4.

TABLE 3 Pearson product-moment correlations between the BITSEA scores at 18 months and vocabulary measures at 24 and 30 months (p values are in parentheses)

BITSEA	VOCABULARY MEASURE			
	ROWPVT-4 24	EOWPVT-4 24	ROWPVT-4 30	EOWPVT-4 30
Problem Total	-0.26 (.045)*	-0.23 (.079)	-0.24 (.061)	-0.37 (.004)**
Externalizing	-0.33 (.013)*	-0.20 (.124)	-0.27 (.040)*	-0.45(<.001)**
Internalizing	-0.19 (.143)	-0.22 (.089)	-0.15 (.253)	-0.20 (.126)
Dysregulation	-0.07 (.605)	-0.12 (.361)	-0.13 (.316)	-0.17 (.196)
Competence Total	0.24 (.069)	0.21 (.103)	0.25 (.051)	0.31 (.016)*

* $p < .05$, ** $p < .01$.

TABLE 4 Pearson product-moment correlations between the BITSEA scores at 18 months and vocabulary gain scores (the 24-month score subtracted from the 30-month score; *p* values are in parentheses)

<i>BITSEA</i>	<i>VOCABULARY GAIN SCORE</i>	
	<i>ROWPVT-4</i>	<i>EOWPVT-4</i>
Problem Total	-0.03 (.818)	-0.18 (.174)
Externalizing	-0.01 (.973)	-0.25 (.054)
Internalizing	0.03 (.816)	-0.06 (.654)
Dysregulation	-0.09 (.483)	-0.09 (.483)
Competence Total	0.07 (.572)	0.09 (.506)

Statistically significant negative correlations were found between Problem Total and receptive vocabulary scores at 24 months and expressive scores at 30 months. Furthermore, at least a trend of a negative correlation was found between Problem Total score and every vocabulary measure. Externalizing problems correlated negatively with vocabulary comprehension at 24 months and with both receptive and expressive vocabulary scores at 30 months. With regard to problematic behaviour in internalizing and dysregulation, all of the correlation coefficients were also negative, although they were small. By contrast, a positive correlation was found between Competence Total and expressive vocabulary scores at 30 months. Furthermore, trends of positive correlations were found between Competence Total and receptive vocabulary scores at 24 and 30 months. With regard to the gain scores, only a trend of a negative correlation was found between externalizing problems and expressive vocabulary. The rest of the correlation coefficients were small.

The results of the correlational analyses for the group of boys are presented in Tables 5 and 6 and for girls in Tables 7 and 8. As a whole, the findings were rather similar in both groups. The number of participants in the gender groups were relatively small ($n = 30$). This may at least partly explain why some of the statistically significant correlations that were found in the whole group of children were no longer identified when the children were split into two groups.

TABLE 5 Pearson product-moment correlations between the BITSEA scores at 18 months and vocabulary measures at 24 and 30 months in boys (*p* values are in parentheses)

<i>BITSEA</i>	<i>VOCABULARY MEASURE</i>			
	<i>ROWPVT-4 24</i>	<i>EOWPVT-4 24</i>	<i>ROWPVT-4 30</i>	<i>EOWPVT-4 30</i>
Problem Total	-0.18 (.334)	-0.09 (.636)	-0.16 (.410)	-0.34 (.070)
Externalizing	-0.31 (.099)	-0.12 (.525)	-0.19 (.308)	-0.44 (.015)*
Internalizing	-0.18 (.330)	-0.26 (.170)	-0.28 (.137)	-0.35 (.060)
Dysregulation	-0.01 (.953)	0.13 (.507)	-0.06 (.751)	-0.08 (.691)
Competence Total	0.19 (.325)	0.13 (.486)	0.14 (.458)	0.21 (.263)

**p* < .05.

TABLE 6 Pearson product-moment correlations between the BITSEA scores at 18 months and vocabulary gain scores in boys (the 24-month score subtracted from the 30-month score; *p* values are in parentheses)

<i>BITSEA</i>	<i>VOCABULARY GAIN SCORE</i>	
	<i>ROWPVT-4</i>	<i>EOWPVT-4</i>
Problem Total	-0.05 (.783)	-0.25 (.191)
Externalizing	-0.01 (.947)	-0.24 (.210)
Internalizing	-0.15 (.427)	-0.26 (.160)
Dysregulation	-0.05 (.785)	-0.10 (.617)
Competence Total	0.04 (.834)	-0.02 (.936)

TABLE 7 Pearson product-moment correlations between the BITSEA scores at 18 months and vocabulary measures at 24 and 30 months in girls (*p* values are in parentheses)

<i>BITSEA</i>	<i>VOCABULARY MEASURE</i>			
	<i>ROWPVT-4 24</i>	<i>EOWPVT-4 24</i>	<i>ROWPVT-4 30</i>	<i>EOWPVT-4 30</i>
Problem Total	-0.26 (.166)	-0.28 (.130)	-0.25 (.180)	-0.35 (.058)
Externalizing	-0.28 (.134)	-0.17 (.358)	-0.25 (.185)	-0.39 (.033)*
Internalizing	-0.24 (.206)	-0.24 (.200)	-0.06 (.753)	-0.11 (.579)
Dysregulation	-0.03 (.886)	-0.21 (.262)	-0.11 (.568)	-0.17 (.368)
Competence Total	0.10 (.607)	0.06 (.772)	0.15 (.445)	0.14 (.464)

**p* < .05.

TABLE 8 Pearson product-moment correlations between the BITSEA scores at 18 months and vocabulary gain scores in girls (the 24-month score subtracted from the 30-month score; *p* values are in parentheses)

<i>BITSEA</i>	<i>VOCABULARY GAIN SCORE</i>	
	<i>ROWPVT-4</i>	<i>EOWPVT-4</i>
Problem Total	-0.08 (.661)	-0.12 (.524)
Externalizing	0.05 (.803)	-0.29 (.116)
Internalizing	0.13 (.506)	0.14 (.471)
Dysregulation	-0.18 (.345)	0.02 (.902)
Competence Total	0.17 (.384)	0.11 (.556)

With regard to the correlations between Problem Total scores and vocabulary measures, the same kind of trend of negative correlations as in the whole group of children was also found in the groups of boys and girls. Moderate correlation coefficients were found between Problem Total and expressive vocabulary scores at 30 months in both gender groups, however, these correlations were not statistically significant. The correlations between externalizing problems and vocabulary scores were also similar in the gender groups to those in the whole group of children. Externalizing problems correlated statistically significantly with expressive vocabulary scores at 30 months among both boys and girls. Unlike in the whole group of children, a trend of a negative correlation between internalizing problems and expressive vocabulary scores at 30 months was found among boys. In turn, all of the correlation coefficients between Competence Total score and vocabulary measures in the gender groups were small, and none of these correlations were statistically significant. Furthermore, neither in the group of boys nor in the group of girls there were any statistically significant correlations or even trends found between the BITSEA and the vocabulary gain scores.

Discussion

This longitudinal study aimed at showing the effect of social-emotional/behavioural (SEB) problems and competencies on later language development among toddlers in a community sample of healthy children ($N = 60$). Parental reports based on the Brief Infant-Toddler Social and Emotional Assessment (BITSEA; Briggs-Gowan & Carter, 2006) were gathered at the children's age of 18 months. The Problem Total and Competence Total, as well as externalizing, internalizing and dysregulation problem domain, scores were calculated. Vocabulary development was assessed by a certified

speech and language therapist at 24 and 30 months using the Receptive and Expressive One-Word Picture Vocabulary Tests (ROWPVT-4 and EOWPVT-4; Martin & Brownell, 2010ab).

Compared to boys, girls obtained higher Competence Total scores and scored considerably higher in all the vocabulary measures at both age points. However, no gender differences were found in the vocabulary gain scores. Vocabulary scores at 24 months correlated positively with vocabulary scores at 30 months. With regard to the correlations between SEB problems and early vocabulary development, significant negative correlations between Problem Total scores and receptive vocabulary scores at 24 months, as well as expressive vocabulary scores at 30 months, were found. Further analyses indicated that particularly externalizing problems were associated with slower vocabulary development. By contrast, Competence Total scores correlated positively with expressive vocabulary scores at 30 months. With regard to the associations between the BITSEA scores and the vocabulary gain scores, only a trend of a negative correlation was found between externalizing problems and the development of expressive vocabulary. The same correlational analyses were carried out separately in the groups of boys and girls. Gender had minor effect on the associations between SEB problems and competencies and early vocabulary development.

Our finding that girls had higher SEB competence scores than boys is consistent with the results of the BITSEA study by Alakortes et al. (2015). With regard to SEB problems, in the present study no statistically significant gender differences were found, although boys tended to be rated higher than girls in Problem Total scores, as well as in externalizing and dysregulation problem domain scores. Also in some earlier studies, significant gender differences have not been found among children younger than 24 months (e.g., Baillargeon et al., 2011; Briggs-Gowan et al., 2001; Skovgaard et al., 2007). However, Baillargeon and others (2007) found that at 17 months boys had more externalizing problem behaviours than girls. The findings of Beernink and others (2007) among 14- and 19-month-old children are similar. Considerable individual variation might be one of the reasons for the contradictory findings. With regard to vocabulary development, girls clearly outperformed boys in the vocabulary measures, at the ages of both 24 and 30 months. This agrees with the findings of several earlier studies (e.g., Fenson et al., 1994; Gram Simonsen et al., 2014; Stolt et al., 2008). However, individual variation was considerable, both among the whole group of children as well as within the gender groups. A particularly interesting observation was that there were some children who could not name any object in the EOWPVT-4 at 24 months or even at 30 months, while some other children named dozens of them. Hence, some of the children participating this study appeared to be so slow in expressive language onset and progression that they would potentially fulfil the criteria for late talking (see Klee et al.,

1998; Rescorla, 1989; Rescorla & Achenbach, 2002; Rescorla et al., 1993). Vocabulary skills seemed to improve steadily among the children participating this study, because both receptive and expressive vocabulary measures at 24 months correlated with the corresponding ones at 30 months.

The findings of the present study are in accordance with earlier research reports indicating that there are associations between SEB problems and slow progress in early language development (Carson et al., 1998; Desmarais et al., 2008; Hawa & Spanoudis, 2014; Horwitz et al., 2003; Irwin et al., 2002; Rescorla et al., 2007; Sim et al., 2013; Whitehouse et al., 2011). However, when considering different domains of problematic behaviour i.e. externalizing and internalizing problems and dysregulation, there are some differences among the research findings. As far as the present study is concerned, only the correlations involving the Problem Total and externalizing problem scores were statistically significant, whereas several earlier studies have reported that problems in internalizing rather than externalizing are associated with low vocabulary scores (Carson et al., 1998; Irwin et al., 2002; Rescorla et al., 2007). Still, Whitehouse and others (2011) found that at 24 months, late talkers had higher scores both in externalizing and internalizing compared to control toddlers. Furthermore, Horwitz and others (2003) found a correlation between externalizing behaviour problems and expressive language delays by 30 months, but not earlier. In the present study, SEB problems and competencies were screened as early as at 18 months. Hence, the results imply that children who subsequently progress slowly in vocabulary development may show elevated SEB problems even before late talking is usually detected. What is more, in the present study early SEB problems predicted not only expressive vocabulary scores but also receptive vocabulary scores. With regard to SEB competencies, we found that they were positively associated with expressive vocabulary scores at 30 months. Rather similarly, earlier research reports indicate that late-talking toddlers have lower scores in social competence (e.g. attention, compliance, imitation/pretend play) than their typically developing peers (Horwitz et al., 2003; Irwin et al., 2002).

The fact that vocabulary skills were not assessed already at the age of 18 months is a weakness of the study design that needs to be acknowledged when interpreting the findings. We were interested in using new methods for a direct assessment of receptive and expressive vocabulary of children acquiring Finnish. ROWPVT-4 and EOWPVT-4 can be used to assess children's abilities from the age of 2 years onwards. Thus, although there are associations between early SEB problems and competencies and later vocabulary skills, we still cannot identify the causal link. It is important to acknowledge that our observations may not be applicable to other situations or populations, and they should be interpreted with caution because the sample size was relatively small. Furthermore, although Cronbach's alphas for the Problem Total and Competence Total

scores were adequate (>0.70), and for externalizing problem domain scores marginal (0.60 – 0.70), for the internalizing and dysregulation problem domain scores the alphas were poor (<0.60). At least for the internalizing domain, the low alpha may be partly due to the low base rate of occurrence of some item scorings among our sample. In addition, in the BITSEA externalizing, internalizing and dysregulation domains there are only a few items, and therefore internal consistency for these domains could not be expected to be very high. Given the low alphas, especially the internalizing and dysregulation domain results are difficult to interpret. It is possible that there truly does not exist associations between internalizing problems and dysregulation and subsequent vocabulary development. However, it also remains possible that due to low reliability of the measures the associations could not be detected. Furthermore, with regard to the vocabulary measures, some limitations should be acknowledged. Still today only a relatively limited set of tests and assessment methods for language development are available in Finnish. The picture vocabulary tests ROWPVT-4 and EOWPVT-4 that were used in the present study are currently under validation. Because norms for Finnish-speaking children are not yet available, it is rather difficult to draw completely reliable conclusions concerning the developmental level of the children. However, ROWPVT-4 and EOWPVT-4 are widely used and relatively easy and quick to administer. Furthermore, vocabulary development was assessed by a certified speech and language therapist who is experienced with working with young children.

Regardless of the above-mentioned constraints, the present study provided valuable information concerning early SEB problems and competencies and subsequent vocabulary skills, as well as their relationships in a community sample of healthy toddlers. Furthermore, the present report introduced screening and assessment methods for early development that are relatively easy to administer and would therefore also be feasible in clinical practice. Our findings provide support and also greater specificity to previous findings. Contrary to some earlier studies that examined only productive vocabulary as an outcome measure (Horwitz et al., 2003; Rescorla et al., 2007; Whitehouse et al., 2011), in the present study receptive skills were also assessed. It was found that SEB problems detected as early as at 18 months, and also early SEB competencies may have a role in subsequent vocabulary development. Horwitz et al. (2003) and Whitehouse et al. (2011) suggested that in children with slow onset and progression of expressive vocabulary, SEB problems may occur primarily as a result of difficulties in communicating effectively. This is to say that SEB problems may be consequences of limited linguistic abilities. However, it also remains possible that low SEB skills may at least in part result in slower vocabulary development. Alternatively or additionally, children with slower language acquisition may be less motivated to participate in social interaction. Even if the causal link between SEB and vocabulary

development cannot be identified precisely, the present findings have important clinical implications: Social-emotional skills should also be screened when coming across with late-talking toddlers, because early SEB problems and delays/deficits in social competencies might be among the reasons for slow onset and progression of vocabulary development. Additionally, it remains possible that early problems in language development increase a risk for problems also in SEB functioning. Hence, early intervention should be provided to these children to promote both social-emotional and vocabulary skills. For example, parent-based intervention programmes for late-talking toddlers that train parents to use language-facilitating interaction strategies might provide suitable support (e.g., Ciccone, Hennessey, & Stokes, 2012; Girolametto, Weitzman, Wiigs, & Pearce, 1999; Kaiser & Hancock, 2003; Roberts & Kaiser, 2011). Further investigations with larger sample sizes are needed. According to our view, longitudinal study design is well-grounded. In order to draw conclusions concerning the relationships between early SEB problems and competencies and language development with more confidence, repeated assessments of SEB problems and competencies at several time points would be needed. Furthermore, the inclusion of analyses of early vocabulary skills as well as prelinguistic communicative capacities in future research endeavours might shed light on this matter. According to a study by Määttä, Laakso, Tolvanen, Ahonen and Aro (2012), the majority of children who exhibit difficulties in language development at age 4;7 years can already be identified early in the second year of their lives by investigating prelinguistic skills.

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