



Long-term interrelations between socio-emotional and language competencies among preschool dual language learners in Germany

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Background. Recent research has shown that socio-emotional and language competencies are positively associated with each other. However, few studies have explored these associations for the second language competencies (L2) of young dual language learners (DLLs).

Aims. This longitudinal study investigated possible bidirectional associations between L2 language (expressive and receptive vocabulary) and socio-emotional competencies among preschool DLLs.

Sample. The participants were 216 German DLLs ($M_{T1} = 52.67$ months; $SD = 9.54$; 53% girls) who were recruited from 19 preschools.

Method. L2 skills were assessed at three time points over the course of one year using standardized tests for expressive and receptive vocabulary. Children's teachers rated their socio-emotional strengths and behaviour concerns. Cross-lagged panel analyses were used to examine the temporal interplay and longitudinal directionality of effects controlling for children's age, sex, type of language acquisition (sequential vs. simultaneous), and socio-economic status.

Results. Vocabulary skills and socio-emotional skills were positively correlated with one another at each time point, such that children with better language proficiency were rated by their teachers as children with higher levels of socio-emotional competence.

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Moreover, our results provided support for an effect of early socio-emotional skills (T1) on the relative increase in L2 vocabulary skills (T2 & T3), particularly for expressive vocabulary. However, our results did not demonstrate a statistically significant effect of better L2 language skills on the relative change in socio-emotional competencies.

Conclusion. Our results suggest unidirectional longitudinal relations between the socio-emotional and L2 skills, signifying the role of socio-emotional skills for the vocabulary development of DLLs.

Early education centres across Germany are facing the issue of how to best serve dual language learners (DLLs)¹. According to the German Federal Institute of Statistics, about 38% of preschool children have a migration background (Statistisches Bundesamt, 2018) and most immigrant families prefer to maintain their home languages in daily life, resulting in an increased number of DLL children in Germany (Autorengruppe Bildungsberichterstattung, 2018). Even though young children are mostly successful in learning multiple languages, large-scale studies (Dubowy, Ebert, von Maurice, & Weinert, 2008; OECD, 2016) have shown that growing up in conditions of migration induced bi-/multilingualism (Gogolin, 2010) can be associated with risks for lower educational achievements. The academic difficulties experienced by German DLLs are particularly attributed to insufficient skills in their second language (L2) (Kempert et al., 2016). On the other hand, a burgeoning body of research demonstrates various benefits of being a successful DLL, including advantages in metalinguistic awareness (Adesope, Lavin, Thompson, & Ungerleider, 2010), third language learning (Cenoz, 2013; Hirosh & Degani, 2018), cognitive skills (Barac, Bialystok, Castro, & Sanchez, 2014; Bialystok, 2015) as well as social and behavioural advantages of bilingualism conveyed through increased self-control over behaviour (Crosnoe, 2007; Guirguis & Antigua, 2017; Winsler, Kim, & Richard, 2014).

Primarily, research on monolingual children reports that language and socio-emotional competencies do not develop independently from each other (Multhauf & Bockmann, 2015). First, it is argued that language can support socio-emotional regulation processes and acts as a fundamental tool within peer relationships and conflict management abilities (Weinert & Ebert, 2017). Second, socio-emotional skills are needed for establishing and maintaining social-interactions, which are a driving force of children's language development (Dickinson & Porche, 2011; Girolametto & Weitzmann, 2002). Therefore, the limited language abilities of DLLs may result in communication problems and difficulties in forming social-interactions, which are essential for both socio-emotional and language development. However, although growing evidence suggests that the development of young DLL's socio-emotional and language skills might be related, research examining these relations in the context of dual language development remains limited (Halle et al., 2014). Most existing studies are cross-sectional (e.g., Sun et al., 2018; McNally, Darmody, & Quigley, 2019) or examine the relations in unidirectional ways without considering their possible reciprocal relations (e.g., Kang, Haddad, Chen, & Greenberger, 2014; Winsler et al., 2014). To our knowledge, only very few longitudinal studies investigated the interplay between the socio-emotional and language competencies of young DLLs (Bohlmann, Maier, & Palacois, 2015; Hagan-Burke et al., 2016), and these are

¹ Although there is no single consistent definition of dual language learners, the one used here takes an inclusive approach, counting as DLLs all children living in a household where one or more members speak a language other than German (Reich, 2010). In addition, it also includes children who were learning a second language while continuing to develop his or her first language. L1 denotes the language of the country from which the children or their family members immigrated, and L2 denotes the language of the host country (in this case German), regardless of whether the languages were acquired sequentially or simultaneously.

limited to specific aspects of these competencies. The present work aims to contribute to a better understanding of the possible bidirectionality between these skills and extends existing research by including different language skills (expressive vs. receptive language) and analysing these relations in context of dual language development.

Relations between socio-emotional and language skills

Socio-cultural theories consider social-interactions as proximal zones by which language shapes other developmental outcomes (Vygotsky, 1978). In particular, language plays a critical role in monitoring, planning, and guiding children's behaviour (Vygotsky, 1962). According to Vygotsky (1962), through self-directed speech, children begin to collaborate with themselves or others; for example, they self-regulate by verbally organizing and planning their thoughts as well as guiding and mastering their behaviour (Winsler, Abar, Feder, Schunn, & Rubio, 2007). Thus, it is proposed that language (self-directed speech) is a psychological tool that serves as a self-regulatory mechanism (Fernyhough & Fradley, 2005).

This is also consistent with usage-based theories (Tomasello, 2003) which postulate that language acquisition occurs in social-interactions. For example, Tomasello's social-pragmatic theory (Tomasello 2001, 2009) is considered as a further development of Vygotsky's socio-cultural approach (Siegler, DeLoache, & Eisenberg, 2011). The theory assumes that children's development takes place in a cultural learning context by gradually acquiring social and cognitive skills. Theoretically seen, language acquisition requires shared attention, shared goals, intentions, and cooperative actions (Tomasello, 2008; Tomasello, Carpenter, Call, Behne, & Moll, 2005). Moreover, children are described as intentional beings with a human-specific ability and willingness for cooperation and prosocial behaviour, which helps them to communicate with other people. Thus, it is theorized that social context is essential for language development and is constructed through 'common social actions' with others (Kauschke, 2012, p. 146). For this purpose, children initially imitate what the adults have said and adopts individual sequences. Little by little children succeed in forming analogies, then they change to more complex and structured systems. It is therefore very likely that children who show better socio-emotional skills experience increased social interaction opportunities, which in turn could have a catalysing effect on the development of language skills. In sum, even though both theories make no explicit statements about the possible bidirectionality between the both developing sets, both theories suggest that relations between language and socio-emotional competencies exist. However, there are several empirical studies that indicate reciprocal relations.

Empirical studies support the theorized relations between the two developmental areas - language and socio-emotional development - and emphasize the association between self-regulation and language skills (Fuhs, Nesbitt, Faran & Dong, 2014; McClelland et al., 2007; Skibbe, Montroy, Bowles, & Morrison, 2019; Weiland, Barata, & Yoshikawa, 2014). Most of the empirical work examining the relations between self-regulation and language skills refers to studies operationalizing self-regulation with executive functions (EF). Even though executive functions and socio-emotional/emotional skills are not interchangeable, these studies can still help to understand the relation patterns, as it is known that these skills are broadly related under self-regulation. Some of these studies report mostly unidirectional effects of early vocabulary skills on later self-regulation skills (Botting et al., 2017; Fuhs & Day, 2011). This highlights language skills as an important developmental asset for children's future self-regulation skills. As such, it

has been suggested that language supports executive function development, which decisively contributes to regulating and planning goal-oriented behaviour (Slot & Suchodoletz, 2018). However, others suggest an opposite effect, demonstrating early self-regulation skills as an indicator of later vocabulary skills (Weiland et al., 2014), likely because children with stronger self-regulation skills may benefit more from language input and social-interactions. Moreover, evidence confirms longitudinal reciprocal relations (Bohlmann, Maier, & Palacios, 2015; Cadima et al., 2019; Daneri & Blair, 2017; Fuhs, Nesbitt, Farran, & Dong, 2014), suggesting that these developing language and socio-emotional skills influence one another throughout time.

Associations between language competencies and other aspects of socio-emotional competencies are documented in the literature as well. Some studies provide evidence for relations between positive social behaviour and language skills (Cassidy, Werner, Rouke, Zubernis, & Balaraman, 2003), while others report links between higher competencies in cooperation behaviour and higher language competencies (Girard, Pingault, Doyle, Falissard, & Tremblay, 2016; Longoria, Page, Hubbs-Trait, & Kennison, 2009). It is contended that children who are cooperative and prosocial are more likely to establish good relationships with children and teachers, since they are willing to follow others' instructions/requests and if necessary, undertake smaller duties (Rose, Weinert, & Ebert, 2018). To understand other people's intentions and needs or to interact with them, expressive and receptive language abilities are needed (Longoria, Page, Hubbs-Tait, & Kennison, 2009). Hence, it is possible that children's limited language competencies might be linked to difficulties in socio-emotional competencies maybe because children's misunderstandings or lack of ability to express themselves in social-interactions may be frustrating and create conflict. In turn, this stressful situation and the inability to communicate effectively with their peers might result in conduct-related behaviour (e.g., aggression) that can act as an alternative form of communication (Menting, van Lier, & Koot, 2011; Monopoli & Kingston, 2012). Evidence supporting reciprocal relations rather than specific unidirectional relations between conduct problems and expressive language exists as well. For example, Girard et al. (2016) have shown that the emergence of problems in either one domain was associated with problems in the other domain. However, the existing research literature having to do with the relations between DLLs' socio-emotional and language skills is limited, a topic to which we now turn.

Relations between DLLs' socio-emotional and language skills

To date, the relations between DLLs' socio-emotional and language skills remain largely unknown (Halle et al., 2014). Most existing studies examine only specific aspects of language skills and do not focus on developmental changes and the interrelations between both developing skill sets. Examining these can be particularly important for DLLs, because monolinguals probably already have enough language skills to communicate their basic needs in daily conversations or to participate in social activities while DLLs may lack these essential language tools in their social lives.

In one of the few studies examining the relation between the two development areas, Winsler et al. (2014) demonstrated low-income Spanish–English speaking preschoolers with better initiative, self-control, attachment, and less behaviour concerns at age four had better L2 outcomes by the end of kindergarten. However, the reverse direction was not considered. Furthermore, a longitudinal study by Hagan-Burke et al. (2016) revealed that problem behaviour was a significant predictor of poor outcomes on vocabulary-related measures for L2 and that entry-level receptive and expressive vocabulary skills were

predictive of later internalizing symptoms. However, in the same study, children with low L2 skills when entering kindergarten did not demonstrate any change in their externalizing symptoms, bullying, and hyperactivity (Hagan-Burke et al., 2016). Another study investigating the bidirectional relations between self-regulation and expressive vocabulary using a longitudinal study conducted over a period of two years confirmed reciprocal relations between the two variables in preschool-aged DLLs (Bohlmann et al., 2015). Nevertheless, they found bidirectional relations for children aged between 56 and 62 months, and only unidirectional relations between early self-regulation skills and later language skills for younger children aged approximately between 35 and 56 months.

To sum up, relations between language and socio-emotional competencies are assumed in DLLs, but research examining the temporal interplay and longitudinal directionality of effects is lacking. As DLLs' development occurs in the specific context of acquiring multiple languages, understanding whether and how language and socio-emotional competencies of DLLs are interrelated is important. Moreover, the limited empirical work on DLLs shows that the comparative role of/for expressive and receptive language abilities remains unclear. This is in particular important for DLLs, as research shows that DLL's receptive and expressive language skills often follow different developmental trajectories (Ribot, Hoff, & Burridge, 2018).

The present study

This study analysed the possible bidirectional associations between the L2 language competencies and socio-emotional competencies of German preschool DLLs, separately for expressive and receptive vocabulary, given the preliminary evidence of the differential roles of each language modality. With this study, we contribute to existing research in several ways. First, we investigated the possible reciprocal relations with a unique longitudinal design across a period of two years and second, we extended prior work by including different aspects of language skills (expressive and receptive language) as recommended by language researchers in order to capture children's developmental progress (Hoff, 2018). Furthermore, analyses dealing with complex relations between language and socio-emotional skills were mainly based on a mixed sample of monolingual and multilingual children which does not allow isolated statements on dual language development. Based on previous research with bidirectional modellings (e.g., Bohlmann et al., 2015), we hypothesized that reciprocal associations between socio-emotional competencies and language skills exist, such that children with better receptive and expressive language skills would be more socially competent at future time points, and vice versa.

Methods

The data of this longitudinal study stem from a larger project on multilingualism in preschools across a period of three years. Data were collected via standardized language assessments and teacher/parent questionnaires once a year.

Participants

In total, 216 dual language learners from 19 daycare centres in Germany participated in this study. Only daycare centres with high proportions of children with migration

background (ranging from 52% to 100%) were selected. Within the aims of the larger project, all DLL children between the ages of three to six years were recruited to participate in the study. Hence, it was sufficient when one child could take part on two instead of three anticipated measurement points. Children's ages ranged from 33 to 77 months ($M_{T1} = 52.67$ months; $SD = 9.54$) at the first time point and more than half were girls ($n = 114$; 53%). The data collection for the first time point (T1) was completed during the summer of year 1 ($n = 216$), the second time point (T2) during the summer of year 2 ($n = 201$), and the third time point (T3) during the summer of year 3 ($n = 118$). The sample size from T1 to T2 decreased because of family moves ($n = 12$) or other unknown reasons ($n = 3$). As children who were five years of age or older at T1 left preschool for primary school, the sample, as expected, decreased from T2 to T3 by 70 more participants. Other reasons for attrition from T2 to T3 included family moves ($n = 9$) and other unspecified reasons ($n = 4$). All the children were DLLs, and encountered at least one language different from German at home. Among the sample, children who speak Turkish ($n = 71$; 32%), Russian ($n = 39$; 17%), Albanian ($n = 14$; 6%), and Kurdish ($n = 12$; 5.6%) represented the large language groups. Furthermore, 17 other languages (with frequencies $< 2\%$) were reported as being spoken by the children.

In total, 175 parents of 216 (81%) completed the parent questionnaires. In addition, some questionnaires had items that were omitted, meaning we had different missing value proportions. 10% of the children's parents had no secondary education, 72% had secondary education, and 18% had obtained a college degree (response rate of 73%). According to the available data (72%) regarding the children's immigration background, 10% ($n = 15$) of the children were first-generation immigrants, 80% ($n = 126$) second-generation immigrants, and 10% ($n = 16$) third-generation immigrants. Information on language exposure to German was reported for 156 of the 216 (72%) children. Of these children, 54% ($n = 85$) were exposed to German from birth, while 39% ($n = 60$) were first exposed to German between the ages of 12 to 36 months. The remaining children ($n = 11$; 7%) were first exposed to German between 41 and 54 months.

Materials and procedure

Experienced and supervised graduate students administered the language assessments during sessions lasting 30–45 minutes for each child in the kindergarten. Information on the children's sociodemographic variables and home language environments were obtained through parental questionnaires. Teachers completed questionnaires on children's socio-emotional outcomes and behavioural concerns. In exchange for their participation, the children received a toy for each session and parents received 10€ for completing the parental questionnaire.

Socio-economic status

The children's socio-economic status was determined based on their parent's current occupational status ($M = 40.48$; $SD = 12.42$). In total, 161 of 216 (75%) parents provided information on their current occupation, which was coded according to the International Socio-economic Index of Occupational Status (ISEI; Ganzeboom & Treiman, 1996). If the scores of the mother and father differed, the higher score was used.

Socio-emotional skills

Children's socio-emotional strengths and behaviour concerns were measured using the subtest for socio-emotional competencies of a German screening battery for basic competencies (BIKO 3–6; Seeger, Holodyski, & Souvignier, 2014). Teachers evaluated the children's behaviour on BIKO using six to eight items per subscale focusing on their cooperation, integration in the group, peer relationship problems, prosocial behaviour, playing behaviour, and emotion regulation. The subscales are based on a rating scale of 0 to 3 (0 = *do not agree*, 3 = *agree*). Lower scores indicate more problematic behaviours. To obtain a total socio-emotional score (BIKO), a composite score was computed by aggregating the scores (summed across items) of all subscales (BIKO, $r = .34-.71$, $p < .001$ among the six subscales). Internal consistency reliability for the subscales within this sample was good to excellent (T1: Cronbach's $\alpha = .83-.88$; T2: Cronbach's $\alpha = .84-.91$; T3: Cronbach's $\alpha = .80-.91$).

Language skills

Receptive Vocabulary. The German version of Peabody Picture Vocabulary-4 (PPVT-4; Lenhard, Lenhard, Segerer, & Suggate, 2015) was used to assess children's receptive vocabulary skills. PPVT-4 is a standardized measure of receptive language in which children are presented with four pictures. They must point out the target picture that matches the item mentioned by the assessor. Testing was stopped when the child's responses to 8 or more items within a set of 12 items were incorrect. The PPVT-4 has high reliability in standardization samples, with an internal consistency of $\alpha = .97$.

Expressive Vocabulary. Children's expressive vocabulary was measured using a German expressive vocabulary test (Aktiver Wortschatztest 3–5 (AWST-R 3–5), Kiese-Himmel, 2005). This test measures expressive vocabulary skills by asking children to provide a label for pictured items displaying objects or actions. The publishers reported an internal consistency coefficient of $\alpha = .88$.

Analysis strategy

To examine the possible bidirectionality of the associations between L2 language competencies and socio-emotional competencies, we estimated different cross-lagged models (raw scores were used) in *Mplus* Version 8 (Muthén & Muthén, 1998–2017). Separate models were tested for expressive and receptive competencies controlling for children's age, sex, type of language acquisition (sequential vs. simultaneous), and socio-economic status, which are often interrelated with language and socio-emotional skills. For both dimensions, three nested models (no coupling, unidirectional coupling (socio-emotional skills $\rightarrow$ language skills), and bidirectional coupling) were tested and compared to find the best representing model. The model of unidirectional coupling with the path from language skills to socio-emotional skills was not tested, because the model with bidirectional coupling indicated no predictive relations.

To test the differences between the nested models, a Satorra–Bentler scaled chi-square difference test was performed (Satorra & Bentler, 2001). Model fits were compared with established fit indicators including the Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). To account for the nested data structure with children in different classrooms, the type = complex option of *Mplus* was applied (Hox, Moerbeek, & van de Schoot, 2017). Intraclass correlations ranged from 0.16 to 0.31.

Missing data

Missing data on receptive vocabulary scores ranged from 2.3% at T1 to 13% at T2 and 46% at T3. Similarly, 2.3% of the expressive vocabulary scores at T1, 7% at T2, and 46% at T3 were also missing for some children. In addition, for 13% of children at T1, 8% at T2, and 52% at T3, teacher ratings on socio-emotional competencies were missing. Missing data at T1 and T2 were largely due to child attrition (leaving the preschool or family moves) or because teachers did not fill in parts of the questionnaires. To address the problem of missing data in longitudinal studies, the Full Information Maximum Likelihood Estimation-Option (FIML) was used. Although there was a systematic attrition in this sample we decided to use the maximum likelihood estimation as deletion methods generally exhibit greater biases than *Missing at Random* approaches (Enders, 2013; Graham, 2009). Therefore, researchers are advised to use the maximum available sample (Enders, 2011).

Results

Preliminary analyses

The descriptive statistics at each assessment point for the children's raw scores on the language and socio-emotional assessments as well as the covariates are displayed in Table 1.

Table 2 shows the correlations for the L2 language measures, socio-emotional competencies, and covariates. Both measures of L2 skills for T1, T2, and T3 correlated positively with socio-emotional ratings at T1 and T2, such that children with higher levels of L2 competencies tended to have better socio-emotional skills and demonstrated less problem behaviour. Notably, the scores of each construct were not only correlated within

Table 1. Descriptive statistics for variables of interest

Variables	M	SD	Min	Max	Range
Language competencies L2					
PPVT _{T1}	46.11	30.15	0	110	0–228
PPVT _{T2}	73.28	27.34	4	136	0–228
PPVT _{T3}	84.34	25.00	4	143	0–228
AWST _{T1}	13.31	12.26	0	47	0–75
AWST _{T2}	21.94	14.06	0	52	0–75
AWST _{T3}	27.62	14.50	0	61	0–75
Socio-emotional competencies					
BIKO _{T1}	84.97	18.21	22	114	0–114
BIKO _{T2}	90.77	18.08	22	114	0–114
BIKO _{T3}	92.24	20.02	18	114	0–144
Covariates					
Age _{T1}	52.67	9.54	33	77	33–77
Age _{T2}	64.49	9.40	45	86	45–86
Age _{T3}	71.30	6.58	57	90	57–90
SES (HISEI)	40.48	12.42	16	73	16–90

Note. T1 = time point 1, T2 = time point 2, T3 = time point 3; PPVT = German Version of Peabody Picture Vocabulary Test - 4 (Receptive Vocabulary); AWST = Aktiver Wortschatztest 3–5 [Expressive Vocabulary Test 3–5]; BIKO = BIKO Subtest Socio-emotional Competencies; SES = Socio-economic Status (HISEI, Highest International Socio-economic Index of Occupational Status; higher scores indicate higher socio-economic status).

Table 2. Intercorrelations between variables of interest

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Age	1											
2. Sex (boys = 0; girls = 1)	-.07	1										
3. SES	-.04	-.18*	1									
4. LA type (sim = 0; seq = 1)	.07	-.04	.05	1								
5. PPVT _{T1}	.50***	-.08	.23**	-.24**	1							
6. PPVT _{T2}	.47***	-.05	.20*	-.19**	.84***	1						
7. PPVT _{T3}	.34**	-.05	.27**	-.24**	.77***	.88***	1					
8. AWST _{T1}	.40***	-.06	.18*	-.31**	.85***	.82***	.72***	1				
9. AWST _{T2}	.39***	-.05	.25**	-.27**	.85***	.89***	.85***	.91***	1			
10. AWST _{T3}	.31***	-.07	.25*	-.36**	.80***	.86***	.86***	.85***	.94***	1		
11. BIKO _{T1}	.24**	.34***	.10	.00	.24***	.29***	.24*	.16*	.23**	.24*	1	
12. BIKO _{T2}	.30***	.38***	-.01	-.04	.20**	.28***	.21*	.18*	.23***	.19*	.69***	1
13. BIKO _{T3}	.16	.38***	-.06	-.01	.05	.12	.12	.06	.10	.12	.53***	.62***

Note. T1 = time point 1, T2 = time point 2, T3 = time point 3; SES = Socio-economic Status (HISEI; higher values indicate higher status); LA type = Language acquisition type; sim = simultaneous; seq = sequential; PPVT = German Version of Peabody Picture Vocabulary Test - 4 (Receptive Vocabulary); AWST = Aktiver Wortschatztest 3-5 [Expressive Vocabulary Test 3-5]; BIKO = BIKO Subtest Socio-emotional Competencies (Total Score). Product-moment correlations were calculated (two-sided).

* $p < .05$; ** $p < .01$, and *** $p < .001$.

one time point, but also significantly correlated across time points, suggesting that previous skills in language or socio-emotional competencies were related with subsequent skills in these competencies. However, socio-emotional competencies at T3 demonstrated no significant associations with receptive and expressive vocabulary scores at all time points. Furthermore, all L2 scores of each time point were significantly correlated with the language scores of the other time points. Likewise, the scores for socio-emotional competencies were also correlated with each other across T1 to T3. Regarding the covariates, sex demonstrated no significant associations with language skills, but was related to socio-emotional competencies, such that girls were rated higher for socio-emotional competencies than boys. Moreover, socio-economic status and children's type of language acquisition (simultaneous vs. sequential) were linked to all L2 scores, but not to socio-emotional competencies, such that children who come from low socio-economic households and were exposed to German later on had lower L2 skills. In addition, older children had higher language competencies and socio-emotional competencies.

Next, different nested models were estimated to test the associations between language and socio-emotional competencies from T1 to T3 separately for each language modality. The fit indices and chi-square difference tests of the conditional models (no coupling, one unidirectional coupling, and bidirectional coupling) for L2 competencies are provided in Table 3. The results revealed that the second models with unidirectional couplings (socio-emotional skills → language skills) were the best representing models, which indicated a significant improvement over the first models (Model 1a vs. 1b). In contrast, adding the bidirectional paths (Model 3a vs. 3b) showed no improvements ($p = .89$ vs. $p = .72$) over the second models (Model 2a vs. 2b), indicating that early L2 language skills were not predictive for the relative increase in socio-emotional competencies.

Table 3. Model fit results for both language modalities

Model	χ^2 (df)	CFI/TLI	RMSEA [CI]	SRMR	χ^2_{diff} (df) ^a
Expressive skills					
1a. no coupling	15.50 (8)*	.99/.97	.07 [.00, .12]	.02	
2a. unidirectional coupling (BIKO → AWST)	6.95 (6)*	1.00/1.00	.03 [.00, .10]	.01	
Difference between model 2a and 1a					8.49 (2)*
3a. bidirectional coupling	6.73 (4)*	1.00/.97	.06 [.00, .13]	.01	
Difference between model 3a and 2a					0.15 (2)
Receptive skills					
1b. no coupling	14.62 (8)*	.99/.96	.06 [.00, .11]	.02	
2b. unidirectional coupling (BIKO → PPVT)	8.79 (6)*	1.00/.98	.05 [.00, .11]	.02	
Difference between Model 2b and 21					7.04 (2)*
3b. bidirectional coupling	7.05(4)*	1.00/.96	.06 [.00, .13]	.02	
Difference between Model 3b and 2b					0.59 (2)

Note. Models controlled for age, sex, language acquisition type and socio-economic status (HISEI); CFI = Comparative Fit Index; TLI = Tucker–Lewis Index; RMSEA = Root Mean Square Error of Approximation. SRMR = Standardized Root Mean Square Residual.

^aThe chi-square difference test has been calculated using the Satorra–Bentler scaling correction factor in Mplus for analysis using full information maximum likelihood (Satorra & Bentler, 2001).; * $p \leq .05$; ** $p \leq .01$.

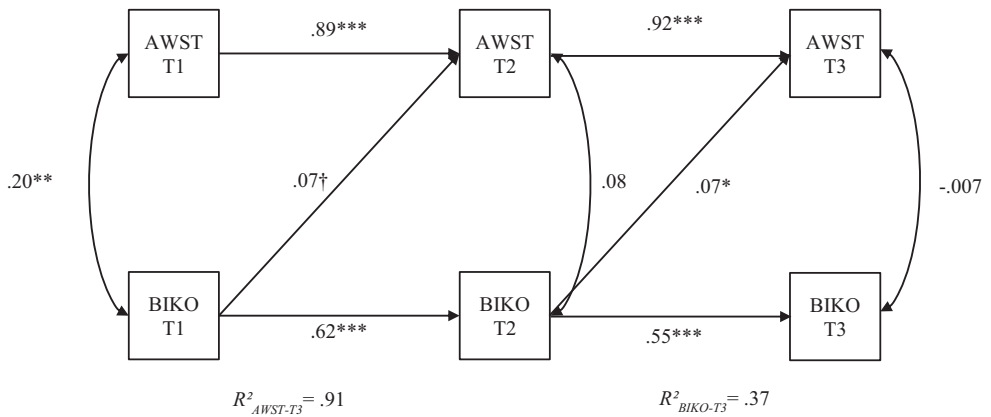


Figure 1. $N = 216$; Best representing autoregressive model (unidirectional coupling, BIKO → AWST) for examining the association between expressive language skills and socio-emotional competencies, controlled for age, sex, language acquisition type, and parental socio-economic status (HISEI). † $p < .10$, * $p < .05$, ** $p < .01$, and *** $p < .001$.

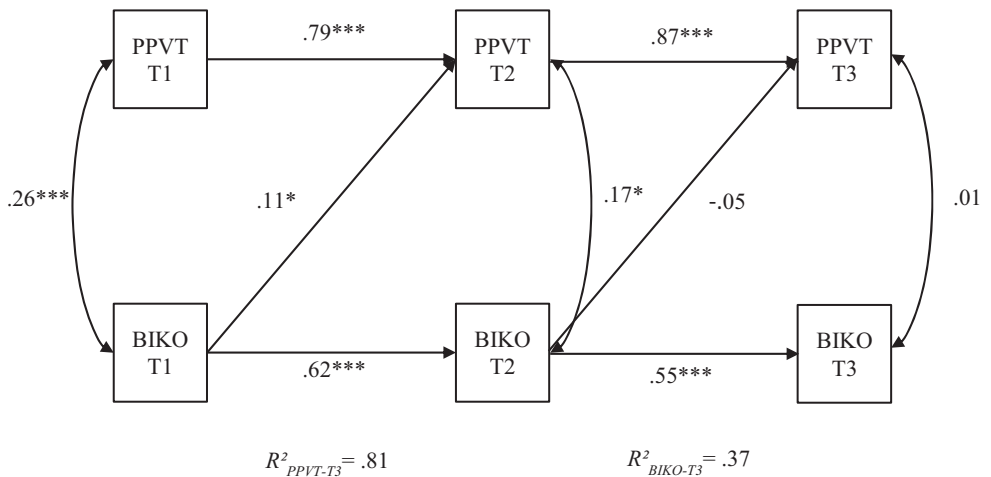


Figure 2. $N = 216$; Best representing autoregressive model (unidirectional coupling, BIKO → PPVT) for examining the association between receptive language skills and socio-emotional competencies, controlled for age, sex, language acquisition type, and parental socio-economic status (HISEI). † $p < .10$, * $p < .05$, ** $p < .01$, and *** $p < .001$.

The results of the final model are displayed in Figures 1 and 2. All autoregressive paths in both models were significant, meaning that children's language skills at T1 were positively associated with the skills at T2 and T3. Furthermore, children's socio-emotional competencies at T1 were positively associated with the scores of T2 and T3. In addition, both language scores (expressive and receptive vocabulary) at T1 were moderately correlated with socio-emotional competencies at T1. This indicates that at the beginning of the study, children with higher language skills tended to have higher socio-emotional skills, and those with lower language skills had lower socio-emotional competencies.

Moreover, the cross-lagged paths from previous socio-emotional skills to almost all later vocabulary skills in L2 were also significant. This means that higher socio-emotional competencies at an earlier time predicted greater relative increase in L2 vocabulary skills (compared to children with poorer socio-emotional competencies). One exception was the path between socio-emotional competencies at T2 and receptive vocabulary in T3, which shows that the relative change in receptive language skills was no longer related to early socio-emotional competencies.

Discussion

This study sought to provide a better understanding of the interrelations between language and socio-emotional competencies of preschool DLLs. Although a large body of studies has shown that socio-emotional and language competencies are positively associated, relatively few examined these associations in a longitudinally bidirectional way. In addition, most existing research was based on non-DLL samples. Given that DLL children's language competencies can follow different developmental trajectories compared to non-DLL children, this study built on and expanded previous work using a longitudinal cross-lagged panel design. Consistent with previous studies, our findings revealed positive associations between L2 skills and socio-emotional competencies, such that children showing higher language competencies were also rated as more socio-emotionally competent. In addition, after controlling for children's sex, age, socio-economic status, and children's type of language acquisition, earlier socio-emotional competencies were significantly related with a relative increase in later receptive and expressive vocabulary. Contrary to our hypothesis, we did not find evidence that DLLs' early L2 skills were associated with the relative change in children's later socio-emotional competencies.

The correlations demonstrated that children with high language competencies in L2 were also rated as having higher social competence. That is, children who are able to understand and communicate were more cooperative, prosocial, integrated in groups, have less problem behaviour, show better playing behaviour, and emotion regulation skills. These results are aligned with other studies using DLL samples (e.g., Sun et al., 2018). Interestingly, correlations between the language scores and socio-emotional measure were not only found concurrently, but significant correlations also emerged between the scores of different time points. This means the children having higher scores at the beginning of the study also achieved higher scores at T2, and vice versa. In contrast, no significant correlations were found for the socio-emotional scores of T3 and all language measures.

Our results did not provide evidence for the bidirectional relations between L2 skills and socio-emotional skills of preschool DLLs. Thus, the results are not in line with our hypothesis and the extant research with non-DLLs (e.g., Cadima et al., 2019; Daneri & Blair., 2017; Girard et al., 2016). However, our results at least suggest that early socio-emotional skills may have a specific role in the development of L2 skills (Bohlmann et al., 2015; Winsler et al., 2014), particularly of expressive skills. To our knowledge, only two other studies on DLLs examine the relations from both perspectives, and our results partially align with theirs. Bohlmann et al. (2015) found bidirectional effects for only a specific period, whereas Hagan-Burke et al. (2016) found only an effect of entry-level vocabulary measures on later internalizing problems, not for acting out problem behaviours. Our findings are also in line with usage-based theories of language acquisition

which highlight the importance of social-interactions for language development. We assume that high socio-emotional competencies promote more successful interactions with peers (Mashburn, Justice, Downer, & Pianta, 2009; Montroy, Bowles, & Skibbe, 2016) and teachers (Dickinson & Porche, 2011; Dickinson & Sprague, 2001; Girolametto & Weitzmann, 2002), potentially contributing positively to larger gains in vocabulary attainment. It is known that children with stronger social skills can take advantage of more learning opportunities, participate fully in classroom activities, and engage more with peers (Arnold, Kupersmidt, Voegler-Lee, & Marshall, 2012; Sparapani et al., 2018; Ziv, 2013). Moreover, during learning activities, socially competent children are probably better able to sit, listen, and follow rules, which enable them to profit more from such activities and to take advantage of them in terms of language stimulation. In addition, this could also affect teachers' teaching strategy, since they can focus more on the contents of learning activities than on managing the potentially disruptive behaviour of children with less socio-emotional skills. Related to this, as reported for preschool DLLs by Hagan-Burke et al. (2016), less problem behaviour can also have a positive effect on vocabulary-related language outcomes.

Our results revealed that children with higher socio-emotional competencies tended to make larger gains in expressive and receptive vocabulary during the first year. However, the path from socio-emotional competencies to receptive vocabulary between T2 and T3 was not significant, indicating that socio-emotional competencies no longer facilitate the gains in receptive vocabulary in the second year. It is possible that socio-emotional skills might be particularly important for the acquisition of expressive vocabulary (Cadima et al., 2019). Possibly, expressive language and socio-emotional competencies share more common cognitive processes than receptive language. For example, it is known that receptive language is more related to long-term memory (Gathercole, 1995), whereas generating expressive language exercises working memory (Daneri & Blair, 2017). Thus, it is conceivable that expressive language may be more related to socio-emotional competencies than receptive skills. This is also reflected in studies that examine the relations between executive functions and language skills. Most of the studies, confirming the bidirectionality between the self-regulation and language skills, use expressive language skills as a measure of language (e.g., Bohlmann et al., 2015; Daneri & Blair, 2017; Fuhs & Day, 2011; Kuhn et al., 2016). Moreover, we assume that the relations between language and socio-emotional skills are especially mediated by social-interactions and the increased possibility of children's language use with their peers and teachers, which in turn might promote their language skills. So, the increased possibility and probably more use of language foster presumably the expressive language skills. This notion is supported by research showing that language use was found to be a stronger predictor of growth in expressive than receptive skills in DLLs (Ribot et al., 2018).

Furthermore, our results did not demonstrate a statistically significant effect of better L2 language skills on the relative change in socio-emotional competencies. This contradicts various studies showing early language skills as an indicator of later socio-emotional competencies among different samples (Aro, Eklund, Nurmi, & Poikkeus, 2012; Menting et al., 2011; Rose et al., 2018). However, these results were based on non-DLL samples, for which the language skills assessed are usually first language skills. Long-standing theoretical assumptions (Vygotsky, 1962) propose that children use their language (e.g., self-directed speech) to self-regulate their behaviour or emotions. Given that our study examined L2 skills, it cannot be ignored that the pattern could be similar if these analyses are conducted with first language skills. Possibly, children use their first language (instead of L2 skills) for their self-regulation, which could not be illustrated with

our data. Similarly, it is assumed that the reason for developing better socio-emotional skills of linguistically competent children is that they easily get in touch with their peers, can more adequately formulate their own needs and respond better to wishes from others, but also show more helpful and prosocial behaviour. All of these listed actions require high language skills in L2, which often seems to be limited in DLLs, particularly in the beginnings of the preschool period. Thus, this can be an explanation for the lack of direct relations between early L2 skills and increase in socio-emotional competencies. Most studies that found direct effects between early language competencies and later social skills were based on samples with monolingual children, who already have a basic language tool for becoming part of social life, integration in groups, and communicate their basic needs. Hence, it is also worth considering whether a certain base level of language competencies is necessary to facilitate gains in socio-emotional competencies (Bohlmann et al., 2015). For example, some studies examining bidirectional relations between language abilities and executive functions suggest that only advanced language skills may emerge as an indicator of later executive functions (Friend & Bates, 2014; Kuhn et al., 2016). Moreover, it is important to note that the DLL sample used in this study was very heterogenous in terms of language acquisition types. Different patterns of association between composites of socio-emotional and language skills could be emerged in case of a more homogenous sample composition (i.e., all simultaneous learners). A more corresponding relations pattern as visible in monolingual children could be expected.

Lastly, another possible explanation for our partially contrasting findings could be also that we have to some extent different assessing time ranges. It is conceivable that a period of two years might be too long for detecting the bidirectionality between the both developing skill sets since we know that cognitive development processes are subjected to very rapid changes in these age periods.

Strengths and limitations

The major strength of the current study is the longitudinal design with three time points, which allowed us to investigate possible bidirectional relations between language and socio-emotional competencies over a period of two years. Our results extend previous findings by documenting the importance of socio-emotional competencies for L2 skills and by examining a sample of DLLs recruited in a non-clinical context. Another strength is that our study provides the possibility to understand the relations of/for expressive and receptive language skills separately. However, only behavioural and affective components of socio-emotional competencies were considered, and aspects of emotional development such as emotional knowledge and understanding were not included. Notably, longitudinal modelling is correlational, and thus can only support interdependencies without enabling causal conclusions (Bohlmann et al., 2015; Weinert & Ebert, 2017). Furthermore, these findings only apply to the observed developmental period of preschool-aged DLL children in Germany and relations may change in other language contexts and in other developmental periods. Regarding limitations, our analyses relied on teacher's ratings of socio-emotional variables. Possibly, teachers' ratings may be subtly biased by teacher-child relationships (Jerome, Hamre, & Pianta, 2009) and ethnic stereotypes (Tenenbaum & Ruck, 2007). Given the correlational design, we cannot exclude the effects of teacher biases, given that it is possible that teachers could rate children with higher language skills as more socio-emotionally competent. However, our preliminary analyses with parent ratings on socio-emotional skills indicated similar relations, but could not be considered in this study because of the unacceptable high

missing proportions and low internal consistencies. Future studies should consider including parent ratings or observational techniques for measuring children's social skills. Furthermore, our analyses did not consider first language skills. Future studies should also explore the same relations for first language skills, as they would likely enhance understanding of possible bidirectionality in the relations. Related to this, it is worth considering to perform separate analyses for simultaneous DLLs versus sequential DLLs. Future research that can identify the mechanisms underlying the developmental pathways between socio-emotional and language skills among different types of DLLs would be a welcome addition to the literature.

Implications

Our results can be relevant in terms of early childhood practices and the prevention of potential emotional and language difficulties among DLLs. Rather than purely linguistic or socio-emotionally oriented inter-/prevention approaches, programs involving several development areas can be considered. In the literature, we can find examples of interventions yielding promising results. For example, the Head Start REDI intervention which was developed to boost language and social competence revealed better expressive language outcomes by targeting also socio-emotional skills (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008). Furthermore, the Programme Chicago School Readiness Project which primarily focused on reducing behaviour problems in low-income preschoolers led also to improvements in other multiple areas such as pre-academic (vocabulary, letter-naming, math skills) and self-regulation skills (Raver et al., 2011). Thus, approaches focusing on behavioural regulation or promoting socio-emotional skills may be a way to increase language learning opportunities with peers or teachers. This may be particularly important for DLLs with limited language skills, as low socio-emotional skills can also have negative consequences for further language development and probably cannot facilitate their already limited language skills. It might be also worth considering whether special programmes for DLLs that specifically convey socio-emotionally important words or phrases such as 'I'm sad', 'May I play along', and 'I don't like it' can be beneficial for DLL children with limited language competencies. This will help to avoid misunderstandings or conflicts and will make it easier for children to join play groups. Consequently, comprehensive programmes can be a way to mutually promote multiple aspects of children's development in the early childhood period.

Lastly, our results also support the fact that early childhood professionals have a great responsibility. They can initiate situations in daily routines such as meal times, play groups, or even joint picture book viewing situations in which social and language development-related processes can be fostered in the sheltered environment of the early childhood institutions.

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Conflict of interest

All authors declare no conflict of interest.

Author contributions

Beyhan Ertanir (Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Writing – original draft) Jens Kaiser-Kratzmann (Funding acquisition; Project administration; Resources) Steffi Sachse (Conceptualization; Funding acquisition; Methodology; Project administration; Resources; Supervision; Writing – review & editing).

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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