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Learning Opportunities of Monolingual and Multilingual kindergarteners and their Early Literacy and Executive Functioning Development

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ABSTRACT

Nowadays, classrooms include children coming from a wide range of cultures and speaking different languages. Teachers are therefore challenged to create appropriate learning opportunities for very diverse children. The current study examined the unique contribution of general classroom interaction, individual teacher-child interactions and behavioral engagement, on early literacy and executive functioning development of monolingual and multilingual kindergartners. Nineteen classrooms were followed for one school year. On three occasions teacher and children were observed for teacher-child interactions and the children were assessed on engagement, early literacy and executive functioning. *Research findings*: The results show that learning outcomes of both multilingual and monolingual children were positively associated with high engagement in large groups and frequent interactions with the teacher. Furthermore, monolingual children's favorable academic outcomes were predicted by complex interactions; multilingual children's favorable outcomes were predicted by low classroom organization. *Practice or policy*: The present study emphasizes the importance of recognizing the differences between monolingual and multilingual children in their needs in the classroom, as well as recognizing that these groups might be unjustifiably exposed to different educational experiences, in order to optimize the learning opportunities for all children, regardless of their language background.

In kindergarten, children are expected to acquire foundational skills for a successful transition to formal schooling. Offering the appropriate learning opportunities to support this process is in itself a challenge for early childhood educators. As schools are becoming more culturally diverse, classrooms include children coming from a wide range of cultures and speaking different languages, requiring teachers to create appropriate learning opportunities for all children from diverse backgrounds. Since children develop mainly through human interaction (Bronfenbrenner & Morris, 2007), we should examine learning opportunities in the classroom in the light of the interactions teachers and children engage in. Ample research shows that in order to promote child cognitive, academic, and socio-emotional development, teachers need to engage in high-quality interactions with the children in the classroom (Bandel et al., 2014; Hamre et al., 2013; Mashburn et al., 2008). However, there is considerable variation in the learning opportunities that different children receive within one classroom (Pelatti, Piasta, Justice, & O'Connell, 2014; Weyns, Colpin, Engels, Doumen, & Verschueren, 2019). Furthermore, engagement of the interaction partners is central to high-quality interaction (Fredricks, Blumenfeld, & Paris, 2004).

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Supplemental data for this article can be accessed here.

Learning opportunities should therefore be conceived as a combination of the quality of teacher-child interactions, at the classroom and the individual level, and child engagement. Even though, previous research exemplifies the importance of these components of learning opportunities, it remains unclear how these components relate to the development of multilingual children. When considering the development of multilingual children and comparing it to monolingual children, two developmental areas are of particular interest: early literacy and executive functioning. Multilingual children often lag behind on early literacy skills in the language of instruction (Bialystok & Feng, 2011), whereas they might show greater executive functioning skills compared to their monolingual peers (Barac, Bialystok, Castro, & Sanchez, 2014). Therefore, the current study will examine the unique contribution of general classroom interaction, individual teacher-child interactions and child engagement, to the development of early literacy and executive functioning skills of monolingual and multilingual children during one year in kindergarten.

Multilingual Children

Multilingualism is a complex concept and definitions and labels vary widely (García, 2011; Wei, 2000). The concept of multilingualism does not only refer to mastering multiple languages, but also often implies being raised in diverse social and cultural contexts (García, 2011). It is difficult to determine when someone should be called multilingual, and cognitive differences might even evolve from the number of languages people speak (Baumgart & Billick, 2018; Schroeder & Marian, 2017). In the present study, we choose to use the term multilingualism rather than bilingualism, as it is more inclusive and some of our participants (N = 8) spoke more than two languages. We call children multilingual when they habitually interact in a different language than Dutch in their home environment.

Multilingual Children's Early Literacy Skills

Early literacy skills are important for later school success, as they prepare children to become successful readers. Aside from an orientation to (the use and functions of) text, vocabulary is important when learning to read (Verhoeven, van Leeuwe, & Vermeer, 2011), as well as to have the ability to recognize and manipulate the separate phonemes in a word (i.e., phonological awareness; Melby-Lervåg, Lyster, & Hulme, 2012). There are suggestions that multilingual children show different developmental pathways concerning phonological awareness and vocabulary. They are often found to have lower vocabulary levels in the language of instruction (Bialystok & Feng, 2011; Leseman, 2000; Verhoeven, 2000), but also in their native language (Bialystok & Feng, 2011), as compared to their monolingual peers. The vocabulary size in the language of instruction accelerates when multilingual children enter early childhood education, but remains smaller than that of monolingual children (Leseman, 2000). The smaller vocabulary size of multilingual children could be partly explained by possible confounders, such as socioeconomic status or home literacy environment. Families of many multilingual children often live in disadvantaged socioeconomic conditions (Calvo & Bialystok, 2014), and therefore might have less resources to offer children a rich and stimulating home literacy environment (van Steensel, 2006), which are both found to have an impact on a child's vocabulary development. Lower vocabulary levels of multilingual children, however, do not imply that multilingual children are incompetent communicators. The lower vocabulary levels do not transfer to other, related, abilities (Bialystok & Feng, 2011). For example, the phonological awareness skills of multilingual children appear to be similar or even better than that of monolingual peers (Bialystok, Majumder, & Martin, 2003; Bruck & Genesee, 1995).

Multilingual Children's Executive Functioning Skills

Executive functions are those skills that are needed for higher order thinking, which involves, amongst others, flexibility, creativity, planning, analyzing, and reasoning. These skills are found to positively relate to school readiness in young children, as it helps children to hold an instruction in mind, resist distractions in the classroom, and focus on the relevant aspects of a task (Brock, Rimm-Kaufman, Nathanson, & Grimm, 2009; Fitzpatrick, McKinnon, Blair, & Willoughby, 2014). In this study we adhere to the conceptualization of Diamond (2013) and Miyake and colleagues 2000, which distinguishes three skills: working memory, inhibition, and cognitive flexibility. Working memory is used to hold information available while using it, whereas inhibition is needed to suppress impulses in order to complete a task. Cognitive flexibility evolves from these two skills and makes it possible to switch between perspectives or tasks. For this, a child needs to suppress the one perspective (inhibition) and to activate the other in their working memory (Diamond, 2013). Although separately mentioned here, the three executive functioning skills work together and are often hard to distinguish from one another.

A large body of research has examined the development of executive functioning skills of multilingual children (Adesope, Lavin, Thompson, & Ungerleider, 2010; Barac et al., 2014; Blom, Küntay, Messer, Verhagen, & Leseman, 2014; Carlson & Meltzoff, 2008). Because multilingual children continuously switch between their languages and need to suppress the one language to speak the other, they are constantly practicing their executive functions. This could lead to better developed executive functions (Adesope et al., 2010). The results, however, are mixed. Background characteristics of the studied multilingual population seem to be important for finding significant executive functioning differences between monolingual and multilingual children (van den Noort et al., 2019). These background characteristics include, amongst others, the age of acquisition of the second language (Struys, Mohades, Bosch, & van den Noort, 2015), as well as sociolinguistic contexts (Blom, Boerma, Bosma, Cornips, & Everaert, 2017), school ethnic composition (Ready & Reid, 2019), and home language environment (J. Verhagen, Mulder, & Leseman, 2017). For example, children who started the acquisition of both languages at birth are found to outperform children that started learning a second language at a later age on nonlinguistic cognitive control (Struys et al., 2015).

A review study of Barac et al. (2014) across 26 studies on the effects of multilingualism on the executive functioning development of young children found primarily effects for inhibition. Multilingual children are generally better able to suppress or ignore distractions than monolingual children. The results for working memory are mixed, but seem to suggest that multilingualism represents a benefit when the working memory task requires a very high level of executive functioning. For cognitive flexibility there seems to be a multilingual benefit, however, the evidence is still limited (Barac et al., 2014).

It should be noted, that evidence for the multilingual benefit on executive functions is still under debate. Many studies that report null results are not being published, and studies that find effects have generally small sample sizes, fail to have comparable groups based on demographic characteristics, or use flawed statistical testing (de Bruin, Treccani, & Della Sala, 2015; Paap, Johnson, & Sawi, 2015; van den Noort et al., 2019).

Learning Opportunities of Monolingual and Multilingual Young Children

The academic and cognitive development of multilingual and monolingual young children is for an important part influenced by the learning opportunities created in early childhood education. Learning opportunities in education are all the classroom experiences that children have, including the quality and quantity of their interactions with teachers, and the activities they engage in (Hamre & Pianta, 2007; La Paro et al., 2009). These classroom experiences have the potential to generate changes in our cognitions, behaviors, and feelings, particularly in young children, but do not necessarily need to be capitalized – i.e., translated into learning gains – in order to be an opportunity. Since children develop by meaningfully interacting with and actively engaging in their learning environment (Bronfenbrenner & Morris, 2007; Fredricks et al., 2004), the present study examines three key components that define the learning opportunities of monolingual and multilingual kindergartners: the quality of general classroom interaction, the quality of individual teacher-child interactions, and child engagement. All three components have been separately found to relate to early literacy and executive functioning development of monolingual children. It is unclear, however, how these components relate to each other and uniquely contribute to the outcomes. Additionally, it is also unclear how these learning opportunity components relate to the developmental outcomes of multilingual children.

General Classroom Interaction

Classroom interactions play an important role in a child's school success. Three domains of classroom interaction are typically distinguished in educational research: emotional support, classroom organization, and instructional support (Hamre et al., 2013; La Paro, Pianta, & Stuhlman, 2004). First, in *emotionally supportive* classrooms the teacher shows enthusiasm and has an emotional connection with the children in the classroom. In addition, the teacher is sensitive to the academic and social needs of the children. As a result, children are open for learning and able to take risks in their learning because of the safe environment that is created. Second, a classroom shows good *classroom organization* when the teacher shows flexibility toward the children's interests and class schedules. Furthermore, the teacher monitors the behavior of the children in the classroom and the productivity of the class. In well-organized classrooms it is easier for children to stay engaged in the activities provided and learn from those, because they can take an active role and are able to focus on the goal of the activity. Third, an *instructionally supportive* teacher stimulates higher-order thinking and problem solving. This teacher engages in extended interactions with children and provides high quality feedback, thereby maximizing learning opportunities (La Paro et al., 2004). In general, studies from different countries all over the world found that teachers show low to moderate levels of instructional support, moderate levels of classroom organization, and higher levels of emotional support (Cadima, Leal, & Burchinal, 2010; La Paro et al., 2009; Pakarinen et al., 2010).

High quality general classroom interactions are associated with the development of early literacy skills and executive functioning. First, teacher warmth and emotional support, has been associated with gains in early literacy skills (Carr, Mokrova, Vernon-Feagans, & Burchinal, 2019; Curby, Rimm-Kaufman, & Ponitz, 2009; Pianta, Belsky, Vandergrift, Houts, & Morrison, 2008) and executive functioning skills (Broekhuizen, van Aken, Dubas, Mulder, & Leseman, 2015). Second, teacher behavioral support and good classroom organization, is linked to higher early literacy (Cameron, McDonald Connor, Morrison, & Jewkes, 2008; Carr et al., 2019; Curby et al., 2009) and executive functioning skills (Rimm-Kaufman, Curby, Grimm, Nathanson, & Brock, 2009). Third, in classrooms where teachers provide high quality instruction, children also show higher levels of early literacy (Bratsch-Hines, Burchinal, Peisner-Feinberg, & Franco, 2019; Carr et al., 2019; Curby et al., 2009; Mashburn et al., 2008) and executive functioning (Rimm-Kaufman et al., 2009). The same relations between early literacy skills and quality of general classroom interaction have been found for multilingual children (Peisner-Feinberg et al., 2014). Yet, high quality general classroom interaction might be even more important for multilingual children as it is found to reduce the gap in language development between monolingual and multilingual children (Leseman & Slot, 2014). High quality instructional support is particularly important for their development of early literacy skills (Buysse, Castro, & Peisner-Feinberg, 2010). The relation between general classroom interaction and executive functioning for multilingual children is still unknown. In the present study we will therefore further explore how general classroom interaction relates to learning outcomes of multilingual children.

Individual Teacher-child Interactions

Interactions measured at the classroom level are only partly informative for the learning opportunities of individual children. While interactions measured at the classroom level can be a good indication of learning opportunities for the children in the classroom, the interactions individual children have with their teacher, might be of different quality than the individual teacher-child interactions of the other children in the classroom. The differential classroom experiences for monolingual and multilingual children that might arise because of this are rarely studied. A recent review (Langeloo, Mascareño, Deunk, Klitzing, & Strijbos, 2019a) showed that only five studies compared the individual teacher-child interactions of monolingual and multilingual children. Teachers were found to offer different learning opportunities to multilingual children in the classroom, which led to unequal chances in classroom activities (DaSilva Iddings, 2005; Gregory, 1993). For example, teachers would offer separate reading activities for multilingual children that primarily focused on decoding skills, whereas the reading activities for monolingual children would focus much more on discussion and making connections to their own lives (DaSilva Iddings, 2005). Furthermore, the linguistic complexity and vocabulary that was used in interactions with multilingual children was less diverse, albeit more abstract, than in interactions with monolingual children (Aarts, Demir-Vegter, Kurvers,

& Henrichs, 2016; Tsybina, Girolametto, Weitzman, & Greenberg, 2006). Teachers also more often had shorter interactions, including simple directives and direct requests, with multilingual children, than with monolingual children (Sullivan, Hegde, Ballard, & Ticknor, 2015). Although this indicates that multilingual children might be exposed to different individual teacher-child interactions than monolingual children, it remains unclear how this might affect their learning outcomes. In the present study, we explore both the possible differences in the interactions monolingual and multilingual children are exposed to, and the potential different associations of these interactions with the outcomes.

Engagement

The potential impact of high quality interactions – both at the classroom and individual levels – presupposes that children are able to focus and maintain their attention on the activity at hand. In other words, children need to be engaged in order to profit from the interaction and educational activity. In early childhood education, engaged children focus on the activity, show dedication, enthusiasm and motivation, and are able to self-regulate their behavior around the activity at hand (Fredricks et al., 2004). Children that are more engaged are found to have better language outcomes on vocabulary and phonological awareness (Bohlmann & Downer, 2016), and have better outcomes on executive functioning, including self-regulation (Brock et al., 2009; Portilla, Ballard, Adler, Boyce, & Obradović, 2014). Research on the differences in engagement of monolingual and multilingual young children is limited. Sullivan et al. (2015) found no significant differences in engagement between monolingual and multilingual children. However, they did find that multilingual children acted more often as a nonparticipating observer when the teacher was not directly addressing them. The authors suggest that this might mean that multilingual children might not have understood the teacher's instruction or are experiencing a silent period, common to multilingual children. Furthermore, showing only observing behavior does not necessarily mean the child is not engaged (Larson, 1999). As research on the behavioral engagement of multilingual children is limited and it remains unclear how multilingual children's engagement relates to their learning outcomes, the present study will explore these relations.

Present Study

Previous research has shown that general classroom interaction, individual teacher-child interactions, and engagement are important components that make up a child's learning opportunities. These learning opportunities are important predictors of children's academic and cognitive development. Since multilingual children show differences in the development of early literacy and executive functioning compared to monolingual children, they might benefit from different learning opportunities. It is still unclear what components constitute the learning opportunities of multilingual children and how they impact their development of early literacy and executive functioning. Therefore, the present study aims to examine the unique contribution of general classroom interaction, individual teacher-child interaction, and engagement on early literacy and executive functioning outcomes in monolingual and multilingual children. We formulated the following research question: How do the three components of learning opportunities relate to early literacy and executive functioning outcomes in kindergarten for monolingual and multilingual children?

Method

Design

This study is part of a larger study with a longitudinal design of three time points in one school year; each roughly three months apart (October 2016, January 2017, April 2017). At each time point the same data was gathered. Data collection at each time point for each classroom took two days. On the first day the focal children were observed for engagement and the teacher-child interactions were filmed. On the second day, the early literacy and executive functioning skills of the focal children were assessed.

Sample

The participants (5–6 years old) came from 20 kindergarten classrooms from 12 schools across the Netherlands. The schools were all located in neighborhoods with a prevalence of immigrants (i.e., at least one parent was born abroad) above national average (CBS, 2013) and were therefore expected to have ample multilingual children. In each classroom, four children were selected (two multilingual, two monolingual; 80 children in total); henceforth referred to as the "focal children". In order to select focal children, teachers were first asked to report which children in their classroom were multilingual, defined as children who habitually interacted in a language other than Dutch in their home environment. When there were more than two multilingual children in one classroom, multilingual children were selected in such a way to retain an even distribution in gender and socioeconomic status (SES; based on the Dutch school funding policy) within the classroom and across the sample. Monolingual children were children that spoke only Dutch, both at home and at school. Monolingual focal children were matched to the multilingual children based on SES and gender. When there were multiple possibilities, children were selected randomly. All children present during the filming in the classroom had active parental consent for filming. Focal children were selected from the children for whom parental consent was also given for individual observation and assessment. This consent for observation and assessment was given by 93% of all parents.

Although we aimed for 40 children in both language groups, the initial sample consisted of 33 monolingual and 43 multilingual children. This was due to three reasons. First, parents of focal children were asked to fill in a questionnaire about their home literacy environment. When comparing the available parent questionnaires (only 42 of 80 (53%) parent questionnaires were returned) and the information provided by the teachers, four focal children that were monolingual according to the teacher, and selected as such by us, turned out to have frequent interactions in other languages than Dutch at home according to the parents. We decided to include them in the multilingual sample based on the information the parents gave about the use of different languages in the school and home context. Second, in one classroom only one of the three monolingual children had parental consent for individual observations. In order to attain the number of four focal children per classroom, we included three multilingual children in that particular classroom. Third, one classroom dropped out of the project after the first observations because of teacher burn out.

The initial sample was used for the identification of the individual teacher-child interactions and engagement profiles. The monolingual and multilingual groups did not significantly differ on age (monolingual: $M = 5;5$, $SD = 4.86$ months; multilingual: $M = 5;4$, $SD = 5.30$ months), gender (monolingual: 52% boys; multilingual: 49% boys), and SES (monolingual: 24% low SES; multilingual: 30% low SES).

Since seven children were not present during the test assessment at the third time point, the sample that was used for the analysis aimed at predicting developmental outcomes consisted of 69 children. Three children changed schools during the school year, one child was diagnosed with a developmental disorder, and the other three children were not present due to illness. The background information about this final sample of focal children and their teachers is presented in Table 1. The multilingual children spoke a wide variety of languages, namely Albanian ($n = 1$), Arabic ($n = 6$), Armenian ($n = 1$), Berber ($n = 2$), Chinese ($n = 1$), Czech ($n = 1$), English ($n = 2$), French ($n = 1$), Greek ($n = 1$), Hindi ($n = 1$), Indonesian ($n = 1$), Isan ($n = 1$), Kurdish ($n = 1$), Lingala ($n = 1$), Moroccan ($n = 3$), Papiamento ($n = 3$), Polish ($n = 4$), Portuguese ($n = 1$), Punjabi ($n = 1$), Sarnami Hindustani ($n = 1$) Somali ($n = 2$), Spanish ($n = 2$), Thai ($n = 1$), and Turkish ($n = 7$). Eight children interacted in two foreign languages at home. The home language was unknown for one child, although the teacher indicated that the child was multilingual.

Measures and Variables

General Classroom Interaction

The Classroom Assessment Scoring System (CLASS; Pianta, La Paro, & Hamre, 2008) was used to assess the general quality of classroom interactions in three domains: emotional support, classroom organization and instructional support. Emotional support includes four dimensions that assess

Table 1. Background statistics of teachers and focal children.

	Teachers (N = 19)		Focal children (N = 69)			
			Monolingual (N = 30)		Multilingual (N = 39)	
	M (*SD*)	Range	*M* (*SD*)	Range	*M* (*SD*)	Range
Age	40.06 (13.12)	22 – 63	5;5 (4.54)	4;10– 6;7	5;4 (4.89)	4;7– 6;5
Experience in primary ed.	16.94 (14.02)	1 – 40				
years in kindergarten	12.50 (13.30)	0 – 40				
Class size	21.21 (3.76)	14 – 28				
of which multilingual	40.98% (20.89)	13 – 86%				
SES			Low: 26%		Low: 32%	
Gender	18 female (95%)		14 boys (47%)		19 boys (49%)	

Teacher's age and experience is in years. Children's mean age and range are indicated in years and months; *SD* in months. Primary ed. = primary education. *Years in kindergarten* refers to the number of years a teacher has been teaching kindergarten classrooms. *SES* was based on the Dutch school funding policy. A low SES indicates that the highest parental education level is prevocational education or a maximum of two years of a higher level secondary education.

positive climate, negative climate, teacher sensitivity, and regard for student perspectives. Classroom organization includes three dimensions that focus on behavior management, productivity, and instructional learning formats. Instructional support entails three dimensions that assess concept development, quality of feedback, and language modeling. The ten dimensions covering the three domains are scored on a 7-point Likert scale. Scores 1 and 2 indicate low quality of teacher-child interactions, 3 to 5 indicates mid-range quality, and 6 and 7 indicate high quality teacher-child interactions. Each recorded morning session was coded on the CLASS domains in cycles of 30 minutes (20 minutes observation; 10 minutes scoring) by a certified, reliable observer (i.e. the first author; La Paro et al., 2004). Depending on the length of the video and time in outdoor play (not scored), the number of cycles of CLASS scoring per recorded morning session ranged from four to seven; most videos (N = 10) had five cycles.

Data Pre-processing for Classroom Level Interaction. For each classroom a score for each dimension of CLASS was calculated by averaging the scores over the different cycles. A Principal Component Analysis (PCA) with varimax rotation on the scoring on the ten dimensions revealed a three component solution explaining 76.67% of the variance replicating the three CLASS domains. The first component accounted for 32.44% of the variance with moderate to high loadings (.54–.91) and represented the Emotional Support domain, including positive climate, negative climate, teacher sensitivity, and regard for student perspectives. The instructional support domain, including concept development, quality of feedback, and language modeling, was represented in the second component. This component accounted for 22.55% of the variance and had moderate to high loadings (.56–.81). The third component accounted 21.67% of the variance and represented the classroom organization domain with high loadings (.70–.89) on behavior management, productivity, and instructional learning formats. To limit the complexity of the final model, the factor scores for the three domains were used, instead of the separate dimensions.

Profiles of Individual Teacher-child Interactions

The profiles of individual teacher-child interactions that were used in the present study have been identified in a previous study (Langeloo, Mascareño, Deunk, LoCasale-Crouch, & Strijbos, 2019b). A summary of the approach can be found in Supplemental Part A. The profiles were based on the individual teacher-child interactions that were filmed during one whole morning in the classroom. As the teacher was constantly followed in the classroom, all interactions between the teacher and the focal children were filmed. All interactions in which the teacher specifically addressed the focal child were considered individual teacher-child interactions. The interactions could take place with more children around (e.g., in circle time or in a small group), but in the analyses only the teacher utterances that were specific for the focal child were included, either because the focal child responded to that teacher utterance, or because the teacher utterance was in response to a focal child utterance. These interactions were transcribed and coded on utterance level for communication channel, type of utterance, and language complexity. Communication channel distinguished between the use of verbal and non-verbal communication. The dimension type of utterance was divided in six main categories: prompting (e.g., “What do you see?”), informing (e.g., “I’m going to the bathroom”), response (e.g., “What do you see?”/“A tree”), follow-up (e.g., “yes, that is a tree”), supporting flow (e.g., turn giving), and residual (i.e., utterances that did not fit the aforementioned categories). Finally, language complexity made a distinction between literal (e.g. “Can you distribute the scissors?”) and inferential utterances (e.g. “Do you have the letter R in your name?”). The complete coding scheme can be found in Supplemental Part A. The first author and research-assistant double-coded nine segments from five different transcripts (157 utterances in total) to determine inter-rater agreement (Krippendorff’s alpha) on communication channel and type of utterance. On both dimensions high agreement was found (Communication channel: Krippendorff’s α = .98; 95% CI [.92,1.00]; Type of utterance: Krippendorff’s α = .93; 95% CI [.88,.96]). After the coding of all transcripts, an internal audit (Akkerman, Admiraal, Brekelmans, & Oost, 2008) by the authors revealed that – though reliably coded by the first author and research assistant – the definitions of the language complexity code had certain inconsistencies in terms of their construct validity. The first three authors discussed the issue and revised the definition and coding rules for language complexity. Consequently, the first author recoded all data for language complexity. The reliability of this coding was ensured with an audit. The first author coded 10 segments from 8 different transcripts and discussed the codes with the second and third author. They agreed with the codes given by the first author. After the coding of all transcripts, the first author discussed all complicated cases (N = 25) with the second and third author and they jointly agreed upon a code for each of these cases.

Using Latent Profile Analysis (LPA) in MPlus Version 8 (Muthén & Muthén, 1998-2017) profiles were identified and children were assigned to their profile with the highest probability. Five profiles could be identified. Alongside the profile label, we gave each profile a short tag name, to be used in tables and figures. These tags reflect the four components in the profiles – i.e., gestures (G), complexity (C), elaborate follow-ups (FU), and quantity (Q) – and the level of each of the components – i.e., above average (+), close to average (±), and below average (-).tag Children in the profile of *low quantity of typical interactions* (G±C± FU±Q-) had a low number of interactions with their teacher. These interactions can be characterized by a close to the sample average use of meaningful gestures and complex interactions. The profile of *low quantity of nonverbal, non-complex interactions* (G+C-FU-Q-) can be characterized by the near absence of complex moves and lowest amount of interaction. The children in the profile with *low quantity of high complex interactions* (G ± C+ FU+Q-) used an average amount of meaningful gestures, but the interactions, although of low quantity, were of high complexity. The children in the profile with *high quantity of high complex interactions* (G ± C+ FU+Q+) had many interactions with their teacher that were characterized by an average use of meaningful gestures and high complexity. Finally, the profile of *high quantity of followed-up interactions* (G±C± FU+Q+) was characterized by an average use of meaningful gestures and complex interactions, and a high use of elaborate follow-ups. The children in this profile had a high number of interactions with their teacher. Children’s profile membership was used in further analyses.

Profiles of Engagement

We used profiles of engagement that were identified in the same study as the profiles of individual teacher-child interactions (Langeloo, et al. 2019b). A summary of the approach can be found in Supplemental Part B. The profiles were based on live observations of the focal children during three whole mornings in the classroom. The focal children were consecutively observed for time intervals of five minutes. Behavioral engagement was scored on a visual analogue scale (Aitken, 1969) where observers had to indicate on a ten-centimeter line how engaged the child was. Since child engagement is expected to be sensitive to classroom settings at the moment of observation – such as group size and role of the teacher – children received a new engagement score every time a new *setting* (i.e., individual, individual with teacher, pair, pair with teacher, small group, small group with teacher, large group, large group with teacher) took place during the five-minute observation intervals. Twelve research-assistants and the first author conducted the observations. They coded five training videos for reliability assessment. This showed good reliability for both engagement (ICC = .84; 95% CI [−.07,1.00]) and setting (Krippendorff's α = .74; 95% CI [.64,.82]).

An average engagement score was calculated for the three aggregated classroom settings – *small group* (up to six children) *with teacher, small group* (up to six children) *without teacher*, and *large group* (seven or more children) *with or without teacher* – and corrected for the duration of the observation. Again, LPA was conducted with the engagement scores in the diverse classroom settings as predictors for the profiles and children were assigned to their profile with the highest probability. Five profiles were identified. Next to profile labels, tag names were given to reflect the characteristics of the profiles in tables and figures. These tags include the setting – small group without teacher (S), small group with teacher (ST), and large group – and the level of engagement – above average (+), close to average (±), below average (-). Children in the *low engagement* (S-ST-L-) profile showed the lowest engagement in all settings. Children in the *low small-group engagement* (S-ST-L+) profile showed low engagement in small group settings with and without the teacher, but high engagement in the large group. The profile of *high small-group and moderate large-group engagement* (S+ST+L±) was characterized by high engagement in small group settings and moderate engagement in the large group. The profile of *high small-group and low large-group engagement* (S+ST±L-) showed high engagement in small groups without the teacher, average engagement in small groups with the teacher and the lowest engagement in large group settings. Finally, the children in the *high engagement* (S+ST±L-) profile showed high engagement across all classroom settings. Children's membership of one of the profiles was used in further analyses.

Early Literacy

Three subtests of a Dutch standardized early literacy test were used to assess early literacy (Aarnoutse, Beernink, & Verhagen, 2016). The productive vocabulary subtest required the child to pronounce the word representing the construct described by the researcher. Phonological awareness was assessed with the other two subtests: the analysis subtest required the child to indicate which of two words contained a certain phoneme, and the synthesis subtest required the child to create a new existing word by removing the first or last phoneme. According to the test administration rules, each subtest was stopped when four consecutive items were answered incorrectly. The subtests had 20 (i.e., analysis and synthesis) or 25 items (i.e., vocabulary) and had good internal consistency (productive vocabulary: Cronbach's α = .85; analysis: Cronbach's α = .90; synthesis: Cronbach's α = .93). Several longitudinal studies with these subtests support their validity (Aarnoutse et al., 2016; Aarnoutse, van Leeuwe, & Verhoeven, 2000; Verhagen, Aarnoutse, & van Leeuwe, 2006).

Data Pre-processing for Early Literacy. Sum scores of correct responses were calculated for the three separate subtests. We conducted a PCA with varimax rotation separately for both time point 1 and 3. Both analyses revealed a one component solution representing early literacy skills. There was slight variation in the explained variance (T1: 49.98%; T3: 50.23%) and the corresponding range of factor loadings (T1: .67-.78; T3: .55-.86). The factor scores were added to the final model as a measure of early literacy at both time points.

Executive Functioning

To assess executive functioning three tests were administered. First, the Corsi Block task (Corsi, 1972) was administered to test visuospatial working memory. We selected a nonverbal working memory test to limit the effect of potential differences in the language skills of multilingual and monolingual children. Nine small blocks were fixed on a square board. The child had to replicate the exact same order as the sequence of blocks that were tapped by the researcher (Kessels, van Zandvoort, Postma, Kappelle, & de Haan, 2000). The sequences started with two blocks, and each second trial the sequence length increased by one block. The test was stopped when both trials of a sequence length were repeated incorrectly. The number of correctly repeated sequences was taken as the score for the Corsi block task.

Second, Hearts and Flowers (Diamond, Barnett, Thomas, & Munro, 2007) was used to measure three components of executive functioning: working memory, inhibition, and cognitive flexibility. The task was administered on a laptop computer and consisted of three blocks. In the congruent block, a heart was presented on either the left or the right side of the screen, and the instruction for the child was to press a button on the same side. This block requires working memory, as the child has to remember the rule that has to be used. In the incongruent block, a flower was presented on either side of the screen and the child had to press a button on the other side. This block requires both working memory (i.e., remembering the rule), and inhibition (i.e., inhibit a prepotent motor response). Finally, in the mixed block, both hearts and flowers were presented and the child had to follow the specific rule of the previous blocks (i.e., same or opposite side) for the picture that was presented. This block requires all three executive functions, as the child has to remember both rules, switch between them and inhibit the one rule to adhere to the other rule. The first two blocks consisted of 12 items, the third block had 32 items.

Third, the Flanker task (Diamond et al., 2007) also assesses three components of executive functioning. Again, the task was administered on a laptop computer. In this task the child had to feed the hungry fish by pressing the button on the same side as the direction where the hungry fish were swimming. In each trial five fish were presented on the screen, with either the middle or the outer fish being hungry. They could appear in four possible combinations: (1) all fish swim in the same direction, either left or right (i.e., congruent trials), (2) the distractor fish swim in the other direction (i.e., incongruent trials), (3) only the hungry fish is presented (i.e., no distractor trials), and (4) the distractor fish swim downwards (i.e., neutral trials). The task consisted of three blocks. In the first block, blue fish were presented on the screen and the child had to indicate in which direction the middle fish was swimming. This block assesses inhibition: the child has to inhibit visual distraction. In the second block, the fish were pink and the child had to indicate in which direction the outer fishes swim. This block also assesses inhibition. Again, the child has to inhibit visual distraction, but also the rule of block 1. In the third block, both pink and blue fish were presented and the child had to press the button according to the rules of the previous two blocks. This block requires all three executive functions. The child has to remember the two rules, switch between rules, and inhibit the one rule to be able to adhere to the other rule. The first two blocks had 16 trials and the mixed block had 64 trials.

Data Pre-processing for Executive Functioning. All trials of the Hearts and Flowers and the Flanker tasks with a response time shorter than 200 milliseconds were removed (TP1: Flanker: 3.93%, Hearts and Flowers: 2.25%; TP3: Flanker: 3.29%, Hearts and Flowers: 2.69%), as these should be considered "anticipatory", meaning that the response was too fast to be in response to the stimulus (Davidson, Amso, Anderson, & Diamond, 2006). Since reaction times are found to be a less reliable and sensitive measure with young children, we used the accuracy on the Hearts and Flowers and Flanker tasks for further analyses (Cohen, Bixenman, Meiran, & Diamond, 2001; Diamond et al., 2007). The total number of correct responses was calculated for each block on both tests. At time point 1 there was a ceiling effect on the hearts block ($M = 9.26$; $SD = 2.91$). This block was therefore not included in further analyses. Since the blocks of both tasks assess multiple executive functions at once (Diamond et al., 2007), and the three executive functions are not independent, but build upon one another (Diamond, 2013), a PCA with varimax rotation was conducted to explore what components of executive functioning could be distinguished. The separate blocks from the Hearts and Flowers and Flanker tasks were included in the PCA, as well as the Corsi block score. In line with previous research (Lin, Liew, & Perez, 2019), only one component was identified. This component accounted for 46.92% of the variance at time point 1 and 57.12% at time point 3. The factor loadings ranged from .46 to .81 in time point 1 and from .52 to .85 in time point 3. The factor scores, representing a general level of executive functioning will be used in further analyses.

Procedure

Data collection at each time point was spread out over two days. On the first day, two researchers came into the classroom for one morning to collect the video and live observational data at each time point. One researcher filmed the teacher for the entire morning – excluding outdoor play – thus including all interactions between the teacher and the focal children. Video data is the raw material for the assessment of general classroom interaction, as well as the individual teacher-child interactions. Simultaneously, the other researcher consecutively observed the focal children during the same activities in order to assess their behavioral engagement. The filming and observations were conducted by the first author and twelve research-assistants. The research assistants were all final year Bachelor's students or Master's students in educational sciences or a related field. They were trained on the observation of child engagement by the first author. The training consisted of two sessions. In between the training sessions, training videos were independently coded. During the next session all disagreements were discussed. The training took about eight hours in total. Before the second and third time point all research-assistants practiced coding again with four videos in order to refresh the observation rules.

On the following day one of the research assistants returned to the classroom to assess language and executive functioning skills of the four focal children. The test assessments were conducted individually in a quiet room and took about 45 minutes. Children could take breaks in between tests. The tests were always administered in the same order (i.e., *Vocabulary, Corsi block task, Analysis, Flanker task, Synthesis, Hearts and Flowers*). The Hearts and Flowers task and Flanker task were conducted on a laptop. After completing all tests the children could pick a sticker as a reward. All research-assistants were trained on the assessments of these tests by the first author and had to practice the assessment with one of the other research-assistants prior to the start of data collection.

The recorded morning sessions in the classroom were used for the assessment of general classroom interaction and individual teacher-child interaction. The first author coded the videos for quality of general classroom interaction using CLASS. Three research-assistants, all Master's students in educational sciences or a related field, and the first author transcribed the segments of individual teacher-child interactions for the first time point. The research-assistants were trained in transcription rules and conventions by the first author in three training sessions. In between sessions they independently transcribed video segments. Disagreements were discussed during the next session. The training took about 10 hours in total.

The transcripts were coded by another research-assistant and the first author. The research-assistant was a Master's student in educational sciences and trained in the coding scheme by the first author. The training consisted of five sessions in which the coding rules were explained. After each session new data was coded independently by both coders. Disagreements were discussed in the next session. In nine instances the coding rules were revised. To limit the complexity of the coding procedure, the first author selected the moves that had to be coded for each focal child and coded *language complexity*. The research assistant only coded for *communication channel* and *type*.

Analyses

For the purpose of this study we intended to use the engagement data and classroom level and individual teacher-child interaction data of time point 1, and the child outcome data of time point 1 and 3. However, for the engagement data this resulted in too much missing data as we needed engagement data across different classroom settings and observations of only one time point did not cover well all eight different settings. To overcome this problem, engagement data from the second and third time point was added. The profiles for individual teacher-child interaction and engagement were identified in a previous paper (Langeloo, et al. 2019b). The analyses are summarized in detail in Supplemental Part A for individual teacher-child interactions and Supplemental Part B for engagement. The other analyses by which the research question for this study was investigated are described below.

Comparing the Relation between Learning Opportunities and Development of Monolingual and Multilingual Children

To examine the unique contribution of the components of learning opportunity on the early literacy and executive functioning skills of kindergartners and whether this differs for multilingual and monolingual children, a multiple group structural equation model was conducted in MPlus Version 8 (Muthén & Muthén, 1998-2017). We used a sandwich estimator (TYPE = COMPLEX) to account for the nested structure of the data (i.e., children in classes) of the data. Executive functioning and early literacy at time point 3 were used as the outcome variables. The learning opportunity variables – the three domains of classroom level interaction (i.e., emotional support, classroom organization, and instructional support) and the profiles of individual teacher-child interactions and engagement – were added as predictor variables. Early literacy and executive functioning outcomes at time point 1 were added to control for initial early literacy and executive functioning. The profiles that could be considered reflecting the highest quality for learning opportunities were taken as reference profiles (i.e. *high quantity of complex interaction* profile and *high engagement* profile). The children in the *low quantity of nonverbal, low complex interactions* profile and the *low large group* engagement profile were all multilingual. These profiles could therefore not be included in the model. The chi-square statistic (χ^2) and related *p*-value, Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Square Residual (SRMR) were used as fit indices with cutoffs that indicate good fit respectively at > .05 (*p*-value), > .90, < .08, and < .08 (Hu & Bentler, 1999).

Predicting Early Literacy and Cognitive Development of All Multilingual Children

Since two profiles only contained multilingual children, a part of the multilingual children could not be included in the comparison between monolingual and multilingual children. Therefore, a separate analysis was conducted to test the same model for all multilingual children with those two profiles included.

Results

Descriptive Results

Detailed descriptive statistics are presented in Table 2. The emotional support and classroom organization in the participating classrooms were of good quality, according to the CLASS standards. The instructional support of the teachers was of low quality. Multilingualism did not predict profile membership of the individual teacher-child interaction profiles. Furthermore, multilingual children were overrepresented in the engagement profiles with lower engagement across classroom settings. Multilingual children had a smaller Dutch vocabulary at both time points compared to their monolingual classmates. There were no significant differences between both language groups on phonological awareness at both time points. At the first time point some statistically significant differences were found on executive functioning. Monolingual children performed better on the mixed block of Hearts and Flowers and on the blue block of the Flanker task. Those differences disappeared at the third time point. Both monolingual and multilingual children improved on all early literacy and executive functioning measures between the start and the end of the school year. Multilingual children improved more than monolingual children on the Flowers block of the Hearts and Flowers task – Wilk's $\lambda = .88$; $F(1, 63) = 8.35$; $p = .005$– and on the Blue block of the Flanker task – Wilk's $\lambda = .93$; $F(1, 66) = 5.17$; $p = .026$.

Comparing the Relation between Learning Opportunities and Development of Monolingual and Multilingual Children

The multi-group SEM showed overall good fit ($\chi^2 = 5.70$, $p = .223$; CFI = .993; RMSEA = .116; SRMR = .008) and explained for monolingual and multilingual children respectively 88% and 85% of the variance in early literacy, and 80% and 77% of the variance in executive functioning. Figure 1 presents the results of the structural equation model for the monolingual children and Figure 2 for the multilingual children. The

Table 2. Descriptive results for the learning opportunity components and the child outcomes.

	Time point 1					Time point 3		
	Mean (*SD*)			*N*		*Mean* (*SD*)		
	Mono	Multi	*p*	Mono	Multi	Mono	Multi	*p*
General classroom interaction								
ES	5.61 (0.55)							
CO	5.83 (0.53)							
IS	2.42 (0.43)							
Individual teacher-child interactions								
P1: G±C±FU±Q-				14	22			
P2: G+C-FC-Q-				0	3			
P3: G±C+FU±Q-				7	6			
P4: G±C+FU+Q+				2	3			
P5: GC±FU+Q+				7	4			
Engagement (T1-3)								
P1: S-ST-L-				3	8			
P2: S-ST-L+				1	5			
P3: S+ST+L±				15	14			
P4: S+ST±L-				0	2			
P5: S+ST+L+				11	10			
Early Literacy								
Vocabulary	9.03 (6.71)	2.56 (3.17)	**< .001**			15.17 (5.69)	8.46 (7.49)	**< .001**
Analysis	10.37 (4.61)	9.53 (4.61)	.458			13.07 (5.67)	14.59 (11.07)	.495
Synthesis	8.83 (5.81)	5.79 (6.93)	.057			10.86 (7.49)	9.38 (8.12)	.446
Executive Functioning								
Flowers	8.39 (3.11)	6.79 (3.57)	.062			9.10 (3.08)	9.48 (2.41)	.576
Mix HF	16.75 (5.20)	13.42 (4.56)	**.008**			19.30 (8.80)	18.23 (4.66)	.524
Blue	9.90 (3.98)	7.90 (3.99)	**.045**			13.30 (3.02)	13.49 (2.32)	.771
Pink	10.10 (3.60)	9.03 (3.52)	.221			12.80 (2.88)	12.43 (2.74)	.594
Mix FF	36.72 (11.36)	32.72 (11.36)	.114			42.57 (11.29)	42.49 (8.72)	.992
Corsi	3.83 (1.77)	3.87 (1.44)	.921			4.63 (1.81)	5.00 (1.72)	.393

ES = Emotional Support, CO = Classroom Organization, IS = Instructional Support. The scores on the domains of general classroom interactions are an average of the scores (1–7) on the underlying dimensions. Profile tags reflect the components of the interaction profiles: G = gestures, C = complexity, FU = follow-up, Q = quantity; and the classroom settings of the engagement profiles: S = small group; ST = small group with teacher; L = large group. Early literacy and executive functioning scores are the number of correct responses on the separate subtests and task blocks. HF = Hearts & Flowers task, FF = Flanker Fish task. Significant differences ($p < .05$) between monolingual and multilingual children are indicated in bold.

profile with *overall high engagement* and the profile with *high quantity of high complex interactions* were taken as reference profiles in the model. Since the children in the *low quantity of nonverbal, non-complex interactions* profile and the *high small-group and low large-group* engagement profile were all multilingual, these profiles could not be included in the comparison.

For both groups, executive functioning (monolingual: $\beta = .86$, $p = < .001$, 95% CI [0.67,1.05]; multilingual: $\beta = .92$, $p = < .001$, 95% CI [0.79,1.05]) and early literacy (monolingual: $\beta = .89$, $p = < .001$, 95%CI [0.77,1.01]; multilingual: $\beta = .83$, $p = < .001$, 95% CI [0.66,1.01]) at the start of the school year predicted the executive functioning and early literacy outcomes at the end of the school year. However, there were large differences for the learning opportunity variables. For monolingual children, quality of general classroom interaction did neither predict early literacy, nor executive functioning outcomes at the end of the school year. Monolingual children in the *high small-group and moderate large-group engagement* profile had lower early literacy skills than monolingual children in the high engagement profile ($\beta = -.18$, $p = .013$, 95% CI [−3.12,-0.04]. The executive functioning and early literacy outcomes of monolingual children in the

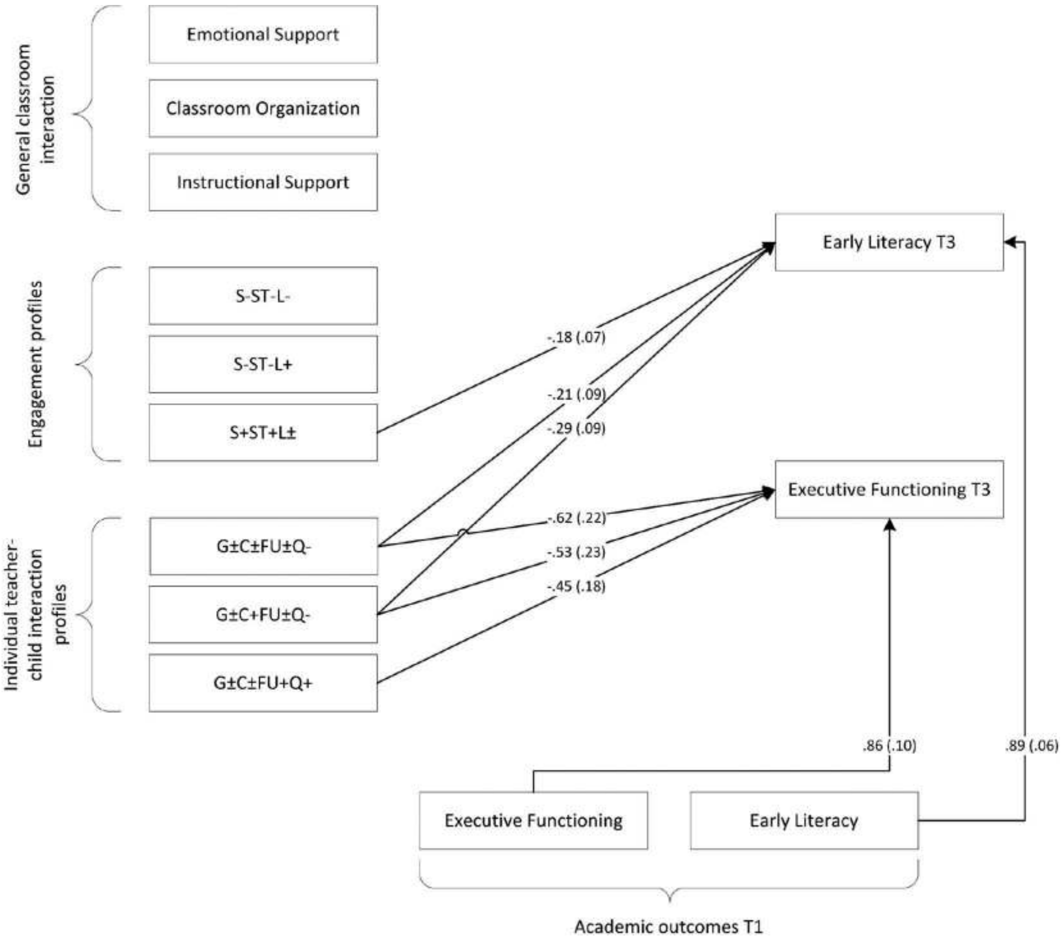

Figure 1. Significant paths among general classroom interaction, engagement profiles, individual teacher-child interaction profiles, early literacy and executive functioning, controlling for previous performance for monolingual children.

Standardized coefficients (β) and associated standard errors are presented. Profile tags reflect the components of the interaction profiles: G = gestures, C = complexity, FU = follow-up, Q = quantity; and the classroom settings of the engagement profiles: S = small group; L = large group. G ±C+FU+Q+ and S +L+ were used as reference profiles.

other engagement profiles did not significantly differ from the outcomes of the monolingual children in the high engagement profile. Monolingual children in the *low quantity of typical interaction* profile ($\beta = -.21$, $p = .024$, 95% CI [−0.38,-0.03]) and in the *low quantity of high complex interactions* profile ($\beta = -.29$, $p = .002$, 95% CI [−0.47,-0.11]) had lower early literacy skills than monolingual children in the *high quantity of high complex interactions* profile. Monolingual children in the *high quantity of high complex interactions* profile had better executive functioning skills than children in any other interaction profile – G±C±FU±Q-: $\beta = -.62$, $p = .00$, 95% CI [−1.05,.19]; G ±C+FU±Q-: $\beta = -.53$, $p = .022$, 95% CI [−0.98,-0.08]; G±C±FU+Q+: $\beta = -.45$, $p = .011$, 95% CI [−0.79,-0.10].

The model for multilingual children shows a different picture. It indicated a negative relationship between classroom organization and early literacy outcomes at the end of the school year – $\beta = -.19$, $p = .049$, 95%CI [−0.37,-0.00]). Furthermore, the children in the *low quantity of typical interaction* profile showed lower early literacy skills than multilingual children in the *high quantity of high complex interactions* profile – $\beta = -.27$, $p = .014$, 95%CI [−0.49,-0.06]. There were no learning opportunity measures that predicted the executive functioning outcomes of multilingual children.

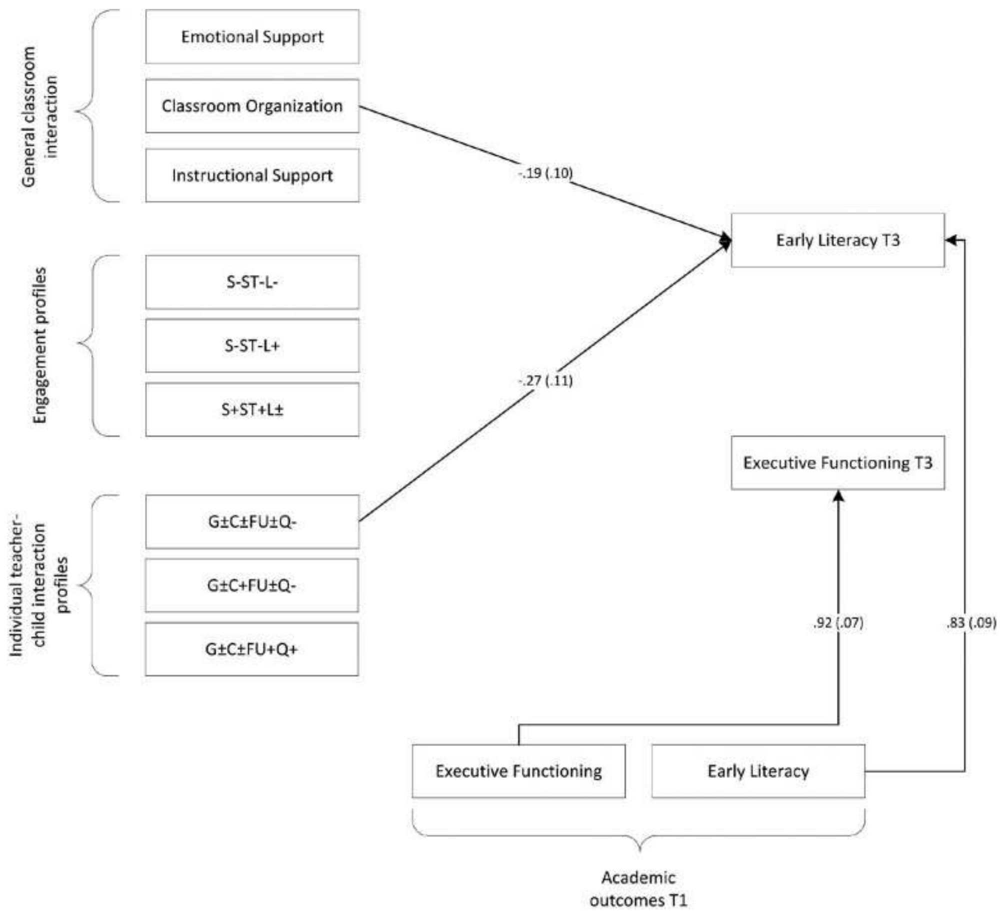

Figure 2. Significant paths among general classroom interaction, engagement profiles, individual teacher-child interaction profiles, early literacy and executive functioning, controlling for previous performance for multilingual children.

Standardized coefficients (β) and associated standard errors are presented. Profile tags reflect the components of the interaction profiles: G = gestures, C = complexity, FU = follow-up, Q = quantity; and the classroom settings of the engagement profiles: S = small group; L = large group. G ±C+FU+Q+ and S +L+ were used as reference profiles.

Predicting Early Literacy and Cognitive Development of All Multilingual Children

A part of the multilingual children was not included in the multiple group structural equation model since their profiles (i.e. *low quantity of nonverbal, non-complex interactions* profile and the *high small-group and low large-group engagement* profile) only contained multilingual children. Therefore, we conducted a separate analysis with only the multilingual children. The model showed good fit (χ^2 = .34, p = .844; CFI = 1.00; RMSEA = .00; SRMR = .004) and explained 85% of the variance for early literacy and 79% of the variance for executive functioning. The model is presented in Figure 3. Again, early literacy (β = .84, p = < .001, 95% CI [0.67,1.01]) and executive functioning (β = .92, p = < .001, 95% CI [0.79,1.05]) at the first time point positively predicted performance at the third time point. None of the learning opportunity predictors predicted executive functioning outcomes. For early literacy there were a few significant relations, similar to the outcomes of the previous model. Classroom organization negatively predicted early literacy outcomes (β = − .22, p = .023, 95% CI [−.40,-0.03]). Furthermore, children in *the high small-group and moderate large-group engagement* profile had lower early literacy skills than children in the *high engagement* profile (β = − .20, p = .037, 95% CI [−0.38;-0.01]) and children in the *low quantity of typical interactions*

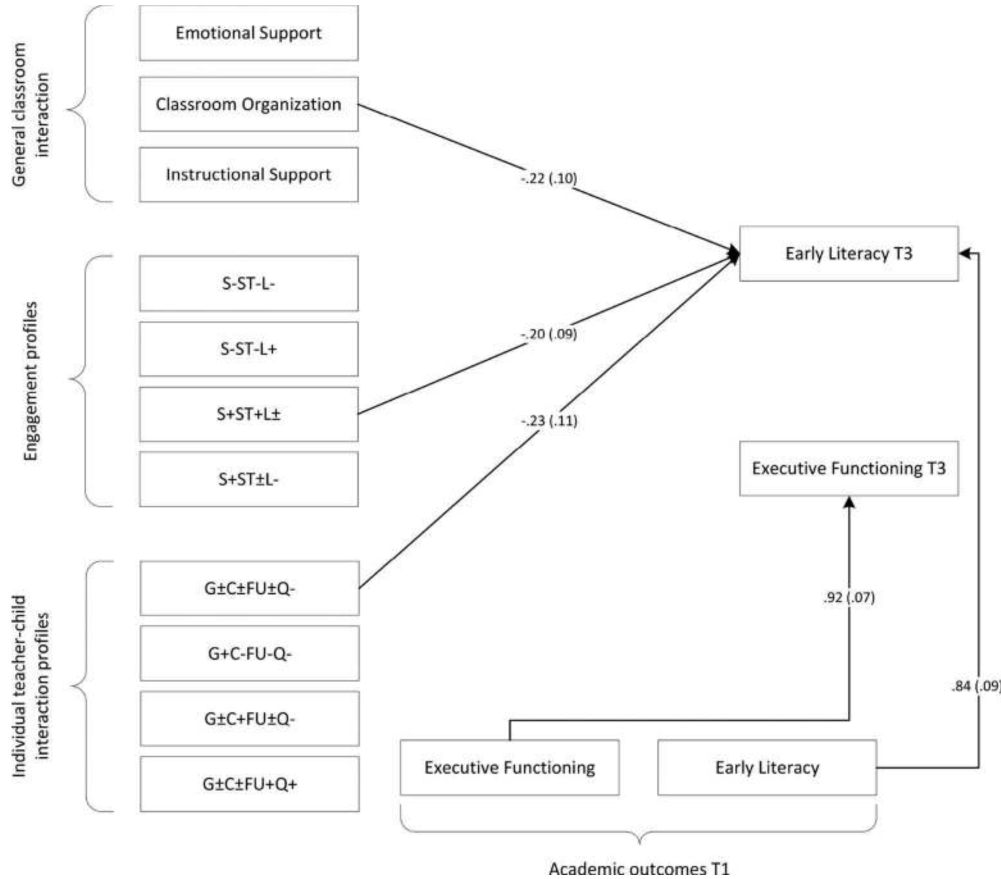

Figure 3. Significant paths among general classroom interaction, engagement profiles, individual teacher-child interaction profiles, early literacy and executive functioning, controlling for previous performance for all multilingual children.
Standardized coefficients (β) and associated standard errors are presented. Profile tags reflect the components of the interaction profiles: G = gestures, C = complexity, FU = follow-up, Q = quantity; and the classroom settings of the engagement profiles: S = small group; L = large group. G±C+FU+Q+ and S+L+ were used as reference profiles.

profile performed lower than children in the *high quantity of high complex interactions* profile ($\beta = -.23$, $p = .040$, 95% CI [−0.46;-0.01]). Early literacy and executive functioning outcomes of children in the other engagement and interaction profiles did not differ from the outcomes of the children in the reference profiles (i.e., *high engagement* and the *high quantity of high complex interactions* profiles).

Discussion

With the present study we explored how the learning opportunities of monolingual and multilingual children relate to their academic outcomes in kindergarten. We examined the unique contribution of general classroom interaction, individual teacher-child interaction, and engagement on the early literacy and executive functioning of monolingual and multilingual children. We found substantial differences in the relations between the learning opportunities and the child outcomes for monolingual and multilingual children. Below, the results will be discussed for each learning opportunity component, followed by the limitations of the present study and the implications for practice.

The first learning opportunity component that was explored was general classroom interaction. We did not replicate the relation between the quality of general classroom interaction and child outcomes with both early literacy and executive functioning found in previous research (Bratsch-Hines et al., 2019; Leyva et al., 2015; Pianta et al., 2008; Rimm-Kaufman et al., 2009). The only statistically significant relation we found between general classroom interaction and child development is counterintuitive: a negative association of quality of classroom organization with early literacy for multilingual children. It is difficult to explain why classrooms that are considered to be less well-organized would be profitable for the early literacy of multilingual children. It goes against previous research reporting how multilingual children still learning the language of instruction benefit from clear classroom routines (Gillanders, 2007; Henderson & Palmer, 2015; Vine, 2006). Although these studies primarily focused on children starting to learn the majority language, in the present study most children already had some exposure to Dutch before. Furthermore, the classroom organization of the participating classrooms was generally of a high level and none of the classrooms had a low mean score (2 or below) on classroom organization. Given the correlational nature of the study that does not inform us about the direction of associations, a possible explanation of the findings is that classroom organization follows multilingual children's language and literacy levels – rather than the other way around. In other words, it could be that in classrooms where the language and literacy development of the multilingual students is low, teachers make extra efforts to have a well-organized classroom as a way to support their participation in the classroom. In opposition, when multilingual children in the classroom possess a higher language and literacy development, teachers might have more flexible classroom rules, reflected in lower scores in the organizational support domain. In-depth, qualitative analysis of the classroom video data could help to get a clearer image of the aspects of classroom organization that are primarily lower in the classroom of this group of children.

Of the three included learning opportunity components, general classroom interaction was the only component measured on classroom level, as individual teacher-child interactions and engagement were explored on child level. The unexpected results may be an indication that measuring educational quality on classroom level does not represent learning opportunities for the individual child well enough. As emphasized by other scholars as well (Pelatti et al., 2014; Weyns et al., 2019), this underlines the importance of considering the within classroom variability and exploring more than just the classroom level variance.

The second component of learning opportunities we considered, was individual teacher-child interactions. The profiles of individual teacher-child interactions were a significant predictor of executive functioning for monolingual children. The children in the profile with a high quantity of teacher-child interactions, as well as high complex interactions, had better executive functioning outcomes than children in any other interaction profile. Interactions that go beyond the here and now and require inferences on the available information, depend upon a child's higher order thinking skills. Children learn to reason and respond to other's perspectives (Michaels & O'Connor, 2015), which requires working memory and cognitive flexibility. The present study suggests that in order to develop these skills, monolingual children not only need to be exposed to high complex interactions with the teacher, but also to a sufficient quantity of individual teacher-child interactions. Interestingly, this association was only found for the monolingual children in our sample. There were no differences in the executive functioning skills of the multilingual children classified in the different interaction profiles. Potentially, as multilingual children practice executive functioning on a daily basis through inhibiting and switching between their languages (Barac et al., 2014), the complexity and quantity of the individual teacher-child interactions, might be of less importance for their development of executive functions.

A similar relation was found between the individual teacher-child interactions and early literacy outcomes for both monolingual and multilingual children. Children in the *high quantity of high complex interactions* profile had better early literacy skills than children in the profiles with moderate to high complex interactions, but low quantity. This again shows that children should not only have complex interactions, but that these should also be frequent. This is in line with the notion stemming from bioecological model of human development that proximal processes should not only be of high quality but should also be stable over time (Bronfenbrenner & Morris, 2007). In addition, a reciprocal process might be at hand: for teachers and children it is easier and therefore possibly more pleasant and rewarding to engage in extended interactions when the child has good language proficiency, increasing the chances of high quantity of interactions.

The third component of learning opportunities that was explored was child engagement. Engagement was not found to be related to executive functioning skills of monolingual or multilingual children. For early literacy we found a relation on one engagement profile. Monolingual and multilingual children (when the full sample of multilingual children was included) in the *high engagement* profile had better early literacy skills than children in the *high small-group and moderate large-group engagement* profile. Children in the latter profile showed high engagement in small group settings, but moderate engagement in large group settings. It is in line with expectations that children who show high engagement in *all* educational activities, both in small and large group settings, will benefit most from what is offered. Most of the literacy activities in the early childhood classroom take place in teacher-directed large group settings (de Haan, Elbers, & Leseman, 2013). This suggests that it is indeed important to be able to highly engage in the activities in large group settings. This finding does however not downplay the importance of spending time in small group settings for developing early literacy skills (Bratsch-Hines et al., 2019), because children are often less actively engaged in large group settings as these activities are more teacher-led and provide less opportunities for child initiative.

Limitations

The present study has several limitations. First, it presents a first exploration on what the learning opportunities of individual monolingual and multilingual children in the same classroom look like and how they predict child outcomes. However, since the sample of our study was rather small and some profiles included a low number of children, results should be interpreted with caution. We suggest that these relations should be further examined in larger-scale studies. Furthermore, it would have been interesting to compare all profiles in relation to child outcomes. However, some profiles could not be included in the multigroup models because they only contained multilingual children, making any comparison between monolingual and multilingual groups impossible. Moreover, because of the small sample size, we could not include the data of all time points, as that would have excessively increased the complexity of the model. Our choice was to use time point 1 for data about the components of the learning opportunities, as we considered this time of the year to be particularly relevant in setting the stage for the classroom practices. Although the final models are therefore based on only one day of observations, by following the teacher and children for a full morning in different activities and settings, we were able to account for the fluctuations of learning opportunities across diverse classroom contexts.

Second, although many studies distinguish three separate executive functions, our analysis only identified one overall component of executive functioning. Generally, studies with young children that use the distinction between working memory, inhibition and cognitive flexibility do not conduct a component analysis. The few previous studies who did conduct such a component analysis could only identify one or two components of executive functioning (Lin et al., 2019; van de Sande, Segers, & Verhoeven, 2013), as did we. This shows the importance of identifying the components of executive functioning that are being measured before using them in further analyses, especially when studying executive functioning in young children.

Third, in the present study we solely focused on the interactions of monolingual and multilingual children with their teachers, ignoring the potential effects of peer interactions. Previous research has shown that peer interactions are associated with social competence, but also early literacy development (Mashburn, Justice, Downer, & Pianta, 2009; NICHD Early Child Care Research Network, 2001). For multilingual children, peer interactions can serve as a resource for understanding and participating in classroom activities (DaSilva Iddings, 2005; Piker & Rex, 2008). Future research should take this dimension of interactions into account.

Fourth, in this study, learning opportunity is defined as “all the classroom experiences that children have, including the quality and quantity of their interactions with teachers, and the activities they engage in”. Due to the quantitative nature of the study, this is operationalized as a combination of general classroom quality as measured by CLASS, quality of individual teacher-child interaction (a combination of the occurrence of meaningful gestures, complex prompts, complex responses, and elaborate follow ups, and quantity of interaction), and engagement in diverse classroom settings. Although the interactional nature of the data was taken into account when quantifying it, some contextual information that might be essential for understanding learning opportunities was lost. Quantifying the data this way was necessary for the type of analyses we envisioned and needed to study effectiveness of classroom experiences. However, for interpreting the unexpected results and fully understanding the classroom experiences of the (heterogeneous group of) multilingual children, an additional qualitative analysis would be useful.

Implications for Practice

With the present study we integrated different components of learning opportunities to obtain a comprehensive overview of the learning opportunities of multilingual and monolingual children and how they predict early literacy and executive functioning outcomes. We adopted a longitudinal and person-oriented approach that enabled us to examine the learning opportunities children are engaged in in one school year and how that relates to development. The present study has found substantial differences between monolingual and multilingual children in what learning opportunity components predicted executive functioning and early literacy outcomes. The results are not straightforward, nor easy to interpret, but do suggest that children might have different classroom experiences related to their language background.

We actively oppose the “deficit approach”, in which – with best intentions – multilingualism by itself is seen as a risk factor instead of an asset, with possibly unjustified lower expectations as a consequence. We therefore caution against translating the findings too literally to the classroom. For example, the finding that high complexity and quantity of individual teacher-child interactions is found to be beneficial for the development of executive functioning of the group of monolingual but not for the group of multilingual children, does of course not imply that high occurrence of complex interactions with the teacher is of less importance to multilingual children.

The present study emphasizes the importance for educators to recognize that children from diverse language backgrounds might be exposed to different learning opportunities within the same classroom and to reflect on whether the differences occur in response to different needs, or have other causes, like bias or different expectations. This recognition lies at the base of the creation of optimal learning opportunities for all children, regardless of their language background.

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No potential conflict of interest was reported by the authors.

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