Activity settings in toddler classrooms and quality of group and individual interactions[☆]

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ABSTRACT

This study examined the variation of interaction quality both at the group and child levels across different activity settings in toddler classrooms. Participants were 104 children, with an average of 30.4 months old, of which 53.8% were boys. Educator-child interactions, at the group level, and child interactions with their educators, peers and tasks, at the child level, were observed through video-recordings across four activity settings, namely free play, early academic activities, aesthetics/arts activities and meals. Group level interactions were observed with the CLASS Toddler, and child level interactions with the inCLASS Toddler. Results showed that the quality of interactions at the group and child levels varied across different activity settings, but not always in the same direction. Findings suggest that activity settings play an important role in explaining the quality of interactions experienced by toddlers. Implications for early childhood educators are discussed.

Introduction

The participation rates of children from birth to 2 years old in early childhood education and care (ECEC) settings are increasing across most western countries (OECD, 2018a). Increasing participation as well as the large body of research suggesting that this period of life is particularly important for later learning and development (Council for Early Child Development, 2010; Naudeau, Kataoka, Valerio, Neuman, & Elder, 2011; Shonkoff & Phillips, 2000), have put toddlerhood and ECEC settings in the spotlight. However, little is known about the quality of toddlers' experiences in ECEC settings, particularly regarding each toddler's individual experience with early childhood educators, peers, and tasks. In addition, toddlers engage in diverse activities throughout the day, namely free play, routine, such as meals, and intentionally planned activities targeting specific early academic skills, such as science or math-oriented activities. But research is even scarcer regarding the quality of interactions across different activity settings in toddlerhood. In this study, we take a step forward in the research of ECEC quality for toddlers by looking at the quality of toddlers' experiences, both at the group and individual levels, across activity settings.

Toddlerhood and the quality of early childhood education and care settings

Toddlerhood is a dynamic developmental period from 12 to 36 months characterized by rapid growth and development in several domains. During this period, most children make major acquisitions, moving from walking to jumping, from using only a few words to establishing conversations, showing progressively more interest in their peers and more autonomy and independence while exploring the environment (Gerber, Wilks, & Erdie-Lalena, 2010). Some researchers argue that the brain sensitivity of highly important developmental areas peak in the first three years of life, therefore determining sensitivity periods for the acquisition of basic skills (Council for Early Child Development, 2010; Naudeau et al., 2011). Toddlerhood is a period of development with specific characteristics, milestones, and acquisitions, making it unique and different in many ways from the preschool period. It is therefore of utmost importance to understand what determines quality in toddler classrooms, and specifically how educators support high-quality interactions and organize the classroom environment and routines to support this unique period of development.

Providing high-quality ECEC for very young children is a priority across Europe (European Commission/EACEA/Eurydice/Eurostat,

2014; OECD, 2018b). Quality in ECEC commonly refers to structural, curriculum, orientation, and process features (Howes et al., 2008; Pianta et al., 2005; Slot, Boom, Verhagen, & Leseman, 2017; Thomason & La Paro, 2009). Structural features refer to the classroom and/or centers characteristics that are commonly regulated by governments and states, such as group size, educator's qualification, and educator-child ratio (Cryer, Tietze, Burchinal, Leal, & Palacios, 1999). Curriculum quality refers to the balanced and planned provision of different types of activities, aiming to support the development and learning of different sets of skills (e.g. pre-academic, socioemotional, self-regulatory skills) on a longer time scale (Leseman, Mulder, Verhagen, & Broekhuizen, 2017). Orientation quality refers to educators' pedagogical beliefs such as their definition of their professional role, their educational values, epistemological beliefs, attitudes with regard to the importance of different educational areas and learning goals (Anders, 2015). At last, process quality refers to dynamic proximal processes, such as educator-child interactions, peer interactions, and involvement in classroom activities (Cryer et al., 1999).

These various features of quality in ECEC have been found to be interrelated (NICHD Early Child Care Research Network, 1996, 2000a). Evidence has also shown that educator-child interactions are particularly crucial for children's development in several domains (Mashburn et al., 2008; OECD, 2018b; Slot, Bleses, Justice, Markussen-Brown, & Højen, 2018). This evidence is consistent with theoretical approaches suggesting that classroom processes, such as interactions between children, educators, and peers, are the main mechanisms through which children learn and develop (Bronfenbrenner & Morris, 2006). Similarly, guidelines from National Association for the Education of Young Children (NAYEC) on developmentally appropriate practices for infants and toddlers highlight relationships as the cornerstone of toddlers' development. When interacting with toddlers, educators should be highly attentive and sensitive to children's individual needs, establishing positive and warm interactions and attuning with toddlers' emotional states.

Children's experiences of classroom process quality include interactions at the group level, understood as the extent to which the educator is sensitive, warm, and acts as a learning facilitator for children in the classroom; but process quality also refers to experiences at the child level or the extent to which each child engages positively with the educator, peers, and tasks (Chien et al., 2010; Downer, Booren, Lima, Luckner, & Pianta, 2010; Williford, Maier, Downer, Pianta, & Howes, 2013; Williford, Whittaker, Vitiello, & Downer, 2013). Measuring both group level interactions and individual child interactions with educators, peers, and tasks allows researchers to analyze the classroom environment from different angles, contributing to a broader ecological perspective of ECEC quality in toddler classrooms (Sabol, Bohlmann, & Downer, 2018). It also allows for a more fine-grained analysis of the role of the educators in determining and organizing experiences for all and every child in toddler classrooms.

To our knowledge, to date, few studies have examined both group and child level interactions in ECEC settings (Sabol et al., 2018). Importantly, research has shown that group and child level do not capture the same interactional features and its examination should be considered complementary (Cadima, Verschueren, Leal, & Guedes, 2015; Sabol et al., 2018; Williford, Maier, et al., 2013). In addition, albeit elucidating, prior studies have been limited to samples of preschool children and additional research is needed to better understand how group and child level interactions are interrelated in toddler classrooms.

Quality of interactions at the group and child levels

It is widely acknowledged that toddlers benefit from engaging in close, warm and caring daily interactions with their educators and peers in ECEC settings (e.g., La Paro, Williamson, & Hatfield, 2014). ECEC educators have an important role in fostering toddlers'

development and they do so by supporting their engagement, cognition, and language throughout the day. Recent frameworks, such as the Classroom Assessment Scoring System (CLASS; La Paro, Hamre, & Pianta, 2012), have conceptualized and organized the quality of educator and toddler interactions at the group level according to two main domains: Emotional/Behavioral Support and educator's Engaged Support for Learning. Classrooms where educators support toddlers emotionally and behaviorally are characterized by warm and close interactions, in which the educator provides several opportunities for children to express themselves while supporting and reinforcing positive behavior and proactively preventing behavior problems (La Paro et al., 2012). Educators who support toddlers learning are active facilitators of the learning process, providing opportunities for children to explore materials and the environment while questioning and giving feedback that stimulates thinking, reasoning and language skills (La Paro et al., 2012). The CLASS framework was built upon extensive literature review and its domains and dimensions were derived mostly from observational tools used in large scale studies such as the NICHD Study of Early Child Care, particularly on those dimensions of the Observational Record of the Caregiving Environment that related to child outcomes (La Paro et al., 2012; Thomason & La Paro, 2009).

Empirical evidence on the positive associations between high-quality educator-child interactions at the group level and child outcomes is considerably large and cross-national for preschool and kindergarten classrooms (Anderson & Phillips, 2017; Burchinal et al., 2016; Cadima et al., 2016; Leyva et al., 2015; Mashburn et al., 2008). For toddlers, empirical evidence is much more limited, compared to preschoolers. Data from the large scale NICHD Study of Early Child Care showed that child care process quality predicted language outcomes from birth to age 3 (NICHD Early Child Care Research Network, 2000b) and child adjustment, functioning, and compliance across toddlerhood (NICHD Early Child Care Research Network, 1998). In a recent study, results suggested that toddlers enrolled in classrooms with higher-quality emotional and learning support had fewer behavior problems according to their educator's report (La Paro et al., 2014). A recent international review on the effects of process quality on child outcomes under the age 3 suggests that the majority of studies with toddlers available were conducted in the U.S., pointing to the need of cross-national evidence for toddlers (OECD, 2018b).

Even though research at the child level is scarcer than at the group level, recent research has shown its importance for the development of early foundational skills in preschool. Interactions at the child level have been conceptualized as child individual interactions with educators, peers, and tasks (Slot, Bleses, & Downer, 2016). Results from studies with preschoolers established positive links between several child school readiness outcomes and individual child interactions with their educators (Sabol et al., 2018; Williford, Whittaker, et al., 2013), peers (Sabol et al., 2018), and tasks (Bohlmann & Downer, 2016; Williford, Whittaker, et al., 2013). This body of research suggests the importance of taking into account these three features of individual child interactions in ECEC classrooms.

Activity settings at the group and child levels

ECEC educators structure children's time throughout the day around different learning activities and routines (Cabell, DeCoster, LoCasale-Crouch, Hamre, & Pianta, 2013; Early et al., 2010; Fuligni, Howes, Huang, Hong, & Lara-Cinisomo, 2012). In toddler classrooms, as stated by NAYEC, educators should plan activities and organize the environment to provide children with a variety of learning formats and contexts that ultimately lead to learning across several developing domains. For instance, it is important to allow children to explore the environment and materials freely and to engage with them in stimulating activities involving language, literacy, science, social phenomena, math, music, arts and crafts, among others. For children at a

very young age, it seems especially important to take advantage of daily experiences, opportunities, and conversations to address important learning goals. Therefore, educators should plan strategically and with intentionality the type of format or context that is more suited to accomplish specific goals (National Association for the Education of Young Children [NAEYC], 2009).

Studies conducted in preschool have shown that the quality of interactions varies as a function of classroom features such as the type of activities, settings, or grouping (Booren, Downer, & Vitiello, 2012; Cabell et al., 2013; Fuligni et al., 2012; Vitiello, Booren, Downer, & Williford, 2012; Whittaker, Williford, Carter, Vitiello, & Hatfield, 2018). The studies suggested that activity type was a cornerstone feature with important effects on proximal processes occurring in ECEC settings (Booren et al., 2012; Cabell et al., 2013; Vitiello et al., 2012; Whittaker et al., 2018) and also on children's gains in school readiness skills (Ansari & Purtell, 2017; Chien et al., 2010; Fuligni et al., 2012; Goble & Pianta, 2017). As such, understanding variation across activity settings in understudied toddler classrooms could be of great value given its possible implications for child development.

In the broadest terms, activity settings can be defined as the main characteristics and configuration of a certain activity taking place in a classroom, including theme, leadership, materials, and social grouping. There are generally four types of activity settings that commonly occur in early childhood settings: free play, early academic activities, meals, and aesthetics/arts. Free play refers to moments during which children play freely around the classroom corners or on the playground. Early academic activities address several learning domains, such as literacy, mathematics, and/or science. Meals are also an important part of every early education setting routine, such as snack breaks and lunchtime. At last, aesthetics/arts include activities that involve creativity and divergent thinking, such as arts and crafts, music, and dancing activities. Free play, early academic activities, and meals have been extensively examined in prior research conducted with preschoolers (e.g., Cabell et al., 2013; Whittaker et al., 2018). In this study, we added an overlooked activity – aesthetics/arts – that although less investigated, represents a common activity in most toddler classrooms. There is no common consensus regarding the definitions of these types of activity settings, however, they represent four common experiences in ECEC settings for toddlers and are generally used in ECEC settings across the world by educators to organize the everyday routine.

Previous research conducted in preschool suggests that during educator-led activities, interactions between educator and children were mostly instructional, while during child-led activities, educator and children engaged in more in-depth interactions, including playful interactions and conversation exchanges (Goble et al., 2016). Relatedly, during educator-led activities, educators were more likely to use language stimulation techniques when compared to child-led activities (Turnbull, Anthony, Justice, & Bowles, 2009). At the child level, preschoolers were found to be more oriented towards tasks and engaged in more positive interactions with their peers during free play, compared to educator-led activities (Vitiello et al., 2012), and to be more positively engaged with their educator during the latter, in comparison to child-led moments (Booren et al., 2012; Vitiello et al., 2012). This evidence from preschool suggests that activity features lead to fluctuations in the quality of interactions.

Overall, this line of research suggests that different activity settings provide different opportunities for educator-child interactions at the group and child levels. At the same time, inconsistencies in available evidence suggest the need for a nuanced understanding of the association patterns between types of activities and the quality of interactions at the group and at the child levels. Importantly, despite several studies focusing on activity features, few studies on this crucial aspect have been found for toddler classrooms.

The current study

In this study, we examined variation in the quality of classroom interactions across activities to address the following research questions: a) to what extent the quality of interactions at the group level varies across activities in toddler classrooms? b) to what extent the quality of interactions at the child level varies across activities in toddler classrooms? c) to what extent the quality of interactions at the group level is related to the quality of interactions at the child level? Four types of activities were considered, representing four common experiences in ECEC settings for toddlers: free play, early academic activities, meals, and aesthetics/arts.

Based on previous studies, we expected to find substantial variation in the quality of interactions across activities at both levels. Regarding the two first research questions, based in activity characteristics and on previous research in preschool, we speculated to observe higher levels of educator-child interactions both at the group and at the child levels in early academic activities and higher levels of peer interactions and orientation towards tasks during free play moments (Booren et al., 2012; Cabell et al., 2013; Vitiello et al., 2012; Whittaker et al., 2018). Nevertheless, given the specificity of the toddlerhood period, we recognize in advance that we can encounter nuances and unique patterns. For example, at the child level, children can establish positive interactions with their educators across activity settings but have fewer interactions with their peers. Concerning the last research question, we expected positive, although modest, associations between the quality of interactions at the group level and child level. Overall, this study will take a first step into understanding variability in two different process quality levels – group and individual – across different activity settings in toddler classrooms.

Method

Participants

This study was part of a broader research project designed to examine the complex relations among activity settings, educator-child interactions, and peer interactions during toddlerhood. For the larger project, three regions in Portugal were selected in order to have geographic variability - two large urban areas and one rural area. A set of criteria was established to select centers: a) centers were considered to be of high quality, according to experts' judgments (e.g., innovating practices, collaboration with universities); and b) centers were required to be aligned with national guidelines regarding structural characteristics (e.g., group size, educator's qualification). In each center, participating classrooms were selected based on the age range (classrooms serving children with 2 years old). Centers were contacted until up to 31 classrooms accepted the invitation. In total, 31 toddler classrooms were selected, with 10 children randomly selected in each classroom. The classrooms were allocated at 23 centers, including both private non-profit and private for-profit. Crèches in Portugal serve children under 3-years-old and can be either private for-profit or non-profit, all under the tutelage of the Ministry of Labor and Social Security.

For this study, selected children were those for whom video data on interactions at the individual level were available, in a total of 104 children (53.8% boys). For descriptive statistics, see Table 1. Children were on average 30.4 months ($SD = 3.8$) and were enrolled in 28 classrooms. The number of participating children per classroom varied from 2 to 6 ($M = 4.00$ children per classroom). Regarding the mother's education level, 17.4% attended high school or less and 82.6% had a higher education degree. The majority of mothers worked outside the home (85.2%), 8% were unemployed, 2.4% were studying, 2.3% were stay-at-home mothers, and 1.1% were both working and studying. Children who participated in this study were similar to the largest sample regarding sex, $\chi2(1) = 0.267$, $p = .62$, but slightly older, $t(266) = -2.28$, $p = .02$.

Table 1
Descriptive statistics for child, educators, and classroom demographics.

Characteristics	N	%	M	SD	Minimum	Maximum
Child characteristics						
Male	56	53.8				
Age (months)	104		30.36	3.78	19	36
Educator characteristics						
Female	28	100				
Age (years)	25		38.16	7.76	24	54
Years experience	21		12.62	5.92	2	24
Bachelors' degree in ECE	17	65.4				
Masters' degree in ECE	9	34.6				
Classroom characteristics						
Group size	24		15.92	3.19	8	22
Adults	25		2.24	0.72	1	4

Participating educators were the classroom lead educators ($N = 28$). All were female, with an average age of 38.2 years ($SD = 7.8$) and an average teaching experience of 12.6 years ($SD = 5.9$). In Portugal, the lead educator is required to have at least a bachelor's degree. In this sample, 65.4% of the educators had a bachelor's degree and 34.6% held a master's degree in early childhood education. Classrooms' age group was 2-years-old, although all classrooms included slightly younger (1-year-old) and older children (3-years-old) as well, depending on the timing of the child's birthdate. Group size ranged from 8 to 22, with an average of 15.9 children enrolled per classroom ($SD = 3.2$). Classrooms were located in 22 ECEC centers. The number of classrooms per center varied from one to four, with almost all centers (82%) having one participating classroom. Among the 22 centers, 54.5% were non-profit and 45.5% were for-profit.

Measures

Group level interactions

The quality of educator-child interactions at the group level was observed with the Classroom Assessment Scoring System Toddler (CLASS Toddler; La Paro et al., 2012), an observational tool designed for classrooms with children from 15 to 36 months old. The CLASS Toddler measures quality along two broad domains comprised of eight dimensions. The first domain, Emotional and Behavioral Support, captures the connection between educator and children, educators' awareness and responsiveness to child needs, the extent to which child interests and motivations are taken into consideration, and if the educator uses proactive strategies to promote child behavior regulation. This domain encompasses the dimensions of Positive Climate, Negative Climate, Educator Sensitivity, Regard for Child Perspectives, and Behavior Guidance. The second domain, Engaged Support for Learning, measures the degree to which and what strategies the educator uses to promote child learning, thinking, reasoning, and language development. This domain is comprised of the dimensions Facilitation of Learning and Development, Quality of Feedback, and Language Modeling. Each dimension is scored by a trained observer on a 7-point scale, across several observation cycles, based on descriptors provided in the manual (scores 1 and 2 are considered low, scores 3 to 5 are considered midrange, and scores 6 and 7 are considered high).

The CLASS Toddler structural validity has been demonstrated across some studies (Bandel, Aikens, Vogel, Booler, & Murphy, 2014; La Paro et al., 2012; Thomason & La Paro, 2009). In line with previous research, results from the confirmatory factor analyses showed that the two-factor model (Emotional and Behavioral Support and Engaged Support for Learning) provided an adequate fit to the data, $\chi^2(19) = 22.087$, $p = .28$, CFI = 0.990, TLI = 0.985, SRMR = 0.025, RMSEA = 0.072. Cronbach's alphas for Emotional and Behavioral Support and Engaged Support for Learning were 0.94 and 0.92 respectively, suggesting excellent internal consistencies.

Two trained observers coded the CLASS Toddler. The training

consisted of first reading the CLASS Toddler manual and getting familiar with the coding procedure. During two days of training, a certified trainer presented each dimension, while discussing each domain and dimension with the trainees. Trainees practiced the coding procedures based on videotaped situations representing a range of quality of interactions at the group level. For reliability purposes, at the end of the training, observers coded individually five master-coded videos, and both have passed the reliability test with within one-scale point of at least 80% of the master-code.

The interrater agreement within one-scale point was 96% on average, ranging from 89% (Regard for Child Perspectives, Behavior Guidance and Quality of Feedback) to 100% (remaining CLASS Toddler dimensions). Intraclass correlations averaged 0.66, ranging from 0.43 (Positive Climate) to 0.85 (Language Modeling), which suggests good consistency across observers.

Child level interactions with educators, peers, and tasks

Individual child interactions with educators, peers, and tasks were observed with the Individualized Classroom Assessment Scoring System – Toddler Version (inCLASS Toddler; Slot et al., 2016). The inCLASS Toddler is comprised of three broader domains – Child Interactions with Educators, Child Interactions with Peers, and Task Orientation – that include a total of ten dimensions. Child Interactions with Educators measures individual child emotional connection with educators and child attempts to initiate and maintain contact and conversations with educators. It encompasses the dimensions Positive Engagement with Educator, Communication with Educator, and Conflict with Educator. Child Interactions with Peers measures the extent to which each child seeks his/her peers, attempts to initiate, maintain, and lead interactions and/or conversations with them while experiencing positive emotions and using positive and successful strategies to lead these exchanges. Child Interactions with Peers includes the dimensions Sociability with Peers, Assertiveness with Peers, Communication with Peers, and Conflict with Peers. Task Orientation captures child active engagement, level of focus, ability to seek opportunities to learn and explore, and ability to match behavioral expectations. This domain is comprised of the dimensions Engagement within Tasks, Self-Reliance, and Behavior Control. Each dimension is rated by trained observers on a 7-point scale, based on behavior descriptors provided in the manual (scores 1 and 2 are considered low, scores 3 to 5 are considered midrange, and scores 6 and 7 are considered high).

Previous research has demonstrated construct and criterion validity for the inCLASS, but only for the pre-K version (Downer et al., 2010). Several studies showed evidence of a four-domain structure of the inCLASS Pre-K (Downer et al., 2010; Slot & Bleses, 2018; Williford, Maier, et al., 2013). However, to our knowledge, the psychometric properties of the inCLASS Toddler have not been examined yet, and therefore an exploratory factor analysis (EFA) was conducted to determine the underlying factor structure. Specifically, an EFA with an oblique rotation was used, following the procedures by Downer et al. (2010). Normality checks revealed that Conflict with Educators and Conflict with Peers had a highly skewed distribution and were therefore excluded from further analyses. In addition, Behavior Control was excluded due to the low correlations with the remaining dimensions. A 3-factor model for child interactions was obtained: Child Interactions with Educators (Positive Engagement and Communication); Child Interactions with Peers (Sociability, Communication, and Assertiveness) and Task Orientation (Engagement and Self-Reliance). All loadings were equal or greater than 0.70, explaining a total of 86.27% of data variance. Internal consistencies were good for the three domains, respectively, for Child Interactions with Educators (two items), Child Interactions with Peers (three items) and Task Orientation (two items), Cronbach's $\alpha = 0.86$, $\alpha = 0.89$, and $\alpha = 0.84$.

Two trained observers coded the inCLASS Toddler. The observers first read the manual and examples provided by the authors. The training was provided across two days, by a certified trainer and

consisted on discussing the domains and dimensions, as well as practicing the coding procedures based on videotaped situations representing a range of quality of interactions at the child level. For reliability purposes, at the end of the training, observers coded individually five master-coded videos each, and have passed the reliability test with within one-scale point of at least 80% of the master-code.

For reliability purposes, 21% of the data was double-coded, with 89% of inter-rater agreement within one-scale point, ranging from 78% (Self-Reliance) to 98% (Engagement). Intraclass correlations averaged 0.83, ranging from 0.65 (Self-Reliance) to 0.89 (Communication with Educators), which suggests very good consistency across observers.

Activity settings

For each activity, observers registered the number of adults and children present, as well as the type of social grouping predominant for each activity. Social grouping was categorized according to the following criterion: (a) Whole Class when the activity was provided to all children (seven or more children); (b) Whole/ Small Group when the activity was provided for all children, but children were organized in small groups (with no more than 6 children per group); (c) Small Group when three to six children were involved in one activity; (d) Individual/ Pairs when one or two children were involved in the activity; (e) Free Grouping when children moved freely in the classroom and (f) Other (Mix) when more than one of the previous was representative.

Procedures

Prior to data collection, informed consents containing detailed information about the project were obtained from center directors, educators, and parents. Meetings and information briefs were exchanged with educators and school directors about the project goals and methods.

Video observations occurred between January and April 2017. Each toddler classroom was visited twice, mostly during the morning and for approximately 2 h. During visits, one observer videotaped four activities (15 to 20 min of recording each) that typically occur during a day in a toddler classroom: free play, early academic activities, aesthetics/ arts activities, and a meal. Although each educator organizes the day differently, typically children gather once they arrive at school, greet each other, sing songs, and talk about what activities are planned for the day. During the morning, educators usually engage children in a whole group activity such as reading books, doing a math matching or pattern game, exploring natural elements, doing experiments with water and objects, modeling with playdough or clay, painting or drawing, among other activities. Children also have the time to play freely around the classroom or outdoors during the morning. Usually, children eat at the school cafeteria, have a nap and play freely in the classroom or outdoors during the afternoon.

Before the visit to the center, the researchers briefly informed educators about the activities to videotape. Early academic activities were described as any approach to a curricular domain, and it was expected that educators would engage with children in an activity about, for example, emergent literacy, mathematics, sciences, or social studies. Aesthetics/arts activities were described as any situation during which children could express themselves freely in some artistic manner, for example, painting, playing with dough, or dancing. During free play moments, children were able to choose what and whom to play with, among several options available in the classroom. Regarding meals, educators were informed that preference was given to lunchtime, and morning and afternoon snacks would be videotaped in those cases where lunchtime would not be possible to observe.

After clarifying the type of activities of interest, educators decided which activities and situations to record based on their plans. Educators were asked to stay as close to the classroom daily routines as possible and visits were scheduled to capture a regular day, with no special

events taking place. Educators were free to ask to videotape another activity if they were feeling nervous about the camera's presence or if the activity did not go as they planned. Researchers checked with the educators whether they felt comfortable with the recorded videos or would like to record once more. Observers completed field notes to record relevant information about the activity and setting. Videos had on average 17 min of length. For the CLASS Toddler, the first 15 min of each video were scored. For the inCLASS Toddler, all children who were visible for at least one period of 8 min from the entire length of the video were observed for the period of time selected. The video was watched as many times as the number of selected children in the video.

Data analysis

To answer our research questions, a series of multilevel models (two and three-level) were computed to address the non-independence of cycles and the nesting of children within classrooms, depending on the outcome. Multilevel modeling takes into account the sources of variability at each level of nesting, preventing biased estimates (Snijders & Bosker, 1999). Previous studies have shown that regression coefficients and variance components are estimated without bias with sample sizes at the group level as small as 30 groups (Maas & Hox, 2005). To determine the variation of interaction quality at the group level, preliminary models were performed to determine the proportion of variance of the CLASS Toddler at the observation cycle (level 1), and classroom levels (level 2). Types of activity (i.e. free play, early academic activities, aesthetics/arts activities, and meals) were entered into the models at the observation cycle level (level 1) and were dummy-coded, so that the effect of each type of activity was contrasted with free play, as referent activity. For example, a significant, negative effect of early academic activities would indicate that the quality of group level interactions was lower in early academic activities compared to free play. A similar procedure was followed for examining the variation of interaction quality at the child level. First, the proportion of variance of the inCLASS Toddler domains was determined at the observation cycle (level 1), child (level 2), and classroom levels (level 3). Child age and sex were used as covariates and entered at the child level (level 2). Group level interaction quality was included as a predictor at the classroom level (level 3). We used MPlus for all analyses (Muthén & Muthén, 1998-2012). All hypothesized models were fitted using all available data-points, with full-information maximum likelihood approach (Graham, 2009; Schafer & Graham, 2002) available in MPlus (Muthén & Muthén, 1998-2012).

Results

Descriptive and preliminary analysis

Means and standard deviations for group and child level interactions, as well as frequencies for activity settings, are presented in Table 2. Frequency analysis revealed that the predominant social grouping varied according to the type of activity. For early academic activities, the most common type of grouping was the whole class. For aesthetics/arts activities, it was common to observe both whole class and small group. During free play, the prevalent social grouping was free. During meals, children were commonly organized in small groups, categorized as a whole/small group. The ratio was lower during aesthetics/arts activities, followed by meals, free play, and early academic activities.

Regarding group level interactions, educator-child interactions were in the mid to mid-high range for Emotional and Behavioral Support, and in the mid-low range for Engaged Support for Learning. Regarding child level interactions, ratings for Child Interactions with Educators and Tasks were mostly in the mid-range and for Child Interactions with Peers in the mid-low range.

Table 2
Descriptive statistics for activity setting, CLASS and inCLASS for each type of activity.

Variables	Early Academic			Aesthetics/Arts			Free Play			Meals		
	Number of Cycles	M	SD	Number of Cycles	M	SD	Number of Cycles	M	SD	Number of Cycles	M	SD
N Children		9.86	4.13		6.57	3.46		7.11	3.71		10.50	3.87
N Adults		1.71	0.54		1.43	0.69		1.21	0.42		1.89	0.69
Ratio		6.21	3.20		4.80	2.19		6.20	3.57		5.93	2.42
Social Grouping												
Whole class	22	78.6%		9	32.1%		0	0%		6	21.4%	
Whole/small group	1	3.6%		2	7.1%		0	0%		18	64.3%	
Small group	4	14.3%		9	32.1%		2	7.1%		4	14.3%	
Individual/Pairs	1	3.6%		7	25%		0	0%		0	0%	
Free Grouping	0	0%		1	3.6%		24	85.7%		0	0%	
Other (mix)	0	0%		0	0%		2	7.1%		0	0%	
CLASS												
Emotional and Behavioral Support	28	4.79	0.94	28	5.06	1.07	28	5.36	0.97	28	4.71	0.93
Engaged Support for Learning	28	3.50	0.92	28	3.48	1.22	28	3.35	1.13	28	2.50	0.94
inCLASS												
Educator Interactions	76	4.39	1.07	50	4.38	1.24	36	4.17	1.43	61	3.50	1.16
Peer Interactions	76	2.74	1.06	50	3.19	0.91	36	3.62	1.14	61	3.40	1.51
Task Orientation	76	4.47	1.22	50	4.91	0.93	36	4.53	1.06	61	4.25	0.97

Variance decomposition

Variance decomposition (for the fully unconditional model) for the CLASS Toddler domains showed that most of the Emotional and Behavioral Support variance was accounted for at the classroom level (59%), with a smaller proportion of variance attributed to observation cycle (41%). For the Engaged Support for Learning, most of the variance was accounted for at the observation cycle (64%) and only 36% of the variance was attributed to differences between classrooms. In sum, the quality of Emotional and Behavioral Support varied mostly from classroom to classroom while the quality of Engaged Support for Learning varied mostly from cycle to cycle.

Variance decomposition (for the fully unconditional model) for the inCLASS Toddler domains showed that most of the variance for the three domains of the inCLASS Toddler was attributed to the cycle level (52% for Child Interactions with Educators, 81% for Child Interactions with Peers, and 82% for Task Orientation), meaning that child interactions with educators, peers, and tasks varied greatly from cycle to cycle (i.e., across activities). Differences between children (level 2) accounted for a smaller proportion of variance, namely 37% for Child Interactions with Educators, 17% for Child Interactions with Peers and 15% for Task Orientation. The classroom level (level 3) explained 11% of the variance in Child Interactions with Educators, 2% of the variance in Child Interactions with Peers, and 3% of the variance in Task Orientation.

To what extent the quality of interactions at the group level varies across activities?

To investigate the extent to which Emotional and Behavioral Support and Engaged Support for Learning varied across types of activities, we tested a two-level model. Results revealed that activity settings were significantly related to the quality of educator-child interactions for both CLASS-Toddler domains (see Table 3). For the Emotional and Behavioral Support domain, free play moments were more likely to have higher ratings than early academic activities, $\beta = -0.40$, $SE = 0.11$, $p < .001$, and meals, $\beta = -0.46$, $SE = 0.11$, $p < .001$. Regarding the Engaged Support for Learning domain, scores were also higher for free play when compared to meals, $\beta = -0.42$, $SE = 0.11$, $p < .001$, but no further differences were found between activity settings.

Table 3
Summary of the two-level model predicting educator-child interactions.

Two-level model	Emotional and Behavioral Support		Engaged Support for Learning	
	β	SE	β	SE
Level 1: observation cycle				
Free Play[a] versus				
Early Academic	−0.40*	0.11	0.08	0.09
Aesthetics/Arts	−0.21	0.12	0.07	0.11
Meals	−0.46*	0.11	−0.42*	0.11

[a] Referent activity is free play (coded as 0).
* $p \le .05$.

To what extent the quality of interactions at the child level varies across activities?

To investigate the extent to which the three broad domains of the inCLASS Toddler varied across activity type, we tested a three-level model. Results revealed that activity settings were significantly related to the quality of child interactions with educators, peers, and tasks (see Table 4). Regarding Child Interactions with Educators, results suggested that, during free play, interactions were of higher quality when compared to meals, $\beta = -0.36$, $SE = 0.10$, $p < .001$. Concerning Child Interactions with Peers, results showed that children were more likely to engage in positive interaction among each other during free play when compared to early academic activities, $\beta = -0.40$, $SE = 0.10$, $p < .001$, and aesthetics/arts activities, $\beta = -0.19$, $SE = 0.09$, $p = .027$. Results showed no variation of Task Orientation across activity settings, using free play as referent activity. Regarding child age and sex, older children engaged in higher quality interactions with educators, $\beta = 0.30$, $SE = 0.12$, $p = .015$, peers, $\beta = 0.76$, $SE = 0.12$, $p < .001$, and tasks, $\beta = 0.87$, $SE = 0.19$, $p < .001$. No associations were found for child's sex.

To what extent the quality of interactions at the group level is related to quality of interactions at the child level?

A statistically significant positive association was found between individual Child Interactions with Educators (inCLASS Toddler) and group level Emotional and Behavioral Support (CLASS Toddler), $\beta = 0.78$, $SE = 0.34$, $p = .023$, suggesting that in classrooms with

Table 4
Summary of the three-level model predicting children's interactions with educators, peers and tasks.

Three-Level Model	Educator Interactions		Peer Interactions		Task Orientation	
	β	SE	β	SE	β	SE
Level 1: Observation Cycle						
Free Play[a] versus						
Early Academic	0.12	0.12	−0.40*	0.10	−0.06	0.10
Aesthetics/Arts	0.06	0.12	−0.19*	0.09	0.12	0.07
Meals	−0.36*	0.10	−0.11	0.14	−0.17	0.09
Level 2: Child						
Age	0.30*	0.12	0.76*	0.12	0.87*	0.19
Sex[b]	0.16	0.11	0.05	0.16	0.16	0.17
Level 3: Classroom						
Emotional and Behavioral Support	0.78*	0.34	−0.01	0.46	0.47	0.62
Engaged Support for Learning	0.40	0.32	−0.28	0.35	−0.07	0.40

[a] Referent activity is free play (coded as 0).
[b] Boy = 1, Girl = 0.
* $p \leq .05$.

higher emotional and behavioral support, individual children were more likely to have higher-quality interactions with educators.

Discussion

This study sought to examine how the quality of interactions observed at the group and at the child levels varied across different activity settings in toddler classrooms, focusing on an age group understudied in the ECEC field. Recent research has shown that interactions between educators and children have different configurations across several activity settings that commonly constitute a regular day in ECEC settings (Booren et al., 2012; Cabell et al., 2013; Fuligni et al., 2012; Vitiello et al., 2012; Whittaker et al., 2018). Recognizing such variation, the current study took a step further in analyzing both levels of interactions, in order to grasp not only the overall experience in the classroom (group level interactions) but also child individual experiences (child level interactions).

At the group level, scores of Engaged Support for Learning were lower than scores of Emotional and Behavioral Support, a pattern that is aligned with previous studies conducted in the U.S. with toddlers (La Paro et al., 2014; Thomason & La Paro, 2009). At the child level, our results suggest slightly higher scores particularly for child interactions with educators, when compared to studies conducted in the US with preschoolers (Downer et al., 2010; Sabol et al., 2018; Williford, Whittaker, et al., 2013). Previous studies have suggested that older children seem to engage in less positive educator-child interactions during free play, in comparison to more structured activity settings (Vitiello et al., 2012). It seems possible that younger children's need of attunement, interaction, and communication with the educators is greater than for older children, although more research is needed to support such claim.

Our results confirmed that the quality of interactions at the group and child levels varied across different activity types. Interestingly, a large percentage of variance, both for the CLASS Toddler and the inCLASS Toddler, was at the cycle level, suggesting that both child level and group level interactions varied greatly across activities. However, distinct patterns also emerged for the two levels of interactions.

Free play as a valuable setting in toddler classrooms

Our findings show that, during free play, the educator established more warm and sensitive interactions with children, following their interests and ideas, in comparison to early academic activities and meals. Additionally, during free play, educators were more likely to support child reasoning, developing and learning, than during meals. At the child level, free play also represented a privileged moment for children's playful and caring interactions with educators and peers.

Our findings are aligned with previous studies showing that, during free play, educators engaged in more warm and sensitive interactions with children, when compared to early academic activities (Goble et al., 2016; Goble & Pianta, 2017). According to Goble et al. (2016), the disparity between the emotional support provided during free play and early academic activities can be explained by the fact that during child-managed moments, such as free play, educators are able to engage with children in more playful and joyful interactions, whereas, during educator-led activities, such as early academics, the educator is more focused on the message content. Therefore, the cognitive load during early academic activities may prevent educators from being attentive and responsive to children.

Similarly, at the child level, during free play, children were more likely to engage in positive interactions among them when compared to early academic and aesthetics/arts activities. These results were consistent with findings from other studies with preschoolers (Booren et al., 2012; Vitiello et al., 2012). According to Booren et al. (2012), a possible explanation is that during educator-led moments, such as early academic activities, educators have a stricter agenda concerning themes and contents, similarly to what happens during a lesson. It is possible that, during early academic activities, educators tended to have a greater focus on teaching concepts or conveying important messages for child learning and development, and that focus prevented them from promoting, encouraging and supporting child interactions with peers.

In addition, it seems that greater orientation towards children in free play allowed educators to engage in back-and-forth exchanges, asking questions that challenge child thinking and reasoning while they were playing according to their preferences. Interestingly, and in contrast with prior research on preschool (Goble & Pianta, 2017), free play provided as many opportunities for stimulating interactions as early academic activities. At the child level, previous research with preschoolers had shown that during free play, individual child interactions with their educators were of better quality during early academic activities and educator-led activities compared to free play and child-led moments (Booren et al., 2012; Vitiello et al., 2012). We did not find support for such findings with toddlers since there was no statistically significative difference between free play and early academic settings regarding child level interactions with their educators. A possible explanation for such differences across studies could rely on the fact that Booren et al. (2012) and Vitiello et al. (2012) studied preschool-aged children, while our sample is composed by children as young as 2 years old, highlighting the difference between children interactions across these two developmental periods. It can be that in toddler classrooms,

during free play, educators are highly involved with children, whereas, in preschool, the educator stands back so that children's play is protected and kept free (Kontos, 1999).

Our findings add to previous research by showing that educators seem to engage with children in close and meaningful interactions during free play moments. It seems that educators' practices are aligned with the guidelines from the NAEYC, in the sense that they seem to be taking advantage of the spontaneous interactions that occur during free play, making the most out of this context, and recognizing the value of warm, close, and stimulating interactions at a very young age.

Meals as a demanding setting in toddler classrooms

Our results suggested that during meals, in comparison to free play, educators engaged in less warm, sensitive and stimulating interactions with children in the classrooms, and individual children also engaged in less positive interactions with their educators. Prior research has shown conflicting results, especially regarding language facilitation techniques. While Cabell et al. (2013) found that educators used more language-stimulating techniques during meal times, in comparison to large-group and free-choice settings, other studies have suggested that interactions between educators and children were of lower quality during meals compared to other activity settings (Chen & Kim, 2014; Gest, Holland-Coviello, Welsh, Eicher-Catt, & Gill, 2006; Hallam, Fouts, Bargreen, & Perkins, 2014). Our study is in line with the latter findings.

During meals, educators engaged in several managerial demands, such as serving food and keeping track of multiple details. Assuming several roles at once could have prevented educators from engaging in close and caring interactions with children as well as from engaging children in back-and-forth interactions, asking questions or stimulating their reasoning and learning over the course of the meal. Moreover, meals were typically observed during lunchtime, which frequently occurred in the cafeteria – a common space shared by several classrooms. It is possible that constraints, such as small spaces for lunch that need to be shared by several groups, pressured educator's timing, making them rush through lunch so all groups could have their meal on time, and did not favor warm or close educator-child interactions. Nevertheless, it is worth mentioning that no differences were found for children's interactions with peers across free play and meals. It seems that children may be taking advantage of meal times to engage in social gratifying interactions among each other, following a common and cultural trend usually seen in Portugal and other south European countries.

Arts/aesthetics as an engaging setting in toddler classrooms

Our results showed children had approximately the same levels of engagement, interest, enthusiasm and focus across all activity settings, using free play as a referent category. With an exploratory approach, we conducted a subsequent three-level model, but now with early academic as a referent activity. Results suggested that during aesthetics/arts activities, children were more focused and seemed to be more enthusiastic while performing the task when compared to early academic activities, $\beta = 0.18$, $SE = 0.06$, $p = .002$. Previous studies (Booren et al., 2012) found that during child-led tasks, such as free play, children were more engaged than during educator-led tasks, such as early academic activities. Whereas free play is generally perceived as child-led and early academic activities as educator-led, a more complex picture seemed to apply to aesthetics/arts activities. It can be that despite aesthetics/arts activities were suggested by the educator, children were allowed more freedom to carry on their projects according to their preferences, interests, and ideas.

It also seems possible that the educator-child ratio had a meaningful impact on these exploratory findings. Previous research has suggested that lower educator-child ratio and smaller group sizes may be associated with more warm, sensitive and close educators' caregiving behaviors (Burchinal, Cryer, Clifford, & Howes, 2002; Mashburn et al.,

2008; NICHD Early Child Care Research Network, 1996, 2000a). During aesthetics/arts activities, children were typically organized in small groups and the educator-child ratio was the lowest across all activity settings. Therefore, it can be that social organization of the classroom in small groups along with the low ratios might have influenced educators' availability towards children and, consequently, the way they provided support to children's needs and followed their interests and motivations. Also, it is possible that the configuration and content of aesthetics/arts activities may be more pleasant for children compared to early academic activities, which would favor children's interest and engagement in aesthetics/arts activities This interesting pattern can have important implications on the way educators perceive, plan, and organize activities.

A combined approach of group and child level quality of interactions

Finally, our findings suggested that the emotional support provided at the group level was related to child-educator interactions at the child level. This means that when the global emotional climate of the classroom was warm, and educators were attentive and responsive to child needs, individual children also engaged in more conversations or in playful interactions with educators and seemed to enjoy these interactions. Our findings are aligned with results from a study with preschoolers, that also reported associations between emotional support at the group level and individual children interactions with their educators, but not between emotional support and child level interactions with peers or tasks (Sabol et al., 2018). Interestingly, Sabol et al. (2018) also found significant associations between the instructional support at the group level and child level interactions, although not always in the expected direction. Importantly, our findings, together with previous ones from the preschool (Cadima et al., 2015; Sabol et al., 2018; Williford, Maier, et al., 2013), suggest that group and child level observations capture somewhat different aspects of the interactions across settings, pointing out to the importance of assessing in combination both levels of quality of interactions, since they seem to capture different, but complementary, aspects of the classroom experience.

The current study adds to the literature an understanding of the activity settings in which the quality levels of group level and child level interactions are aligned, as well as of the activity settings in which important discrepancies occur. Specifically, free play moments seemed to provide good opportunities for positive interactions both at the group and at the child level, meaning that, during play, children engaged in positive interactions with their educators and peers and, at the same time, the educators established a positive and warm climate, stimulating children's thinking and language skills. Meals, in turn, seemed to be especially difficult for educators to establish warm and close interactions with children, as well as to promote children's reasoning and engage in cognitive challenging exchanges, even though individual peer interactions were on the average levels. For early academic activities, the quality of emotional support provided by the educator at the group level was lower when compared to free play, but observations at the child level suggest there was no difference in individual child behavior towards the educator across the two settings. At last, although aesthetics/arts activities did not differ from free play at the group level, exploratory results suggest it may be a privileged activity concerning children's engagement with tasks.

Limitations and future research

Several limitations of the current study need to be acknowledged. First, classroom observations were conducted through video recordings, which had important repercussions on sample size, limiting our sample to those children for whom video observations were available. Despite meeting the smallest accepted number of classrooms for multilevel analysis, a larger sample at the classroom level would have strengthened our conclusions and increase the generalizability of our findings.

Relatedly, the presence of the researcher and the camera in the classroom could have influenced educators' and children's behaviors. Thus, it is possible that observed activities and interactions were not as typical or common as expected. A second limitation is that observations lasted only two days and each activity setting was only videotaped once. Increasing the number of visits to each classroom and the number of observations per activity setting would increase the generalizability of our scores. Third, despite several regions of Portugal were included in our sample, sample size and its characteristics prevent us from generalizing our findings. Fourth, one of the observers scored both the CLASS and inCLASS, although in different time frames. It is also important to mention the restricted variance of mother education of this sample. Nevertheless, data from the OECD Family Dataset shows that children whose mothers have higher levels of education are considerably more likely to use ECEC from birth to age 2, compared to children whose mothers have low educational levels (OECD, 2016). Finally, the correlational and transversal nature of our design precludes statements about causal associations among variables. Further research might consider obtaining more precise and detailed information on each activity setting. Fully understanding activity settings' characteristics and particularities could contribute to a deeper understanding of the variations of educator-child interactions at the group and at the child levels across different activity settings, and contribute to analyze the discrepancies and similarities across the two levels of interactions.

In sum, our results suggested that the quality of interactions observed both at the child and at the classroom levels is different across activity settings in toddler classrooms. In other words, the characteristics of each activity appear to play a role in explaining the quality of interactions experienced by very young children. Whereas extant research has mainly focused on identifying the structural conditions that might contribute to improving the quality of interactions, this study contributes to the ECEC field by suggesting that features related to the activities can influence the quality of interaction as well.

Implications

The variation observed in group and child level interactions across activity settings has important implications for educator practices. Specifically, findings on group level interactions during meals suggested the need for additional planning (or even some redesigning) of this everyday routine to maximize positive interactions between educators and children and increase learning opportunities. Further, early academic activities, usually carefully planned by the educator, would also benefit from additional consideration of goals such as maximizing individual child engagement, promoting positive interactions among children, and ensuring high levels of educators' emotional support. Because group level emotional support seemed to be more stable across activities than support for learning, findings should encourage educators and center directors to carefully observe group and individual child experiences throughout the day and, then, consider ways to consistently ensure group level learning supports and individual child interactions with peers and tasks across activity settings.

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