CHILD DEVELOPMENT

Child Development, May/June 2018, Volume 89, Number 3, Pages 897–913

Using a Group-Centered Approach to Observe Interactions in Early Childhood Education

Saskia D. M. van Schaik, Paul P. M. Leseman, and Mariëtte de Haan
Utrecht University

This study examined the value of using a group-centered approach to evaluate process quality of early childhood education and care (ECEC). Is observed support of group processes a different aspect of classroom quality, and does it predict children's collaborative play in ECEC in the Netherlands? In two play situations, 37 teachers and 120 two- to four-year-old children were observed with the Classroom Assessment Scoring System (CLASS) Toddler and two new measures. In a two-level structural equation model, teachers' support of group processes was positively related to the CLASS domains and to children's collaborative play, over and above the effect of children's cognitive ability and social competence. These findings suggest that ECEC quality evaluation could be enriched by adding group-centered indicators of classroom quality.

Over the last decades a large body of research has shown that high-quality early childhood education and care (ECEC) supports children's social and cognitive development (Mashburn et al., 2008; Melhuish, 2011). Quality in this research is usually defined as those features of ECEC that foster developmental outcomes (Phillips & Lowenstein, 2011), focusing both on structural (e.g., teacher–child ratio, group size, physical environment, or teacher education) and process characteristics (teacher–child interactions and children's daily experiences). High process quality is defined as reflecting a setting where teacher–child relationships and interactions are warm, sensitive, and supportive. However, several researchers have pointed out areas of possible enrichment of this common definition of process quality and its related measures (Burchinal, 2010; Kutnick et al., 2007). One important but largely unrecognized area of enrichment draws upon a key feature of ECEC: the fact that teachers take care of more than one child and that children in ECEC are part of a group of peers (Fabes, Hanish, & Martin, 2003; Organization for Economic Cooperation and Development [OECD], 2011). Current quality measures tend to focus on teacher–child interactions, whereas teachers interact daily with groups of children and children interact with each other within group settings (Kutnick et al., 2007). These group settings may offer children several opportunities to develop social and cognitive skills, for instance, learning to adjust behavior to the group and to collaborate in play and work. Playing and collaborating with peers has often been found to be positively associated with children's cognitive and social competence (Diamond & Lee, 2011; Elias & Berk, 2002; Howes et al., 2011).

The main goal of this study is to explore the potential added value of a group-centered perspective to existing quality assessment instruments for ECEC. The study investigates to what extent teachers support group processes and how this support, compared to common quality measures, is related to the prosocial behavior and collaboration skills of children. For this purpose, new observation instruments were developed focusing on teachers' support of group processes and children's collaborative play. While focusing on the usefulness of these scales, the study also discusses psychometric properties of the new measures.

In past research on the effects of ECEC, only a few studies have taken into account the fact that children are members of groups in center-based child care. By focusing on structural characteristics of ECEC, some studies have found that large groups in center-based care and high children-to-adult ratios are related to children's stress and low

Correspondence concerning this article should be addressed to Saskia D. M. van Schaik, Faculty of Social Sciences, Department of Pedagogical and Educational Sciences, Utrecht University, Heidelberglaan 1, 3584 CS Utrecht, The Netherlands. Electronic mail may be sent to s.d.m.vanschaik@uu.nl.

0009-3920/2018/8903-0018
DOI: 10.1111/cdev.12814

well-being, and predict social and behavioral problems at later ages (Vermeer & Van IJzendoorn, 2006; Watamura, Donzella, Alwin, & Gunnar, 2003). Other studies, however, have shown that experience in peer groups is positively related to children's cognitive and social skills (Morrissey, 2010). Increasingly, studies find evidence of peer effects in ECEC on children's early academic development, such that children benefit from more skilled peers in their ECEC classroom (Justice, Petscher, Schatschneider, & Mashburn, 2011; Reid & Ready, 2013; Weiland & Yoshikawa, 2013). In several studies, the quality of interactions with peers in ECEC was found to be important, as associations between positive interactions with peers and both social and cognitive development were found (Howes & Smith, 1995; Howes et al., 2011; Wishard, Shivers, Howes, & Ritchie, 2003), and negative peer interactions were associated with children's lower well-being (Gevers Deynoot-Schaub & Riksen-Walraven, 2006). Adding to these findings, Morrissey (2010) suggests that younger children might respond differently to group care than older children. Whereas infants and young toddlers benefit from small groups in home-based care and might experience stress from being among many peers in center-based care, from age 2.5 years center-based care in bigger groups could be beneficial to cognitive and social development above and beyond home-based or family care.

Only a few studies to date have investigated the role of teachers' support of group processes and children's interactions in group care. Williams, Mastergeorge, and Ontai (2010) studied teachers' strategies of fostering positive peer interactions among infants in ECEC. They found that specifically child-centered social scaffolding, including communicating to infants about the feelings and behaviors of other children as well as helping infants to participate in the group, predicted later social competence. In a study by Girard, Girolametto, Weitzman, and Greenberg (2011), teachers' encouragement of peer interactions among toddlers was associated with increased prosocial behavior toward peers. In addition, in a previous study by Van Schaik, Leseman, and Huijbregts (2014) in ECEC classrooms in the Netherlands, teachers' support of group processes was related to a higher level of collaborative play among 2- to 4-year-old children. Higher levels of collaborative play were found to be associated with higher cognitive functioning, including verbal and sensorimotor functioning, and involvement. In early childhood special education, several studies were done on peer interactions and findings show that teachers' support of interactions leads to better inclusion of children with disabilities (Brown, Odom, & Conroy, 2001). These studies together provide growing evidence that supporting children to interact with each other predicts positive peer interactions in ECEC classrooms. In this regard, existing ECEC quality measures could be extended to assess the support of children's interactions and group processes.

Quality of ECEC

Over the last decades, several measurement instruments have been developed to assess process quality in center-based child care (for an overview, see Ishimine & Tayler, 2013). Currently, widely used quality observation systems tend to focus on teacher–child relationships and do not explicitly address teacher–group relationships and interactions. The most frequently used observation systems were developed in European and North American contexts and are firmly grounded in dyadic adult–child attachment models, emphasizing warm, sensitive, and responsive teacher–child interactions, as well as interactions and activities that support children's cognitive development (Burchinal, 2010; Maccoby & Lewis, 2003; Rosenthal, 2003; Singer, 1993; Vandell, 2004).

The most widely used classroom quality measure is the Early Childhood Environment Rating System–Revised edition (ECERS-R, Harms, Clifford, & Cryer, 1998). The ECERS-R assesses global quality of the early childhood environment and does not specifically focus on quality of teacher–child relationships, interactions, or teacher–group relationships. A more recent measure is the Classroom Assessment Scoring System (CLASS), of which the Pre-K and Toddler versions are increasingly used in many countries to evaluate process quality in ECEC classrooms (CLASS Pre-K, Pianta, LaParo, & Hamre, 2008; CLASS Toddler, La Paro, Hamre, & Pianta, 2009). The CLASS Toddler assesses process quality in ECEC classrooms serving children till 5 years old and focuses on the overall emotional support and engaged support for learning, two broad domains of quality that include several, more specific dimensions of quality with three to four indicators per dimension (Ishimine & Tayler, 2013). High emotional quality ECEC, according to the CLASS Toddler, is characterized by a positive classroom climate with no or very infrequent instances of negative interaction, a teacher who is sensitive to individual children shows regard for children's perspectives and guides children's behavior well. High

support for learning indicates a teacher who facilitates and supports children's individual learning and development, provides adequate feedback, and models language use. The CLASS Toddler makes no specific mention of teacher–group interactions or of the teacher's role in supporting group processes. The instrument does assess the quality of group processes in one of the four indicators of the dimension positive climate, namely, positive peer interactions. Note, however, that the CLASS Toddler manual also specifically instructs that positive interactions between the children are not necessary for a high score on positive classroom climate.

Two other quality observation systems that more specifically evaluate to what extent teachers support children in forming peer relations and in engaging in positive peer interactions are the Modified Observational Ratings of the Caregiving Environment (M-ORCE, Gunnar, Kryzer, Phillips, & Vandell, 2001) and a Dutch system, Caregiver Interactions Profile (CIP, Helmerhorst, Riksen-Walraven, Vermeer, Fukkink, & Tavecchio, 2014). However, neither the M-ORCE nor the CIP include actions and practices initiated by the teacher to support the quality of group processes, to enhance children's belongingness to the group or to stimulate collaborative play. Altogether, currently widely used process quality measurement instruments lack a group-centered perspective on classroom quality.

A Group-Centered Approach

To define a group-centered approach to classroom quality, several possible features of group care as found in studies that focus on early child development in group contexts need to be considered. The present review specifically includes several studies in non-Western contexts as in these contexts, generally, concepts such as group membership and learning from peers and siblings are more strongly emphasized and more consistently put into practice in the early years (Maccoby & Lewis, 2003; Rogoff, 2003; Rosenthal, 2003).

A first feature of group care that reoccurs in the literature is the importance of socially responsible intelligence as a developmental goal for young children, as was found, for instance, in sub-Saharan African cultures (Nsamenang, 2006; Super, Harkness, Barry, & Zeitlin, 2011). In these studies, a large body of literature is reviewed that shows that in several sub-Saharan African cultures children learn, at an early age, how to care for others and to show socially responsible behavior in the group or community they belong to. Second, in line with the importance of group membership, a number of studies have focused on children's attachment to their teachers and peers in group care in diverse cultural contexts. For example, in a meta-analysis on child–teacher attachment in ECEC, Ahnert, Pinquart, and Lamb (2006) conclude that children's secure attachment to their teachers depends on teachers' sensitivity to the whole group more than on teachers' sensitivity to individual children. In addition, in their commentary on the nature of out-of-home care in the United States, Maccoby and Lewis (2003) integrate findings of several Western and non-Western studies and conclude that center-based care should foster children's attachment to their teachers as well as to their peer groups to support social development. For example, teachers should group children or organize shared classroom and group activities in which prosocial behavior and interdependence among children are supported. In addition to supporting children's social development, Master and Walton (2013) emphasize the importance of group belongingness for children's learning. In several experimental studies, they find that a sense of group membership increases 4-year-old children's motivation and learning. These studies together indicate that teachers' group sensitivity as well as teachers' initiation of group activities that enhance a sense of group membership could be important aspects of ECEC quality.

Third, a number of studies address the importance of supporting shared, multiparty engagement in play. Mejía-Arauz, Rogoff, Dexter, and Najafi (2007) describe how 6- to 9-year-old children with a Mexican Pueblo heritage coordinate more as an ensemble when given a common task. In these coordinated ensembles, instead of just taking turns, children collectively perform a complex task. The children continuously observe each other and are continuously engaged in interaction with each other. Chavajay and Rogoff (2002) report similar findings and show how groups of a mother and three children can fluidly coordinate their actions by being mutually engaged in whole-group problem solving. They suggest that irrespective of children's background, this form of collaboration and shared engagement could lead to more on-task behavior of children as opposed to teacher-directed learning. Although the empirical evidence is still limited, these studies together do suggest that group activities and supporting children's interactions could be important aspects of ECEC quality as they might promote children's collaborative play and learning.

Structural features of ECEC, such as group size and the cultural composition of a group, can also influence children's collaborative play and learning. Morrissey (2010) reviews several studies that investigated the influence of adult-to-child ratio on children's interactions; however, no clear relations were found between group size and quality of children's interactions. In addition, the cultural composition of the group of children can be important for the quality of children's collaborative play. Some studies have shown that groups of children of non-Western cultural backgrounds show more collaborative play (Mejía-Arauz et al., 2007; Nsamenang, 2006; Serpell, 2011). However, Howes, Sanders, and Lee (2008) found that in ethnically mixed classrooms children engaged in more complex play with peers than in classrooms only consisting of ethnic minority children. This study will further investigate the influence of both group-centered process quality as well as structural quality elements such as group size and the cultural composition of the group on children's collaborative play.

Children's Collaborative Play

The development of young children's collaborative play has been the topic of many studies (e.g., Eckerman & Whitehead, 1999; Hay, Payne, & Chadwick, 2004). The findings indicate that even in infancy, children already observe and respond to each other. As toddlers and preschoolers, children become increasingly able to reciprocate actions and to sustain social play episodes for prolonged time. Moreover, the complexity of play increases with children learning to behave prosocially, to help each other, and to share with each other (Howes & Matheson, 1992). Several studies have found that toddlers and preschoolers, although playing together, coconstruct knowledge and practice their self- and other-regulation skills by discussing plans and rules, coordinating their play behavior, and negotiating sociocognitive conflicts (Bodrova, Leong, & Akhutina, 2011; Leseman, Rollenberg, & Rispens, 2001; Whitebread, Bingham, Grau, Pasternak, & Sangster, 2007). These aspects of collaborative play experiences, moreover, have been found to be related to later social, cognitive, and academic development (Diamond & Lee, 2011).

Several child characteristics, such as age and developmental stage, are related to children's collaborative play. Older children are more experienced in playing together and have better social competence and more mature cognitive and language skills to create shared understanding, to coregulate behavior, and to negotiate sociocognitive conflicts (Howes et al., 2008). The relations among social competence, cognitive ability, and collaborative play are increasingly recognized (Duncan et al., 2007; Rhoades, Warren, Domitrovich, & Greenberg, 2011; Welsh, Nix, Blair, Bierman, & Nelson, 2010). For young children specifically, early vocabulary and attention skills have been identified as core aspects of cognitive and social functioning in the classroom (Duncan & Magnuson, 2011; Mulder, Hoofs, Verhagen, van der Veen, & Leseman, 2014). However, the extent to which social competence and cognitive ability support collaborative play or vice versa remains unclear. To conclude, when examining the relations among collaborative play, characteristics of group care, and teachers' support of group processes, these child characteristics need to be considered as possible predictors of children's collaborative play.

In previous research, several instruments have been developed to assess peer interactions and peer play, such as the Penn Interactive Peer Play Scale (PIPPS; Fantuzzo, Coolahan, Mendez, McDermott, & Sutton-Smith, 1998), the Howes Peer Play Scale (Howes, 1980), and the Social Pretend Play Scale (Howes, Unger, & Seidner, 1989). The PIPPS focuses mainly on play interaction and does not include collaboration or children building upon each other's actions as such. The Howes Peer Play Scale and the Social Pretend Play Scale are used to assess complexity of peer play with complex social pretend play being rated highest. This study's aim was to assess 2- to 4-year-old children's level of collaboration in pretend play and constructive play. The scale focuses on children's verbal and nonverbal actions and rates children's social awareness, prosocial behavior, and mutual play regulation. The newly developed scale adds to the previous scales by its focus on collaboration and not on complexity of peer play.

ECEC in the Netherlands

This study was conducted in center-based early childhood care and education settings in the Netherlands. Formal ECEC is available for children between 3 months (the end of paid maternity leave) and 4 years of age (the age at which virtually all children start in the kindergarten department of primary school in the Netherlands). The minimum required education level of ECEC teachers is 3 years of intermediate vocational training. A recent large-scale national study involving quality observations in day care and preschool classrooms using

the CLASS Toddler shows that the current quality of ECEC in the Netherlands is on average medium-to-high regarding emotional support of children, and low-to-medium regarding engaged support for learning (Slot, Leseman, Verhagen, & Mulder, 2015).

Current Study

The aim of this study is to gain more insight in the quality of ECEC from a group-centered point of view and to investigate whether adding a group-centered evaluation of activities and interactions in ECEC classrooms adds relevant information to an existing and increasingly used measure of classroom process quality, the CLASS Toddler (La Paro et al., 2009). For this purpose, a new observation measure evaluating teachers' support of group processes was developed and applied to Dutch ECEC classrooms together with the CLASS Toddler. In addition, another new observation measure was developed evaluating individual children's collaborative play. Using these observation measures, the study addresses two research questions: (a) Is teachers' support of group processes an aspect of overall classroom quality that differs from, yet is related to, existing measures? and (b) To what extent are the different aspects of classroom quality, including teachers' support of group processes, related to children's collaborative play, after controlling for children's age, cognitive ability, and social competence, and classroom characteristics such as group size and cultural composition of the group? From a group-centered view on process quality, we hypothesize that teachers' support of group processes is positively related to overall classroom process quality but is distinct from existing measures. We also hypothesize that, over and above the effects of age, social competence, cognitive ability, and overall classroom quality, teachers' support of group processes explain part of the variance in children's collaborative play.

Method

Sample

The teachers and children participating in this study were involved in a satellite project of the Dutch national cohort study pre-COOL that examines the effects of ECEC on child development in the Netherlands (Veen et al., 2012). The satellite project pre-COOL Groups is an observational in-depth study among teachers and children participating in pre-COOL. A total of 289 ECEC classrooms are involved in the larger pre-COOL study, serving 1,819 children who participate in the longitudinal child measurements of pre-COOL. For the pre-COOL Groups project, a purposive subsample of 87 ECEC centers (30%) was selected to obtain a balanced mixture of centers in rural and urban areas and of centers providing full-day and half-day programs. Centers that were involved in other intensive studies within pre-COOL were excluded.

Of the 87 contacted centers, 44 centers with 65 classrooms agreed to participate (51%). In two classrooms, parents objected to the video observation study. In the remaining 63 classrooms, parents consented to participation. For the analyses of this study, only classrooms were selected where at least three children had participated in the first wave of the pre-COOL child assessments. Data were collected from June 2011 to February 2012.

This selection procedure resulted in 120 focus children in 37 classrooms. Of these classrooms, 18 provided a half-day program (48.6%), the other classrooms provided full-day care. Of the 37 teachers, 11 had a non-Dutch cultural background: five teachers were Turkish- or Moroccan Dutch, four teachers were Surinamese- or Antillean Dutch, and two teachers originated from Eastern Europe. The classrooms varied in cultural diversity, with 17 classrooms in which the vast majority of the children were native Dutch (45.9%) and 12 classrooms in which the vast majority of the children had a nonnative Dutch cultural background (32.4%). In the remaining eight classrooms 40%–70% of the children had a nonnative Dutch cultural background.

The final child sample consisted of 65 boys and 55 girls between the ages of 28 and 45 months (M_{age} = 37.61 months, SD_{age} = 3.51). Of these children, 47 (39.8%) had a non-Western immigrant background. For almost half of the children (44.2%) further socioeconomic background information was missing, due to a low response rate on the parent questionnaire. Parental education of the remaining children ranged from not having had any formal education to having a university degree. Of 22% of the children, parents had had no postsecondary education, 21% of the parents had had postsecondary vocational education and training, and 57% of the parents had obtained a college degree.

Procedure

Classrooms were visited on two regular mornings within a 2-week time span. During these visits,

research assistants made video observations in the classrooms of four different situations, including mealtime, free play, and two guided play situations with a construction and a pretend play activity, respectively. This study focused on the guided play situations. All parents of the children present during the observations had consented to video observations.

To ensure comparability, researchers brought a standard set of play materials to the classrooms and provided the teachers with standard instructions. The teachers were asked to include at least all the pre-COOL children in the classroom and to play as they usually would do. No further instruction was given. This resulted in teachers playing with groups of two to nine children ($M = 6$, $SD = 1$). The pretend play activity involved a set of toy kitchen materials and toy food. The construction play activity involved a set of wooden train tracks and accessories. The research assistants were instructed to notify the teacher after 15 min that they had been filming for 15 min and to stop filming after 20 min. This was done to give the teachers the opportunity to finish the activity during the video observations.

Measures

Using the video segments, teacher and child behaviors in both play situations were observed and assessed with rating scales. The coded segments lasted between 12 and 15 min ($M = 14.89$, $SD = 0.48$). To avoid method-bound correlation of teacher and child scores, the behaviors of children and teachers were evaluated by different research assistants in separate sessions. In addition, assistants were assigned to different children and teachers in both play situations so that none of them rated the same child or teacher twice.

Classroom Measures

The CLASS Toddler (La Paro et al., 2009) was used to evaluate overall classroom process quality. A newly developed measure was used to evaluate teachers' strategies and initiatives to support group processes.

The CLASS Toddler assesses quality in two domains: emotional and behavioral support, and engaged support for learning. These domains comprise of several dimensions rated on a 7-point scale, ranging from *low* (1 or 2), *mid* (4), to *high* (6 or 7). The domain of emotional and behavioral support consists of five dimensions: positive climate, reflecting the warmth, respect, and enjoyment during the activity shown by the teacher and children; negative climate, reflecting the overall negativity expressed by the teacher and children (reverse coded); teacher sensitivity, defined as the extent to which the teacher is aware of and responsive to children's needs; regard for child perspective, specifying the degree to which children's interests and independence are encouraged and taken into account; and behavior guidance, assessing the teacher's ability to promote positive behavior and redirect negative behavior. The domain engaged support for learning combines three dimensions: facilitation of learning and development, reflecting the extent to which teachers facilitate activities that support learning and development; quality of feedback, assessing how well the teacher's feedback supports learning and participation; and language modeling, defined as the degree to which teachers foster, model, and encourage children's language use.

Five research assistants were trained by a licensed CLASS trainer. All observers were required to achieve at least 80% agreement within one scale point of the CLASS trainer on an online test (average agreement was 88%; agreement by chance is 33%) as recommended by the developers of the CLASS. After the coding was completed, the main researcher independently coded a random sample of 10 videos (about 14% of the sample) to control for observer drift. The average agreement within one scale point of the researcher ranged between 81% and 100% for the five research assistants. The descriptive statistics of the observed quality in all dimensions as well as the domain scores for both play situations are presented in Table 1.

To measure the extent to which teachers supported group processes, a 5-point Likert rating scale was developed, named support of group processes (for more information see appendix S1). The scale support of group processes consists of five indicators, ranging from *low* (1), *mid* (3) to *high* (5): organizational support of group processes, assesses the degree to which the teacher facilitates group processes, for example, by organizing a group-wise sitting arrangement as well as a group-wise activity, that is, a play or activity that can be carried out by a group working on a group aim or task; teacher–group sensitivity evaluates the extent to which the teacher is aware of and responsive to the needs of the group of children and tries to involve all children in the group, for example, by emphasizing group belongingness, continuously supporting children to engage in the activity and

Table 1
Descriptive Statistics of Classroom and Child Measures in Both Play Situations

	Pretend play			Constructive play		
	Range	*M*	*SD*	Range	*M*	*SD*
Classroom measures (*N* = 37)						
Emotional and behavioral support	3.60–6.20	5.07	0.61	4.00–6.20	5.14	0.53
Positive climate	3.00–7.00	5.08	1.01	3.00–7.00	5.24	0.89
Negative climate	1.00–2.00	1.32	0.48	1.00–2.00	1.30	0.46
Teacher sensitivity	2.00–6.00	4.70	0.88	3.00–6.00	4.92	0.76
Regard for child perspective	2.00–6.00	4.24	0.98	2.00–6.00	4.19	1.02
Behavior guidance	3.00–6.00	4.62	0.89	2.00–6.00	4.62	0.92
Engaged support for learning	1.33–5.33	3.28	0.88	2.00–5.33	3.53	0.84
Facilitation of learning and development	2.00–6.00	3.95	1.05	3.00–6.00	4.30	1.02
Quality of feedback	1.00–5.00	2.68	0.91	1.00–5.00	2.78	0.95
Language modeling	1.00–5.00	3.22	1.00	2.00–5.00	3.51	0.87
Support of group processes	1.60–3.80	2.44	0.55	1.20–4.00	2.33	0.63
Organizational support	2.00–4.00	2.92	0.72	2.00–5.00	2.95	0.94
Teacher–group sensitivity	1.00–5.00	2.95	0.84	1.00–5.00	2.78	0.95
Support of collaboration	1.00–5.00	2.38	0.79	1.00–4.00	2.24	0.80
Support of prosocial behavior	1.00–4.00	2.38	0.76	1.00–4.00	2.35	0.89
Support of mutual play regulation	1.00–3.00	1.57	0.73	1.00–3.00	1.32	0.63
n Children in group	3–10	5.6	1.4	4–9	5.9	1.5
Child measures (*N* = 120)						
Collaborative play	1.00–4.33	2.15	0.73	1.00–4.33	2.20	0.74
Collaboration	1.00–5.00	2.57	0.86	1.00–5.00	2.79	0.84
Prosocial behavior	1.00–5.00	2.45	1.11	1.00–5.00	2.23	1.39
Mutual play regulation	1.00–5.00	1.44	0.81	1.00–4.00	1.57	0.73

with each other; support of collaboration assesses the degree to which the teacher actively supports children's social awareness and responsiveness; support of prosocial behavior, reflects the extent to which the teacher supports, models, and encourages children's prosocial behaviors; finally, support of mutual play regulation assesses to what extent the teacher supports children to regulate each other's play behavior.

A high rating on this scale reflects a teacher who organizes the play setting as a group activity, such that children are gathered around the activity and can face each other. This teacher defines a clear common goal or task, for example, by saying "let's build the train tracks together." The teacher is sensitive to the group as a team, emphasizing group belongingness and trying to engage all children in the activity as group members. Furthermore, the teacher continuously directs children's attention to other children's actions, supports positive interactions, and models and rewards prosocial behavior and mutual play regulation among children. In contrast, a low rating on this scale reflects a teacher who does not organize the setting for a group activity, for instance, by not placing the children in a way that they can face each other. This teacher does not react when children disengage from the group. Although the teacher can be sensitive to individual children, he or she is not sensitive to the group as a whole. Interaction, prosocial behavior, and mutual play regulation among children are hardly supported.

One research assistant was trained by the first author, who developed the observation scale for support of group processes. Training took two half-days and began with a thorough description of the concept. At the end of training, two video segments were rated and the trainer and assistant discussed disagreement. After training, to assess interobserver reliability, both observers independently coded a random sample of video recordings of 12 teachers (about 32% of all teachers). The interobserver reliability was moderate-to-high with intraclass correlations (ICCs) for the different dimensions ranging between .63 and .80, using a two-way mixed-effect model with absolute agreement. The support of group processes average measures ICC was .74. The descriptive statistics of the dimensions as well as the domain scores in both play situations are presented in Table 1.

In addition to the classroom process quality measures, group size and cultural composition of the group were rated. Group size was assessed based on the average number of children present during the entire observation period. If an observation started with a teacher with two children and halfway through the session two other children joined the activity, the group size was assessed as three. Cultural composition of the group was assessed on a 10-point scale, based on teacher reports, with a score of 1 indicating that 0%–10% of all children had a non-Dutch cultural background and a score of 10 indicating that 90%–100% of all children had a non-Dutch cultural background.

Child Measures

A 5-point Likert scale was developed to assess each focus child's collaborative play behavior during the observation (for more information see Appendix S2). This scale, Child collaborative play, comprised three indicators, with scores ranging from *low* (1), *mid* (3), to *high* (5); child collaboration, referring to the degree to which a child is socially aware of peers, imitates peers, responds to peers, and builds upon other children's behavior; child prosocial behavior, assessing the degree to which a child is nice to other children, cares for other children, shares toys with other children, or helps other children; and child mutual play regulation, addressing the extent to which a child shares or discusses rules of the play with other children. Seven research assistants were trained on this scale by the first author. Following an extensive two half-days training, two video segments were rated independently by the assistants to determine whether they could continue with coding. Five assistants passed the preset reliability criterion of 80% agreement within one scale point difference from the first author and continued data collection. To assess interrater reliability throughout the coding process, at least 15% of the video segments assigned to each assistant were double coded. The collaborative play scale ICCs ranged between .65 and .87, using a two-way mixed-effect model with absolute agreement. Again, the descriptive statistics of the dimensions as well as the averaged domain scores in both play situations are presented in Table 1.

Children's cognitive ability was a composite score of receptive vocabulary and attention skills. Receptive vocabulary was measured with a short Dutch version of the Peabody Picture Vocabulary Test (Dunn & Dunn, 2005). The children were asked to point to one of four pictures that matched an orally presented word. Selective attention skills were assessed with a newly developed visual search task (Mulder et al., 2014) in which children were shown a display of 48 images of elephants, bears, and donkeys in the same size and color. Children were asked to locate as many targets as possible (the elephants) among its distractors (the bears and donkeys). As vocabulary and selective attention were found to be significantly positively correlated ($r = .44$, $p < .01$), they were standardized and pooled into one measure of cognitive ability for this study. Children varied significantly on this combined measure, with z scores ranging from −2.37 to 1.82 ($SD = 0.85$).

Children's social competence was based on teacher ratings of seven items of the Brief Infant–Toddler Social and Emotional Assessment Competence scale (Briggs-Gowan, Carter, Irwin, Wachtel, & Cicchetti, 2004). Sample items are "the child follows rules" and "the child looks for you (or other teacher) when upset," with scores ranging from *never* (1) to *always* (5). A scale score was computed as the mean score of the seven items ($\alpha = .73$).

Analysis Strategy

To gain insight in the level and quality of group processes in the ECEC classrooms involved in this study, descriptive statistics of classroom and child measures for both play situations were examined. For the two new scales, measurement equivalence across the two play situations was tested prior to pooling the situations. After confirming equivalence of the measures (see below), aggregated scores combining the two play situations were used in confirmatory factor analyses in Mplus (Version 7; Muthén & Muthén, 1998-2012) for all observation scales to test the factor structure of the scales. To reduce the number of variables in the main analysis in view of the small sample size at the group level, as well as to limit measurement error in our final model, the exported factor scores were used in further analyses instead of the averaged domain scores. At the child level, the sample size enabled the inclusion of the full factor model of collaborative play.

To answer the research questions, the relations among overall classroom quality, teachers' support of group processes, and children's collaborative play were examined in a single model. Given the nested structure of the data with three to five focus children per classroom, a two-level structural equation model was built. In this model, children's collaborative play skills were related to overall

classroom quality, teachers' support of group processes, group size, and cultural composition of the classroom at the classroom level. At the child level, collaborative play was related to age, cognitive ability, and social competence.

Information on age was missing for 1 child and for 11 children the measure of cognitive ability was missing. These children were evenly spread over different groups and did not differ significantly in age, $t(117) = -.12$, $p = .91$, or collaborative play skills, $t(118) = -.42$, $p = .68$, from the rest of the sample. For 56 children, teacher ratings on social competence were missing. The children with and without ratings did not differ significantly in age, $t(117) = 1.30$, $p = .20$, cognitive ability, $t(107) = .60$, $p = .55$), collaborative play, $t(118) = 1.04$, $p = .30$, or teachers' support of group processes, $t(118) = 1.23$, $p = .22$, indicating missing at random. Missing data were dealt with by using full-information-maximum-likelihood estimation in Mplus (Muthén & Muthén, 1998-2012). Model fit was deemed acceptable if the chi-square goodness-of-fit statistic was not significant ($p > .05$), the root mean square error of approximation was smaller than .08, and the comparative fit index (CFI) exceeded .90 (Hox, 2010).

Results

Descriptives

Table 1 presents descriptive statistics of the classroom and child measures in both play situations.

All groups scored medium to high on emotional and behavioral support. On engaged support for learning some groups scored low to medium; the average score of all groups was below medium. Within the emotional and behavioral support domain, a lack of variation was found on the dimension negative climate, with all groups scoring 1 or 2, indicating that hardly any negativity was observed.

The groups on average showed low-to-medium support of group processes. Within this dimension, particularly the teachers' support of group play regulation was rated between low and medium, and showed less variation between groups and lower scores overall than the other indicators. On average, individual children's collaborative play skills were evaluated low to medium. In particular, mutual play regulation was rated rather low on average, indicating overall infrequent mutual play regulation, but the scores did show a considerable range from low to high. On all other scales, teachers and children showed considerable variation as well.

Following the CLASS guidelines (La Paro et al., 2009), first overall classroom quality domain scores were calculated for the two play situations. The two-factor structure of overall classroom quality, with a factor emotional and behavioral support and a factor engaged support for learning was tested using confirmatory factor analysis. However, this factor structure could not be estimated in Mplus due to the lack of variance in the dimension negative climate, replicating findings in other European studies (Pakarinen et al., 2010; Slot et al., 2015). The confirmatory factor analysis without the dimension negative climate yielded good model fit, $\chi^2(13) = 11.40$, $p = .58$; CFI = 1.00; root mean square error of approximation (RMSEA) = .00. Factor loadings ranged between .42 and .95 for emotional and behavioral support and between .83 and .90 for engaged support for learning.

Before combining scores of the two play situations on teachers' support of group processes and children's collaborative play, measurement equivalence across the play situations was tested using Mplus. In both play situations, teachers' support of group processes consisted of five indicators, and the factor loadings and intercepts of these indicators could be constrained to be equal across the two play situations, confirming scalar invariance, $\chi^2(20) = 28.89$, $p = .09$; CFI = 0.91; RMSEA = .06. Following this, the scores per indicator for both play situations were combined and a single-factor model with the five combined indicators was tested. The single-factor support of group processes model revealed good model fit, $\chi^2(5) = 6.14$, $p = .29$; CFI = 0.98; RMSEA = .08. Factor loadings ranged between .58 and .98, indicating satisfactory internal consistency (Tabachnik & Fidell, 2013). In view of the small sample size at the classroom level, extracted factor scores of all quality measures, including the CLASS measures, were used in the final analysis instead of the full factor models.

The collaborative play factor consisted of three indicators. Again the factor loadings and intercepts of the indicators could be constrained to be equal across play situations, confirming scalar invariance, $\chi^2(30) = 41.02$, $p = .09$; CFI = 0.93; RMSEA = .06. After combining the scores per indicator for both play situations, a one-factor model with three indicators was estimated, yielding a fully saturated model. Factor loadings ranged between .50 and .83, again indicating satisfactory internal consistency. Given the focus of the study on collaborative play and considering the sample size at the child level,

the full factor model was included in the final analyses.

Classroom Quality and Child Collaborative Play

Given the nested data, a two-level structural equation model was examined to answer both research questions. The first research question addressed the relation between teachers' support of group processes and classroom quality. The second research question investigated the relation among classroom process quality, teachers' support of group processes, and children's collaborative play skills, controlling for age and cognitive ability of the children. Before testing these relations, an empty two-level model of collaborative play without predictors was tested to determine the amount of variance in collaborative play that could be explained at the classroom level (Hox, 2010). In this model, factor loadings were constrained to be equal at both the child and the classroom level, assuming that the factor structure of collaborative play does not differ between classroom and child level (Jak, Oort, & Dolan, 2013, 2014). This model fitted the data well, $\chi^2(5) = 2.46$, $p = .78$; CFI = 1.00; RMSEA = .00. With an average cluster size of 3.24, the intraclass correlation coefficients (ICCs) for the collaborative play indicators were .08 for collaboration, .05 for prosocial behavior, and .10 for mutual play regulation. The variance of the factor collaborative play at the classroom level was .11 and not statistically significant ($p = .43$) but did account for 10% of the total variance. This percentage was calculated by dividing the variance at the classroom level by the total variance of the factor (Jak et al., 2013). As the focus of this study is on classroom-level quality and its relation with children's collaborative play, and both the ICCs of collaborative play as well as the percentage of explained variance at the classroom level (10%) were medium sized, we continued the analysis by adding the predictors to the model.

Next, all hypothesized predictors of children's collaborative play at the child and classroom level were included in the model. At the child level, age, cognitive ability, and social competence were included in the model. At the classroom level, emotional and behavioral support, engaged support for learning, support of group processes, group size, and the cultural composition of the group were included in the model. Correlations between all study variables in the model can be found in Table 2.

The full model with all predictors fit the data well, $\chi^2(29) = 33.54$, $p = .26$; CFI = 0.96; RMSEA = .04. In this final model, the ICCs of collaboration, prosocial behavior, and mutual play regulation were .05, .05, and .10, respectively. The residual variance of the collaborative play factor at the classroom level was .02 ($p = .93$), indicating that nearly all variance at the classroom level (10% in the model without predictors) could be explained by the classroom-level predictors included in the model. The final model, with standardized parameter estimates, is depicted in Figure 1.

As the final model contained missing values in the variable social competence, the model was also tested in a subsample with only complete data. This

Table 2
Bivariate Correlations for Study Variables

	E&BS[a]	ESofL[b]	SoGP[c]	GrS[d]	CC[e] %	CP[f]	Age	CognA[g]
Classroom measures ($N = 37$)								
Emotional and behavioral support	1							
Engaged support for learning	.72*	1						
Support of group processes	.42*	.47*	1					
Group size	.08	.11	.19	1				
Cultural composition	.06	.06	.18	−.05	1			
Aggregated child collaborative play	.05	−.06	.21	.17	−.14			
Child measures ($N = 120$)								
Collaborative play						1		
Age						.11	1	
Cognitive ability						.25*	.05	
Social competence						−.09	−.07	.23†

[a]Emotional and behavioral support. [b]Engaged support for learning. [c]Support of group processes. [d]Group size. [e]Cultural composition. [f]Collaborative play. [g]Cognitive ability. *$p < .05$. †$p < .10$.

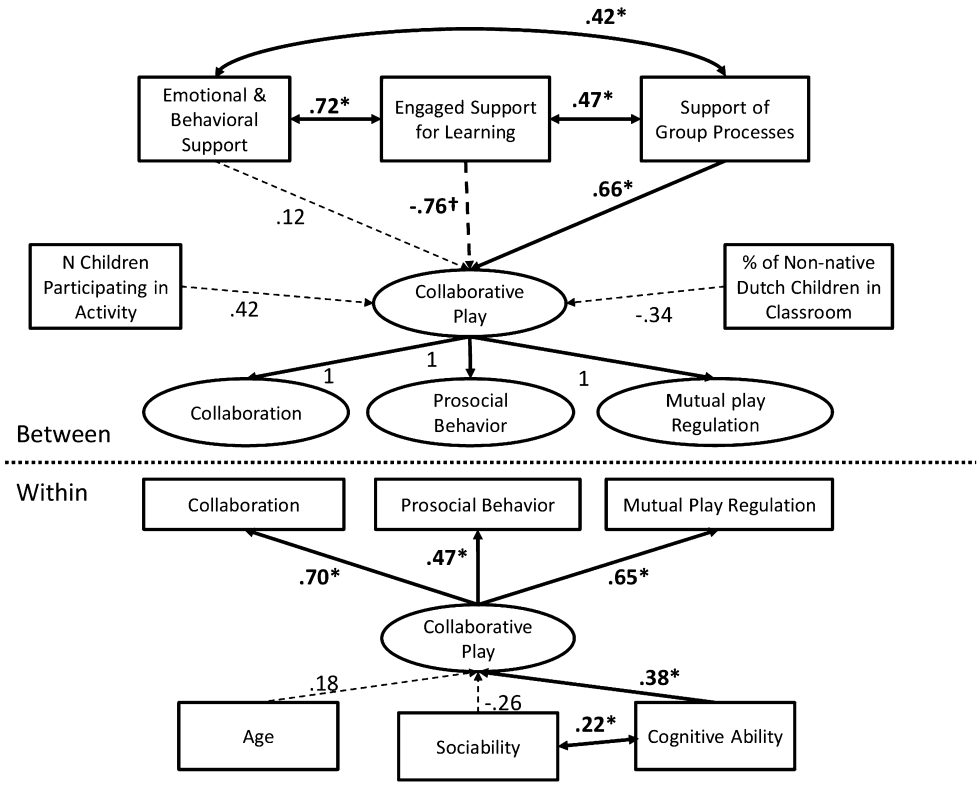

Figure 1. Final model of the relation between classroom quality aspects and children's collaborative play, controlled for age, cognitive ability, and social competence at the child level. Figure presents standardized coefficients for all paths in final model. Dashed lines indicate nonsignificant parameters. Factor loadings of collaborative play indicators at the classroom level are 1, as they are constrained to be equal to the child level. Chi-square = 33.54, $df = 29$, $p = .26$, CFI = .96, RMSEA = .04, CFI: Comparative Fit Index; RMSEA: Root Mean Square Error of Approximation. $^{*}p < .05$. $^{\dagger}p < .10$.

resulted in a model with adequate fit and similar coefficient estimates, yet some coefficients were no longer significant due to the smaller sample size, $\chi^2(32) = 27.85$, $p = .68$. Overall, the results confirmed the assumption that the data were missing at random.

To answer the first research question, relations between classroom quality and teachers' support of group processes at the classroom level are addressed. As expected, emotional and behavioral support and engaged support for learning were strongly related in the final model. In addition, a smaller positive relation was found between support of group processes and both emotional and behavioral support and engaged support for learning, indicating adequate convergent as well as discriminant validity of the new measure.

The second research question addressed the relation between overall classroom quality, teachers' support of group processes, and children's collaborative play skills, controlling for age, cognitive ability, and social competence. In the final model, most variance in children's collaborative play was associated with individual child characteristics. In particular, a moderate relation was found between children's cognitive ability as tested and their collaborative play as observed, whereas teacher-rated social competence was not related to observed collaborative play. At the classroom level, a positive relation with a small-to-medium effect size was found between teachers' classroom-level support of group processes and children's collaborative play. Second, a marginally significant ($p < .10$) negative relation was found between classroom-level engaged support for learning and children's collaborative play. Emotional and behavioral support was not related to children's collaborative play. Neither group size nor the cultural composition of the group significantly predicted variance in collaborative play.

Discussion

This study reports the results of an exploratory study on the potential value of a group-centered approach to the definition and measurement of

process quality in ECEC. For this purpose two new measures were developed, assessing teachers' support of group processes and individual children's collaborative play, respectively. Although these measures have to be validated more extensively in future research, the present results indicate satisfactory intercoder reliability, internal consistency, and convergent and discriminant validity.

Our findings show that, in addition to existing measures of classroom quality, teachers' support of group processes can be of value to evaluate the quality of ECEC. Although teachers' support of group processes was positively related to emotional and behavioral support as well as to engaged support for learning, the newly developed scale differs from these existing measures as it evaluates more specifically teachers' ability to organize and guide a group of children. In our study, teachers showed low-to-moderate support of group processes. This confirms previous findings that, even though teachers in ECEC take care of children in a group setting every day, their behavioral repertoire in dealing with a group is limited (Kutnick et al., 2007; Van Schaik et al., 2014).

Our multivariate model confirms a positive, significant relation between teachers' support of group processes and children's collaborative play. Teachers' emotional and behavioral support of children, however, was not related to children's collaborative play in this study. A possible explanation is that the CLASS domain emotional and behavioral support assesses the general classroom climate as well as characteristics of dyadic teacher–child interactions, such as teachers' sensitivity to individual children's needs and teachers' regard for children's perspectives, but does not evaluate teachers' support of interactions between children or their collaboration in group activities. Thus, the classroom could be rated as emotionally very supportive in a situation in which all children are happily playing solitarily while being individually well-supported by the teacher, who shows high regard for each child's individual perspective. The score for supporting collaborative play, however, would be very low in this situation. This difference in emphasis likely explains the lack of a correlation between the two measures.

Also unexpected was the negative relation, although only marginally significant, between the CLASS domain engaged support for learning and children's collaborative play. It should be noted that engaged support for learning was positively associated with both emotional and behavioral support and teachers' support of group processes. The finding suggests that, when combined with support of group processes, the nonshared part of the variance in engaged support for learning is negatively related to children's collaborative play. A possible explanation is that engaged support for learning also encompasses teacher-directed approaches to learning in which children are not specifically supported to interact and collaborate with each other. For example, teachers who adopt a directive teaching style are likely to score medium on engaged support for learning as they do initiate learning processes, yet this teaching style does not promote child–child interactions and collaborative group processes. The present results are in line with claims that currently widely used quality measures mainly focus on teacher–child interactions but tend to underemphasize collaborative child–child interactions (Burchinal, 2010; Rosenthal, 2003). The present findings, in this regard, also provide initial evidence that a teacher–group approach to quality in early childhood classrooms does not overlap with these quality measures and, therefore, could be of added value to these measures.

Only 10% of the variance in children's collaborative play could be explained at the classroom level. There are a number of possible explanations. First, there was limited variance in children's collaborative play. Note that, in correspondence with previous findings (Girard et al., 2011; Van Schaik et al., 2014), children in this study showed low-to-moderate levels of collaborative play, on average. Only a few children showed higher levels of collaborative play, which could be mainly due to individual child characteristics and less so to group characteristics or to teachers' support of group processes. The collaborative play scale was specifically developed for children in the 2–4 years age range. Still, the children in this study may have been rather young for engaging in elaborate collaborative play (Howes et al., 2008). Note that the level of cognitive ability was especially predictive of collaborative play, which could imply that children's developmental stage is an important determinant of collaborative play. Second, there was also little variance in teachers' support of group processes. Most teachers scored rather low on the observation measure, suggesting that they are not used to supporting group processes, as was found in previous studies (Girard et al., 2011; Kutnick et al., 2007; Williams et al., 2010). This suggests that there is room for improvement, both in teacher practice and in teacher training. The potential effect of support of group processes can be bigger if more support is provided than found in this study.

Children's social competence was not related to children's collaborative play. A possible explanation is that both measures capture different aspects of children's social behavior in early childhood classrooms. Children's social competence was a teacher-rated measure of broad social competence, encompassing children's competence to interact with peers ("plays well with peers") but also children's compliance with social rules ("child follows rules") and other aspects of social competence that do not directly relate to collaboration in group activities. Children's competence in collaborative play, in contrast, was based on direct observation of children's interactions with peers, their prosocial behavior, and mutual play regulation during group play. In addition, part of children's collaborative play involved cognitive processes, such as establishing a shared imaginary world, planning the play activity, and coconstructing solutions to particular problems that may emerge during the activity. This may explain why the composite measure of children's cognitive ability, based on tested vocabulary and attention skills, did show a relatively strong relation with the collaborative play measure.

As discussed in the introduction, evidence on the influence of group size or cultural composition of the group on the developmental effects of ECEC remains inconclusive (Howes et al., 2011; Master & Walton, 2013; Morrissey, 2010). This study found no relation between group size or cultural composition of the group and children's collaborative play. In the staged observations of this study, child characteristics as well as teachers' support of group processes were more important for children's collaborative play. Note, however, that the maximum group size in this study was nine. A different result might have been found with far bigger groups.

This study was conducted in ECEC classrooms in the Netherlands. Quality of ECEC in the Netherlands is, on average, moderate to high in the emotional domain and low to moderate in the educational domain, which is similar to other European countries (Slot et al., 2015). A difference with other ECEC contexts is that the quantity of ECEC attendance in the Netherlands is rather low. Most children attend ECEC on average 2–3 days per week (Van Schaik, 2016). Previous studies found that effects of ECEC on children's development are stronger when children spend more hours in early childhood education (Burchinal et al., 2008; Votruba-Drzal, Levine Coley, and Chase-Lansdale. 2004). Given the limited attendance in ECEC in the Netherlands, the relations found in this study could be stronger among children attending ECEC full-time. Several limitations should be considered with regard to the present results. Although the size of the sample at the child level was sufficient, the study included only a rather small sample of classrooms, with consequences for the power of the study to detect the hypothesized relations at the classroom level. Note, however, that we did find a significant relation at the classroom level between teachers' support of group processes and children's collaborative play. A second limitation is that video observations were made during staged play situations with materials and instructions provided by the researchers. This limits the generalizability of our findings to everyday practice, as research procedures may have influenced teacher and child behaviors. A third limitation is the lack of information on socioeconomic status (SES) of part of the sample. Not knowing SES of the full sample limits the generalizability of these findings. A third limitation is that this study used newly developed rating scales, which were not validated yet. Note, however, that the new rating scales used in this study could be reliably used by different observers, showed measurement equivalence across two different play situations, had satisfactory internal consistency, and revealed adequate convergent and discriminant validity. The present findings also confirm previous findings by Van Schaik et al. (2014) using initial versions of these rating scales in a different sample of teachers and children in the Netherlands.

A final limitation is that this study was correlational. No causal conclusions can be drawn. Moreover, the observed relations between teacher and child behaviors could be interpreted as reflecting mere situational contingency, as teacher and child behaviors were measured in the same situation without clear clues about the directionality of the relation. The use of multilevel modeling in this study deals with this issue to at least some extent by partitioning the total observed variance in collaborative play in a component that was related to individual children and their characteristics, and a component that was shared between children within one classroom. The current finding that a significant part of the shared variance in collaborative play at the classroom level was related to teachers' support of group processes, whereas controlling for other classroom level factors lends support to the interpretation that teachers indeed can influence the quality of group processes among children (Hox, 2010). However, to rule out the hypothesis of mere situational contingency

completely, future research should examine to what extent teachers' support of group processes in one situation predicts children's collaborative play in a next situation.

Future studies could further define quality in a group-centered perspective and investigate effects of support of group processes on other aspects of classroom quality and child behavior. An interesting future direction would also be to include teachers' support of group processes in larger studies investigating the impact of the quality of ECEC, using a longitudinal design and addressing the question of whether support of group processes adds to the developmental effects of ECEC, in both the social and cognitive domain.

This study is one of the few studies to date evaluating the quality of ECEC by applying a group-centered approach. Our study suggests that in classrooms where teachers support group processes well, children show higher levels of collaborative play, which is in line with previous studies showing the importance of group processes for children's social and cognitive development (Girard et al., 2011; Williams et al., 2010). In addition to the importance of teachers' sensitivity to the group for children's attachment to their teacher and peers in ECEC (Ahnert et al., 2006; Maccoby & Lewis, 2003), several studies have highlighted the relation between collaborative play and children's social and cognitive development (Elias & Berk, 2002; Howes et al., 2011). If higher quality of group processes can indeed lead to stronger engagement of children in collaborative play, this could also strengthen effects of ECEC on children's social and cognitive development. To conclude, this study is one of the first studies to investigate recent proposals by several researchers (Burchinal, 2010; Maccoby & Wilson, 2003; Kutnick et al., 2007; Rosenthal, 2003) that the current conceptualization of ECEC process quality could be enriched by adding a group-centered approach to the definition and measurement of process quality.

References

Ahnert, L., Pinquart, M., & Lamb, M. E. (2006). Security of children's relationships with nonparental care providers: A meta-analysis. *Child Development*, *77*, 664–679. https://doi.org/10.1111/j.1467-8624.2006.00896.x

Bodrova, E., Leong, D. J., & Akhutina, T. V. (2011). When everything new is well-forgotten old: Vygotsky/Luria insights in the development of executive functions. In R. M. Lerner, J. V. Lerner, E. P. Bowers, S. Lewin-Bizan, S. Gestsdottir, & J. B. Urban (Eds.), *Thriving in childhood and adolescence: The role of self-regulation processes. New directions for child and adolescent development* (Vol. 133, pp. 11–28). San Francisco, CA: Jossey-Bass. https://doi.org/10.1002/cd.301

Briggs-Gowan, M. J., Carter, A. S., Irwin, J. R., Wachtel, K., & Cicchetti, D. V. (2004). The brief infant-toddler social and emotional assessment: Screening for social-emotional problems and delays in competence. *Journal of Pediatric Psychology*, *29*, 143–155. https://doi.org/10.1093/jpepsy/jsh017

Brown, W., Odom, S., & Conroy, M. (2001). An intervention hierarchy for promoting preschool children's peer interactions in naturalistic environments. *Topics in Early Childhood Special Education*, *21*, 162–175. https://doi.org/10.1177/027112140102100304

Burchinal, M. (2010). *Differentiating among measures of quality: Key characteristics and their coverage in existing measures*. OPRE Research-to-Policy, Research-to-Practice Brief OPRE 2011-10b, Washington, DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services.

Burchinal, M., Vandergrift, N., Pianta, R., & Mashburn, A. (2010). Threshold analysis of association between child care quality and child outcomes for low-income children in pre-kindergarten programs. *Early Childhood Research Quarterly*, *25*, 166–176. https://doi.org/10.1016/j.ecresq.2009.10.004

Chavajay, P., & Rogoff, B. (2002). Schooling and traditional collaborative social organization of problem solving by Mayan mothers and children. *Developmental Psychology*, *38*, 55–66. https://doi.org/10.1037/0012-1649.38.1.55

Diamond, A., & Lee, K. (2011). Interventions shown to aid executive function development in children 4 to 12 years old. *Science*, *333*, 959–964. https://doi.org/10.1126/science.1204529

Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., . . . Japel, C. (2007). School readiness and later achievement. *Developmental Psychology*, *43*, 1428–1446. https://doi.org/10.1037/0012-1649.43.6.1428

Duncan, G., & Magnuson, K. (2011). The nature and impact of early achievement skills, attention and behavior problems. In G. Duncan & R. Murnane (Eds.), *Social inequality and educational disadvantage*. (pp. 47–69) New York, NY: Russell Sage Foundation.

Dunn, L. M., & Dunn, L. M. (2005). *Peabody Picture Vocabulary Test-III-NL, Nederlandse versie door Liesbeth Schlichting [Dutch version by Liesbeth Schlichting]*. Amsterdam, The Netherlands: Harcourt Assessment B.V.

Eckerman, C. O., & Whitehead, H. (1999). How toddler peers generate coordinated action: A cross-cultural exploration. *Early Education and Development*, *10*, 241–266. https://doi.org/10.1207/s15566935eed1003_2

Elias, C. L., & Berk, L. E. (2002). Self-regulation in young children: Is there a role for sociodramatic play? *Early Childhood Research Quarterly*, *17*, 216–238. https://doi.org/10.1016/s0885-2006(02)00146-1

Fabes, R. A., Hanish, L. D., & Martin, C. L. (2003). Young children at play: The role of peers in understanding the effects of child care. *Child Development*, *74*, 1039–1043. https://doi.org/10.1111/1467-8624.00586

Fantuzzo, J., Coolahan, K., Mendez, J., McDermott, P., & Sutton-Smith, B. (1998). Contextually-relevant validation of peer play constructs with African American Head Start children: Penn interactive peer play scale. *Early Childhood Research Quarterly*, *13*, 411–431. https://doi.org/10.1016/s0885-2006(99)80048-9

Gevers Deynoot-Schaub, M. J. J. M., & Riksen-Walraven, J. M. A. (2006). Peer interaction in child care centres at 15 and 23 months: Stability and links with children's socio-emotional adjustment. *Infant Behavior and Development*, *29*, 276–288. https://doi.org/10.1016/j.infbeh.2005.12.005

Girard, L., Girolametto, L., Weitzman, E., & Greenberg, J. (2011). Training early childhood educators to promote peer interactions: Effects on children's aggressive and prosocial behaviors. *Early Education and Development*, *22*, 305–323. https://doi.org/10.1080/10409281003668060

Gunnar, M. R., Kryzer, E. M., Phillips, D., & Vandell, D. (2001). *Modified observational ratings of the caregiving environment (M-ORCE)*. Unpublished coding instrument and manual.

Harms, T., Clifford, R. M., & Cryer, D. (1998). *Early childhood environment rating scale—revised*. New York, NY: Teachers College Press.

Hay, D. F., Payne, A., & Chadwick, A. (2004). Peer relations in childhood. *Journal of Child Psychology and Psychiatry*, *45*, 84–108. https://doi.org/10.1046/j.0021-9630.2003.00308.x

Helmerhorst, K. O. W., Riksen-Walraven, J. M., Vermeer, H. J., Fukkink, R. G., & Tavecchio, L. W. C. (2014). Measuring the interactive skills of caregivers in child care centers: Development and validation of the caregiver interaction profile scales. *Early Education and Development*, *25*, 770–790. https://doi.org/10.1080/10409289.2014.840482

Howes, C. (1980). Peer play scale as an index of complexity of peer interaction. *Developmental Psychology*, *16*, 371–372. https://doi.org/10.1037/0012-1649.16.4.371

Howes, C., & Matheson, C. C. (1992). Sequences in the development of competent play with peers: Social and social pretend play. *Developmental Psychology*, *28*, 961–974. doi: 10.1037/0012-1649.28.5.961

Howes, C., Sanders, K., & Lee, L. (2008). Entering a new peer group in ethnically and linguistically diverse childcare classrooms. *Social Development*, *17*, 922–940. https://doi.org/10.1111/j.1467-9507.2008.00472.x

Howes, C., & Smith, E. W. (1995). Relations among child-care quality, teacher behavior, children's play activities, emotional security, and cognitive activity in childcare. *Early Childhood Research Quarterly*, *10*, 381–404. https://doi.org/10.1016/0885-2006(95)90013-6

Howes, C., Unger, O., & Seidner, L. B. (1989). Social pretend play in toddlers: Parallels with social play and with solitary pretend. *Child Development*, *60*, 77–84. https://doi.org/10.2307/1131073

Howes, C., Wishard Guerra, A., Fuligni, A., Zucker, E., Lee, L., Obregon, N. B., & Spivak, A. (2011). Classroom dimensions predict early peer interaction when children are diverse in ethnicity, race, and home language. *Early Childhood Research Quarterly*, *26*, 399–408. https://doi.org/10.1016/j.ecresq.2011.02.004

Hox, J. J. (2010). *Multilevel analysis* (2nd ed.). New York, NY: Routledge.

Ishimine, K., & Tayler, C. (2013). Assessing quality in early childhood education and care. *European Journal of Education*, *49*, 272–290. https://doi.org/10.1111/ejed.12043

Jak, S., Oort, F. J., & Dolan, D. V. (2013). A test for cluster bias: Detecting violations of measurement invariance across clusters in multilevel data. *Structural Equation Modeling*, *20*, 265–282. https://doi.org/10.1080/10705511.2013.769392

Jak, S., Oort, F. J., & Dolan, D. V. (2014). Measurement bias in multilevel data. *Structural Equation Modeling*, *21*, 31–39. https://doi.org/10.1080/10705511.2014.856694

Justice, L. M., Petscher, Y., Schatschneider, C., & Mashburn, A. (2011). Peer effects in preschool classrooms: Is children's language growth associated with their classmates' skills? *Child Development*, *82*, 1768–1777. https://doi.org/10.1111/j.1467-8624.2011.01665.x

Kutnick, P., Brighi, A., Avgitidou, S., Genta, M. L., Hännikäinen, M., Karlsson-Lohmander, M., . . . Lovqvist, M. (2007). The role and practice of interpersonal relationships in European early education settings: Sites for enhancing social inclusion, personal growth and learning? *European Early Childhood Education Research Journal*, *15*, 379–406. https://doi.org/10.1080/13502930701679429

La Paro, K. M., Hamre, B. C., & Pianta, R. C. (2009). *The classroom assessment scoring system, toddler version*. Charlottesville, VA: Teachstone.

Leseman, P. P. M., Rollenberg, L., & Rispens, J. (2001). Playing and working in kindergarten: Cognitive co-construction in two educational situations. *Early Childhood Research Quarterly*, *16*, 363–384. https://doi.org/10.1016/s0885-2006(01)00103-x

Maccoby, E. E., & Lewis, C. C. (2003). Less day care or different day care? *Child Development*, *74*, 1069–1075. https://doi.org/10.1111/1467-8624.00592

Mashburn, A. J., Pianta, R. C., Hamre, B. K., Downer, J. T., Barbarin, O. A., Bryant, D., . . . Howes, C. (2008). Measures of classroom quality in prekindergarten and children's development of academic, language, and social skills. *Child Development*, *79*, 732–749. https://doi.org/10.1111/j.1467-8624.2008.01154.x

Master, A., & Walton, G. M. (2013). Minimal groups increase young children's motivation and learning on group-relevant tasks. *Child Development*, *84*, 737–751. https://doi.org/10.1111/j.1467-8624.2012.01867.x

Mejía-Arauz, R., Rogoff, B., Dexter, A., & Najafi, B. (2007). Cultural variation in children's social

organization. *Child Development*, *78*, 1001–1014. https://doi.org/10.1111/j.1467-8624.2007.01046.x

Melhuish, E. C. (2011). Preschool matters. *Science*, *333*, 299–300. https://doi.org/10.1126/science.1209459

Morrissey, T. W. (2010). *Sequence of child care type and child development: What role does peer exposure play? Early Childhood Research Quarterly*, *25*, 33–50. https://doi.org/10.1016/j.ecresq.2009.08.005

Morrissey, T. W. (2010). Sequence of child care type and child development: What role does peer exposure play? *Early Childhood Research Quarterly*, *25*, 33–50. https://doi.org/10.1016/j.ecresq.2009.08.005

Mulder, H., Hoofs, H., Verhagen, J., van der Veen, I., & Leseman, P. P. M. (2014). Psychometric properties and convergent and predictive validity of an executive function test battery for two-year-olds. *Frontiers in Psychology*, *5*, 1–17. https://doi.org/10.3389/fpsyg.2014.00733

Muthén, L. K., & Muthén, B. O. (1998-2012). *Mplus user's guide* (7th ed.). Los Angeles, CA: Authors.

Nsamenang, A. B. (2006). Human ontogenesis: An indigenous African view on development and intelligence. *International Journal of Psychology*, *41*, 293–297. https://doi.org/10.1080/00207590544000077

Organization for Economic Cooperation and Development (OECD). (2011). *Starting Strong III: A quality toolbox for early childhood education and care*. Paris, France: Author. https://doi.org/10.1787/9789264123564-en

Pakarinen, E., Lerkkanen, M., Poikkeus, A., Kiuru, N., Siekkinen, M., Rasku-Puttonen, H., & Nurmi, J. (2010). A validation of the classroom assessment scoring system in Finnish kindergartens. *Early Education and Development*, *21*, 95–124. https://doi.org/10.1080/10409280902858764

Phillips, D. A., & Lowenstein, A. E. (2011). Early care, education, and child development. *Annual Review of Psychology*, *62*, 483–500. https://doi.org/10.1146/annurev.psych.031809.130707

Pianta, R. C., La Paro, K. M., & Hamre, B. K. (2008). *Classroom Assessment Scoring System (CLASS) manual, Pre-K*. Baltimore, MD: Brookes Publishing.

Reid, J. L., & Ready, D. D. (2013). High-quality preschool: The socioeconomic composition of preschool classrooms and children's learning. *Early Education & Development*, *24*, 1082–1111. https://doi.org/10.1080/10409289.2012.757519

Rhoades, B. L., Warren, H. K., Domitrovich, C. E., & Greenberg, M. T. (2011). Examining the link between preschool social-emotional competence and first grade academic achievement: The role of attention skills. *Early Childhood Research Quarterly*, *26*, 182–191. https://doi.org/10.1016/j.ecresq.2010.07.003

Rogoff, B. (2003). *The cultural nature of human development*. Oxford, UK: Oxford University Press.

Rosenthal, M. K. (2003). Quality in early childhood education and care: A cultural context. *European Early Childhood Education Research Journal*, *11*, 101–116. https://doi.org/10.1080/13502930385209191

Serpell, R. (2011). Social responsibility as a dimension of intelligence, and as an educational goal: Insights from programmatic research in an African society. *Child Development Perspectives*, *5*, 126–133. https://doi.org/10.1111/j.1750-8606.2011.00167.x

Singer, E. (1993). Shared care for children. *Theory and Psychology*, *3*, 429–449. https://doi.org/10.1177/0959354393034003

Slot, P. L., Leseman, P. P. M., Verhagen, J., & Mulder, H. (2015). Associations between structural quality aspects and process quality in Dutch early childhood education and care settings. *Early Childhood Research Quarterly*, *33*, 46–76. https://doi.org/10.1016/j.ecresq.2015.06.001

Super, C. M., Harkness, S., Barry, O., & Zeitlin, M. (2011). Think locally, act globally: Contributions of African research to child development. *Child Development Perspectives*, *5*, 119–125. https://doi.org/10.1111/j.1750-8606.2011.00166.x

Tabachnik, B. G., & Fidell, L. S. (2013). *Using multivariatie statistics* (6th ed.). Boston, MA: Pearson.

Van Schaik, S. D. M. (2016). *Let's play together. Cultural diversity in early childhood education and care* (Doctoral dissertation). Utrecht, The Netherlands: Utrecht University.

Van Schaik, S. D. M., Leseman, P. P., & Huijbregts, S. K. (2014). Cultural diversity in teachers' group-centered beliefs and practices in early childcare. *Early Childhood Research Quarterly*, *29*, 369–377. https://doi.org/10.1016/j.ecresq.2014.04.007

Vandell, D. (2004). Early child care: The known and the unknown. *Merrill-Palmer Quarterly*, *50*, 387–414. https://doi.org/10.1353/mpq.2004.0027

Veen, A., Veen, I., Heurter, A., Ledoux, G., Mulder, L., & Paas, T., . . . Slot, P. (2012). *Pre-COOL cohortonderzoek. technisch rapport tweejarigencohort, eerste meting 2010-2011. [Pre-COOL cohort study. Technical report two-year-olds cohort, first measurement 2010-2011]*. Amsterdam, The Netherlands: Kohnstamm Instituut.

Vermeer, H. J., & Van IJzendoorn, M. H. (2006). Children's elevated cortisol levels at child care: A review and meta-analysis. *Early Childhood Research Quarterly*, *21*, 390–401. https://doi.org/10.1016/j.ecresq.2006.07.004

Votruba-Drzal, E., Coley, R. L., & Chase-Lansdale, P. L. (2004). Child care and low-income children's development: Direct and moderated effects. *Child Development*, *75*(1), 296–312. https://doi.org/10.1111/j.1467-8624.2004.00670.x

Watamura, S. E., Donzella, B., Alwin, J., & Gunnar, M. R. (2003). Morning-to-afternoon increases in cortisol concentrations for infants and toddlers at child care: Age differences and behavioral correlates. *Child Development*, *74*, 1006–1020. https://doi.org/10.1111/1467-8624.00583

Weiland, C., & Yoshikawa, H. (2014). Does higher peer socio-economic status predict children's language and executive function skills gains in prekindergarten? *Journal of Applied Developmental Psychology*, *35*, 422–432. https://doi.org/10.1016/j.appdev.2014.07.001

Welsh, J. A., Nix, R. L., Blair, C., Bierman, K. L., & Nelson, K. E. (2010). The development of cognitive

skills and gains in academic school readiness for children from low-income families. *Journal of Educational Psychology*, *102*, 43–53. https://doi.org/10.1037/a0016738

Whitebread, D., Bingham, S., Grau, V., Pasternak, D. P., & Sangster, C. (2007). Development of metacognition and self-regulated learning in young children: Role of collaborative and peer-assisted learning. *Journal of Cognitive Education and Psychology*, *6*, 433–455. https://doi.org/10.1891/194589507787382043

Williams, S. T., Mastergeorge, A. M., & Ontai, L. L. (2010). Caregiver involvement in infant peer interactions: Scaffolding in a social context. *Early Childhood Research Quarterly*, *25*, 251–266. https://doi.org/10.1016/j.ecresq.2009.11.004

Wishard, A. G., Shivers, E. M., Howes, C., & Ritchie, S. (2003). Child care program and teacher practices: Associations with quality and children's experiences. *Early Childhood Research Quarterly*, *18*, 65–103. https://doi.org/10.1016/s0885-2006(03)00007-3

Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's website:

Appendix S1. Van Schaik & Leseman (2017). Support of Group Processes in ECEC; Manual. Utrecht: Utrecht University.

Appendix S2. Van Schaik & Leseman (2017). Collaborative Play in ECEC; Manual. Utrecht: Utrecht University.