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Individual children's interactions with teachers, peers, and tasks: The applicability of the inCLASS Pre-K in Danish preschools

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ABSTRACT

Social competence in a preschool setting, defined as children's success in interacting with peers and teachers, and showing adaptive classroom and task-related behavior, has shown to be predictive of subsequent positive social-emotional, academic, and school outcomes. Social competence is partly viewed as an individual skill, but is also shaped by the environmental and cultural context, resulting from the classroom experiences, activities, and interactions that are provided to children. Evaluating children's social competence as expressed in day-to-day contexts requires an appropriate tool that takes into account the interactional nature of this behavior. The inCLASS Pre-K is such an observational tool, developed in the United States (U.S.) that assesses individual children's classroom interactions with peers, teachers and tasks. The aims of the current study are threefold: i) to investigate the applicability of the inCLASS Pre-K in Danish preschools constituting a different cultural context, ii) to assess children's broad social competence by looking at their interactions with peers, teachers and tasks, iii) to study the extent to which the inCLASS Pre-K is capturing individual differences in children, depending on their age, gender and language background. A total of 184 children of 81 classrooms were observed on two occasions. The results supported the applicability of the inCLASS Pre-K in Denmark by confirming the four-factor structure reported in previous studies, and in line with previous work revealing small to moderate stability both within one day and across two observation days, and good inter-rater reliability. Danish children showed a higher quality of interactions with peers and lower quality interactions with the teacher as compared to results from the U.S. and Germany. The findings revealed only few individual differences between children in which boys had more conflict interactions than girls. In addition, older children scored lower on peer interactions and task orientation and higher on conflict interactions compared to younger children, although these associations decreased or disappeared when controlling for the mean age of children in the classroom. Interestingly, individual children's interactions with the teacher, peers, and materials showed moderate classroom level variance, which might in part explain the lack of stronger individual differences. Altogether, this supports the notion that children's social competence in the classroom is at least in part a situated skill that is shaped by the environment and cultural context. Contrary to the U.S., which seems to more strongly reflect a dyadic model of teacher-child interactions in teacher-directed (learning) activities, the findings from Denmark illustrate a model of preschool education with a stronger emphasis on free play and social peer interactions. Overall, the findings from this study support the applicability of the inCLASS Pre-K in Denmark and enhance our understanding on what classroom quality looks like from an individual child's perspective and, as such, is informative in improving educational practices.

1. Introduction

Preschool provides a social context outside of the home environment in which children have the opportunity to interact with teachers and peers (Fabes, Hanish, & Martin, 2003). Moreover, in this group-based setting children have to meet behavioral and academic demands and show socially adaptive classroom behavior. In her theoretical model, Rose-Krasnor (1997) identified three levels of children's social competence. On the highest, theoretical, level, social competence is broadly defined as 'effectiveness in social interaction' referring to a set of behaviors organized to meet short and long term developmental needs, which are shaped by interactions with the environment. The second level, referred to as the index level, consists of situation-specific and contextual indices of social competence, such as friendships and

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social self-efficacy (i.e. meeting personal goals while maintaining interpersonal connectedness to others) that take into account the transactional nature of children's behavior. Contrary to this social level, the third level, named the skills level, captures the individual variation in children's social skills, including the behaviors and motivations or building blocks for social competence, such as perspective taking, empathy or social problem solving. Rose-Krasnor (1997) suggests that on the conceptual level social competence can be viewed as a universal construct, but cultural variability is more likely to occur at the index level, where social competence is constructed in interaction with the environment, and the skills level, as the behavior required for social competence might differ between cultures. Likewise, Rogoff (2003), in her cultural model of human development, illustrates the role of context, specifically culture, in children's development and the way social interactions take place. She states that individual development is inseparable from the social and socio-historical context the individual is part of, as the activities and practices an individual is part of contribute to the person's behavior in everyday life. At the index level identified by Rose-Krasnor (1997), for instance, cultural differences can become evident in classroom interactions. For example, work by Rogoff (2003) showed that in European American cultures interactions tend to be dyadic in nature in contrast to group-based interactions in Mayan cultures. This dyadic interaction model is also reflected in school practices in the U.S. where children take turns in answering the teacher, whereas in Alaskan and Japanese classrooms calling upon individual children is less common and a group-oriented approach is used in which children are encouraged to build on each other's ideas in discussions. Consequently, children's classroom experiences and interactions with peers and adults might differ between cultures and countries, which in turn may affect opportunities for the development of social competence and classroom behavior that is considered desirable in that particular context.

At the index level of social competence, several studies have demonstrated that the quality of individual children's interactions with both teachers and peers were related to higher academic achievement, more adaptive learning behavior, and better self-regulation (Birch & Ladd, 1997; Fantuzzo, Bulotsky-Shearer, Fusco, & McWayne, 2005; Gifford-Smith & Brownell, 2003; Hamre & Pianta, 2001; Pianta & Stuhlman, 2004). Also, children showing more task-persistence and self-reliant behavior during activities or tasks showed higher academic skills and better emotion regulation (Fantuzzo, Perry, & McDermott, 2004; McClelland, Morrison, & Holmes, 2000).

A recently developed observational tool tapping into social competence is the individualized Classroom Assessment Scoring System Pre-K, which evaluates three aspects of preschooler's interactions and classroom experiences with teachers, peers, and tasks (inCLASS Pre-K; Downer, Booren, Lima, Luckner, & Pianta, 2010). The inCLASS Pre-K was developed in the U.S. and has been validated in several U.S. studies (e.g., Booren, Downer, & Vitiello, 2012; Downer et al., 2010; Vitiello, Booren, Downer, & Williford, 2012; Williford, Vick Wittaker, Vitiello, & Downer, 2013). However, an important question is whether an observational tool developed in a country within in a particular preschool context, is also applicable in another cultural context. To date, evidence on the psychometric properties of the inCLASS Pre-K in countries outside the U.S. is limited to Germany that generally supported the applicability of the inCLASS Pre-K, but also showed few differences that might reflect cultural differences (von Suchodoletz, Gunzenhauser, & Larsen, 2015). For example, conflicts with the teachers appeared very rare in German preschools. Overall, preschoolers' quality of interactions with the teacher and with peers appeared lower in Germany compared to the U.S. validation study (Downer et al., 2010), but more comparable with the findings of two other U.S. studies (Vitiello, Moas, Henderson, Greenfield, & Munis, 2012; Williford et al., 2013). A closer look at the patterns of interactions shows that, on average, the quality of interactions with the teacher was lower than the quality of peer interactions. However, this difference was much larger in the German sample than in the U.S. samples (more than one standard deviation for Germany compared to one third to about half a standard deviation). The mean scores for teacher interactions appeared quite comparable across these studies, but the mean score for peer interactions was higher in Germany suggesting a different pattern of interactions in Germany that might reflect cultural differences in preschool practices (von Suchodoletz et al., 2015). Following Rose-Krasnor's model, the current study contributes to our understanding of what children's social competence looks like in Danish preschoolers by investigating the quality of interactions with teachers, peers and tasks, reflecting the index level of social competence, using the inCLASS Pre-K and the extent to which this tool is capturing individual differences, representing the skills level. The study starts out by investigating the applicability of the inCLASS Pre-K in a different cultural context, as will be outlined below.

1.1. Preschool in the Danish context

Denmark provides universal preschool with an enrollment rate of 98% of all three-to-five year olds (Statistics Denmark, 2015). Denmark, like many European countries, provides a preschool context that typically emphasizes children's social-emotional development, as opposed to a focus on pre-academic skills, and is characterized by a holistic and strong free-play oriented curriculum with little time spent on formal instruction (Bauchmüller, Gørtz, & Rasmussen, 2014; Sylva, Ereky-Stevens, & Aricescu, 2015). Denmark does not have a national curriculum, but curricula are locally defined, usually at the center level. With a new legislation implemented in 2004, all preschools are obliged to formulate so-called ‘learning plans’ focusing on six broad themes: children's all-round individual development, social competence, language development, body and movement, nature and natural phenomena, and cultural expressions and values (Sylva et al., 2015). This Danish legislation reflects a broad concept of learning through free play, creativity and outdoor activities within a social and inclusive context (Bauchmüller et al., 2014; Jensen, 2009). The importance of learning through social interaction and play rather than in structured instructional situations, such as circle time or academic activities, was revealed in a large-scale survey among 1340 Danish teachers (Broström, Johansson, Sandberg, & Frøkjær, 2012). Consequently, the stronger focus on social-emotional learning using a free and play-based approach might affect children's experiences and interactions with both the teacher and peers, thus exposing them to a different preschool environment than for instance in the U.S.

1.2. Children's classroom interactions: inCLASS Pre-K

Children's classroom experiences related to social interactions and their engagement with tasks, as part of the broader construct of social competence, are viewed as important elements of early learning and development (Vitiello, Moas et al., 2012). The inCLASS Pre-K distinguishes three different domains relevant to capture children's classroom experiences, referring to the index level of Rose-Krasnor's (1997) social competence model. The first domain, Teacher Interactions, focuses on two dimensions: Positive Engagement assesses the emotional closeness with the teacher and the extent to which the teacher uses the teacher as a secure base; Teacher Communication evaluates the degree to which the child initiates and maintains language interactions with the teacher for a variety of purposes, including social and practical. The second domain, Peer Interactions, includes three dimensions: Peer Sociability reflect the extent to which the child seeks out peers and shares positive emotions and behaviors; Peer Communication includes the extent to which the child initiates and maintains language interactions with peers for a variety of purposes, including social and practical; Peer Assertiveness focuses on the initiation and maintenance of peer interactions and expressed leadership and self-confidence in these interactions. The third domain encompasses two dimensions: Engagement within Tasks assesses the extent to which the child is actively involved in activities

and tasks, including the degree of sustained attention and enthusiasm displayed. Self-Reliance measures the extent to which the child takes initiative in his/her own learning process, such as seeking opportunities for learning. The fourth domain, Conflict Interactions consists of three dimensions: Teacher Conflict and Peer Conflict evaluate the degree to which the child's interactions are characterized by negativity or aggression either towards the teacher or with peers. Behavior Control (reversely coded) captures the patience, activity level and physical awareness in the child's interactions.

The current study adds to the contemporary knowledge by investigating children's social competence in the Danish preschool context. Following Rose-Krasnor (1997) a large part of children's social competence is socially constructed in interaction with the classroom environment, hence research in another cultural context might shed a different light on preschoolers' social competence. The other part of children's social competence reflects individual differences between children that may be related to their background.

1.3. Capturing individual differences with the inCLASS Pre-K

During the preschool period children's social-emotional, attention-based and behavioral self-regulation skills develop rapidly (Blair & Diamond, 2008; Bronson, 2000; Denham & Brown, 2010), elevating their abilities to show adaptive classroom behavior and engage in classroom interactions with teachers, peers, and tasks in a socially acceptable way (Denham & Brown, 2010). Differences in developmental levels and trajectories already exist at an early age and have shown to be related to children's background (e.g. Denham et al., 2003; Denham, Wyatt, Bassett, Echeverria, & Knox, 2009). From a developmental perspective, individual differences in social competence can be explained by children's age. For instance, concerning peer interactions children gradually move from playing alongside peers to more sustained peer interactions and the development of friendships from toddlerhood through kindergarten (Denham et al., 2009). Empirical evidence based on the inCLASS Pre-K confirmed that older children showed higher quality of peer interaction skills and better self-regulation and task orientation in the classroom (Downer et al., 2010; Vitiello, Moas et al., 2012). The gender socialization perspective highlights differential experiences in interactions with the teacher and with peers, revealing that girls showed more closeness and lower levels of conflicts compared to boys (e.g. Birch & Ladd, 1997; Ewing & Taylor, 2009; Hamre & Pianta, 2001; Maccoby, 1998). Studies that have used the inCLASS Pre-K generally supported this by illustrating that girls outperform boys regarding peer interactions (von Suchodoletz et al., 2015) and fewer conflict interactions with the teacher and peers (Downer, Booren, Hamre, Pianta, & Williford, 2011; von Suchodoletz et al., 2015). An understudied topic is the role of ethnicity or home language in children's interactions in the classrooms. There is solid evidence of an education gap for children with a minority background or speaking another home language, which poses them at greater risk of school failure and unfavorable long-term outcomes (Magnuson & Duncan, 2016). Some studies have demonstrated that ethnic or language minority children were rated lower on social competence (Halle et al., 2014) and closeness of their relations with the teacher compared to Caucasian children (Ewing & Taylor, 2009; Graves & Howes, 2011). Some studies using the inCLASS Pre-K controlled for ethnicity or home language (e.g. Williford et al., 2013), rather than addressing possible differences in minority children's experiences in the preschool setting. Downer et al. (2011) reported that children speaking a different home language scored lower on peer interactions and task orientation as measured with the inCLASS Pre-K. However, further investigation of possible individual differences between children based on home language is warranted.

Following Rose-Krasnor's (1997) model children's social competence reflects individual differences between children at the skills level. Age, gender and language background have shown to be important aspects contributing to children's social competence in the preschool setting. However, before investigating children's social competence in the classroom and possible individual differences herein using the inCLASS Pre-K it is important to investigate the applicability of the inCLASS Pre-K in Denmark to enable drawing valid conclusions.

1.4. Psychometric properties of the inCLASS Pre-K

The most commonly studied psychometric properties of an observational measure involve the factor structure, as indicator of the structural validity, and aspects of reliability including the test-retest reliability and inter-rater reliability. Previous studies from the U.S. and Germany confirmed the theoretically hypothesized four-domain-structure of the inCLASS Pre-K (Booren et al., 2012; Downer et al., 2010; Downer et al., 2011; Vitiello, Moas et al., 2012; von Suchodoletz et al., 2015; Williford, Maier, Downer, Pianta, & Howes, 2013). However, the German study showed that the dimensions Teacher Conflict, Peer Conflict and Behavior Control showed low factor loadings (ranging from 0.06–0.45). Particularly, Teacher Conflict showed very little variance, as it hardly occurred in German preschools, which led the researchers to exclude this dimension from the model altogether (von Suchodoletz et al., 2015). This finding might reflect cultural differences and illustrates the importance of investigating the psychometric properties of a tool when applying it in another context than the context where it was developed.

Concerning the test-retest reliability, evidence from the U.S. demonstrated small to moderate stability of the inCLASS Pre-K dimensions across observation cycles within one day (correlations ranging from $r = 0.07$–0.50) as well as small to moderate test-retest stability between two times of data collection, ranging from two weeks to a couple of months (correlations ranging from $r = 0.33$–0.59), with the weakest correlations for the Conflict dimensions (Downer et al., 2011). These correlational findings show stronger stability in children's classroom interactions across two different days, than within the same day. A possible explanation might be that children are engaged in different types of activities across a morning (i.e., in teacher-directed whole group activities vs. free choice) resulting in more variation in the quality of their interactions with teachers and peers. Across two different observation mornings the pattern of activities might be more comparable, thus resulting in stronger stability across two different days. Inter-rater reliability or consistency across observers was found to be adequate in the U.S. (agreement within one scale point ranged from 71 to 99%) and in Germany (agreement within one scale point ranged from 71 to 100%) (Booren et al., 2012; Vitiello, Moas et al., 2012; von Suchodoletz et al., 2015).

To summarize, studies to date have established a four-factor structure of the inCLASS Pre-K and confirmed several aspects of reliability, consistency and stability across observations of the inCLASS Pre-K. However, the majority of these studies were conducted in the U.S. and only one study applied the inCLASS Pre-K in Germany.

1.5. Current study

The current study contributes to the literature in three ways. The first aim is to investigate the applicability of the inCLASS Pre-K in Denmark to evaluate aspects of the structural validity (i.e., the factor structure) and reliability (i.e., test-retest reliability and inter-rater reliability). Based on prior research, we expected to find a four-factor structure, small to moderate stability across observation cycles, with stronger stability across two observation days than within one observation day, and adequate inter-rater reliability (Booren et al., 2012; Downer et al., 2011; Vitiello, Moas et al., 2012; von Suchodoletz et al., 2015). The current study aims to further disentangle the (shared) classroom and individual levels of children's social competence following the conceptual model proposed by Rose-Krasnor (1997). Therefore, the second aim is to gain more insights into children's broad

social competence (i.e., their interactions and experiences in the preschool classroom with teachers, peers and tasks). Given the stronger focus on play and social-emotional learning in Danish preschools, we expected that Danish children show higher quality of peer interactions compared to previous studies conducted in the U.S. or Germany. Finally, the third aim is to study individual differences in Danish children's interactions depending on their age, gender, and language background. Based on prior research, we expected older children to score higher on peer interactions and task engagement (Downer et al., 2010; Vitiello, Moas et al., 2012). We also expected girls to score higher on peer interactions and lower on conflict interactions (Downer et al., 2010; von Suchodoletz et al., 2015). Finally, concerning children's language background, we expected non-Danish children to score lower on peer interactions and task orientation (Downer et al., 2010).

2. Method

The current study used data of a randomized controlled trial study into effectiveness of an intervention focused at enhancing preschool children's language and literacy skills using the pre-test data only (Bleses et al., 2017). The study is registered with the Danish Data Protection Agency and conducted in accordance with their ethical standards for human subject research. Twenty-five preschool centers from three municipalities were approached for participation in the current study, which was an in-depth-investigation of the learning environment of individual children in selected preschools. The centers were not randomly selected, but selection was based on following criteria: 1) the centers were taking part in the intervention study and were not part of the control condition; 2) the centers were located within one of three municipalities. In the selected centers, staff was asked to hand out consent forms to parents. From all children for whom parental consent was available, eight children were selected from each center based on their age (equally targeting three-, four- and five-year olds) and gender (roughly equal division of boys and girls). Due to attrition, a total of 23 centers with 81 classrooms participated with on average 2.19 children per classroom (range 1–7). The classrooms were age-heterogeneous with children ranging from 36 until 68 months of age (M = 52 months, *SD* = 8.68).

2.1. Participants

A total of 184 children (of which 53.7% girls) participated in the current study and were observed in their classroom for several observation cycles during a morning and an afternoon on two different days. The children were on average 52 months old (*SD* = 9.86 months, range 36–79 months) and the majority of children was Danish (88.6%).

2.2. Measures

2.2.1. Child demographic information

Age in months and gender (1 = girl) was derived from the civil registration number (CPR number) that all children are assigned at birth by the Central Office of Civil Registration. Teachers provided information about whether the child was Danish or speaking another home language (1 = non-Danish). The teachers did not report the language spoken at home, but based on the parental information from the larger sample, we know that the majority of non-Danish children are from the Middle East/Africa and Eastern Europe (Højen, Bleses, Dale, & Jensen, 2017).

2.2.2. Child observations

Children's interactions with teachers or peers were evaluated using the inCLASS Pre-K, which distinguishes ten dimensions (Downer et al., 2011). The first three dimensions capture the child's communication and interactions with the teacher: Positive Engagement and Teacher Communication reflect the positive and warm communicative relations with the teacher whereas Teacher Conflict (reversely scored) reflects negative aspects of this relation. The next four dimensions focus on the child's interactions with peers: Peer Sociability, Peer Assertiveness and Peer Communication include the positive communicative relations with peers whereas Peer Conflict (reversely scored) focuses on negative peer relations. The final three dimensions focus on the child's adaptive classroom behavior: Engagement within Tasks, Self-Reliance and Behavior Control. Children's classroom interactions were rated on a 7-point scale ranging from 1 or 2 (*child is low on that dimension*); to 3, 4 or 5 (*child is in the midrange on that dimension*); and to 6 or 7 (*child is high on that dimension*).

Seven observers were trained by a certified inCLASS trainer and had to pass a reliability test, prior to data collection, with a pre-set criterion of 80% agreement within one-scale point, with an average inter-rater agreement of 85.6%.

2.2.3. Classroom level covariates

The *number of adults* and the *number of children* were recorded for each observation cycle by the observers.

2.3. Procedures

All observational data was collected within a one-month window after training during fall. Each child was observed twice during two different days (once in the morning and once in the afternoon) within two weeks following the typical schedule of the day. The observers were instructed to observe children during a regular morning, typically between 8 a.m. and 12 p.m., and an afternoon, usually between 1 and 4 p.m., resulting in 494 morning observation cycles and 453 afternoon observation cycles. They observed the participating children in alternating 10 minute-cycles in order to have three observations per child per day. Based on the typical pattern of activities in Denmark, this meant that during the morning children were mainly observed during free play, meal or snack time and circle time. In the afternoon sessions, all instance but one concerned free play. 18% of the data (i.e., 170 observation cycles) was double coded.

2.4. Analysis strategy

To address the first research question we investigated the psychometric properties of the inCLASS by conducting a number of different analyses. To evaluate the structural validity, a confirmatory factor analysis in Mplus 7 (Muthén & Muthén, 1998–2012) using the average scores of the observation cycles from the morning and afternoon sessions was used to investigate the factor-structure of the inCLASS Pre-K. We controlled for the nested nature of the data by using the 'type is complex' option in Mplus that adjusts the standard errors. The inCLASS Pre-K dimensions Teacher Conflict and Peer Conflict showed a highly skewed distribution, due to a lack of variance, which we dealt with in Mplus by using the MLF estimator and defining these two dimensions as categorical instead of continuous variables. Model fit was evaluated following the usually applied criteria with Chi-Square/df < 3, CFI > 0.95, and RMSEA < 0.05, indicating good fit and < 0.08 indicating acceptable fit. After establishing the factor structure of the inCLASS Pre-K, the domains were used in the subsequent analyses. To evaluate the test-retest reliability, we calculated Pearson correlations between the six observation cycles allowing for a comparison within one day (morning and afternoon, respectively) and across days, based on the previously established domains. As it is common to use average scores in capturing children's classroom experiences (e.g., Downer et al., 2010), we also examined the Pearson correlations based on the mean scores for each day to investigate the overall stability across different observation days. Following Cohen (1988), we interpret $r = 0.10$ as a small, $r = 0.30$ as a medium, and $r = 0.50$ as a strong correlation. Pairs of observers double-coded a total of 170 observation cycles, or 18% of the collected data, and the percentage agreement within one-scale point

was determined as recommended and reported by the developers of the inCLASS Pre-K to examine the inter-rater reliability.

Regarding the second research question, we evaluated children's interactions in the classroom. Given the nested nature of the data, we first investigated the amount of shared variance at the classroom level for the different inCLASS Pre-K dimensions. Next, we calculated mean domain scores based on the previously established inCLASS domains.

For the third research question, we studied individual differences between children using Pearson correlations to investigate age-related differences and an ANOVA to test differences depending on children's gender and language background. As the ICC's showed considerable classroom level variance, this needs to be taken into account when investigating individual children's classroom experiences. A common way to investigate correlations between two variables while controlling for classroom effects is by using group-mean centering (Raudenbush & Bryk, 2002). This means that the group mean is subtracted from all individual children's scores to remove the classroom effect. This adjusted mean score is used for investigating whether there are individual differences between children based on their background. In addition, we added two classroom level variables as covariates: mean number of adults and mean number of children.

3. Results

The results are presented below according to the three main research questions. The descriptive information of the inCLASS Pre-K dimension scores from both observation days is presented in Table 1. Note that the mean number of adults present during the afternoon sessions was about half of the number of adults present during the morning sessions (and also showed less variation in the afternoon), while the mean number of children only slightly decreased in the afternoon session (with the same variation as during the morning session). The correlations among the dimensions are presented in Table 2. Teacher Conflict shows small correlations with Peer Conflict and with Behavior Control. The two other teacher-oriented dimensions show a strong inter-correlation and the peer-oriented dimensions show a similar pattern. Task Engagement and Self-Reliance also appear to be strongly correlated.

3.1. Psychometric properties of the inCLASS Pre-K

In evaluating the factor structure, a CFA was conducted estimating a 4-factormodel using the MLF estimator and defining the dimensions Teacher Conflict and Peer Conflict as categorical variables as they showed severely restricted variance. The model fit was χ^2 (29) = 51.68, p = 0.01; RMSEA = 0.07; CFI = 0.92, but an error message appeared indicating a negative residual variance of Positive Engagement with the Teacher. After constraining this residual variance to 0.00001, the model fit was acceptable χ^2 (30) = 52.13, p = 0.01; RMSEA = 0.06; CFI = 0.92. However, the factor loadings of Teacher Conflict and Peer Conflict were lower compared to the factor loading of Behavior Control, showing a smaller contribution to the latent factor Conflict Interactions. The final model is presented in Fig. 1.

To investigate the reliability of the inCLASS Pre-K the correlations of the average inCLASS Pre-K domain scores across the different observation cycles showed small to moderate stability according to Cohen (1988), see Table 3. Cycles 1 till 3 represent the morning sessions and, overall, show a more consistent pattern of stability compared to the afternoon sessions, reflected in cycles 4 till 6, which particularly holds for the Teacher Interactions and Conflict Interactions. Peer Interactions and Task Orientation generally show stronger associations. The correlations between the two observation days were slightly stronger than the within-day correlations, except for Teacher interactions, indicating small to moderate stability across observation days.

In investigating the inter-rater reliability, 18% of the data was double-coded by pairs of observers. The consistency across observers was good as the results showed good inter-rater reliability of 94.6% [range 84.8–100.0%] within one-scale point.

3.2. Children's social competence in the classroom as measured with the inCLASS Pre-K

Table 4 presents the intra-class-coefficients for all inCLASS Pre-K dimensions and reveal small to moderate degrees of shared classroom level variance. The teacher-oriented dimensions show small classroom level variance, whereas the peer interaction dimensions, Self-Reliance and Behavior Control show moderate to strong levels of classroom variance. Table 5 shows the average domain scores and reveals that children score in the low range for the teacher-oriented interactions, whereas they are rated in the mid-range for peer-oriented interactions, as well as for Task Engagement and Self-Reliance. Overall, the children show a lack of conflict interactions with either the teacher or peers.

3.3. Individual differences in children's skills with the inCLASS Pre-K

Individual differences in children's interactions with the teacher, peers and materials were investigated based on children's gender, language background and age (see mean scores for each group in Table 5). The ANCOVA's, controlling for the mean number of adults, the mean number of children and the mean age of children in the classroom, showed no significant differences regarding children's language background and only one borderline significant association for gender. Boys scored slightly higher on Conflict Interactions than girls (F (161) = 3.10, p = 0.08). The Pearson correlations showed that older children scored slightly lower on Peer Interactions (r = −0.28, p < 0.001) and Task Orientation (r = −0.23, p = 0.003) and higher on Conflict

Table 1
Descriptive information based on averaged dimension scores for children for both observation days.

	Morning observations (N = 162)			Afternoon observations (N = 167)		
	Mean	SD	Range	Mean	SD	Range
Positive engagement with teacher	2.26	0.95	1.00–6.00	2.03	1.05	1.00–7.00
Teacher communication	1.90	0.78	1.00–4.00	1.76	0.84	1.00–5.00
Teacher conflict	1.09	0.33	1.00–4.33	1.09	0.25	1.00–2.50
Peer sociability	3.94	1.22	1.00–7.00	4.13	1.24	1.00–7.00
Peer communication	3.25	1.22	1.00–6.67	3.27	1.18	1.00–7.00
Peer assertiveness	2.91	1.20	1.00–6.33	3.04	1.26	1.00–6.33
Peer conflict	1.27	0.38	1.00–2.67	1.30	0.52	1.00–4.00
Task engagement	4.83	0.93	1.67–6.67	4.83	1.03	2.00–7.00
Self-reliance	3.59	1.11	1.00–6.67	3.62	1.23	1.00–6.33
Behavior control	5.74	0.97	3.00–7.00	5.97	0.88	3.00–7.00
Mean number of adults	0.82	1.12	0–6	0.43	0.76	0–6
Mean number of children	6.44	7.18	1–60	5.08	7.19	1–60

Table 2
Correlations between the different dimensions based on averaged scores of all cycles (N = 184 children).

		2	3	4	5	6	7	8	9	10
1	Positive engagement teacher	0.79**	− 0.00	− 0.22**	− 0.29**	− 0.26***	− 0.08	0.03	− 0.06	0.07
2	Teacher communication		0.08	− 0.17*	− 0.14+	− 0.06	0.01	0.14+	0.15*	− 0.02
3	Teacher conflict			0.06	0.05	0.04	0.15*	− 0.07	0.00	− 0.31**
4	Peer sociability				0.82**	0.81**	0.07	0.33**	0.38**	0.06
5	Peer communication					0.88**	0.10	0.42**	0.50**	0.03
6	Peer assertiveness						0.10	0.37***	0.58***	− 0.08
7	Peer conflict							− 0.07	0.04	− 0.37***
8	Task engagement								0.66**	0.27***
9	Self-reliance									− 0.14
10	Behavior control									

+ $p < 0.10$.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

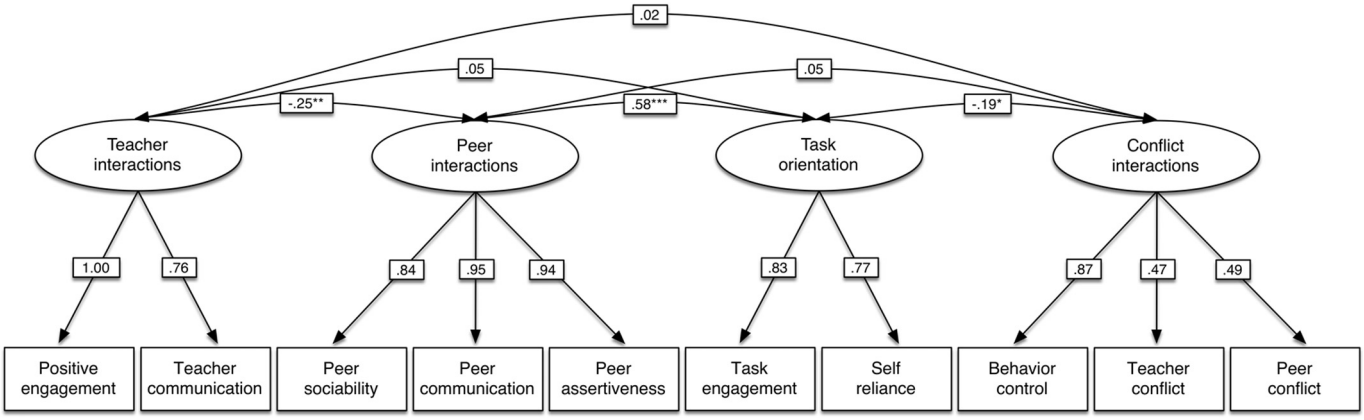

Fig. 1. CFA model replicating the factor structure from the U.S. (behavior control reversely coded). + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3
Test-retest reliability of inCLASS domains across observation days and cycles.

Across two days			Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 6
Teacher interactions	0.16+	Cycle 1[a]	0.20**	0.22**	0.23**	0.23**	0.03
		Cycle 2		0.27**	0.07	0.03	0.25**
		Cycle 3			− 0.00	0.24**	0.31**
		Cycle 4				0.10	0.30**
		Cycle 5					0.16
Peer interactions	0.36**	Cycle 1	0.28**	0.27**	0.28**	0.29**	0.15
		Cycle 2		0.18*	0.08	0.16	0.20*
		Cycle 3			0.25**	0.35**	0.26**
		Cycle 4				0.26**	0.20*
		Cycle 5					0.29**
Task orientation	0.36**	Cycle 1	0.16*	0.24**	0.10	0.28**	0.24*
		Cycle 2		0.19*	0.01	0.09	0.17
		Cycle 3			0.25**	0.37**	0.26**
		Cycle 4				0.28**	0.35**
		Cycle 5					0.36**
Conflict interactions	0.30**	Cycle 1	0.28**	0.25**	0.16*	0.05	0.29**
		Cycle 2		0.21**	0.05	0.14	0.25**
		Cycle 3			0.07	0.21*	0.20*
		Cycle 4				0.14	0.20*
		Cycle 5					0.13

***$p < 0.001$.
[a] Note: cycles 1–3 represent the morning observations and cycles 4–6 reflect the afternoon observations.
+ $p < 0.10$.
* $p < 0.05$.
** $p < 0.01$.

Table 4
Shared classroom variance in children's inCLASS scores reflected in the intra class coefficients (ICC's).

	ICC
Positive engagement with teacher	0.08
Teacher communication	0.05
Teacher conflict	0.06
Peer sociability	0.30
Peer communication	0.23
Peer assertiveness	0.24
Peer conflict	0.08
Task engagement	0.09
Self-reliance	0.27
Behavior control	0.34

Interactions ($r = 0.16$, $p = 0.04$).

4. Discussion

Children's social competence in a broad sense, specifically positive, social and adaptive interactions with teachers, peers and tasks, has shown to be predictive of school-related outcomes (Birch & Ladd, 1997; Fantuzzo et al., 2005; Gifford-Smith & Brownell, 2003; Hamre & Pianta, 2001; Pianta & Stuhlman, 2004; Williford et al., 2013; Williford et al., 2013). Following Rose-Krasnor (1997), children's social competence is constructed both at the individual level, reflecting children's individual skills and differences therein, and in interaction with the environmental context. Hence, the classroom and cultural context inevitably plays a role as well in the way children behave in the classroom (Rogoff, 2003; Rose-Krasnor, 1997) and social competence can be viewed as a partly situated skill. An observational tool used to assess different aspects of children's social competence is the inCLASS Pre-K, which is developed in the U.S. (Downer et al., 2010). However, the applicability of this measure in Danish preschools with a strong free-play based approach focused at social-emotional learning has not been established yet. Therefore, the current study studied the psychometric properties of the inCLASS Pre-K in Denmark, before turning to the investigation of children's social competence in the classroom and possible individual differences related to their background.

4.1. Psychometric properties of the inCLASS Pre-K

Overall, the current study confirmed the four-factor structure of the inCLASS Pre-K, although with lower factor loadings for the conflict dimensions due to restricted variation, which is in line with previous studies (Booren et al., 2012; Downer et al., 2011; Vitiello, Moas et al., 2012; von Suchodoletz et al., 2015). Further, the results showed small to moderate stability of the inCLASS Pre-K domains both within one day and across two observation days corroborating previously reported results from the U.S. (Downer et al., 2011). However, some different patterns emerged with a more consistent and stable pattern of small to moderate stability during the morning sessions for all domains, but less consistent stability for the quality of teacher and conflict-related interactions during the afternoon observations. Although the stability across two observation days was slightly stronger than the within-day stability, in line with previous research (Downer et al., 2011), this association was again weaker for children's interactions with teachers. Note that the mean number of adults present during the afternoon sessions was half of the mean number of adults present during the morning sessions, consequently children scored lower on teacher interactions during the afternoon sessions. At the same time, the variation in the quality of teacher interactions was larger during the afternoon compared to the morning observations, which might explain the lower stability between the two observation days. Also the type of activity could play a role as the afternoon sessions only concerned free play. This might reflect larger variation in children's experiences, particularly concerning their interactions with the teacher, depending on the role and engagement of the teacher in children's play. The inter-rater reliability between observers was found to be good and in line with previous studies (Downer et al., 2010; Downer et al., 2011; von Suchodoletz et al., 2015). Note that the inter-rater reliability for the double-coded real live observations (94.6%) was higher compared to the inter-observer agreement that was established during the training (85.6%.). The inter-rater reliability of the live observations is also higher than found in U.S. studies (range 83.8% - 91% and one study with 95.5%) and in the German study (92.8%).

4.2. Children's social competence in the classroom

The results showed that children scored lower on the quality of interactions with teachers compared to interactions with peers. Although this pattern has also been demonstrated in studies from the U.S. and Germany, children's quality of interactions with teachers was lower in the current study compared to other studies (Downer et al., 2010; von Suchodoletz et al., 2015; Williford et al., 2013), although not completely consistent (Vitiello, Moas et al., 2012; Williford et al., 2013). A possible explanation for the slightly lower scores might be related to the fact that teachers were not present during all the observation cycles. However, Danish preschoolers had higher quality peer interactions and showed higher levels of classroom engagement compared to the German findings and some of the U.S. results (Vitiello, Moas et al., 2012; von Suchodoletz et al., 2015; Williford et al., 2013; Williford et al., 2013). Children's displayed similar levels of behavioral control and conflict interactions as reported in the U.S. (Downer et al., 2010; Downer et al., 2011; Vitiello, Moas et al., 2012; Williford et al., 2013). Interestingly, the quality of peer interactions showed moderate to high levels of shared classroom level variance, whereas the interactions with the teacher revealed weaker classroom level variance. Also, a child's self-reliant and self-regulation behavior appeared moderate to strongly shared among children within a classroom. Overall this seems to point to differences in children's day-to-day experiences in Danish preschools as compared to the U.S. or Germany.

The results point to preschool practices that place a stronger emphasis on children's free play and social interactions with peers rather than with the teacher. Not only the average scores of children's teacher and peer interactions, respectively, illustrate this but also how these two domains of interactions are interrelated. Interestingly, the correlational pattern between the inCLASS Pre-K domains showed that Teacher Interactions and Peer Interactions were negatively related, whereas results from U.S. studies showed either null or positive

Table 5
Descriptive information depending on gender and language background (based on the averaged mean scores of all observation cycles).

	Overall			Girls			Boys			Danish children			Non-Danish children		
	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range
Teacher interactions	2.01	0.39	1.10–3.25	2.06	0.64	1.10–4.67	1.99	0.72	1.00–1.98	1.98	0.68	1.00–4.83	2.28	0.70	1.17–3.67
Peer interactions	3.35	0.64	1.89–4.80	3.42	0.93	1.17–5.11	3.37	0.98	1.44–5.78	3.45	0.94	1.17–5.78	2.88	1.00	1.44–4.67
Task orientation	4.20	0.53	2.80–5.75	4.17	0.78	2.00–5.83	4.27	0.80	2.25–6.00	4.27	0.78	2.00–6.00	4.08	0.88	2.25–5.50
Conflict interactions	1.50	0.23	1.04–2.33	1.44	0.30	1.00–2.33	1.55	0.38	1.00–2.67	1.50	0.34	1.00–2.67	1.61	0.41	1.00–2.33

associations (Downer et al., 2010; Downer et al., 2011; Williford et al., 2013). This finding highlights that children are either engaged in interactions with teachers or with peers, but not simultaneously. The findings from the U.S. seem to more strongly reflect the common dyadic model of teacher-child interactions and the provision of teacher-directed (learning) activities (Rogoff, 2003), whereas these types of instructional activities are not very common in Danish preschools. Learning is rather viewed as occurring through play and social interaction (Bauchmüller et al., 2014; Broström et al., 2012; Jensen, 2009), resulting in more peer interactions and ample time for free play, reflecting a different 'cultural model' of preschool education.

4.3. Individual differences in children's social competence

The inCLASS Pre-K revealed few individual differences between children, although borderline significant. Boys showed slightly more conflicts in their interactions than girls, supporting findings from previous studies (Downer et al., 2011; von Suchodoletz et al., 2015). However, contrary to previous research, older children showed lower quality of their peer interactions and lower classroom engagement and more conflict interactions compared to findings from the U.S. (Downer et al., 2010; Downer et al., 2011; Vitiello, Moas et al., 2012; Williford et al., 2013), although it must be noted that the variation in the latter domain was limited. This lower quality of peer interactions and lower task orientation might not necessarily reflect a lack of older children's skills, but may be related to contextual aspects in the classroom. Recall that the mean age of children was 52 months, also the average age at the classroom level, but with substantial variation between individual children ranging from 36 until 79 months, whereas the mean age range at the classroom level is from 36 to 68 months. In view of this context, it might reflect a lack of same-aged peers in the classroom for the oldest children, resulting in fewer positive peer interactions, more conflicts and less overall engagement. To test this possible hypothesis, a post-hoc analysis was performed in which the mean age of children in the classroom was added as covariate to the correlational analysis, which indeed partially confirmed our hypothesis. The magnitude of the negative correlation between age and peer interactions decreased and was only borderline significant ($r = -0.15$, $p = 0.08$). In addition, the correlation between age and task orientation was lower, although still significant ($r = -0.18, p = 0.04$). Finally, the correlation with conflict interactions was no longer significant at all ($r = -0.07$, $p = 0.42$).

The lack of (stronger) associations with children's background reveals an interesting finding. The inCLASS Pre-K is aimed at capturing individual children's experiences and implicitly assumes the evaluation of children's classroom interactions as representative of their individual skills. However, in the current study it appeared that some aspects of individual children's interactions and experiences are to a moderate extent dependent on the classroom context, which in this case might be typical for Danish preschool. The overall quality of peer interactions in Danish preschools appeared to be related to classroom features, as was reflected in the relatively large amount of shared classroom level variance, which was not the case in Germany (von Suchodoletz, Gunzenhauser, & Larsen, 2015) and to the best of our knowledge, for the U.S. such findings are not reported. The present findings show that children in Danish preschools, who are in classrooms with higher levels of peer interactions, also show comparatively higher quality of interactions with peers at an individual level. This seems to, at least partly, contradict the notion of social competence being an individual skill, but at least partly a 'situated' skill that is affected by the environment (Rose-Krasnor, 1997). Hence, supporting children in developing and sustaining peer interactions may benefit from taking a classroom perspective rather than focusing on children's individual skills only. For instance, work by van Schaik et al. (van Schaik, Leseman, & de Haan, 2017; van Schaik, Leseman, & Huijbregts, 2014) showed the added value of supporting group processes, which appeared related to more peer collaboration and higher levels of cognitive engagement in play. Especially in a cultural context where social development, play and peer interactions are highly valued, it seems important to consider appropriate means of improving the quality of children's classroom interactions and experiences.

The present finding that social competence is at least partly a situated skill has implications for the way we view the construct and, consequently, the way we can adequately measure it. Measuring social competence from a solely 'individual skills' perspective, which is often measured by means of teacher or parent reports, misses the significant role the environmental context, in this case the preschool classroom, plays in the way children's behavior is constructed and expressed in actual social situations, and thus only shows part of the picture. Thus, the current findings underscore the importance of using observational, real-time measures of children's behavior in actual social situations to more fully grasp the interactive nature of children's behavior.

Further, the finding that a child's interactions with the teacher showed much less similarity with peers' interactions with the same teacher (indicated by the lower intra-class coefficient), illustrates the differential relations a teacher has with children, which has also been demonstrated in other studies (e.g., Broekhuizen, van Aken, Dubas, Mulder, & Leseman, 2015; Broekhuizen, Slot, Dubas, & van Aken, 2017; Rimm-Kaufman, Curby, Grimm, Nathanson, & Brock, 2009; Vitiello, Moas et al., 2012). This illustrates the added value of looking at individual children within the classroom as a way of assessing the quality of their experiences. Most studies to date have relied on overall and generalized classroom quality assessment as predictor of child outcomes with usually only small effects (e.g. Burchinal, Kainz, & Cai, 2011). Future studies could use a measure such as the inCLASS Pre-K, capturing individual children's experiences, to complement commonly used classroom-based measures to better understand children's experiences and investigate their respective relations with child outcomes.

The present study suffers from a number of limitations. First, the classrooms selected for the current in-depth study were not chosen randomly, which might limit the generalizability of the current findings. Another limitation concerns the small sample size of the current study. It is recommendable to use the inCLASS Pre-K in larger samples to further investigate the nature of children's experiences and interactions in preschool. Finally, the current study has not included child outcome measures to investigate relations with children's developmental and educational outcomes and lending further support to the construct and predictive validity of the measure. Future studies should study relations between individual children's experiences and their outcomes, preferably using a longitudinal design. Another suggestion for future research concerns the use of classroom and child level measures to investigate what type of measures shows the strongest predictive value in child outcomes.

Despite these limitations, the current study supports the applicability of the inCLASS Pre-K in Danish preschools by showing good validity and reliability in line with previous studies. Further, the results point to some differences in children's experiences that might be related to cultural differences between the U.S. and Denmark. Altogether the current findings underline the importance of investigating individual children's experiences and classroom interactions as it contributes to our understanding of what classroom quality looks like from an individual child's perspective and, in fact, supports the importance of the classroom context for individual children's social competence.

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