Process quality in Portuguese preschool classrooms serving children at-risk of poverty and social exclusion and children with disabilities

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Abstract

This study investigates process quality and structural features of classrooms serving children at-risk of poverty and social exclusion and children with disabilities in Portugal. We examine (a) whether the three-domain structure of a widely used standard observational tool, the Classroom Assessment Scoring System (CLASS; Pianta, LaParo, & Hamre, 2008) describes adequately teacher–child interactions in those classrooms and (b) associations between CLASS domains and structural features, including teacher education and group size. The study was conducted in 178 preschool classrooms. Data included classroom observations using the CLASS Pre-K and teacher reports on structural features. Confirmatory factor analysis supported the three domains of teacher–child interactions. In addition, the CLASS domains described teacher–child interactions equally well across classrooms serving children with disabilities and children at-risk of poverty and social exclusion. Finally, we found modest associations between structural features and CLASS organizational and instructional support, suggesting a complex interplay among structural features in predicting levels of teacher-child interactions.

Keywords: process quality, teacher-child interactions, preschool, structural features, low-income, disabilities

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Currently, across Europe, more and younger children are attending early childhood education and care (ECEC) services. Over the last decade, the percentage of children enrolled in ECEC has risen steadily from 86% in 2001 to 93% in 2011, on average, in European countries (European Commission/EACEA/Eurydice/Eurostat, 2014). In Portugal, universal access to preschool education for 4- and 5-year-olds was recently established by law and, currently, attendance rates are very high, with 93% of 4-year-olds and 98% of 5-year-olds attending center-based ECEC (European Commission/EACEA/Eurydice/Eurostat, 2014).

Importantly, European countries have implemented educational policies aiming to increase participation rates of disadvantaged children in publicly supported ECEC, prioritizing the participation of children at-risk of poverty and social exclusion and children with disabilities (European Commission/EACEA/Eurydice/Eurostat, 2014). Relatedly, about one-third of existing Portuguese preschool classrooms include at least one child with disabilities (Ministério da Educação, 2007), with legislation on special education prioritizing inclusion in regular ECEC settings (Ministério da Educação, 2008). As a result, new challenges arise from the increasing social and educational diversity in European ECEC settings. Yet, although access and affordability of ECEC have been at the core of policy making, the quality of European ECEC in socially disadvantaged and inclusive settings has been largely overlooked.

Compelling evidence suggests that the quality of ECEC provision is important for child development and well-being (Burchinal, Peisner-Feinberg, Bryant, & Clifford, 2000; Lerkannen et al., 2012; Mashburn et al., 2008). Two broad aspects are widely acknowledged as important when conceptualizing and measuring ECEC

quality: process and structural quality (Cryer, Tietze, Burchinal, Leal, & Palacios, 1999). Process quality focuses on observed interactions between teachers and children and is considered one of the central aspects of high-quality ECEC (Hamre, Pianta, Mashburn, & Downer, 2007). Indeed, several studies have found that sensitive, well-organized, and cognitively stimulating interactions foster children's development in many domains, including language, mathematics, self-regulation, and reduction of behavior problems (Burchinal et al., 2008; Cadima, Verschueren, Leal, & Guedes, 2016; Howes et al., 2008; Mashburn et al., 2008; Weiland, Ulvestad, Sachs, & Yoshikawa, 2013). Process quality is usually assessed through observational rating scales (Howes et al., 2008). However, while extant research has been conducted on the effects of process quality, less research has investigated the application of available measures in different contexts. Given the growing diversity in ECEC settings in Europe, more research is needed to test whether observational measures are equally appropriate for diverse ECEC settings such as those serving children with diverse abilities and social backgrounds.

Compared to process quality, structural quality is easier to measure as it refers to quality aspects that are regulatable and relatively stable, such as teacher-child ratio, group size, and teacher education (Blau, 2000; Cryer at al., 1999; Pianta et al., 2005; Vandell & Wolfe, 2000). Structural quality has been perceived as providing the conditions for process quality (Burchinal, 2018; Cryer et al., 1999; Pianta et al., 2005). However, findings are mixed regarding how structural features are associated with process quality (Cryer et al., 1999; Phillipsen, Burchinal, Howes, & Cryer, 1997; Pianta et al., 2005), as described later in this work.

Prior research has shown that there are context-specific aspects derived from the features of different ECEC systems that should be considered when looking both

at process and structural quality (Cryer et al., 1999). In addition, it has been suggested that the educational and developmental needs of the children in the classroom can explain important variation in process quality (Pianta et al., 2005). However, we know very little about quality in settings serving children with diverse abilities and social backgrounds in Europe.

In this study, we extend prior research on process quality by (a) examining the extent to which a widely used standardized observational tool, the Classroom Assessment Scoring System (CLASS; Pianta, LaParo, & Hamre, 2008) demonstrates similar psychometric and measurement properties in classrooms serving children at-risk of poverty and social exclusion and children with disabilities in Portugal and (b) examining the associations between structural features and process quality, considering country- and context-specific features of those settings.

Measuring process quality: The CLASS

Measurement is a key issue of research on process quality. A recent observational measure that has been widely used is the Classroom Assessment Scoring System (Pianta et al., 2008). The CLASS is theoretically grounded in the Teaching Through Interactions framework (Hamre et al., 2013), which posits that the interactions that take place among teachers and children on a daily basis are the primary mechanisms through which children learn (Pianta & Hamre, 2009). This assumption is consistent with the notion that proximal processes are the engines of development (Bronfenbrenner & Morris, 1998). According to this conceptual framework, three distinct but interrelated domains of teacher–child interactions are central to children's learning: Emotional Support, Classroom Organization, and Instructional Support (Hamre et al., 2013; La Paro, Pianta, & Stuhlman, 2004). Emotional Support refers to teachers' warmth and sensitivity towards children and

support of children's expression of ideas (Pianta et al., 2008; Pianta & Hamre, 2009). Organizational Support refers to teachers' use of proactive approaches to monitor child engagement, organization of predictable routines, and provision of activities that are inherently interesting (Pianta et al., 2008; Rimm-Kaufman, Curby, Grimm, Nathanson, & Brock, 2009). Instructional Support comprises teachers' encouragement of analysis and reasoning, provision of scaffolding, and engagement in meaningful conversations with children (Hamre et al., 2007; La Paro et al., 2004; Pianta et al., 2008; Pianta & Hamre, 2009). Findings have shown that high levels of Emotional, Organizational, and Instructional Support, as assessed by the CLASS, are associated with academic achievement and social performance at the end of preschool and first grade (Burchinal et al., 2008; Cadima et al., 2016; Curby et al., 2009; Howes et al., 2008; La Paro et al., 2004; Leyva et al., 2015; Mashburn et al., 2008; Rimm-Kaufman et al., 2009; Weiland et al., 2013). In one recent meta-analysis, results revealed positive, although modest, associations between the CLASS and children's outcomes (Perlman et al., 2016)

The CLASS has been used in several European countries, including Finland, (Pakarinen et al., 2010), Portugal (Cadima, Leal, & Burchinal, 2010), the Netherlands (Slot, Leseman, Verhagen, & Mulder, 2015), and Germany (Suchodoletz, Fäsche, Gunzenhauser, & Hamre, 2014). Using the same observational system across countries can be very useful, as it allows for the identification of common and distinct quality features and for examining whether one general framework, such as Teaching Through Interactions, is useful across ECEC settings.

While the CLASS has shown promising results across multiple ECEC settings, several issues remain, which have led researchers to point out the need to refine and strengthen measures of quality using psychometric techniques (e.g., Burchinal, 2018;

Burchinal et al., 2009). First, there is some debate regarding the extent to which the three CLASS domains are distinct, as they tend to be highly correlated. The three-factor structure has been replicated in a number of studies (e.g., Pakarinen et al., 2010; Suchodoletz et al., 2014). For instance, the examination of the structure of the CLASS Pre-K in 63 preschool classrooms in Germany indicated that the three-domain model appropriately described the quality of teacher-child interactions in German classrooms, although the associations among domains varied between .63 and .76 (Suchodoletz et al., 2014). However, in a recent study involving 43 classrooms in Portugal, the results from the confirmatory factor analysis showed that a two–factor model in which Emotional Support and Classroom Organization were combined, fitted the data adequately, and the decrease in model fit from the original three–factor solution was statistically non-significant (Cadima et al., 2016). Importantly, knowledge on the extent to which classroom process quality domains are distinct from one another can be important to better understand the links between dimensions of process quality and structural features of ECEC settings.

A second caveat related to the CLASS is the question of whether one particular dimension, Negative Climate, is relevant in describing teacher-child interactions in countries other than the USA. Negative Climate reflects teachers' displays of anger, sarcasm, teasing, and/or harshness (Pianta et al., 2008). In studies conducted in Finland, Chile, and Germany, Negative Climate was poorly correlated with the other dimensions of Emotional Support (Leyva et al., 2015; Pakarinen et al., 2010; Suchodoletz et al., 2014). It has been suggested that the weak contribution of Negative Climate to the Emotional Support domain is a result of its low scores, indicating that negativity was seldom observed (Pakarinen et al., 2010; Suchodoletz et al., 2014). However, it has also been suggested that, in some cultural contexts, such as

Chile, negativity may be interpreted differently by adults and considered as an acceptable social means to manage children's behavior (Leyva et al., 2015). Indeed, in both the Chilean and Finish contexts, Negative Climate was moderately correlated with dimensions belonging to the Classroom Organization domain (Leyva et al., 2015; Pakarinen et al., 2010). These findings suggest the relevance of examining the construct of teacher-child interactions in countries outside the USA, and of examining the factorial validity equivalence of the CLASS so that interpretations of cultural variations can be meaningful. Interestingly, decisions on whether to include or exclude Negative Climate in the final model have varied across studies (Leyva et al., 2015; Pakarinen et al., 2010; Suchodoletz et al., 2014).

Importantly, research on ECEC quality outside the USA is still limited, particularly in inclusive and socioeconomic disadvantaged settings. More specifically, few studies have focused on the quality of inclusive preschool settings. Previous research, conducted in the USA, suggests that global quality is higher in inclusive settings (e.g., Hestenes, Cassidy, Hegde, & Lower, 2007; Jeon et al., 2010) and at least comparable to segregated settings (e.g., La Paro, Sexton, & Snyder, 1998). In Europe, Aguiar, Moiteiro, and Pimentel (2010) reported moderate levels of overall classroom quality in Portuguese inclusive preschool classrooms. However, they also found poor levels of teacher warmth and responsiveness towards children with disabilities. These results are of difficult interpretation because the applicability of available observational measures, such as the CLASS, to inclusive settings has not yet been examined. It could be that teacher-child interactions are organized differently in inclusive classrooms, but it is also possible that the CLASS three-domain model describes well the quality of interactions in inclusive settings.

For children who enter school at higher risk of academic problems, research

conducted in the USA has suggested that attending high-quality classrooms seem to act as a protective factor (Burchinal et al., 2000; Burchinal, Peisner-Feinberg, Pianta, & Howes, 2002). Many studies have suggested that the effects of ECEC programs differ across ethnic groups and socioeconomic status, indicating larger benefits for poor children compared with children from more affluent families (LoCasale-Crouch et al., 2007; Loeb, Fuller, Kagan, & Carrol, 2004; Magnuson, Meyers, Ruhm, & Waldfogel, 2004; Peisner-Feinberg et al., 2001), and for children of ethnic minority groups compared with White children (Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2002; Gormley, Gayer, Phillips, & Dawson, 2005; Gormley, Phillips, & Gayer, 2008; Loeb et al., 2004; Magnuson, Lahaise, & Waldfogel, 2006; Vandenbroeck, De Visscher, Van Nuffel, & Ferla, 2008).

It should be noted, however, that high quality may not be equally accessible to all children (Leseman & Slot, 2014). In the USA, children of immigrants and children from non-English speaking families are less likely to attend regulated center-based ECEC settings than their native-born or English-speaking counterparts (Brandon, 2004; Crosnoe, 2007; Magnuson et al., 2006). Further, in one study of 692 pre-kindergarten classrooms, classrooms with higher proportions of children living in poverty were linked to the poorest quality profile, suggesting that the children who need the highest quality educational experiences are more likely to attend lower-quality programs (LoCasale-Crouch et al., 2007). In Germany, Leu and Schell (2009) found that children with a migration background tend to be clustered in centers of lower quality.

Selective access to high-quality ECEC seems to be dependent upon structural features (Leseman & Slot, 2014; Phillips, Mekos, Scarr, McCartney, & Abbott-Shim, 2000). For example, in the USA, Phillips et al. (2000) found that high-quality ECEC

was less accessible for low income children because centers with higher-educated paid staff and lower child-to-staff ratios had higher parental fees. Overall, these results suggest the need to examine whether the CLASS 3-domain model of teacher–child interactions is consistent across classrooms serving diverse groups of children, but also to the importance of looking at the structural features that may covary with process quality.

Structural features of ECEC settings and their associations with process quality

In addition to process quality, definitions of ECEC quality include a second broad area: structural features (Cryer et al., 1999). As structural features are amenable to regulation, it is assumed that they can be used to influence process quality (Burchinal, 2018; Pianta el., 2005). Nonetheless, the strength of the associations between classroom and center structural features and process quality is still unclear, with studies reporting mixed findings (Cryer et al., 1999; Phillipsen et al., 1997; Pianta et al., 2005).

Teacher education is a structural quality indicator commonly investigated across studies (Cryer et al., 1999; LoCasale-Crouch et al., 2007; Phillipsen et al., 1997; Phillips et al., 2000; Pianta et al., 2005). It has been widely accepted that professional competency and a strong knowledge base can lead to higher process quality (Tout, Zaslow, & Berry, 2005). Research findings, however, are far from conclusive. For example, in a recent meta-analysis (Manning, Garvis, Fleming, & Wong, 2017), teacher education was positively associated with overall process quality as measured by the Environment Rating Scales, namely the Early Childhood Environment Rating Scale (ECERS), the Infant Toddler Environment Rating Scale and their revised versions. Similarly, Pianta et al. (2005) found positive effects of having a bachelors' degree in ECEC on both Emotional Climate as measured by the

CLASS and the Provisions for Learning factor, based on the ECERS-R. However, a report based on 7 large-scale studies in the USA did not find such effects on overall process quality, as measured by the ECERS-R (Early et al., 2007). Similarly, group size has been examined in numerous studies, but its associations with process quality have been inconsistent, with some studies showing a negative association between group size and overall process quality, as measured by the Environment Rating Scales (Cryer et al., 1999; Phillips et al., 2000), and recent meta-analytic work finding no overall statistically significant associations with overall process quality measured similarly (Vermeer, van IJzendoorn, Cárcamo, & Harrison, 2016). An additional predictor of overall process quality included in numerous studies is teacher experience, but again the effects are inconsistent across studies (Cryer et al., 1999; Philipsen et al., 1997; Pianta et al., 2005).

Several explanations for these inconsistent findings have been proposed, including the nature of the national regulation systems and resources and the populations served (LoCasale-Crouch 2007; Love et al., 2003). Even though most European countries regulate the same set of structural features, namely teacher education or group size, there are important variations in such regulations (Cryer et al., 1999; Slot, Lerkkanen, & Leseman, 2015). In one study designed to investigate whether the associations between structural features and overall process quality, as measured by the ECERS, were consistent across four countries, Cryer et at. (1999) found that the associations differed among various national ECEC systems. For example, the association between teacher experience and process quality was negative in Germany, but positive in Portugal and in the USA. Results from a set of secondary data analyses involving several European countries also revealed complex patterns, showing that the associations between structure features and process quality

(measured through the CLASS in Finland and in the Netherlands and through the Environment Rating Scales in Germany, Portugal, and England) varied across ECEC systems (Slot, Lerkkanen et al., 2015). For example, teacher education was positively associated with process quality in England and in Finland, but not in the Netherlands. Together, these findings suggest that associations between structure features and process quality are not straightforward and should be examined considering country-specific regulations.

In addition to commonly used indicators of structural quality, this study includes two additional structural features that are relevant to the Portuguese context as they show important variation across centers and classrooms in Portugal. One such feature is school sector. The Portuguese preschool network includes both public and private centers. Although all preschool centers are regulated by the Ministry of Education and follow the same curriculum guidelines, previous findings suggest public schools provide higher levels of overall process quality (Gamelas, 2010). Importantly, sector is likely to be associated with important structural features, namely diverse working conditions and staff education levels (OECD, 2006).

A second relatively understudied structural feature that shows variability in Portugal is the age composition of preschool classrooms. In Portugal, as in other countries such as the USA, there are same-age classrooms, enrolling only children within a particular age range, and mixed-age classrooms, that enroll children as young as three years and as old as five or six years. In a national study involving 463 classrooms, 81.4% served mixed-aged groups, with important variations across sectors showing that the public sector served mostly mixed-aged groups and most same-age groups were in the private sector (Abreu-Lima et al., 2014). Despite variations in the classroom age composition, to our knowledge, no study has

examined yet whether classroom age composition is associated with the quality of teacher-child interactions. It is possible that age composition affects the way teachers facilitate interactions to meet the individual needs of children. Indeed, some authors asserted that, in same-age classrooms, teachers may focus on developmentally appropriate practices for one particularly age group, which may lead to higher levels of classroom quality (Moller, Forbes-Jones, & Hightower, 2008).

The characteristics of the group of children can also interact with teacher characteristics in predicting process quality. For example, Slot, Lerkkanen et al. (2015) found that, in Germany, teacher experience mitigated the negative effect of a sizeable proportion of children with immigrant background on process quality. In this study, we examine the associations between structural features and process quality in a diverse sample of children and families, considering whether the setting serves children at-risk of poverty and social exclusion or children with disabilities. By including such a diverse sample of classrooms while considering country-specific structural features, we can gain a better understanding of the complex interplay between structural features and process quality domains.

Serving children at-risk of poverty and social exclusion and children with disabilities in Portuguese preschools

The European Commission urges European Union countries to increase the participation of children at-risk of poverty and social exclusion in preschool settings (European Commission / EACEA / Eurydice / Eurostat, 2014). Therefore, many countries have developed programs or implemented policies to provide these groups of children with additional support. Portugal has established one such program in public schools, the Priority Intervention Territories Program (Territórios Educativos de Intervenção Prioritária [TEIP]), designed to reduce the effects of socioeconomic

disadvantage and promote equity and social inclusion from an early age. This program targets mainly children from disadvantaged socioeconomic backgrounds by targeting specific geographical areas, and provides support through allocating more economic and human resources. However, the levels of process quality in preschool classrooms within the TEIP program are unknown.

Portugal has also shown a steadily increase in the participation rates of children with disabilities in mainstream preschool classrooms. However, although external support services, including specialists or multi-professional support teams, are available at the local level, ECEC teachers, who provide daily support to children, are not specifically trained. Training ECEC staff for working with children with disabilities is not a compulsory requirement for pre-service training but, instead, is left to the decision of individual higher education institutions (European Commission / EACEA / Eurydice / Eurostat, 2014).

The additional resources available for preschool classrooms within the TEIP program and for classrooms serving children with disabilities are quite different. In general, the former can be quite cross-cutting, serving the school /school cluster (e.g., community mediators) with the goal to increase students' achievement in later stages of schooling. The latter usually focus on the specific and current needs of the target child/children with disabilities, their teachers, and families. These differences in type of support may result in a different pattern of associations among structure features and process quality and, thus, should be explored.

The current study

Building on previous findings, this study aims to examine both process quality and structural features of preschool classrooms and their associations in European settings that have been underrepresented in the literature, namely Portuguese settings

serving children at-risk of poverty and social exclusion and/or children with disabilities. Two main aims are addressed. First, we examine process quality and investigate the factor structure of a widely used measure of teacher-child interactions, the CLASS, in a diverse sample of Portuguese preschool classrooms. Specifically, we examine whether CLASS observations of teacher–child interactions are organized in three domains in Portuguese settings and investigate the equivalence of the factor structure across classrooms serving children with disabilities and classrooms serving children at-risk of poverty and social exclusion. This is a first step to determine construct comparability and ensure that the measure is comparable across different groups so that meaningful interpretations of the CLASS scores can be formulated.

Second, we examine the associations between a set of structural features and domains of process quality across diverse classrooms, considering country- and context-specific aspects. We add to the previous literature by examining both traditional indicators of structural quality such as group size, teacher education, and teacher experience, and context-relevant structural indicators such as school sector and classroom age composition.

Based on prior research (Hamre et al., 2007; Suchodoletz et al., 2014), we hypothesize that the three domains of teacher–child interactions of CLASS are invariant across a range of diverse classrooms. This would indicate that, regardless of classroom characteristics, the ways in which classroom interactions are organized are comparable across settings. Regarding structural features, given the inconsistent findings in previous work (e.g., Pianta et al., 2005), we expect to find modest associations between structural features and the CLASS three domains of teacher–child interactions. Moreover, based on recent findings (Slot, Lerkkanen et al., 2015), we anticipate that the inclusion of children with disabilities and of children at-risk of

poverty and social exclusion affect the patterns of associations between structural features and process quality. The examination of differential associations between structural features and CLASS domains can contribute to a more nuanced understanding of structural and process quality across diverse classrooms.

Method

Participants

Participants were 178 preschool classrooms in Portugal, involved in two studies. Both studies were designed to describe preschool programs that serve children that are underrepresented: The first study (n = 88), conducted in the Metropolitan Area of Lisbon, was designed to describe inclusive programs, and the second study (n = 90), conducted in the Metropolitan Area of Porto, was designed to describe programs that serve mainly children at-risk of poverty and social exclusion.

Inclusive classrooms included at least one child with diagnosed disabilities and an individualized education plan (IEP). In Portugal, preschool classrooms should not include more than two children with an IEP and, in such cases, group size should not exceed 20 children. Classrooms serving mainly children at-risk of poverty and social exclusion participated in the Priority Intervention Territories Program (TEIP). All teachers, including the ones working in TEIP schools and in inclusive classrooms, follow the national curriculum guidelines, and the activities and materials are similar to other preschool classrooms. It is important to note that, whereas all preschool teachers in Portugal have a university degree in early childhood education, those in TEIP schools and inclusive classrooms do not receive specific training for working with disadvantaged and/or inclusive groups.

In the total sample (N = 178), a high percentage of classrooms were located in a public school (73%). Group size averaged 21.5 children (SD = 3.03) and teacher-

child ratio averaged 9.55 (*SD* = 3.94). About 75% of participating classrooms served mixed-age groups and 25% served same-age groups, with 10% serving 5-year-olds, and 9.5% serving 4-year-olds. Teachers had an average of 21.18 years of teaching experience (*SD* = 8.35) and 12% had a Master or Post-graduation degree. All but one teachers were female. All classrooms were classified as inclusive (72%) or non-inclusive classrooms (28%). Further, all classrooms were categorized as TEIP (38%) and non-TEIP (62%). Table 4 provides descriptive information on school, classroom, and teacher characteristics within each type of classroom. Categories were not mutually exclusive and a small percentage of classrooms were non-inclusive non-TEIP (15%) or inclusive TEIP (20%).

Measures

Quality of teacher–child interactions. The quality of teacher–child interactions was assessed using the Classroom Assessment Scoring System (CLASS; Pianta et al., 2008). The CLASS is an observational measure that groups several classroom dimensions into three major domains: Emotional Support, Classroom Organization, and Instructional Support. Observers rated the classroom on 10 distinct dimensions: 1) Positive Climate considers the enthusiasm, enjoyment, and respect displayed by the teacher and the children; 2) Negative Climate is the degree to which there are displays of anger, aggression, and/or harshness (reverse coding); 3) Teacher Sensitivity reflects the extent to which teachers provide comfort and encouragement and are aware of children's needs; 4) Regard for Student Perspectives reflects the extent to which classroom activities place an emphasis on children's interests and points of view; 5) Behavior Management considers teacher’s ability to use effective methods to monitor, prevent, and redirect children’s misbehavior; 6) Productivity considers how well teachers maximize time spent in learning activities; 7) Instructional Learning

Formats reflects the degree to which teachers facilitate activities and provide interesting materials to maximize children's engagement; 8) Concept Development considers the strategies used to promote children's higher order thinking skills and creativity through problem solving and instructional discussions; 9) Quality of Feedback concerns the degree to which teachers' feedback extends children's learning and understanding; and, finally, 10) Language Modeling considers the use of language-stimulation and language-facilitation techniques (e.g., open–ended questions, mapping behavioral actions). A 7-point Likert scale is used to score each dimension, based on a range of indicators, with 1 or 2 indicating low quality, 3, 4, or 5 indicating mid-range quality, and 6 or 7 indicating high quality.

The CLASS has been widely used in the USA and in some European countries, and its concurrent and predictive validity has been examined, with results showing positive associations with other quality measures (e.g., ECERS-R), as well as positive associations with children's social and academic development (Cadima et al., 2010; Curby et al., 2009; Mashburn et al., 2008; Pakarinen et al., 2010).

Prior to data collection, the observers participated in a 2-day training on the CLASS, followed by a certification test. All observers reached the reliability criterion of 80% of the scores within one scale point of the master codes. Interobserver agreement was checked throughout data collection. One-way random single-measures Intraclass Correlation Coefficients (ICC) were, on average, .62 and .63, for the two data sets. ICC values between .60 and .74 are indicative of good inter-rater reliability (Hallgren, 2012).

Teacher, classroom, and school characteristics. Data on teacher, classroom, and school characteristics were collected through a teacher questionnaire. For the present study, the following structural quality variables were used in the analyses:

Teacher education. Teachers' highest level of education was coded as holding a bachelor or 5-year degree in ECEC (=0) and holding Post-Graduation or a Master degree (=1).

Teacher experience. The total number of years of teaching experience was used in the analyses.

Class size. The total number of children in the classroom reported by the teacher was used in the analyses.

School sector. School sector was coded as private (=0) or public (=1).

Classroom age composition. Classrooms were coded as enrolling same-age groups (=0) or mixed-age groups (=1).

Procedures

Before data collection, the procedures of the two studies were approved by the Portuguese Data Protection Authority, and teachers' and parents' informed consents were obtained. Trained observers conducted live classroom observations of teacher–child interactions using the CLASS (Pianta et al., 2008) across four 20 min observation cycles. Observations lasted approximately two to three hours, and started at the beginning of the classroom day. Teachers completed the questionnaire at the end of the observation.

Data analysis

Confirmatory Factor Analyses. We initially conducted confirmatory factor analysis (CFA) for this sample. This allowed us to examine the a priori factor structure of the CLASS in Portuguese preschool programs serving children with disabilities or at-risk of poverty and social exclusion. Following the proposed structure of the CLASS (Pianta et al., 2008), a three-factor model was examined using the CLASS dimensions as indicators of three latent factors representing emotional,

organizational, and instructional process quality, respectively. This model was tested against alternative models of teacher-child interactions that have been proposed in the literature (Hamre et al., 2013), namely the single domain model of Effective Teaching and the two-domain model of Social and Instructional Support.

Measurement invariance. To test whether the same latent structure was invariant across TEIP and non-TEIP classrooms, and across inclusive and non-inclusive classrooms, Multiple Group Confirmatory Factor Analyses were used. The models were fit separately for TEIP and inclusive classrooms. Specifically, first a set of models was fitted to determine whether the CLASS was measuring the same constructs in the same metric, across TEIP and non-TEIP classrooms. Second, a new set of models was fitted to determine whether the CLASS was measuring the same constructs in the same metric, across inclusive and non-inclusive classrooms. Multiple Group Confirmatory Factor Analysis has been the most common technique for testing measurement invariance (Chen, 2008; Meade, Johnson, & Braddy, 2008; Millsap & Kwok, 2004). Following the procedure described by Hair et al. (2006), for each set of models, a series of increasingly more restrictive confirmatory factor analysis models were fit to the data: In the first step, *Configural Invariance*, the same structural equations were specified for each group, and the factor loadings, and intercepts were allowed to differ by group. This model tested whether the basic model structure (i.e., same number of constructs and items) was equivalent across groups, and provided the basis for the next models (Hair et al., 2006). In the second step, *Metric Invariance*, to test whether the CLASS was measuring the same construct in all groups, factors loadings were constrained to be equal across groups, while intercepts were kept free. In the last step, *Scalar Invariance*, equality constraints were additionally placed on the intercepts of the observed items, to test whether the mean of each construct had

the same meaning between the groups (Hair et al., 2006). Model fit was examined using the chi-square statistic, the Root Mean Square Error of Approximation (RMSEA), the Comparative Fix Index (CFI), and Tucker–Lewis Index (TLI). CFI and TLI values greater than .90 indicate adequate fit and values greater than .95 indicate good fit. Similarly, RMSEA values less than .08 indicate adequate fit and values less than .05 indicate good fit. The decrease of model fit was tested with the chi-square difference test. Because differences in chi-square are highly sensitive to sample size and it has been recommended to use alternative fit indices (Cheung & Rensvold, 2002), we computed differences in CFI, using a cutoff value of .01 (Cheung & Rensvold, 2002).

Structural Equation models. A series of structural equation models were then fit to determine whether the CLASS latent factors were predicted by a set of structural predictors, namely, sector, teacher education and experience, group size, and classroom age composition. After examining the associations among structural features and the CLASS latent factors, we used multiple-group comparison approach to test whether such associations differed for TEIP and inclusive classrooms. Specifically, a series of models in which successive parameters were constrained to be equal across classroom settings were estimated and compared sequentially by testing the decrease in model fit using the Chi-square difference test. Models were estimated using the Mplus program, version 6.0 (Muthén & Muthén, 1998-2010).

Standardized regression coefficients were used as measures of the effect size with B > .10 indicating a small effect, a B > .30 a moderate effect and B > .50 a large effect (Kline, 2005). The analyses were conducted using Mplus (Muthén & Muthén, 1998–2011). Missing data for any one variable ranged from 0% to 10.7%. To account for missing data, Full Information Maximum Likelihood (FIML) estimation with

robust standard errors was used.

Results

Process quality: Descriptive statistics for the CLASS

Table 1 shows the descriptive statistics including means, standard deviations, and correlation coefficients for the dimensions of teacher–child interactions. The means for six dimensions were in the mid range, ranging from $M = 4.13$ ($SD = 0.99$) for Instructional and Learning Formats to $M = 4.84$ ($SD = 1.01$) for Positive Climate. The means for Negative Climate, Concept Development, Quality of Feedback, and Language Modeling were in the low range. The correlations among the CLASS dimensions were moderate to strong and in the expected direction.

Factor structure of the CLASS

First, to test whether the three-factor structure fit data well, a confirmatory factor analysis was estimated specifying the three hypothesized latent factors, Emotional Support, Classroom Organization, and Instructional Support, respectively. The three-factor model had acceptable fit, $\chi 2\ (32) = 113.08$, $p < .001$, CFI = .946, TLI = .925, RMSEA = .119, SRMR = .049, with fit indices suggesting that the model could be improved. A closer inspection of factor loadings indicated that Negative Climate showed the lowest factor loading of .66 on the hypothesized domain compared to all other loadings that were above .77 in the respective domain. Modification indices additionally suggested that the fit of the model would increased if the residuals of Negative Climate were allowed to correlate with Behavior Management and Productivity, both dimensions of the Classroom Organization domain. Examination of the structure of the CLASS Pre-K in Finnish classrooms indicated that Negative Climate had poor discriminant validity and that excluding the dimension Negative Climate could improve model fit (Pakarinen et al., 2010). We

therefore rerun the CFA excluding Negative Climate. Model fit was significantly improved, $\chi2$ (24) = 74.67, $p < .001$, CFI = .963, TLI = .945, RMSEA = .109, SRMR = .045, $\Delta\chi2$ (9) = 38.41, $p < .001$, ΔCFI = .02.

The three-factor model provided the best relative fit to the data, compared to the two-factor model, $\chi2$ (26) = 120.50, $p < .001$, CFI = .932, TLI = .906, RMSEA = .143, SRMR = .066, with a statistically significant difference in chi-square, $\Delta\chi2$ (2) = 45.83, $p < .001$, ΔCFI = .03 and the single-factor model, $\chi2$ (27) = 532.59, $p < .001$, CFI = .635, TLI = .514, RMSEA = .324, SRMR = .163, which indicated a unsatisfactory model fit (see Table 2). The difference in chi-square between the single-factor model and the three factor model was also statistically significant, $\Delta\chi2$ (3) = 457.92, $p < .001$, ΔCFI = .328. Figure 1 shows the factor loadings for the three-factor model.

Internal consistency: Cronbach's alpha coefficients indicated high internal consistency of the CLASS domains, .91, .86, and .94, for Emotional Support, Classroom Organization, and Instructional Support, respectively.

Measurement Invariance across TEIP and non-TEIP classrooms

Table 3 presents fit statistics of the multiple-group factor models for TEIP and non-TEIP classrooms. The three-factor configural invariance model showed adequate fit, $\chi2$ (48) = 103.12, $p < .001$, CFI = .976, TLI = .963, RMSEA = .090, SRMR = .053 suggesting that the three-factor structure was equivalent across TEIP and non-TEIP classrooms. The metric invariance model did not fit significantly different from the configural model, $\Delta\chi2$ (6) = 4.91, $p = .56$, ΔCFI = .00, indicating that the factor loadings were invariant across TEIP and non-TEIP classrooms. The decrease in model fit for the scalar invariance model was also non-statistically significant, $\Delta\chi2$ (9) = 9.36, $p = .40$, ΔCFI = .00, indicating that scalar invariance was supported and that

the indicator intercepts were invariant across TEIP and non-TEIP classrooms.

Measurement Invariance across inclusive and non-inclusive classrooms

Table 3 also presents fit statistics for the multiple-group factor models based on inclusive / non-inclusive classrooms. The three factor configural invariance model showed acceptable fit, $\chi 2$ (48) = 108.78, $p < .001$, CFI = .952, TLI = .928, RMSEA = .125, SRMR = .048. Constraining the factor loadings to be equal across inclusive and non-inclusive classrooms did not significantly decrease the fit of the model, $\Delta\chi 2$ (6) = 4.56, $p = .60$, providing support for the metric invariance model. The decrease in model fit for the scalar invariance model was also non-statistically significant, $\Delta\chi 2$ (9) = 12.18, $p = .20$. Thus, the multiple-group factor models indicated that the CLASS pre-k measures equivalent constructs on a common scale across inclusive and non-inclusive classrooms. In addition, the CLASS scores did not significantly vary as a function of classrooms settings. Table 3 presents standardized factor loadings for the multiple group CFA models for both sets of analyses.

Structural Features: Characteristics across TEIP and non-TEIP classrooms, inclusive and non-inclusive classrooms

Table 4 shows the structural characteristics of the overall sample and of each type of classroom. Interestingly, TEIP classrooms were more likely to have teachers with a master or postgraduation degree, $\chi 2$ (1) = 8.33, $p = .006$, to have teachers with more experience, F (1, 154) = 14.54, $p < .001$, and to have mixed-age groups, $\chi 2$ (1) = 7.44, $p = .008$. Teacher education and teacher experience did not differ across inclusive and non-inclusive classrooms, but inclusive classrooms were more likely to have mixed-age groups, $\chi 2$ (1) = 3.89, $p = .048$.

Associations between process quality and structural features

To examine the associations between (a) school sector, teacher characteristics,

group size, and classroom age composition and (b) the quality of teacher-child interactions, considering whether the classroom is inclusive or TEIP, a new set of structural equation models was performed. Table 5 presents a summary of the parameter estimates. The final model showed acceptable fit, $\chi 2$ (66) = 141.19, $p <$ .001, CFI = .943, TLI = .915, RMSEA = .085, SRMR = .039.

The quality of emotional climate as observed with the CLASS was not associated with any of the structural predictors, after controlling for the effects of the remainder. The quality of Classroom Organization was higher in public schools and in inclusive classrooms, *B* = .29, *SE* = .12, *p* = .014 and *B* = .16, *SE* = .08, *p* = .043, respectively, and lower in classrooms with larger group sizes and with mixed-aged groups, *B* = -.21, *SE* = .08, *p* = .011 and *B* = -.25, *SE* = .09, *p* = .006, respectively, although the associations were small in magnitude. Finally, instructional quality was higher in classrooms in which the teacher had a master degree, *B* = .21, *SE* = .07, *p* = .003, but lower in inclusive classrooms, *B* = -.48, *SE* = .06, *p* < .001. The strength of the associations was small to moderate.

To determine whether the associations between structural features and CLASS domains differed across TEIP and non-TEIP classrooms, and inclusive and non-inclusive classrooms, a series of models were fit by systematically constraining each path across the different types of classrooms. The multigroup analyses showed a significant chi-square decrease when the effects of group size were constrained to be equal across TEIP and non-TEIP, $\Delta\chi 2(1) = 3.93$, *p* = .047. Group size was negatively associated with Emotional Support in TEIP classrooms, *B* = –.23, *SE* = .10, *p* = .017, but not in non-TEIP classrooms, *B* = –.06, *SE* = .09, *p* = .49. This significant interaction is depicted in Figure 2.

An additional interaction effect was found between classroom age

composition and TEIP classrooms in predicting Classroom Organization. Multigroup analyses showed a significant chi-square decrease when the effects of classroom age composition were constrained to be equal across TEIP and non-TEIP classrooms, $\Delta\chi2(1) = 16.94$, $p < .001$. Mixed-age groups were negatively associated with Classroom Organization in TEIP classrooms, $B = –.40$, $SE = .09$, $p < .001$, but not in non-TEIP classrooms, $B = –.02$, $SE = .10$, $p = .83$. The interaction is depicted in Figure 3.

Finally, there was an interaction effect between inclusive and TEIP classrooms in predicting Instructional Support. Whereas there was a trend for inclusive classrooms to show lower levels of Instructional Support compared to non-inclusive classrooms in the overall sample, the effects of including children with disabilities in TEIP classrooms were not detrimental, $B = –.19$, $SE = .12$, $p = .120$, while the effects were negative in non-TEIP classrooms, $B = –.58$, $SE = .06$, $p < .001$ (see Figure 4).

Discussion

With the increasing diversity in children's abilities and backgrounds in preschool classrooms throughout Europe, this study aimed to advance understanding of both process quality and structural features in classrooms serving children with disabilities or at-risk of poverty and social exclusion in a relatively understudied country, Portugal. This investigation presents findings related to the extent to which the domains of teacher–child interactions, as assessed by a widely used measure, the CLASS, are comparable across classrooms serving children with disabilities and classrooms serving children at-risk of poverty and social exclusion and the extent to which such classroom diversity may help understand differences in associations between structural features and process quality. These findings have implications for adequate assessment of the quality in Portuguese preschool classrooms.

Process quality: The CLASS

Our findings provide further support for the three-factor structure of the CLASS Pre-K for observation of teacher–child interactions. Findings are consistent with those of other studies using the CLASS (Pakarinen et al., 2010; Suchodoletz et al., 2014), suggesting that teacher-child interactions are best described through three distinct but interrelated domains: Emotional Support, Classroom Organization, and Instructional Support. In addition, the analyses revealed configural, metric, and scalar invariance of the three domains in classrooms serving children with disabilities and children at-risk of poverty and social exclusion. Therefore, the CLASS satisfied important requirements to assess the quality of teacher-child interactions across diverse settings. To our knowledge, this is the first study in Europe to examine the equivalence of the CLASS across preschool inclusive settings and settings serving children at-risk of poverty and social exclusion. Overall, this study supports the applicability of one observational measure developed elsewhere to the Portuguese context.

The exclusion of one dimension, Negative Climate, from the final models merits special consideration. The CFA showed that the Negative Climate had poor discriminant validity, possibly due to limited variability among classrooms, which likely reflects the fact that negative interactions were rarely observed. This result is similar to those obtained in Finland (Pakarinen et al., 2010), Germany (Suchodoletz et al., 2014), and Chile (Leyva et al., 2015), indicating that Negative Climate made low or no contribution to the Emotional Support domain. As argued by Pakarinen, one possible reason for the low ratings of the Negative Climate among classrooms is the high levels of education of Portuguese teachers, who hold at least a bachelor degree in ECEC, which might prevent them to use negative affect or punitive control as

pedagogical strategies. Importantly, it seems that, across multiple samples and countries, the interactions between teachers and children are seldom negative. Because measurement invariance of the CLASS was established, it was possible to meaningfully examine the relations between CLASS domains and other classroom features.

Associations between structural features and CLASS domains

One additional goal of the current study was to examine the associations between process quality, as measured by the CLASS, and several structural features, at the teacher, classroom, and school levels. Consistent with prior research (Cryer et al., 1999; Pianta et al., 2005), associations were in general modest.

A positive association was found between teacher education and Instructional Support. Although initial training among Portuguese teachers is relatively homogeneous, as all lead teachers in each classroom have at least a Bachelor's degree in ECEC, our findings suggest that teachers who invest more in their education, earning a post-graduation or a Master's degree, are more likely to develop interactions that sustain high-order thinking skills. Interestingly, teacher education was not associated with Emotional or Organizational Support, but only with the kind of interactions that have been reported as more challenging to develop and sustain (La Paro et al., 2004). Prior research has found that, across American and European classrooms, the mean levels of Instructional Support tend to be low, that is, characterized by a limited amount of interactions that would support concept understanding and limited stimulating conversations, or rich feedback (Curby et al., 2009; Pianta et al., 2005; Suchodoletz et al., 2014). Our findings suggest that additional education might help teachers in providing opportunities for learning, focusing more on problem solving, and developing more effective cognitively

stimulating interactions. It could also be that additional education and specialization in ECEC contribute to a deeper and broader understanding of children's developmental needs and, conversely, of ways of engaging children in interactions that encourage communication and reasoning (Pianta et al., 2005). However, one alternative explanation for the association between teacher education and instructional quality should be acknowledged and it relates to the possibility that teachers who seek an advanced educational level may be different from those who do not, namely in their level of intentionality and motivation to develop new skills and knowledge. Therefore, it may be that selection effects are responsible for the association among teacher education and instructional support. While in this study it is not possible to determine the direction of this association, the creation of opportunities for teachers to invest in their education and specialization may be important. Nevertheless, more fine-grained research is needed to better understand the mechanisms by which additional education can be translated into higher-quality classroom practices (Early et al., 2007).

A second noteworthy finding was that, in this sample, Classroom Organization was associated with several structural features, which did not happen with Emotional and Instructional Support. Classroom Organization was negatively related to group composition features, such as larger groups and mixed-aged groups, which is consistent with the notion that the characteristics of the group of children may contribute to the kind of organizational strategies teachers employ (Ponitz, Rimm-Kaufman, Grimm, & Curby, 2009). Larger groups of children may decrease teacher's ability to create a well organized, patterned, and predictable environment. Our findings are consistent with prior research suggesting that teachers in classrooms with more children may spend more time in restrictive communication and redirecting

children's behavior (Litjens & Taguma, 2010; Suchodoletz et al., 2014).

Classroom age composition was also negatively associated with levels of Classroom Organization. Findings suggest that teachers may experience more difficulty in managing children's behavior and classroom activities in groups with larger proportions of both younger and older children and, thus, with a wider range of developmental and behavioral needs, and may perceive managing such classrooms as somewhat more stressful. Prior studies have shown conflicting findings regarding the effect of mixed-age groups on children's social and cognitive development (Bailey, Burchinal, & McWilliam, 1993; Bell, Greenfield, Bulotsky-Shearer, 2013; Guo, Tompkins, Justice, & Petscher, 2014; Moller et al., 2008). Our results add to this body of knowledge by suggesting that classroom organization should be considered when trying to understand how classroom composition may influence children's language and social development.

School sector was also associated with variations in the levels of quality of Classroom Organization. Prior evidence has found that public schools in Portugal provide higher levels of observed quality (Gamelas, 2010). Public schools have been linked to better working conditions, namely higher salaries and fewer working hours, higher job satisfaction, and teachers' lower levels of stress (OECD, 2006). Apparently, public schools may provide a supportive context and a less stressful environment for teachers which can be associated with higher levels of Organizational Support.

Interestingly, while inclusive classrooms showed higher levels of Classroom Organization, in such classrooms the levels of Instructional quality tended to be lower. It is possible that inclusive classrooms represent both a challenge and an opportunity for teachers to develop high-quality interactions. One possible

explanation relates to the whole group approach typically found among Portuguese preschool classrooms (Abreu-Lima et al., 2014). It may be that in a context where instruction occurs mainly through whole-group activities, teachers provide lower levels of cognitively and linguistically stimulating interactions in order to reach all children. Prior research conducted in Portuguese inclusive classrooms did suggest lack of individualization in teaching practices (Aguiar et al., 2010). On the other hand, in classrooms serving children with disabilities, teachers may structure time and manage behaviors more efficiently and in a more predictable way compared to non-inclusive classrooms. This result is somewhat surprising, given the negative associations between Classroom Organization and larger and mixed-age groups. One possible explanation is related to the number of children in need of additional support in the group. Inclusive classrooms in Portugal usually include one or two children with disabilities, whereas mixed-age groups may include several children with a wide range of developmental skills. It is possible that it is the total number or the proportion of children with varying educational and behavioral needs in the group that is negatively related to the levels of Classroom Organization, rather than the range of educational and behavioral needs in the group per se.

An additional explanation for these findings is related to the fact that teachers in inclusive classrooms are supported by early childhood intervention and/or early childhood special education professionals, who might help them in structuring time and tasks more effectively in order to meet the needs of children with disabilities. It can also be that these professionals use more direct instruction, the most prevalent model in special education (Burns & Ysseldike, 2009), and have a highly organized classroom. Teachers serving larger or mixed-aged groups do not receive similar supports.

Prior research has found that the overall quality of inclusive programs was higher or at least comparable to non-inclusive programs (Buysse, Wesley, Bryant, & Gardner, 1999; Hestenes et al., 2007). Our findings extend prior research conducted in inclusive settings by suggesting that when using a fine grained measure of process quality, the quality may be higher in some dimensions, but not in others, a result that deserves further attention.

Interestingly, no main effects were found for TEIP, indicating similar levels of quality across TEIP and non-TEIP classrooms. It is important to mention that teacher education and experience were positively associated with TEIP classrooms, such that TEIP classrooms were more likely to have teachers better trained and with more experience in ECEC. It is also important to add that all TEIP schools were public, and school sector might also contribute to understand our findings. Although tentative, the results from this study suggest that classrooms of the TEIP program provide similar levels of process quality, which contrasts with findings in the USA, where access to high-quality teaching seems to be highly uneven for children from disadvantaged backgrounds (LoCasale-Crouch et al., 2007).

The current study also intended to examine whether the associations between structural features and process quality were different for classrooms serving children with disabilities and classrooms serving children at-risk of poverty and social exclusion. Our findings suggest that group characteristics seem to be particularly important in TEIP classrooms, namely group size and age composition. Specifically, large and mixed-aged groups appeared to be more challenging for teachers in TEIP classrooms in terms of Emotional and Organizational Support. Following a cumulative risk framework (Gutman, Sameroff, & Cole, 2003), it is conceivable that the accumulation of challenging classroom characteristics, such as larger proportion

of children at-risk of poverty and social exclusion and larger groups or groups with a wider age range, is more detrimental for levels of process quality than each factor by itself.

Finally, the interaction effect between inclusive and TEIP classrooms on Instructional Support suggests that teachers working in TEIP classrooms may be better able to address the challenges of providing cognitively stimulating interactions for a group of children that includes children with disabilities, compared to teachers working in non-TEIP classrooms. These findings may be related to the fact that these teachers benefit both from the TEIP program additional resources and from the support of early childhood intervention/early childhood special education specialists, which could be instrumental in fostering this process quality dimension, despite of the overall low levels of Instructional Support.

Limitations and future directions

There are several limitations to the present study that require discussion. First, both TEIP and inclusive classrooms only provide a rough estimate of group characteristics without fully considering the skills and needs of individual children. Further, in this study, the categories of inclusive and at-risk of poverty and social exclusion were treated independently, but these classifications were not mutually exclusive. Given the associations between group composition and process quality, further research should pay careful attention to individual characteristics of the children in the group. Third, although inter-rater agreement was good, in the present study, agreement checks were not conducted at pre-specified intervals throughout data collection. Assessing the agreement rate at 20% intervals during data collection might have increased inter-rater reliability scores. Fourth, although the current sample included classrooms from the two major metropolitan areas in Portugal, sample size

was relatively small and findings cannot be generalized across regions. Findings require replication in rural and smaller regions, which likely represent different constellations of structural features. Further research would benefit from simultaneous consideration of multiple structural indicators such as country policies and regulations, pedagogical approaches, and school, classroom, and teacher characteristics. In particular, cross-country studies that capitalize on the variation in ECEC systems and their regulations can contribute in our endeavor to understand how can structural features contribute to higher levels of teacher-child interactions. Finally, the design of the current study is correlational and, therefore, causal links cannot be inferred.

Conclusion and implications

The present study contributes to the body of research devoted to the measurement of ECEC quality by showing that the domains suggested by the Teaching Through Interactions framework and operationalized through the CLASS (Hamre et al., 2013; Pianta et al., 2008) are replicated in Portuguese settings. Therefore, our study adds to the literature that supports the use of the CLASS in cultural contexts other than the USA and suggests that meaningful interpretations of the CLASS scores within and across countries can be formulated. An important implication of this study is that CLASS scores can be meaningfully interpreted across Portuguese preschools serving children with disabilities and preschool classrooms within the TEIP program, thus contributing to subsequent research and evaluation procedures in these settings.

Findings from this study also suggest modest associations between structural features and process quality, while simultaneously highlighting their complex interplay across classrooms serving children at risk of social and educational

exclusion and/or children with disabilities. Practice implications related to group composition can be also drawn, with findings supporting the need to reduce the number of children in TEIP classrooms, which serve children at risk of poverty and social exclusion, and suggesting that reducing the age-range of children in these groups might also be advantageous. Overall, our findings are consistent with the importance of considering a wide group of structural aspects and the complex interplay among them when trying to understand the associations between structural features and process quality (Slot, Lerkannen et al., 2015).

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Table 1

Means, Standard Deviations, and Correlations for the Classroom Assessment Scoring System Dimensions (N = 178)

	1	2	3	4	5	6	7	8	9	*M*	*SD*	Min- Max
1. Positive Climate										4.84	1.01	2.25 - 7.00
2. Negative Climate	-.58									1.52	0.60	1.00 - 3.50
3. Teacher Sensitivity	.81	-.61								4.36	1.12	1.25 - 6.75
4. Regard for Student Perspectives	.69	-.62	.81							4.24	1.12	1.75 - 7.00
5. Behavior Management	.56	-.59	.67	.57						4.69	1.08	1.75 - 6.75
6. Productivity	.55	-.35	.66	.54	.67					5.19	0.84	2.75 - 7.00
7. Instructional and Learning Formats	.63	-.52	.76	.76	.68	.68				4.13	0.99	1.50 - 6.25
8. Concept Development	.47	-.21	.39	.28	.16	.14	.25			2.02	0.87	1.00 - 4.50
9. Quality of Feedback	.52	-.23	.42	.29	.27	.25	.27	.84		2.28	0.91	1.00 - 5.25
10. Language Modeling	.56	-.32	.45	.35	.27	.20	.28	.85	.85	2.51	1.01	1.00 - 5.67

Note. All correlations above .15 are significant at $p < .01$.

Table 2

Model Fit Statistics for Alternative Measurement Invariance Models Based on (A) TEIP Classrooms and (B) Inclusive Classrooms

Model	$\chi 2$	*df*	CFI	TLI	RMSEA	SRMR	ΔCFI	$\Delta\chi 2$	*df*	*p*
TEIP vs. Non-TEIP										
Model 1: Configural Invariance	103.12	48	.961	.941	.114	.053				
Model 2: Metric invariance	108.03	54	.961	.949	.106	.078	.000	4.91	6	.555
Model 3: Scalar invariance	117.39	63	.961	.956	.098	.088	.000	9.36	9	.404
Inclusive vs. Non-Inclusive										
Model 1: Configural Invariance	108.78	48	.952	.928	.125	.048				
Model 2: Metric invariance	113.33	54	.953	.937	.116	.065	--	4.56	6	.602
Model 3: Scalar invariance	125.51	63	.950	.943	.110	.094	.003	12.18	9	.204

Note. TLI = Tucker–Lewis Index; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; TEIP = Território Educativo de Intervenção Prioritária (Priority Intervention Territories Program).

Table 3

Standardized Factor Loadings for the Scalar Invariance Models for the (A) TEIP and non-TEIP Classrooms and for the (B) Inclusive and non-Inclusive Classrooms

	TEIP (n = 67)	Non-TEIP (n = 111)
	Estimate (*SE*)	Estimate (*SE*)
Emotional Support by		
Positive climate	.87 (.03)	.82 (.03)
Teacher sensitivity	.92 (.02)	.97 (.01)
Regard for student perspectives	.84 (.04)	.85 (.03)
Classroom Organization by		
Behavior management	.83 (.04)	.77 (.04)
Productivity	.80 (.04)	.78 (.04)
Instructional and learning formats	.84 (.04)	.91 (.02)
Instructional Support		
Concept development	.89 (.03)	.92 (.02)
Quality of feedback	.91 (.02)	.91 (.02)
Language modeling	.93 (.02)	.93 (.02)
	Inclusive (n = 118)	Non-inclusive (n = 45)
	Estimate (*SE*)	Estimate (*SE*)
Factor loading		
Emotional Support by	.86 (.03)	.83 (.04)
Positive climate	.97 (.02)	.92 (.03)
Teacher sensitivity	.84 (.03)	.81 (.04)
Regard for student perspectives		
Classroom Organization by	.77 (.04)	.84 (.04)
Behavior management	.78 (.04)	.75 (.05)
Productivity	.87 (.03)	.88 (.03)
Instructional and learning formats		
Instructional Support		
Concept development	.89 (.02)	.87 (.03)
Quality of feedback	.92 (.02)	.82 (.04)
Language modeling	.91 (.02)	.98 (.02)

Note. TEIP = Território Educativo de Intervenção Prioritária (Priority Intervention Territories Program).

Table 4

Descriptive Statistics for Structural Features by Classroom (A) TEIP and Non-TEIP Categories and (B) Inclusive and non-Inclusive Categories

	TEIP (n = 67)			Non-TEIP (n = 111)		
	%	*M*	*SD*	%	*M*	*SD*
School sector (1 = public)	100%			56%		
Teacher education (1 = master/post-graduation)	13%[a]			6% [b]		
Teacher experience		24.5	7.01		19.4	8.49
Group size		21.4	2.45		21.5	3.32
Age composition (1 = mixed-aged)	88% [a]			69% [b]		
	Inclusive (n = 118)			Non-inclusive (n = 45)		
	%	*M*	*SD*	%	*M*	*SD*
School sector (1 = public)	75%			67%		
Teacher education (1 = master/post-graduation)	12%			13%		
Teacher experience		21.2	8.25		20.8	8.64
Group size		21.3	2.68		21.8	3.82
Age composition (1 = mixed-aged)	81% [a]			67% [b]		

Note: ANOVA and chi-square pairwise significant differences are denoted by superscript letters.

Table 5

Standardized Parameter Estimates of Structural Equation Models Using Structural Characteristics to Predict CLASS Latent Domains

	Emotional Support		*Classroom Organization*		*Instructional Support*	
	B	*SE*	*B*	*SE*	*B*	*SE*
Public sector	.21	.12	.29*	.12	-.07	.10
TEIP school	-.01	.09	-.12	.09	.05	.08
Inclusive classroom	-.05	.08	.16*	.08	-.48*	.06
Teacher education	.05	.08	.03	.08	.21*	.07
Teacher experience	.04	.10	.08	.10	.16	.09
Group size	-.16	.08	-.21*	.08	.06	.07
Mixed-aged group	-.16	.09	-.25*	.09	-.14	.08

Note. TEIP = Território Educativo de Intervenção Prioritária (Priority Intervention Territories Program).

*$p < .05$.

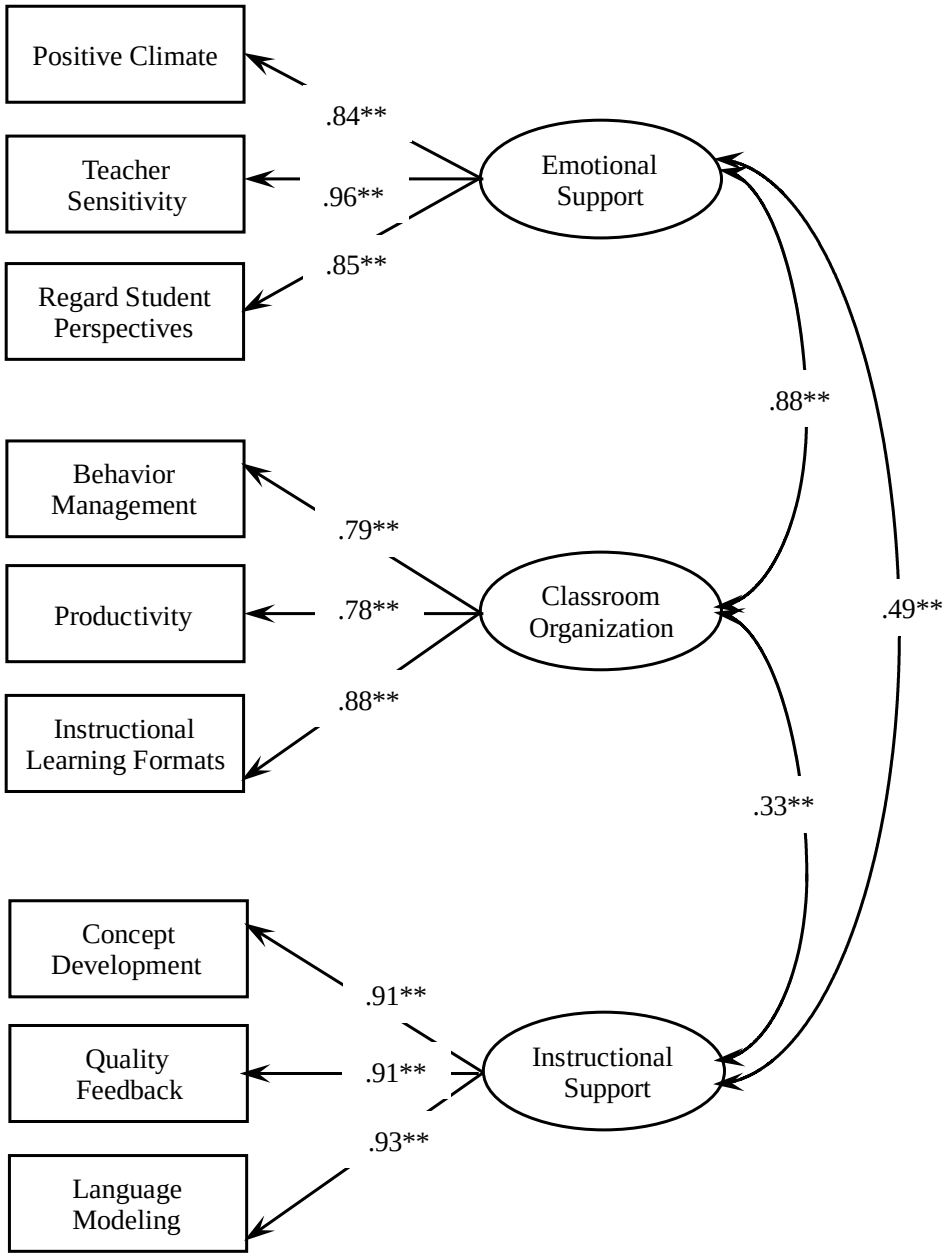

Figure 1. Three-factor model of classroom quality.

*$p < .05$ ** $p < .01$.

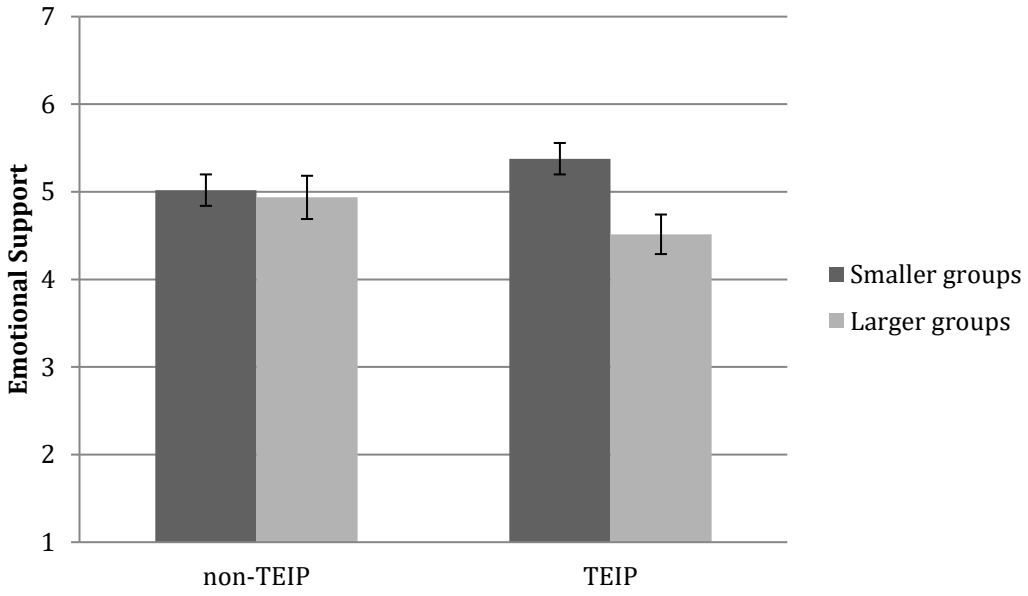

Figure 2. Group size x TEIP/non-TEIP classrooms predicting Emotional Support. TEIP = Território Educativo de Intervenção Prioritária (Priority Intervention Territories Program).

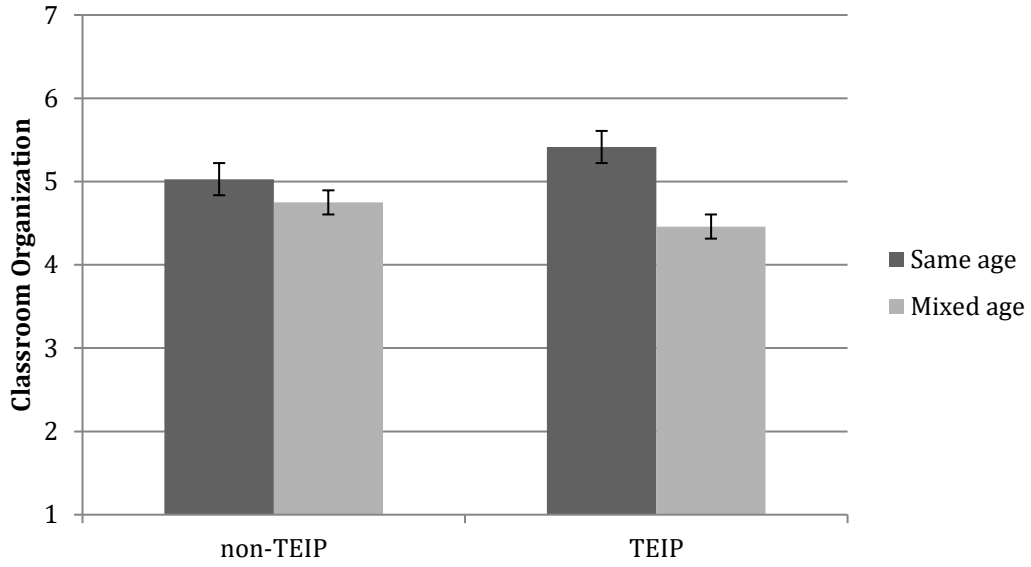

Figure 3. Classroom age composition x TEIP/non-TEIP classrooms predicting Classroom Organization. TEIP = Território Educativo de Intervenção Prioritária (Priority Intervention Territories Program).

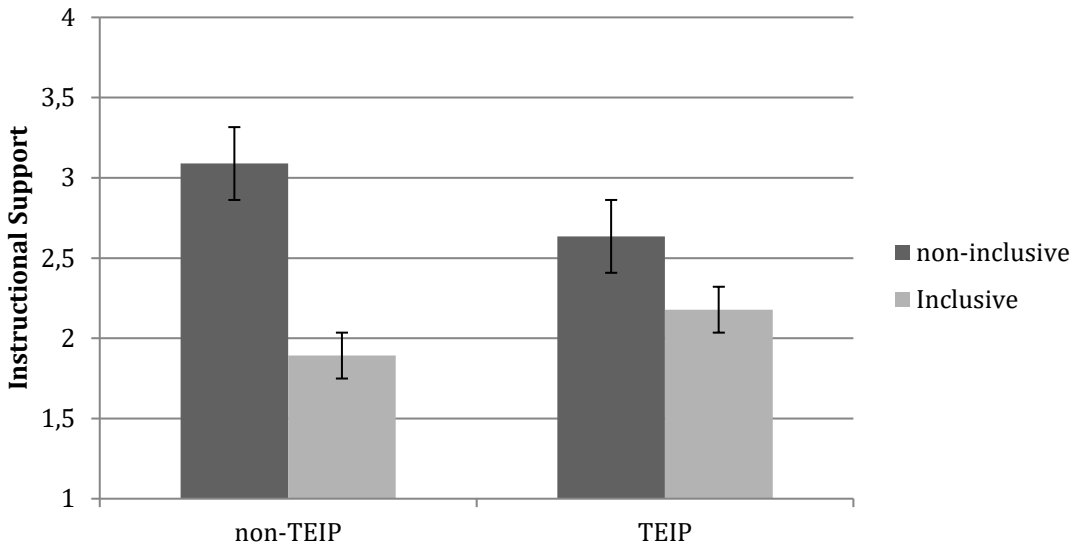

Figure 4. Inclusive/non-inclusive x TEIP/non-TEIP classrooms predicting Instructional Support. TEIP = Território Educativo de Intervenção Prioritária (Priority Intervention Territories Program).