



Longitudinal associations between teacher-child interactions and academic skills in elementary school[☆]



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ABSTRACT

This study examined the extent to which the quality of teacher-child interactions assessed in kindergarten (6-year-olds) is associated with children's reading and math development across the elementary school years. The sample consisted of 515 Finnish children (271 boys, 244 girls). Teacher-child interactions were observed in 49 kindergarten classrooms. The findings from the latent growth curve models showed that high-quality teacher-child interactions in kindergarten were positively associated with the initial levels of reading and math skills. Furthermore, the results indicated that high-quality teacher-child interactions in kindergarten were positively associated with children's academic skills four years later. The results emphasize the importance of strong emotional, organizational, and instructional supports in kindergarten for further development of academic skills.

1. Introduction

Given the increasing participation and policy interest in early education programs, the long-term benefits of early childhood education are of interest worldwide. In the United States in particular, the efficiency of teaching and early education programs as a means of reducing gaps in academic performance has been the focus of numerous studies (e.g., Burchinal et al., 2008; Vandell, Belsky, Burchinal, Vandergrift, & Steinberg, 2010). Recent research has proposed that the process quality of classrooms, that is, teacher-child interactions, is more influential than participation in program and the structural features of programs (Mashburn et al., 2008; see also Yoshikawa et al., 2013). However, few studies outside the United States have investigated the long-term benefits of preschool and kindergarten process quality (see Anders, Grosse, Rossbach, Ebert, & Weinert, 2013; Lehl, Kluczniok, & Rossbach, 2016; Sylva, Melhuish, Sammons, Siraj-Blatchford, & Taggart, 2008), and none of them has used the Classroom Assessment Scoring System (CLASS). The major benefits of CLASS instruments are that it provides a theoretically grounded and an empirically tested tool for investigating teacher-child interactions in a variety of cultural and educational settings, it has been widely used in US settings, and it produces scores for three domains of teacher-child

interactions of particular importance for child development. Consequently, the present study builds on prior research by examining whether the observed quality of teacher-child interactions in kindergarten classrooms (6-year-olds) is associated with Finnish children's development of reading and math skills across their elementary school years. The current study adds to the literature by investigating the long-term predictive role of teacher-child interactions for both initial level and further development of reading and math skills by conducting a five-year follow-up from kindergarten to Grade 4, by taking into account several important control factors, and by using advanced statistical methods.

1.1. Quality of teacher-child interactions as a predictor of academic skills

The key aspects of quality in preschool education are stimulating and supportive interactions between teachers and children (e.g., Yoshikawa et al., 2013; see also Mashburn et al., 2008). In their Teaching Through Interactions (TTI) framework, Hamre et al. (2013) and Hamre, Hatfield, Pianta, and Jamil (2014) conceptualized the quality of teacher-child interactions in three broad domains: emotional support, classroom organization, and instructional support. *Emotional support* refers to a positive tone in interactions and a warm and

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supportive climate in a classroom. Emotionally supportive teachers are sensitive and responsive to children's needs, and provide children with appropriate levels of leadership and autonomy (Pianta, La Paro, & Hamre, 2008). *Classroom organization* consists of effective teacher management of time and attention and setting of clear rules and routines (Yates & Yates, 1990). In addition to providing a structure for learning, teachers with high classroom organization skills also actively monitor the classroom and try to keep children engaged in academic activities (Pianta, La Paro, et al., 2008). *Instructional support* captures the quality of the teacher's feedback, stimulation of thinking skills and reasoning in the classroom, and explicit linking of content knowledge with meaningful contexts (Hamre et al., 2013; Pianta, La Paro, et al., 2008).

Many theoretical perspectives support the view that teacher–child interactions influence child outcomes. The ecological systems theory argues that the interactions that take place among teachers and students on a daily basis (i.e., proximal processes) are the key mechanisms through which children learn (Bronfenbrenner & Morris, 2006). Attachment theory (see Bergin & Bergin, 2009) posits that if children feel emotionally secure and respected by their teachers, they are better able to invest their attention and engagement in learning (Pianta, 1999). Self-determination theory (SDT; Ryan & Deci, 2000) contends that students' engagement in learning activities and subsequent schooling outcomes are enhanced if the basic psychological need for autonomy, relatedness, and competence are met in a classroom. Within the TTI framework, teachers can promote these needs, for example, by being sensitive to students' needs, by being responsive, by taking children's initiatives into account, and by providing process-oriented feedback (Hamre et al., 2013). Furthermore, empirical findings concerning environmental support for the development of children's self-regulatory skills (Paris & Paris, 2001; Raver et al., 2009), and cognitive and linguistic skills (Wharton-McDonald, Pressley, & Mistretta-Hampston, 1998) indicate that there is positive association between instructional and organizational supports and child outcomes. For example, teachers who provide high-quality instructional support give children rich learning opportunities by scaffolding, extending, and providing consistent, process-oriented feedback (Hamre et al., 2014; Pianta, La Paro, et al., 2008), which in turn contributes to children's skill development (Mashburn et al., 2008). In addition, well-organized activities and proactive behavior management contribute to better self-regulatory skills in children (Cadima, Doumen, Verschueren, & Buyse, 2015; Hamre et al., 2013; Rimm-Kaufman, Curby, Grimm, Nathanson, & Brock, 2009), which then translate into better academic skills (Ponitz, Rimm-Kaufman, Brock, & Nathanson, 2009).

1.2. Longitudinal effects of teacher–child interactions

Although the domains of teacher–child interactions are moderately or highly correlated, recent studies have provided evidence of the domain-specific associations of emotional support, classroom organization, and instructional support with child outcomes (e.g., Downer, Sabol, & Hamre, 2010; Hamre et al., 2014). Emotional support has been linked mostly with gains in literacy outcomes. For example, it has been found to predict gains in expressive and receptive language during preschool (Burchinal, Vandergrift, Pianta, & Mashburn, 2010), kindergarten (Curby, Rimm-Kaufman, & Ponitz, 2009) and Grade 1 (Cadima, Leal, & Burchinal, 2010; Curby et al., 2009; Lee & Bierman, 2015). McDonald Connor, Son, Hindman, and Morrison (2005) demonstrated that children who experienced more responsive teacher–child interactions in preschool showed stronger vocabulary and decoding skills at the end of first grade. Moreover, high levels of emotional support over time and across grades have been associated with progress in reading from preschool to fifth grade (Pianta, Belsky, Vandergrift, Houts, & Morrison, 2008). There is at least one study showing the beneficial effect of emotional support for math skills: Stronger emotional support in fifth-grade classrooms predicted improved math skills

in fifth grade (Pianta, Belsky, et al., 2008).

Research has documented the beneficial effect of classroom organization for both math and literacy outcomes. For instance, high-quality classroom organization has been shown to be related to first graders' print concepts, vocabulary (Cadima et al., 2010), and literacy gains (Ponitz et al., 2009). In addition, students with low preschool skills showed greater improvement in number identification skills in first grade when being in classrooms of better classroom organization (Cadima et al., 2010). In a similar vein, Curby et al. (2009) showed that lower-achieving children in classrooms had better kindergarten classroom organization showed greater progression in mathematics across the Grade 1 year.

Previous studies have demonstrated the predictive effect of instructional support mainly for literacy outcomes. High-quality instructional support in preschool has been found to contribute to children's pre-literacy skills (Hamre et al., 2014; Mashburn et al., 2008), their progress in word reading (Curby et al., 2009), and also to their skills in solving applied math problems (Mashburn et al., 2008). Hamre et al. (2014) showed recently that children who had preschool teachers who provided high-quality instructional support made the most gains in early literacy and language skills during their year of preschool. In kindergarten, instructional support is related to better pre-reading skills, such as vocabulary, understanding and the use of spoken language, phonological awareness, and letter knowledge (Burchinal et al., 2008; Mashburn et al., 2008). Instructional support has also been shown to be linked to children's gains in vocabulary and print concepts in elementary school (Cadima et al., 2010).

Although most of the studies investigating the longitudinal associations between teacher–child interactions and academic outcomes have been conducted in the US classrooms, there are also some studies conducted in Europe. These studies have typically used the Early Childhood Education Rating Scale (ECERS) instrument for measuring the process quality of classrooms (see Cadima et al., 2010 as an exception), which somewhat differs from the process quality measured by CLASS. In a German sample, Anders et al. (2012) demonstrated that the preschool process quality in terms of mathematics was related to the progression in children's early numeracy skills between age 3 and 5 years. Lehl et al. (2016) indicated that preschool quality in terms of mathematical stimulation was predictive of growth in mathematical skills between Grades 1 and 3 in a German sample. The findings of the Effective Provision of Preschool Education (EPPE) study (Sylva et al., 2008) in the UK showed that the beneficial effects of high-quality preschool education can last up to the end of primary school and tend to be most beneficial for boys and children from disadvantaged backgrounds.

Previous studies on longitudinal associations have some limitations. Most of the studies using CLASS to date have been conducted in US preschool and kindergarten classrooms, whereas less is known about the associations between teacher–child interactions and child outcomes in other cultural and educational settings. Another limitation is the inconsistency between previous studies with regard to how long the influence of quality of teacher–child interactions lasts. Most of the long-term associations have been reported between preschool center quality and academic outcomes at kindergarten or school entry (1–2 years). However, there are a few longitudinal studies that have investigated whether the quality of preschool or kindergarten teacher–child interactions would predict children's elementary school outcomes (see Belsky et al., 2007, Pianta, Belsky, et al., 2008, Lee & Bierman, 2015 and Vandell et al., 2010 as exceptions). Consequently, further investigation of the long-term associations between the quality of preschool and kindergarten teacher–child interactions and children's academic outcomes is clearly needed. In addition, previous studies differ in the way they have investigated long-term associations between quality of teacher–child interactions and academic skills, i.e., whether they have investigated the academic skills at certain time point (e.g., skills at the beginning of Grade 1) or development of academic skills (e.g.,

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