JYVÄSKYLÄ STUDIES IN EDUCATION, PSYCHOLOGY AND SOCIAL RESEARCH
447

Eija Pakarinen

Relations Between Teacher–Child Interactions and Children's Learning and Motivation in Finnish Kindergartens

JYVÄSKYLÄN YLIOPISTO

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Esitetään Jyväskylän yliopiston yhteiskuntatieteellisen tiedekunnan suostumuksella
julkisesti tarkastettavaksi yliopiston vanhassa juhlasalissa S212
syyskuun 28. päivänä 2012 kello 14.

Academic dissertation to be publicly discussed, by permission of
the Faculty of Social Sciences of the University of Jyväskylä,
in Building Seminarium, Auditorium S212, on September 28, 2012 at 2 p.m.

UNIVERSITY OF JYVÄSKYLÄ

JYVÄSKYLÄ 2012

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JYVÄSKYLÄ 2012

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Pekka Olsbo, Sini Tuikka
Publishing Unit, University Library of Jyväskylä

URN:ISBN:978-951-39-4866-5
ISBN 978-951-39-4866-5 (PDF)

ISBN 978-951-39-4865-8 (nid.)
ISSN 0075-4625

Jyväskylä University Printing House, Jyväskylä 2012

ABSTRACT

Pakarinen, Eija
Relations Between Teacher–Child Interactions and Children's Learning and Motivation in Finnish Kindergartens
Jyväskylä: University of Jyväskylä, 2012, 96 p.
(Jyväskylä Studies in Education, Psychology and Social Research
ISSN 0075-4625; 447)
ISBN 978-951-39-4865-8 (nid.)
ISBN 978-951-39-4866-5 (PDF)
Diss.
Finnish summary

The present thesis focused on the predictive relations between the quality of teacher–child interactions and children's learning motivation, task avoidance, and academic pre-skills. The thesis had four aims: First, to examine the reliability and validity of the Classroom Assessment Scoring System (CLASS Pre-K; Pianta, La Paro, & Hamre, 2008) in Finnish kindergartens. Second, to investigate the effects of teacher–child interactions on children's motivational outcomes, namely, task avoidance and learning motivation. The third aim was to examine the predictive role of teacher stress in kindergarteners' learning motivation and phonological awareness. The fourth aim was twofold: first, to investigate the predictive role of children's academic pre-skills in teacher–child interactions, and, second, to examine the influence of teacher–child interactions on academic skills. The data stem from the First Steps longitudinal study. Altogether 49 kindergarten teachers were observed using the CLASS instrument. Other sources of data utilized in the analyses include assessments of 1268 kindergarteners (655 boys, 613 girls) conducted in the beginning and in the end of their kindergarten year, questionnaires filled out by kindergarten teachers (n = 137) and children's mothers (n = 1028), and kindergarten teachers' ratings of task-avoidant behavior of the children in their kindergarten classroom. The results of the thesis suggest that the CLASS is a reliable and valid instrument for investigating teacher–child interactions also in Finnish kindergarten classrooms. Further, the results suggest that teacher–child interactions are important to kindergarteners' motivational outcomes. Children's task avoidance and learning motivation assessed at the end of their kindergarten year were related to their academic pre-skills. Moreover, learning motivation mediated the association between kindergarten teachers' stress and children's phonological skills. The results also suggest that kindergarten teachers adapt their classroom interactions in accordance with children's academic pre-skills. Overall, these results suggest that it is essential to study the actual practices and interactions in classrooms in order to determine how teacher–child interactions facilitate children's motivation and learning.

Keywords: teacher–child interactions, classroom quality, learning motivation, task-avoidant behavior, academic pre-skills, kindergarten, teacher stress

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ACKNOWLEDGEMENTS

I would like to express my warmest gratitude to several people who have made this endeavor possible. Firstly, I would like to thank the supervisors of my doctoral thesis. I have been extremely fortunate to have such a great team of supervisors in my process of learning to become a researcher. I would like to express my deepest gratitude to my main supervisor, Professor Jari-Erik Nurmi. Thank you, Jari, for all your guidance, support, wisdom and patience during this process. Besides all the expertise, you have such a great sense of humor, which has helped in many situations. I am also indebted to Professor Anna-Maija Poikkeus. Thank you, Anna-Maija, for all the support, encouragement and valuable comments. Thank you also for all the opportunities that you have created for me. Further, I would like to thank Professor Timo Ahonen for always being such a positive and encouraging person. I am also deeply grateful to Adjunct Professor Marja-Kristiina Lerkkanen. Thank you, Marja-Kristiina, for always having time and patience with my questions and for sharing all your expertise. Thank you also for being the enthusiastic, positive, warm and friendly person that you are. And thank you for all the opportunities that you have given to me during this process.

I would also like to thank the reviewers of this thesis. My warmest gratitude I would like to express to Dr., Research Associate Professor Bridget Hamre for devoting her time and expertise to reviewing this thesis, and also for being the opponent of this dissertation. I also wish to thank Dr., Academic Fellow Lars-Erik Malmberg for his valuable comments on this thesis.

I also wish to thank several people at the Department of Psychology. I would like to express my warmest gratitude to Noona, who has helped me with statistics and taught me a lot of about doing research. Thank you, Noona, for always having time and patience with all my questions. Further, I want to express special thanks to Kati, Riikka, Eija, Jaana, Laura, Riikka, Ulla, and Katja for being in the "same boat" with me and being more than just colleagues. I also would like to thank Jenni S. for so many inspiring conversations and joint interests; thank you also for making many congress journeys so nice. Thank you, Hely, Katrin, Gintas, and many others for all the support.

I also want to thank the whole "ALPO" research group. Thank you, Anna-Liisa and Jenni R., for always helping me with the data. Thank you, Professor Helena Rasku-Puttonen, for being such an encouraging and supportive person on all the way. Next, I wish to thank Dr. Martti Siekkinen for sharing his expertise and enthusiasm regarding early childhood education research. I would also like to thank Professor Eve Kikas for cooperation and so nice joint congress journeys. And I also want to thank all the children, teachers, and parents participating in the *First Steps* study.

I am also very grateful to my family and friends. My deepest gratitude goes to my mother, Sirkka-Liisa, for always encouraging and supporting me and believing in me. I am also grateful to my godchildren, Kim, Cinderella, Veera, Jesse and Lassi for sharing their special moments of life with me.

I have been blessed with wonderful children: Eetu, Leevi, Veeti, and Ella. You four have taught me more about life and parenthood than I could have ever learned in theory. Thank you for bringing so much joy and happiness into my life and also for teaching me what is important in life. Finally, I would like to thank my husband, Mika, for his unconditional love and endless support. Thank you for sharing all the joys and sorrows of life with me. I am not sure whether I could have made it this far without you. You are more than I could have ever asked for.

This work has been financially supported by the National Center of Excellence in Learning and Motivation, the Department of Psychology, and the National Doctoral Program of Psychology – thank you for your support.

Jyväskylä, September 2012
Eija Pakarinen

FIGURES

TABLES

LIST OF PUBLICATIONS

I Pakarinen, E., Lerkkanen, M.-K., Poikkeus, A.-M., Kiuru, N., Siekkinen, M., Rasku-Puttonen, H., & Nurmi, J.-E. (2010). A validation of the Classroom Assessment Scoring System in Finnish kindergartens. *Early Education and Development, 21*, 95–124. doi: 10.1080/10409280902858764

II Pakarinen, E., Kiuru, N., Lerkkanen, M.-K., Poikkeus, A.-M., Siekkinen, M., & Nurmi, J.-E. (2010). Classroom organization and teacher stress predict learning motivation in kindergarten children. *European Journal of Psychology of Education, 25*, 281–300. doi: 10.1007/s10212-010-0025-6

III Pakarinen, E., Kiuru, N., Lerkkanen, M.-K., Poikkeus, A.-M., Ahonen, T., & Nurmi, J.-E. (2011). Instructional support predicts children's task avoidance in kindergarten. *Early Childhood Research Quarterly, 26*, 376–386. doi: 10.1016/j.ecresq.2010.11.003

IV Pakarinen, E., Lerkkanen, M.-K., Poikkeus, A.-M., Siekkinen, M., & Nurmi, J.-E. (2011). Kindergarten teachers adjust their teaching practices in accordance with academic pre-skills. *Educational Psychology, 31*, 37–53. doi: 10.1080/01443410.2010.517906

CONTENTS

1 INTRODUCTION

Child development is a function of social interactions that occur at home, in school, or in any environment in which patterns of interactions accumulate over time (Bronfenbrenner & Morris, 2006). Children's first significant relationships are typically formed with parents, yet children's relationships with teachers and other primary caregivers also have developmental relevance (Downer, Driscoll, & Pianta, 2011). In fact, many children spend a high proportion of their waking hours in day care centers or kindergartens. A parallel has sometimes been drawn between teaching and parenting (e.g., Wentzel, 2002), and an increasing amount of research has been conducted on teacher–student interactions and the influence of teacher practices on child outcomes (for a meta-analysis, see Roorda, Koomen, Spilt, & Oort, 2011).

Children's early educational experiences have long-lasting effects on their academic achievement (Hamre & Pianta, 2001) and motivation (for reviews, see Rutter, 1985b; Sylva, 1994). Rutter (1985a, b) concluded that: "The long-term educational benefits stem not from what children are specifically taught but from effects on children's attitudes to learning, on their self-esteem, and on their task orientation." In order to understand the key factors that promote children's academic learning and motivation, it is important to examine what kinds of learning environments and teacher–child interactions children are exposed to. Both classroom- and teacher-related factors have been found to be associated with successful school outcomes (Pianta, Belsky, Vandergrift, Houts, & Morrison, 2008). The majority of previous research on classroom quality has focused on structural characteristics, such as adult–child ratio, group size, and teachers' education (Rutter & Maughan, 2002). Early research on the quality of early education addressed whether children attending early education institutions develop differently from those not attending such institutions (Melhuis, 2001). However, recent literature has indicated that early educational experience is not unitary and that it is the quality or characteristic of experience that matters (Melhuis, 2001). Moreover, the process quality of daily interactions between the teacher and students has been shown to provide more powerful predictors of child outcomes than the classroom structural features have (Early et al., 2006; Howes et

al., 2008; Mashburn et al., 2008; see also Montie, Xiang, & Schweinhart, 2006). Consequently, the goal of the present thesis was to examine the predictive relations between the quality of teacher–child interactions in kindergarten classrooms and children's learning motivation and academic pre-skills. The thesis also had more specific aims: first, to investigate the reliability and validity of the Classroom Assessment Scoring System as an observational tool (Pianta et al., 2008b) in Finnish kindergartens; second, to examine the predictive role of teacher–child interactions in kindergarteners' motivational outcomes, namely, task avoidance and learning motivation; third, to investigate the role of teacher stress in kindergarteners' learning motivation and phonological awareness; and, fourth, to examine the predictive role of kindergarteners' academic pre-skills in teacher–child interactions. In addition, the predictive role of teacher–child interactions in kindergarteners' academic pre-skills was investigated.

1.1 Teacher–child interactions

Classroom processes taking place in interactions between teachers and children, as well as among children are seen as the primary mechanisms of influence of schools and teachers on child development, that is, through the provision of opportunities to develop social skills and competencies and be engaged in learning (Early et al., 2007; Hamre, Pianta, Mashburn, & Downer, 2007; Mashburn et al., 2008). In the framework of Bronfenbrenner's bioecological model (Bronfenbrenner & Morris, 1998) interactions between teachers and children form an example of *proximal processes*, i.e., enduring forms of interaction between the child and persons, objects, and symbols in his or her immediate environment. Teacher–child interactions representing a bidirectional transactional process between individuals are influenced by both individual and contextual factors (Downer et al., 2010b; Jennings & Greenberg, 2009; see Figure 1). In other words, each individual brings his/her own personal characteristics, beliefs and dispositions into the everyday teacher–child interactions evidenced in the *proximal context*. More *distal* contextual factors such as classroom, family, and school may facilitate or impede effective teacher–child interactions to evolve as well (Downer et al., 2010b). Teacher–child interactions are also a part of a larger ecological system, e.g., socioeconomic and cultural contexts (Bronfenbrenner & Morris, 1998).

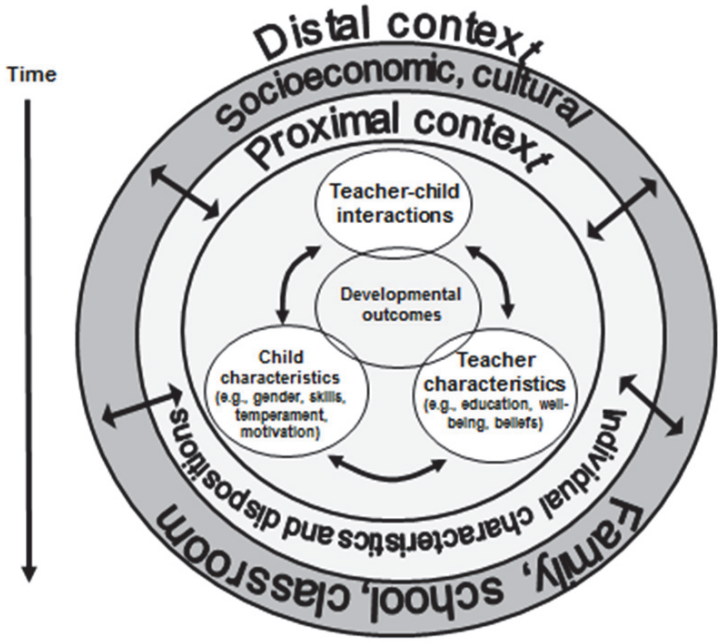

FIGURE 1 The contextual model of teacher–child interactions. Based on Downer et al. (2010b).

Previous research on the quality of classroom interactions and teaching practices has relied on several approaches and used a variety of concepts. These include developmentally appropriate practices (DAP; e.g., Copple & Bredecamp, 2009; NAYEC, 2009), classroom quality (La Paro, Pianta, & Stuhlman, 2004; Pianta et al., 2008b), effective teaching (Bogner, Raphael, & Pressley, 2002; Wharton-McDonald, Pressley, & Hampston, 1998), child-centered versus teacher-directed (didactic) practices (Perry, Donohue, & Weinstein, 2007; Stipek & Byler, 2004; Stipek, Feiler, Daniels, & Milburn, 1995), and individualizing instruction (Connor et al., 2009). Despite the different concepts, the approaches make similar assumptions regarding the key elements of teacher–child interactions in children's learning: (1) social and emotional elements, (2) classroom management or organization, and (3) instructional or cognitive components (e.g., Bru, Stephens, & Torsheim, 2002; Connor, Son, Hindman, & Morrison, 2005; Eccles & Roeser, 1999; La Paro et al., 2004; Stipek & Byler, 2004).

The previous research clearly points to three domains of classroom interactions that are crucial for children's academic outcomes: classroom management, classroom climate, and the amount and type of instruction evidenced in the classroom (e.g., Connor, Morrison, & Katch, 2004; La Paro et al., 2004; Pianta et al., 2008b; Stipek & Byler, 2004). Student achievement has been found to be related to teachers' *management* strategies (i.e., clarity of rules, management of students' behavior, time, and attention) of learning activities and behavior in the classroom (e.g., Emmer & Stough, 2001). There is also clear evidence that

classroom *climate* (i.e., a positive and warm teacher–child relationship characterized by the teacher's regard for children's perspectives and responsiveness to their needs and interests) promotes children's adjustment and development of academic skills (e.g., Birch & Ladd, 1997; Connor et al., 2005; for a meta-analysis, see Cornelius-White, 2007). Further, a high quality of *instruction* (i.e., active monitoring and scaffolding of children's learning and thinking, and tailoring the instruction) has been shown to contribute significantly to children's academic skills (e.g., Connor et al., 2005; Juel & Minden-Cupp, 2000; La Paro et al., 2004; Mashburn et al., 2008).

Teacher–student interactions have been studied intensively during the recent decades (for meta-analyses, see Cornelius-White, 2007; Roorda et al., 2011). Research has shown that teachers differ significantly in their interactions with their students (Howes et al., 2008; LoCasale-Crouch et al., 2007; Pianta, La Paro, Payne, Cox, & Bradley, 2002). Supportive teacher–student relationships are documented to contribute to children's academic achievement and successful schooling outcomes (Birch & Ladd, 1997; Burchinal, Peisner-Feinberg, Pianta, & Howes, 2002; Crosnoe et al., 2010; Furrer & Skinner, 2003; Howes et al., 2008; Hughes & Kwok, 2007; Skinner & Belmont, 1993; Skinner, Furrer, Marchand, & Kindermann, 2008), to peer acceptance (Hughes & Kwok, 2006), and to have long-lasting effects on academic achievement (e.g., Hamre & Pianta, 2001).

1.1.1 Measuring teacher–child interactions

Information on teacher–child interactions can be captured by using teacher reports (e.g., Student–Teacher Relationship Scale; Pianta, 2001), student reports (e.g., Nolen & Haladyna, 1990; Ryan & Grolnick, 1986), and observations—or combinations of these (cf., De Jong & Westerhof, 2001). Several observational measures have been developed for measuring the process quality in classrooms. Both global rating scales, such as the Early Childhood Environment Rating Scale (ECERS-R; Harms, Clifford, & Cryer, 1998; ECERS-E; Sylva, Siraj-Blatchford, & Taggart, 2006), and direct observation of classroom interactions, such as the Classroom Assessment Scoring System (CLASS; Pianta et al., 2008b), the Early Childhood Classroom Observation Measure (ECCOM; Stipek & Byler, 2005), and the Individualizing Student Instruction classroom observation and coding system (ISI; Connor et al., 2009) have been applied in various contexts. As an extension to the CLASS coding system, the Individualized Classroom Assessment Scoring System (inCLASS; Downer, Booren, Lima, Luckner, & Pianta, 2010) has recently been developed for studying individual children's experiences in the classroom.

In the U.S., classroom observations have been used as measurement tools in educational research for more than 30 years (Gage & Needels, 1989). In the Finnish context, classroom observations have mostly been conducted using a qualitative microanalysis, whereas internationally standardized and validated observational tools such as the CLASS had not been implemented before in the Finnish kindergarten context (for an exception, the ECCOM measure was used at the same time as the CLASS in the First Steps study; Lerkkanen et al., 2012a).

In the present study, the CLASS tool was applied for measuring the quality of teacher–child interactions in Finnish kindergartens. The CLASS was chosen because it provides a standardized and validated way of assessing teacher–child interactions across grades and across content areas (Pianta & Hamre, 2009). Another reason for selecting the CLASS was that it is based on identifiable dimensions of teacher–child interactions shown in earlier studies to contribute in a meaningful way to students' development (Hamre et al., 2007; Pianta & Hamre, 2009). Although the CLASS framework shares many features with other approaches, it is unique in its strong theoretical basis, its empirical validation, and applicability to a range of early childhood and elementary classroom settings (Hamre & Pianta, 2007).

1.2 The CLASS framework: A theory of teacher–child interactions

The CLASS framework (Downer, Sabol, & Hamre, 2010; Pianta & Hamre, 2009; Pianta et al., 2008b) conceptualizes classroom quality in terms of teacher–student interactions that are likely to contribute to student learning and development (see Figure 2). The CLASS framework leans heavily toward earlier theoretical and empirical educational and psychological literature (Downer et al., 2010b). Classroom processes are operationalized in several specific dimensions involving emotional, organizational, and instructional features of the classroom (Pianta & Hamre, 2009). These dimensions are organized into three broad domains of teacher–child interactions, namely, emotional support, classroom organization, and instructional support (Downer et al., 2010b; Pianta et al., 2008b).

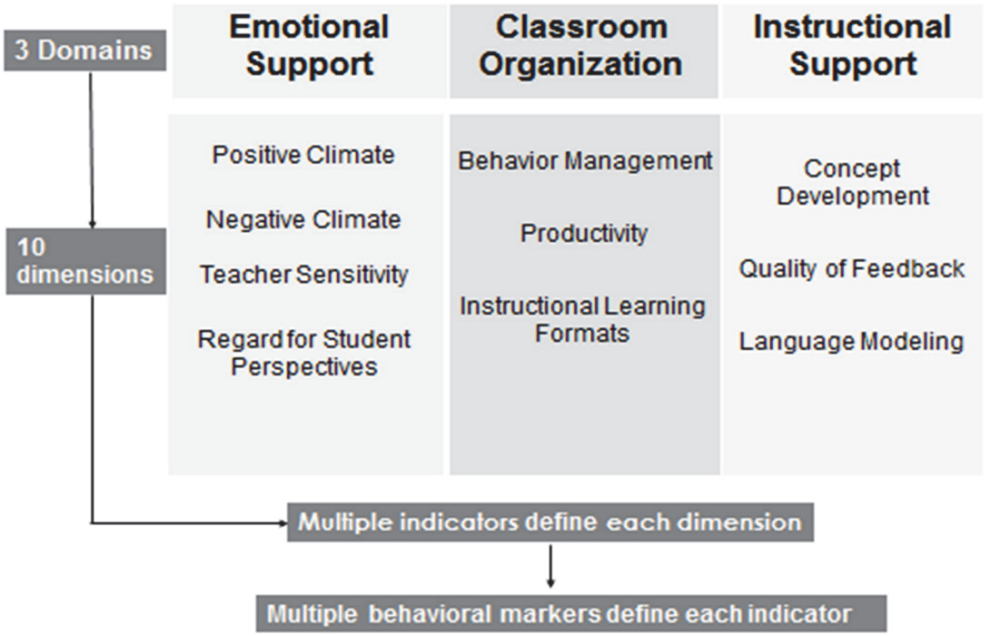

FIGURE 2 The CLASS framework. Modified from Hamre (2008).

1.2.1 Emotional support

Emotional support refers to dimensions of classroom interaction which support children's social and emotional functioning (La Paro et al., 2004; Pianta et al., 2008b). In classrooms with high emotional support, teachers are sensitive to children's needs and interests, and show responsiveness and warmth (Pianta et al., 2008b). Emotionally supportive teachers also provide children with appropriate levels of autonomy and comfort (Pianta et al., 2008b). Classrooms with high quality emotional support are characterized by positive tone and respectful interactions (Hamre & Pianta, 2007).

Emotional support has its theoretical foundation in attachment and self-determination theory (Downer et al., 2010; Hamre et al., 2007). Self-determination theory (STD) postulates that students are more likely to be engaged and motivated to learn when their three innate psychological needs, that is, needs for relatedness, competence, and autonomy are met (Connell & Wellborn, 1991; Ryan & Deci, 2000; Skinner & Belmont, 1993). Attachment theory, in turn, posits that when children have predictable, emotionally supportive and secure relationships with their primary caregivers, they become more self-reliant and are able to take risks when exploring novel situations (Ainsworth, Belehar, Waters, & Wall, 1978; Bowlby, 1982). Based on these theoretical underpinnings, it can be assumed that emotionally supportive teacher–child interac-

tions promote children's connectedness with school and the sense of security to explore new ideas as well as motivation to learn (Hamre et al., 2007).

Previous research has shown that emotional support contributes to students' emotional and social outcomes (e.g., Mashburn et al., 2008; NICHD, 2003), as well as to their academic outcomes (Hamre & Pianta, 2005; Perry et al., 2007). For example, teachers' regard for students' perspectives, responsiveness to students' interests, and the emotional climate of the classroom have been documented to be associated with children's achievement (Bogner et al., 2002; Connor et al., 2005; Dolezal, Welsh, Pressley, & Vincent, 2003). Teacher warmth and sensitivity have been shown to be related to early reading outcomes (Connor et al., 2005), low rates of negative behavior (Bru et al., 2002; NICHD, 2002, 2003; Rimm-Kaufman et al., 2002), and academic achievement (Hamre & Pianta, 2001). Emotional support provided by the teacher also promotes children's engagement (McWilliam, Scarborough, & Kim, 2003) and can function as a protective factor among at-risk children (Buyse, Verschueren, Doumen, Van Damme, & Maes, 2008; Hamre & Pianta, 2005).

1.2.2 Classroom organization

Classroom organization is defined in terms of routines and management in the classroom (Emmer & Stough, 2001). It is displayed, for instance, in how teachers manage time and activities to promote children's engagement in productive learning (Cameron, Connor, & Morrison, 2005; Cameron, Connor, Morrison, & Jewkes, 2008; Emmer & Stough, 2001). Teachers in well-organized classrooms promote children's learning by establishing clear expectations for behavior and well-established routines (Emmer & Stough, 2001), and helping students to regulate their own behavior and to maintain interest in learning activities (Pianta et al., 2008b). Effective teachers also actively monitor children's schoolwork (Bru et al., 2002), and are proactive rather than reactive with regards to disruptive behavior (Yates & Yates, 1990).

Conceptualization of classroom organization is based on theoretical and empirical postulations on children's development of self-regulatory skills (Hamre et al., 2007; Paris & Paris, 2001; Raver, 2004). Although a lot of individual variability exists (e.g., temperament), the development and expression of self-regulatory skills are seen as also being highly dependent on the external regulations provided by parents and teachers (Raver, 2004; Rimm-Kaufman et al., 2002). It can be assumed, thus, that classroom organization is foremost aligned to children's behavioral and attentional skills (Downer et al., 2010; Hamre et al., 2007).

Effectiveness of classroom organization—or classroom management, which is often used as a parallel term—is associated with children's higher achievement (Cameron et al., 2008; Wharton-McDonald et al., 1998), higher mastery of first grade vocabulary and print concepts (Cadima, Leal, & Burchinal, 2010), greater student engagement (Rimm-Kaufman, Curby, Grimm, Nathanson, & Brock, 2009; Wharton-McDonald et al., 1998), and fewer behavioral problems (Arnold, McWilliams, & Arnold, 1998; Bru et al., 2002). In classrooms

with high-quality management, students have been found to show higher on–task behavior and social and academic competence than students in classrooms with low-quality management (e.g., Pianta et al., 2002; Rimm-Kaufman, La Paro, Downer, & Pianta, 2005).

1.2.3 Instructional support

Instructional support refers to the ways in which teachers implement instructional discussions and activities to effectively support children's cognitive and language development (Pianta et al., 2008b). In classrooms with high-quality instructional support, teachers provide scaffolding (Yates & Yates, 1990), create opportunities for concept development, use questioning and feedback in supportive ways (La Paro et al., 2004; Pianta et al., 2008b), and promote students' problem solving, creative thinking, and complex language skills (Pianta et al., 2008b). Teachers characterized by a high provision of instructional support promote children's learning by affording additional explanations and ideas (Meyer, Wardrop, Hastings, & Linn, 1993), by scaffolding and providing support (Bogner et al., 2002), and by asking optimally challenging questions (Dolezal et al., 2003). High quality feedback extends children's learning by suggesting alternative ways of thinking and by emphasizing deeper understanding of concepts rather than the correctness of answers (La Paro et al., 2004).

Instructional support has its theoretical roots in theory and research on children's cognitive and linguistic development (Catts, Fey, Zhang, & Tomblin, 1999; Hamre et al., 2007; Vygotsky, 1991; Wharton-McDonald et al., 1998). A child's cognitive and linguistic development is seen as contingent on the opportunities provided by adults, that is, by scaffolding, extending, and encouraging (Vygotsky, 1991). It can be assumed, therefore, that teachers' instructional support provides a strong basis for the development of children's cognitive skills and academic outcomes (Downer et al., 2010; Hamre et al., 2007).

Instructional support has been found to be positively associated with students' classroom engagement (Bogner et al., 2002; Dolezal et al., 2003; Downer, Rimm-Kaufman, & Pianta, 2007; NICHD, 2005; Wharton-McDonald et al., 1998), academic outcomes (Hamre & Pianta, 2005; Howes et al., 2008; Mashburn et al., 2008; Taylor, Pearson, Clark, & Walpole, 2000; Wharton-McDonald et al., 1998), and adaptive interactions with teachers and peers (NICHD, 2002). Instructional support has particular relevance for developmental outcomes of at-risk children: higher teacher instructional support can aid in closing the gap in academic achievement between at-risk children and children without common risk indicators (Hamre & Pianta, 2005).

Previous research has shown that classroom interactions conceptualized using the three aforementioned domains of classroom process quality are important for both the development of children's academic skills and adaptive classroom behaviors. The associations between teacher–child interactions and children's motivational outcomes, however, have been studied to a lesser extent. Consequently, one major aim of the present thesis was to examine the predictive role of teacher–child interactions in the development of kindergarteners'

learning motivation (Study II) and task-avoidant behavior (Study III). The role of teacher–child interactions in children's academic pre-skills (Studies II–III) was also investigated.

1.2.4 The CLASS as an observational tool

In the present study, teacher–child interactions were assessed using the CLASS observational instrument focusing on three domains of classroom interaction (Pianta et al., 2008b; see Figure 2). The *Emotional Support* domain includes four observable dimensions: positive climate, negative climate, teacher sensitivity, and regard for student perspectives. It focuses on the positive tone and respectful interactions in the classroom, that is, the teacher's ability to support social and emotional functioning in the classroom (Pianta et al., 2008b). The *Classroom Organization* domain includes three observable dimensions: behavior management, productivity, and instructional learning formats. Observations concerning this domain focus on management of students' behavior, time, and attention in the classroom (Hamre & Pianta, 2007). The *Instructional Support* domain involves the following three observable dimensions: concept development, language modeling, and quality of feedback. It does not focus on the content of the curriculum (the *what*) but rather on the ways in which teachers establish conversations and give feedback (the *how*) in order to promote children's cognitive development (Pianta et al., 2008b).

1.2.5 Limitations of previous research

Previous research on the quality of teacher–child interactions has some limitations. First, research using the CLASS instrument to analyze teacher–child interactions has been conducted mainly regarding the U.S. context (for exceptions, see Cadima et al., 2010; Malmberg, Hagger, Burn, Mutton, & Colls, 2010). However, mechanisms that promote learning in the classroom are assumed to be universal (Hamre et al., 2007; Van de Grift, 2007), and there is an evident need for a valid measure of teacher–child interactions also outside the United States. There is no empirical research on how process quality in kindergarten classrooms is associated with children's learning outcomes and motivation in the Finnish context with a more homogeneous educational system and teacher education than that in the U.S., for instance. Second, although the relations between teacher–child interactions and academic outcomes have been intensively studied in recent years, the associations between teacher–child interactions and children's motivational outcomes have been investigated to a much lesser extent, especially concerning young children. The topic of motivation development is especially important in the Finnish context given that the national kindergarten curriculum (Esiopetuksen opetussuunnitelman perusteet, 2010) strongly emphasizes the promotion of children's motivation and engagement in learning. Consequently, the first aim was to investigate the reliability and validity of the Classroom Assessment Scoring System as an observational tool (Pianta et al., 2008b) with regard to Finnish kindergartens. The second aim was to

examine the effects of teacher–child interactions on kindergarteners' motivational outcomes, namely, learning motivation (Study II) and task avoidance (Study III).

1.3 Teacher and classroom characteristics

In addition to teachers' educational background, work experience, age and other background variables, their personal or psychological characteristics can also be assumed to influence the quality of teacher–child interactions as well as children's academic and motivational outcomes (for a meta-analysis, see Jennings & Greenberg, 2009). In their theoretical model of teacher–child interactions, Downer and colleagues (2010b) refer to these teacher characteristics as proximal factors predicting the quality of interactions (see also Figure 1).

1.3.1 Teacher stress and exhaustion

The quality of classroom interactions may also partly depend on the psychological well-being of the teacher (Downer et al., 2010b; Pianta et al., 2005). One aspect of teacher well-being is their work-related stress. Teacher stress can be defined as the experience of unpleasant emotions, such as tension, frustration, anxiety, anger and depression, resulting from some aspects of the teacher's work (Kyriakou & Sutcliffe, 1978). Teacher burnout, in turn, has been described as a syndrome resulting from prolonged teacher stress (Kyriakou, 1987). Burnout in the work context can be manifested as emotional exhaustion, cynicism or depersonalization, and reduced professional accomplishment (Maslach, Schaufeli, & Leiter, 2001).

The teaching profession is evaluated as stressful and mentally loaded (e.g., Johnson et al., 2005; Kalimo & Toppinen, 1997; Travers & Cooper, 1996). Stress and exhaustion at work have been found to be quite common among teachers: 27% of Finnish teachers suffer from symptoms of exhaustion (Kalimo & Toppinen, 1997). International prevalence of stress reported by teachers has ranged between 30% to 90% (e.g., Travers & Cooper, 1996). The frequency of teacher stress varies from study to study and depends on the criteria, cut-off points, and measures used. Recently, teaching has been ranked as one of the highest in stress-related outcomes from a database of 26 occupations (Johnson et al., 2005). Preschool teachers' work stressors have been described along the dimensions of job-related demands, resources and control, or more specifically as high demands, low control in daily activities, few resources and rewards for work, and low confidence in managing children's behavior (Curbow, Spratt, Ungaretti, McDonnell, & Breckler, 2000). Emotionally challenging situations, such as maintaining discipline and teaching unmotivated children with conduct or other problems, have also been identified as potential stressors for teachers (Brouwers & Tomic, 2000; Sutton & Wheatley, 2003).

Teacher stress can have both individual consequences as well consequences for those with whom a teacher works (Grayson & Alvarez, 2008; Jennings & Greenberg, 2009; Zhai, Raver, & Li-Grining, 2011). Stressed teachers may experience decreased motivation and high absenteeism, as well as increasing teacher turnover rates. Some theoretical perspectives have informed on the influence of teacher stress on child outcomes. Emotion socialization models, for example, suggest that adults' emotional expression, that is, their reactions to children's emotions and behavior, shape children's emotional and behavioral development (Li-Grining, Raver, Champion, Sardin, Metzger, & Jones, 2010). Further, transactional models of child development suggest that both adults and children have the capacity to reduce stress and anxiety or to increase it (e.g., Combs-Ronto, Olson, Lunkenheimer, & Sameroff, 2009). Jennings and Greenberg (2009), in turn, conclude that teachers' social and emotional competence is highly dependent on their well-being. Relatedly, Raver and colleagues (Li-Grining et al., 2010; Zhai et al., 2011) have suggested that teacher stress influences child outcomes indirectly via lowered quality of classroom management and emotional support, and via children's self-regulation skills (Raver et al., 2011).

Previous studies have shown that, when teachers experience stress or emotional exhaustion, their relationships with students and the quality of their teaching suffer (Grayson & Alvarez, 2008; Li-Grining et al., 2010; Roth, Assor, Kanat-Maymon, & Kaplan, 2007; Yoon, 2002). Teachers may, for example, have difficulties in maintaining emotionally supportive classroom interactions and effective behavior management when they experience a high level of stress (Li-Grining et al., 2010). In addition, teachers' reports of stress have been found to predict their negative relationships with students (Yoon, 2002). It has also been shown that teachers who experience high levels of stress and burnout are more likely to engage in harsh interactions with students (Curbow et al., 2000; Hamre & Pianta, 2004). Teachers with burnout symptoms may have a low tolerance when it comes to meeting the needs of students with challenging behavior (Kokkinos, Panayiotou, & Davazoglou, 2005). Moreover, emotional exhaustion may lead to lowered sensitivity and avoidance of interaction with students. Further, teachers' emotional exhaustion has been found to be indirectly related to students' lower autonomous motivation for learning (Roth et al., 2007). It has also been connected to teachers' lower self-efficacy beliefs (Brouwers & Tomic, 2000). Self-reported depression in teachers, which is closely linked to feelings of exhaustion and stress, has been shown to be negatively connected with the observed quality of interactions (Gerber, Whitebook, & Weinstein, 2007; Hamre & Pianta, 2004; Pianta et al., 2005).

These findings support the assumption that teacher stress and exhaustion may lead to a lower quality of interaction in the classroom, which in turn contributes to lowered learning motivation and learning outcomes in children (see Jennings & Greenberg, 2009). As there are only a few previous findings on the influence of teacher stress on children's learning and motivation, one aim of the

present thesis was to investigate the role of self-reported teacher stress in kindergarteners' learning motivation and phonological skills (Study II).

1.3.2 Interactional style in teaching

Teachers' behaviors and characteristics that describe their interactions with children in their classroom, defined in the present thesis as *interactional style in teaching*, may contribute to the quality of interactions in the classroom. Research on teacher interactional style rests on the assumption that effective teaching is much like effective parenting (Wentzel, 1997, 2002). The theoretical background originates from literature on parenting styles, namely, Baumrind's parenting dimensions (Baumrind, 1991). According to her, parenting style is composed of two dimensions. One dimension, *demandingness*, involves behavioral control, autonomy support and expectations (Baumrind, 1991). The other dimension, *responsiveness*, involves warmth and care, involvement, provision of resources, and adaptation to individual needs. Variations along the two dimensions yield different parenting styles, namely, authoritative, authoritarian and permissive parenting (Baumrind, 1991). Barber (1996) has extended the theory on parenting styles by introducing a concept of psychological control which is defined as parental behaviors that are intrusive and manipulative of children's thoughts, feelings, and attachment to parents. While the impact of parenting styles on children's academic achievement has been investigated extensively (e.g., Aunola & Nurmi, 2004, 2005; Darling & Steinberg, 1993), much less research has been conducted on teaching styles (for exceptions, see Kuntsche, Gmel, & Rehm, 2006; Walker, 2008; Wentzel, 2002).

As in the case of parenting styles, teacher interactional styles can be conceptualized as teacher warmth, affection and support (Kiuru et al., 2012b; Kuntsche et al., 2006), rules and behavioral control (Kuntsche et al., 2006), and psychological pressure or control (Kuntsche et al., 2006). A combination of providing autonomy support and responding to the students' needs, as well as setting and reinforcing clear rules, is defined as authoritative teaching (Kuntsche et al., 2006; Walker, 2008). Interactional style in teaching has also been conceptualized as adult-centered versus child-centered beliefs by some researchers (Justice, Mashburn, Hamre, & Pianta, 2008; Pianta et al., 2005).

Authoritative teaching has been shown to provide an optimal context for student engagement and learning (Walker, 2008). Previous research has also indicated that teacher warmth and support can protect first graders against the detrimental impact of reading disabilities risk on peer rejection (Kiuru et al., 2012b). Authoritarian teaching, in turn, has been connected to students' self-handicapping strategies and low self-efficacy (Walker, 2008), whereas psychological pressure has been found to be associated with adolescents' low academic achievement and increased problem behaviors (Kuntsche et al., 2006). Previous findings on how teacher beliefs are associated with the quality of classroom interactions are, however, somewhat inconsistent. For example, Pianta and colleagues found that teachers' adult-centered beliefs were negatively associated with classroom quality (Pianta et al., 2005), whereas Justice and colleagues

showed that preschool teachers' adult-centered attitudes were associated with high-quality literacy instruction (Justice et al., 2008).

1.3.3 Teachers' self-efficacy beliefs

The construct of self-efficacy refers to a person's beliefs about his or her own capabilities to complete the required tasks and to overcome possible difficulties (Bandura, 1977). When the concept of self-efficacy is applied to teachers and teaching, it is defined as a belief that one's capabilities can bring about desirable changes in students' behavior and achievement (Gibson & Dembo, 1984) as well as in their motivation (Tschannen-Moran & Woolfolk-Hoy, 2001).

Teacher's sense of efficacy has been found to be positively associated with several predictors and indicators of student achievement (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). For example, teachers' high sense of efficacy is associated with high-quality instruction in preschool (Justice et al., 2008), a close relationship with children (Mashburn, Hamre, Downer, & Pianta, 2006), a more positive impression of children (Mashburn et al., 2006), and children's higher academic performance (Goddard, Hoy, & Woolfolk, 2000; Guo, Piasta, Justice, & Kaderavek, 2010; Skaalvik & Skaalvik, 2007; Tschannen-Moran & Woolfolk Hoy, 2001; Wolters & Daugherty, 2007). Teacher efficacy is also related to teachers' classroom management strategies (Woolfolk, Rosoff, & Hoy, 1990), commitment to teaching (Coladarci, 1992), and persistence in challenges (Brouwers & Tomic, 2000), whereas low teacher efficacy is associated with burnout symptoms (Brouwers & Tomic, 2000; Skaalvik & Skaalvik, 2007, 2010). Moreover, the relations between teacher efficacy beliefs and child outcomes are moderated by classroom quality (Goddard & Goddard, 2001; Guo et al., 2010). For example, teachers' self-efficacy has been found to predict children's vocabulary skills only within the context of emotionally supportive preschool classrooms (Guo et al., 2010). Thus, teacher efficacy beliefs can be assumed to influence child outcomes through teacher–child interactions.

Since teachers' self-efficacy beliefs, interactional style in teaching, and exhaustion at work have been shown to be associated with the quality of teacher–child interactions, they were used in the present thesis to provide validation for measures of observed classroom quality (Study I).

1.3.4 Classroom structural characteristics

Although process quality has been proven to be a powerful indicator of child outcomes, some structural features of classrooms may need to be in place for high-quality practices to evolve (Mashburn et al., 2008). Among the two most critical structural classroom characteristics are extent of teaching experience and class size. Previous research on teaching experience is inconsistent as effects for length of teaching experience have not been found in some studies (e.g., Early et al., 2007; Gerber et al., 2007; NICHD, 2002), while other studies have indicated that emotional support is higher in classrooms where the teacher has fewer years of professional experience (Connor et al., 2005; Mashburn et al., 2006).

Shorter teaching experience has also been found to protect first graders against the detrimental impact of social and learning risk factors on peer rejection (Kiuru et al., 2012b). One possible explanation for these findings is that less experienced teachers have received their training more recently and consequently may have learned more child-centered practices, such as taking into account individual students' needs in learning situations (Hytönen, 2008). They may also be more critical of their teaching as well as more receptive to new ideas.

Small class size has been identified as being beneficial for students' positive academic and behavioral outcomes (Blatchford, 2003; Blatchford, Bassett, & Brown, 2011; Ehrenberg, Brewer, Gamoran, & Willms, 2001), as well as for high-quality instructional and emotional support (NICHD, 2004). In particular the youngest students benefit most from smaller classes in terms of academic outcomes (Blatchford, Bassett, Goldstein, & Martin, 2003; Ehrenberg et al., 2001; Nye, Hedges, & Konstantopoulos, 2000). Smaller class size in the first grade has also been found to protect children against the detrimental impact of social withdrawal on peer rejection (Kiuru et al., 2012b). In smaller classes, teachers are likely to have more resources for providing attention, active interaction and individualized support (Blatchford, Goldstein, Martin, & Browne, 2002; NICHD, 2004). Some other studies, however, have not found effects of class size (NICHD, 2002; Rutter & Maughan, 2002).

Due to previously reported effects on child outcomes and teacher–child interactions, teachers' professional experience and class size were used as control variables in most of the analyses included in the present thesis.

1.4 The influence of students on teachers

While it is widely acknowledged that teacher–child interactions—and especially the teacher's beliefs and teaching practices—influence children's motivational and academic outcomes (Birch & Ladd, 1997; Skinner & Belmont, 1993; Stipek et al., 1995, 1998), there are also some studies suggesting that students and their different characteristics influence teachers and their instructional practices (Dobbs & Arnold, 2009; Ladd, Birch, & Buhs, 1999; Nurmi, Viljaranta, Tolvanen, & Aunola, 2012; for a meta-analysis, see Nurmi, in press). For example, it has been suggested that student characteristics evoke various responses from teachers and influence teacher–child interactions (Borko & Putnam, 1996; Calderhead, 1996; Coplan & Prakash, 2003; Pianta, 2006). The idea that children's characteristics influence adults is, in fact, not new. Bell (Bell, 1968; Bell & Harper, 1977) suggested quite some time ago that child–adult interactions are bidirectional. Moreover, the transactional theory of child development suggests that adult and child characteristics interact in producing child outcomes (Combs-Ronto et al., 2009). In their theoretical model, Downer and colleagues (2010b) also acknowledge the bidirectional nature of teacher–child interactions.

The importance of students' characteristics in affecting teachers' behavior and instructional practices can be explained via two psychological mechanisms.

In addition to their general pedagogical knowledge and beliefs about classroom management, instructional strategies and subject matter, teachers also construct knowledge and beliefs about particular students and classrooms (Borko & Putnam, 1996; Calderhead, 1996). Such knowledge and beliefs about students as learners and about learning processes influence the methods that teachers use to instruct these students (Calderhead, 1996). Teachers' impressions of children and their characteristics have an impact on teacher–child relations and teacher instruction (Pianta, 2006). Second, alongside teachers' cognitions, students and their characteristics activate affective reactions in teachers, which are then reflected in the teachers' patterns of instruction, socioemotional support, and classroom management (Sutton & Wheatley, 2003). Some studies suggest that the major source of teachers' positive emotions, such as satisfaction, is derived from children's good learning outcomes and progress (Emmer, Oakland, & Good, 1974; Hargreaves, 1998). Although investigated to a lesser extent, teachers' emotions may have important consequences for their instruction and classroom practices (Sutton & Wheatley, 2003).

Research on the ways in which students' academic skills contribute to teachers' instruction rests largely on the assumption that success in education depends on adapting teaching to the needs of individual students (Connor et al., 2009; Corno & Snow, 1986; Morrison & Connor, 2002; Pressley, Hogan, Wharton-McDonald, Mistretta, & Ettenberger, 1996; Rimm-Kaufman, Vorhees, Snell, & La Paro, 2003; Sinatra & Mason, 2008). From this point of view, children's academic performance and skills are important in activating teacher instruction (Corno, 2008). For example, students' level of academic performance plays a crucial role in teachers' planning of their instruction and classroom practices (Corno & Snow, 1986; Rimm-Kaufman et al., 2003). The influence of students' academic skills can be described as an "evocative impact" on teachers' instruction (Rutter, 1997; Scarr & McCartney, 1983), as it is students' characteristics rather than their active efforts that have an influence on teachers' behavior.

Although the influence of children's academic performance on teachers' instruction and practices is widely acknowledged (Babad, 1998; Corno, 2008; Martin, 2004; Pianta, 2006; Skinner & Belmont, 1993), it has rarely been analyzed empirically and the findings are mixed. Some studies have shown that teachers give more praise, support and encouragement to students of whom they have low expectations (Babad, 1990). Some other studies, in turn, have indicated that teachers give more praise to (Brophy & Good, 1970; Good, Cooper, & Blakey, 1980) and set higher performance demands (Brophy & Good, 1970) on students of whom they have high expectations.

Previous research has indicated that students' academic skills are associated with the ways in which teachers instruct different students (Babad, 1990, 1996; Babad, Bernieri, & Rosenthal, 1989). For example, first grade students' poor level of performance in mathematics was found to lead to a higher amount of active instruction given by the teacher (Nurmi et al., 2012a, 2012b). Several recent studies suggest that students' reading skills are more likely to improve when instructional practices are matched to their initial skill levels (Cameron et

al., 2005; Connor, Morrison, & Katch, 2004; Juel & Minden-Cupp, 2000; Morrison & Connor, 2002). Similar results have been shown, for instance, for development in mathematics (Curby, Rimm-Kaufman, & Ponitz, 2009). A recent finding showed that teachers do not only adapt their instruction with respect to students' academic skills at the beginning of primary school, but they also adjust their instruction depending on the development of children's skills during the first school year (Nurmi et al., 2012a).

Related findings using classroom observations showed that classroom quality has a different developmental relevance for children with different skill levels. Namely, in terms of math outcomes, children with lower initial math skills benefited from a higher quality of teacher–child interactions (Cadima et al., 2010; Curby et al., 2009). Based on previous studies, there is good reason to assume that students' overall skill level in the classroom influences the quality of teacher–child interactions. Consequently, one aim of the present thesis was to investigate whether children's academic pre-skills typical of the kindergarten classroom would predict the quality of teacher–child interactions later on (Study IV).

1.5 Learning motivation

During the last three decades, the role of motivation and related classroom behavior in children's learning and academic achievement has been widely acknowledged (e.g., Onatsu-Arvilommi & Nurmi, 2000; Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006). Students' interests, goal orientations, and achievement-related beliefs and behaviors are recognized as central motivation-related constructs reflecting students' purposes and reasons behind activities evidenced in achievement situations (Wigfield & Cambria, 2010). In the present thesis, *learning motivation* (defined as interest in kindergarten activities) and *task-avoidant behavior* displayed in learning situations with academic tasks are used as the key motivational constructs. Learning motivation and achievement behaviors are theoretically aligned motivational constructs. For example, Nurmi and colleagues (2008) have presented an integrated process model which posits that when an individual is motivated or interested in a particular task or subject, his or her behavior is more likely to be focused on the task (on-task) than to be task-avoidant (off-task). Learning motivation, in turn, is influenced, for example, by previous experiences, expectancies and beliefs concerning achievement and learning (Eccles et al., 1983).

1.5.1 Interest

One framework in conceptualizing academic motivation focuses on students' valuing of and interest in various school subjects, tasks, or activities. This framework utilizes various concepts, such as task-value (Eccles et al., 1983), task-motivation (Aunola et al., 2006; Viljaranta, Lerkkanen, Poikkeus, Aunola,

& Nurmi, 2009), intrinsic motivation (Deci, Vallerand, Pelletier, & Ryan, 1991; Gottfried, 1990), and interest (Renninger, 1992; Schiefele, 1991; Viljaranta, Aunola, Tolvanen, & Nurmi, 2012). In the present thesis, the concept of *learning motivation* is used to refer to children's interest in and enjoyment of contents of learning and activities in the Finnish kindergarten curriculum, such as activities related to letters, rhyming, mathematics, listening to storybook reading, music activities, outdoor play, nature studies, and arts and crafts. Learning activities in Finnish kindergartens are thematic rather than subject based, and instead of formal teaching of basic reading and math (e.g., decoding, or arithmetic exercises with work sheets), learning of academic pre-skills is fostered using play activities, rhyming, letter and number games, and exercises. Thus, in the context of Finnish kindergartens learning motivation was investigated by targeting a wide range of activities, that is, overall motivation and interest in different kinds of kindergarten activities.

Previous research indicates that the development of learning motivation begins very early in the school career (Aunola et al., 2006). Children's task-motivation in reading and mathematics appears to be relatively high at around school entry, but declines during the elementary school years (Gottfried, Fleming, & Gottfried, 2001; Wigfield et al., 1997). Similarly, individual differences in task-motivation emerge in early school years (Eccles, Wigfield, Harold, & Blumenfield, 1993; Nurmi & Aunola, 2005; Wigfield et al., 1997), and inter-individual stability has been documented as increasing with age (Aunola et al., 2006; Gottfried et al., 2001). Motivation plays a role not only in students' overall academic achievement but also in the development of specific skills, such as reading (Baker & Wigfield, 1999; Ecalle, Magnan, & Gibert, 2006).

Despite wide agreement on the role of motivation in successful learning, the antecedents of children's learning motivation are not yet well understood. It has been suggested that previous learning outcomes related to a particular school subject and relevant feedback provide a basis for the development of students' interest in a particular subject. For example, in primary school students, performance in reading (Gottfried, 1990) and mathematics (Aunola et al., 2006; Gottfried, 1990) predict subsequent task-motivation in those particular subjects. Viljaranta et al. (2009) recently showed that kindergarten children's prior level of math-related skills predicted their subsequent interest in mathematics.

It has been suggested that the characteristics of schools and classrooms, as well as teaching practices, may also play an important role in the development of learning motivation (for a review, see Wigfield, Eccles, & Pintrich, 1996). Previous findings have indicated that teachers' teaching goals are related to primary school children's task motivation (Aunola et al., 2006), and that instructional practices contribute to students' learning motivation (Anderman, Eccles, Yoon, Roeser, Wigfield, & Blumenfeldt, 2001). Associations have also been reported between students' intrinsic motivation and teacher support for students' autonomy (Guay, Boggiano, & Vallerand, 2001; Guthrie, Wigfield, & von Secker, 2000), teacher caring (Wentzel, 1997, 1998), and teacher warmth combined with

consistent enforcement of rules in the classroom (Ryan & Grolnick, 1986). These findings are in accordance with the postulations of the self-determination theory (Ryan & Deci, 2000; Skinner & Belmont, 1993; Skinner et al., 2008), which suggests that children are most motivated to learn when adults support their need to feel competent and autonomous as well as the need for relatedness.

Previous research in the field has, however, some limitations. First, little research has been carried out among kindergarten-age children (for exceptions see Lerkkanen et al., 2012b; Stipek et al., 1998; Viljaranta et al., 2009). Second, the majority of previous studies have investigated teacher instruction and classroom goal structures either by using student reports (Nolen & Haladyna, 1990; Ryan & Grolnick, 1986) or teacher reports (Anderman et al., 2001), whereas less research has been conducted using observational methods. Third, previous studies have not typically taken into account the differences in children's preexisting academic skills (Nolen & Haladyna, 1990; Ryan & Grolnick, 1986). Classroom differences in children's interests may be partly due to student selection for placement in classes. Although it is acknowledged (e.g., Turner & Patrick, 2008) that understanding development and change in motivation requires analyzing the transaction between individuals and context, the role of classroom-level factors in the development of motivation has been analyzed much less than the role of individual factors. Thus, in the present thesis, the role of observed teacher–child interactions and teacher stress in kindergarteners' learning motivation (Study II) was examined by taking into account the children's previous skills and including other potentially relevant factors (i.e., mothers' education and child gender) in the analyses.

1.5.2 Task-focused versus task-avoidant behavior

The kinds of motivational behavior patterns and strategies that children adopt can be expected to play an important role in their academic achievement and performance (e.g., Lau & Nie, 2008; Onatsu-Arvilommi & Nurmi, 2000; Stephenson, Parrila, Georgiou, & Kirby, 2008). Achievement-related beliefs and behaviors refer to a variety of expectations, beliefs and behaviors that individuals display in various learning situations (for reviews, see Valentine, DuBois, & Cooper, 2004; Wigfield et al., 2006). The basic idea in this framework is that when an individual faces a new challenging or demanding task, experiences of prior learning and achievement situations activate expectations about what will happen (Eccles et al., 1993; Dweck, 1986; Wigfield & Eccles, 2000). These expectations and related emotions then influence the ways in which the individual handles a particular task (Pintrich & De Groot, 1990).

Although various types of achievement-related beliefs and behaviors have been described in previous literature, there are two major kinds of patterns that children display. Task-focused patterns—such as mastery orientation (Diener & Dweck, 1978; Dweck, 1986), *task-focused behavior* (Aunola, Nurmi, Lerkkanen, & Rasku-Puttonen, 2003; Hirvonen, Georgiou, Lerkkanen, Aunola, & Nurmi, 2010; Zhang, Nurmi, Kiuru, Lerkkanen, & Aunola, 2011), task involvement (Nicholls, 1984), and task orientation (Nicholls, Cheung, Lauer, & Patashnick, 1989; Salo-

nen, Lepola, & Niemi, 1998)—are typically characterized by positive affects, success expectations, and high levels of effort and persistence. By contrast, task-avoidant patterns—such as learned helplessness (Diener & Dweck, 1978; Dweck, 1986), self-handicapping (Jones & Berglas, 1978), *task-avoidant behavior* (Aunola, Nurmi, Niemi, Lerkkanen, & Rasku-Puttonen, 2002; Stephenson et al., 2008; Zhang et al., 2011), defensive pessimism (Martin, Marsh, & Debus, 2001), and ego-oriented coping (Nicholls et al., 1989; Salonen et al., 1998)—are characterized by failure expectations, and low levels of effort and persistence in academic tasks. In the present thesis, children's achievement-related behaviors were operationalized as teacher-rated task-avoidant versus task-focused behavior (e.g., Onatsu-Arvilommi & Nurmi, 2000; Onatsu-Arvilommi, Nurmi, & Aunola, 2002; for validation, see Zhang et al., 2011).

Previous research has shown that children's task-focused versus task-avoidant behavior plays an important role in their academic achievement and performance (Aunola et al., 2002; Georgiou, Manolitsis, Nurmi, & Parrila, 2010; Onatsu-Arvilommi et al., 2002; Stephenson et al., 2008). For example, such behaviors have been found to predict the development of math and reading skills (Aunola et al., 2002, 2003; Hirvonen et al., 2010; Hirvonen, Tolvanen, Aunola, & Nurmi, 2012; Hughes, Luo, Kwok, & Loyd, 2008; Mägi, Häidkind, & Kikas, 2010; Onatsu-Arvilommi & Nurmi, 2000; Onatsu-Arvilommi et al., 2002), and to be associated with learning disabilities (Poskiparta, Niemi, Lepola, Ahtola, & Laine, 2003).

Previous studies have investigated various antecedents of children's task-focused versus task-avoidant behaviors. High academic performance has been found to contribute to a high level of success expectations and task-focused behavior (Manolitsis, Georgiou, Stephenson, & Parrila, 2009; Onatsu-Arvilommi & Nurmi, 2000), whereas poor academic performance typically predicts failure expectations and task avoidance (Aunola et al., 2003; Onatsu-Arvilommi & Nurmi, 2000). A recent study by Mägi et al. (in press) using a person-oriented approach showed, however, that task avoidance and poor reading skills do not necessarily go hand in hand. Temperament factors may also play a role in children's task avoidance versus task focus (Hirvonen, Aunola, Alatupa, Viljaranta, & Nurmi, 2012). Parental expectations and beliefs have also been found to contribute to children's achievement behaviors. Aunola et al. (2002, 2003), for example, found that high parental expectations concerning children's school performance predicted children's subsequently high level of task-focused behavior, whereas low parental expectations predicted task avoidance. Also, Mägi and colleagues (2011) demonstrated a similar result in the context of homework.

There are several studies suggesting that teachers may play an important role in children's achievement-related beliefs and behaviors (e.g., Anderman et al., 2001; Church et al., 2001; Lau & Nie, 2008; Turner et al., 2002; Urdan, Midgley, & Anderman, 1998; for a review, see Wigfield et al., 2006). Previous research has shown that rates of task avoidance are lower in classrooms in which teachers provide instructional and motivational support for learning compared to classrooms in which teachers do not provide such support (Turner

et al., 2002, 2003; Urdan et al., 1998). Moreover, off-task behavior among children has been shown to be less common in classrooms with a high compared to low observed classroom quality (Pianta et al., 2002; Rimm-Kaufman et al., 2005, 2009). Associations have also been documented between children's higher engagement in school work and effective classroom management and high instructional quality (Downer et al., 2007; Wharton-McDonald et al., 1998). The use of avoidance strategies has been found to be significantly less common among students in classrooms perceived as emphasizing learning, understanding, effort and enjoyment than in other types of classrooms (Turner et al., 2002).

Previous research on the role of teachers has, however, some limitations. First, most previous studies have been conducted among primary school children and adolescents, and less is known about the role of teachers in younger children's achievement beliefs and behaviors (for exceptions, see Perry et al., 2007; Rimm-Kaufman et al., 2005, 2009). Second, the majority of previous studies has examined classroom instruction and classroom goal structures by using teacher reports (Aunola et al., 2006; Urdan et al., 1998) or student reports (e.g., Church et al., 2001; Lau & Nie, 2008; Nolen & Haladyna, 1990; Ryan & Grolnick, 1986), while less research has been conducted using observational methods (for exceptions, see Rimm-Kaufman et al., 2009; Turner et al., 2002). Third, few previous studies have investigated teachers' role using methods that are appropriate for analyzing hierarchical data, which is typical of classrooms (for exceptions, see Anderman et al., 2001; Rimm-Kaufman et al., 2009). Consequently, the present thesis aimed to increase our understanding of classroom processes by investigating the role of observed teacher–child interactions in kindergarteners' task-avoidant behavior (Study III). Classroom-level effects in task-avoidant behavior were investigated by using multilevel modeling which takes into account the nested structure of the data.

1.6 Academic skills development

Reading and mathematics are basic academic skills that children are expected to learn during the early school years. Since these skills form the basis for later academic achievement (Entwistle & Alexander, 1990), it is important to promote the learning of key pre-skills in reading and math already in kindergarten. Experiences of high quality in early education are likely to boost young children's ability to learn (see Sylva et al., 2004) by providing them with a stronger basis for skill development in the early school years. The effects of high-quality preschool teaching on cognitive skills have been found to persist up to ages 8–11 years (Anders et al., 2011; Belsky et al., 2007), and even up to 15 years in some cases (Vandell, Belsky, Burchinal, Vandergritf, & Steinberg, 2010).

1.6.1 Learning to read

Learning to read requires acquiring the system for mapping between distinctive visual symbols and units of sounds, namely, the process of phonological recoding (Ziegler & Goswami, 2005). Research on the antecedents of early reading skills indicates that letter knowledge and phonological awareness are the best proximal predictors of future reading skills (e.g., Leppänen, Aunola, Niemi, & Nurmi, 2008; Pennington & Lefly, 2001). In addition to phonological awareness, letter knowledge is related to vocabulary skills (e.g., Lonigan, Burgess, & Anthony, 2000), phonological memory, and rapid serial naming (de Jong & Olson, 2004). Naming speed has also been found to be associated with word reading (e.g., Holopainen, Ahonen, & Lyytinen, 2001; Wimmer, Mayringer, & Landerl, 1998, 2000) especially in languages such as Finnish or German having orthographies with a high degree of consistency. Children with poor reading skills are four to five times more likely than good readers to have problems in kindergarten-age phonological awareness and rapid automatized naming (Catts et al., 1999).

The development of phonological awareness progresses from syllable awareness emerging around 3 and 4 years of age, to onset-rime awareness around 4 and 5 years of age, and finally to phoneme awareness which develops reciprocally with reading instruction (see Ziegler & Goswami, 2005). The strongest predictors of reading, phonological awareness and letter knowledge also have strong associations with difficulties in reading (e.g., de Jong & van der Leij, 1999).

Compared to many other languages, Finnish is relatively easy to learn to read, as it has a highly regular orthography and simple syllabic structure (Seymour, Aro, & Erskine, 2003). In Finnish, the writing system consists of only 29 grapheme-phoneme combinations and every word can be read through reliance on a bi-directionally, highly consistent phonological strategy. This makes the acquisition of basic reading accuracy a fast and easy process for the majority of beginning readers (e.g., Seymour et al., 2003). At least 25% of Finnish children can read before they enter formal education at the age of 7 (Holopainen, Ahonen, Tolvanen, & Lyytinen, 2000; Lerkkanen, Rasku-Puttonen, Aunola, & Nurmi, 2004), and the vast majority of Finnish children achieve accurate and fluent word reading skills before the end of their first school year (Aunola et al., 2002; Seymour et al., 2003). Although there are many individual differences in reading skills among Finnish children in kindergarten, they decrease during the first school years (Leppänen, Niemi, Aunola, & Nurmi, 2004; Parrila, Aunola, Leskinen, Nurmi, & Kirby, 2005).

Young students' reading skills have been found to be influenced by teacher warmth and sensitivity (Connor et al., 2005), as well as other aspects of teacher–child interactions (Cadima et al., 2010; Curby et al., 2009; Ponitz, Rimm-Kaufman, Grimm, & Curby, 2009). Motivational factors also play a role in the development of reading skills (Baker & Wigfield, 1999). In the present thesis, the roles of teacher–child interactions and teacher stress in children's phonolog-

ical awareness were examined (Study II). In addition, the role of learning motivation in the development of phonological skills was investigated (Study II). Phonological awareness was chosen as one of the focal outcome variables since phonological processing has proven to be an important prerequisite for learning to read and spell (e.g., Lonigan et al., 2000; Wagner et al., 1997).

1.6.2 Learning mathematics

Mathematical skills begin to develop well before formal schooling (Hannula, 2005; Resnick, 1989). The development of math skills is different from that of reading skills in that mathematical skills develop cumulatively during the first school years. In other words, inter-individual differences in mathematical skills grow over time and children with originally good skills improve more than do children with poorer early skills (Aunola, Leskinen, Lerkkanen, & Nurmi, 2004; Crosnoe et al., 2010; Kikas, Peets, Palu, & Afanasjev, 2009). Aunola and colleagues (2004) showed that the increase in mathematical competence progressed faster among those children who entered kindergarten with an already high level of mathematical skills (see Jordan et al., 2009).

Mathematical skills are built on several subskills, such as number sense, knowledge of arithmetic operations, reasoning skills, conceptual understanding, and procedural knowledge (e.g., Aunola et al., 2004; Dowker, 1998; Fazio, 1996). Mathematical skills have been found to be influenced by cognitive antecedents, such as working memory (Geary, 1993), counting ability (Geary, 1993), processing speed (Fuchs et al., 2006; Hecht, Torgesen, Wagner, & Rashotte, 2001), metacognitive skills (Desoete, Roeyers, & Buysse, 2001), attention (Ackerman, Anhalt, & Dykman, 2001; Fuchs et al., 2005), language skills such as phonological awareness (Fuchs et al., 2005; Hecht et al., 2001), naming (Fazio, 1996), and listening comprehension (Jordan, Hanich, & Kaplan, 2003). Number sequence skills before school age have been shown to be related to arithmetical skills in kindergarten (Johansson, 2005), and to be strong predictors of later math skills at school age (Aunola et al., 2004; Koponen, Aunola, Ahonen, & Nurmi, 2007).

Besides cognitive factors, math performance is also sensitive to various motivational and affective factors (Aunola et al., 2003; De Corte, 1995; Pajares & Miller, 1994). For example, math performance has been shown to be negatively affected by children's anxiety (Wigfield & Meece, 1988). Children's maladaptive achievement behaviors have been found to hamper their subsequent progress in mathematical skills (Hirvonen et al., 2012b; Kikas et al., 2009; Mägi et al., 2010; Onatsu-Arvilommi et al., 2002). Children's math skills are also sensitive to teacher–student relationship quality (Crosnoe et al., 2010), teachers' instructional goals (Lau & Nie, 2008; Turner et al., 2002) and to contextual factors (Kikas et al., 2009). Namely, in classrooms where teachers have been shown to emphasize learning and improving, students performed better in math tests and were more likely to put effort into their math work (Lau & Nie, 2008). Teachers' teaching methods and teaching experience have been shown to positively influence students' math performance (Kikas et al., 2009). The role of classroom-level factors in the development of math skills has been analyzed to a lesser extent

than the role of individual factors. Curby et al. (2009), however, showed that observed classroom organization moderates the association between initial achievement and growth in mathematics.

It has been suggested that there are gender differences in math (Geary, 1996), but they typically emerge only in later school years (Leahey & Guo, 2001; Robinson & Lubienski, 2011). In most studies focusing on early school years, particularly kindergarten or first grade, no gender differences have been found in math performance (e.g., Aunola et al., 2004; Hyde, Fennema, & Lamon, 1990; Robinson & Lubienski, 2011; Skaalvik & Rankin, 1994). As an exception, Jordan and colleagues (2006) found gender effects favoring boys as regards overall number sense performance and nonverbal calculation already in kindergarten.

One aim of the present thesis was to examine the effects of teacher–child interactions in children's early math skills (Study III). The predictive relations between children's task avoidance and their math skills were also examined.

1.6.3 The role of maternal education in academic skills

There is wide agreement on the connections between children's academic outcomes and parents' level of education and socioeconomic status (SES). Both parental education and socioeconomic status have been found to influence children's math skills (Anders et al., 2012; Aunola et al., 2004; Byrnes & Wasik, 2009; Entwisle & Alexander, 1990) and reading skills (Leppänen et al., 2004; Lewis, 2000; McClelland & Morrison, 2003). There is some evidence indicating that parental education is a more powerful predictor of child outcomes than SES (Melhuis, 2010). Maternal education (Hamre & Pianta, 2005) has also been examined as a moderator in the relation between teacher–child interaction quality and student outcomes. In the present thesis, mothers' educational background (i.e., vocational education) was used as a control variable in most of the studies (Studies II–IV).

1.7 Context of the study

Compulsory formal education in Finland consists of nine years of comprehensive school, starting at age 7 and ending at age 16 (primary school grades 1–6 and secondary school grades 7–9). Kindergarten education is provided in the year preceding entrance into primary school, that is, at the age of 6. Since the year 2001, six-year-old children are given, according to legislation, the opportunity to attend kindergarten education whether in day care centers or in comprehensive schools (minimum of 700 hours per year). At the moment, about 99% of six-year-olds in Finland attend kindergarten (National Board of Education, 2010). Kindergarten-age children also have the right to day care if it is needed.

The National Core Curriculum for Kindergarten Education (Esiopetuksen opetussuunnitelman perusteet, 2010) is regulated by the Ministry of Education. The core curriculum advocates an integrated approach where learning utilizes

curricular areas by forming themes rather than teaching them separately. Bridging these with children's everyday experiences and learning through play and arts is recommended. No requirement about specific pedagogies is imposed. The core curriculum requires continuity from early childhood education to kindergarten and from kindergarten education to basic academic education, especially up to the first two years of primary school.

The curriculum for kindergarten education includes seven subject areas: (1) Language and Interaction, (2) Mathematics, (3) Environmental Studies and Natural Science, (4) Ethics, (5) Health, (6) Physical and Motor Development, and (7) Art and Culture. Learning activities are not divided into subject area lessons, but the guided activities are an integrated part of thematic learning throughout the day. Kindergarten education is based on developmentally appropriate practices and child-centered activities. Children can learn at their own speed in accordance with their own capabilities, and their interests are taken into account when organizing activities. The individual development of each child is observed and attention is paid to children's readiness for school attendance, especially with regard to their social and cognitive development. The intention is to minimize the possible later risks affecting learning at school.

In the Finnish kindergarten education system, teachers must at least have tertiary-level training. There is a recommendation for class size, e.g., when preschool education is provided in schools, the maximum class size should be 20. The requirement regarding child–staff ratio depends on the context: kindergarten groups in day care centers follow the adult–child ratio regulations of early childhood education (half-day= 1 adult to 13 children, full day= 1 adult to 7 children). When kindergarten groups are organized at a school facility, the ratio is 13 children to one teacher, and in excess of 13 children, the teacher must have an assistant.

Overall, the Finnish educational system is different from, for example, that of the U.S. For example, in Finnish kindergartens there is no formal instruction of academic subjects (e.g., arithmetic exercises with symbols), and rather than attending whole-group lessons, the children engage in thematically structured small-group activities with a high emphasis on play, problem solving, and creativity (see Ojala & Talts, 2007). When Finnish children enter kindergarten and elementary school, they are one to two years older than children in many other countries, such as the United States. In Finland, the majority of children go to the nearest kindergarten and school in the region rather than parents selecting a kindergarten of their choice.

1.8 Aims of the empirical studies

The present thesis focused on the predictive relations between teacher–child interactions and children's learning motivation, task avoidance, and academic pre-skills. The first aim was to investigate the reliability and validity of the Classroom Assessment Scoring System observational tool (Pianta et al., 2008b)

in Finnish kindergartens. The second aim was to examine the effects of teacher–child interactions on kindergarteners' motivational outcomes, namely, learning motivation and task avoidance. The third aim was to examine the influence of teacher stress in kindergarteners' learning motivation and phonological skills. The fourth aim was twofold: first, to investigate the predictive role of kindergarteners' academic pre-skills (Fall semester of kindergarten) in subsequent teacher–child interactions, and second, to examine whether teacher–child interactions predict children's academic pre-skills (Spring semester of kindergarten).

The thesis consists of four empirical studies. Study I examined the validity and reliability of the CLASS observational tool (Pre-K; Pianta et al., 2008b) in the Finnish kindergarten context. In addition, the quality of teacher–child interactions in Finnish kindergartens was compared to kindergarten classroom quality in the U.S.

Study II investigated the role of teacher–child interactions (in terms of emotional support, classroom organization, and instructional support) in children's learning motivation and phonological awareness. In addition, the classroom-level effect of kindergarten teachers' self-reported stress on children's learning motivation and phonological awareness was investigated. The influence of kindergarteners' learning motivation on their phonological awareness was also examined both at the level of the classroom and the individual.

Study III examined the role of the quality of teacher–child interactions, that is, emotional support, classroom organization and instructional support, in children's task-avoidant behavior and math skills. In addition, the influence of kindergarteners' task avoidance on their math skills was investigated at the level of the classroom and the individual.

Finally, Study IV investigated the predictive role of children's classroom-level academic pre-skills in relation to the teacher–child interactions (i.e., emotional support, classroom organization, and instructional support). The influence of teachers' professional experience, class size, and maternal education on teacher–child interactions was also analyzed.

2 METHOD

2.1 Participants and procedure

The empirical studies reported here have all been conducted as part of the First Steps study: Interaction and Learning within the Child–Parent–Teacher Triangle (Alkuportaat; Lerkkanen et al., 2006b). The First Steps study focuses on investigating the role of teachers and parents in children's development of academic skills and motivation. In the First Steps study, 1874 children entering kindergarten were followed up to Grade 4. The children in the sample were recruited from three medium-sized towns and one smaller municipality, two in Central, one in Western, and one in Eastern Finland. The children represented the whole age cohort of three towns and about half of the age cohort from another town.

The analyses of the present thesis are based on a subsample of 1268 kindergarteners (613 girls, 655 boys) aged 5–6 years (M = 73.58 months, SD = 3.40 months) and their kindergarten teachers (n = 137; 130 female, 7 male). The subsample consisted of children from three municipalities in which classroom observations were conducted. Children of this subsample came from 137 kindergarten classes and from 121 kindergarten sites. Eighty-seven of the kindergarten sites were situated in day care centers and 34 in elementary schools. The kindergarten class sizes ranged from 7 to 24 children (M = 13.70; SD = 5.51).

The children participated in two assessments, one in the beginning of their kindergarten year (October 2006) and the other at the end of their kindergarten year (April 2007). At both time points, the children were assessed on their academic performance (i.e., pre-reading and pre-math skills). At the end of their kindergarten year, children were interviewed regarding their learning motivation, and their kindergarten teachers were asked to provide ratings on the children's task avoidance. In the Spring semester of the kindergarten year, children's mothers and the kindergarten teachers were also asked to fill in questionnaires. Ninety-one % of teachers (n = 137, 130 female, 7 male) and 81.6% of mothers (n = 1033) agreed to provide questionnaire data. For all children, a

written consent for participation in the study had been received from the parents before any assessments. Tests given to check whether children whose mothers provided questionnaire data differed from children whose mothers chose not to provide the data indicated that the latter children had somewhat lower pre-math and pre-reading skills.

Kindergarten teachers participating in the classroom observations (n = 49; 47 female, 2 male) were selected on a voluntary basis from the total of 137 kindergarten teachers participating in the First Steps study. When the kindergarten teachers who participated in observations were compared to those who chose not to participate in the classroom observations, no statistically significant differences were found concerning teachers' work experience, number of kindergarteners in the classrooms, exhaustion at work, curriculum goals or interactional styles. However, a trend (p < .10) toward teachers having higher self-efficacy was found for the participating versus non-participating kindergarten teachers. Classroom observations were conducted in the Spring semester of the kindergarten year on two separate days with two observers being present in each classroom at the same time.

The sample of children and families was fairly representative of the Finnish population (Statistics Finland, 2007). The vast majority of the children, 78.5% came from nuclear families, 11.3% were from single parent families, 8.2% from blended families, and 2% from families where the parents were divorced and the child had two homes. A total of 26% (general population = 29%) of the children's mothers had a Master's degree or higher (five years of education at university, or a licentiate or doctor degree), 35.2% (general population = 35%) had a Bachelor's or vocational college degree (three years of education at a college or university), 31.8% (general population = 30%) had a secondary education (high school or vocational school, grades 10–12), and 7% (general population = 6%) had no education beyond comprehensive school (nine years of formal education, grades 1–9).

2.2 Measures

In studies I–IV, diverse sets of variables were used. A summary of these variables and statistical methods is presented in Table 1. More detailed descriptions of the measures are available in the original papers.

Study I. Kindergarten classrooms were observed using the Classroom Assessment Scoring System (CLASS Pre-K; Pianta et al., 2008b). Kindergarten teachers' interactional style in the classroom was measured using the Teachers' Interactional Style Scale (Aunola, Lerkkanen, Poikkeus, & Nurmi, 2005), and their stress was measured using a modified version of Gerris' Parental Stress Inventory (Gerris, Vermulst, van Boxtel, Janssens, van Zutphen, & Felling, 1993). The efficacy beliefs of kindergarten teachers were measured using a shortened version of the Teacher Efficacy Scale (Gibson & Dembo, 1984), and exhaustion

at work was measured using a shortened version of the Bergen Burnout Inventory (BBI-15; Näätänen, Aro, Matthiesen, & Salmela-Aro, 2003).

Study II. Kindergarten classrooms were observed using the CLASS (Pre-K; Pianta et al., 2008b). Teacher stress was measured using a modified version of Gerris' Parental Stress Inventory (Gerris et al., 1993). Children's learning motivation was assessed by using the Content Interest Rating Scale for Children (CIRS-C; Lerkkanen & Poikkeus, 2006). Their pre-literacy skills were assessed by using two subtests, that is, a letter knowledge test including 29 items from the ARMI test material (Lerkkanen, Poikkeus, & Ketonen, 2006) and a phoneme identification test including 10 items from the ARMI test material (Lerkkanen et al., 2006a).

Study III. Kindergarten classrooms were observed using the CLASS (Pre-K; Pianta et al., 2008b). Children's task-avoidant behavior was evaluated by their kindergarten teachers using the Behavior Strategy Rating Scale (BSR; Onatsu & Nurmi, 1995; Onatsu-Arvilommi & Nurmi, 2000; Zhang et al., 2011). Children's pre-math skills were assessed by using the number sequences test and their math skills were assessed by using two subtests, that is, the math screen number concept test (Elomäki, Huolila, Poskiparta, & Saranpää, 1999) and the arithmetic test (Aunola & Räsänen, 2007; see also Räsänen et al., 2009).

Study IV. Kindergarten classrooms were observed using the CLASS (Pre-K; Pianta et al., 2008b). Children's pre-math skills were assessed by using the number sequences test, and pre-literacy skills were assessed by using a letter knowledge test and a phoneme identification test (Lerkkanen et al., 2006a).

TABLE 1 Overview of the studies

Study	Data	Variables	Statistical methods
Study I A validation of the Classroom Assessment Scoring System in Finnish kindergartens	49 observed kindergarten teachers 161 kindergarten teachers	Observed emotional, instructional, and organizational support Teacher affection, behavioral control, psychological control, and stress Teacher efficacy beliefs Teacher exhaustion at work Teacher professional experience Class size	*CFA* correlations
Study II Classroom organization and teacher stress predict learning motivation in kindergarten children	137 kindergarten teachers 49 observed kindergarten teachers 1268 kindergarteners (Fall) 1268 kindergarteners (Spring) 1028 mothers	Observed emotional, instructional, and organizational support Teacher stress Learning motivation: interest in kindergarten activities Pre-reading skills: letter knowledge, phonological awareness (Fall) Phonological awareness (Spring) Maternal vocational education Class size	Multilevel modeling
Study III Instructional support predicts children's task avoidance in kindergarten	137 kindergarten teachers 49 observed kindergarten teachers 1268 kindergarteners (Fall) 1231 kindergarteners (Spring) 1028 mothers	Observed emotional, instructional, and organizational support Teacher ratings of children's task avoidance Number sequences (Fall) Math skills: number concept, arithmetic skills (Spring) Teacher professional experience Child age Maternal vocational education	Independent samples *t*-tests *MCAR*-tests Multilevel modeling
Study IV Kindergarten teachers adjust their teaching practices in accordance with academic pre-skills	49 observed kindergarten teachers 1268 kindergarteners (Fall) 1028 mothers	Observed emotional, instructional, and organizational support Teacher professional experience Maternal vocational education Class size	Multilevel modeling

3 OVERVIEW OF THE EMPIRICAL STUDIES

3.1 Study I: A validation of the Classroom Assessment Scoring System in Finnish kindergartens

This study investigated the validity and reliability of the Classroom Assessment Scoring System (CLASS Pre-K; La Paro et al., 2004; Pianta et al., 2008b) in Finnish kindergartens. First, the structure of the CLASS was examined by investigating whether the theoretical three-factor model (i.e., Emotional support, Classroom organization, and Instructional support; see Hamre et al., 2007) depicts classroom quality in Finnish kindergarten classrooms as well. Second, reliabilities were examined at the levels of both items and scales. Third, concurrent validity of the CLASS was investigated by examining the associations between CLASS scores and teachers' self-reported interactional styles, efficacy beliefs, and exhaustion at work. Finally, by using some previously published U.S. data, the mean levels of classroom quality in Finnish and US kindergartens were also compared.

The results of the confirmatory factor analysis showed, first, that when the item measuring negative climate was excluded, the three-factor solution assuming three positively correlated latent factors (i.e., Emotional support, Classroom organization, and Instructional support) also represented the key dimensions of the quality of teacher–child interactions in Finnish kindergartens. Although the three factors correlated highly with each other, the three-factor model fit the data better than the one-factor model.

The analyses indicated that the CLASS had good item reliabilities. For example, the three latent factors (i.e., emotional support, classroom organization, and instructional support) explained at least half of the variance in the items, suggesting that all the items of the CLASS were highly reliable. Further, the high, standardized factor loadings indicated that the CLASS items had a high construct validity. The results, thus, suggest that all items that were included in the final three-factor model (i.e., 9 items after excluding negative climate) were

good indicators of the latent factors. The results also indicated good internal consistency regarding the three scales of the CLASS.

In addition, almost all of the inter-rater reliabilities were high, exceeding 80% agreement, indicating high levels of inter-observer agreement (Pianta et al., 2008b). The only exceptions were concept development (observation day 1) and language modeling (observation day 2).

The findings also provided some evidence of the concurrent validity of the CLASS scale. Domains of observed teacher–child interactions were associated with teacher ratings in a meaningful way. Teachers' self-rated affection was positively associated with observed emotional support and classroom organization, and teacher-reported efficacy was positively associated with observed emotional support.

The results of this study showed that the provision of emotional support was moderately high in the observed Finnish kindergarten classrooms. The classrooms were typically well-organized and the instructional support provided by the kindergarten teachers was moderate. The results suggested that Finnish kindergarten teachers may provide a somewhat higher quality of instructional support in their classrooms in comparison to kindergarten teachers in the U.S. sample.

Overall, the results suggested that the CLASS is a valid and reliable measure of the quality of teacher–child interactions in cultural contexts outside the U.S, namely, in Finnish kindergartens.

3.2 Study II: Classroom organization and teacher stress predict learning motivation in kindergarten children

This study investigated the role of teacher–child interactions and teacher stress in kindergarteners' learning motivation and phonological awareness. The following five research questions were set: (1) Do kindergarten classes differ in terms of children's learning motivation and emergent phonological awareness? (2) Do observed emotional support, classroom organization, and instructional support predict differences in children's learning motivation (i.e., interest in kindergarten activities), specifically, after controlling for classroom differences in mothers' education, gender, and pre-reading skills? (3) Does teacher stress predict classroom differences in children's learning motivation, specifically, after controlling for classroom differences in mothers' education, gender, and pre-reading skills? (4) Do observed emotional support, classroom organization, instructional support, teacher stress, and classroom differences in learning motivation predict classroom differences in children's phonological awareness, specifically, after controlling for classroom differences in pre-reading skills? (5) Does learning motivation mediate the association between teacher stress, observed classroom quality factors and children's phonological skills?

The intraclass correlations showed, first, that children in the same kindergarten class resembled each other in terms of their learning motivation and phonological skills. Second, the multilevel modeling results indicated that classroom organization was associated with children's learning motivation: the higher the classroom organization observed in a kindergarten classroom, the higher the learning motivation children showed in that particular classroom. Emotional support and instructional support also correlated with children's learning motivation, although not at a statistically significant level.

Third, the results showed that kindergarten teachers' self-reported teaching-related stress was linked to children's learning motivation in that particular classroom: when the kindergarten teacher reported high levels of teaching-related stress, the children in that particular classroom typically showed low learning motivation. Fourth, the kindergarteners' learning motivation was found to be associated with their levels of kindergarten phonological awareness in the Spring semester: children who reported high learning motivation typically had a high level of phonological awareness. However, no direct predictive relationships were found between the quality of teacher–child interactions and the children's phonological awareness. Finally, the results showed that teacher stress had an indirect effect on phonological awareness via children's learning motivation: high teacher stress was related to low learning motivation in children, which further predicted a low level of phonological awareness.

Overall, the findings of Study II indicated that—in Finnish kindergartens—the quality of classroom organization, i.e., setting of clear rules, looking for opportunities to actively engage children, and provision of inherently interesting tasks, is associated with children's learning motivation. The results also suggest that children's learning motivation is an important mediator of the impact of teacher-related variables on children's school-related skills. Kindergarten teachers' well-being may affect children's academic pre-skills by promoting children's enthusiasm and engagement in learning.

3.3 Study III: Instructional support predicts children's task avoidance in kindergarten

This study examined the effects of teacher–child interactions on kindergarteners' task-avoidant behavior and math skills. The following research questions were investigated: (1) Do kindergarten classrooms differ in the extent to which children show task-avoidant behavior? (2) Do kindergarten classrooms differ from each other in terms of children's math skills? (3) Do observed classroom quality indicators predict classroom differences in children's task-avoidant behavior, specifically, after controlling for classroom differences in teachers' professional experience, mother's education, gender, children's age, and previous skills in math? (4) Do observed classroom quality indicators and classroom differences in task-avoidant behavior predict classroom differences in children's math skills?

The intraclass correlations showed, first, that kindergarten classrooms differed in regard to children's task-avoidant behavior and math skills. Namely, children in the same kindergarten class resembled each other in terms of their task avoidance and math skills.

Second, the multilevel modeling analyses showed that instructional support was associated with kindergarteners' task avoidance: the more instructional support was evidenced in the classroom, the less children were rated as showing task-avoidant behavior in that particular classroom. Emotional support and classroom organization also correlated negatively with children's teacher-rated task avoidance at the classroom, although not with statistical significance.

Third, the results showed that when task-avoidant behavior was typical of a kindergarten classroom, it was associated with children's math skills: when the task-avoidant behavior rated by the teacher was typically high in a particular classroom, then the children in that particular classroom typically had low math skills. Fourth, no evidence was found for the assumption that observed quality of teacher–child interactions would predict kindergarteners' math skills in a particular kindergarten classroom.

Overall, the results suggest that already in kindergarten, teachers can promote children's preparedness to face difficult learning situations and be engaged in learning by giving individualized, task-specific feedback, and by providing conceptual scaffolding and optimally challenging tasks. High-quality instructional support may, thus, function to prevent experiences of anxiety in learning situations and, eventually, also task-avoidant behaviors. The results also suggest that the factor of task-avoidant versus task-focused motivational and behavioral patterns is an important predictor of math skills.

3.4 Study IV: Kindergarten teachers adjust their teaching practices in accordance with academic pre-skills

This study examined the predictive role of kindergarteners' academic pre-skills regarding observed teacher–child interactions. The following research questions were set: (1) Do kindergarten classrooms differ in terms of children's pre-reading and pre-math skills? (2) Do differences in academic pre-skills between children of different classrooms predict observed classroom quality (i.e., emotional support, classroom organization, and instructional support given by the teacher) when controlling for mothers' education, professional experience of teachers, and class size?

First, the intraclass correlations showed that children in the same kindergarten class resembled each other in terms of their academic pre-skills. The results indicated further that children's academic pre-skills typical of the kindergarten classroom in the Fall semester were negatively related to the classroom quality observed in that particular classroom in the Spring semester: the lower

the pre-skills typical of the kindergarten classroom in the fall, the higher the observed kindergarten classroom quality in the same classroom in spring.

The results suggest that once aware of the low level of academic pre-skills of the children in their class, kindergarten teachers start to pay particular attention to their teaching practices and to the quality of teacher–child interactions, and actively adapt their practices according to the levels of pre-reading and pre-math skills of the children in their kindergarten class.

4 GENERAL DISCUSSION

Kindergarten experience does not appear to be unitary, and the quality of experience matters more than sole attendance (Melhuis, 2001). The present thesis focused on the predictive relations between the observed teacher–child interactions and children's motivational and academic outcomes. First, the reliability and validity of the CLASS instrument was examined in the Finnish context (Study I). Secondly, the predictive role of kindergarten teacher–child interactions in children's learning motivation (Study II) and task-avoidant behavior (Study III) was investigated. Thirdly, the role of teacher stress in children's learning motivation and phonological awareness was examined (Study II). Fourthly, the predictive role of children's academic pre-skills in observed teacher–child interactions was determined (Study IV). In addition, the predictive role of teacher–child interactions in kindergarteners' math skills (Study III) and phonological awareness (Study II) was investigated.

The findings indicated that the CLASS is a reliable and valid tool for measuring the quality of teacher–child interactions, that is, classroom quality, in Finnish kindergartens. Moreover, at kindergarten age, the role of teacher–child interactions was found to be particularly important for children's motivational outcomes. Namely, instructional support was related to kindergarteners' task avoidance and classroom organization was connected to their learning motivation. Further, children's learning motivation was shown to mediate the association between teacher stress and children's phonological awareness. The findings also suggest that kindergarten teachers adapt their classroom interactions and practices in accordance with children's academic pre-skills typical of the classroom.

4.1 The reliability and validity of the CLASS tool

The first aim in the present thesis was to examine the reliability and validity of the Classroom Assessment Scoring System in Finnish kindergartens (Study I).

The results provided evidence of a factor structure very similar to that found previously in the U.S. (Downer et al. 2012; Hamre et al., 2007). Namely, when the item measuring negative climate was omitted, the three-factor solution assuming three positively correlated factors (i.e., Emotional support, Classroom organization, and Instructional support) described the quality of teacher–child interactions well also in the Finnish kindergarten context. Only negative climate did not contribute to the three factor structure, and it was left out of the subsequent analyses. One explanation for this finding concerning negative climate is that Finnish kindergarten teachers have a highly homogeneous university level training, and high negative climate may seldom be evidenced in Finnish kindergarten classrooms. However, it is possible that there is some selectivity in the observed sample since only a subset of teachers in the original sample participated in the observations. The voluntary participants may have been more likely to represent teachers with higher responsiveness and sensitivity and lower negative interactional patterns than those who did not participate in the classroom observations.

The findings concerning the reliability and internal consistency of the CLASS items and scales showed, first, that the CLASS had good item reliabilities also in the Finnish data. Further, the high standardized factor loadings indicated a high construct validity as regards the CLASS items. Our results also indicated good internal consistency for the three scales of the CLASS. These findings are in line with those obtained in the U.S. by Pianta, Hamre and colleagues (see Hamre et al., 2007; Pianta et al., 2008b).

Almost all of the inter-rater reliabilities were high (exceeding 80% agreement), indicating high levels of inter-observer agreement (see Pinta et al., 2008). The only exceptions were concept development (observation day 1) and language modeling (observation day 2). These two low inter-rater reliabilities may reflect the fact that the examples of these dimensions in the CLASS manual (Pre-K; Pianta et al., 2008b) are intended for children younger than 6 years of age, and therefore, these dimensions were somewhat difficult to rate for the Finnish observers since 6-year-olds are at a higher level of conceptual thinking than younger children. Since Finnish kindergartens and teachers typically employ constructive forms of pedagogy instead of subject-based lessons (see OECD Country Note, 2006), the observers may have had difficulties in rating the items measuring concept development and language modeling. The second possible explanation for the low inter-rater reliabilities concerning these items is that the observers may have had slightly different understandings of what a "concept" is in kindergarten education, even though the criteria were carefully covered in their training. The observers may also have had a varying extent of experience with children which may have caused differences in their ratings. Thus, the result suggests that more discussion and guidance is needed in future training of observers, at least on items measuring concept development and language modeling.

The test-retest reliabilities for most dimensions ranged from adequate to high. The only exceptions were productivity and concept development which

showed relatively low test-retest reliabilities. Since the teaching structure is flexible in Finnish kindergartens, it is possible that observation days may have varied, so that there were, for example, more learning activities (e.g., rhyming or number games) on one day and more play-centered activities on another day. The dimensions measuring instructional support may, in fact, be more context dependent than those measuring emotional support. For example, Curby and colleagues (2011) have indicated that classroom interactions are most stable regarding emotional support and least stable concerning instructional support. The present findings suggest that more than one observation day is required for obtaining reliable results, at least concerning instructional support.

Some evidence for concurrent validity of the CLASS in the Finnish sample was also found. For example, teachers' self-reported affection was positively associated with observed emotional support: teachers' child-centered attitudes and valuing of emotional closeness with their students were in line with observations of high-quality emotional support. Observed classroom organization was also higher in kindergarten classrooms where teachers reported higher affection. This result suggests that there is a link between child-centered attitudes and a teacher's ability or propensity to set clear expectations for behavior and to apply effective monitoring, as well as to actively look for opportunities to motivate children. The results also indicated that observed emotional support was higher in kindergarten classrooms where teachers reported higher self-efficacy beliefs. This suggests that teachers who see themselves as having the necessary knowledge and means to handle difficult situations in their classroom are more sensitive and responsive toward their students in observed classroom situations. This finding is consistent with a prior result suggesting that teachers' high self-efficacy is associated with a closer relationship with their students (Mashburn et al., 2006).

Further, the results showed that the provision of emotional support was moderately high in the observed Finnish kindergarten classrooms. The classrooms were also typically well-organized and the instructional support provided by the kindergarten teachers was moderate. These findings are similar to those reported previously regarding early education environments in the U.S. (e.g., La Paro et al., 2004; Pianta et al., 2002). These results also fit the argument that pedagogical practices in Finnish kindergartens possess many high-quality features (Ojala & Talts, 2007). The strong emphasis on child-initiated activities and small-group activities inherent in Finnish kindergarten education is consistent with developmentally appropriate practices (see Montie et al., 2006). Overall, the results concerning the classroom quality in Finnish kindergartens suggest that classroom interactions typical of Finnish early education provide children with plenty of positive opportunities for favorable, enriching interactions with teachers and peers.

The ratings for the quality of feedback and concept development dimensions were somewhat lower than those for the other CLASS dimensions. Low quality of feedback in Finnish kindergartens may connote that kindergarten teachers mostly provide general praise (e.g., "good"/"well done"/"right"),

whereas individualized, task-specific feedback that encourages children's learning and thinking is not very frequent (see Koivisto, 2007). Previous literature (La Paro et al., 2004) has shown that instructional support provided in early education settings is not always optimal, that is, feedback provided by teachers is not focused on effort and learning processes but rather on outcomes of activities. The results concerning low quality of feedback in Finnish kindergartens suggests that kindergarten teachers should pay more attention to children's effort and process of learning when giving feedback in daily classroom situations. Further, in terms of concept development, bringing concepts to life and providing children with opportunities to use analysis and reasoning in their approach to problems may help children to reach a deeper understanding of concepts than they could gain on their own.

However, compared to previous American studies, the mean levels of the dimensions in the instructional support domain were higher in Finnish kindergarten classrooms. There are at least three possible explanations for this result. First, it is possible that the quality of teacher–child interactions in Finnish kindergartens is actually on average higher than that in U.S. kindergartens due to factors such as the high qualification of teachers or favorable adult–child ratio in classrooms. Finnish kindergarten teachers all have at least a Bachelor's degree from a university where the program follows a homogeneous curriculum including supervised practice periods in day care centers or schools. The child–staff ratio is typically lower and group sizes smaller in Finnish kindergartens than is the case in kindergartens in many other European countries, as shown by international comparisons (OECD 2011; see also Ojala & Talts, 2007). Moreover, based on international comparisons, for example, with the neighboring country Estonia, the pedagogical practice in Finnish kindergartens shows many high-quality features such as, for example, a low proportion of whole-group activities with teacher-directed didactic instruction (Ojala & Talts, 2007). Second, the result may also reflect the cultural ways of interpreting and evaluating the dimensions. Observers (in this case Master's degree students of Psychology or Teacher Education) naturally interpreted the items measuring instructional support in light of the Finnish educational context in which kindergarten education includes well-designed activities that are integrated as thematic learning throughout the day. Third, the result may also be due to the fact that Finnish kindergarteners are 6 years of age, the same age as U.S. first graders. Previous studies have shown that instructional support is higher in classrooms in which the children are older, i.e., more mature (Hamre et al., 2007; Pianta et al., 2008b). As an exception to this, La Paro and colleagues (2006) showed that instructional support actually decreased from kindergarten to first grade in their study sample.

Overall, the results suggest that classroom quality is a useful concept in understanding classroom processes in educational systems also outside the U.S. That is, the same kinds of components reflecting the quality of teacher–child interactions can be found in quite different educational settings. Using a standardized observational tool is likely to make cross-cultural comparisons of the

quality of teacher–child interactions more reliable. However, setting codings for behavior is by nature somewhat culturally sensitive, and thus, adequate training and continuous checking of the reliability of observations are essential.

4.2 The role of teacher–child interactions in kindergarteners' motivation

It has been argued that understanding the development of and change in motivation requires analyzing the transactions between individuals and the context (Turner & Patrick, 2008). One major aim of the present study was, therefore, to examine the role of the quality of teacher–child interactions in children's learning motivation and task-avoidant behavior. The findings using multilevel modeling indicated that the quality of teacher–child interactions plays an important role in promoting kindergarteners' learning motivation (Study II) and task avoidance (Study III). These results fit the conclusion by Rutter (1985a, b) that early education experiences have effects on children's attitudes toward learning, on their self esteem, and on their task orientation.

4.2.1 The influence of teacher–child interactions on learning motivation

One aim of the present thesis was to investigate the effect of teacher–child interactions on kindergarteners' learning motivation. Observed classroom organization was found to be positively associated with kindergarteners' motivation to learn (Study II). This suggests that teachers' setting of clear rules, looking for opportunities to actively engage children, and providing of inherently interesting tasks in the classroom is beneficial to children's learning motivation, i.e., interest in learning activities. This finding is partly in line with that by Ryan and Grolnick (1986), showing that warmth and consistent rules in the classroom are related to children's mastery motivation. Guay and colleagues (2001) have also shown that teachers' provision of both autonomy support and optimal structure predicts children's motivation. The present result broadens the previous research by showing that children's learning motivation is connected to the observed quality of teacher–child interactions and not only based on teacher reports (Anderman et al., 2001; Aunola et al., 2006) or student reports (e.g., Ryan & Grolnick, 1986) of teachers' practices.

The concept of classroom quality focuses on the "*how*" aspect in teaching, that is, how the curriculum is realized in practice (Pianta et al., 2008b). According to Pianta at al. (2008b), classroom organization focuses on the ways in which the teacher maximizes students' interest, engagement and ability to learn from lessons and activities, and how well the teacher manages instructional time and routines to provide opportunities for active involvement. Children are motivated and show enthusiasm in learning when their kindergarten teachers look for opportunities to actively engage them in learning, provide interesting activities, and give consistent praise for meeting expectations. In a study by

Rimm-Kaufman et al. (2009), classroom organization was also the strongest predictor of children's engagement in learning and teacher-rated work habits.

The result showing that classroom organization was linked to children's learning motivation was somewhat unexpected. Many previous empirical studies and theoretical postulations have posited that it is emotional support that is more closely linked to children's motivation to learn than are the other domains of teacher–child interactions. However, Downer and colleagues (2010b) have suggested that, besides within-domain links, there are also cross-domain links to child outcomes. The result of the present study showing that classroom organization is associated with learning motivation represents this kind of cross-domain effect on child outcomes. One possible explanation for the result that emotional support did not play a significant role in children's motivation may simply be that there was not that much variance in kindergarten teachers' emotional support as compared to other CLASS domains. Moreover, classroom organization and emotional support were highly correlated, indicating that kindergarten teachers who were able to set clear rules and behavioral expectations for children were also showing sensitivity and responsiveness, and promoted children's autonomy. Thus, high scores in items measuring classroom organization are also more likely to represent high scores in items tapping emotional support. It would have been useful to use, for example, mixture modeling and other person-oriented methods to investigate whether different combinations of emotional support, classroom organization and instructional support are more beneficial to children's learning motivation than other combinations are.

The results of the present thesis add to our understanding of the development and promotion of children's learning motivation by showing that teachers' classroom practices and interactions make a difference already in kindergarten, before formal education starts: in the classrooms in which teachers predominantly employed high-quality classroom organization, children, on average, showed higher learning motivation than in classrooms with a lower quality of classroom organization. As shown previously, classrooms provide the most opportunities for learning when the students are well-behaved, consistently have things to do, and are engaged in learning tasks (Pianta et al., 2008b). When teachers have clear rules, routines and expectations for children's behavior then there are more opportunities for the children to learn and explore and for teachers to employ effective instruction. In classrooms where the classroom organization is of high quality, children have clearly defined learning activities throughout the day and teachers look for opportunities to actively engage children (Pianta et al., 2008b). Further, instructional activities are provided using many modalities and materials that are particularly interesting and stimulating to children. In such classrooms, children may receive more positive feedback after a good performance, which leads to an increase in the children's liking for a subject or activity (see Deci et al., 1991). At kindergarten age, most of the children face systematic feedback concerning their learning outcomes for the first time. Therefore, kindergarten teachers should pay particular attention to the kind of feedback and activities they provide and how they praise children

for meeting the expectations as a step to promote their learning motivation. The most recent Finnish kindergarten curriculum, which was put in operation in January 2011, does, in fact, emphasize promoting children's motivation accordingly.

4.2.2 The role of teacher–child interactions in task avoidance

The next aim of this thesis was to examine the role of teacher–child interactions in children's task avoidance. The findings (Study III) showed that instructional support provided by kindergarten teachers was connected to children's task-avoidant versus task-focused behavior at the classroom level. Higher levels of instructional support have previously been linked to more observed on-task behavior in kindergarten classrooms (Pianta et al., 2002). The results of this thesis suggest that quality of feedback, language modeling, and scaffolding do contribute to children's achievement-related beliefs and behaviors already before formal schooling. When kindergarten teachers give individualized, task-specific and encouraging feedback and provide conceptual scaffolding, kindergarteners focus more on tasks and engage in the activities at hand. Children's academic self-concept was not studied in the present thesis, but it may be assumed that positive achievement-related feedback contributes to children's self-concept as learners, and subsequently increases their task-focused behavior. The results of the present thesis are partly in line with previous findings among older students. For example, Turner and colleagues (2002, 2003) found that students reported a lower incidence of avoidance behavior in classrooms in which teachers provided instructional and motivational support for learning, that is, emphasized learning, effort and understanding. Teachers providing cognitively challenging tasks and providing scaffolding have also been shown more likely to have students showing greater engagement in learning (Bogner et al., 2002; Dolezal et al., 2003). Further, Ponitz and colleagues (2009) indicated that kindergarteners' behavioral engagement mediated the association between classroom quality and reading achievement.

The results of the present thesis add to previous research by showing that teachers can foster children's engagement in learning and task-focused behavior already in kindergarten settings before formal education commences. The findings suggest that teachers' role in promoting children's adaptive behavior in learning-related situations is also important in the context of kindergarten education, which mostly involves play-centered learning activities instead of formal instruction. There is an evident need to pay more attention to early educators' awareness of their influence on children's achievement-related beliefs and behaviors, as well as a need to increase the means available to promote children's focus on tasks and adaptive behaviors. The findings of the present thesis indicate that kindergarten teachers can promote children's preparedness to face difficult learning situations and decrease their experience of anxiety in learning situations that would normally be expected to readily lead to task avoidance. The findings suggest that providing optimally challenging tasks, scaffolding and encouragement to children at their "zone of proximal develop-

ment" (Pressley et al., 1996) promotes their adaptive achievement-related beliefs and behaviors.

The present result indicating that instructional support was linked to children's task avoidance was, however, also somewhat unexpected. Previous studies have indicated that it is classroom organization that is more likely linked to children's self-regulation, task orientation and behavioral engagement than the other CLASS domains are (e.g., Downer et al., 2010b; Rimm-Kaufman et al., 2009). The present result represents so called cross-domain links to child outcomes (see Downer et al., 2010b). Classroom organization and instructional support were also highly correlated, indicating that kindergarten teachers who were providing high quality feedback, scaffolding and language modeling were also able to set clear rules and behavioral expectations for children. Thus, high scores in items measuring instructional support are also more likely to represent high scores in items tapping classroom organization. However, the results need to be interpreted with caution due to the small sample size. Therefore, more refined studies are needed in future to determine which aspects of teacher–child interactions are the most beneficial in the promotion of children's behavioral engagement and task-focused behavior.

The present findings differ somewhat from some previous results. For example, Cadima and colleagues (2010) found that classroom quality was associated with first grade students' print concepts and literacy skills but not with their adaptive behaviors. One explanation for the differences between the findings is that a different measure was used in measuring adaptive behaviors. Cadima et al. (2010) used quite a broad measure of classroom behaviors in the analyses, including attention, sociability and compliance skills. The second possible explanation is that the children in the study by Cadima and colleagues were older than those in the present study.

Further, Rimm-Kaufman and colleagues (2009) found that classroom organization was linked to kindergarteners' adaptive classroom behavior, and children who experienced more instructional support from their teachers were rated as lower in cognitive self-control and lower in positive work habits. On the contrary, in the present study, it was instructional support that was linked to children's adaptive classroom behavior. There are at least two possible explanations for the differences between the findings. First, the Finnish children were one year older than the children in the American study by Rimm-Kaufman et al. (2009). Older children's adaptive classroom behaviors may benefit more from instructional support, whereas younger children may be more dependent on the external environment to support their self-regulatory skills. Second, it is possible that Finnish kindergarten teachers rate children's adaptive behavior differently and have different demands on children than teachers in the United States. The latter may place more academic demands on children, as suggested by Rimm-Kaufman et al. (2009), whereas Finnish kindergarten teachers place a strong emphasis on developing the children's positive self-concept and social skills, and on promoting their learning potential (Hytönen, Krokfors, Talts, & Vikat, 2003). Although the Finnish children were older than their

American counterparts, their kindergarten teachers may have placed more social and behavioral demands on the children as there are no demands on formal teaching and learning standards in the Finnish kindergarten curriculum.

The results of the present thesis suggest that teacher–student interaction in kindergarten provides an important context for the development and promotion of children's task-avoidant versus task-focused behavior. Kindergarten teachers may either encourage children's engagement in and enthusiasm for learning activities or, alternatively, discourage their efforts and inadvertently augment their anxiety and task-avoidant behavior. However, being able to give attention and individualized feedback to all children in the classroom and to engage in meaningful conversations with children may be challenging for kindergarten teachers in our modern times with increasing class sizes and more children with special needs in the classrooms.

It should be noted, however, that due to the study design and transactional nature of teacher–child interactions (Downer et al., 2010b; Nurmi, in press) it is possible that teachers reacted to children's achievement behaviors as well. In other words, in classrooms characterized by high levels of task avoidance teachers may not be able to provide children with high quality scaffolding and language modeling.

4.3 The role of teacher–child interactions in children's academic pre-skills

It has been shown that early classroom experiences of high quality boost young children's ability to learn (cf. see the finding of the EPPE study by Sylva et al., 2004) by providing them with a stronger basis for skill development in the early school years. Therefore, one aim of the present thesis was to examine the influence of teacher–child interactions on children's math skills (Study III) and phonological awareness (Study II). In contrast to many previous studies, the present results showed that teacher–child interactions did not directly predict children's academic pre-skills (Studies II and III).

The results of the present thesis showed that observed classroom quality—in terms of emotional support, classroom organization and instructional support—was not directly associated with children's academic outcomes at an age when the children did not yet participate in formal instruction in mathematics and literacy. In many American studies, classroom quality has been associated with children's academic skills (e.g., Curby et al., 2009; Hamre & Pianta, 2005; Mashburn et al., 2008). In their study, Cadima and colleagues (2010) found that—in Portugal—classroom quality was associated with first grade students' print concepts and literacy skills. The contrasting result of the present study—in which teacher–child interactions were not associated with children's academic pre-skills measured in the Spring semester of the kindergarten year—may, in fact, reflect that—in Finnish kindergartens—there is a strong emphasis on the

play-centered approach, while formal instruction in math and literacy is scant. Therefore, more detailed research is needed on Finnish kindergarten classroom quality and its influence on children's academic outcomes. It should be noted that children's academic skills are influenced by many other factors, such as intelligence and parenting, which were not measured in the present study. A related point is that the CLASS (Pianta et al., 2008b) provides an overall measure of the teacher–child interactions and does not give information on individualized teaching and classroom interactions. In the present study, the quality of the teacher–child interactions was associated with the children's learning motivation, measured by task avoidance and interest in learning activities, rather than with their academic pre-skills. However, the teacher–child interactions were related to the children's motivational factors (task avoidance and learning motivation), which, in turn, were associated with their academic pre-skills. Therefore, teacher–child interactions of high quality may promote children's academic outcomes as well by enhancing children's task-focused behavior and learning motivation. However, the results and implications need to be interpreted with caution due to the small sample size.

4.4 The role of teacher stress in children's learning motivation and phonological awareness

One aim of the present thesis was to investigate the role of teacher-reported stress in kindergarteners' learning motivation and phonological awareness (Study II). The results showed that teacher stress was negatively associated with children's learning motivation. Moreover, learning motivation mediated the association between teacher stress and children's phonological awareness.

The result showing that learning motivation mediated the association between teacher stress and kindergarteners' phonological awareness suggests that kindergarten teachers' well-being is important for children's motivational outcomes as well as for their academic pre-skills. Children in the classrooms of kindergarten teachers with high stress may feel less motivated to learn, which then further contributes to their lower academic pre-skills. This result may reflect the fact that kindergarten teachers who experience stress may show low effort and ability to support their students' engagement and interest in learning. Previous research has shown that teachers exhibiting greater amounts of enthusiasm are effective in promoting interest, excitement, and curiosity among students (Patrick, Hisley, Kempler, & College, 2000), while emotional exhaustion leads to avoidance of interaction with students and to lowered sensitivity (Jennings & Greenberg, 2009; Kokkinos et al., 2007). Depressive symptoms of teachers have also been found to be associated with a lower quality of observed interactions (Gerber et al., 2007; Hamre & Pianta, 2004; Pianta et al., 2005). With respect the present study, it is important to note that kindergarten teachers were also asked to report the amount of time spent on activities that promote

literacy skills. There were no statistically significant differences between kindergarten teachers in their self-reported instructional activities, and the amount of time spent on activities did not predict gains in phonological awareness. This result broadens prior research by suggesting that, in addition to teachers' instructional practices (Anderman et al., 2001; Aunola et al., 2006), their well-being is also important in promoting children's learning motivation and further, children's academic pre-skills.

Overall, the result of the present thesis showing that teacher stress matters suggests that children's learning motivation is an important mediator of the impact of teacher-related variables on children's academic skills. In other words, kindergarten teachers' well-being affects children's academic skills by promoting children's enthusiasm for and engagement in learning. In a previous intervention study, Raver and her colleagues (2011) found that training preschool teachers in behavioral regulation and management strategies positively contributed to children's pre-academic skills via improving their self-regulation skills. Zhai and colleagues (2011) have shown that classroom-based interventions can improve teachers' perceived job control and work-related resources, thereby releasing their work-related stress.

However, the results need to be interpreted with caution due to the design of the present study. The design was not cross-lagged longitudinal so it is also possible that kindergarten teachers reacted to children's low phonological awareness and low interest in kindergarten activities by increased stress. Previous research has identified emotionally challenging situations, such as maintaining discipline and teaching unmotivated children, as potential stressors for teachers (Brouwers & Tomic, 2000; Sutton & Wheatley, 2003).

4.5 The effect of children's academic skills on teacher–child interactions

One aim of this thesis was to investigate the predictive role of kindergarteners' academic pre-skills regarding the quality of teacher–child interactions (Study IV). The results suggest that children have a kind of "evocative impact" (see Rutter, 1997) on teacher–child interactions in terms of emotional support, classroom organization and instructional support. Namely, kindergarteners' lower academic pre-skills predicted higher subsequent classroom quality (Study IV).

The result suggests that once teachers become aware of the low level of academic pre-skills of children in their classroom, they start to pay particular attention to their classroom interactions and practices. In terms of classroom organization, they may increase their consistency concerning routines, lay down behavioral rules and expectations, apply effective monitoring, and make an extra effort to provide the children with inherently interesting activities. In addition, they may look for more opportunities to actively engage children in academic activities. By adjusting their teaching practices according to the chil-

dren's skill level, teachers seek to respond to the individual needs of children and to promote learning while the children are in their zone of proximal development (Pressley et al., 1996). The result of the present thesis is in line with the recent finding by Nurmi et al. (2012b), who reported that the poorer the performance in reading a student showed at the end of the kindergarten year, the higher the amount of support and attention in reading the first grade teacher had given that particular student. A similar result has been reported concerning mathematics (Nurmi et al., 2012a, in press). The finding is also in line with a previous one showing that teachers deployed more management in low ability or low track classes (Eder, 1981). Also, Cadima and colleagues (2010) showed that classroom quality was differently related to children's math outcomes depending on their previous skill level, namely, children with lower initial skills benefited more from high-quality interactions (see also Curby et al., 2009).

The finding of the present thesis suggests further that awareness of low academic pre-skills of the children in a class activates teachers to provide more conceptual scaffolding and individualized feedback to children, that is, instructional support of high quality. This result of the present study is in accordance with the finding showing that the poorer a first grade student's level of performance in mathematics was, the more the teacher reported providing active instruction for that particular student (Nurmi et al., in press; see also Nurmi et al., 2012a). Teachers adjust their instructional practices in accordance with the academic performance of the children in their class (Doyle, 1979b; Corno, 2008; Pianta, 2006). It is possible that kindergarten teachers increase their instructional support with the aim of reducing the gap in academic skills between children with low academic pre-skills and those with higher pre-skills in order to prepare them equally well for school entry. As indicated by Hamre and Pianta (2005), high-quality instructional support can aid in closing the gap in academic achievement between at-risk children and children without common risk indicators.

The finding that kindergarteners' academic pre-skills predict subsequent teacher–child interactions suggests that emotionally supportive teachers notice when students are struggling or need extra support, either academically or socially, and then respond to those needs appropriately (Hamre & Pianta, 2007). School readiness is a major focus of the kindergarten curriculum, and it appears that kindergarten teachers adjust their practices and interactions according to children's skill level in preparing them for school entry. However, although the amount of emotional support given by the teacher correlated negatively with children's pre-math skills, it did not correlate with their pre-reading skills.

Overall, the results of the present study add to our knowledge of the impact of children's previous academic skills on teachers' classroom interactions. In addition to being associated with teachers' self-reports on their instruction (Nurmi et al., 2012a, 2012b, in press), children's prior skill level is also associated with subsequent classroom quality, that is, observed teacher–child interactions (see also Connor et al., 2004, 2005). The findings of this thesis suggest that kindergarten teachers actively adapt their instructional practices and interac-

tions according to the levels of pre-reading and pre-math skills in the kindergarten classroom. Thus, these results provide some evidence as to the bidirectional transactional nature of teacher–child interactions (Downer et al., 2010b). It is important to note that mothers' education typical of that kindergarten class, number of children in the group, and professional experience of the teacher were controlled for in the analyses.

4.6 The relations between motivation and academic skills

The results of the present thesis showed that kindergarteners' learning motivation and task-avoidance behaviors were associated with their academic skills, namely, math skills (Study III) and phonological awareness (Study II). The extent of task-avoidant behavior predicted children's math skills both at the classroom-level and at the level of individual children (Study III). This finding is in line with some previous findings (e.g., Aunola et al., 2003; Hirvonen et al., 2012b; Onatsu-Arvilommi et al., 2002), suggesting that children's math performance is sensitive to their achievement-related beliefs and behaviors. Less advanced pre-math skills were related to higher task-avoidant behavior, suggesting that children's achievement-related beliefs and behaviors develop partly as a result of previous skill development and related feedback affecting expectations of success and self-concept. Onatsu-Arvilommi and Nurmi (2000) suggested that anticipation of success is likely to increase a child's interest in the task at hand and related task-focused behavior. The present finding is in line with a previous result by Hirvonen et al. (2012b), suggesting that improvement of math skills and decrease in task-avoidant behaviors go hand in hand.

Kindergarteners' learning motivation, as assessed by their self-rated interest in kindergarten activities, was associated with their phonological awareness (Study II). This finding is partly in line with previous findings showing that motivation in reading is related to good reading skills (Baker & Wigfield, 1999; Ecalle et al., 2006), and that kindergarteners' behavioral engagement contributes to their reading skills (Ponitz et al., 2009). A high level of interest in a particular task has been shown to increase a child's effort and task-focused behavior, which further contributes to better skills in that particular subject or task (Aunola et al., 2003).

Overall, the results concerning the relation between motivational and academic outcomes suggest that early educators should pay particular attention to achievement-related beliefs and behaviors as well as learning motivation already during children's kindergarten year. The development of adaptive achievement strategies during the early phases of the school career is important as they seem to form cumulative cycles with academic skills and school performance (Aunola et al., 2002; Hirvonen et al., 2010, 2012b; Onatsu-Arvilommi & Nurmi, 2000). Therefore, it is important to identify particularly those children who, besides having low levels of skills, also have low learning motivation and less adaptive achievement-related beliefs and behaviors already before the on-

set of formal schooling. For example, it is important for kindergarten teachers to pay attention to the beliefs that children have about their abilities and performance since low efficacy beliefs and expectations of failure are likely to result in a low level of effort and a high level of task-avoidant behavior (Aunola et al., 2003). Children benefit from supportive feedback from teachers recognizing and complimenting them on their abilities when they succeed and encourages their effort in cases of failure (Meece, Blumenfeld, & Hoyle, 1988). Feedback should also support children's beliefs in their own self-efficacy and control, and convince them that effort does make a difference (Martin et al., 2001).

4.6.1 The roles of gender and age in motivation and academic skills

Gender and age were associated with children's motivational outcomes and academic skills (Study II and Study III). The finding showing higher learning motivation (i.e., interest in kindergarten activities) for girls than for boys (Study II) is partly in line with previous studies indicating that girls are typically more motivated to learn languages than boys are (Eccles et al, 1998, 2005). It poses a challenge to develop both classroom interactions and contents for early education in ways that better foster boys' learning motivation as well. Boys, on the other hand, were rated by their kindergarten teachers to have shown more task avoidance than girls did (Study III). This is consistent with some previous findings (Hughes et al., 2008; Midgley & Urdan, 1995; Onatsu-Arvilommi & Nurmi, 2000; Urdan et al., 1998), suggesting that boys are more likely than girls to develop maladaptive patterns of achievement behaviors. One explanation for this finding is that classroom behavior being valued as desirable is considered to be more typical of girls than boys. Teachers tend to have stereotypical views about boys being less attentive and persistent in tasks (Beaman, Wheldall, & Kemp, 2006). Boys have also been shown to demonstrate poorer behavioral self-regulation both as assessed through teachers' ratings and in self-regulation tasks (Matthews, Ponitz, & Morrison, 2009). It is, thus, possible that differences in task-avoidant behaviors between boys and girls may be associated with differences in behavioral self-regulation skills. However, Vitiello, Booren, Downer & Williford (2012) showed recently that, in preschool settings, boys did not exhibit less task engagement than girls did.

Girls were shown to have a higher level of phonological awareness than boys at the end of the kindergarten year (Study II), whereas boys had better math skills than girls did (Study III). These results are partly in accordance with some previous findings. For example, girls have been shown to perform better than boys in reading also in some earlier studies (e.g., Leppänen et al., 2008; Logan & Johnston, 2009; Robinson & Lubienski, 2011). Although gender differences in standardized math tests have virtually disappeared in the United States in recent years (e.g., Hyde, Fennema, & Lamon, 1990; Hyde, Lindberg, Linn, Ellis, & Williams, 2008), some longitudinal studies in other countries have demonstrated that the small gender gap appears after the first grade and then continues to widen during the following school years in favor of boys (e.g., Aunola et al., 2004; Leahey & Guo, 2001; Robinson & Lubienski, 2011). Jordan

and colleagues (2006) showed that boys had better number sense and nonverbal calculation skills already in kindergarten.

Finally, it was also found that the older the children were at the beginning of their kindergarten year, the less task-avoidant behavior they were rated as showing and the better their math skills were later on (Study III). This result suggests that task-avoidant behavior and math skills may partly be linked with maturation. Older children may have better self-regulatory skills and, therefore, tend to be more open and responsive to instructional activities as well as better able to concentrate on tasks (see Saft & Pianta, 2001). Vitiello et al. (2012) also indicated that older preschoolers were rated higher with regard to peer and task engagement than younger preschoolers were. Jordan and colleagues (2006, 2009), on the other hand, found that older children had better math skills at the end of the kindergarten year which further contributed to better performance and faster growth in mathematics achievement from first to third grade (Jordan et al., 2009).

5 PRACTICAL IMPLICATIONS

The results of the present thesis have some practical implications. First, classroom observations provide important insights on daily teacher–student interactions, that is, classroom quality and its influence on different child outcomes. An understanding of the processes linking the quality of teacher–child interactions with children's motivational and academic outcomes will provide early educators with knowledge and abilities to foster high-quality relationships with all children in their classroom, thereby responding to their personal needs and promoting their school readiness. Knowledge on effective interactions is highly relevant and of advantage for both in-service teachers and trainee teachers. For purposes of policy making, there is an evident need to determine the key instructional and interactional processes—the *"what"* and *"how"* in classrooms—and how these affect children's development. Empirical findings of classroom observations provide knowledge on how goals of the curriculum are realized in practice.

Second, as regards teachers and early educators, the findings highlight the importance of the quality of classroom organization in promoting kindergarteners' learning motivation. Classroom organization is of high quality when several of the following dimensions are high in the observed classrooms: productivity, instructional learning formats, and behavior management. One of the critical dimensions for building a basis for children's motivation to learn may be diversity of learning formats. Teachers should, therefore, look for opportunities to actively engage children and provide inherently interesting activities and stimulating materials. Productivity in classrooms, namely, provision of clearly defined learning activities and efficient transitions may also enhance children's motivation toward learning activities. Setting of clear rules and routines and provision of consistent praise may also be core components of motivational instruction. Thus, kindergarten teachers should pay particular attention to being proactive rather than reactive toward disruptive behavior and give continuous praise to children for meeting expectations. Clear rules and routines provide children with an adaptive learning environment and with more experiences to explore and learn from. For example, in their intervention study, Raver

and her colleagues (2011) found that training preschool teachers in behavioral regulation and management strategies positively contributed to children's pre-academic skills via improving their self-regulation skills. Furthermore, taking children's initiatives and opinions into account promotes their feelings of autonomy, which further contributes to their motivation (Ryan & Grolnick, 1986). This could be realized in practice by actively listening to children, and through responsiveness and sensitivity to children's interests and points of view.

Third, the findings highlight the importance of instructional support in promoting kindergarteners' adaptive patterns of achievement behaviors. Instructional support can be considered to be of a high quality when concept development, language modeling, and quality of feedback are rated highly in observed classroom situations. Kindergarten teachers should, therefore, aspire to focus on the process of learning and understanding, and provide children with opportunities to use analysis and reasoning in their approach to problems. It has been found previously that students show more adaptive patterns of behavior in classrooms where the atmosphere and teacher practices are mastery-oriented, that is, where the focus is on understanding and learning rather than on performance and competence (Meece et al., 1988; Midgley et al., 2001). Bringing concepts to life by applying them to children's everyday world and helping children to reach a deeper understanding of concepts than they could gain on their own may give the children more functional means to handle upcoming learning situations. Further, teachers should also intentionally aspire to engage in meaningful conversation with children, and encourage and elaborate on children's answers. Given that kindergarten is usually the first environment for children to get systematic feedback on their academic learning, the results suggest that kindergarten teachers should pay particular attention to both the quality of individual feedback and feedback intended for the whole class, as well as to the quality of scaffolding and language they use in order to support children's engagement and focus on tasks. By giving individualized and task-specific feedback focusing on effort and learning instead of just general positive feedback (e.g., "right"/"well done"/"okay"), teachers provide a more effective a basis for kindergarteners' adaptive achievement behaviors. Earlier findings regarding school age show that positive feedback after a good performance leads to an increase in children's liking for a subject or activity (Deci et al., 1991), which is likely to lead more effort in further learning situations (Onatsu-Arvilommi & Nurmi, 2000; Wigfield & Eccles, 2000). Providing children with alternative interpretations in case of their success and failure is recommended in previous literature: feedback that recognizes and compliments children on their abilities when they succeed and advises them to make more effort in case of failure (Meece et al., 1988) can support children's beliefs in their own self-efficacy and control (Martin et al., 2001). Especially children with low achievement beliefs and high task-avoidant behaviors may benefit from alternative, more adaptive models affecting ability beliefs and self-concept (Martin et al., 2001).

Fourth, the findings of the present thesis can spark an interest in focusing on children's motivational outcomes in addition to academic skills. It would be especially important to identify children with low learning motivation and dysfunctional achievement beliefs and behaviors already during their kindergarten year. The kindergarten year presents an important opportunity for identifying risks related to learning difficulties and to evaluate children's school readiness. The development of adaptive patterns of achievement behaviors during the early school years is particularly important as these seem to form cumulative cycles affecting academic skills and school performance (Aunola et al., 2002; Hirvonen et al., 2012b; Onatsu-Arvilommi & Nurmi, 2000). In teacher education programs, a more central role needs to be given to increasing future teachers' awareness of children's motivational characteristics at entry to kindergarten, as well as addressing means to foster children's efficacy beliefs and academic self-concept in addition to their academic skills.

Fifth, for policy makers and educational administrators, the results highlight the importance of kindergarten teachers' well-being in promoting kindergarteners' motivation and its role as a modifier of children's learning outcomes. Via lowered quality of student–teacher interaction, work-related stress of kindergarten teachers can hamper children's motivation to learn and subsequently affect their academic outcomes. More research is needed to better understand the antecedents of teacher stress and for finding solutions and means to relieve it. There is an evident need for studying kindergarten teachers' work conditions and other related factors that might cause stress and hamper their success as early educators. Budgetary cuts and not having substitute personnel, for example, can have harmful consequences for children's learning and motivation in the long run by increasing teachers' work-related stress and exhaustion. Zhai and colleagues (2011) have shown that classroom-based interventions can improve teachers' perceived job control and work-related resources, thereby releasing their work-related stress.

In addition, the findings highlight the importance of teachers' sensitivity to students' needs in terms of their level of academic skills. The results emphasize the importance of finding appropriate pedagogical tools to respond to the differences in pre-reading and pre-math skills between students in the classroom context. Creating learning environments where all children can feel successful and feel a sense of improvement and control is a top priority of instruction at any age-level. This means that teachers should be well aware of children's skill levels and provide tasks and activities that are appropriate for the children and support their learning in their zone of proximal development (Pressley et al., 1996). In individualized instruction, students are given tasks that are optimally challenging for them but do not go too far beyond their current competence (see also Juel & Minden-Cupp, 2000; McCaslin & Good, 1996). These kinds of tasks also promote motivation by providing experiences of efficacy and control. By providing optimally challenging tasks and activities, teachers can encourage children's active engagement in and enthusiasm for learning. Planning of systematically supportive, individualized tasks may also

require cooperation with other practitioners and parents. Individualization and adaptation to students' skill levels and capitalizing on strengths is at the core of teachers' work and of remediation efforts. Research on the influences of child characteristics on teachers has, however, been infrequent in educational psychology, particularly in recent years. It would be important to investigate the impact of students' academic skills on their teachers' instruction and the quality of teacher–child interactions in the later school years as well. A related point is that there is clearly a need in teacher training concerning teachers' metacognitive knowledge of instructional practices and their regulation in classroom contexts. For example, Pressley and colleagues (1996) recently suggested that matching demands of instruction to students' skill levels plays an important role in classroom learning.

6 LIMITATIONS

The findings of the present thesis also have limitations that need to be considered. First, the sample of the observed kindergarten teachers was small which decreases the generalizability of the findings as well as the power of statistical testing. Although the kindergarten teachers who chose not to participate in the classroom observations did not differ significantly from those who chose to participate, there can be some selection effects that may have influenced the findings. For example, it is possible that only those kindergarten teachers who were more confident about their teaching participated in the classroom observations. Therefore, the results should be interpreted with caution due to the small sample size and possible selectivity.

Second, although longitudinal data was employed, the procedure was not cross-lagged as not all variables were measured at each time point. Consequently, caution is warranted in making causal inferences. For example, we cannot confirm whether it was low quality of teacher–child interactions and high teacher stress that caused low learning motivation and higher task-avoidant behavior in the kindergarten classrooms. It is also possible that low motivation and high task-avoidant behavior in children influenced the quality of teacher–child interactions and teacher stress. It has been suggested, for example, that children's problem behavior can lead to coercive cycles of feedback and a reduction in the quality and frequency of teacher–student interactions, as well as to "burnout cascades" among teachers (e.g., Arnold et al., 1998; Jennings & Greenberg, 2009). Thus, more refined longitudinal research with a cross-lagged design is needed in the future to determine the causal relations more precisely.

Third, the CLASS observational instrument is an overall measure of the quality of teacher–child interactions and does not take individual children's experiences of classroom interactions into account. What is of high quality for one child may not be of the same worth to another child in the same classroom (see Curby et al., 2009). Similarly, the CLASS does not take into account the amount and quality of individual support and instruction given by a teacher to an individual child. Future studies may, therefore, benefit from also investigating individual students' experiences (e.g., by using tools like the ISI and in-

CLASS), as well as teacher reports of classroom interactions and the quality and amount of individualized support and instruction.

Fourth, the measure of children's task-avoidant behavior relied on teachers' ratings rather than on external observations. While teachers' ratings are proven to be quite good indicators of child behavior (e.g., Aunola et al., 2003; Zhang et al., 2011), future studies might benefit from also utilizing students' own ratings, as well as observers' ratings of task avoidance (as an example, see Vitiello et al., 2012). It is possible that teachers' ratings reflect their beliefs and expectations concerning the children (e.g., based on children's skill level) more so than the children's actual behavior.

Sixth, the present thesis controlled for mothers' educational background. Although maternal education has proven to be a good indicator of parental socioeconomic status (SES) (Melhuis, 2010), it still is a narrow indicator of quality regarding the home environment. In addition, parental attitudes, beliefs and parenting practices would be important to take into account.

Finally, the results reflect a particular cultural and educational setting, that is, Finnish kindergartens. As there is substantial variation in how kindergartens and primary schools are organized and considerable differences exist between the kinds of instruction provided in different countries, there is clearly a need to replicate these findings concerning other cultures and educational settings. A related point is that the Finnish language has a regular orthography and learning to read is typically quite easy and progresses at a high rate for most Finnish children, which may have also influenced some of the findings in the thesis. Furthermore, as growing up and attending kindergarten and school in a much more heterogeneous cultural and educational context like that of the United States may be somewhat different compared to as part of a relatively more homogeneous society like that of Finland, caution is warranted in making generalizations regarding the results and interpretations of the present dissertation.

7 FUTURE DIRECTIONS

Along with providing some evidence on the relations between teacher–child interactions and children's motivational and academic outcomes, the findings of the present thesis also raise some important questions for future research. First, more refined studies are needed to increase our understanding of the developmental relevance of teacher–child interactions for child outcomes. Using the newly developed inCLASS (Downer et al., 2010; Vitiello et al., 2012) or some similar tools would deepen our understanding of classroom processes and their influence on the outcomes of children with different characteristics. InCLASS, for example, provides the opportunity to measure children's engagement in classroom interactions with teachers, peers, and tasks (Downer et al., 2010).

Secondly, as the findings provided some suggestions that, already in kindergarten, teachers are particularly sensitive to children's level of academic skills, there is clearly a need for future studies on this topic at different grade levels and for various educational settings. Further, as the present thesis did not investigate the impact of adaptive instruction on children's academic performance (see Connor et al., 2004, 2009), there is clearly a need for future studies on this topic as well. Research in the area of adaptive or individualized teaching will contribute in particular to the development of teaching methods that can effectively help both individual children and groups of children in classrooms with different levels of academic skills.

It would also be important to investigate teachers' reflections on their classroom interactions and adaptive teaching, such as how aware they are of their teaching practices and to what degree they modify these according to their students' levels of performance and other characteristics. Combining classroom observations with teachers' own views on their instruction may yield important information on teacher beliefs behind the practices.

An important goal for future research would be the examination of children with learning disabilities and behavioral risks. Given that high-quality emotional and instructional support are particularly important for children at risk regarding learning disabilities (Buyse et al., 2008; Hamre & Pianta, 2005), it would be important to examine whether teacher–child interactions could also

function as a protective factor against learning disabilities in the Finnish context.

Future research should focus on the effects of teacher–child interactions on child outcomes later on in school. In the present thesis, the quality of teacher–child interactions was associated with children's motivational outcomes rather than with their academic ones. However, it is possible that teacher–child interactions have a different influence on children's academic outcomes later on in their school career when instruction and the curriculum put more pressure on the teaching of academic skills.

Another important goal for future research is developing interventions regarding quality of classroom interactions for both in-service teachers and teacher educators. The CLASS instrument is an excellent tool for that kind of use. In the United States, the *MyTeachingPartner* (Pianta, Mashburn, Downer, Hamre, & Justice, 2008) online consultation on teacher–student interactions and related feedback has yielded promising results. Using consultation based on teachers' video material of their instruction helps teachers in becoming more conscious about their interactional style and ways of giving feedback, for instance. A recent study by Hamre and colleagues (2012) has indicated that in-service course on effective classroom interactions can improve the quality of early childhood teachers' interactions with children, even without providing any feedback or coaching on teachers' own classroom practice.

In addition, more refined analyses on teacher–child interactions are needed in future studies. It has been shown, for example, that teachers are more stable in terms of their emotional support than their instructional support (Curby et al., 2011). Analyses of change and stability across observational cycles (Curby et al., 2010, 2011) and factors influencing these (Curby et al., 2011; Vitiello et al., 2012) could provide important information on children's experiences and on conducting classroom observations. Furthermore, using person-oriented analyses, such as the mixture modeling procedure, would be beneficial for a greater understanding of the differences between teachers with respect to their instruction and classroom practices. For example, different combinations of classroom quality factors, that is, teacher profiles of classroom quality (e.g., Salminen et al., 2012) or qualitative analyses of the educational dialogues in high-quality classrooms (Rasku-Puttonen, Lerkkanen, Poikkeus, & Siekkinen, 2012), may have a different developmental relevance for child outcomes.

Another important avenue for future studies is gaining a deeper understanding of the sources of teacher stress and determining the most effective ways of coping with the stress. More information is needed on what aspects of kindergarten teachers' work cause stress and what can be done in terms of teacher well-being both at the level of individual kindergarten teachers and at the level of society. Relatively little is known, for example, about the role of interpersonal relationships between teachers and children in teacher well-being (for a review, see Spilt, Koomen, & Thijis, 2011). Interestingly, intervention studies have shown their potential by having reduced teacher stress in the con-

text of the *Head Start* teaching programme (e.g., Raver et al., 2011; Zhai et al., 2011).

Research on how school and home life interact in shaping child development could contribute more information on the processes related to adaptive achievement. The effects of education and teaching can only be reliably evaluated if family and home-related factors are considered at the same time as the classroom factors. For example, different family characteristics and home learning environments can work as moderators regarding teacher–child interactions. Investigation of those children who lack parental support is also important in examining whether teacher–child interactions could work as a compensatory resource (see Kiuru et al., 2012a).

8 CONCLUSIONS

The present thesis focused on the predictive relations between the quality of teacher–child interactions and children's motivational and academic outcomes in the Finnish kindergarten context. The results showed, first, that the CLASS is a valid and reliable tool also in the Finnish kindergarten context. Consequently, the results of this thesis suggest that classroom quality is also a useful concept in understanding classroom processes in educational systems outside the United States. Secondly, observed classroom organization was linked to kindergarteners' learning motivation, and instructional support was associated with task avoidance: teacher–child interactions, thus, were shown to have developmental relevance for children's learning motivation in the Finnish kindergarten context. Thirdly, learning motivation mediated the association between teacher stress and children's phonological awareness. Children's learning motivation is, therefore, an important mediator of teacher well-being and children's academic pre-skills. Finally, children's academic pre-skills were associated with the observed teacher–child interactions, suggesting that kindergarten teachers actively adapt their classroom interactions according to children's level of academic pre-skills in order to promote the children's development. Thus, the results also provided some evidence of the bidirectional nature of teacher–child interactions.

Overall, to determine how children's motivation and learning can best be facilitated, it is essential to study the actual teaching practices and teacher–child interactions in classrooms. Children's interest in activities and their willingness to approach tasks, make an effort, and persist in tasks may, at least partly, depend on how teacher interactions and teacher well-being are evidenced in daily classroom situations.

TIIVISTELMÄ

Tämän väitöskirjatutkimuksen tavoitteena oli tarkastella esiopetusryhmässä havainnoidun ohjausvuorovaikutuksen laadun yhteyttä esiopetusikäisten lasten oppimismotivaatioon, tehtävää välttävään työskentelytapaan sekä luku- ja laskutaitoa ennakoiviin valmiuksiin. Lisäksi tarkasteltiin esiopettajien kokeman ohjauksen haasteisiin liittyvän stressin yhteyttä esiopetusikäisten oppimismotivaatioon ja fonologisen tietoisuuden taitoihin. Tutkimuksessa selvitettiin myös lasten luku- ja laskutaitoja ennakoivien valmiuksien merkitystä esiopetusryhmän ohjausvuorovaikutuksen laadun kannalta.

Väitöstutkimus koostuu neljästä osatutkimuksesta. Tutkimuksen aineistona käytettiin Alkuportaat–seurantatutkimuksen esiopetusvuoden aineistoa. Ensimmäisen osatutkimuksen osallistujina oli 161 esiopettajaa, joista 49 (47 naista, 2 miestä) esiopettajaa ja heidän opetusryhmänsä lapset osallistuivat luokkahuonehavainnointeihin. Toisen ja kolmannen osatutkimuksen tutkimusjoukon muodostivat 1268 lasta (655 poikaa ja 613 tyttöä) ja 137 esiopettajaa, joista 49 osallistui havainnointeihin, sekä 1028 äitiä. Neljännen osatutkimuksen tutkimusjoukon muodostivat puolestaan 1268 lasta, 49 esiopettajaa ja 1028 äitiä.

Ensimmäisessä osatutkimuksessa tarkasteltiin the Classroom Assessment Scoring System (CLASS Pre-K; Pianta, La Paro, & Hamre, 2008) – havainnointimenetelmän reliabiliteettia ja validiteettia suomalaisen esiopetuksen ympäristössä. Tutkimuksen tulokset osoittivat ensinnäkin, että CLASS oli luotettava ja validi havainnointimenetelmä myös suomalaisessa esiopetusympäristössä. Kun negatiivista ilmapiiriä mittaava osio jätettiin pois, tuloksena oli samankaltainen kolmen faktorin rakenne kuin aiemmissa yhdysvaltalaisissa tutkimuksissa on esitetty. Lisäksi tulokset antoivat viitteitä siitä, että suomalaisessa esiopetuksessa opettajien antama ohjauksellinen tuki on erityisen korkeatasoista suhteessa havaintoihin yhdysvaltalaisista esiopetusryhmistä, vaikkakin palautteen alueella ohjauksellinen tuki oli muita osa-alueita alhaisempaa.

Toisessa osatutkimuksessa selvitettiin ohjausvuorovaikutuksen laadun ja esiopettajan kokeman opetukseen ja ohjaukseen liittyvän stressin merkitystä esiopetusikäisten lasten oppimismotivaation ja fonologisen tietoisuuden taitojen kannalta. Toiminnan organisoinnin laadun eli sen, kuinka hyvin esiopetuksen toiminnot tukevat lasten kiinnostuneisuutta ja millaiset säännöt ja rutiinit ryhmässä vallitsevat, havaittiin olevan positiivisesti yhteydessä esiopetusikäisten lasten oppimismotivaatioon. Mitä laadukkaampaa toiminnan organisointi ja ryhmän hallinta olivat, ja mitä enemmän toiminnot tukivat lasten kiinnostuneisuutta, sitä kiinnostuneempia ryhmän lapset tyypillisesti olivat esiopetuksen sisältöalueita kohtaan. Esiopettajien kokema ohjaukseen liittyvä stressi oli puolestaan negatiivisesti yhteydessä lasten oppimismotivaatioon ryhmässä ja vaikutti sen kautta lasten fonologisen tietoisuuden taitoihin. Tytöt olivat poikia kiinnostuneempia esiopetuksen sisältöalueita kohtaan ja heillä oli myös paremmat fonologisen tietoisuuden taidot esiopetusvuoden keväällä.

Kolmannessa osatutkimuksessa tarkasteltiin ohjausvuorovaikutuksen laadun yhteyttä lasten tehtävää välttävään työskentelytapaan ja matemaattisiin

valmiuksiin. Tulokset osoittivat, että esiopetusryhmässä havainnoitu ohjauksellisen tuen laatu eli se, millaista palautetta esiopettaja antaa ja kuinka hän mallintaa kielellisesti lasten toimintaa, oli yhteydessä lasten tehtävää välttävään työskentelytapaan. Mitä korkeatasoisempaa ohjauksellinen tuki oli, sitä vähemmän esiopetusryhmän lapsilla arvioitiin esiintyvän tehtävää välttävää työskentelytapaa. Tehtävää välttävä työskentelytapa puolestaan oli negatiivisesti yhteydessä lasten matemaattisiin taitoihin, kun heidän aikaisemmat matemaattiset valmiutensa oli kontrolloitu. Esiopettajat arvioivat tehtävää välttävän työskentelytavan yleisemmäksi pojilla ja loppuvuodesta syntyneillä kuin tytöillä ja alkuvuodesta syntyneillä lapsilla. Paremmat lukujonotaidot esiopetusvuoden alussa olivat negatiivisesti yhteydessä lasten tehtävää välttävään työskentelytapaan ja positiivisesti yhteydessä myöhempiin matemaattisiin taitoihin. Pojilla oli tyttöihin verrattuna paremmat matemaattiset valmiudet esiopetusvuoden keväällä.

Neljännessä osatutkimuksessa tarkasteltiin lasten luku- ja laskutaidon valmiuksien ennusteyhteyttä esiopetusryhmässä havainnoidun ohjausvuorovaikutuksen laatuun. Tulokset antoivat viitteitä siitä, että esiopettajat mukauttavat aktiivisesti ohjausvuorovaikutustaan lasten taitotason mukaan: mikäli esiopetusryhmän lapsilla oli syksyllä keskimäärin heikot luku- ja laskutaitojen valmiudet (fonologinen tietoisuus, kirjaintuntemus, lukujonotaidot), esiopetusryhmässä keväällä havainnoitu tunnetuki, ohjauksellinen tuki ja toiminnan organisointi olivat korkeatasoisempia verrattuna muihin esiopetusryhmiin. Äitien koulutustausta oli yhteydessä lasten luku- ja laskutaitojen valmiuksiin sekä yksilö- että ryhmätasolla: mitä korkeampi ammatillinen koulutustausta äideillä oli, sitä paremmat koulutaitoja ennakoivat valmiudet lapsilla oli.

Kaiken kaikkiaan väitöskirjan tulokset osoittivat, että esiopetuksessa havainnoitu ohjausvuorovaikutuksen laatu oli yhteydessä esiopetusikäisten oppimismotivaatioon, jota arvioitiin esiopetuksen sisältöalueita koskevalla kiinnostuksella ja tehtävää välttävän työskentelytavan esiintymisellä. Esiopettajan kokema stressi heijastui kielteisesti lasten oppimismotivaatioon ja vaikutti sitä kautta haitallisesti myös lasten fonologiseen tietoisuuteen. Lisäksi tulokset antoivat viitteitä siitä, että lasten luku- ja laskutaitojen valmiudet esiopetusvuoden alussa vaikuttavat myöhempään ohjausvuorovaikutuksen laatuun.

Tulokset viittaavat siihen, että erityistä huomiota tulisi kiinnittää ohjausvuorovaikutuksen laatuun ja esiopettajien hyvinvointiin. Näin parhaiten tuettaisiin lasten kiinnostusta esiopetuksen sisältöalueisiin sekä oppimisen kannalta edullisten työskentelytapojen kehittymistä. Koska oppimismotivaation on havaittu olevan merkityksellistä myöhemmän koulusuoriutumisen kannalta, tulisi jo esiopetusvaiheessa kiinnittää huomiota lapsiin, joilla on sekä heikot luku- ja laskutaitojen valmiudet että alhainen oppimismotivaatio ja oppimisen kannalta haitalliset työskentelytavat. Kiinnittämällä erityistä huomiota siihen, että jokainen lapsi saisi kannustavaa palautetta ja tehtävät olisi suunniteltu niin, että kaikki voisivat kokea onnistumisen elämyksiä, kyettäisiin vahvistamaan lasten innokkuutta oppimiseen ja luomaan pohjaa myöhemmille myönteisille oppimiskokemuksille. Esiopettajien ja muiden varhaiskasvatuksen ammattilaisten

olisi tärkeää huomioida lasten yksilöllisiä ominaisuuksia ja tarvittaessa mukauttaa ohjausvuorovaikutustaan, jotta se parhaiten tukisi kunkin lapsen oppimista. Opettajankoulutuksen tulisi tarjota tietoa myös lasten erilaisten ominaisuuksien ja taitojen yhteydestä opettajan uskomuksiin, tunteisiin, hyvinvointiin ja sitä kautta ohjausvuorovaikutuksen laatuun luokassa.

Tulevaisuudessa olisi tärkeää tarkastella myös lasten yksilöllisiä kokemuksia ohjausvuorovaikutuksesta esiopetuksessa ja sitä, miten lapsen käyttäytyminen puolestaan vaikuttaa opettajan toimintaan ryhmässä. Yleinen koko ryhmälle suuntautuvan ohjausvuorovaikutuksen laadun tarkastelu antaa suuntaviivoja sille, millaisesta ohjauksesta lapset keskimäärin näyttävät hyötyvän ryhmässä. Lasten yksilölliset ominaisuudet, kuten varhaiset riskit tai muita edistyneemmät taidot, voivat kuitenkin ratkaisevasti vaikuttaa siihen, millaisesta ohjauksesta kukin yksilö parhaiten hyötyy. Ohjausvuorovaikutuksen laatua käsittelevissä tutkimuksissa olisi tarpeen tarkastella myös laadun vaihtelua havainnointisyklien tai –päivien välillä. Lisäksi henkilökeskeiset analyysimenetelmät voisivat antaa lisävalaistusta ohjausvuorovaikutuksen laatua ja sen vaikutuksia koskevaan tutkimukseen. Jatkotutkimusta tarvitaan myös ohjausvuorovaikutuksen laadun yhteydestä lasten sosiaalisiin taitoihin sekä koulusuoriutumiseen myöhemmissä ikävaiheissa. Tutkimuksissa olisi tärkeää ottaa huomioon myös lapsen kotiympäristö sekä opettajan ja vanhempien välinen yhteistyö. Lisäksi esiopetuksen ohjausvuorovaikutuksen laadun kehittämiseen tähtäävä interventiotutkimus olisi tarpeen.

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