

This is a self-archived version of an original article. This version may differ from the original in pagination and typographic details.

Author(s): Soininen, Viola; Pakarinen, Eija; Lerkkänen, Marja-Kristiina

Title: Reciprocal associations among teacher-child interactions, teachers' work engagement, and children's social competence

Year: 2023

Version: Published version

Copyright: © 2022 The Authors. Published by Elsevier Inc.

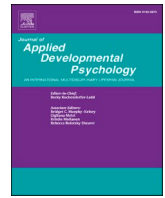
Rights: CC BY 4.0

Rights url: <https://creativecommons.org/licenses/by/4.0/>

Please cite the original version:

Soininen, V., Pakarinen, E., & Lerkkänen, M.-K. (2023). Reciprocal associations among teacher-child interactions, teachers' work engagement, and children's social competence. *Journal of Applied Developmental Psychology*, 85, Article 101508.

<https://doi.org/10.1016/j.appdev.2022.101508>



Reciprocal associations among teacher–child interactions, teachers' work engagement, and children's social competence

Viola Soininen^{*}, Eija Pakarinen, Marja-Kristiina Lerkkanen

University of Jyväskylä, 40014 University of Jyväskylä, P. O. Box 35, Finland

ARTICLE INFO

Keywords:

Teacher–child interaction
Work engagement
Social competence
First grade

ABSTRACT

This study aimed at examining reciprocal associations among teacher–child interactions, teachers' work engagement, and children's social competence across grade 1. The participants were 51 Finnish teachers and 815 children. The quality of teacher–child interactions (emotional support, classroom organization, and instructional support) was assessed with the Classroom Assessment Scoring System. In addition, teachers reported their work engagement and rated children's social competence (prosocial and antisocial behaviors). The results of the multilevel modeling indicated that high-quality instructional support was associated with more prosocial and less antisocial behavior. Prosocial behavior was associated with higher-quality instructional support. Work engagement was associated with less antisocial behavior, and prosocial behavior with higher work engagement. Finally, work engagement was associated with higher-quality teacher–child interactions. The results suggest that teachers can enhance children's social competence with high-quality instructional support. Moreover, children's prosocial behavior can be reflected in teacher–child interactions and in teachers' work engagement.

In their prosocial classroom model, Jennings and Greenberg (2009) proposed that teachers' social and emotional competence and well-being enables them to create healthy teacher–child relationships, conduct effective classroom management, and implement social-emotional learning in the classroom. This way, they noted, a teacher creates a positive classroom climate that enhances children's social, emotional, and academic outcomes. Thus, according to their prosocial classroom model, teachers' occupational well-being is reflected in their interactions with children, which again is reflected in children's outcomes, including their social competence. Based on this model, it is possible that teachers' work engagement as part of their occupational well-being is associated with the quality of teacher–child interactions and the average social competence of the children in the classroom. However, earlier research on the associations between teachers' work engagement and the quality of teacher–child interactions has been scarce and cross-sectional, and thus has not been able to examine directions of associations (e.g., Penttinen, Pakarinen, von Suchodoletz, & Lerkkanen, 2020). Directions of the associations between the quality of teacher–child interactions and children's social competence also remain somewhat unclear because most of the earlier studies have only examined if the quality of teacher–child interactions enhances children's social competence (e.g., Siekkinen et al., 2013). Recent research indicates

that the associations might be reciprocal – at least between emotional support and children's empathy (Pakarinen, Lerkkanen, & von Suchodoletz, 2020). Furthermore, although earlier research has shown that teachers' stress is associated with children's lower social competence (Herman, Hickmon-Rosa, & Reinke, 2018; Siekkinen et al., 2013), to date, it is not yet clear whether work engagement as a positive aspect of occupational well-being plays a role in children's social competence. Altogether, there is a limited amount of knowledge of the possible associations among the three domains of teacher–child interactions (emotional support, classroom organization, and instructional support), teachers' work engagement, and average social competence (prosocial and antisocial behavior) of children in the classrooms. To better understand how to support the development of children's social competence, this study aimed to explore reciprocal associations among the quality of teacher–child interactions, teachers' work engagement, and children's social competence over the course of first school year.

The quality of teacher–child interactions

In the present study, the quality of teacher–child interactions was conceptualized with the Teaching through Interactions (TTI) framework developed by Hamre et al. (2013). The focus of the TTI framework and,

^{*} Corresponding author at: Department of Teacher education, University of Jyväskylä, P.O. Box 35, 40014 University of Jyväskylä, Finland.
E-mail address: violasoininen@gmail.com (V. Soininen).

hence, the present study, is at teacher-child interactions at the classroom-level, not at dyadic teacher-child relationships (i.e., relationships between teacher and individual children). The TTI framework is based on Bronfenbrenner & Morris's (2006) bioecological model, which suggests that regular interactions that children have, for example, with parents and teachers, are a central driver for their development (Hamre et al., 2013). Indeed, research has indicated that the quality of teacher-child interactions in the classroom is a critical indicator of the quality of education (Pianta, Downer, & Hamre, 2016, see also Burchinal, Vandergrift, Pianta, & Mashburn, 2010; Hu, Fan, Wu, LoCasale-Crouch, & Song, 2019). In TTI, interactions in the classroom are conceptualized under three domains: emotional support, classroom organization, and instructional support. The quality of these three domains can be assessed with an observational tool, the Classroom Assessment Scoring System (CLASS; Pianta, La Paro, & Hamre, 2008).

The domain of *emotional support* has its roots in attachment theory (Ainsworth, Belehar, Waters, & Wall, 1978; Bowlby, 1969) and self-determination theory (Ryan & Deci, 2000; Skinner & Belmont, 1993), which underline the importance of sensitive and responsive interactions in supporting learning and motivation. According to the TTI framework, emotionally supportive teachers can create and maintain a positive climate in their classroom, they are sensitive to children's individual needs, and they consider children's perspectives. In these classrooms, children enjoy being with each other and with the teachers; they approach the teacher freely and express their ideas. The second domain, *classroom organization*, is grounded on earlier classroom management (see Emmer & Stough, 2001) and self-regulation skill research (e.g., Paris & Paris, 2001; Raver, 2004; Rimm-Kaufman et al., 2002). Teachers with high-quality classroom organization manage children's behavior and time efficiently and make the lessons interesting for the children. In well-organized classrooms, children behave well and are interested and involved in the activities and learning. The last domain, *instructional support*, is based on studies in cognitive and language development and in how adults can support this development with, for example, scaffolding (e.g., Catts, Fey, Zhang, & Tomblin, 1999; Skibbe, Behnke, & Justice, 2004). In instructionally supportive classrooms, teachers support children's learning in several ways: they give children specific feedback that is targeted on enhancing the learning, they use versatile language to support language development, and they ask open-ended questions such as "why" and "how" to encourage conversation and to support children's deeper understanding of concepts rather than memorizing facts. In these classrooms, children actively take part in conversations, and activities are related to their own experiences and lives.

Teachers' work engagement and the quality of teacher-child interactions

Teachers' occupational well-being has received growing interest in the field of educational research during the last decade (see Cumming, 2017). Research in occupational well-being has first focused on challenges in well-being such as stress and burnout whereas recent research has also noticed the positive aspects of well-being such as work engagement and job satisfaction (see e.g., Seppälä et al., 2009). However, the relation between teachers' occupational well-being and the quality of teacher-child interactions (e.g., Friedman-Krauss, Raver, Morris, & Jones, 2014; Hoglund, Klinge, & Hosan, 2015) and children's social competence (e.g., Herman et al., 2018; Siekkinen et al., 2013) has mainly been examined in terms of stress and burnout. Teachers' stress refers to negative emotions such as anxiety, frustration, and tension (Kyriacou, 2001) and its associations with the quality of teacher-child interactions (e.g., Jennings, 2015; Penttinen et al., 2020) and child outcomes (e.g., Siekkinen et al., 2013) have been negative. Since work engagement refers to positive emotions (see below), we expect that it has positive associations with the quality of teacher-child interactions and the average social competence of the children in the classroom.

Work engagement is characterized by three components: vigor, dedication, and absorption (Schaufeli, Salanova, González-romá, & Bakker, 2002). Teachers with a high level of vigor have a lot of energy and are ready to invest in their work. Highly dedicated teachers are proud of their work, consider it meaningful, and feel enthusiasm and inspiration while working. Finally, teachers with a high absorption are highly concentrated while working and might feel that "time flies" while working. Compared with those in other professions, teachers usually experience relatively high work engagement (Hakanen, Ropponen, Schaufeli, & De Witte, 2019). High work engagement can be considered favorable, as it is related to higher job satisfaction (Høigaard, Giske, & Sundslø, 2012; Klassen et al., 2012), lower levels of burnout (Høigaard et al., 2012), and lower intention to leave the profession (Høigaard et al., 2012; Skaalvik & Skaalvik, 2016).

Bakker and Demerouti (2008) introduced a model of work engagement, in which they proposed that people's performance at work is predicted by their work engagement, which is predicted by their resources. The first studies that examined the relation between work engagement and teaching performance reported teachers' work engagement as being positively associated with child-rated quality of instruction in secondary schools (Klusmann, Kunter, Trautwein, Lüdtke, & Baumert, 2008) and teachers' self-rated job performance among beginning teachers (Bakker & Bal, 2010). However, to date, there has been a limited amount of research conducted concerning the associations between teachers' work engagement and the observed quality of teacher-child interactions. In kindergarten classrooms, Penttinen et al. (2020) reported that teachers experiencing a high level of work engagement also provided high-quality instructional support. However, teachers' work engagement was not associated with the quality of emotional support or classroom organization. To the best of our knowledge, no research examining the relation between work engagement and the observed quality of teacher-child interactions in elementary school classrooms has been conducted. Moreover, the previous research conducted in kindergarten classrooms has been cross-sectional; thus, it is not clear if high-quality interactions with children enhance teachers' occupational well-being or vice versa. Therefore, in the present study, we examined also if the quality of teacher-child interactions is associated with teachers' level of work engagement.

Children's social competence and the quality of teacher-child interactions

Social competence can be defined as an ability to use a variety of skills in interactions with others to achieve meaningful goals in social groups (Waters & Sroufe, 1983). Sheridan and Walker (1999), and Merrell and Gimpel (1998) have suggested that these skills can be conceptualized under two separate aspects. The first aspect reflects the ability to learn context-appropriate social skills needed in social interaction whereas the second aspect reflects the ability to behave in a socially acceptable manner. When developing the Multisource Assessment of Social Competence Scale, Junttila, Voeten, Kaukiainen, and Vauras (2006) named the two aspects as prosocial behavior and antisocial behavior. The first aspect, prosocial behavior, refers to behaviors that people usually see as desirable and therefore encourage children to display (Junttila et al., 2006). These behaviors include cooperative behaviors (e.g., offering help, starting conversations, participating in group activities) and behaviors that show empathy (e.g., sensitive and accepting behaviors, showing, and communicating positive emotions). Thus, socially competent children have social skills that can be used to successfully interact with other people (Junttila et al., 2006; Merrell & Gimpel, 1998; Sheridan & Walker, 1999).

In contrast with prosocial behavior, antisocial behavior refers to behaviors that people usually see as undesirable (Junttila et al., 2006). These behaviors include impulsive behaviors (e.g., tantrums, getting easily irritated) and disruptive behaviors (e.g., teasing, quarreling, acting without thinking). Impulsive children have challenges in

restraining immediate responses, waiting, and planning (Baer & Nietzel, 1991) whereas disruptive children direct their disruptive behaviors at other people, often intentionally to annoy them (Kaplan, Gheen, & Midgley, 2002). Thus, socially competent children can inhibit impulsivity and disruptiveness (i.e., antisocial behavior) and behave in a way that is acceptable to other people (Junttila et al., 2006; Merrell & Gimpel, 1998; Sheridan & Walker, 1999).

When defining antisocial behavior, it is important to consider also externalizing behavior which shares some similarities with antisocial behavior. Externalizing behavior refers to variety of behaviors that are against social norms and/or are harmful to other people (Kauten & Barry, 2020). These behaviors include both hyperactive and aggressive behaviors (Hinshaw, 1987; Liu, 2004). Externalizing behavior is sometimes used as a synonym for antisocial behavior (Hinshaw, 1987; Liu, 2004) but as Liu (2004) states, there are distinctions between the two concepts. For example, externalizing behavior includes hyperactive behaviors but not all hyperactive children are antisocial (see Liu, 2004). Moreover, externalizing behavior can include behaviors such as substance use (Kauten & Barry, 2020) or delinquency (Liu, 2004) which are not part of antisocial behavior as defined above.

To conclude, children considered as highly socially competent display high levels of prosocial behavior in combination with low levels of antisocial behavior. A child with lower social competence can display either a mixture of prosocial and antisocial behaviors or a lack of prosocial behaviors and a presence of antisocial behaviors. Thus, it is also possible, that children display both high prosocial behavior and high antisocial behavior or low levels of both types of behavior (Junttila et al., 2006). Studies have highlighted the importance of children's social competence by showing its relationship with several positive outcomes. For example, in kindergarten, a link has been found between children's social competence and preliteracy skills (Pakarinen, Salmi-nen, Lerkkanen, & von Suchodoletz, 2018), the number of friends, and the level of peer acceptance (Ladd, Birch, & Buhs, 1999). In elementary school, longitudinal studies have reported that children's social competence predicts their later academic skills (Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo, 2000; Legkauskas & Magelinskaitė-Legkauskienė, 2021), level of anxiety (Junttila, Vauras, Niemi, & Laakkonen, 2012; Legkauskas & Magelinskaitė-Legkauskienė, 2021), loneliness (Junttila et al., 2012), and peer preference (Caprara et al., 2000). Furthermore, children with high social competence in kindergarten are more likely to obtain a college degree and a full-time job in early adulthood and less likely to be engaged in criminal activity (Jones, Greenberg, & Crowley, 2015).

The role of teacher-child interactions in children's social competence has been examined rather notably in different educational settings. A meta-analysis by Perlman et al. (2016) showed that in preschool classrooms where the quality of instructional support was high, children's social competence was also high. However, the quality of emotional support or classroom organization was not related with children's social competence (Perlman et al., 2016). Similarly, in Finnish kindergarten classrooms where the quality of instructional support was high in fall, children displayed more empathy and less disruptiveness in spring (Siekkinen et al., 2013). In contrast, in a study by Broekhuizen et al. (2016), high-quality emotional support and classroom organization – but not instructional support – in prekindergarten and kindergarten classrooms predicted children's high social competence in first grade. Moreover, it has been shown in middle school data that high emotional support was associated with more prosocial behavior and high classroom organization with less aggression (Luckner & Pianta, 2011). However, there has been less research examining reciprocal associations or if children's social competence predicts the quality of teacher-child interactions. As an exception, one recent study reported a reciprocal link between kindergarteners' empathy and the quality of emotional support indicating that the quality of teacher-child interactions and children's social competence might be reciprocally associated. If there was high-quality emotional support in the classroom in fall, children

displayed more empathy in spring and vice versa: if children displayed more empathy in the classroom in fall, the quality of emotional support was higher in spring (Pakarinen et al., 2020). Furthermore, if there was more impulsivity in the classroom in fall, the quality of emotional support was lower in spring (Pakarinen et al., 2020).

To conclude, many studies have shown that high-quality emotional support (Broekhuizen et al., 2016; Pakarinen et al., 2020), classroom organization (Broekhuizen et al., 2016; Luckner & Pianta, 2011), and instructional support (Perlman et al., 2016; Siekkinen et al., 2013) are related with higher average social competence of the children in the classroom. However, only few studies have examined if children's social competence plays a role in teacher-child interactions and not all domains of teacher-child interactions have yet been examined reciprocally with social competence (see Pakarinen et al., 2020). For this reason, more research is needed to fully understand the dynamics between the quality of teacher-child interactions and average social competence of the children in the classroom.

Children's social competence and teachers' work engagement

Earlier research on the association between teachers' occupational well-being and children's social competence has focused on the role of teachers' stress in children's social competence. In Finnish kindergarten classrooms, children displayed more impulsivity and disruptiveness, less empathy, and lower cooperation skills if the teacher experienced higher stress (Siekkinen et al., 2013). Similarly, in US kindergarten to 4th grade classrooms, there was more disruptive behavior and less prosocial behavior in the classroom if the teacher experienced high levels of stress and burnout together with low levels of coping (Herman et al., 2018). In turn, research on the associations between teachers' work engagement and children's social competence remains limited. However, Jennings and Greenberg's (2009) prosocial classroom model suggests that teachers' social and emotional competence and well-being enhance their capability to provide high-quality interactions which support children's social, emotional, and academic skill development. At the same time, the model indicates that if teachers have challenges to their well-being, it may be difficult for them to respond to children's individual needs, be proactive, and manage child behavior, which is reflected in child outcomes such as child behavior in the classroom. Thus, based on this model, it is possible, that teachers' work engagement as one aspect of teachers' occupational well-being is associated with both the quality of teacher-child interactions and the average social competence of the children in the classroom.

Education system in Finland

The current study was conducted in Finland, where nine years of comprehensive school begin in the year when the child turns seven years old. Primary school is preceded by a one-year, free of charge, and mandatory kindergarten year, and followed by three years of secondary education in either upper secondary school or vocational school. Primary and secondary education in Finland is also free of charge. Elementary school teachers (grades 1–6) are required to have at least a master's degree in education, and an average class size in elementary school is 20 children (Organisation for Economic Co-operation and Development, 2018). Class sizes are not nationally regulated. In first grade, one school week consists of a minimum of 20 h of teaching. First grade teaching in Finland is focused on the development of children's academic, social, and motor skills (Finnish National Agency for Education, 2016). In terms of social competence, development of cooperating skills is important as children learn to work together in groups.

The aims of the present study

There has been a limited amount of research on the role of teachers' work engagement in the observed quality of teacher-child interactions

(with the exception of a cross-sectional study by Penttinen et al., 2020). Moreover, previous studies examining the associations between teacher–child interactions and children’s social competence have mainly examined if the quality of teacher–child interactions enhance children’s average social competence in the classrooms (e.g., Siekkinen et al., 2013) and less attention has been given to reciprocal associations (see Pakarinen et al., 2020). Finally, the associations between teachers’ work engagement and children’s social competence remain unstudied. Since little is known about the associations and direction of effect among the variables, this study examined reciprocal associations of the quality of teacher–child interactions, teachers’ work engagement, and children’s social competence between classrooms. More specifically, the following research question was investigated: *To what extent are the quality of teacher–child interactions (emotional support, classroom organization, and instructional support), teachers’ level of work engagement, and average social competence (prosocial and antisocial behavior) of the children in the classrooms associated across grade 1?*

Moreover, the following hypotheses were set: First, based on the model of work engagement by Bakker and Demerouti (2008), we expected that teachers’ level of work engagement is positively associated with subsequent quality of teacher–child interactions in the classrooms (Hypothesis 1). Second, because recent research has suggested that the quality of teacher–child interactions and children’s social competence might be reciprocally associated (see Pakarinen et al., 2020), we assumed that the quality of teacher–child interactions is positively associated with subsequent social competence of the children in the classrooms (Hypothesis 2a) and that average social competence of the children in the classrooms is positively associated with subsequent quality of teacher–child interactions (Hypothesis 2b). Third, although earlier research has not examined the associations between teachers’ work engagement and average social competence of the children in the classroom, based on the prosocial classroom model by Jennings and Greenberg (2009) and earlier research on the associations between teachers’ stress and children’s social competence (Siekkinen et al., 2013), we hypothesized that teachers’ level of work engagement is positively associated with subsequent social competence of the children in the classrooms (Hypothesis 3).

Method

Participants and procedures

Participants of the present study were 51 first grade teachers and 815 children from their classrooms who were participating in a follow-up study (Lerkkanen & Pakarinen, 2016–2022) in the 2017–2018 school year. Participation in the study was voluntary, and teachers and children’s guardians gave written consent for their or their child’s participation. The ethical statement from the ethical committee of the university was received prior to commencing the study.

Before data collection, all 70 elementary schools in eight municipalities in Central Finland were contacted to ask permission from the principal to conduct the study in the school. All schools provided permission. Next, all 136 first grade teachers in the schools were contacted and invited to participate in the study. Finally, 54 teachers from 36 schools agreed to participate in the study. Number of participating classrooms per school varied between one and four and 88.5% of the children from the classrooms participated in the study based on the guardians’ consents. Participating schools were located in both rural and suburban areas. Because there was missing data from three of the participating 54 classrooms, only 51 classrooms were included in the analyses of the present study. The mean age of the participating teachers was 45 years ($SD = 8.85$, min. 27 years, max. 62 years), and their average work experience at schools was 16.54 years ($SD = 9.31$, min. 0.5 years, max. 39 years). All teachers were Finnish-speaking Caucasians and most of them (94.1%) were female.

In the participating classrooms, class sizes varied from seven to 25

($M = 19.25$, $SD = 4.40$). Children’s (50.1% girls) mean age at the beginning of the school year was 7.19 years ($SD = 0.34$, min. 4.83 years, max. 9.28 years). The highest education of parents varied as follows: no vocational education (2.8%), vocational courses (min. 4 months; 1.2%), vocational school degree (33.1%), college-level training (7%), polytechnic degree (23.2%), university/college degree (22.8%), and licentiate or doctoral degree (4.3%). However, parental education information was available only for 67% of the participating children.

Data of the present study were collected twice during the first school year: in fall (2017; Time 1 [T1]) and spring (2018; Time 2 [T2]). Data consisted of video recordings from the classrooms, teacher questionnaires on their work engagement, and teacher ratings on children’s social competence. Video recordings of the classes were collected to assess the quality of teacher–child interactions in the classroom. Video recordings were conducted during one regular school day, and three to four lessons were recorded in each classroom in fall (T1) and again in spring (T2). Similarly, the teacher questionnaires and their ratings on children’s social competence were collected first in fall (T1) and again in spring (T2). Reliability information, that is, Cronbach’s alphas for all measures, is presented in Table 2.

Measures

The quality of teacher–child interactions

The quality of teacher–child interactions was assessed with the Classroom Assessment Scoring System (CLASS K-3; Pianta et al., 2008). Validity of the CLASS in the Finnish data has been reported by Pakarinen et al. (2010). The measure has been widely used to measure the quality of teacher–child interactions in Finland (e.g., Pakarinen et al., 2020; Penttinen et al., 2020; Salminen, Pakarinen, Poikkeus, Laakso, & Lerkkanen, 2022; Siekkinen et al., 2013) and around the world (e.g., Canada: Hoglund et al., 2015; Chile: Leyva et al., 2015; China: Hu et al., 2019). CLASS conceptualizes teacher–child interactions under three domains: emotional support, classroom organization, and instructional support. Each of the domains consists of three to four dimensions, which again are measured with more specific behavior indicators. Indicators, dimensions, and domains are all described in the coding manual (Pianta et al., 2008), which guides the assessment of the quality of interactions. In the present study, approximately seven ($M = 6.82$, $SD = 1.18$, min. 5, max. 9) cycles per classroom in fall and approximately six ($M = 5.90$, $SD = 0.73$, min. 5, max. 8) cycles per classroom in spring were rated by six certified coders. The average length of one cycle was 18.5 min ($SD = 3.0$, min. 10.5, max. 26.5). The mean score of cycles for each domain at one time point was used in the analyses. To assess the inter-rater reliability of the CLASS ratings, 26% of the cycles were double coded, and the adjacent agreements and intraclass correlation coefficients (ICCs) for the ratings were calculated (see Table 1). Adjacent agreement refers to the percentage of ratings that are within one point of each other (Pianta et al., 2008). Developers of the CLASS measure (Pianta et al., 2008) use this measure to indicate sufficient inter-rater reliability of the ratings. In the present study, adjacent agreements varied from 77.2% to 100% (see Table 1). Thus, the level of adjacent agreement was acceptable for all ten dimensions at both timepoints (Pianta et al., 2008).

ICCs were calculated using two-way random effects model with absolute agreement (Landers, 2015). For most of the dimensions, ICCs indicated good (0.60–0.74) or excellent (0.75–1.00) reliability (Cicchetti & Sparrow, 1981; see Table 1). As exceptions, the level of agreement was fair for the ratings of Regard for student perspectives in the spring data and poor for spring ratings of Negative climate in the spring data. As ICC as a measure is subject to a variety of statistical assumptions (e.g., normality, stable variance), low ICC for negative climate might be caused by the nonnormality of the distribution and low variance in the ratings of this dimension. As shown in Table 1, adjacent agreement for the ratings of negative climate in spring was very and over 90% of the ratings were within one point of each other.

Table 1
Inter-rater reliabilities of the classroom assessment scoring system ratings.

	PC	NC	TS	RSP	BM	PR	ILF	CD	QF	LM
<i>First grade fall</i>										
Adjacent agreement	97.4%	100%	94.7%	93.4%	98.7%	97.4%	96.1%	96.1%	96.1%	97.4%
ICC	0.82	0.88	0.84	0.86	0.86	0.81	0.78	0.84	0.85	0.89
<i>First grade spring</i>										
Adjacent agreement	88.3%	93.2%	88.3%	77.7%	93.2%	94.2%	93.2%	87.4%	92.2%	91.3%
ICC	0.70	0.24	0.67	0.54	0.71	0.65	0.73	0.72	0.69	0.70

Note: PC = Positive climate; NC = Negative climate; TS = Teacher sensitivity; RSP = Regard for student perspectives; BM = Behavior management; PR = Productivity; ILF = Instructional learning formats; CD = Concept development; QF = Quality of feedback; LM = Language modeling; ICC = Intraclass correlation coefficient.

Teachers' work engagement

Teachers' work engagement was measured with the Utrecht Work Engagement Scale (UWES; [Schaufeli et al., 2002](#)). Validity of the UWES measure in the Finnish data has been reported by [Seppälä et al. \(2009\)](#). The measure has been widely used in Finland (e.g., [Hakanen, Bakker, & Schafeli, 2006](#); [Penttinen et al., 2020](#); [Vuorio, Suominen, Kautiainen, & Korhonen, 2019](#)) and around the world (e.g., European countries: [Hakanen et al., 2019](#); India: [Kataria, Garg, & Rastogi, 2013](#); Serbia: [Petrović, Vukelić, & Čizmić, 2017](#)). UWES consists of nine items that the teachers answered on a scale from 1 (never) to 7 (daily). These items fall under three domains: vigor (e.g., "At my work, I feel bursting with energy"), dedication (e.g., "I am enthusiastic about my job"), and absorption (e.g., "I get carried away when I am working"). The mean score of the nine items was used in the analysis.

Children's social competence

Teachers rated children's social competence using the Multisource Assessment of Children's Social Competence Scale (MASCS; [Junttila et al., 2006](#)). Validity of the MASCS measure in the Finnish data has been reported by [Junttila et al. \(2006\)](#). The measure has been recently used to measure children's social competence for example in studies by [Panula, Junttila, Aromaa, Rautava, and Riihã \(2020\)](#), [Pakarinen et al. \(2020\)](#), and [Salminen et al. \(2022\)](#). MASCS consists of 15 items and four subscales: cooperating skills (5 items, e.g., "offers help to other children"), empathy (3 items, e.g., "is sensitive to the feelings of others"), impulsivity (3 items, e.g., "is easily irritated"), and disruptiveness (4 items, e.g., "bothers and annoys other children"). All 15 items were rated by teachers on a scale from 1 (never) to 4 (very frequently). Of the subscales, cooperating skills and empathy reflect prosocial behavior, whereas impulsivity and disruptiveness reflect antisocial behavior. Mean scores for prosocial behavior and antisocial behavior were used in the analysis.

Control variables

Teachers reported their work experience and class size on the questionnaire. Work experience and class size were controlled for in the analyses because earlier research has indicated that these teacher and classroom characteristics are related with the quality of teacher-child interactions (e.g., [Friedman-Krauss et al., 2014](#); [Slot, Lerkkanen, & Leseman, 2015](#)). Children's gender was controlled for as previous studies have shown that girls' social competence is usually higher than boys' (e.g., [Junttila et al., 2006](#); [Pakarinen et al., 2018](#); [Siekkinen et al., 2013](#)).

Data analyses

First, as preliminary analysis, correlations among the variables were conducted with Mplus version 8 ([Muthén & Muthén, 1998-2017](#)) (see [Table 2](#)). Moreover, to investigate if there were differences among classrooms in children's social competence or gender, intraclass correlation coefficients (ICCs; see [Table 2](#)) were calculated. Third, to examine

to what extent are quality of teacher-child interactions, teachers' level of work engagement, and children's average social competence in classrooms associated across grade 1 fall (T1) and grade 1 spring (T2), multilevel models were conducted with Mplus. In the models, the social competence T1 scores were group-mean centered at the within-level. At the between-level, social competence at T1 was used as a classroom-mean averaged variable (cluster-mean). Multilevel modeling is an ideal analysis strategy for nested data because it enables the variance in the observed variables to be divided into the variation caused by the membership in a certain classroom (between-level variation) and variation due to individual children's differences, after taking into account classroom membership (within-level variation) ([Hox, 2010](#)).

At the between-level of the models (see schematic representation of the multilevel models, [Fig. 1](#)), stability and cross-lagged paths were estimated between the quality of teacher-child interactions, teacher's level of work engagement, and children's average social competence in the classroom at T1 and T2. All study variables were allowed to correlate with each other. Moreover, at the between-level of the models, teachers' work experience and class size were controlled for. However, these two between-level control variables were excluded from the final models due to model parsimony. Excluding the between-level control variables from the final models did not influence the results.

At the individual level of the models (within-level), group-mean centered social competence at T1 predicted social competence at T2. Social competence at T1 was predicted by gender. Multilevel-models were conducted separately for the three domains of teacher-child interactions (i.e., emotional support, classroom organization, and instructional support) and two domains of children's social competence (i.e., prosocial and antisocial behavior) because both the three CLASS domains and two MASCS domains were highly correlated. Consequently, six models were conducted ([Figs. 2-7](#)). Goodness-of-fit for the models was evaluated with a χ^2 test, comparative fit index (CFI), Tucker Lewis index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR). Model fits for the investigated models are presented in [Table 3](#).

Results

Descriptive results, correlations among the study variables, and intraclass correlation coefficients (ICCs) are shown in [Table 2](#). ICCs were estimated using the classroom as a cluster variable. ICCs were statistically significant for both dimensions of children's social competence (i.e., prosocial, and antisocial behavior) at both time points (i.e., first grade fall and first grade spring), indicating that there was statistically significant variation in children's social competence among classrooms. ICC for children's gender was not statistically significant, indicating that there was no statistically significant variation in children's gender among the classrooms. Consequently, children's gender was treated as a within-level variable (variation only within classrooms) in further analysis, whereas children's social competence was treated as both a within- and between-level variable.

Table 2
Descriptive statistics and bivariate correlations between study variables (within-level correlations below the diagonal and between-level correlations above the diagonal).

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
<i>First grade fall</i>															
1. Emotional sup. T1	1	0.72***	0.54***	0.41***	0.51***	-0.08	0.70***	0.43***	0.43***	0.35**	0.46**	-0.17	-	0.08	-0.28*
2. Classroom org. T1	-	1	0.46***	0.43***	0.46***	0.06	0.56***	0.57***	0.40***	0.35**	0.49**	-0.02	-	0.03	-0.06
3. Instructional sup. T1	-	-	1	0.18	0.29†	-0.25†	0.26*	0.16	0.45***	0.10	0.40**	-0.41**	-	0.20	-0.21
4. Work engag. T1	-	-	-	1	0.40**	-0.22	0.46**	0.47***	0.34**	0.64***	0.29†	-0.30	-	0.19	-0.05
5. Prosocial beh. T1	-	-	-	-	1	-0.10	0.58***	0.48***	0.37**	0.51***	0.65***	-0.17	-	0.23	-0.23
6. Antisocial beh. T1	-	-	-	-	-	1	-0.13	-0.20	-0.23†	-0.19	0.03	0.82***	-	-0.35*	-0.06
<i>First grade spring</i>															
7. Emotional sup. T2	-	-	-	-	-	-	1	0.73***	0.51***	0.45***	0.39**	-0.27†	-	0.08	-0.25*
8. Classroom org. T2	-	-	-	-	-	-	-	1	0.52***	0.42***	0.38**	-0.18	-	0.05	-0.08
9. Instructional sup. T2	-	-	-	-	-	-	-	-	1	0.23†	0.23†	-0.28*	-	0.14	0.14
10. Work engag. T2	-	-	-	-	-	-	-	-	-	1	0.11	-0.09	-	0.01	-0.24*
11. Prosocial beh. T2	-	-	-	-	-	-	-	-	-	-	1	-0.11	-	0.08	-0.31†
12. Antisocial beh. T2	-	-	-	-	-	-	-	-	-	-	-	1	-	-0.42**	0.03
<i>Control variables</i>															
13. Child gender ¹	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
14. Class size	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-0.06
15. Work experience	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>Descriptive statistics</i>															
Mean	5.42	5.62	2.55	6.08	3.04	1.64	5.36	5.68	2.60	6.16	3.02	1.70	1.50	19.25	16.54
Std. deviation	0.46	0.45	0.44	0.75	0.30	0.33	0.40	0.43	0.46	0.83	0.26	0.34	0.50	4.39	9.31
Minimum	4.14	4.15	1.78	4.13	2.13	1.07	4.38	4.44	1.87	2.67	2.28	1.09	1	7	0.5
Maximum	6.40	6.47	3.53	7.00	3.65	2.58	6.20	6.50	3.73	7.00	3.53	2.83	2	25	39
α	0.79	0.74	0.82	0.87	0.89	0.92	0.74	0.75	0.79	0.93	0.88	0.92	-	-	-
ICC ²	-	-	-	-	0.24***	0.18***	-	-	-	-	0.18***	0.13***	0.00	-	-

Note: T1 = first grade fall, T2 = first grade spring; N = 51; *** $p < .001$, ** $p < .01$, * $p < .05$; † $p < .10$; ¹Child gender: 1 = female, 2 = male; ²Intra-class correlation coefficients.

The quality of emotional support

The results first showed that at the between-level of the model 1, quality of emotional support, teachers' work engagement, and children's prosocial behavior were associated with their preceding values (Fig. 2: Model 1). Moreover, average prosocial behavior of the children in the classroom in fall was marginally significantly associated with the quality of emotional support, and statistically significantly associated with the level of teachers' work engagement in spring. Thus, if children displayed more prosocial behavior in the classroom at the beginning of grade 1, there was a higher quality of emotional support in the classroom at the end of grade 1, although the association was rather small. Furthermore, if there was more prosocial behavior in the classroom in fall, teachers reported higher levels of work engagement in spring. At the within-level of the model, children's prosocial behavior at the beginning of grade 1 was positively associated with their prosocial behavior at the end of grade 1, and girls displayed more prosocial behavior than boys.

Results further showed that at the between-level of model 2, average antisocial behavior of the children in the classroom was stable across grade 1 (Fig. 3: Model 2). Moreover, teachers' work engagement was associated with the subsequent quality of emotional support; if teachers reported higher work engagement in fall, the observed quality of emotional support in the classroom was higher in spring. At the within-level of the model, children's antisocial behavior in fall was associated with their antisocial behavior in spring. Moreover, boys displayed more antisocial behavior than girls.

The quality of classroom organization

Results showed that at the between-level of model 3, classroom organization was stable across grade 1 (Fig. 4: Model 3). Moreover, teachers' work engagement was positively associated with subsequent quality of classroom organization. Thus, if teachers reported higher work engagement in the fall, the quality of classroom organization in the classroom was higher in the spring. Furthermore, classroom organization was positively related to subsequent prosocial behavior of the children in the classroom, albeit marginally significantly. Thus, if the quality of classroom organization in the classroom was higher in fall, there was on average more prosocial behavior in the classroom in spring, although the association was rather small.

The results further showed that teachers' work engagement was negatively associated with subsequent antisocial behavior of the children in the classroom (Fig. 5: Model 4). Thus, if teachers reported higher work engagement in the fall, there was on average less antisocial behavior in the classroom in spring.

The quality of instructional support

Instructional support showed stability across the school year (Fig. 6: Model 5). Moreover, there was a reciprocal association between the quality of instructional support and children's prosocial behavior; First, instructional support was positively and statistically significantly associated with subsequent prosocial behavior of the children in the classroom. Thus, in classrooms where the quality of instructional support was higher in fall, children displayed on average more prosocial behavior in spring. Second, average prosocial behavior of the children in the classroom in fall was positively associated with subsequent quality of instructional support in spring. Thus, in classrooms where children displayed on average more prosocial behavior in the fall, the quality of instructional support was higher in spring.

Finally, the results showed that the quality of instructional support was negatively associated with subsequent antisocial behavior of the children in the classroom (Fig. 7: Model 6). Thus, if the quality of instructional support was higher in fall, there was on average less antisocial behavior in the classroom in spring. Moreover, teachers' work engagement was positively associated with subsequent instructional

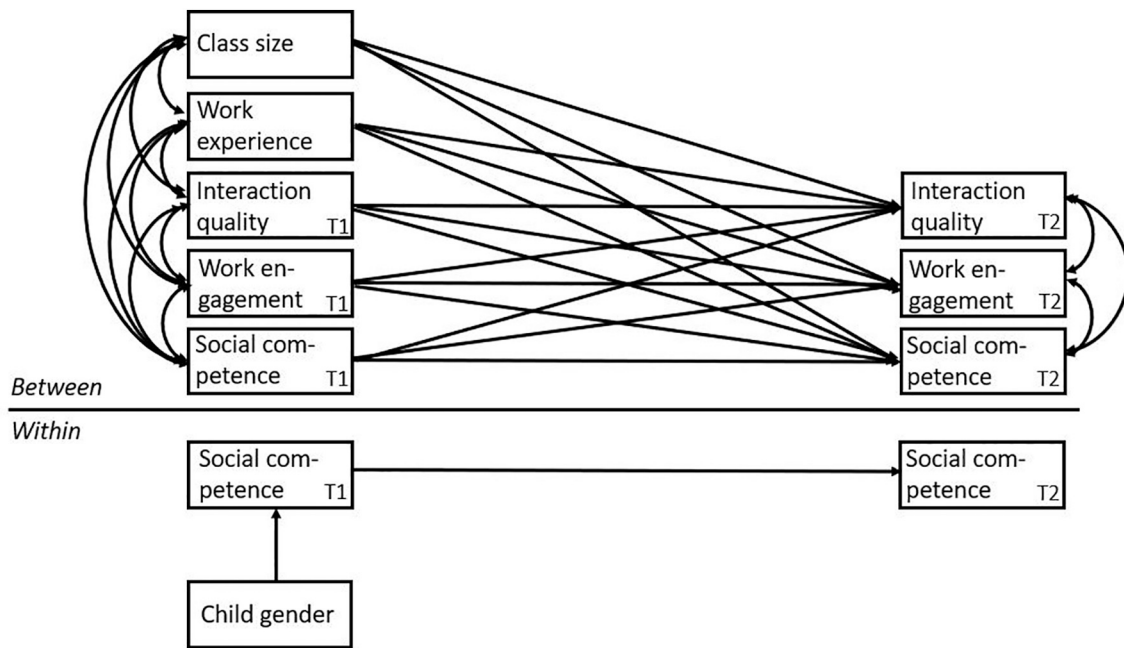


Fig. 1. Schematic Representation of the Models. Note: T1 = first grade fall; T2 = first grade spring

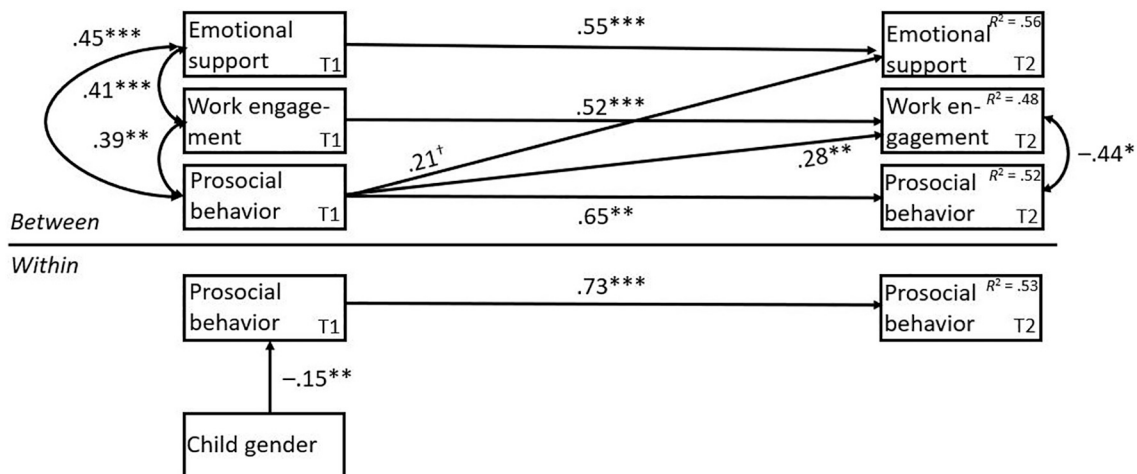


Fig. 2. Model 1: Emotional Support, Work Engagement, and Prosocial Behavior. Note: T1 = first grade fall; T2 = first grade spring; † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$. Non-significant associations were estimated but not displayed due to reasons of model clarity. T1 social competence at the within-level was group-mean centered, and at the between-level, the mean of children’s social competence in the classroom was used (cluster-mean).

support; if the teacher reported higher work engagement in fall, the quality of instructional support in the classroom was higher in spring.

Discussion

The aim of this study was to examine reciprocal associations among the quality of teacher–child interactions, teachers’ level of work engagement, and average social competence of the children in the classroom during first grade. The results showed reciprocal associations between the quality of instructional support and children’s average prosocial behavior in the classrooms. Other associations were in one direction: Teachers’ work engagement was positively associated with subsequent quality of teacher–child interactions (emotional support, classroom organization, and instructional support). Children’s average prosocial behavior in the classroom was positively associated with subsequent quality of emotional support whereas the quality of

classroom organization was positively associated with subsequent prosocial behavior in the classroom. However, these two associations were rather small and therefore only marginally significant. Finally, teachers’ high levels of work engagement in fall were associated with less anti-social behavior in the classrooms in spring whereas children’s average prosocial behavior in the classroom in fall was associated with higher work engagement for teachers in spring. Together these results reveal new information on the diverse associations among teacher-child interactions, teachers’ occupational well-being, and children’s prosocial and antisocial behaviors in first grade classrooms.

The role of work engagement in the quality of teacher–child interactions

As hypothesized (Hypothesis 1) based on the model of work engagement (Bakker & Demerouti, 2008), teachers’ work engagement was positively associated with subsequent quality of teacher–child

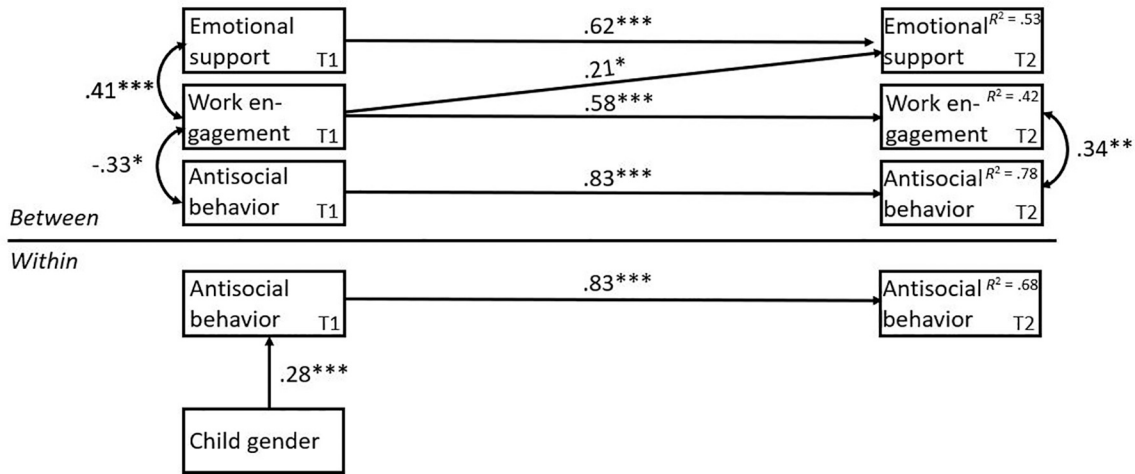


Fig. 3. Model 2: Emotional Support, Work Engagement and Antisocial Behavior. Note: T1 = first grade fall; T2 = first grade spring; † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$. Non-significant associations were estimated but not displayed due to reasons of model clarity. T1 social competence at the within-level was group-mean centered, and at the between-level, the mean of children’s social competence in the classroom was used (cluster-mean).

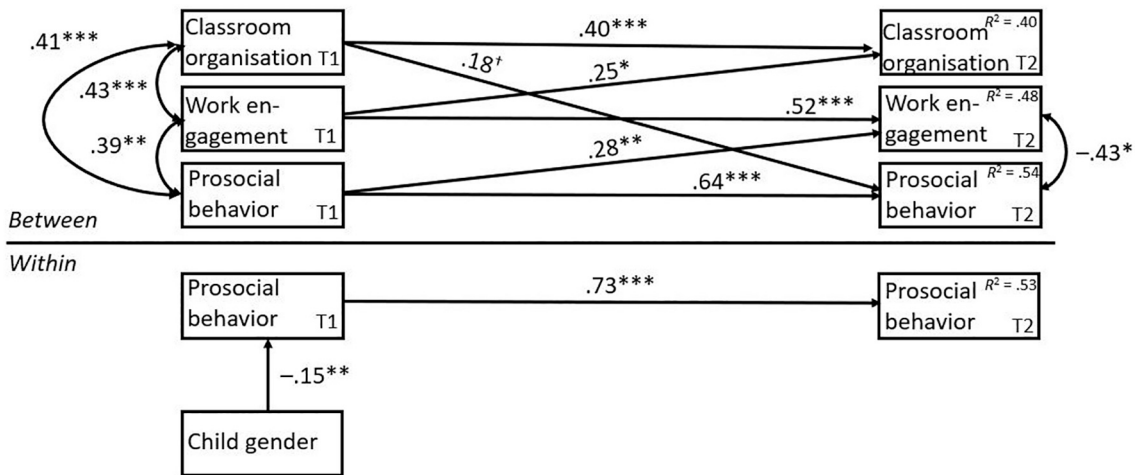


Fig. 4. Model 3: Classroom Organization, Work Engagement, and Prosocial Behavior. Note: T1 = first grade fall; T2 = first grade spring; † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$. Non-significant associations were estimated but not displayed due to reasons of model clarity. T1 social competence at the within-level was group-mean centered, and at the between-level, the mean of children’s social competence in the classroom was used (cluster-mean).

interactions. Associations between observed quality of teacher–child interactions and teachers’ work engagement have been studied earlier only cross-sectionally (see Penttinen et al., 2020). Thus, the results of the present study expand our understanding of the role of teachers’ work engagement in the quality of teacher–child interactions by showing that teachers’ work engagement at the beginning of grade 1 is related with the quality of emotional support, classroom organization, and instructional support at the end of grade 1.

When teachers experience high work engagement, they have energy to work, they find their job as being meaningful, and it is easy for them to concentrate on their work (Schaufeli et al., 2002). This enjoyment and dedication might be reflected in teachers’ motivation to perform in their job as well as possible (see Bakker & Demerouti, 2008). The present study further suggests that the energy, dedication, and concentration that teachers feel when experiencing work engagement can be seen in all three domains of teacher–child interactions: in the warm and supportive interactions (emotional support), in proactive behavior management and efficient time management (classroom organization), and in high-quality instructions, conversations, and feedback (instructional support). Altogether, the results of this study, together with the earlier results (Penttinen et al., 2020) and theoretical models (Bakker &

Demerouti, 2008; Jennings & Greenberg, 2009), highlight the importance of teachers’ occupational well-being in the quality of teacher–child interactions.

The interplay between social competence and the quality of teacher–child interactions

The results of the present study supported the Hypothesis 2a and 2b by showing that there were reciprocal associations between the quality of instructional support and average prosocial behavior of the children in the classroom. More precisely, the results indicated that in line with Hypothesis 2a, the quality of instructional support was associated with subsequent prosocial and antisocial behaviors in the classroom; if there was high-quality instructional support evident in the classroom in fall, children showed on average more prosocial behavior and less antisocial behavior in the classroom in spring. Moreover, in line with the Hypothesis 2b, in classrooms where children displayed more prosocial behavior in fall, the quality of instructional support was higher in spring. Associations between the remaining two domains of teacher–child interactions and children’s social competence were not reciprocal but the direction of the association was different for emotional support and

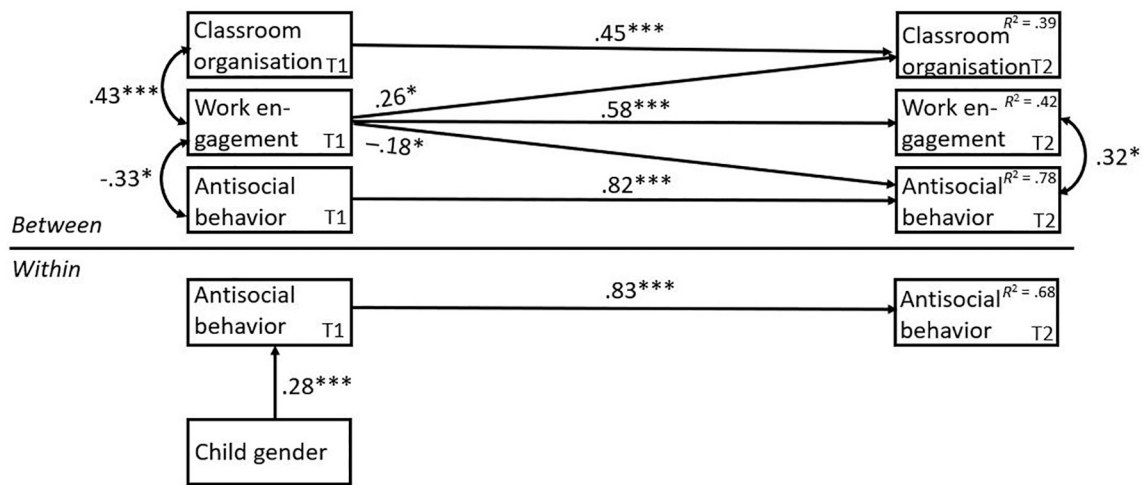


Fig. 5. Model 4: Classroom Organization, Work Engagement, and Antisocial Behavior. Note: T1 = first grade fall; T2 = first grade spring; $^\dagger p < .10$, $*p < .05$, $**p < .01$, $***p < .001$. Non-significant associations were estimated but not displayed due to reasons of model clarity. T1 social competence at the within-level was group-mean centered, and at the between-level, the mean of children’s social competence in the classroom was used (cluster-mean).

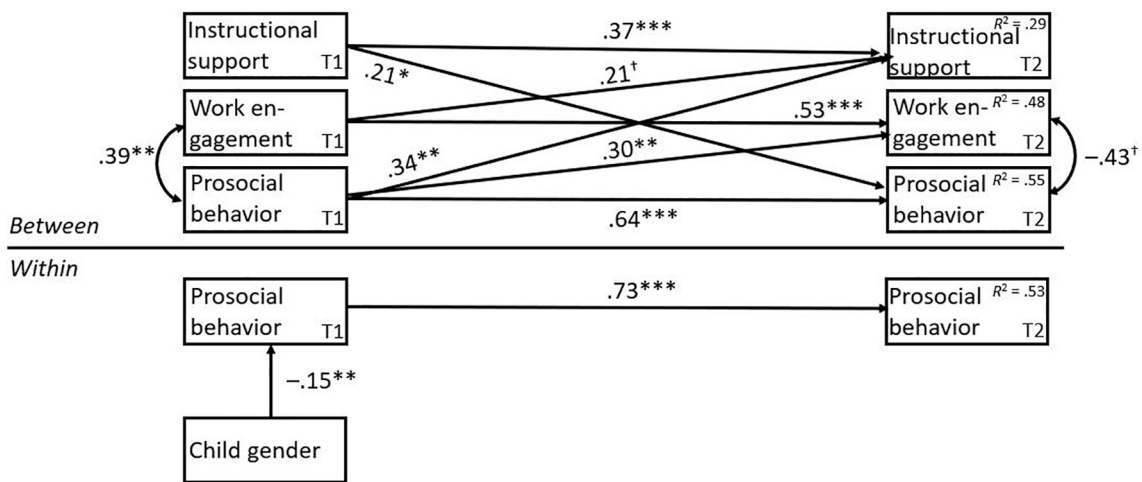


Fig. 6. Model 5: Instructional Support, Work Engagement, and Prosocial Behavior. Note: T1 = first grade fall; T2 = first grade spring; $^\dagger p < .10$, $*p < .05$, $**p < .01$, $***p < .001$. Non-significant associations were estimated but not displayed due to reasons of model clarity. T1 social competence at the within-level was group-mean centered, and at the between-level, the mean of children’s social competence in the classroom was used (cluster-mean).

classroom organization; Children’s average prosocial behavior in the classroom in the fall was associated with the quality of emotional support in the spring, whereas the quality of classroom organization in fall was associated with children’s average prosocial behavior in the classroom in spring. These last two associations were only marginally significant, however, indicating that these results should be interpreted with caution.

Although previous studies indicated that emotional support (Broekhuizen et al., 2016; Luckner & Pianta, 2011; Pakarinen et al., 2020) and classroom organization (Broekhuizen et al., 2016; Luckner & Pianta, 2011) can support children’s social competence, Siekkinen et al. (2013) also reported a positive association between high-quality instructional support and children’s social competence in kindergarten. Thus, it seems that instructional support is not only important for the development of children’s academic skills (e.g., see Burchinal et al., 2010; Cash, Ansari, Grimm, & Pianta, 2019; Mashburn et al., 2008) but might also contribute to children’s social competence (see also Downer, Sabol, & Hamre, 2010; Salminen et al., 2022). When the quality of instructional support is high in first-grade classroom, teacher has versatile conversations with children, encourages them, gives feedback that supports

learning, and tasks that are tied into children’s own experiences (Pianta et al., 2008). It might be that with this kind of support, teacher similarly promote the development of children’s cooperation skills and empathy (i.e., prosocial behavior). It might also be that children display less impulsivity and disruptiveness (i.e., antisocial behavior) when they are engaged in interesting conversations and meaningful tasks.

The results of the present study further indicated that not only high-quality teacher–child interactions were associated with subsequent social competence of the children in the classroom but also the other way around. Similarly, children’s empathy, one of the two subscales of prosocial behavior, was positively associated with subsequent quality of emotional support in a recent study from kindergarten classrooms (Pakarinen et al., 2020). Thus, it seems that children’s prosocial behavior is not only associated with children’s academic skill development (e.g., see Caprara et al., 2000) or lower risk for loneliness (Junttila et al., 2012), but it can also be reflected in the quality of emotional and instructional support in the classroom.

When children display prosocial behavior, they offer help, participate in group activities, start conversations with other children, are sensitive to others’ feelings, and show acceptance of other children

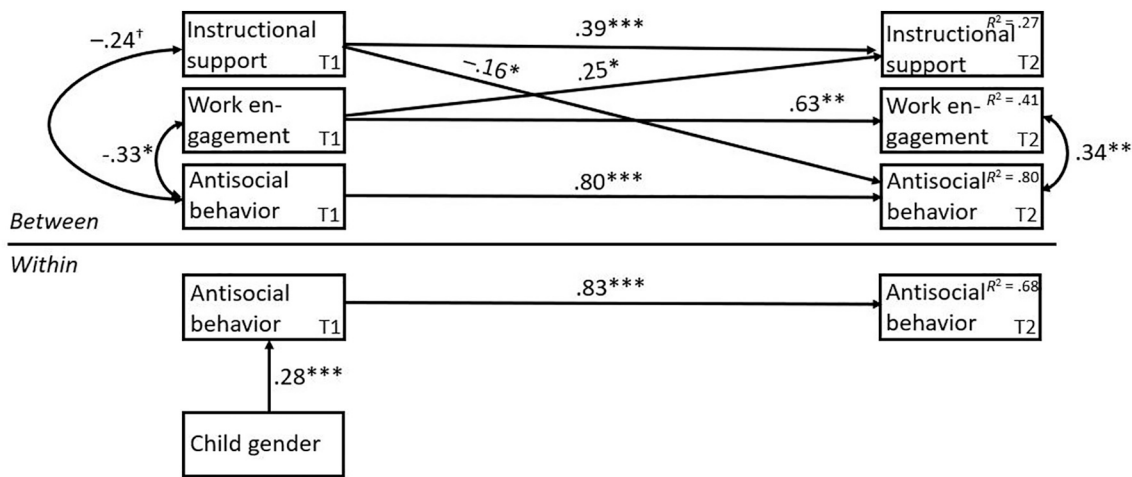


Fig. 7. Model 6: Instructional Support, Work Engagement, and Antisocial Behavior. Note: T1 = first grade fall; T2 = first grade spring; [†] $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$. Non-significant associations were estimated but not displayed due to reasons of model clarity. T1 social competence at the within-level was group-mean centered, and at the between-level, the mean of children’s social competence in the classroom was used (cluster-mean).

Table 3
Model fit indices for the investigated models.

	χ^2	df	p-value	CFI	TLI	RMSEA	SRMR _{between}	SRMR _{within}
Model 1	5.13	1	0.024	0.993	0.874	0.071	0.006	0.026
Model 2	2.56	1	0.109	0.998	0.970	0.044	0.003	0.015
Model 3	5.18	1	0.023	0.993	0.866	0.072	0.006	0.027
Model 4	2.47	1	0.116	0.998	0.971	0.042	0.003	0.014
Model 5	4.99	1	0.025	0.993	0.874	0.070	0.006	0.026
Model 6	2.46	1	0.117	0.998	0.972	0.042	0.003	0.014

Note: CFI = Comparative fit index; TLI = Tucker Lewis index; RMSEA = Root mean square error of approximation; SRMR = Standardized root mean square residual.

(Junttila et al., 2006). It might be that this kind of behavior enhances the positive climate and sensitivity in the classroom (emotional support) and makes it easier to have frequent conversations and focus on promoting learning (instructional support). Overall, it might be easier for the teacher to work and interact in classrooms where children display prosocial behavior. Earlier research has supported this assumption by showing that child behavior plays a role in teacher–child relationships (for a review, see Nurmi, 2012). However, it should be noted that so far, it has not been common to examine reciprocal connections between the quality of teacher–child interactions and children’s social competence, and most earlier studies have only examined how teacher–child interactions are reflected in social competence (see Broekhuizen et al., 2016; Luckner & Pianta, 2011; Siekkinen et al., 2013). The results of the present study contributed to the literature by showing that not only is the quality of teacher–child interactions associated with children’s subsequent social competence in the classroom but also vice versa.

Associations between teachers’ work engagement and children’s social competence

To the best of our knowledge, this study is among the first attempts to examine the associations between teachers’ work engagement and children’s social competence, and thus, it provides new information on the interplay between teachers’ occupational well-being and average social competence of the children in the classrooms. In line with Hypothesis 3, the results first showed that teachers’ work engagement was positively associated with children’s subsequent social competence; In classrooms where teachers reported high work engagement in fall, there was an average less antisocial behavior in the spring. Thus, if the teacher is enthusiastic and dedicated, children in the classroom have, for example, fewer tantrums, are not easily irritated, do not argue with other children, or tease or annoy their peers. This result supplements

earlier research which has shown associations between teachers’ low occupational well-being (i.e., stress) and children’s antisocial (Siekkinen et al., 2013) and disruptive behavior (Herman et al., 2018). Together, these results suggest that teachers’ occupational well-being might contribute to the average social competence of the children in the classroom. For this reason, it is important to support teachers’ occupational well-being and work engagement at school.

In contrast with the Hypothesis 3, children’s social competence was also associated with teachers’ subsequent work engagement. The results showed that in classrooms where there was more prosocial behavior in fall, teachers reported higher work engagement in spring. Thus, it appears that children’s behavior in the classroom is also important for teachers’ work engagement. It might be that when children display socially desirable behaviors such as helping others and showing empathy, working with children is more enjoyable for the teacher, and thus, they report higher work engagement. This result further confirms that children’s prosocial behavior is not only beneficial for themselves (e.g., see Caprara et al., 2000; Jones et al., 2015; Junttila et al., 2012), but also for the teacher enjoyment and engagement in work. For this reason, it is important to support the development of children’s social competence throughout their school years.

Practical implications

The results of the present study indicate that it is important to support teachers’ work engagement, as it seems to be reflected in the quality of teacher–child interactions in first grade classrooms. In their study, Bakker, Hakanen, Demerouti, and Xanthopoulou (2007) showed that supervisor support, innovativeness, appreciation for one’s work, and a positive organizational climate are important job resources that can help teachers to cope with child misbehavior and thus maintain high work engagement. Moreover, results of the current study highlight the

importance of supporting children's social competence as the average prosocial behavior of the children in the classroom seems to be reflected in the quality of instructional support, and in teachers' level of work engagement. Results further suggest that children's social competence can be supported with high-quality instructional support. Thus, it could be useful to provide teachers with opportunities to learn more about how to provide high-quality instructional support in their classrooms. One possibility for this are video-based professional development programs that have been shown to increase teacher-child interaction quality (e.g., Pianta, Mashburn, Downer, Hamre, & Justice, 2008).

Limitations and future directions

This study has some limitations that need to be acknowledged when interpreting the results. First, the sample size of the study at the classroom level was rather small, and there were only two time points in the study. Small sample size might lead to inaccurate and unstable estimation of the parameters and sometimes inflated values for goodness-of-fit indices (e.g., Muthén & Muthén, 2002). Moreover, although we had a cross-lagged design, more than two time points are needed to make causal inferences. In the future, the study design should be replicated with a larger sample size and more time points across several school years. Second, inter-rater reliability in terms of ICC was rather low for the negative climate dimension of teacher-child interactions at time-point 2. Since ICC is subject to a variety of statistical assumptions such as normality and stable variance, low ICC might be due to the non-normality and low variance in negative climate ratings. According to the adjacent agreement (i.e., agreement within one point), raters agreed highly on their negative climate scores. Third, work engagement was the only assessed indicator of teachers' occupational well-being. In future studies, using several indicators, including positive and negative aspects of occupational well-being, would provide a wider perspective on teachers' occupational well-being and its associations with teacher-child interactions and children's social competence. Fourth, although the MASCS measure (Junttila et al., 2006) has been developed to be used by teachers, parents, peers, and children themselves, children's social competence was only rated by teachers. For this reason, we recommend that in the future, researchers collect assessments from multiple sources to produce a more nuanced and comprehensive picture of children's social competence. Fifth, there was missing information concerning parents' education, which makes it difficult to draw any conclusions in terms of children's socioeconomic background. Finally, in the data analyses, only associations between classrooms were examined whereas differences between individuals in terms of associations remained unexamined, except for the stability of children's social competence during the school year and the association between children's social competence and gender which were examined also at the individual level. In the future, more research about the interindividual differences is needed to gain deeper understanding of the factors that are associated with children's social competence.

Conclusion

This study revealed new results on the interplay of teacher-child interactions, teachers' work engagement, and children's social competence in first grade classrooms. It expands earlier literature by showing that not only is the quality of instructional support positively associated with subsequent social competence of the children in the classroom, but the average prosocial behavior in the classroom is also associated with the subsequent quality of instructional support. Moreover, the study is among the first openings on the associations between teachers' work engagement and children's social competence. The results showed that the average prosocial behavior in the classroom is positively associated with teachers' subsequent work engagement. Furthermore, children display on average less antisocial behavior in classrooms where teacher experienced higher work engagement. Finally, the study expanded

earlier cross-sectional research by showing that teachers' level of work engagement is positively associated with the subsequent quality of all three domains of teacher-child interactions. These results highlight the importance of teachers' occupational well-being and high-quality teacher-child interactions for children's social competence as well as the role of children's social competence in teachers' work engagement and the quality of teacher-child interactions.

CRedit authorship contribution statement

Viola Soininen: Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing. **Eija Pakarinen:** Conceptualization, Methodology, Writing – review & editing. **Marja-Kristiina Lerkkanen:** Conceptualization, Methodology, Writing – review & editing.

Declaration of Competing Interest

None.

Data availability

The data that has been used is confidential.

Acknowledgements

This study was funded by the Finnish Work Environment Fund, the Ella and Georg Ehrnrooth Foundation, the University of Jyväskylä, Faculty of Education and Psychology, and a personal grant for the first author from Finnish Cultural Foundation, Central Finland Regional fund.

References

- Ainsworth, M. D., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation*. Lawrence Erlbaum.
- Baer, R. A., & Nietzel, M. T. (1991). Cognitive and behavioral treatment of impulsivity in children: A meta-analytic review of the outcome literature. *Journal of Clinical Child Psychology, 20*(4), 400–412. https://doi.org/10.1207/s15374424jccp2004_9
- Bakker, A. B., & Bal, P. M. (2010). Weekly work engagement and performance: A study among starting teachers. *Journal of Occupational and Organizational Psychology, 83* (1), 189–206. <https://doi.org/10.1348/096317909X402596>
- Bakker, A. B., & Demerouti, E. (2008). Towards a model of work engagement. *Career Development International, 13*(3), 209–223. <https://doi.org/10.1108/13620430810870476>
- Bakker, A. B., Hakanen, J. J., Demerouti, E., & Xanthopoulou, D. (2007). Job resources boost work engagement, particularly when job demands are high. *Journal of Educational Psychology, 99*(2), 274–284. <https://doi.org/10.1037/0022-0663.99.2.274>
- Bowlby, J. (1969). *Attachment and loss, Volume I: Attachment*. Basic books.
- Broekhuizen, M. L., Mokrova, I. L., Burchinal, M. R., Garrett-Peters, P. T., & The Family Life Project Key Investigators. (2016). Classroom quality at pre-kindergarten and kindergarten and children's social skills and behavior problems. *Early Childhood Research Quarterly, 36*(3), 212–222. <https://doi.org/10.1016/j.ecresq.2016.01.005>
- Bronfenbrenner, U., & Morris, P. A. (2006). The bioecological model of human development. In R. M. Lerner, & W. Damon (Eds.), *Handbook of child psychology: Theoretical models of human development* (pp. 793–828). John Wiley & Sons.
- Burchinal, M., Vandergrift, N., Pianta, R., & Mashburn, A. (2010). Threshold analysis of association between child care quality and child outcomes for low-income children in pre-kindergarten programs. *Early Childhood Research Quarterly, 25*(2), 166–176. <https://doi.org/10.1016/j.ecresq.2009.10.004>
- Caprara, G. V., Barbaranelli, C., Pastorelli, C., Bandura, A., & Zimbardo, P. G. (2000). Prosocial foundations of children's academic achievement. *Psychological Science, 11* (4), 302–306. <https://doi.org/10.1111/1467-9280.00260>
- Cash, A. H., Ansari, A., Grimm, K. J., & Pianta, R. C. (2019). Power of two: The impact of 2 years of high quality teacher child interactions. *Early Education and Development, 30*(1), 60–81. <https://doi.org/10.1080/10409289.2018.1535153>
- Catts, H. W., Fey, M. E., Zhang, X., & Tomblin, J. B. (1999). Language basis of reading and reading disabilities: Evidence from a longitudinal investigation. *Scientific Studies of Reading, 3*(4), 331–361. https://doi.org/10.1207/s1532799xssr0304_2
- Cicchetti, D. V., & Sparrow, S. A. (1981). Developing criteria for establishing interrater reliability of specific items: Applications to assessment of adaptive behavior. *American Journal of Mental Deficiency, 86*(2), 127–137. <https://psycnet.apa.org/record/1982-00095-001>.

- Cumming, T. (2017). Early childhood educators' well-being: An updated review of the literature. *Early Childhood Education Journal*, 45(5), 583–593. <https://doi.org/10.1007/s10643-016-0818-6>
- Downer, J., Sabol, T. J., & Hamre, B. (2010). Teacher–child interactions in the classroom: Toward a theory of within- and cross-domain links to children's developmental outcomes. *Early Education and Development*, 21(5), 699–723. <https://doi.org/10.1080/10409289.2010.497453>
- Emmer, E. T., & Stough, L. M. (2001). Classroom management: A critical part of educational psychology, with implications for teacher education. *Educational Psychologist*, 36(2), 103–112. https://doi.org/10.1207/S15326985EP3602_5
- Finnish National Agency for Education. (2016). Perusopetuksen opetussuunnitelman perusteet 2014 [Finnish core curriculum for basic education 2014]. In , 2014. *Määräykset ja ohjeet* (p. 96). <https://www.oph.fi/fi/koulutus-ja-tutkinnot/perusopetuksen-opetussuunnitelman-perusteet#e1ddbed9>.
- Friedman-Krauss, A. H., Raver, C. C., Morris, P. A., & Jones, S. M. (2014). The role of classroom-level child behavior problems in predicting preschool teacher stress and classroom emotional climate. *Early Education and Development*, 25(4), 530–552. <https://doi.org/10.1080/10409289.2013.817030>
- Hakanen, J. J., Bakker, A. B., & Schaufeli, W. B. (2006). Burnout and work engagement among teachers. *Journal of School Psychology*, 43(6), 495–513. <https://doi.org/10.1016/j.jsp.2005.11.001>
- Hakanen, J. J., Ropponen, A., Schaufeli, W. B., & De Witte, H. (2019). Who is engaged at work?: A large-scale study in 30 European countries. *Journal of Occupational and Environmental Medicine*, 61(5), 373–381. <https://doi.org/10.1097/JOM.0000000000001528>
- Hamre, B. K., Pianta, R. C., Downer, J. T., DeCoster, J., Mashburn, A. J., Jones, S. M., ... Hamagami, A. (2013). Teaching through interactions. *The Elementary School Journal*, 113(4), 461–487. <https://doi.org/10.1086/669616>
- Herman, K. C., Hickmon-Rosa, J., & Reinke, W. M. (2018). Empirically derived profiles of teacher stress, burnout, self-efficacy, and coping and associated student outcomes. *Journal of Positive Behavior Interventions*, 20(2), 90–100. <https://doi.org/10.1177/1098300717732066>
- Hinshaw, S. P. (1987). On the distinction between attentional deficits/hyperactivity and conduct problems/aggression in child psychopathology. *Psychological Bulletin*, 101(3), 443–463. <https://doi.org/10.1037/0033-2909.101.3.443>
- Hoglund, W. L. G., Klinge, K. E., & Hosan, N. E. (2015). Classroom risks and resources: Teacher burnout, classroom quality and children's adjustment in high needs elementary schools. *Journal of School Psychology*, 53(5), 337–357. <https://doi.org/10.1016/j.jsp.2015.06.002>
- Hoigaard, R., Giske, R., & Sundslø, K. (2012). Newly qualified teachers' work engagement and teacher efficacy influences on job satisfaction, burnout, and the intention to quit. *European Journal of Teacher Education*, 35(3), 347–357. <https://doi.org/10.1080/02619768.2011.633993>
- Hox, J. J. (2010). *Multilevel analysis: Techniques and applications* (2nd ed.). Routledge, Hu.
- B. Y., Fan, X., Wu, Y., LoCasale-Crouch, J. & Song, Z. (2019). Contributions of teacher–child interaction quality to Chinese children's development in the early childhood years. *Early Education and Development*, 30(2), 159–177. <https://doi.org/10.1080/10409289.2018.1544809>
- Hu, B. Y., Fan, X., Wu, Y., LoCasale-Crouch, J., & Song, Z. (2019). Contributions of teacher–child interaction quality to Chinese children's development in the early childhood years. *Early Education and Development*, 30(2), 159–177. <https://doi.org/10.1080/10409289.2018.1544809>
- Jennings, P. A. (2015). Early childhood teachers' well-being, mindfulness, and self-compassion in relation to classroom quality and attitudes towards challenging students. *Mindfulness*, 6(4), 732–743. <https://doi.org/10.1007/s12671-014-0312-4>
- Jennings, P. A., & Greenberg, M. T. (2009). The prosocial classroom: Teacher social and emotional competence in relation to student and classroom outcomes. *Review of Educational Research*, 79(1), 491–525. <https://doi.org/10.3102/0034654308325693>
- Jones, D. E., Greenberg, M., & Crowley, M. (2015). Early social-emotional functioning and public health: The relationship between kindergarten social competence and future wellness. *American Journal of Public Health*, 105(11), 2283–2290. <https://doi.org/10.2105/AJPH.2015.302630>
- Junttila, N., Vauras, M., Niemi, P., & Laakkonen, E. (2012). Multisource assessed social competence as a predictor for children's and adolescents' later loneliness, social anxiety, and social phobia. *Journal for Educational Research Online*, 4(1), 73–98. <https://doi.org/10.25656/01:7052>
- Junttila, N., Voeten, M., Kaukiainen, A., & Vauras, M. (2006). Multisource assessment of children's social competence. *Educational and Psychological Measurement*, 66(5), 874–895. <https://doi.org/10.1177/0013164405285546>
- Kaplan, A., Gheen, M., & Midgley, C. (2002). Classroom goal structure and student disruptive behaviour. *British Journal of Educational Psychology*, 72(2), 191–211. <https://doi.org/10.1348/000709902158847>
- Kataria, A., Garg, P., & Rastogi, R. (2013). Work engagement in India: Validation of the Utrecht work engagement. *Asia-Pacific Journal of Management Research and Innovation*, 9(3), 249–260. <https://doi.org/10.1177/2319510X13519322>
- Kauten, R., & Barry, C. T. (2020). Externalizing behavior. In V. Zeigler-Hill, & T. K. Shackelford (Eds.), *Encyclopedia of personality and individual differences*. Cham: Springer. https://doi.org/10.1007/978-3-319-24612-3_894
- Klassen, R. M., Aldhafri, S., Mansfield, C. F., Purwanto, E., Siu, A. F. Y., Wong, M. W., & Woods-McConney, A. (2012). Teachers' engagement at work: An international validation study. *The Journal of Experimental Education*, 80(4), 317–337. <https://doi.org/10.1080/00220973.2012.678409>
- Klusmann, U., Kunter, M., Trautwein, U., Lüdtke, O., & Baumert, J. (2008). Teachers' occupational well-being and quality of instruction. *Journal of Educational Psychology*, 100(3), 702–715. <https://doi.org/10.1037/0022-0663.100.3.702>
- Kyriacou, C. (2001). Teacher stress: Directions for future research. *Educational Review*, 53(1), 27–35. <https://doi.org/10.1080/00131910124115>
- Ladd, G., Birch, S., & Buhs, E. (1999). Children's social and scholastic lives in kindergarten: Related spheres of influence? *Child Development*, 70(6), 1373–1400. <https://doi.org/10.1111/1467-8624.00101>
- Landers, R. N. (2015). Computing intraclass correlations (ICC) as estimates of interrater reliability in SPSS. *The Winnower*, 6(e143518), 81744. <https://doi.org/10.15200/winn.143518.81744>
- Legkauskas, V., & Magelinskaitė-Legkauskienė, Š. (2021). Social competence in the 1st grade predicts school adjustment two years later. *Early Child Development and Care*, 191(1), 83–92. <https://doi.org/10.1080/03004430.2019.1603149>
- Lerkanen, M.-K., & Pakarinen, E. (2016–2022). *Teacher and Student Stress and Interaction in Classroom (TESSD)*. <https://doi.org/10.17011/jyx/dataset/77741>
- Leyva, D., Weiland, C., Barata, M., Yoshikawa, H., Snow, C., Treviño, E., & Rolla, A. (2015). Teacher–child interactions in Chile and their associations with prekindergarten outcomes. *Child Development*, 86(3), 781–799. <https://doi.org/10.1111/cdev.12342>
- Liu, J. (2004). Childhood externalizing behavior: Theory and implications. *Journal of Child and Adolescent Psychiatric Nursing*, 17(3), 93–103. <https://doi.org/10.1111/j.1744-6171.2004.tb00003.x>
- Luckner, A. E., & Pianta, R. C. (2011). Teacher–student interactions in fifth grade classrooms: Relations with children's peer behavior. *Journal of Applied Developmental Psychology*, 32(5), 257–266. <https://doi.org/10.1016/j.appdev.2011.02.010>
- Mashburn, A. J., Pianta, R. C., Hamre, B. K., Downer, J. T., Barbarin, O. A., Bryant, D., ... Howes, C. (2008). Measures of classroom quality in prekindergarten and children's development of academic, language, and social skills. *Child Development*, 79(3), 732–749. <https://doi.org/10.1111/j.1467-8624.2008.01154.x>
- Merrell, K. W., & Gimpel, G. A. (1998). *Social skills of children and adolescents. Conceptualization, assessment, treatment*. Mahwah, NJ: Lawrence Erlbaum.
- Muthén, L. K., & Muthén, B. O. (1998–2017). Mplus users guide and Mplus version 8. <http://www.statmodel.com/index.shtml>
- Muthén, L. K., & Muthén, B. O. (2002). How to use a Monte Carlo study to decide on sample size and determine power. *Structural Equation Modeling*, 9(4), 599–620. https://doi.org/10.1207/S15328007SEM0904_8
- Nurmi, J. (2012). Students' characteristics and teacher–child relationships in instruction: A meta-analysis. *Educational Research Review*, 7(3), 177–197. <https://doi.org/10.1016/j.edurev.2012.03.001>
- Organisation for Economic Co-operation and Development. (2018). *Education at a Glance 2018: OECD Indicators*. OECD Publishing. <https://doi.org/10.1787/eag-2018-en>
- Pakarinen, E., Lerkanen, M.-K., Poikkeus, A.-M., Kiuru, N., Siekkinen, M., Rasku-Puttonen, H., & Nurmi, J. (2010). A validation of the classroom assessment scoring system in Finnish kindergartens. *Early Education and Development*, 21(1), 95–124. <https://doi.org/10.1080/1040928902858764>
- Pakarinen, E., Lerkanen, M.-K., & von Suchodoletz, A. (2020). Teacher emotional support in relation to social competence in preschool classrooms. *International Journal of Research & Method in Education*, 43(4), 444–460. <https://doi.org/10.1080/1743727X.2020.1791815>
- Pakarinen, E., Salminen, J., Lerkanen, M.-K., & von Suchodoletz, A. (2018). Reciprocal associations between social competence and language and pre-literacy skills in preschool. *Journal of Early Childhood Education Research*, 7(2), 207–234. <https://jeecer.org/reciprocal-associations-between-social-competence-and-language-and-pre-literacy-skills-in-preschool/>
- Panula, V., Junttila, N., Aromaa, M., Rautava, P., & Räihä, H. (2020). Parental psychosocial well-being as a predictor of the social competence of a child. *Journal of Child and Family Studies*, 29, 3004–3019. <https://doi.org/10.1007/s10826-020-01790-6>
- Paris, S. G., & Paris, A. H. (2001). Classroom applications of research on self-regulated learning. *Educational Psychologist*, 36(2), 89–101. https://doi.org/10.1207/S15326985EP3602_4
- Penttinen, V., Pakarinen, E., von Suchodoletz, A., & Lerkanen, M.-K. (2020). Relations between kindergarten teachers' occupational well-being and the quality of teacher–child interactions. *Early Education and Development*, 31(7), 994–1010. <https://doi.org/10.1080/10409289.2020.1785265>
- Perlman, M., Falenchuk, O., Fletcher, B., McMullen, E., Beyene, J., & Shah, P. S. (2016). A systematic review and meta-analysis of a measure of staff/child interaction quality (the classroom assessment scoring system) in early childhood education and care settings and child outcomes. *PLoS One*, 11(12). <https://doi.org/10.1371/journal.pone.0167660>
- Petrović, I. B., Vukelić, M., & Čizmić, S. (2017). Work engagement in Serbia: Psychometric properties of the Serbian version of the Utrecht work engagement scale (UWES). *Frontiers in Psychology*, 8. <https://doi.org/10.3389/fpsyg.2017.01799>
- Pianta, R. C., Downer, J., & Hamre, B. K. (2016). Quality in early education classrooms: Definitions, gaps, and systems. *The Future of Children*, 26(2), 119–137. <https://doi.org/10.1353/foc.2016.0015>
- Pianta, R. C., La Paro, K. M., & Hamre, B. K. (2008). *Classroom assessment scoring system: Manual K-3*. Paul H Brookes Publishing.
- Pianta, R. C., Mashburn, A. J., Downer, J. T., Hamre, B. K., & Justice, L. (2008). Effects of web-mediated professional development resources on teacher–child interactions in pre-kindergarten classrooms. *Early Childhood Research Quarterly*, 23(4), 431–451. <https://doi.org/10.1016/j.ecresq.2008.02.001>
- Raver, C. C. (2004). Placing emotional self-regulation in sociocultural and socioeconomic contexts. *Child Development*, 75(2), 346–353. <https://doi.org/10.1111/j.1467-8624.2004.00676.x>
- Rimm-Kaufman, S. E., Early, D. M., Cox, M. J., Saluja, G., Pianta, R. C., Bradley, R. H., & Payne, C. (2002). Early behavioral attributes and teachers' sensitivity as predictors of competent behavior in the kindergarten classroom. *Journal of Applied*

- Developmental Psychology*, 23(4), 451–470. [https://doi.org/10.1016/S0193-3973\(02\)00128-4](https://doi.org/10.1016/S0193-3973(02)00128-4)
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68–78. <https://doi.org/10.1037/0003-066X.55.1.68>
- Salminen, J., Pakarinen, E., Poikkeus, A.-M., Laakso, M.-L., & Lerkkanen, M.-K. (2022). Teacher–child interactions as a context for developing social competence in toddler classrooms. *Journal of Early Childhood Education Research*, 11(1), 38–67. <https://journal.fi/jecer/article/view/114006>.
- Schaufeli, W., Salanova, M., González-romá, V., & Bakker, A. (2002). The measurement of engagement and burnout: A two sample confirmatory factor analytic approach. *Journal of Happiness Studies*, 3(1), 71–92. doi:1015630930326.
- Seppälä, P., Mauno, S., Feldt, T., Hakanen, J., Kinnunen, U., Schaufeli, W., & Tolvanen, A. (2009). The construct validity of the Utrecht work engagement scale: Multisample and longitudinal evidence. *Journal of Happiness Studies*, 10(4), 459–481. <https://doi.org/10.1007/s10902-008-9100-y>
- Sheridan, S. M., & Walker, D. (1999). Social skills in context: Considerations for assessment, intervention, and generalization. In C. R. Reynolds, & T. B. Gutkin (Eds.), *The handbook of school psychology* (pp. 686–708). New York: John Wiley.
- Siekkinen, M., Pakarinen, E., Lerkkanen, M.-K., Poikkeus, A.-M., Salminen, J., Poskiparta, E., & Nurmi, J. (2013). Social competence among 6-year-old children and classroom instructional support and teacher stress. *Early Education & Development*, 24(6), 877–897. <https://doi.org/10.1080/10409289.2013.745183>
- Skaalvik, E. M., & Skaalvik, S. (2016). Teacher stress and teacher self-efficacy as predictors of engagement, emotional exhaustion, and motivation to leave the teaching profession. *Creative Education*, 7(13), 1785–1799. <https://doi.org/10.4236/ce.2016.713182>
- Skibbe, L., Behnke, M., & Justice, L. M. (2004). Parental scaffolding of children’s phonological awareness skills: Interactions between mothers and their preschoolers with language difficulties. *Communication Disorders Quarterly*, 25(4), 189–203. <https://doi.org/10.1177/15257401040250040401>
- Skinner, E. A., & Belmont, M. J. (1993). Motivation in the classroom: Reciprocal effects of teacher behavior and student engagement across the school year. *Journal of Educational Psychology*, 85(4), 571–581. <https://doi.org/10.1037/0022-0663.85.4.571>
- Slot, P., Lerkkanen, M.-K., & Leseman, P. (2015). The relations between structural quality and process quality in european early childhood education and care provisions: Secondary analyses of large scale studies in five countries. <http://eccc-care.org/resources/publications/>.
- Vuorio, T., Suominen, S., Kautiainen, H., & Korhonen, P. (2019). Determinants of sickness absence rate among Finnish municipal employees. *Scandinavian Journal of Primary Health Care*, 37(1), 3–9. <https://doi.org/10.1080/02813432.2019.1568710>
- Waters, E., & Sroufe, L. A. (1983). Social competence as a developmental construct. *Developmental Review*, 3(1), 79–97. [https://doi.org/10.1016/0273-2297\(83\)90010-2](https://doi.org/10.1016/0273-2297(83)90010-2)