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Teachers' emotional competence and students' social integration: exploring mediation pathways through teacher-student relationships in elementary classrooms

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Introduction: The Prosocial Classroom Model theorizes that teachers' emotional competence influences student outcomes through indirect pathways, with teacher-student relationships representing one key mediating pathway. However, empirical evidence testing these specific mediation mechanisms for students' social integration remains limited.

Methods: Using multilevel mediation analysis, we examined direct and indirect associations between teachers' emotional competence and students' social integration in a sample of 43 first-grade teachers and 618 students across 18 German elementary schools. Teachers' emotional competence was assessed via self-report (EKF), social integration through students' self-perception (FEES) and peer nominations, and teacher-student relationship quality from students' perspectives (SPARTS).

Results: Teachers' emotional competence showed no significant direct associations with any social integration indicator. However, multilevel mediation analyses revealed a significant indirect pathway through teacher-student closeness for students' self-reported social integration (indirect effect = 0.022, $p = 0.046$), while the total effect reached significance ($p = 0.048$). No mediation effects emerged for peer-nominated acceptance or rejection, indicating construct-specific pathways.

Discussion: These findings provide initial empirical support for the Prosocial Classroom Model's core proposition that teachers' emotional competence relates to student outcomes primarily through relationship-mediated rather than direct pathways. While effect sizes are small, results suggest that interventions targeting teachers' emotional competence may enhance students' self-perceived social integration by improving teacher-student relationship quality. The differential effects across self-report versus peer-nomination

measures highlight the complexity of social integration processes in elementary classrooms.

KEYWORDS

teacher emotional competence, social integration, teacher-student relationships, multilevel mediation, elementary education

1 Introduction

Social integration represents one of the most fundamental aspects of children's school experience, rooted in the basic human need to belong (Baumeister and Leary, 1995) and for relatedness with significant others (Deci and Ryan, 2000). Children who experience higher social integration demonstrate greater wellbeing (Murray et al., 2024; Schwerter et al., 2024), school enjoyment (Ömerogullari and Gläser-Zikuda, 2022), and academic achievement (Gallardo et al., 2016; Shao et al., 2024). Conversely, children who struggle with social integration face increased risks for academic difficulties (Buhs et al., 2006; García Bacete et al., 2021; Plenty and La Roi, 2024) and for behavioral problems and mental health challenges (Beerli and Lev-Wiesel, 2012; Ladd, 2006), with these negative effects often persisting into adolescence and adulthood (Ladd, 2006; Will et al., 2016).

Students' experiences within peer groups have been examined through various lenses, including school-level belonging (Goodenow, 1993) and peer-level acceptance (Cillessen and Marks, 2011). In the present study, we focus specifically on social integration at the classroom peer level, defined as the extent to which children feel accepted by classmates and perceive themselves as valued members of the peer group (Rauer and Schuck, 2004). This conceptualization emphasizes students' subjective sense of being integrated into the classroom peer community. To complement this self-perceived dimension, we additionally assess students' peer perceived social standing through sociometric nominations of acceptance and rejection (Cillessen and Marks, 2011). This dual operationalization captures both the internal psychological experience of feeling integrated and the external social reality of one's position within the classroom peer group.

Understanding factors that promote social integration is essential in educational contexts. Growing diversity in classrooms—whether due to inclusive education practices that integrate students with special educational needs, increasing cultural and linguistic diversity, or varied socioeconomic backgrounds (OECD, 2023)—highlights the need to identify malleable factors that support all students' social integration. While much research has focused on adolescence, social integration plays a particularly crucial role during the transition from kindergarten to elementary school, when children first encounter formal peer group structures and establish foundational social relationships that influence their subsequent school experience (Gifford-Smith and Brownell, 2003; Ladd et al., 2000; Rimm-Kaufman and Pianta, 2000).

1.1 Teachers' influence on classroom social dynamics

Students' feelings of wellbeing within their classroom and with their peers depend on various factors. Research has increasingly conceptualized teachers as important facilitators who actively shape the social dynamics within their classrooms - what Farmer et al. (2011) termed the teacher's "invisible hand" in peer relationships. This perspective challenges the traditional view of teachers as passive observers, positioning them instead as active agents who influence peer relationships and classroom social climate through their daily interactions and instructional practices (Farmer et al., 2011).

According to this framework, teachers function as both architects of classroom interactions and as social referents for children's perceptions of their classmates through multiple mechanisms. Structurally, they are theorized to create conditions that facilitate or hinder positive peer relationships through classroom organization, group formations, and intervention strategies (Gest and Rodkin, 2011). Based on social learning theory (Bandura, 1977), teachers are proposed to serve as social models who demonstrate interaction patterns that students observe and internalize, with demonstrations of empathy, respect, and positive communication potentially providing templates for prosocial behavior.

Empirical evidence supports these theoretical propositions. Experimentally, Van den Berg et al. (2012) demonstrated that structural arrangements matter: manipulating seating arrangements to place initially disliked peers in closer proximity led to improved likeability ratings and reduced victimization. Research has further shown that teachers function as social referents, with peers using teachers' responses as reference points to evaluate their classmates' social competence and likability. Hendrickx et al. (2016) found that higher normative teacher support at the classroom level was associated with more peer liking and prosocial behavior, while higher normative teacher conflict predicted more peer disliking and aggression. More rigorously, Hendrickx et al. (2017) demonstrated in a longitudinal study that negative teacher behavior toward students can harm peer relationships through a social referencing process. This social referencing function appears particularly important during the elementary school years, when teacher-student relationship quality dynamically influences children's social and behavioral adjustment (Magro et al., 2025), with teachers playing a key role in shaping children's perceptions of peer relationships (Chen et al., 2020).

Recent meta-analytical work by Endedijk et al. (2022), who analyzed 297 studies, found that teacher-student relationship

quality partially mediates the association between student behavior and peer relationships. Their analysis reveals that negative aspects of teacher-student relationships were particularly predictive of peer relationship outcomes, suggesting that the teacher's influence on peer dynamics may operate more strongly through the prevention of negative interactions than through the promotion of positive ones. This finding underscores the complexity of teachers' social influence and highlights the importance of examining both positive and negative pathways in classroom relationship dynamics.

1.2 The centrality of teacher-student relationships

Teacher-student relationships are conceptualized as encompassing the emotional, social, and instructional interactions between educators and individual students, characterized by dimensions such as closeness, conflict, and dependency (Pianta, 2001). The theoretical foundations for understanding these relationships draw from attachment theory, which posits that secure teacher-student relationships provide emotional security for learning and exploration (Verschuere and Koomen, 2012), and self-determination theory, which emphasizes how supportive relationships fulfill students' basic psychological needs for relatedness, autonomy, and competence (Deci and Ryan, 2000).

Research shows that these relationships form through daily interactions and develop over time, creating unique dyadic bonds that can profoundly influence students' school experiences and developmental outcomes (Chen et al., 2020; Magro et al., 2025; Roorda et al., 2017). More specifically, high-quality teacher-student relationships, characterized by warmth, support, and low conflict, are associated with numerous positive outcomes for students. Meta-analytic evidence confirms that affective teacher-student relationships are significantly related to students' school engagement and academic achievement across different contexts (Endedijk et al., 2022; Roorda et al., 2017), with children experiencing close, supportive relationships showing greater academic engagement, improved behavioral regulation, and enhanced social competence (Chen et al., 2020; Magro et al., 2025). Importantly, the quality of teacher-student relationships is directly linked to students' sense of belonging and acceptance within the classroom community, with students who feel valued by their teacher developing greater confidence in social situations regardless of their specific peer relationship patterns (Chen et al., 2020; Furrer and Skinner, 2003). Given these established associations, teacher-student relationships may serve as a critical mediating mechanism through which teachers' broader competencies relate to students' social integration within the classroom context.

1.3 Effects of teachers' emotional competence

Given the central role of teachers as social architects and relationship builders within elementary classrooms, understanding the specific teacher characteristics that enable effective social

facilitation becomes crucial. Among various teacher competencies, emotional competence has emerged as a particularly important factor that may influence teachers' ability to establish positive relationships with students and create supportive classroom environments that promote social integration (Calandri et al., 2025; Lee, 2024; Poulou and Garner, 2024).

Teachers' emotional competence encompasses a multifaceted set of abilities related to understanding and effectively managing emotions in educational contexts. Following established frameworks (Mayer and Salovey, 1997; Rindermann, 2009), emotional competence comprises four interconnected dimensions particularly relevant for educational practice: (1) perception and understanding of one's own emotions, enabling teachers to recognize their emotional states and comprehend the underlying causes and implications of these emotions in classroom contexts; (2) perception of others' emotions, encompassing teachers' ability to accurately identify and interpret students' emotional states; (3) regulation and control of one's own emotions, involving teachers' ability to manage emotional responses effectively and maintain composure during difficult interactions; and (4) expression of emotions, referring to teachers' capacity to communicate emotions appropriately. Research examining teachers' emotional competence has documented positive associations with various outcomes. Teachers with higher emotional awareness and regulation skills report greater job satisfaction, lower burnout, and more positive relationships with students (Cece et al., 2021; Donker et al., 2020; Mérida-López and Extremera, 2017; Ornaghi et al., 2023), with recent research demonstrating that teachers' ability to regulate emotions is a significant predictor of their stress levels in educational settings (Rauterkus et al., 2024). Beyond these documented positive effects for teachers themselves, the impact of emotional competence on student outcomes is equally important. The Prosocial Classroom Model provides a theoretical framework for understanding these connections between teachers' emotional competencies and student development.

1.4 The Prosocial Classroom Model

The Prosocial Classroom Model (Jennings and Greenberg, 2009) proposes that teachers' social-emotional competence operates through multiple interconnected pathways rather than through direct skill transmission to influence student outcomes. The model identifies three primary mechanisms. First, emotional competence enhances teacher-student relationship quality by enabling teachers to recognize, understand, and respond appropriately to students' emotional needs, establishing warm and supportive relationships that serve as a secure base for social development. Second, it improves classroom management through effective emotion regulation, creating a positive classroom climate that reduces stress and supports social learning. Third, emotionally competent teachers promote social-emotional learning through modeling and responsive coaching. Critically, the Prosocial Classroom Model emphasizes that these pathways are interconnected rather than independent. For instance, positive teacher-student relationships both emerge from and reinforce effective classroom management, while teachers' emotion regulation simultaneously

supports relationship quality and enables responsive social-emotional instruction. In a transactional manner, these three pathways collectively contribute to a healthy classroom climate, which in turn may reinforce teachers' enjoyment, efficacy, and commitment—creating a positive feedback loop that prevents burnout.

The Prosocial Classroom Model has garnered empirical support across several domains. First, teachers with higher levels of positive emotions and emotional competence are more successful in building sustainable relationships with their students (Poulou and Garner, 2024). A second central area concerns classroom management and conflict resolution. Studies demonstrate that emotionally competent teachers are more effective in classroom management and conflict resolution (Valente et al., 2019; Valente and Lourenço, 2020). Conversely, teachers with low emotional competence have difficulty attending to students' needs and successfully managing behavioral problems in the classroom (Nizielski et al., 2012). However, the empirical evidence on associations between emotion regulation and teaching effectiveness is inconsistent. Aldrup et al. (2024) found mixed results in their systematic review, suggesting that these associations are weaker and more complex than commonly assumed. Third, emotional competence plays an important role in the implementation of social-emotional learning (SEL). The increasing demands for teachers to provide SEL require corresponding emotional competencies (Schonert-Reichl, 2017). Research evidence shows that emotionally competent teachers are more likely to value and understand SEL goals and positively socialize students' emotions (Lee, 2024; Valiente et al., 2020; Zinsser et al., 2015). Fourth, teachers' emotional skills have important implications for creating a positive classroom climate and implementing emotionally supportive practices (Shewark et al., 2018; Zinsser et al., 2015). Such emotional support has been shown to enhance prosocial behavior in preschoolers (Pakarinen et al., 2020). However, a recent meta-analysis by Gebre et al. (2025) found only a weak correlation ($r = 0.120$) between teachers' socio-emotional competence and student engagement across 21 studies. Similarly, Aldrup et al. (2022) examined teacher empathy in relation to teacher-student relationships and student outcomes but found no significant effects.

These partly mixed findings suggest that the relationship between teachers' emotional competencies and student outcomes may be more complex and context-dependent than previously assumed. This aligns with the central premise of the Prosocial Classroom Model, which suggests that teacher emotional competence is associated with student outcomes through mediating mechanisms such as teacher-student relationship quality rather than through direct effects. While related research has demonstrated mediation pathways from teacher-student relationship quality to peer acceptance, with classroom engagement mediating this association (Hughes and Kwok, 2006), studies examining teacher emotional competence as the initial predictor in mediation models have focused primarily on academic outcomes (Chamizo-Nieto et al., 2021) or learning engagement (Wang et al., 2024) rather than student social integration. This leaves a gap in understanding whether and how teacher emotional competence relates to student social outcomes through relationship-mediated pathways,

particularly given the absence of studies examining both direct effects on social integration and mediation through teacher-student relationships.

1.5 Methodological considerations

The mixed empirical findings regarding teacher emotional competence effects may reflect several methodological and theoretical shortcomings that have not been consistently addressed in previous research. First, much of the existing research has focused on global measures of student adjustment or academic achievement, with less attention to specific social outcomes such as peer relationships or social integration. Emotional competence may be particularly relevant for social-emotional rather than purely academic domains (Jennings and Greenberg, 2009). Given this theoretical emphasis, the use of broader outcome measures in previous research may have obscured important effects. Second, many studies have relied on single-informant designs, often using only teacher self-reports of both emotional competence and student outcomes (Podsakoff et al., 2003, 2012; Spector, 2006). This approach may inflate observed associations due to shared method variance and may not adequately capture students' own perspectives on their social experiences. Third, even when student-reported outcomes are included, studies rarely combine multiple methods of assessing student outcomes, such as both self-reports and peer nominations, which capture different aspects of social functioning and together provide a more comprehensive assessment (Cillessen and Marks, 2011; Hughes and Chen, 2011).

Beyond these measurement concerns, the hierarchical structure of educational data, with students nested within classrooms and schools, has not always been addressed through appropriate multilevel analyses, which may lead to biased estimates and incorrect inferences about teacher effects (Hox et al., 2017; Raudenbush and Bryk, 2002). Moreover, the majority of research has examined direct effects of teacher emotional competence without systematically testing mediation hypotheses. This approach may miss important indirect pathways through which emotional competence is associated with student outcomes (Hayes, 2009; MacKinnon et al., 2007) and may contribute to the inconsistent pattern of findings observed across studies.

1.6 The present study

The present study addresses these methodological gaps and a theoretical limitation in the application of the Prosocial Classroom Model to social integration by examining both direct and indirect pathways through which teacher emotional competence may be associated with multiple indicators of social integration in elementary classrooms. While the model's mediation hypothesis has been tested primarily for academic outcomes (Chamizo-Nieto et al., 2021) and learning engagement (Wang et al., 2024), its applicability to social integration outcomes remains largely unexplored.

Our approach extends previous research by combining several methodological strategies that address limitations of prior studies. First, we focus specifically on social integration outcomes

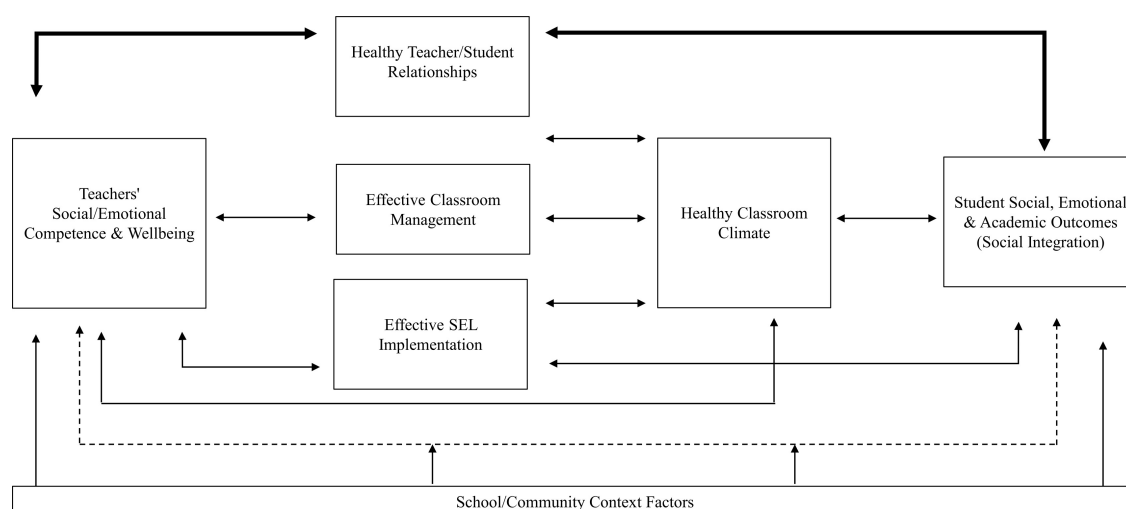


FIGURE 1

The Prosocial Classroom Model [adapted from Jennings and Greenberg (2009)]. The pathways examined in this study include the mediation pathway (bold arrows) and the direct pathway (dashed arrow) from teachers' emotional competence to student outcomes.

rather than global measures of student adjustment or academic achievement, allowing for precise examination of teacher emotional competence effects in the social-emotional domain where such effects may be most pronounced (Jennings and Greenberg, 2009). Second, we employ a multi-informant approach that includes students' own perspectives rather than relying solely on teacher reports, addressing concerns about common method bias in single-informant designs (Podsakoff et al., 2012; Spector, 2006). Third, we use multiple methods to assess social integration, including students' self-reports of social integration as well as sociometric peer nominations of social acceptance and rejection (Cillessen and Marks, 2011; Hughes and Chen, 2011). This methodological strategy allows for examination of both self-perception and perception of others regarding peer relationship patterns, providing a more comprehensive assessment of social integration than studies relying on single indicators.

Beyond these measurement strategies, we utilize multilevel modeling approaches that explicitly account for the nested structure of students within classrooms, addressing methodological limitations noted in previous research (Raudenbush and Bryk, 2002; Hox et al., 2017). This analytical strategy allows for unbiased parameter estimation by appropriately partitioning variance across classroom and student levels.

Figure 1 illustrates the application of the prosocial classroom model to the current study tested in this study, showing the hypothesized mediation pathway from teachers' emotional competence to students' social integration through teacher-student relationship quality, as well as the direct pathway we examine in our analyses.

While the Prosocial Classroom Model proposes multiple interconnected pathways (teacher-student relationships, classroom management, and social-emotional instruction), we focus specifically on the relational pathway, which has been meta-analytically associated with students' peer relationships (Endedijk et al., 2022). Given the scope of the larger research project, we prioritized comprehensive assessment of this pathway,

recognizing that future research should examine the other proposed mechanisms.

Based on the prosocial classroom model and the methodological considerations outlined above, we formulate three specific hypotheses:

Hypothesis 1 (absence of direct effects): Given the Prosocial Classroom Model's theoretical emphasis on relationship-mediated mechanisms and prior mixed findings regarding direct teacher effects on social outcomes, we hypothesize that teachers' emotional competence does not show significant direct effects on students' social integration.

Hypothesis 2 (mediation effects): We hypothesize that teacher-student relationship quality mediates the relationship between teachers' emotional competence and students' social integration, such that higher emotional competence is associated with improved teacher-student relationships, which in turn relates to greater social integration.

Hypothesis 3 (construct specificity): Given the different mechanisms underlying self-perception versus peer perception of social integration, we hypothesize that mediation effects are stronger for self-reported social integration than for peer nomination measures, reflecting the greater sensitivity of self-perception indicators to teacher-student relationship quality.

2 Materials and methods

2.1 Participants

Data for this study are collected within the framework of the *Multimo* Project at the University of Cologne. *Multimo* is a multi-tiered, multimodal, and multiprofessional intervention designed to foster emotional and social competencies and to prevent externalizing behavior in elementary school settings in North Rhine-Westphalia, Germany (Hanisch et al., 2019). In the German education system, elementary school typically comprises grades

one through four. Children with special educational needs either attend special schools or are integrated into general education classes. The schools in our sample follow inclusive education practices, integrating students with and without special educational needs. The data used in the present study are collected at the first measurement point of a four-wave longitudinal study and represent a cross-sectional survey conducted in October 2020, approximately 2 months after the start of the school year. The sample includes 43 first-grade classes across 18 elementary schools (see Table 1), corresponding to 2–4 classes per school. Class sizes range from 2 to 26 participating students ($M = 14.37$, $SD = 5.92$). Classes with fewer than five participating students were excluded from sociometric analyses. Specific sample sizes for each analysis are reported in the respective results sections.

The gender distribution shows that 95.3% of the teachers are female, while 4.7% do not specify their gender. Most teachers are between 31 and 40 years of age (34.9%, see Table 1). Teaching experience ranges from 1 to 32 years ($M = 14.18$, $SD = 8.38$), reflecting a broad spectrum of professional experience within the sample. The student sample includes 618 first-grade students. Gender distribution showed 48.4% female and 51.0% male participants, with an average age of 6.08 years ($SD = 0.332$), ranging from 5.0 to 7.0 years.

2.2 Measurements

2.2.1 Emotional competence (EC)

Emotional competence is measured with the emotional competence questionnaire (EKF- Emotionale-Kompetenz-Fragebogen, Rindermann, 2009), a validated German questionnaire for both self- and external assessment of emotional competences. In the present study, only the self-report version is administered.

The EKF is grounded in theoretical models by Mayer and Salovey (1997) and captures EC across four dimensions: (1) perception and understanding of one's own emotions ("I usually understand why I am in a particular mood"); (2) perception of others' emotions ("In the course of conversations, I quickly recognize how my conversation partner is doing and when their mood changes"); (3) regulation and control of one's own emotions ("When I feel anger rising within me, I know how to calm myself down again") and (4) expression of emotions ("I can describe my feelings well to other people"). The questionnaire includes 62 items rated on a five-point Likert scale. In the current sample internal consistencies were excellent for the total score ($\alpha = 0.97$) and all subscales: perception and understanding of one's own emotions ($\alpha = 0.95$), perception of others' emotions ($\alpha = 0.95$), regulation and control of one's own emotions ($\alpha = 0.92$), and expression of emotions ($\alpha = 0.91$). Intercorrelations among subscales varied ($r_s = -0.04$ to $.65$), reflecting the multidimensional nature of the construct. Nevertheless, the high total score reliability and Rindermann's (2009) theoretical framework support the use of a composite score for examining overall emotional competence. However, to explore whether specific dimensions of emotional competence show differential associations with teacher-student relationships and student outcomes, we also conducted exploratory dimension-specific mediation analyses (see section "3.5 Exploratory analyses of emotional competence dimensions").

2.2.2 Social integration

2.2.2.1 Self-perceived social integration

The Questionnaire for the Assessment of Emotional and Social School Experiences of First and Second Graders (FEES 1-2), developed by Rauer and Schuck, 2004, is a validated German-language survey tool that measures emotional and social school experiences. It is divided into two main domains: (1) Social Climate and Self-Concept of Ability (with 3 scales); (2) School and Learning Climate (with 4 scales). In the present study, only the Social Integration scale from the first domain is used. This scale measures the "extent to which a student feels accepted and welcomed by their peers as a full member of the group" (Rauer and Schuck, 2004, p. 12). The scale consists of 11 items, such as "I feel comfortable in my class" and "I'm allowed to join in when playing in the schoolyard." Participants respond to these items with either "true" or "false." The internal consistency in the current sample is $\alpha = 0.69$, which falls within an acceptable range for research purposes.

2.2.2.2 Peer nominations

To complement students' self-reported perceptions, a sociometric peer assessment was conducted. Originally developed by Moreno (1953), sociometry offers a systematic method for identifying patterns of affiliation and rejection within social groups. By surveying each student in the classroom, it becomes possible to map the social dynamics—specifically, interpersonal preferences and aversions—within the peer group (Cillessen and Bukowski, 2018). In the present study, two questions are used as indicators of peer acceptance and rejection: "Which classmates would you most like to sit next to?" and "Which classmates would you rather not sit next to?" Students are allowed to name an unlimited number of peers (Cillessen and Bukowski, 2018), as unlimited nominations yield more stable sociometric constructs and higher correlations with social behavior measures compared

TABLE 1 Participants.

Teachers ($n = 43$)			
Variable	Category	n	%
Sex	Female	41	95.3
	Not specified	2	4.7
Age (years)	20–30	10	23.3
	31–40	15	34.9
	41–50	10	23.3
	51–60	6	14.0
	Missing	2	4.7
Professional experience	Mean (SD)	14.18 (8.38) years	–
(years, incl. teacher training)	Range	1–32 years	–
Students ($n = 618$)			
Variable	Category	n	%
Sex	Female	299	48.4
	Male	315	51.0
	Not specified	4	0.6
Age	Mean (SD)	6.08 (0.332) years	–
	Range	5.0–7.0 years	–

to limited nominations (Terry, 2000). Consistent with evidence that acceptance and rejection have different trajectories and effects (García Bacete et al., 2021), this study analyzes likes and dislikes separately rather than using composite social preference scores. Nominations received are converted to percentage scores by dividing the number of nominations by the total possible nominators (class size minus one) and multiplying by 100, allowing for direct comparison across classrooms of varying sizes (García Bacete et al., 2021).

2.2.3 Teacher-student-relationship

The teacher-student relationship is assessed using the Student Perception of Affective Relationship with Teacher Scale (SPARTS, orig.: Koomen and Jellesma, 2015, German adaptation: Leidig et al., 2019), which emphasizes the students' perspective on the relationship. The German-language version of SPARTS used in this study has not yet been validated and is based on the Dutch short version, which includes two subscales—Closeness and Conflict—with a total of 12 items (Zee and de Bree, 2017). The Closeness scale captures students' positive feelings toward their teacher as well as the trust they have in the teacher during challenging times ("I tell my teacher things that are important to me"). The Conflict scale assesses how students perceive the extent of negative behaviors, anger, and distrust in their relationship with the teacher ("I often get into arguments with my teacher"). The 12 items are rated on a three-point Likert scale (agree, sometimes agree, disagree). The internal consistency in the current sample is $\alpha = 0.62$ (Closeness) and $\alpha = 0.59$ (Conflict). Due to insufficient internal consistency of the Conflict subscale, only the Closeness subscale is used in subsequent analyses.

2.3 Procedures

Following written informed consent from all participants, data collection took place in October 2020. Teacher emotional competence data are collected via self-report questionnaires that are sealed in envelopes and returned to the research team through school administration. Student assessments are conducted by trained research assistants in separate rooms. Assistants read

all items aloud and record responses to ensure comprehension among first-grade participants. For sociometric questions, peer nominations are converted to anonymous ID codes. COVID-19 safety protocols are followed throughout data collection. The study is approved by the ethics committee of the University of Cologne (registration number: THHF0089).

2.4 Statistical analyses

All analyses are conducted in R (version 4.5.0) using the *lme4* package for multilevel models (Bates et al., 2015) and the *mediation* package for mediation analyses (Tingley et al., 2014). The nested structure of the data (students within classrooms) is accounted for through multilevel modeling approaches throughout all analyses (random intercept models). Given that teachers' emotional competence varies only between classrooms, we conduct multilevel mediation analyses at the classroom level. This approach is consistent with previous research examining how teacher characteristics relate to student outcomes through classroom processes (Hu et al., 2021; Tofighi and Thoemmes, 2014) and allows for appropriate examination of between-classroom mediation pathways. Teachers' emotional competence is grand-mean centered to facilitate interpretation. Direct effects are estimated with multilevel regression models, while Monte Carlo simulation with 1,000 iterations is used to compute confidence intervals for indirect effects (Krull and MacKinnon, 2001). Classrooms with fewer than five participating students are excluded from sociometric analyses, and missing item-level data are handled using predictive mean matching (Eekhout et al., 2014). Model assumptions are checked through visual inspection of residuals and random effects distributions.

3 Results

3.1 Descriptive statistics and correlations

Table 2 presents descriptive statistics for all study variables. Students report high levels of social integration ($M = 0.83$,

TABLE 2 Descriptive statistics and correlations of the study variables.

Variable	Teachers' emotional competence	Students' social integration	Teacher-student closeness	Peer acceptance	Peer rejection	<i>M</i> (SD)
Teachers' emotional competence						3.08 (0.48)
Students' social integration	0.11* [0.02, 0.20]					0.83 (0.18)
Teacher-student closeness	0.24** [0.16, 0.32]	0.14** [0.05, 0.22]				1.65 (0.34)
Peer acceptance	−0.04 [−0.13, 0.05]	0.11* [0.02, 0.20]	0.01 [−0.08, 0.10]			2.17 (1.84)
Peer rejection	0.01 [−0.08, 0.10]	−0.13** [−0.22, −0.05]	−0.09 [−0.17, 0.00]	−0.12* [−0.20, −0.03]		1.57 (2.04)

This table presents Pearson correlation coefficients with pairwise deletion. Values in brackets represent 95% confidence intervals. * $p < 0.05$, ** $p < 0.01$.

SD = 0.18 on a 0–1 scale) and perceive high closeness with their teachers ($M = 1.65$, SD = 0.34 on a 0–2 scale). Teacher-student conflict is reported at low levels ($M = 0.23$, SD = 0.31 on a 0–2 scale). Teachers' self-reported emotional competence is generally moderately high ($M = 3.07$, SD = 0.48 on a 0–4 scale). Sociometric data reveal that peer acceptance nominations average 13.88% of possible nominations (SD = 11.64%, range = 0%–66.67%), while peer rejection nominations are lower at 9.71% of possible nominations (SD = 12.51%, range = 0%–88.89%). The standardized percentage scores allow for meaningful comparison across classrooms of varying sizes.

Correlation analyses reveal several associations. Teachers' emotional competence is significantly correlated with students' self-reported social integration ($r = 0.11$, $p < 0.05$) and teacher-student closeness ($r = 0.24$, $p < 0.01$), providing preliminary support for the hypothesized relationships. Teacher-student closeness shows a small positive correlation with social integration ($r = 0.14$, $p < 0.01$), suggesting that students who perceive closer relationships with their teachers also report higher levels of social integration. Additionally, peer acceptance and rejection are negatively correlated ($r = -0.12$, $p < 0.05$), and peer rejection shows a negative association with social integration ($r = -0.13$, $p < 0.01$), indicating that students experiencing peer rejection tend to report lower self-perceived integration. These correlation patterns provide the foundation for testing the proposed mediation hypotheses.

The results of the main analyses are organized according to the three specific hypotheses formulated for this study. First, we examine direct effects of teachers' emotional competence on social integration outcomes (Hypothesis 1). Second, we test mediation effects through teacher-student relationship quality (Hypothesis 2). Finally, we analyze construct-specific patterns across different indicators of social integration (Hypothesis 3).

3.2 Hypothesis 1: absence of direct effects of teachers' emotional competence

To test Hypothesis 1, which predicts no direct effects of teachers' emotional competence on students' social integration, three separate multilevel regression models are conducted. Teachers' emotional competence showed no significant effects on any of the outcome measures: self-reported social integration ($\beta = 0.06$, $p = 0.090$, 95% CI $[-0.01, 0.12]$), peer acceptance ($\beta = -0.10$, $p = 0.966$, 95% CI $[-4.96, 4.75]$), or peer rejection ($\beta = 0.60$, $p = 0.788$, 95% CI $[-3.77, 4.97]$). The models reveal similar multilevel structures across outcomes. Peer rejection showed the lowest classroom-level variance (ICC = 0.06), followed by self-reported social integration (ICC = 0.07), while peer acceptance demonstrated the highest classroom variance (ICC = 0.11). Overall, results support Hypothesis 1, demonstrating no direct effects of teachers' emotional competence across social integration indicators.

3.3 Hypothesis 2: mediation effects through teacher-student relationship quality

To test whether the association between teachers' emotional competence and students' social integration operates through indirect pathways, Hypothesis 2 examines teacher-student relationship quality as a potential mediator. Three separate multilevel mediation analyses are conducted for each social integration indicator.

3.3.1 Mediation analysis for self-reported social integration

The mediation analysis for self-reported social integration ($N = 482$ students, 38 teachers) reveals a significant mediation pathway. The indirect effect through teacher-student closeness is small but statistically significant (ACME = 0.022, 95% CI $[0.001, 0.046]$, $p = 0.046$). The direct effect is non-significant (ADE = 0.040, 95% CI $[-0.028, 0.102]$, $p = 0.240$), while the total effect is statistically significant (Total Effect = 0.062, 95% CI $[0.001, 0.125]$, $p = 0.048$). These results indicate that the association between teachers' emotional competence and students' social integration operates primarily through the indirect pathway via teacher-student relationship quality, with no evidence of a significant direct effect.

3.3.2 Mediation analysis for peer acceptance

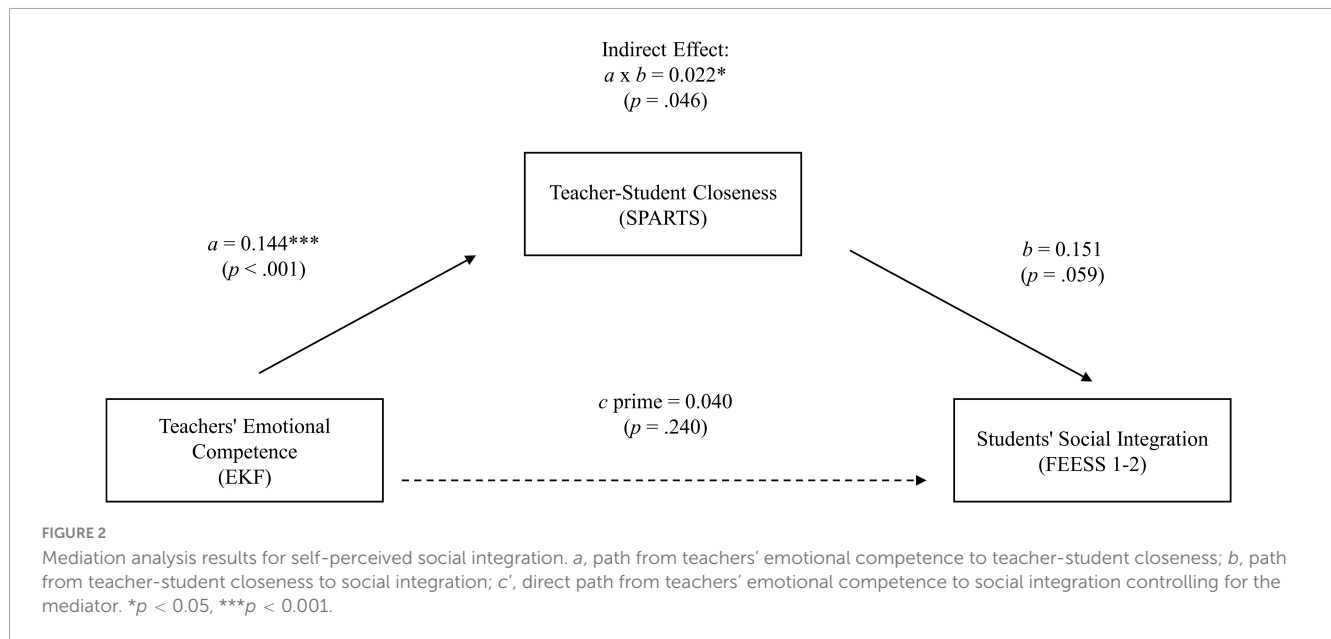
The mediation analysis for peer acceptance ($N = 502$ students, 37 teachers) yields no evidence for mediation effects. Neither the indirect effect through teacher-student closeness (ACME = 0.30, 95% CI $[-1.33, 1.92]$, $p = 0.736$), the direct effect (ADE = -0.48 , 95% CI $[-5.85, 4.69]$, $p = 0.860$), nor the total effect (Total Effect = -0.18 , 95% CI $[-5.15, 4.78]$, $p = 0.928$) reached statistical significance.

3.3.3 Mediation analysis for peer rejection

The mediation analysis for peer rejection ($N = 502$ students, 37 teachers) shows no significant mediation effects. The indirect effect through teacher-student closeness is non-significant (ACME = -1.19 , 95% CI $[-2.73, 0.17]$, $p = 0.084$), as are both the direct effect (ADE = 1.67, 95% CI $[-2.40, 5.72]$, $p = 0.432$) and the total effect (Total Effect = 0.48, 95% CI $[-3.49, 4.33]$, $p = 0.790$).

Figure 2 illustrates the significant mediation pathway for self-reported social integration, showing how teachers' emotional competence relates to students' social integration through teacher-student closeness.

The results provide preliminary support for Hypothesis 2, with a significant though small mediation effect observed for self-reported social integration but not for peer-rated outcomes. The mediation pattern for self-reported integration suggests support for the predicted pathway from teachers' emotional competence through teacher-student relationship quality to student outcomes.



3.4 Hypothesis 3: construct-specific patterns across social integration indicators

To test Hypothesis 3, which predicts stronger mediation effects for self-reported social integration than for peer nomination measures, we compare the mediation patterns across the three social integration indicators examined in Hypothesis 2.

The mediation analyses reveal construct-specific differences that provide partial support for Hypothesis 3. A significant indirect effect through teacher-student relationship quality is found for students' self-reported social integration (ACME = 0.022, $p = 0.046$), while no significant indirect effects emerge for peer-rated outcomes (peer acceptance: ACME = 0.30, $p = 0.736$; peer rejection: ACME = -1.19, $p = 0.084$). These findings suggest that self-perception indicators of social integration may be more sensitive to teacher-student relationship quality than peer evaluation measures, though formal statistical comparisons of effect sizes would be needed to confirm differential effect strengths.

3.5 Exploratory analyses of emotional competence dimensions

Given the significant mediation effect observed for self-reported social integration, we conducted exploratory analyses to identify which specific dimensions of teachers' emotional competence contributed to this indirect pathway. We conducted separate multilevel mediation analyses for each of the four EKF subscales, examining their indirect effects on students' self-perceived social integration through teacher-student relationship quality. Regulation and control of one's own emotions showed a significant indirect effect (ACME = 0.012, 95% CI [0.001, 0.024], $p = 0.044$), as did expression of emotions (ACME = 0.009, 95% CI [0.0005, 0.018], $p = 0.038$). In contrast, neither perception and understanding of one's own emotions (ACME = 0.009, 95% CI

[-0.0002, 0.020], $p = 0.062$) nor perception of others' emotions (ACME = -0.003, 95% CI [-0.012, 0.003], $p = 0.312$) showed significant indirect effects. When examined separately, none of the dimensions showed significant direct effects (all $ps > 0.36$) or total effects (all $ps > 0.07$).

3.6 Overall summary of results

The analyses provide a comprehensive test of the hypothesized relationship patterns between teachers' emotional competence, teacher-student relationship quality, and students' social integration. Results are consistent with Hypothesis 1, with teachers' emotional competence showing no significant direct effects on students' social integration. Hypothesis 2 receives empirical support, with a significant though small mediation effect found for self-reported social integration, supporting the core theoretical mechanism. Hypothesis 3 receives partial support, with evidence for construct-specific differences: a significant mediation effect emerges for self-reported integration but not for peer-rated outcomes, consistent with differential sensitivity of different social integration measures to teacher-student relationship quality. Exploratory analyses of emotional competence dimensions reveal that regulation and control of emotions, as well as expression of emotions, show significant indirect effects, while perception dimensions do not. These findings collectively support a nuanced understanding of how teachers' emotional competence relates to student social integration through relationship-mediated pathways that vary systematically across different dimensions of social functioning.

4 Discussion

The present study examines whether teachers' emotional competence is associated with students' social integration directly

or indirectly through teacher-student relationship quality in elementary classrooms. Using multilevel mediation analysis across multiple indicators of social integration, our findings provide initial evidence for relationship-mediated pathways linking teachers' emotional competence to student social integration. The results advance understanding of the mechanisms through which teachers' emotional competence may relate to students' social experiences and underscore the importance of teacher-student relationship quality in this process.

4.1 Absence of direct effects (Hypothesis 1)

The findings are consistent with Hypothesis 1, showing that teachers' emotional competence has no significant direct effects on students' on any of the social integration indicators examined, validating theoretical expectations based on the Prosocial Classroom Model's emphasis on indirect mechanisms. These findings align with [Valente and Lourenço \(2020\)](#), [Valente et al. \(2019\)](#), who demonstrated that emotional competence primarily operates through classroom management and conflict resolution processes rather than through direct effects on student outcomes. Similarly, our results mirror [Aldrup et al.'s \(2024\)](#) systematic review findings, which found limited evidence for direct associations between teachers' emotion regulation and student outcomes.

4.2 Validation of mediation pathways (Hypothesis 2)

Hypothesis 2 receives empirical support, with the observed mediation pattern for self-reported social integration providing preliminary evidence of our theoretical predictions. The significant indirect effect through teacher-student closeness, combined with the non-significant direct effect, suggests that teachers' emotional competence is associated with students' self-perceived social integration through teacher-student relationship quality rather than through direct pathways. The small effect size observed in our study aligns with [Gebre et al.'s \(2025\)](#) meta-analytic finding of only weak correlations ($r = 0.120$) between teachers' socio-emotional competence and student engagement. This pattern suggests that emotional competence represents one component within a broader system of factors associated with student social integration, with relationship quality serving as a key mechanism through which this association operates.

4.3 Partial support for construct-specificity (Hypothesis 3)

Hypothesis 3 receives partial empirical support, with the findings demonstrating construct-specific differences in mediation effects across different indicators of social integration. Consistent with our predictions, a significant mediation effect emerges for self-reported social integration but not for peer nomination measures,

supporting our expectation that self-perception indicators are more sensitive to teacher-student relationship quality than peer evaluations. The contrast between the significant mediation effect for self-reported integration and the absence of effects for peer-rated outcomes supports theoretical distinctions between self-perception and others' perception as indicators of social integration ([Goodenow, 1993](#); [Osterman, 2000](#)). Students' perceptions of their social integration appear more closely linked to their relationships with teachers and the emotional climate these relationships create, while peer nomination patterns may operate through different social dynamics that are largely independent of teacher-student relationship quality.

Although the indirect effect for peer rejection did not reach statistical significance, the effect direction is theoretically consistent with [Endedijk et al.'s \(2022\)](#) meta-analytic finding that teacher-student relationship quality exerts its strongest influence on negative peer dynamics. This suggests that the mediation pathway from teachers' emotional competence through relationship quality may still play a small role in mitigating peer rejection, even if the effect did not reach statistical significance in the present sample.

4.4 Differential effects across emotional competence dimensions

Exploratory subscale analyses reveal that regulation and expression of emotions show significant indirect effects through teacher-student relationship quality, whereas perception dimensions did not reach statistical significance. However, the near-significant effect for perception and understanding of one's own emotions ($p = 0.062$) suggests that this dimension may show significant associations with larger samples. This suggests that the behavioral aspects of emotional competence (how teachers manage and communicate emotions) may be more critical for relationship building than cognitive-perceptual aspects (recognizing emotions), with regulatory and expressive behaviors constituting the proximal mechanisms through which emotional competence influences students' social integration.

4.5 Implications for theory and practice

The findings support mediation models over direct-effect models for understanding how teacher emotional competence relates to student outcomes, providing preliminary support for the prosocial classroom model's core predictions ([Jennings and Greenberg, 2009](#)). The mediation pattern suggests that emotional competence operates through proximal relational processes rather than through direct effects on student outcomes.

For professional development and teacher education, the mediation results indicate that emotional competence training may support improved relationship quality, aligning with research showing that teachers' emotional competence is associated with more positive teacher-student relationships ([Poulou and Garner, 2024](#)). This suggests that interventions focused on teachers' emotional skills may yield broader relational benefits than initially anticipated. However, given that relationship quality represents a key mechanism for student social and emotional development

(Chen et al., 2020; Roorda et al., 2017), programs seeking to maximize effects on student social integration might consider integrating approaches that focus specifically on developing teachers' capacity to build positive, supportive relationships with students.

The construct-specific nature of the effects also indicates that comprehensive approaches to promote student social integration should include multiple intervention targets. While our findings suggest that teacher-focused factors relate to students' self-perception of social integration, additional peer-focused strategies may be needed to address peer relationship dynamics as assessed through peer nominations. These might include social skills training, cooperative learning structures, or peer mediation programs that directly target peer interactions and classroom social dynamics.

4.6 Limitations and future directions

Several important limitations of the current study should be acknowledged. First, the cross-sectional design limits causal inferences, as such designs cannot establish temporal precedence or rule out alternative causal orderings (Cole and Maxwell, 2003). Additionally, shared method variance from single-timepoint assessment may inflate observed relationships (Podsakoff et al., 2012), and teachers' and students' perceptions may be influenced by momentary classroom dynamics or reciprocal influences. Longitudinal research is needed to establish temporal precedence and examine how teacher emotional competence and relationship quality develop over time. Second, the study relies exclusively on self-report measures for teachers' emotional competence, which may be subject to social desirability bias (Donaldson and Grant-Vallone, 2002) and may not capture emotional competence as manifested in classroom interactions. Future studies should consider complementary approaches such as performance-based assessments (MacCann and Roberts, 2008; Mayer et al., 2003), observational measures (Hamre et al., 2013), or multi-informant ratings to provide more comprehensive assessment.

Third, the small magnitude of the mediation effect limits conclusions about the practical importance of teacher emotional competence for student social integration. These modest effect sizes may reflect measurement limitations or indicate that teacher emotional competence represents one contributing factor within a broader system of influences (Pianta et al., 2016). Fourth, the reliability of the teacher-student closeness measure is below conventional thresholds, which may have attenuated the observed relationships and suggests that our findings may represent conservative estimates of true associations. This limitation may reflect the use of an unvalidated German short form of the SPARTS.

Additionally, several sample-related limitations constrain generalizability. The construct validity of relationship measures such as "closeness" and "conflict" may vary across cultural contexts, with considerable differences in how teacher-student relationships are conceptualized between Global North and Global South settings, particularly regarding the balance between relatedness and autonomy in relationships (Markus and Kitayama, 1991; Rothbaum and Trommsdorff, 2007). Furthermore, the study's focus on first-grade students in German elementary

schools limits generalizability across developmental stages and educational systems. Data collection approximately two months after school start meant limited time for relationship development, potentially constraining observed associations. Future research should examine whether these patterns generalize to other cultural contexts, educational systems, across different developmental stages and later timepoints.

4.7 Conclusion

This study provides preliminary evidence that teachers' emotional competence relates to students' social integration through teacher-student relationship quality, with a significant mediation effect observed for students' self-reported social integration but not for peer-rated outcomes. While the mediation effect is statistically significant, its small magnitude suggests that emotional competence represents one component within a broader system of factors associated with student social integration. The findings support the importance of emotional competence as a contributing professional capacity that enables teachers to build supportive relationships that may enhance students' social-emotional development.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by the ethics committee of the University of Cologne (registration number: THHF0089). The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

Author contributions

HR: Validation, Data curation, Project administration, Visualization, Methodology, Formal Analysis, Investigation, Conceptualization, Writing – review & editing, Writing – original draft. THE: Writing – review & editing, Resources, Funding acquisition, Supervision, Conceptualization, Project administration. THa: Data curation, Conceptualization, Writing – review & editing, Supervision. JK: Investigation, Conceptualization, Writing – review & editing, Funding acquisition, Data curation, Project administration. JN: Investigation, Conceptualization, Project administration, Writing – review & editing, Data curation. KE: Project administration, Writing – review & editing, Data curation, Conceptualization, Investigation.

PK: Writing – review & editing, Supervision, Methodology, Data curation, Validation, Investigation, Formal analysis. LV: Writing – review & editing, Investigation, Conceptualization, Project administration, Data curation. CH: Supervision, Writing – review & editing, Conceptualization, Methodology, Funding acquisition, Resources, Project administration.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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