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The flip side of teacher enthusiasm?

Relations between teaching enthusiasm and socio-emotional support under consideration of different perceptions of teachers and students

Mareike Trauernicht ⓘ · **Rebecca Lazarides** ⓘ

Abstract Research suggests that enthusiastic teachers show good teaching. At the same time, based on flow theory, it can be hypothesized that high enthusiasm is associated with a limited ability to perceive others' needs. Hence, this study examines the relation between teaching enthusiasm and socio-emotional support. Based on questionnaire data from 89 mathematics teachers (61.8% women) and their 1716 students (50.0% girls), manifest multilevel analyses show that higher student-perceived teaching enthusiasm was associated with higher perceived socio-emotional support. In addition, the difference between student- and teacher-perceived support was lower for high student-perceived teaching enthusiasm. However, teacher-reported teaching enthusiasm was neither related to student-perceived socio-emotional support nor to the difference between teacher and student perceptions of teacher support. The study indicates that a multi-perspective assessment of motivation and teaching behavior may contribute to a better understanding of their correlates.

Keywords Teaching enthusiasm · Socio-emotional support · Different perceptions

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Die Kehrseite des Lehrkräfte-Enthusiasmus?

Zusammenhänge zwischen Lehr-Enthusiasmus und sozio-emotionaler Unterstützung unter Berücksichtigung unterschiedlicher Wahrnehmungen von Lehrkräften und Lernenden

Zusammenfassung Studien legen nahe, dass enthusiastische Lehrkräfte guten Unterricht gestalten. Gleichzeitig kann basierend auf der Flow-Theorie angenommen werden, dass hoher Enthusiasmus mit einer eingeschränkten Fähigkeit zur Wahrnehmung der Bedürfnisse anderer einhergeht. In dieser Studie wird daher der Zusammenhang zwischen Lehr-Enthusiasmus und sozio-emotionaler Unterstützung untersucht. Basierend auf Fragebogendaten von 89 Mathematiklehrkräften (61,8 % Frauen) und ihren 1716 Schüler:innen (50,0 % Mädchen) zeigen manifeste Mehrebenen-Analysen, dass ein höherer schülerperzipierter Lehr-Enthusiasmus mit einer stärkeren wahrgenommenen Unterstützung einherging. Zudem war der Unterschied zwischen schüler- und lehrkraftperzipierter Unterstützung geringer bei hohem schülerperzipiertem Lehr-Enthusiasmus. Von den Lehrkräften selbst berichteter Lehr-Enthusiasmus hing dagegen weder mit schülerperzipierter sozio-emotionaler Unterstützung zusammen noch mit dem Unterschied zwischen lehrkraft- und schülerperzipierter Lehrkraft-Unterstützung. Die Studie verdeutlicht, dass die multiperspektivische Erfassung von Motivation und Unterrichtsverhalten zu einem besseren Verständnis ihrer Korrelate beitragen kann.

Schlüsselwörter Lehr-Enthusiasmus · Sozio-emotionale Unterstützung · Unterschiedliche Wahrnehmung

1 Introduction

For more than 50 years, researchers have studied the role of enthusiastic teachers in schools (for an overview, see Keller et al. 2016). On a theoretical level, the model of teachers' professional competence (cf. Baumert and Kunter 2013) describes teacher enthusiasm as an important prerequisite for high-quality teaching, leading to positive learning outcomes in students. Several empirical studies confirm these assumptions and show positive relations between teachers' enthusiasm and effective teaching behaviors (e.g., Kunter et al. 2013, 2008), as well as students' motivation and emotions (e.g., Frenzel et al. 2009; Keller et al. 2014; Patrick et al. 2000). However, it is still an unresolved question whether teaching enthusiasm also promotes teachers' socio-emotional support toward students, which is highly important for students' academic development in school (e.g., Schuitema et al. 2016). Whereas the model of teachers' professional competence (cf. Baumert and Kunter 2013) generally assumes that high levels of teacher enthusiasm enhance high-quality teaching behaviors, without addressing the role of different perspectives, theoretical work based on flow theory (cf. Csikszentmihalyi 1996) contrastingly suggests that individuals experiencing high enthusiasm in regard to an activity become extremely focused and absorbed by the task. Applied to the classroom context, this may indicate that more enthusiastic teachers are less able to perceive and react to their students' social and emotional

needs than teachers who are less enthusiastic, although they may not realize it themselves. However, empirical studies have not yet investigated this assumption, especially with regard to different viewpoints on teacher enthusiasm and teacher socio-emotional support. Hence, with this study we aim to examine whether there is a flip side of teacher enthusiasm by shedding light on the relations between teacher-reported (experienced) and student-reported (displayed) teaching enthusiasm and (divergent views on) socio-emotional support from mathematics teachers in German secondary schools. We focus on mathematics because of its high academic importance (cf. OECD 2020) and because there is a strong decline in students' interest in mathematics during secondary school years (cf. Watt 2004).

2 Theoretical considerations and empirical findings

2.1 Teacher enthusiasm

Teacher enthusiasm is "an affective, person-specific characteristic that reflects the subjective experience of enjoyment, excitement, and pleasure" (Kunter et al. 2011, p. 290), expressed by (mainly nonverbal) behavior (cf. Keller et al. 2016). The theoretical model of teachers' professional competence (cf. Baumert and Kunter 2013) considers teacher enthusiasm as the emotional component of teachers' motivational orientations. Motivational orientations, in turn, are seen as crucial to teachers' ability to teach effectively in class in order to foster student learning. In line with these assumptions, several studies have demonstrated that teacher enthusiasm is related to effective teaching behaviors in class, such as better handling of classroom disruptions and more learning support (e.g., Baier et al. 2019; Kunter et al. 2013, 2008; Lazarides et al. 2021). Only a few studies have examined and shown positive relations to higher levels of socio-emotional support (cf. Kunter et al. 2008).

Researchers distinguish between teaching enthusiasm—focusing on the affective experience of the teaching activity itself—and topic-related subject enthusiasm (cf. Kunter et al. 2011), such as the enthusiasm toward mathematics. Topic-related subject enthusiasm, however, has been shown to be less relevant for the quality of teaching behaviors in class (cf. Kunter et al. 2008), which is why this study focuses on teaching enthusiasm. Researchers have proposed that teacher enthusiasm is comprised of two different aspects: the enthusiasm the teacher experiences in class and the enthusiasm that the teacher displays in class (cf. Keller et al. 2014). The former is assessed via self-reports, meaning teacher reports, and the latter by reports from external observers, including students. Experienced and displayed enthusiasm do not always coincide, as teachers may report being highly enthusiastic when teaching, but students may not perceive their teachers as being enthusiastic, or teachers may use enthusiasm as a teaching strategy without actually feeling enthusiastic (cf. Keller et al. 2018). Some studies have already highlighted the relevance of teachers' self-reported (and thus experienced) enthusiasm for high-quality teaching behaviors in class (e.g., Baier et al. 2019; Kunter et al. 2013), whereas research examining the role of displayed enthusiasm in effective teaching is still scarce. The few existing findings show that displayed enthusiasm alone can already lead to positive student

emotions, even when students were previously informed about external motives of the teacher that indicate low levels of experienced teacher enthusiasm (cf. Frenzel et al. 2019). The importance of displayed enthusiasm has also been emphasized by research showing that the effect of teachers' experienced enthusiasm on students' interest was fully mediated by student-reported enthusiasm of their teachers (cf. Keller et al. 2014). Hence, there are indications that student-reported teaching enthusiasm plays a pivotal role in predicting student outcomes, but it is less clear whether the same applies to student-reported teaching enthusiasm and teachers' teaching behavior in class. Further, research focusing on students' outcomes shows that teaching enthusiasm is particularly beneficial when the perception of teaching enthusiasm from both students and teachers corresponds (cf. Keller et al. 2018), but research that includes different rater perspectives is rare. To better understand the importance of both experienced and displayed teaching enthusiasm and its role in effective teaching, this study examines both teachers' own ratings of their enthusiasm to teach and the perceptions of students regarding their teachers' enthusiasm to teach. We thereby focus on the dimension of socio-emotional support from teachers as a teaching behavior because this aspect of teaching behavior, while highly relevant to students' school development (e.g., Schuitema et al. 2016; Wentzel et al. 2010), has been studied very little so far in relation to teachers' teaching enthusiasm.

2.2 Teaching enthusiasm and teachers' socio-emotional support

Classrooms are social systems in which relationships between teachers and students, including teachers' relational behaviors, such as their socio-emotional support toward students, are deeply embedded (cf. Pianta 2013). Teachers' socio-emotional support toward students relates to their efforts to maintain close relationships to their students and to attend to students' needs. Self-determination theory (cf. Deci and Ryan 2004) postulates that, in addition to feeling competent and autonomous, individuals grow and develop best if they also feel positively related to others. Empirical studies have accordingly shown that teachers' socio-emotional support is highly relevant for both students' cognitive and motivational development (cf. Elias and Haynes 2008; Schuitema et al. 2016; Wentzel et al. 2010). Therefore, teachers' socio-emotional support is considered a central dimension of effective teaching (cf. Hamre et al. 2013; Pianta et al. 2002).

Empirical research based on the model of teachers' professional competence (cf. Baumert and Kunter 2006) has revealed that supportive relationships in class are positively affected by teachers' motivation in class (cf. Kunter et al. 2008, 2013). In line with such prior theoretical and empirical work, it can be assumed that experienced and displayed teaching enthusiasm influence the socio-emotional support provided by teachers. Another theoretical framework dealing more specifically with the antecedents and consequences of enthusiasm is flow theory (cf. Csikszentmihalyi 1996). Flow theory characterizes the experience of flow as encompassing high enjoyment during an activity along with high intrinsic motivation to carry out the activity, but also complete absorption by and immersion in the activity (cf. Bakker 2005). Applied to the classroom context and to teachers' socio-emotional support, this would indicate that more enthusiastic teachers are particularly absorbed by their

teaching activities and thus have fewer attention and resources to be sensitive to and empathize with their students' socio-emotional needs compared to less enthusiastic teachers. Since flow theory refers to a self-experience, this assumption may be particularly true for experienced enthusiasm compared to externally observable, i.e. displayed, enthusiasm. However, the assumption of flow theory has rarely been tested in and applied to the classroom context, especially with regard to both experienced and displayed teaching enthusiasm. In contrast to other dimensions of effective teaching behavior, it is particularly interesting to investigate the consequences of teaching enthusiasm for teachers' socio-emotional support, because the latter requires focusing on different psychological concepts, namely on social and emotional aspects, instead of merely cognitive aspects and it requires a high level of (individualized) perspective-taking and sensitivity. Hence, teacher enthusiasm may have different consequences for teachers' socio-emotional support instead of their classroom management or learning support. Further, studies often neglect to capture the perspective of both teachers and students regarding teachers' socio-emotional support behavior, although previous research has demonstrated that ratings of teachers' teaching quality, including their socio-emotional support, are dependent on the source of information and class context (e.g., Fauth et al. 2020; Kunter and Baumert 2006). In this study, we focus on student reports of their teacher's socio-emotional support because students' ratings of the teacher's teaching behavior are considered important sources of information. This is because students—as recipients of the teaching—can best give information about their needs and their feelings about being supported (cf. Lauermann and ten Hagen 2021), and previous research underlines the importance of student observations in class for students' development in school (cf. Frenzel et al. 2019; Keller et al. 2014). However, we also include the teachers' perspective by investigating the role of teaching enthusiasm in the difference between teacher and student reports of teachers' socio-emotional support in class, because, based on the assumptions drawn from flow theory (cf. Csikszentmihalyi 1996), highly enthusiastic teachers' ratings of their socio-emotional support may be less congruent with their students' ratings of their socio-emotional support leading to higher differences between teacher and student perceptions. This is, first, because they may be less able to perceive and react to their students' social and emotional needs without necessarily noticing it and, second, because individuals experiencing flow are assumed to develop a more positive self-concept (cf. Csikszentmihalyi 2014) and may thus be more convinced of the quality of their own behavior in class, such as their socio-emotional support behavior. However, to our knowledge, this relation has never been tested empirically.

2.3 Purpose of the present study

Whereas several studies have investigated the relation between teaching enthusiasm and high-quality teaching (e.g., Baier et al. 2019; Kunter et al. 2013), the role of teaching enthusiasm in the socio-emotional support provided by teachers has been rather neglected so far, although, in light of flow theory (cf. Csikszentmihalyi 1996), consequences may be different compared to other teaching behaviors and especially with regard to the difference between experienced and displayed teaching

enthusiasm, as well as different perspectives on teachers' socio-emotional support. Our cross-sectional study addresses these research gaps and extends previous studies by investigating the role of mathematics teachers' and their students' perspectives on teachers' teaching enthusiasm and socio-emotional support in the German school context.

Our first research question refers to the role of teaching enthusiasm in student-reported socio-emotional support provided by the teacher. The second research question addresses the role of teaching enthusiasm in the diverging views of teachers and students on teachers' socio-emotional support behavior. Based on the outlined theoretical frameworks and empirical studies, the following hypotheses are derived:

Hypothesis 1: According to the model of teachers' professional competence (cf. Baumert and Kunter 2013), we assume positive relations between teaching enthusiasm and student-reported socio-emotional support (Hypothesis 1a). However, we test our expectations against the assumption of negative effects of high teaching enthusiasm on teacher socio-emotional support based on the conclusions of flow theory (cf. Csikszentmihalyi 1996). In line with research indicating that students' perceptions in particular are relevant for an effect of teaching enthusiasm on emotional or motivational student outcomes (cf. Frenzel et al. 2019; Keller et al. 2014), we further assume that student-reported (displayed) teaching enthusiasm plays a stronger role in student reports of socio-emotional support from teachers than teacher-reported (experienced) teaching enthusiasm (Hypothesis 1b).

Hypothesis 2: The model of teachers' professional competence (cf. Baumert and Kunter 2013) does not provide information on the role of teacher enthusiasm for differences between teacher- and student-reported socio-emotional support. However, conclusions drawn from flow theory (cf. Csikszentmihalyi 1996) suggest that higher teaching enthusiasm may lead to higher differences between teacher and student perceptions concerning socio-emotional support because highly enthusiastic teachers may be less sensitive and reactive toward students' socio-emotional needs and estimate their own abilities more highly leading to differing views of the teachers' socio-emotional support in class. Hence, we exploratively investigate the role of experienced and displayed teaching enthusiasm on the difference between teacher- and student-reported socio-emotional support.

We use teachers' gender and working experience as well as students' mathematics competence as covariates because previous research has shown that teacher gender and years of working experience are related to teaching quality (e.g., Boring 2017; Lazarides et al. 2020), and that working experience is also connected to perceptions of teacher-student relationships (cf. Zee and Koomen 2017). Furthermore, it was demonstrated that academic achievements of students are higher in classes with higher emotional support (cf. Kashy-Rosenbaum et al. 2018).

3 Method

3.1 Sample and procedure

Data were drawn from the first measurement point of the longitudinal study 'Teach! The Role of Teachers' Beliefs and Instructional Practices for Students' Beliefs and Academic Outcomes' (cf. Lazarides and Schiefele 2019–2022) and was collected in fall 2019. We excluded 62 students from the original sample of 1778 students because their teachers did not respond to the questionnaire. This resulted in a final sample of 1716 students (50.0% girls; $M_{Age} = 14.20$, $SD_{Age} = 0.61$) and 89 mathematics teachers (61.8% women; $M_{Age} = 44.52$, $SD_{Age} = 11.50$) nested in 94 classrooms (19.28 students per class) in 45 secondary schools (52.4% academic track schools) located in two federal states of Germany (Brandenburg and Berlin). On average, teachers had 16.78 years of working experience ($SD = 13.90$). After giving written informed consent, teachers and students responded to paper questionnaires at the beginning of a compulsory mathematics lesson for about 20 min. Additionally, students filled out a mathematics competence test on a separate day about one week later. Participants did not receive compensation for taking part in the study. The procedure and data assessments were confirmed by the ethics committee of the University of Potsdam and by the respective local authorities.

3.2 Measurements

A complete list of items can be found in the Appendix (Table 5). Response formats of each of the Likert scales ranged from *does not apply at all* (1) to *fully applies* (5) for each item.

3.2.1 Student- and teacher-Reported socio-emotional support from teachers

We used a Likert scale with five items based on Ramm et al. (2006) and Butler and Shibaz (2014). Items were similarly worded for students and teachers. An example item from the student scale is "Our teacher maintains close relationships with us." Reliability of the student measure was excellent (Cronbach's $\alpha = 0.91$). Reliability of the teacher measure was acceptable (Cronbach's $\alpha = 0.79$).

3.2.2 Student- and teacher-Reported teaching enthusiasm

We used a scale comprising three items adapted from Keller et al. (2014) for student-reported and teacher-reported enthusiasm; items were similarly worded for students and teachers. An example item from the student scale is "My mathematics teacher seems to be completely absorbed when teaching." Reliability of the student measure was good (Cronbach's $\alpha = 0.84$). Reliability of the teacher measure was acceptable (Cronbach's $\alpha = 0.79$).

3.2.3 Covariates

We measured students' competences in mathematics by applying a standardized, curriculum-sensitive test with 98 dichotomous items developed in cooperation with the Institute for Educational Quality Improvement (IQB), Germany, which was scaled by means of item response analysis. We included weighted likelihood estimates (WLEs) into our analyses. Reliability was calculated by comparing averaged square standard errors to the test score variance (cf. Embretson and Reise 2000), was good ($r = 0.83$). Furthermore, teachers reported their gender, years of age, and years of working experience as a teacher. However, as age and working experience were highly interrelated ($r = 0.91$, $p < 0.01$), we only used teaching experience as a covariate.

3.3 Statistical analyses

To examine our research questions and due to our hierarchical data structure with students nested in more than 50 classrooms—indicating sufficient statistical power (cf. Maas and Hox 2005)—we applied cross-sectional multilevel analysis performed with M*plus* 8.3 (Muthén and Muthén, 1998–2019). In the first two models, we examined how student-reported enthusiasm (Model 1) and teacher-reported enthusiasm (Model 2) relates to student-reported socio-emotional support from teachers in class (Hypotheses 1a and 1b). In the third and fourth models, we examined how student-reported enthusiasm (Model 3) and teacher-reported enthusiasm (Model 4) relates to the difference between teacher and student perspectives regarding the teacher's socio-emotional support (Hypotheses 2). To examine the second research question, we calculated a difference score by subtracting student-reported from teacher-reported socio-emotional support and including the absolute value of the result as the outcome variable in our model.

In all models, we had student-reported teaching enthusiasm of the teacher and students' mathematics competence included at the student level (L1). Further, in Model 1 and 3 we included aggregated student-reported teaching enthusiasm of the teacher and in Model 2 and 4 we included teacher-reported experienced teaching enthusiasm at the classroom level (L2). Additionally, we included teacher gender, teacher working experience, and aggregated mathematics competence per class at the classroom level (L2) in all models. In Model 1 and 2, the outcome variable was student-reported socio-emotional support. In Model 3 and 4, the outcome variable was the difference score between the teacher-reported and student-reported socio-emotional support.

We modelled random intercept models with fixed slopes. At the student level, mathematics competence was centered at the grand mean of the sample, and student reports of their teacher's teaching enthusiasm were centered at the group mean of the sample (cf. Lüdtke et al. 2009). Model fits were assessed using the Yuan–Bentler scaled χ^2 (mean-adjusted test statistic robust to non-normality), the root mean square of approximation (RMSEA), the comparative fit index (CFI), the Tucker and Lewis index (TLI), and the standardized root mean residual (SRMR). CFI and TLI values greater than 0.95, RMSEA values lower than 0.06, and SRMR lower than 0.08

were accepted as indicators of a good model fit using the criteria suggested by Hu and Bentler (1999). As there were no significant covariances of the independent variables at the classroom level, we excluded them and thus only report the most parsimonious model.

In the very first step, before testing our hypotheses, to test whether the data were suitable for multilevel analyses we specified null models for student-reported socio-emotional support and for the difference score between teacher- and student-reported socio-emotional support in order to obtain the intraclass correlation coefficients of these variables. The null models revealed an ICC1 of 0.31 for student-reported socio-emotional support and an ICC1 of 0.32 for the difference score, indicating that 31% of the overall variance in student-reported socio-emotional support and 32% of the overall variance in the difference score was located between classes. Thus, there was sufficient variance explained by students' membership in specific classrooms and multilevel models were indicated (cf. LeBreton and Senter 2008).

We also calculated the intraclass correlation coefficients ICC1 and ICC2 as the effect size and reliability index for student ratings of the teacher's teaching enthusiasm, commonly used for aggregated variables at level 2 (cf. Lüdtke et al. 2009). In our sample, the ICC1 was 0.28, meaning that 28% of the variance in student-reported teaching enthusiasm can be traced back to the classroom level, indicating a large effect (cfl. LeBreton and Senter 2008). The ICC2 is calculated based on the ICC1 and the average cluster size (cf. Bliese 2000) and was 0.88 in this sample. This indicates a strong agreement within classes (cf. LeBreton and Senter 2008). We also calculated the ICC1 for students' mathematics competence, which was 0.41 and means that 41% of the variance in students' mathematics competence is attributable to the classroom level. This indicates a large effect. Hence, aggregating students' reports of their teachers' enthusiasm as well as aggregating students' mathematics competence scores per classroom are valid L2-predictors. All parameters were estimated using a full information maximum likelihood (FIML) procedure with non-normality robust standard errors to make use of the full sample and handle missing data; 10.8% missing values were for students' competence in mathematics, while all other variables had a range of 0.0–4.8% missing values.

4 Results

4.1 Descriptive results

Means, standard deviations, and bivariate correlations of all student-level study variables are presented in Table 1 and of all classroom-level variables in Table 2. On average, students rated their teacher's socio-emotional support above the midpoint of the scale ($M_{student} = 3.39$, $SD_{student} = 0.98$; range: 1–5) and teachers themselves rated their socio-emotional support even higher ($M_{teacher} = 4.04$, $SD_{teacher} = 0.54$). The difference score between teachers' own and students' perceptions of the socio-emotional support was 0.98 on average ($SD_{L1} = 0.77$; range: 0–4); this difference was highly statistically significant (Wald $\chi^2 = 134.91$, $p < 0.001$). Correlation coefficients indicated that the higher students rated their teacher's socio-emotional support, the lower was

Table 1 Means, Standard Deviations, and Bivariate Correlations for Student-Level (L1) Variables

		M (SD)	1	2	3
1	Student-reported socio-emotional support[a]	3.39 (0.98)	–	–	–
2	Difference score socio-emotional support[b]	0.98 (0.77)	–0.69**	–	–
3	Student-reported teaching enthusiasm[a]	3.72 (0.95)	0.59**	–0.42**	–
4	Math competence	0.06 (1.39)	0.09*	–0.08*	0.10*

[a] Range: 1–5

[b] Range: 0–4

$N = 1531$–1716; *$p < 0.05$, **$p < 0.01$

the difference between teacher- and student-reported socio-emotional support and the higher students rated their teacher's teaching enthusiasm. However, aggregated student reports of the teachers' socio-emotional support were not correlated with teacher-reported teaching enthusiasm. Furthermore, the difference between teacher-reported and aggregated student-reported socio-emotional support was weakly, but positively, associated with teacher reports of their teaching enthusiasm and highly, but negatively, associated with aggregated student reports of the teacher's teaching enthusiasm. Teacher reports and students' aggregated reports of teaching enthusiasm were not correlated.

4.2 How is teaching enthusiasm related to student-Reported socio-emotional support?

Our first research question referred to the role of student- and teacher-reported teaching enthusiasm in student-reported socio-emotional support from teachers. Hence, in Model 1, we tested how student-reported enthusiasm for teaching related to student-reported socio-emotional support, controlling for mathematics competence at the student and classroom levels, and for teacher gender and working experience at the classroom level. The model showed a good fit, $\chi^2 = 2.86$, df $= 1$, $p = 0.091$, RMSEA $= 0.03$, CFI $= 1.00$, TLI $= 0.98$, SRMR$_{within} = 0.01$, SRMR$_{between} = 0.001$. The parameters of the model are reported in Table 3. Results indicated a significant and positive relation between student-reported teaching enthusiasm and student-perceived socio-emotional support from teachers ($\beta = 0.48$, $SE = 0.02$, $p < 0.001$). Further, students' individual mathematics competence levels were associated significantly and positively with their perceptions of their teachers' socio-emotional support ($\beta = 0.08$, $SE = 0.03$, $p = 0.014$). At the classroom level, we found a significant and positive relation between students' aggregated reports of their teacher's teaching enthusiasm and student-reported socio-emotional support ($\beta = 0.86$, $SE = 0.04$, $p < 0.001$). The model explained significant amounts of variance in student-reported socio-emotional support at the student level ($R^2 = 0.24$) and classroom level ($R^2 = 0.75$).

In Model 2, we specifically tested how teacher-reported enthusiasm for teaching related to student-reported socio-emotional support. We also included student-reported teaching enthusiasm and mathematics competence at the student level, and

Table 2 Means, Standard Deviations, and Bivariate Correlations for Classroom-Level (L2) Variables

		M (SD)	1	2	3	4	5	6	7
1	Student-reported socio-emotional support[a,b]	3.37 (0.60)	–	–	–	–	–	–	–
2	Teacher-reported socio-emotional support[b]	4.04 (0.54)	0.19	–	–	–	–	–	–
3	Difference score socio-emotional support[c]	0.78 (0.60)	–0.64**	0.55**	–	–	–	–	–
4	Teacher-reported teaching enthusiasm[b]	4.32 (0.59)	0.08	0.42**	0.24**	–	–	–	–
5	Student-reported teaching enthusiasm[a,b]	3.69 (0.56)	0.83**	0.09	–0.60**	0.19	–	–	–
6	Teacher gender[d]	0.62 (0.49)	0.18	–0.22*	–0.35**	–0.01	0.15	–	–
7	Teacher's workings experience[e]	16.78 (13.90)	–0.09	–0.26*	–0.16	0.01	–0.05	0.17	–
8	Math competence[a]	–0.10 (0.93)	0.04	–0.11	–0.09	–0.18	0.20*	0.03	0.02

[a] Aggregated per class
[b] Range: 1–5
[c] Range: 0–4
[d] 0 = male, 1 = female
[e] In years
$N = 87$–89; *$p < 0.05$, **$p < 0.01$

Table 3 Results from Multilevel Modeling for Student-Reported Socio-Emotional Support

	Student-reported socio-emotional support					
	Model 1			Model 2		
	β	SE	p	β	SE	p
Student Level (L1)						
Student-reported teaching enthusiasm[a]	**0.48**	**0.02**	**<0.001**	**0.48**	**0.02**	**<0.001**
Math competence	**0.08**	**0.03**	**0.014**	**0.08**	**0.03**	**0.02**
R^2	**0.24**	**0.02**	**<0.001**	**0.24**	**0.02**	**<0.001**
Classroom Level (L2)						
Student-reported teaching enthusiasm[a,b]	**0.86**	**0.04**	**<0.001**	–	–	–
Teacher-reported teaching enthusiasm[a]	**–**	**–**	**–**	0.13	0.11	0.249
Teacher gender[c]	0.09	0.06	0.165	0.16	0.12	0.188
Teacher working experience[d]	–0.06	0.06	0.292	–0.13	0.11	0.249
Math competence[b]	–0.19	0.07	0.009	–0.04	0.11	0.728
R^2	**0.75**	**0.05**	**<0.001**	0.05	0.05	0.233

[a] Range: 1–5
[b] Aggregated per class
[c] 0 = male, 1 = female
[d] In years

we controlled for mathematics competence, teacher gender, and working experience at the classroom level. The model showed a good fit, $\chi^2 = 2.89$, df = 1, $p = 0.089$, RMSEA = 0.03, CFI = 1.00, TLI = 0.97, $SRMR_{within} = 0.01$, $SRMR_{between} = 0.001$. The parameters of the model are also reported in Table 3. Again, results indicated a significant and positive relation between student-reported teaching enthusiasm and student-perceived socio-emotional support from teachers ($\beta = 0.48$, $SE = 0.02$, $p < 0.001$) at the student level. Further, students' individual mathematics competence levels were associated significantly and positively with their perceptions of their teachers' socio-emotional support ($\beta = 0.08$, $SE = 0.03$, $p = 0.014$). At the classroom level, we found no significant relations to student-reported socio-emotional support. The model only explained a significant amount of variance in student-reported socio-emotional support at the student level ($R^2 = 0.24$).

4.3 How is teaching enthusiasm related to diverging views on socio-emotional support?

In Model 3 and 4, we tested how student- and teacher-reported enthusiasm for teaching related to this difference score, controlling for mathematics competence at the student and classroom levels, and for teacher gender and working experience at the classroom level. Model 3 and 4 both showed a good fit with $\chi^2 = 2.82$, df = 1, $p = 0.093$, RMSEA = 0.03, CFI = 0.99, TLI = 0.94, $SRMR_{within} = 0.01$, $SRMR_{between} < 0.001$. The parameters of both models are also reported in Table 4. Results of Model 3 showed a significant and negative relation between student-reported teaching enthusiasm and the difference score between student- and teacher-reported socio-

Table 4 Results from Multilevel Modeling for Difference Scores

	Difference score socio-emotional support					
	Model 3			Model 4		
	β	SE	p	β	SE	p
Student Level (L1)						
Student-reported teaching enthusiasm[a]	**–0.33**	**0.04**	**<0.001**	**–0.33**	**0.04**	**<0.001**
Math competence	–0.03	0.03	0.330	–0.03	0.03	0.317
R^2	**0.11**	**0.02**	**<0.001**	**0.11**	**0.02**	**<0.001**
Classroom Level (L2)						
Student-reported teaching enthusiasm[a,b]	**–0.56**	**0.10**	**<0.001**	–	–	–
Teacher-reported teaching enthusiasm[a]	–	–	–	**0.18**	**0.09**	**0.037**
Teacher gender[c]	**–0.32**	**0.09**	**<0.001**	**–0.37**	**0.10**	**<0.001**
Teacher working experience[d]	–0.10	0.08	0.249	–0.07	0.09	0.480
Math competence[b]	–0.02	0.09	0.839	–0.07	0.10	0.488
R^2	**0.45**	**0.11**	**<0.001**	0.19	0.10	0.062

[a] Range: 1–5

[b] Aggregated per class

[c] 0 = male, 1 = female

[d] In years

emotional support from teachers at the student level (β = –0.33, SE = 0.04, p < 0.001). At the classroom level, we found a significant and negative coefficient for students' aggregated reports of their teacher's teaching enthusiasm and the difference score (β = –0.56, SE = 0.10, p < 0.001), indicating that in classes in which students rated the teachers' enthusiasm to teach on average as high, students and their teachers had similar perceptions of the socio-emotional support provided by the teacher (and vice versa). Finally, we found a significant and negative coefficient for teacher gender, indicating that the difference score was lower for female than for male teachers (β = –0.32, SE = 0.09, p < 0.001). The model explained significant amounts of variance in student-reported socio-emotional support at the student level ($R^2 = 0.11$) and classroom level ($R^2 = 0.45$).

Also in Model 4, we found a significant and negative relation between student-reported teaching enthusiasm and the difference score between student- and teacher-reported socio-emotional support from teachers at the student level (β = –0.33, SE = 0.04, p < 0.001). At the classroom level, results showed a significant, but positive coefficient for teacher-reported teaching enthusiasm (β = 0.18, SE = 0.09, p = 0.037), indicating that in classes in which teachers rated their enthusiasm to teach as high, students and their teachers had differing perceptions of the socio-emotional support that the teacher provided, and again a significant and negative coefficient for teacher gender (β = –0.37, SE = 0.10, p < 0.001). However, the model explained significant amounts of variance in student-reported socio-emotional support at the student level ($R^2 = 0.11$), but not at the classroom level.

5 Discussion

In consideration of different theoretical predictions and the sparse empirical research on the relation between teachers' teaching enthusiasm and socio-emotional support in class, this study aimed to examine the role teacher-reported (experienced) and student-reported (displayed) teaching enthusiasm plays in student-perceived socio-emotional teacher support and in the difference between teacher- and student-reported socio-emotional teacher support. We expand current knowledge by demonstrating that experienced and displayed enthusiasm differ in the direction of their relation to socio-emotional support.

5.1 Teaching enthusiasm and student-reported socio-emotional support

Our first research question addressed the role of teaching enthusiasm in student-reported socio-emotional support. Our findings partially confirmed our first expectation (H1a): Student-reported teaching enthusiasm was positively related, but teacher-reported teaching enthusiasm was not related, to student-perceived socio-emotional support from the teachers. Hence, just as the model of teachers' professional competence (cf. Baumert and Kunter 2013) claims, highly enthusiastic teachers seem to provide more effective teaching behavior, in this case better student-perceived socio-emotional support in class. However, according to the results of this study, this relation is only valid when students observe their teachers to be enthusiastic. Teachers' self-perception of their teaching enthusiasm was not related to students' perception of their socio-emotional support. Hence, high teacher-reported teaching enthusiasm may not lead to a lower capacity to attend and react to students' socio-emotional needs, as we assumed based on conclusions of flow theory (cf. Csikszent-mihalyi 1996), but does also not enable teachers to better socio-emotionally support their students, at least from their students' perspective. Taken together, based on the findings of this study it can be assumed that a difference exists between experienced and displayed teaching enthusiasm on the part of the teacher, which is also indicated by the non-significant bivariate correlation of teacher- and student-reported teaching enthusiasm. Although we measured teaching enthusiasm with very similar items for teachers and students, teachers may perceive their enthusiasm accurately, but may not be able to show it to their students. To test whether this explanation is correct, we would need to additionally include observer ratings of classroom situations, as student ratings can also be influenced by the dyadic interaction with the teacher (cf. Göllner et al. 2018), and thus may not accurately reflect the teachers' displayed enthusiasm in class.

Our second expectation (H1b) was supported by the data because student-reported teaching enthusiasm played a stronger role in student-perceived socio-emotional teacher support than teacher-reported teaching enthusiasm. This finding is in line with previous research underlining the role of students' perceptions in the impact of teaching enthusiasm on students' emotions or motivation in class (cf. Frenzel et al. 2019; Keller et al. 2014). Thus, for students to feel socio-emotionally supported in class, teachers need to be able to show observable and perceivable behaviors related

to teaching enthusiasm, including verbal and/or non-verbal behaviors (cf. Keller et al. 2016).

5.2 Teaching enthusiasm and divergent views on socio-emotional support

Our second research question exploratively dealt with the role of teaching enthusiasm in the diverging views of teachers and students regarding teachers' socio-emotional support. Our findings showed that the relation between teaching enthusiasm and socio-emotional support behavior strongly depended on the perspective of the rater. It was demonstrated that, although teachers and students rated the level of socio-emotional support from teachers differently, the higher students rated their teachers' teaching enthusiasm the lower was the difference between teachers' and students' perceptions of the teachers' socio-emotional support. Hence, displayed teaching enthusiasm may lead to a higher capacity to perceive and react to students' socio-emotional needs, which is in contrast to conclusions drawn from flow theory (cf. Csikszentmihalyi 1996). However, teachers' self-experienced teaching enthusiasm was not only unrelated to student-reported (displayed) teaching enthusiasm, but also to the difference between teachers' and students' perception of the level of socio-emotional support in class. Thus, the use of multi-perspective assessments of motivational teacher characteristics is just as important as the use of multi-perspective assessments of their teaching behavior and the model of teachers' professional competence (cf. Baumert and Kunter 2013) may benefit from including more information on the role of different perspectives on teaching enthusiasm, including their relations on different dimensions of effective teaching behavior.

5.3 Strengths and weaknesses

This study has several strengths, such as the theoretical merging of the model of teachers' professional competence (cf. Baumert and Kunter 2013) and flow theory (cf. Csikszentmihalyi 1996) or the multi-perspective assessment of teaching enthusiasm and socio-emotional support. However, there are also some weaknesses limiting the interpretation and generalizability of our findings. First, from a theoretical perspective, teaching comprises multiple facets, such as effectively monitoring student groups, regulating student behaviors, dealing with disruptions and disturbances, activating students in a cognitively challenging way, but also planning lessons, reflecting teaching situations and building relationships to students (cf. Hamre et al. 2013; Klieme et al. 2009; Praetorius et al. 2018). However, when measuring experienced and displayed teaching enthusiasm, we do not know which teaching activities the respondents refer to when rating their own or their teachers' teaching enthusiasm. Perhaps teachers and students differ in which teaching activities they refer to, which may explain why the ratings of experienced and displayed teaching enthusiasm diverge so strongly in this study. Although most items in this study and also other studies (e.g., Kunter et al. 2008) refer to teaching enthusiasm in a specific subject—i.e. "I really enjoy teaching mathematics"—and we therefore assume that respondents rather refer to didactic aspects and not pedagogical aspects of teaching, this assumption needs to be tested by using more differentiated instruments. It

is also possible that teachers and students refer to different teaching activities and have therefore assessed teacher-teaching enthusiasm so differently. Second, some important variables may be missing in explaining the different perceptions of teachers' socio-emotional support on the level of the individual student, as the explained variance is comparatively low. Third, it is interesting that the (aggregated) student-perceived socio-emotional support of teachers highly correlates with the (aggregated) student-perceived teaching enthusiasm. This could be due to common method bias (cf. Podsakoff et al. 2024) or a general rating tendency of the class in relation to teacher-related constructs, which could also be explained by other variables not assessed in this study. Fourth, the study uses a cross-sectional design, and thus no causal conclusions can be drawn from the collected data. Fifth, we only assessed the enthusiasm of teachers and the socio-emotional support as perceived by teachers and their students in the domain of mathematics. Hence, it is an important question for future research whether the examined relations would be similar in other subjects, for example, in language domains. Finally, we included different perspectives on teacher enthusiasm and socio-emotional support, but future studies may also benefit from including observations or more complex data collection procedures, such as experience-sampling methods (e.g., Larson and Csikszentmihalyi 2014), to shed even more light on the complex role of experienced and displayed teaching enthusiasm in (perceived) socio-emotional teacher support.

5.4 Implications and conclusion

The current study investigated whether a flip side to teacher enthusiasm exists and challenges prevailing assumptions about the role of teaching enthusiasm in teachers' socio-emotional teaching quality. Findings suggest making more differentiated theoretical predictions regarding the relation between experienced as well as displayed teaching enthusiasm and the perception of socio-emotional teacher support, for example, in the model of teachers' professional competence (cf. Baumert and Kunter 2013). Further, the study highlights the need to develop a more differentiated instrument to measure teaching enthusiasm that distinguishes between different activities of teaching a teacher can get enthusiastic about. As a starting point, the interest scale developed by Schiefele et al. (2013) may be helpful, as the authors differentiate between subject, didactic, and educational interest. Future studies should be sensitive to the source of information, use multi-perspective assessments of motivational teacher characteristics and teaching behavior and continue to explore the differences between experienced and displayed enthusiasm and how they relate to the perceived classroom behavior, such as teachers' socio-emotional support.

6 Appendix

Table 5 Survey Items Included in the Analysis

	Items
Socio-emotional support (student report)	
Instruction	To what extent do the following statements apply to your mathematics lessons? *Inwiefern treffen die folgenden Aussagen auf euren Mathematikunterricht zu?*
Items	1) Our teacher takes time whenever we want to discuss something with her/him. *Unsere Lehrkraft nimmt sich Zeit, wenn eine Schülerin oder ein Schüler etwas mit ihr bereden will.* 2) Our teacher cares about our problems. *Unsere Lehrkraft kümmert sich um die Probleme der Schülerinnen und Schüler.* 3) Our teacher tries to fulfill our wishes as much as possible. *Unsere Lehrkraft bemüht sich, die Wünsche der Schülerinnen und Schüler so weit wie möglich zu erfüllen.* 4) Our teacher maintains close relationships with us. *Unsere Lehrkraft pflegt vertrauensvolle Beziehungen zu uns.* 5) Our teacher shows us that we are important to her/him. *Unsere Lehrkraft zeigt uns, dass wir ihm/ihr wichtig sind*
Responses	1 = does not apply at all, 2 = mostly does not apply, 3 = partially applies, 4 = largely applies, 5 = fully applies *1 = trifft gar nicht zu, 2 = trifft sehr begrenzt zu, 3 = trifft teilweise zu, 4 = trifft weitgehend zu, 5 = trifft völlig zu*
Socio-emotional support (teacher report)	
Instruction	To what extent do the following statements apply to your mathematics lessons? *Stimmen diese Aussagen für Ihren Mathematikunterricht?*
Items	1) I take time when the students want to discuss something with me. *Ich nehme mir Zeit, wenn die Schülerinnen und Schüler etwas mit mir bereden wollen.* 2) I care about my students' problems. *Ich kümmere mich um die Probleme der Schülerinnen und Schüler.* 3) I try to fulfill the wishes of my students as much as possible. *Ich bemühe mich, die Wünsche der Schülerinnen und Schüler so weit wie möglich zu erfüllen.* 4) I maintain trustful relationships with my students. *Ich pflege vertrauensvolle Beziehungen zu meinen Schülerinnen und Schülern.* 5) I show my students that I care about them. *Ich zeige meinen Schülerinnen und Schülern, dass Sie mir wichtig sind*
Responses	1 = does not apply at all, 2 = mostly does not apply, 3 = partially applies, 4 = largely applies, 5 = fully applies *1 = trifft gar nicht zu, 2 = trifft sehr begrenzt zu, 3 = trifft teilweise zu, 4 = trifft weitgehend zu, 5 = trifft völlig zu*

Table 5 (Continued)

	Items

Teaching enthusiasm (teacher report)

Instruction	To what extent do the following statements apply to your mathematics lessons? *Inwiefern treffen die folgenden Aussagen auf Deine Mathematiklehrkraft zu?*
Items	1) I teach mathematics with great enthusiasm. *Ich unterrichte Mathematik mit Begeisterung.* 2) I really enjoy teaching mathematics. *Mir macht das Unterrichten von Mathematik großen Spaß.* 3) While teaching I am completely absorbed. *Beim Unterrichten gehe ich völlig auf*
Responses	1 = does not apply at all, 2 = mostly does not apply, 3 = partially applies, 4 = largely applies, 5 = fully applies *1 = trifft gar nicht zu, 2 = trifft sehr begrenzt zu, 3 = trifft teilweise zu, 4 = trifft weitgehend zu, 5 = trifft völlig zu*

Teaching enthusiasm (student report)

Instruction	To what extent do the following statements apply to your mathematics teacher? *Inwiefern treffen die folgenden Aussagen auf Deine Mathematiklehrkraft zu?*
Items	1) I have the impression that our mathematics teacher really enjoys teaching. *Ich habe den Eindruck, dass unsere Mathematiklehrkraft sehr gerne unterrichtet.* 2) My mathematics teacher seems to really enjoy teaching. *Meiner Mathematiklehrkraft scheint das Unterrichten wirklich Spaß zu machen.* 3) My mathematics teacher seems to be completely absorbed when teaching. *Meine Mathematiklehrkraft scheint beim Unterrichten völlig aufzugehen*
Responses	1 = does not apply at all, 2 = mostly does not apply, 3 = partially applies, 4 = largely applies, 5 = fully applies *1 = trifft gar nicht zu, 2 = trifft sehr begrenzt zu, 3 = trifft teilweise zu, 4 = trifft weitgehend zu, 5 = trifft völlig zu*

Original German version in italic script

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