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Teacher Social Support in Mathematics: Gendered Meanings and Socio-Affective Consequences

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Abstract

This study examines the associations between perceived teacher social support and students' socio-affective attitudes toward mathematics and their fluctuations according to teacher gender, student gender, and type of support. Drawing on a multidimensional conception of socio-affective attitudes and on the Child and Adolescent Social Support Scale, data were collected from 544 lower secondary students in the French-speaking region of Switzerland. Separate regression models were estimated for girls and boys in classes taught by male versus female teachers. Results show that teacher support is not uniformly perceived. Its effects differ depending on the gendered configuration of the classroom and on the specific type of support (emotional, informational, instrumental, evaluative). In classrooms taught by male teacher, support explains a larger share of variance in girls' attitudes, whereas boys appear particularly responsive to support in classrooms taught by female teacher. Some forms of support are associated with ambivalent or contrasting outcomes across genders. Overall, teacher social support should not be considered a neutral pedagogical resource; rather, it contributes to shaping students' emotions, competence beliefs, engagement, and gender representations in mathematics within a socially structured context.

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Introduction

Mathematics occupies a central place in students' educational trajectories, playing a key role in academic selection, access to further studies, and future career opportunities. Across secondary education, positive attitudes toward mathematics often decline, with significant implications for engagement, persistence, and achievement (Aquilina et al., 2024; Wen & Dubé, 2022). Attitudes toward mathematics are now conceptualized as multidimensional constructs encompassing cognitive components such as perceived utility and self-concept, affective experiences including positive and negative emotions, behavioural engagement reflected in investment, and sociocultural representations such as gender stereotypes (Genoud & Guillod, 2014; Goldin, 2002; Hannula, 2002; Triandis, 1971). These dimensions are shaped within classroom interactions and institutional contexts rather than emerging solely from individual dispositions (Evans, 2000; Eynde et al., 2006).

Among the contextual factors influencing students' socio-affective attitudes, teacher-student interactions play a central role. Perceived teacher social support (Malecki & Demaray, 2002) has been consistently linked to motivation, emotional well-being, and engagement (Aldrup et al., 2018; Martin et al., 2024). In mathematics, a domain often characterized by high cognitive demand and evaluative pressure, teacher support is associated with stronger self-efficacy and engagement, reducing the anxiety in this field (Ahmed et al., 2010; Federici & Skaalvik, 2013; Liu et al., 2021). Importantly, perceived support predicts socio-affective outcomes more robustly than objectively observed behaviours, underscoring the interpretative nature of classroom relationships (Demaray et al., 2009).

Furthermore, mathematics is a domain whose the meaning is shaped within a gendered sociocultural context. The persistent construction of mathematics as a masculine field (Martinot et al., 2025; Nurlu, 2025) has consequences for students' school experience (Eccles & Wigfield, 2002; Kiefer & Sekaquaptewa, 2007; Xie et al., 2022). Gender stereotypes shape not only students' internal beliefs, but also teacher expectations and evaluative practices (Lafontaine & Monseur, 2009). Teacher gender itself may interact with student gender in complex ways and the identification processes differ across gender configurations (Stout et al., 2011). Indeed, participation patterns vary depending on whether the teacher is male or female (Dee, 2005), and in some contexts female teachers have been shown to reduce gender gaps in mathematics achievement and advanced course-taking by positively influencing girls' performance and academic choices (Carrell et al., 2010).

Despite these findings, few studies have simultaneously examined how perceived teacher social support, student gender, and teacher gender intersect in shaping socio-affective attitudes toward mathematics. Most existing research conceptualizes teacher support as a global and uniformly beneficial construct, without distinguishing between emotional, informational, instrumental, and evaluative forms of support, nor considering how their effects may vary across gendered classroom configurations. Yet in a domain such as mathematics, which is strongly marked by gendered expectations, these different forms of support may carry distinct symbolic meanings. Drawing on motivational frameworks (Eccles & Wigfield, 2002; Ryan & Deci, 2000) and sociocultural perspectives on gender and stereotype threat (Kiefer & Sekaquaptewa, 2007; Martinot et al., 2025), the present study therefore examines how different types of perceived teacher support relate to students' socio-affective

attitudes toward mathematics as a function of both teacher and student gender.

Using the Child and Adolescent Social Support Scale (Malecki & Demaray, 2002) and the QASAM framework (Genoud & Guillod, 2014), this research examines whether and how emotional, informational, instrumental, and evaluative teacher support predict students' socio-affective attitudes toward mathematics according to both student gender and teacher gender. By doing so, the study moves beyond the assumption that teacher support operates as a neutral pedagogical resource and instead explores how its effects are included in gendered classroom dynamics and the sociocultural construction of mathematics.

Theoretical Framework

Adolescents' Socio-Affective Attitudes and Mathematics

Attitudes toward mathematics are commonly understood as complex and multidimensional constructs, resulting from the interplay between cognitive, affective, and behavioural components that shape how students perceive, interpret, and respond to learning situations (Pelgrims, 2013; Triandis, 1971). These components are embedded within broader systems of emotions, values, and social representations that orient students' engagement in mathematical activity (Evans et al., 2006). Mathematics learning is not limited to individual cognitive processing but emerges from interactions between cognition, metacognition, motivation, and affect, situated within specific social, cultural, and institutional contexts (Evans, 2000; Eynde et al., 2001). As a result, students' attitudes are continuously shaped by their school experiences (especially academic results), classroom climates, teacher-student interactions, and pedagogical practices, and can be examined both at the level of individual trajectories and shared classroom dynamics (Evans et al., 2006; Eynde, 2004; Lim & Chapman, 2013).

Attitudes toward mathematics play a central role in shaping students' academic achievement and educational trajectories. Research shows that more positive attitudes are associated with higher performance and greater likelihood of pursuing advanced studies in mathematics-related tracks. At the same time, a decline in positive attitudes is often observed during secondary education, with important consequences for academic outcomes (Aquilina et al., 2024; Wen & Dubé, 2022). In this study, attitudes toward mathematics are conceptualized using the multidimensional model proposed by Genoud and Guillod (2014), grounded in Scherer's (2000) framework of interacting emotional systems. This model captures the cognitive, affective, behavioural, and sociocultural components that structure students' relationships with mathematics.

Within the cognitive domain, perceived utility refers to the value students attribute to mathematics in relation to their everyday lives, future goals, and personal aspirations. When mathematics is perceived as meaningful and connected to authentic or personally relevant contexts, students are more likely to engage and persist in learning activities (Dobie, 2019). As a motivational value, perceived utility constitutes a core component of attitudes toward mathematics and contributes to intrinsic motivation, sustained engagement and achievement, alongside dimensions such as interest, anxiety, and perceived competence (Abín et al., 2020; Wen & Dubé, 2022). In this perspective, the inquiry-based approaches, authentic problem solving, and pedagogical designs emphasizing relevance can strengthen students' perceptions of utility, while interventions targeting utility value are effective

only when they prompt deep and meaningful reflection (Gómez-Chacón et al., 2023; Liebendörfer & Schukajlow, 2020).

Another central cognitive dimension concerns mathematics self-concept, defined as students' perceptions of their ability to successfully carry out mathematical tasks and cope with increasing levels of difficulty. This sense of competence is highly sensitive to classroom climate, instructional practices, and institutional contexts. Teaching approaches that combine cognitive challenge with appropriate support have been shown to foster a stronger self-concept and higher performance (Wang et al., 2023), while differences across school settings highlight the role of expectations and pedagogical cultures in shaping students' perceived competence (Ding et al., 2024). When tasks are appropriately calibrated to students' levels, learners are more likely to attribute success to their own abilities, thereby consolidating a cognitively grounded sense of competence (Jansen et al., 2013). Beyond objective ability, mathematics self-concept emerges as a robust predictor of achievement and acts as a protective factor, supporting persistence, resilience, and effective mobilization of cognitive resources in the face of difficulty (Jansen et al., 2013; Passiatore et al., 2023).

The affective domain highlights the role of emotions as integral components of mathematical activity rather than as secondary reactions. Affect is conceptualized as a system of internal representations that interacts with cognition and motivation (Goldin, 2002). Emotions in mathematics are understood as dynamic, socially situated processes grounded in cognitive appraisals of tasks, self, and learning contexts (Eynde et al., 2006; Paris & Turner, 1994). Within this framework, positive and negative effects are not opposite ends of a single continuum but constitute partially independent dimensions. The absence of enjoyment or interest does not necessarily imply the presence of anxiety or frustration, and students may experience low or high levels of each depending on contextual cues and personal interpretations. Attitudes toward mathematics therefore form dynamic systems integrating emotions, beliefs, goals, and identities (Hannula, 2002). Affective attitudes mediate students' relationships with mathematical tasks by shaping how situations are interpreted, how effort is regulated, and how engagement unfolds (Dodge & Reid, 2001). Empirical research shows that negative emotions such as anxiety and frustration are associated with avoidance behaviours and lower performance, whereas positive emotions support intrinsic motivation, persistence, and achievement (Lichtenfeld et al., 2012).

These cognitive and affective processes are translated into observable behaviours through students' investment in mathematical activity, which constitutes the behavioural dimension of attitude. Investment encompasses participation, effort, attention and persistence, particularly in challenging tasks (Jansen et al., 2023). Interest and behavioural engagement tend to develop jointly during secondary education, and behavioural engagement has been identified as a strong predictor of academic success (Papageorgiou et al., 2025; Ryan et al., 2022). Importantly, students' investment is highly context-dependent and varies according to task design, classroom climate, instructional practices, and the extent to which teachers support autonomy and participation. Teachers themselves emphasize the close link between meaningful engagement, task quality, and classroom culture of learning (Jansen et al., 2023).

Finally, attitudes toward mathematics include broader sociocultural representations, among which gender

stereotypes play a particularly influential role. Mathematics has long been constructed as a masculine domain, a stereotype confirmed by extensive research spanning several decades (Nurlu, 2025). This representation shapes social norms, teacher expectations, and students' self-perceptions from early schooling onward and remains salient throughout secondary education (Martinot et al., 2025). Gender stereotypes vary across cultural and institutional contexts and are less pronounced in societies characterized by more egalitarian gender norms, where performance gaps tend to be smaller (Nurlu, 2025; Stoet & Geary, 2013). At the individual level, these stereotypes affect engagement and performance through mechanisms such as stereotype threat, internalization of lower competence beliefs among girls, and positive self-evaluation biases among boys (Eccles & Wigfield, 2002; Kiefer & Sekaquaptewa, 2007; Xie et al., 2022). They also influence participation, intrinsic motivation, and perceptions of the value of mathematics, thereby shaping students' academic trajectories.

In line with this perspective, the model developed by Genoud and Guillod (2014) includes a specific normative dimension assessing the perceived masculinity of mathematics. This dimension measures students' perceptions of socially shared beliefs about gender and mathematical ability. By examining the extent to which students endorse these normative representations, the model allows for the identification of differentiated student profiles in mathematics that account for the sociocultural dimensions of attitudes.

Taken together, these dimensions highlight that students' attitudes toward mathematics are individual dispositions shaped within relational and instructional contexts. Among the contextual factors that may influence the development and regulation of these attitudes, teacher-student interactions play a significant role. In particular, the social support provided by teachers may contribute to shaping students' perceptions of competence, emotional experiences, behavioural investment, and gender representations in mathematics. The following section therefore focuses on teacher social support in mathematics education.

Teacher Social Support and Students' Socio-Affective Attitudes in Mathematics

Teacher social support plays a central role in students' schooling and academic trajectories, acting as a foundational element of classroom climate that shapes motivation and emotional experiences across the curriculum (Martin et al., 2024). In the context of mathematics (a domain characterized by high cognitive demands and frequent stressors) the nature of the support provided by the teacher may be especially consequential for students' socio-affective attitudes, including perceived utility, positive and negative effects, and self-competence beliefs.

However, in educational research, teacher social support is primarily conceptualized through students' perceptions of the emotional, informational, instrumental, and evaluative assistance provided by teachers (Malecki & Demaray, 2002). Emotional support refers to expressions of care, empathy, trust, and encouragement that communicate warmth and benevolence toward the student. It reflects the extent to which students feel valued, understood, and emotionally supported by their teacher. Instrumental support involves the provision of tangible or practical assistance, such as additional explanations, adapted materials, or concrete help with tasks, aimed at facilitating task completion. Informational support refers to the provision of advice, guidance, and clarifications

that help students understand academic expectations, solve problems, or improve their learning strategies. Evaluative support consists of feedback and appraisal that allow students to assess their performance and abilities, including praise, recognition, and constructive evaluative comments (Tardy, 1985).

Beyond the objective characteristics of teacher behaviour, it is students' interpretations of these behaviours and their belief that supportive resources are available, accessible, and reliable, that are most consistently associated with motivational and affective outcomes (Demaray et al., 2009). In this sense, the impact of support on attitudes depends less on its presumed "objective" nature than on the meaning students attribute to it. Moreover, whereas earlier frameworks treated teacher support as a unidimensional construct, contemporary research emphasizes its multidimensional character and its integration into broader relational and motivational processes (Malecki & Demaray, 2002; Martin et al., 2024).

Teacher support – when perceived as caring, respectful, and responsive – emerges as one of the most robust predictors of students' academic motivation, engagement, and emotional well-being (Aldrup et al., 2018; Martin et al., 2024). Greater perceived teacher support is consistently associated with higher intrinsic motivation and increased effort, proved by a greater school attendance (Kramer et al., 2024; Martin et al., 2024). Within mathematics learning specifically, perceived teacher support has been shown to promote students' emotional engagement, confidence, and persistence in mathematical tasks (Liu et al., 2021; Tao et al., 2022). These effects are not limited to cognitive engagement but extend to affective experiences such as interest in mathematics and positive classroom participation (Yang et al., 2023), thereby reinforcing the connection between supportive teacher-student interactions and positive socio-affective profiles.

The Child and Adolescent Social Support Scale framework (CASSS; Malecki & Demaray, 2002) brings an additional contribution relative to broader motivational theories such as Expectancy-Value Theory and Self-Determination Theory (Eccles, 2011; Ryan & Deci, 2000). While these theories identify psychological needs and value beliefs that shape students' engagement, the CASSS provides a measurable, source-specific operationalization of support as students' perceptions of teacher actions. This enables a finer analysis of how specific types of support (emotional, informational, instrumental and evaluative) relate to distinct components of attitudes, rather than treating support as a global or latent construct. In doing so, the CASSS bridges motivational theory with empirically grounded measures of relational experience in the classroom.

Gendered Dynamics of Teacher–Student Interactions and Perceived Social Support in Mathematics

Nevertheless, teacher influence on students' academic experiences may vary according to both teacher and student gender, with implications for students' socio-affective attitudes and engagement. Although teachers often report egalitarian beliefs, gendered interaction patterns persist and may shape classroom perceptions, expectations, and feedback practices (Carrington et al., 2007; Lafontaine & Monseur, 2009). Students taught by teachers of the opposite gender are more frequently perceived as inattentive, suggesting that student gender can subtly influence teachers' judgments and interactions (Dee, 2005).

Gender-related disparities also emerge in assessment practices. Teachers tend to overestimate boys' performance and underestimate girls' performance, while showing greater leniency toward girls when evaluating low achievement (Lafontaine & Monseur, 2009). These largely unconscious biases may affect students' perceived competence and fairness perceptions, both of which are central in the development of socio-affective attitudes toward learning.

When considering teacher-assigned grades, evidence suggests that evaluation does not solely reflect students' competencies but may also be shaped by an interaction between student gender and teacher gender. Boys tend to receive lower grades when taught by female teachers, whereas girls often obtain lower grades than boys when taught by male teachers, despite comparable competencies (Carrell et al., 2010). Importantly, female teachers appear to reduce gender gaps and foster stronger academic progress among girls. In mathematics, gender differences in performance are particularly sensitive to contextual cues, with disparities increasing in stereotypical environments and diminishing in contexts that counter gender stereotypes (Lesko & Corpus, 2006; Martinot et al., 2025).

Identification processes also contribute to gender-differentiated experiences. Boys tend to identify with teachers regardless of teacher gender, whereas girls report stronger identification with female teachers, which positively predicts their academic self-concept (Stout et al., 2011). Gender differences are further reflected in classroom participation. Girls generally participate less and initiate fewer interactions with male teachers, while participation and questioning behaviours tend to increase in classrooms taught by female teachers (Stout et al., 2011). Since participation opportunities and responsiveness are core components of teacher social support, these interactional patterns are likely to influence students' perceived emotional and informational support.

Teacher social support has consistently been identified as a key determinant of students' socio-affective attitudes in mathematics (Ahmed et al., 2010; Federici & Skaalvik, 2013; Wentzel et al., 2016). However, this support is not experienced uniformly and is shaped by gendered classroom dynamics. Students' perceptions of teacher support vary according to student gender, with girls generally reporting higher levels of perceived emotional and evaluative support than boys (Malecki & Demaray, 2002; Tennant et al., 2015), while mathematics remains a domain strongly marked by gender stereotypes that differentially affect girls' confidence, participation, and emotional experiences (Lesko & Corpus, 2006; Martinot et al., 2025). In addition, teacher gender may further moderate these processes, as girls' self-concept, participation, and engagement appear particularly sensitive to relational cues and identification with female teachers, whereas boys' attitudes are less consistently influenced by teacher gender (Dee, 2005; Stout et al., 2011).

Despite these findings, few studies have simultaneously examined the role of student gender and teacher gender in the relationship between perceived teacher social support and students' socio-affective attitudes in mathematics. Using the Child and Adolescent Social Support Scale (CASSS) to capture students' perceptions of emotional, informational, instrumental and evaluative teacher support, the present study addresses this gap by adopting a gender-informed perspective on how teacher support contributes to the socio-affective experiences of girls and boys in mathematics classrooms.

- H1. When the mathematics teacher is male, perceived teacher social support is positively associated with students' socio-affective attitudes toward mathematics, with stronger associations observed for boys than for girls.
- H2. When the mathematics teacher is female, perceived teacher social support is positively associated with students' socio-affective attitudes toward mathematics for both girls and boys, with particularly strong associations for girls.
- H3. Teacher social support predicting students' socio-affective attitudes differs according to teacher gender, such that emotional and evaluative support account for a larger share of explained variance in classes taught by female teachers, whereas informational support plays a more central role in classes taught by male teachers.

Methodology

Sample

This research was carried out in lower secondary schools located in the French-speaking region of Switzerland and targeted students attending the last year of compulsory education. An online questionnaire was administered via the LimeSurvey platform, allowing for anonymous and confidential data collection. The final sample included 544 students, with a mean age of 15.1 years ($SD = 0.6$). In terms of gender, 46% of the participants reported being male and 54% female.

Measure

Socio-affective attitudes toward mathematics were assessed using the QASAM questionnaire (Genoud & Guillod, 2014; Genoud et al., 2015). The original instrument consists of 45 items designed to capture students' learning experiences in mathematics across several learning situations. The cognitive domain includes measures of perceived utility, self-concept, and controllability. The affective domain addresses positive affects, negative affects, and affect regulation, while the behavioural domain focuses on investment. In addition, the questionnaire includes a specific subscale assessing gender-related stereotypes associated with mathematics, a subject traditionally viewed as male-dominated. All items were rated on a six-point Likert scale ranging from 0 ("strongly disagree") to 5 ("strongly agree"). Table 1 summarizes the retained subscales and their internal consistency coefficients.

In this study, the affect regulation and controllability subscales were not retained. This methodological choice was informed by psychometric evidence, as both dimensions exhibited comparatively low internal consistency in the preliminary analyses, falling below commonly accepted thresholds for research use. In addition, these metacognitive and meta-affective subscales were only marginally aligned with the central aims of the study, which focused on students' school-related perceptions, self-concept, and affective experiences in learning contexts. Excluding these dimensions allowed the instrument to be more closely aligned with the research focus while improving the overall robustness of the analyses.

Table 1. Subscales of QASAM (Genoud & Guillod, 2014)

Subscales	Items	Reliability scores (<i>alpha</i>)
Perceived utility	5	.78
Self-concept	6	.89
Positive affects	6	.91
Negative affects	6	.76
Investment	6	.80
Gender-related stereotypes	5	.87

Perceived teacher support in mathematics was assessed using the Teacher Support subscale of the Child and Adolescent Social Support Scale (CASSS; Malecki & Demaray, 2002). This instrument aims to examine the extent to which students perceive their teacher as providing academic and emotional support, as well as the degree to which teachers may convey gender-related stereotypes within instructional interactions. Responses were collected using a six-point Likert scale ranging from 1 (“never”) to 6 (“always”). Table 2 shows the subscales and their reliability scores.

Table 2. Subscales of Teacher Support (CASSS; Malecki & Demaray, 2002)

Dimensions	Items	Reliability scores (<i>alpha</i>)
Emotional support	3	.71
Informational support	3	.83
Instrumental support	3	.79
Evaluative support	3	.75

Results and Discussion

To examine gender-specific associations between perceived teacher social support and students’ socio-affective attitudes toward mathematics, multiple linear stepwise regression models were estimated separately according to teacher gender. This analytical strategy was chosen to capture configuration-specific effects and to avoid masking differentiated patterns that might be diluted in a single model including interaction terms. Table 3 presents boys’ perceptions of teacher social support, whereas Table 4 reports girls’ perceptions. For each student gender, separate regression models were then computed according to teacher gender, allowing a differentiated analysis of how the various dimensions of perceived teacher social support relate to socio-affective attitudes in mathematics.

The results indicate that the influence of teacher social support on students’ socio-affective attitudes toward mathematics is not uniform. It is shaped by the gendered configuration of the teacher-student relationship and by the specific meaning attached to each type of support. More broadly, the findings suggest that teacher support operates within a sociocultural context structured by gender norms. Its effects depend on how students interpret supportive practices in light of culturally shaped expectations about competence, legitimacy, and belonging in mathematics. In this way, support regulates not only emotions and engagement (Evans, 2000; Eynde et al., 2006) but also students’ perceived place within a gender-marked domain.

Table 3. Boys' Perceptions of Teacher Social Support in Mathematics

Teacher social support		Perceived utility	Self-concept	Positive affects	Negative affects	Investment	Gender-related stereotypes
Emotional support	Men				-.52**		
	Women		.35**	.23*		.41**	
Informational support	Men		.44**	.31**	-.32*	.40**	
	Women	.35*			-.40**		
Instrumental support	Men		.60**				
	Women	.42**	.68**			-.23*	-.67**
Evaluative support	Men						
	Women	.17	.21	.17	.16	.16	.28
R^2 adjusted	Men		.13	.09	.10	.15	
	Women	.17	.21	.17	.16	.16	.28
	Men	<i>n.s.</i>	$F_{(2,108)} = 9.25**$	$F_{(1,109)} = 11.71**$	$F_{(2,108)} = 7.33**$	$F_{(1,109)} = 20.73**$	<i>n.s.</i>
	Women	$F_{(2,137)} = 29.15**$	$F_{(2,137)} = 18.95**$	$F_{(2,137)} = 15.13**$	$F_{(1,138)} = 26.71**$	$F_{(2,137)} = 28.18**$	$F_{(2,137)} = 27.59**$

Table 4. Girls' Perceptions of Teacher Social Support in Mathematics

Teacher social support		Perceived utility	Self-concept	Positive affects	Negative affects	Investment	Gender-related stereotypes
Emotional support	Men	.46**			-.52**	.52**	-.45**
	Women					.38**	-.20*
Informational support	Men	-.21*	-.63**	-.51**	.67**	-.54**	.23*
	Women					.59**	
Instrumental support	Men				-.21*		
	Women	.32**	.17*	.22**		.60**	
Evaluative support	Men	.30**	.41**	.36**			.28**
	Women						-.46**
R^2 adjusted	Men	.35	.29	.19	.28	.21	.21
	Women	.10	.03	.04		.38	.20
	Men	$F_{(3,113)} = 21.79**$	$F_{(2,114)} = 25.21**$	$F_{(2,114)} = 14.66**$	$F_{(3,113)} = 23.70**$	$F_{(2,114)} = 15.94**$	$F_{(3,113)} = 8.40**$
	Women	$F_{(1,174)} = 19.66**$	$F_{(1,174)} = 5.42**$	$F_{(1,174)} = 8.62**$	<i>n.s.</i>	$F_{(3,172)} = 36.52**$	$F_{(2,173)} = 45.35**$

At a macro level, teacher gender moderates the overall weight of social support. When mathematics is taught by a male teacher, support explains a larger share of variance in girls' socio-affective attitudes. Conversely, in classrooms taught by a female teacher, boys' attitudes appear particularly sensitive to support. More generally,

coefficients tend to be stronger for girls, suggesting greater variability in their relationship to mathematics, a domain often associated with lower perceived utility and heightened negative affects for them (Ahmed et al., 2010; Eccles & Wigfield, 2002). These global patterns indicate that support acquires heightened symbolic salience when it intersects with gender norms that either confirm or challenge students' perceived legitimacy in mathematics.

In male-taught classrooms, support appears to function in ways that largely preserve the existing gender order of the domain. For boys, emotional support mainly reduces negative affects, consistent with the stress-buffering hypothesis (Cohen & Wills, 1985) and models of affect regulation in mathematics (Goldin, 2002). Instrumental support reinforces self-concept, consolidating mastery beliefs aligned with culturally endorsed expectations of male competence (Lafontaine & Monseur, 2009). These forms of support stabilize boys' positioning without fundamentally transforming it. However, from girls' experience, emotional support extends beyond affect regulation to perceived utility, behavioural investment, and stereotype attenuation. Relational warmth from a male authority figure may signal conditional inclusion within a masculinized field (Martinot et al., 2025), thereby enhancing task value (Eccles & Wigfield, 2002) while partially weakening stereotype threat processes (Kiefer & Sekaquaptewa, 2007).

By contrast, informational support in this configuration is associated with less adaptive patterns for girls. This finding suggests that instructional guidance is not interpreted as a purely technical resource but as a socially situated cue about competence. In a male-taught classroom within a masculinized domain, detailed explanations, corrections, or academic clarification may implicitly signal heightened standards of performance. For girls, whose legitimacy in mathematics is historically more fragile, such guidance may be experienced less as scaffolding and more as confirmation that competence must be demonstrated and justified. Informational support may therefore activate evaluative self-monitoring processes, increasing comparative attention and sensitivity to potential inadequacy. Rather than strengthening self-concept, it may intensify stereotype-consistent interpretations of difficulty (e.g., attributing misunderstanding to lack of ability rather than task complexity), consistent with research on stereotype threat and attributional ambiguity (Kiefer & Sekaquaptewa, 2007). Instructional guidance from a male teacher may heighten evaluative salience and reinforce comparative standards, thereby intensifying competence concerns within a gendered hierarchy. Moreover, informational support delivered by a male authority figure may heighten the salience of hierarchical expertise. When competence is embodied by a representative of the gender culturally associated with mathematical excellence, instructional clarification can function as an asymmetrical signal and position the student as recipient of correction rather than co-creator of knowledge. This dynamic may undermine perceived autonomy and belonging, thereby explaining the observed less adaptive socio-affective profile.

In female-taught classrooms, support assumes a more transformative potential. From a sociocultural perspective, the presence of a female authority figure in mathematics alters the symbolic configuration of the learning environment. Exposure to counter-stereotypical exemplars can weaken the implicit association between masculinity and mathematical competence (Carrell et al., 2010; Stout et al., 2011). In such contexts, supportive interactions are embedded within a normative frame that partially decouples competence from gender, thereby

modifying how support is interpreted.

For boys, emotional support is strongly associated with self-concept, positive affects, and engagement. Emotional support satisfies the need for relatedness, which in turn facilitates internalization of competence beliefs and engagement (Ryan & Deci, 2000). However, because mathematics is culturally coded as masculine, boys' competence in the domain is often normatively assumed rather than relationally constructed. In the presence of a female teacher, emotional support may therefore recalibrate the foundations of competence by integrating relational validation into academic self-concept. Rather than simply buffering stress (Cohen & Wills, 1985), emotional support may contribute to a more autonomous form of motivation by legitimizing effort and vulnerability within a context that challenges traditional masculinity-performance scripts. Instrumental support further strengthens boys' perceived utility and self-concept and reduces stereotype endorsement, yet coincides with lower behavioural investment. In other terms, while scaffolding enhances expectancy beliefs (self-concept) and perceived utility value, it may simultaneously undermine the experience of autonomy if perceived as externally regulating (Eccles & Wigfield, 2002). It suggests that support promotes engagement only when autonomy is preserved (Ryan & Deci, 2000; Ryan et al., 2022). For boys socialized to equate mathematical competence with independence, structured assistance from a female authority figure may create a subtle dissonance between competence reinforcement and autonomy expectations, explaining the coexistence of stronger self-beliefs and reduced investment.

For girls, instrumental support plays a central integrative role, simultaneously strengthening cognitive, affective, and behavioural dimensions. In a same-gender configuration, instrumental guidance may be interpreted less as evaluative correction and more as collaborative competence-building. It suggests that identification with a female mathematics teacher can reduce stereotype threat by normalizing women's expertise in the domain (Stout et al., 2011). When identity-relevant cues shape performance-related self-perceptions (Kiefer & Sekaquaptewa, 2007), instrumental support delivered by a female teacher may weaken the salience of gender as a limiting category. In this way, practical assistance becomes not only cognitive scaffolding but also identity-affirming feedback, consolidating expectancy beliefs and task value simultaneously.

Emotional support contributes mainly to investment and stereotype attenuation, functioning more as consolidation than as identity transformation in a same-gender context. Because belonging may already be implicitly legitimized through gender identification, emotional support operates less as a signal of inclusion and more as a stabilizer of engagement. It reinforces continuity rather than rupture in girls' academic positioning, consolidating motivational commitment within a context where competence and gender identity are less in tension.

Conclusions

This study examined the impact of different types of teachers' social support on students' socio-affective attitudes towards mathematics, according to the gender of the teacher and the student. Overall, the findings only partially confirm the initial hypotheses and, more importantly, refine them by revealing complex and sometimes ambivalent gendered dynamics. Regarding H1, we hypothesized that with male teacher, perceived social support would be

positively associated with students' socio-affective attitudes, with stronger associations for boys than for girls. The results do not fully support this expectation. Although several positive associations were observed for boys, the explanatory power of the models was generally stronger for girls in classrooms taught by a male teacher. Moreover, some forms of support (notably informational support) were associated with particularly damaging patterns among girls. Thus, rather than confirming a straightforward "greater benefit for boys" pattern, the findings suggest that teacher support provided by a male teacher may carry heightened symbolic salience for girls in a masculinized domain such as mathematics. H1 is therefore only partially supported and must be reconsidered in light of the stronger sensitivity observed among girls.

Concerning H2, we expected that perceived support from female teachers would be positively associated with socio-affective attitudes for both genders, with particularly strong associations for girls. The results again provide partial support. Associations were indeed generally positive and more balanced across genders in classrooms with a female teacher. However, boys' socio-affective profiles appeared especially sensitive to support in this configuration, particularly in relation to emotional and instrumental dimensions. For girls, support was positively related to engagement and stereotype attenuation, yet not systematically stronger than for boys. Consequently, H2 is only partially validated because support in classrooms taught by a female teacher appears broadly beneficial, but not exclusively for girls.

With respect to H3, the expectation was that the predictive role of support types would differ by teacher gender, with emotional and evaluative support accounting for more explained variance in classrooms with a female teacher and informational support playing a more central role in classrooms taught by a male teacher. The results lend qualified support to this hypothesis. Informational support did emerge as particularly central in classrooms with a male teacher, especially for boys, although its effects were not uniformly positive across genders. Emotional and evaluative support showed distinctive and sometimes stronger associations in classrooms taught by a female teacher, particularly regarding stereotype regulation and engagement. However, the observed patterns cannot be reduced to a simple alignment between specific types of support and teacher gender. For instance, informational support in classrooms with a male teacher was strongly predictive for boys but associated with less adaptive socio-affective patterns for girls. Similarly, evaluative support from a male teacher enhanced girls' perceived competence and positive affects while being accompanied by a moderate reinforcement of gender stereotypes. Conversely, instrumental support assumed a broader and more consistently positive role in classrooms with a female teacher. These results indicate that the effects of each support type depend not only on teacher gender, but also on how it is interpreted within a specific teacher–student gender configuration. H3 is therefore broadly supported in its differentiation logic, but the underlying mechanisms are more nuanced and interactional than initially hypothesized.

Theoretically, these findings contribute to a more contextualized understanding of teacher social support. Rather than functioning as a stable, universally beneficial resource, support operates at the intersection of affect regulation (Goldin, 2002), motivational processes (Eccles & Wigfield, 2002), basic psychological needs (Ryan & Deci, 2000), and sociocultural representations of mathematics as a gendered domain (Martinot et al., 2025; Nurlu, 2025). The results underscore that instructional and relational practices are symbolically embedded because the same

form of support may reinforce self-concept, buffer anxiety, or activate stereotype-related schemas depending on who provides it and to whom. This highlights the importance of integrating (teacher and student) gender as a structuring variable in multidimensional models of attitudes toward mathematics.

From a practical perspective, the findings call for greater reflexivity in teacher education and professional development. Rather than assuming that increasing support is uniformly beneficial, educators should be encouraged to reflect on how different forms of emotional, informational, instrumental, and evaluative support may be interpreted differently by students. In gender-marked domains such as mathematics, feedback and guidance can inadvertently reinforce or attenuate stereotypes. Training programs could therefore integrate a gender-informed lens, helping teachers adapt their support strategies in ways that foster pleasure, engagement or even perceived utility.

While the study provides evidence of gender-differentiated associations between teacher social support and students' socio-affective attitudes, several conceptual limits remain. Teacher support was examined through analytically distinct dimensions, yet in classroom life emotional reassurance, guidance, scaffolding, and evaluation are deeply intertwined. This segmentation, though methodologically useful, may obscure the dynamic and interactional character of support. Approaches grounded in classroom observation or process-oriented designs would allow a finer understanding of how supportive acts are enacted, combined, and interpreted in situ.

In addition, other variables likely to influence socio-affective attitudes were not included in the present models. Students' prior achievement, although partially reflected in self-concept, may independently shape both perceived support and motivational positioning. Likewise, broader classroom dynamics – such as goal orientation structures, normative climates, or peer achievement norms – may substantially inflect individual attitudes and interact with perceived teacher support. Without longitudinal or multilevel evidence, it remains unclear whether the differentiated support patterns observed here translate into durable effects on achievement, persistence, or orientation toward mathematics-related pathways, or whether they vary across classroom ecologies over time.

Taken together, these findings invite a theoretical shift in how teacher social support is conceptualized. Rather than viewing support as a neutral pedagogical input, it should be understood as a relational practice whose meaning is constructed within a gendered sociocultural context. Support does not merely regulate affect or facilitate engagement because it also conveys implicit cues about competence, legitimacy, and belonging in mathematics. Its impact is therefore mediated by gendered expectations and identification processes that shape how students interpret instructional interactions.

The interplay between support type, teacher gender, and student gender highlights that socio-affective attitudes develop within relational systems where pedagogical practices and symbolic meanings are tightly intertwined. What appears as the same supportive behaviour may reinforce existing hierarchies in one configuration and promote identity renegotiation in another. From a practical standpoint, these findings suggest that professional development should move beyond encouraging “more” support and instead foster teachers' awareness of how supportive practices acquire different meanings depending on classroom gender dynamics.

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