



Differences in need-supportive teaching toward students from different socioeconomic backgrounds and the role of teachers' attitudes

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Abstract

According to Self-Determination Theory, teachers can enhance their students' motivation, engagement, and learning through need-supportive teaching, which involves providing autonomy support, structure, and involvement. However, within classes, there appears to be great variation in the degree to which teachers support students' psychological needs. The current studies aimed to investigate to what extent this differentiation in need support was associated with students' socioeconomic background. Additionally, we examined whether teachers differentiated their need support more strongly when they had more biased Explicitly or Implicitly measured attitudes toward students from a low socioeconomic background. We conducted two studies: Study 1 was a vignette study representing a fictional student from a high or low socioeconomic background, and Study 2 was a field study where teachers reported on the need support provided to real students from a high and low socioeconomic background from their own class. Findings of both studies indicated that teachers reported lower levels of involvement for students from a low compared to a high socioeconomic background. Moreover, in Study 2, teachers reported to provide students from a low socioeconomic background with less autonomy support and more structure compared to students from a high socioeconomic background. However, these differences in autonomy support and structure seemed to be related to other student characteristics, namely students' gender, and teachers' perceptions of students' academic ability and classroom behavior. Furthermore, we revealed that teachers differentiated their need support more strongly when they had more biased attitudes toward low socioeconomic backgrounds.

Keywords Achievement gap · Need-supportive teaching · Socioeconomic background · Teacher attitudes

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1 Introduction

Over the past few decades, educational inequalities have increased among children from different socioeconomic backgrounds (see Liu et al., 2022 for a review). In many countries socioeconomic background is associated with students' academic achievement (e.g., Björklund & Salvanes, 2011; Von Stumm et al., 2022), and this association seems to have become stronger in recent years, also due to the impact of the COVID-19 pandemic (Engzell et al., 2021; Kuhfeld et al., 2020). Moreover, the achievement gap between students from high versus low socioeconomic backgrounds tends to widen across the different grades of the academic track (Liu et al., 2022), indicating that schools are currently unable to successfully counter this trend.

Through their teaching practices, teachers provide their students with learning opportunities and thereby teachers play an essential role in student learning (e.g., Brophy, 1984; Klem & Connell, 2004). Teachers interact differently with students from diverse socioeconomic backgrounds (e.g., Quay & Jarret, 1986; Ready & Chu, 2015), which may lead to different opportunities for learning and reinforcing existing socioeconomic advantages. Therefore, examining teaching practices toward students from different socioeconomic backgrounds may help to explain why achievement gaps between these students are maintained in school. Self-Determination Theory (SDT) (Deci & Ryan, 1985, 2020) provides a comprehensive theoretical framework for describing teacher-student interactions by emphasizing that every child—regardless of their family background—flourishes if teachers support their basic psychological needs for autonomy, competence, and relatedness. Empirical findings show that teachers' need support enhances students' motivation, engagement, and learning (Howard et al., 2021).

Although SDT posits that all children benefit from need support, teachers tend to differ in the extent to which they provide need support to distinct students (Domen et al., 2020). Furthermore, teachers' attitudes toward stigmatized groups have been found to be associated with differential teaching practices (e.g., Denessen et al., 2020a), and similar to other people, teachers may hold biased attitudes toward low socioeconomic backgrounds (Pit-ten Cate & Glock, 2018). Hence, research is needed to investigate the extent to which teachers differentiate their need support toward students from different socioeconomic backgrounds, and how this is affected by their attitudes.

For this purpose, vignette and field study designs are particularly useful. Experimental vignette studies use stories about fictional students, allowing us to manipulate and control variables, such as socioeconomic background (Eifler & Petzold, 2019). Field studies that have a non-experimental nature, on the other hand, allow us to capture the complexity of interactions in real-life classroom settings. To benefit from both approaches, we used a two-study approach and conducted two studies: Study 1 was a vignette study in which teachers reported their need support toward a hypothetical student from either a low or a high socioeconomic background (i.e., between-subject comparison). Study 2 was a field study in which teachers answered the same questions about a student from a high and

low socioeconomic background from their class (i.e., within-subject comparison). In both studies, we examined whether teacher-reported need support differed between students from different socioeconomic backgrounds, and whether these differences were stronger when teachers held more biased attitudes toward low socioeconomic backgrounds. The current studies use SDT to gain a better understanding of the underlying mechanisms of the socioeconomic achievement gap, which is needed to ultimately be able to foster more inclusive educational environments.

1.1 Need-supportive teaching

In classrooms, teachers continuously interact with their students. Consequently, teachers provide their students with learning opportunities (Pianta, 2016). SDT provides a theoretical framework to explain how teachers can shape these interactions to support students' motivational, affective and cognitive needs (Deci & Ryan, 1985). That is, when teachers support their students' basic psychological needs for autonomy, competence, and relatedness, this will foster their students' motivation, engagement (Bureau et al., 2022; Lei et al., 2018; Stroet et al., 2013; Vansteenkiste et al., 2020; Zhang et al., 2011), and learning outcomes (Howard et al., 2021). For this purpose, teachers can provide autonomy support, structure and involvement, respectively (Connell & Wellborn, 1991; Ryan & Deci, 2020). Longitudinal research has shown that students' perceptions of need support can positively predict students' need satisfaction, which in turn can enhance students' engagement and academic achievement in the long run (Jang et al., 2012). Moreover, SDT research has shown that the effects of the three dimensions of need support on student outcomes are not just additive. It is important for teachers to support all three needs simultaneously as it is the combination of high support of all three basic psychological needs which yields the most beneficial outcomes for students (Hornstra et al., 2021; Olivier et al., 2021).

Autonomy refers to the need to experience a learning activity as self-chosen and unpressured (e.g., Ryan & Deci, 2020). Through autonomy support, teachers can shape a learning environment enhancing students' sense of volition, personal ownership and self-endorsement of learning (Ahmadi et al., 2022). Previous research identified several aspects of autonomy-supportive teaching practices including allowing for student input and choice, or teaching in students' preferred ways so that students can meaningfully direct their own learning (Ahmadi et al., 2022). Teachers' autonomy support has been found to predict students' autonomy satisfaction (Ahn et al., 2021; Bureau et al., 2022), which in turn fosters student motivation, engagement, and academic achievement (e.g., Flunger et al., 2022; Reeve & Cheon, 2021; Stroet et al., 2013). Yet, when teachers thwart students' need for autonomy, they may pressure students to think, feel, and behave in prescribed ways (Reeve, 2009). A so-called controlling teaching style has been associated with maladaptive student outcomes like amotivation and disengagement (Aelterman et al., 2019; Haerens et al., 2015; Patall et al., 2018).

Second, the need for competence refers to a person's desire to experience a sense of mastery and the capability to succeed and grow (Ryan & Deci, 2020). Teachers can support the need for competence by structuring the learning environment in a way that facilitates students' experiences of accomplishment and progress. Teachers can provide structure through clear communication of expectations, consistent guidance, and encouragement (Ahmadi et al., 2022; Skinner & Belmont, 1993; Stroet et al., 2013). Accordingly, students gain a better understanding of what is expected from them, which helps them to reach their teachers' expectations and feel more competent. Research has shown positive associations between teachers' provision of structure and students' perceived competence (e.g., Stroet et al., 2013). However, in certain instances, teachers' provision of structure compromises their provision of autonomy support. That is, many teachers believe that structure is incompatible with high levels of autonomy support (Reeve, 2009). Consequently, teachers may combine high levels of structure with low autonomy support, which is referred to as a demanding or domineering teaching style (Aalterman et al., 2019). Yet, previous research has shown that this is based on a misconception. In case teachers provide high levels of structure and autonomy support simultaneously, students have been found to thrive most regarding several adaptive outcomes (Cheon et al., 2020; Hornstra et al., 2021), while a demanding or domineering style was associated with maladaptive student outcomes (Jang et al., 2010).

Finally, relatedness refers to the desire for belongingness and warm interpersonal relationships, characterized by stability and frequent positive contact (Baumeister & Leary, 1995). Teachers can support students' need for relatedness through involvement (Ryan & Deci, 2020), which includes displaying affection, dedicating resources such as time, and being dependable (Ahmadi et al., 2022; Belmont et al., 1992; Stroet et al., 2013). Accordingly, teachers create a safe learning environment that allows students to challenge themselves, which promotes motivation and learning achievement (Wubbels et al., 2016). Moreover, research has shown that for certain students, such as those from low socioeconomic backgrounds, their teachers' involvement can serve as a buffer against other disadvantages they may encounter (Roorda et al., 2011).

1.2 Teachers' need support: differences by students' socioeconomic backgrounds

SDT posits that the three psychological needs are universal across cultures, races, ages, and other contextual factors, implying that all students, regardless of their background should benefit from optimal levels of need support (Ryan & Deci, 2020). Moreover, empirical evidence supports this universality claim of SDT. That is, students across different countries and socioeconomic backgrounds have been found to benefit from the satisfaction of their psychological needs (e.g., Archambault et al., 2020; Benita et al., 2020; Brandisauskiene et al., 2022).

Consequently, SDT provides a fruitful framework to study educational inequalities. SDT's universality claim does not mean that teachers cannot differentiate their practices. Instead, SDT posits that teachers should differentiate *how* they support distinct students to adapt to their individual needs. Thus, although the way in which

teachers support students' needs might differ between students, all students should receive high levels of need support (Vansteenkiste et al., 2020). If teachers systematically do not provide sufficient support to students from specific groups, they might undermine the academic achievement of these students and widen existing achievement gaps.

Previous studies indeed indicate that some groups of students experience less need support in school compared to others, particularly students from low socioeconomic backgrounds (Atlay et al., 2019; Shogren et al., 2018). This suggests that teachers may support the psychological needs of students from low socioeconomic backgrounds less optimally than those of students from high socioeconomic backgrounds. Moreover, teachers have been found to differentiate their autonomy support, structure, and involvement between children within the same classroom (e.g., Chatzisarantis et al., 2019; Domen et al., 2020). However, it is not yet known whether this is also related to students' socioeconomic background.

First of all, in a small qualitative study with nine Grade 6 teachers with different student populations, Hornstra et al. (2015) found that teachers were more controlling (i.e., less autonomy-supportive) toward 'at-risk' students, including those from low socioeconomic backgrounds. Teachers believed autonomy-supportive teaching styles would not be beneficial for the motivation and achievement of these students and reported more controlling behavior toward these students. Furthermore, Glock and Kleen (2022) found that pre-service teachers responded differently to misbehaviors of students from different socioeconomic backgrounds, and that they were more likely to ask students from higher socioeconomic backgrounds for an explanation of their behavior. Accordingly, they acknowledged the perspective (i.e., applied autonomy support; e.g., Ahmadi et al., 2022) of students from high socioeconomic backgrounds but not for students from a low socioeconomic background—indicating they might undermine these students' need for autonomy (Reeve, 2009).

Secondly, for teachers' provision of structure previous findings are mixed. More specifically, teachers have been found to formulate their feedback toward students from low socioeconomic backgrounds with more criticism and less praise (Ready & Chu, 2015), which suggests less encouragement and positive feedback (components of structure; Stroet et al., 2013). In contrast, some studies suggest that teachers provide more feedback and guidance toward 'at-risk' students as a means to cater to these students' needs, which could indicate higher levels of structure (Denessen et al., 2020b; Hornstra et al., 2015). However, this feedback tends to be more directive (Hornstra et al., 2015), suggesting that teachers may provide structure in controlling and thus autonomy-undermining ways.

Lastly, concerning involvement, research has shown that teachers tend to have poorer relations with students from low compared to high socioeconomic backgrounds (Jiang et al., 2018). Additionally, teachers have been found to have fewer interactions with students from lower socioeconomic backgrounds (Quay & Jarret, 1986). This might imply that the teacher dedicates less time to these students or students do not approach the teacher when they need help (indicators of involvement, Ahmadi et al., 2022). Furthermore, Bakchich et al. (2023) found that students from low socioeconomic backgrounds received less emotional support from their teachers

than students from higher socioeconomic backgrounds, which was associated with lower sense of belonging in school for these students.

The abovementioned findings illustrate that teachers differentiate their support out of good intentions and to adapt to differences in students' individual needs (e.g., Hornstra et al., 2015). Teachers may differentiate their teaching based on students' socioeconomic background to adjust to their backgrounds and their perceptions of these students' needs. There is considerable evidence that students from low socioeconomic backgrounds are accustomed to a parenting style characterized by a stronger emphasis on obedience and conformity and less on autonomy support (Kohn, 1989). Therefore, students from low socioeconomic backgrounds might be more familiar with a controlling type of parenting and may also expect this style from their teachers (Alwin & Tufiş, 2021). Teachers might observe this and respond to this in their teaching. However, SDT studies show that these controlling teaching practices are disadvantageous (e.g., Reeve, 2009) and that students from low socioeconomic backgrounds also benefit from high levels of autonomy support (Archambault et al., 2020).

Additionally, teachers differentiate their support based on their expectations (Babad, 1993; Harris & Rosenthal, 1985). Previous research has shown that the expectations teachers have from their students are related to their need-supportive teaching (Hornstra et al., 2018). Hence, teachers may differentiate their practices to adapt to (perceived) differences in students' abilities, which—on average—differ based on students' socioeconomic backgrounds (Liu et al., 2022). However, research has also shown that teachers' expectations are biased against students from low socioeconomic backgrounds (e.g., Sneyers et al., 2020; Wang et al., 2018). This means that teachers' expectations are systematically too low for these students, relative to their actual achievement (Timmermans et al., 2015). Thus, students from low socioeconomic backgrounds might receive different levels of support compared to their classmates from higher socioeconomic backgrounds.

Besides, other student characteristics might also underlie differences in teachers' need support. For instance, teachers might differentiate their teaching based on students' gender (Lietaert et al., 2015) and their perceptions of their students' ability (Hornstra et al., 2018) or classroom behavior (O'Connor et al., 2011). Moreover, teachers' perceptions of students' ability and classroom behavior might differ for students from different socioeconomic backgrounds (Brandmiller et al., 2020). Therefore, in the current studies, we control for these student characteristics to investigate to what extent teachers differentiate solely based on students' socioeconomic background, beyond these other factors.

1.3 Teachers' attitudes toward students from low socioeconomic backgrounds

Attitudes refer to a person's tendency to evaluate an object or social group more positively or negatively (Eagly & Chaiken, 1993), and attitudes can affect behavior toward a certain group (Kurdi et al., 2019). Biased attitudes refer to attitudes that are consistently more negative toward a particular group, such as students from low socioeconomic backgrounds (Singh, 2019). Previous studies have shown

that teachers' biased attitudes toward stigmatized groups (e.g., minority students) can impact their judgements toward these students, and that more biased attitudes may be associated with more differentiation in teaching practices (Denessen et al., 2020a). Students from low socioeconomic backgrounds are an example of a stigmatized group, as many people tend to hold biased attitudes toward people from this group (Kuppens et al., 2018), including teachers (Pit-ten Cate & Glock, 2018). This raises the question whether teachers with more biased attitudes toward students from low socioeconomic backgrounds differentiate their need support more strongly for students from different socioeconomic backgrounds.

To explain how someone's attitudes guide their behavior, we distinguish between automatic and controlled processes (Dovidio et al., 1997; Gawronski & Creighton, 2013). Controlled processes relate to behaviors resulting from conscious decision-making processes and concern intentionally initiated behaviors (Gawronski & Creighton, 2013). Applied to teaching, this may be linked to the feedback and guidance teachers provide to their students. Hence, biased attitudes may affect these deliberate teaching practices. The second process through which attitudes guide behavior are automatic processes, which mostly occur outside a person's conscious awareness and cannot be stopped voluntarily (Gawronski & Creighton, 2013). Where teaching practices are concerned, this suggests that attitudes can affect teachers' spontaneous behavior, such as the warmth and friendliness they express to their students. As such, biased attitudes might result in e.g., (unintentionally) showing less positive affect or giving less (positive) feedback to some students. Moreover, automatic processes typically come into play in situations of stress and high cognitive load (Gawronski & Bodenhausen, 2006). Everyday classroom situations are typically demanding and these situations often do not allow teachers to think and act deliberately (Feldon, 2007; Klassen & Chiu, 2010). Hence, next to controlled processes, automatic processes may be an important predictor of teachers' (need-supportive) behavior in class (Glock & Kovacs, 2013).

The distinction between controlled and automatic processes requires different measurement methodologies. Explicit measures of attitudes, such as self-report questionnaires, tap into controlled processes as this type of measure allows respondents to think about their answers and give a controlled response (Hofmann et al., 2005). This can be achieved by asking teachers to explicitly report their attitudes toward teaching students from low socioeconomic backgrounds (Glock et al., 2016). Some scholars (e.g., Schimmack, 2021) claim that explicit measures are valid measures of someone's attitudes as they can reveal information about individuals' cognitive biases and variations between participants are found, at least when being measured anonymously. However, social desirability may limit the validity of explicit measures, particularly when they relate to socially sensitive issues (Fazio et al., 1995). Implicit attitude measures, tapping into automatic processes, are designed to circumvent social desirability (De Houwer, 2006). The Implicit Association Test (IAT) is an example of a frequently used instrument to measure automatic processing involved in implicit attitudes (Greenwald & Lai, 2020; Pit-ten Cate & Glock, 2018). The IAT is based on a response latency paradigm (Fazio & Olson, 2003) and assumes that when people's associations between two concepts are stronger, they will be quicker in pairing concepts (e.g., Greenwald et al., 2009). For instance,

people with biased attitudes toward students from low socioeconomic backgrounds will pair concepts related to low socioeconomic backgrounds with negative emotions (i.e., anger) more quickly than with positive emotional concepts (i.e., happy), and concepts related to high socioeconomic backgrounds more quickly with positive than negative emotions. Even though implicit measures tap into the automatic pathway, this does not mean that people are unaware of their underlying attitudes. Previous research suggested that people are highly accurate at estimating their performance on implicit attitude measures (Hahn et al., 2014).

Thus, implicit and explicit measures have been found to relate to different types of behavior (Gawronski, 2009), teacher judgements, and practices (Dovidio et al., 1997). Therefore, to comprehend the origin of differential teacher behavior and whether teachers with more biased attitudes may differentiate more strongly in their need-supportive teaching, we will incorporate both Implicitly and Explicitly measured attitudes of teachers.

1.4 Two-study approach: combining vignette and field study designs

To investigate the association between teachers' attitudes towards students' socioeconomic background and their need support, we employed a two-study approach; consisting of a vignette study to examine the effects of socioeconomic background while keeping other factors constant (Study 1), and a field study to examine the effects of socioeconomic background on need support while simultaneously considering the complexity of the real-life classroom environment (Study 2). In vignette studies, hypothetical stories such as those featuring a student are presented to participants, who subsequently make judgements about this fictional student (Evans et al., 2015; Krolak-Schwerdt et al., 2018). Vignette studies offer several advantages, such as the ability to manipulate specific variables, such as students' socioeconomic background, while holding other factors constant (Evans et al., 2015; Krolak-Schwerdt et al., 2018). It can be argued that vignettes are useful to overcome the limitations of research conducted within complex real-life classroom environments in which teachers are aware of and respond to many student characteristics (Copur-Gencturk et al., 2019). Vignettes also help researchers overcome ethical concerns by avoiding asking teachers direct questions about unequal treatment of their students. However, although such vignette studies have high internal validity, the ecological or external validity (i.e., whether we can translate the findings to real-life classroom phenomena) of the findings may be a critical issue (e.g., Eifler & Petzold, 2019). For this reason, field studies including real students from teachers' own classes are particularly useful. While field studies have the disadvantage that it can be more difficult to isolate effects of specific variables due to the complexity of real-life situations, these studies tend to have higher ecological validity (Eifler & Petzold, 2019).

Previous studies investigating the effects of teachers' biased attitudes toward stigmatized groups like ethnic minority students showed inconsistent findings which may be linked to differences in using vignette versus field study designs (Denessen et al., 2020a). Specifically, field studies have shown that teachers' biased Implicitly measured attitudes are related to lower achievement among students from

stigmatized groups, even when controlling for prior achievement (e.g., van den Bergh et al., 2010; Hornstra et al., 2010; Peterson et al., 2016). Some vignette studies have also suggested that more biased teacher attitudes are related to more negative judgements of students from these groups (e.g., Halberstadt et al., 2020). However, other vignette studies did not find an effect of teachers' attitudes (e.g., Krischler & Pit-ten Cate, 2019; Quinn, 2020), or showed some contradictory results. For example, Bonefeld and Dickhäuser (2018) found that more biased Implicitly measured teacher attitudes were related to less bias in teachers' judgements of minority students. By doing both a vignette study and a field study on the role of teachers' attitudes and their teaching practices, we utilize the benefits of both approaches and aim to shed light on previous inconsistent findings.

1.5 Present studies

The present studies aimed to investigate to what extent teachers differentiate their need support in terms of autonomy support, structure, and involvement toward students with different socioeconomic backgrounds. Additionally, we examined whether potential differences in need-supportive teaching for these students were more pronounced when teachers held more biased Implicitly or Explicitly measured attitudes toward students from low socioeconomic backgrounds. We addressed these goals in two studies with different research designs. Study 1 was a vignette study, where teachers answered questions about a hypothetical student from a high or low socioeconomic background (between-subjects comparison). Study 2 was a field study, where teachers answered questions about two students from their own class (within-subjects comparison).

Based on the study of Hornstra et al. (2015) showing that teachers act less autonomy-supportive toward 'at-risk' students, we hypothesized that teachers would report lower levels of autonomy support toward students from low versus high socioeconomic backgrounds (Hypothesis 1a). Besides, based on studies suggesting that teachers provide either more structure (Denessen et al., 2020b; Hornstra et al., 2015) or less structure (Ready & Chu, 2015) for students from a low compared to a high socioeconomic background, we had a non-directional hypothesis for teachers' differential provision of structure (Hypothesis 1b). Lastly, based on research showing that teachers have poorer relationships with students from a low compared to a high socioeconomic background (Jian et al., 2018) and that teachers provide these students with less emotional support (Bakchich et al., 2023; Quay & Jarret, 1986), we expected that teachers would report lower levels of involvement for students from a low compared to a high socioeconomic background (Hypothesis 1c).

Furthermore, based on previous findings (Denessen et al., 2020a; Pit-ten Cate & Glock, 2018), we hypothesized that teachers with more biased Implicitly measured attitudes would differentiate more strongly in their need support toward students from different socioeconomic backgrounds, while providing lower levels of need support toward students from a low compared to a high socioeconomic background (Hypothesis 2a). However, previous research has found that teachers' Implicitly measured attitudes are more frequently associated with their judgements

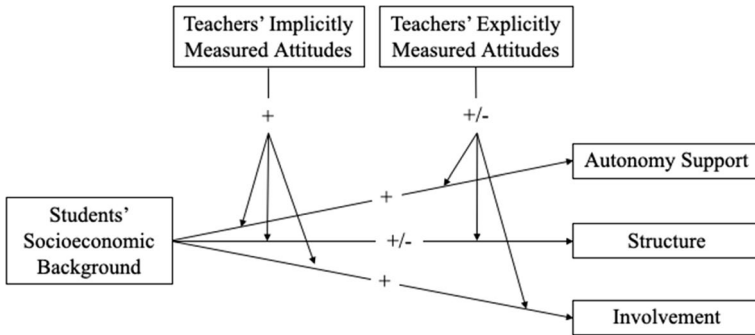


Fig. 1 Conceptual model of the associations between students' socioeconomic background, teachers' need support, and attitudes. *Note.* Expected effects are + positive, – negative, +/- non-directional

and behaviors than their Explicitly measured attitudes (Denessen et al., 2020a). Therefore, we had a non-directional hypothesis, meaning that we had no specific expectations regarding the direction of the moderation of teachers' Explicitly measured attitudes (Hypothesis 2b). See Fig. 1 for the conceptual model underlying both studies. Furthermore, in Study 1, we controlled for students' gender, teachers' perceptions of students' ability, and perceptions of classroom behavior by keeping these factors constant in the vignette. In Study 2, we included them as covariates. Accordingly, we tested whether teachers differentiated their need support based on students' socioeconomic background and not due to students' gender (Lietart et al., 2015), and their perceptions of students' ability (Hornstra et al., 2018) or classroom behavior (O'Connor et al., 2011).

2 Method Study 1

2.1 Participants and design

Study 1 included 78 Dutch primary education teachers. The majority of the participants were female (84.4%), with a mean age of 34.54 years ($SD = 12.60$, range 21–63) and an average teaching experience of 9.96 years ($SD = 10.61$, range 0–40). The sample included three preservice teachers and nine substitute teachers who had a similar educational background as the rest of the participants.¹ Study 1 was a vignette-based experimental study with a between-subject design. Participants were randomly assigned to either the condition with a vignette about a student from a high socioeconomic background ($n = 40$) or a low socioeconomic background ($n = 38$).

¹ A robustness check with the sample excluding substitute and preservice teachers ($n = 66$) showed findings in line with the results from the total sample ($N = 78$), hence, substitute and preservice teachers were included in the total sample used for all analyses. See Appendix A for more details.

2.2 Procedure

Data were collected online in Spring 2020. We invited participants to a study on ‘Dealing with differences in the classroom’, investigating how student characteristics were associated with teachers’ judgements and practices. We used convenience sampling by spreading the link to the study in the network of the researchers and on social media platforms for teachers. Gift cards were raffled among the participants. First, participants received information about the study and an estimated time of completion (25–30 min). Participants were *not* told beforehand that the study was about their attitudes since this could have affected the results. After participants gave consent, they were randomly assigned to one of the two conditions and answered general questions about themselves. Next, teachers read the vignette and answered questions about their teaching practices toward the hypothetical student. As this study was part of a larger project, some additional questions were asked (e.g., regarding teachers’ track recommendations). Teachers then reported their Explicitly measured attitudes and performed the IAT. Finally, participants received a debriefing about the actual aim of the study and were given the option to object to their data being used in the study. The original sample consisted of 121 participants, but due to drop-out (a technical issue due to which not all participants were forwarded to the IAT and the debriefing), only 78 participants gave consent after the debriefing and could be included in the analyses, the other 43 teachers needed to be excluded.

2.3 Instruments

2.3.1 Vignettes

Teachers were presented with a vignette describing a female student (see [Appendix B](#)). The name and hobbies of the student were manipulated to represent characteristics commonly attributed to students from high or low socioeconomic backgrounds. In the Netherlands, a child’s name can indicate its socioeconomic background. We used names typical for students from different socioeconomic backgrounds based on the study by Onland and Bloothoofd (2008). The name *Willemijn* was used to indicate a high socioeconomic background, depicting this student’s hobbies as playing violin and field hockey. *Shelly* was a student from a low socioeconomic background, attributed with liking to dance at the community center. All other information (e.g., pertaining to achievement and classroom behavior) was similar in both conditions. The manipulation was considered in the data as a nominal, dummy, between-subjects variable (1 = *low socioeconomic background*, 0 = *high socioeconomic background*).

2.3.2 Manipulation check

To check whether the manipulation of socioeconomic background was effective, we compared how teachers perceived the educational attainment of the students’

Table 1 Frequencies of the rated parental educational attainment

	Low socioeconomic background (Shelly)	High socioeconomic background (Willemijn)
Low educated	1	1
Average educated	30	20
High educated	7	19

parents across both conditions. Socioeconomic background is generally determined by educational level of the parents, parental income, parental occupation, and home resources (e.g., books, or access to educational services outside school) (Sirin, 2005). In the current study, we focus on parental educational attainment since this is considered the most stable factor due to being established at an early age (Sirin, 2005), and most relevant when it comes to children's education. Teachers rated the educational attainment of the parents of Willemijn or Shelly on a three-point scale (i.e., low, average, or high educated). A Mann–Whitney U -test indicated that the manipulation succeeded: Teachers significantly more often estimated the parents of Shelly to be lower educated ($Mean Rank = 33.38, n = 38$), and the parents Willemijn as higher educated ($Mean Rank = 44.90, n = 40$), $U = 544.00, z = -2.58, p = .010$, with $r = 0.29$ indicating a medium-sized effect. See Table 1 for the frequencies.

2.3.3 Need-supportive teaching

To measure teachers' need support, teachers answered questions (See Appendix C) on a five-point Likert Scale (1 = *totally disagree*; 5 = *totally agree*). For autonomy support and structure, the scales were based on the Teacher as Social Context Questionnaire (TASC, Belmont et al., 1992; Domen et al., 2020). Autonomy support (e.g., 'I think it is important for this student to make their own decisions about schoolwork') and structure (e.g., 'I think it is important to be consistent toward this student') were both measured with five items. Involvement was measured with four items of the Teacher Relationship Scale (Pianta, 2001; see for the Dutch version we used, Koomen et al., 2007) (e.g., 'I think I would like this student').

To test whether the questionnaire comprised a three-factor model, Confirmatory Factor Analyses (CFA) were conducted in *Mplus* Version 8.7 (Muthén & Muthén, 1998-2017). After deleting five items (due to low factor loadings), the final model consisted of a three-factor solution with three items for each factor. Furthermore, the internal consistencies of the scales were determined with McDonald's Omega (ω) (Hayes & Coutts, 2020). McDonald's ω for all scales was above or approached the frequently used cut-off score of .70 (Viladrich et al., 2017), indicating sufficient reliability. See Appendix D for a detailed description of the CFA and the internal consistencies.

2.3.4 Explicitly measured attitudes

To measure teachers' explicit attitudes toward students from low socioeconomic backgrounds, teachers responded to six items on a five-point Likert Scale (1 = *totally disagree*; 5 = *totally agree*) (e.g., 'It is more pleasant to teach children with more highly educated parents.'). Items were adopted from an explicit attitudes measure developed by Glock et al. (2016). A CFA confirmed that all items loaded on a single factor, yet due to low factor loadings (see Appendix D for more details) three items were deleted resulting in a factor indicated by three remaining items. McDonalds ω of this scale was .61, which was deemed sufficient. A higher score indicated more biased Explicitly measured attitudes.

2.3.5 Implicitly measured attitudes

Teachers' Implicitly measured attitudes toward students from a low socioeconomic background were measured with the IAT developed by Greenwald et al. (2009). More specifically, the version we used was based on the version of Pit-ten Cate and Glock (2018) measuring someone's attitudes toward a low socioeconomic background. The underlying assumption of the IAT is that individuals will respond quicker to concepts when it more strongly complements their automatic associations (Greenwald et al., 2009; Nosek et al., 2011). The IAT of Pit-ten Cate and Glock (2018) relied on the strengths of someone's associations between the educational level of the parents and positive or negative valence (emotional concepts, e.g., happy, anger). Dutch names were used as proxy for socioeconomic background. Based on Onland and Bloothoof (2008) Dutch names are commonly associated with someone's socioeconomic background (e.g., Fleur or Diederik for a high socioeconomic background versus Delano or Rowena for a low socioeconomic background).

The IAT consisted of seven blocks, the first three blocks and blocks five and six were to practice, since including a sufficient number of practice trials increases the construct validity of the IAT (Nosek et al., 2005). Blocks four and seven were the actual test blocks on which we based the IAT scores included in this study. In the first block, teachers were asked to categorize names either to a high (press 'e') or a low socioeconomic background (press 'i'). In Block 2, teachers had to categorize emotional concepts as positive (press 'e') or negative (press 'i') (e.g., happy versus angry). The third and fourth block combined the previous tasks, and randomly asked teachers to categorize emotional concepts (block 3) and names (block 4) with *high-educated/positive* or *low-educated/negative*. In block five, the categories for emotional concepts were reversed (i.e., press 'e' for negative, and 'i' for positive associations). For the last two blocks, the categories were combined counterintuitively; teachers had to randomly combine emotional concepts (block 5) and names (block 7) with *high-educated/negative* and *low-educated/positive*. The blocks were not counterbalanced (i.e., first testing counterintuitive associations), as the order of presentation does not affect the predictive validity of the IAT (Greenwald et al., 2009).

Teachers' Implicitly measured attitudes were considered more biased toward low socioeconomic backgrounds when they more quickly paired names associated with low socioeconomic backgrounds with *negative*, than names associated with high

Table 2 Descriptive statistics

Variable	Total group M (SD)	High socioeconomic background M (SD)	Low socioeconomic background M (SD)
Autonomy support	3.15 (0.64)	3.15 (0.64)	3.15 (0.65)
Structure	3.72 (0.73)	3.63 (0.79)	3.82 (0.66)
Involvement	4.46 (0.48)	4.59 (0.46)	4.32 (0.47)

$N=78$. For the purpose of interpretability, descriptive statistics were calculated with composite scores in which each item had the same weight. For further analyses, factor scores were used

socioeconomic backgrounds with *negative*, and more quickly paired names associated with high socioeconomic backgrounds with *positive*, than names associated with low socioeconomic backgrounds with *positive*. To determine teachers' Implicitly measured attitudes, we calculated standardized scores (d) using the method of Greenwald et al. (2003). Based on norms of Nosek et al. (2007), the trials in which teachers responded in less than 400 ms (like pointing to arbitrary responses) or more than 10.000 ms (possibly reflecting explicit thinking) were left out to make sure we measured teachers' spontaneous associations. A d -score of 0.00 indicated neutral Implicitly measured attitudes. A positive d -score can be interpreted as showing more biased Implicitly measured attitudes toward students from low socioeconomic backgrounds and more positive attitudes toward students from high socioeconomic backgrounds, while a negative d -score means more biased attitudes toward students from high socioeconomic backgrounds. Cunningham et al. (2001) found that the IAT has good convergent validity when compared to other implicit tests. The internal consistency for the IAT of this study was calculated using the method of Bosson et al. (2000) and displayed good reliability (Cronbach's $\alpha = .83$).

2.4 Data analyses

Data analyses were conducted in *Mplus* version 8.7 (Muthén & Muthén, 1988-2017). Given the small sample, testing the effects with latent variables might have yielded biased results (Tanaka, 1987). Therefore, factor scores based on CFAs were used in the subsequent analyses. This is considered an appropriate way to retrieve values for individual observations (for analyses) because it allows to consider the weighted function of the observed variable on the latent factors (Bollen, 1989). Cohen's d and partial η^2 were reported as measures of effect size; with Cohen's d of 0.20, 0.50, and 0.80, and η^2 of 0.01, 0.06, and 0.14 reflecting small, medium, and large effects, respectively (Cohen, 1988). To test the hypotheses, regression analyses were conducted using the maximum likelihood with robust standard errors (MLR) estimator to account for non-normality (Hox et al., 2010). Condition (i.e., high socioeconomic background=0; low socioeconomic background=1) was included as independent variable and autonomy support, structure and involvement as dependent variables. In a following step, we tested two-way interactions between socioeconomic background and teachers' Implicitly and Explicitly measured attitudes; accordingly, standardized scores of the continuous predictors (i.e., Implicitly and

Explicitly measured attitudes) were calculated, and multiplication terms between socioeconomic background and Implicitly measured attitudes and socioeconomic background and Explicitly measured attitudes were created.

3 Results study 1

3.1 Descriptive statistics

Descriptive statistics of teacher-reported need support for the total sample and per condition are shown in Table 2. Moreover, the mean of teachers' Explicitly measured attitudes was 2.65 ($SD=0.63$). For the implicit measure of teacher attitudes, a one sample t -test indicated that the mean ($M=0.69$, $SD=0.33$) of teachers' Implicitly measured attitudes was significantly higher than zero; $t(77)=18.35$, $p<.001$. This suggests that teachers' attitudes were on average biased against low socioeconomic backgrounds, with Cohen's $d=2.08$ indicating a large effect. The correlations between all variables can be found in Appendix E.

3.2 Teachers' differential need support

A multivariate regression analysis was conducted to test whether teachers presented with the different vignettes of the fictional student from a high or low socioeconomic background differed from each other in terms of self-reported need support in Model 1 (see Table 3). The first model fitted the data well ($\chi^2(6)=18.42$, $p=.005$; $RMSEA<0.001$; $CFI=1.00$; $SRMR<0.001$). With respect to Hypothesis 1a, we expected lower levels of reported autonomy support for the student from a low relative to a high socioeconomic background. Yet, there was no statistically significant difference between teachers' autonomy support toward the fictional students ($b^*=0.08$, $p=.472$). Moreover, regarding Hypothesis 1b, our expectations for teachers' provision of structure were non-directional. Analyses showed there was no statistically significant difference between teachers' provision of structure toward the students ($b^*=0.17$, $p=.129$). However, in line with Hypothesis 1c, the analysis revealed that teachers reported a significantly higher level of involvement with the student from a high compared to a low socioeconomic background ($b^*=-0.25$, $p=.018$), with partial $\eta^2=0.06$ indicating a medium effect.

3.3 Explicitly and Implicitly measured attitudes

To test whether differential teaching behaviors were moderated by teachers' Implicitly and Explicitly measured attitudes, two two-way interactions between socioeconomic background and attitudes were included in Model 2 (see Table 3). The model fitted the data well ($\chi^2(18)=34.83$, $p<.001$; $RMSEA<0.001$; $CFI=1.00$; $SRMR<0.001$). For teachers' Implicitly measured attitudes, a positive interaction with socioeconomic background for all three dimensions of need support was

Table 3 Standardized estimates for the model predicting teachers' need support toward students from different socioeconomic backgrounds

Variable	Model 1			Model 2		
	<i>b</i> *	SE	R ² (SE)	<i>b</i> *	SE	R ² (SE)
<i>Autonomy support</i>						
Low socioeconomic background (ref: high)	0.08	0.11	0.01 (0.02)	0.08	0.12	0.03 (0.04)
Explicitly measured attitudes	-	-	-	0.10	0.13	-
Implicitly measured attitudes	-	-	-	0.11	0.14	-
Low socioeconomic background × Explicitly measured attitudes	-	-	-	-0.12	0.16	-
Low socioeconomic background × Implicitly measured attitudes	-	-	-	-0.14	0.13	-
<i>Structure</i>						
Low socioeconomic background (ref: high)	0.17	0.11	0.03 (0.04)	0.17	0.11	0.11* (0.05)
Explicitly measured attitudes	-	-	-	0.02	0.17	-
Implicitly measured attitudes	-	-	-	-0.17	0.14	-
Low socioeconomic background × Explicitly measured attitudes	-	-	-	-0.06	0.16	-
Low socioeconomic background × Implicitly measured attitudes	-	-	-	0.36***	0.13	-
<i>Involvement</i>						
Low socioeconomic background (ref: high)	-0.25*	0.11	0.06 (0.05)	-0.24***	0.10	0.14 (0.07)
Explicitly measured attitudes	-	-	-	-0.12	0.14	-
Implicitly measured attitudes	-	-	-	0.20	0.14	-
Low socioeconomic background × Explicitly measured attitudes	-	-	-	0.27***	0.13	-
Low socioeconomic background × Implicitly measured attitudes	-	-	-	-0.23	0.20	-

p* < .05 **p* < .01

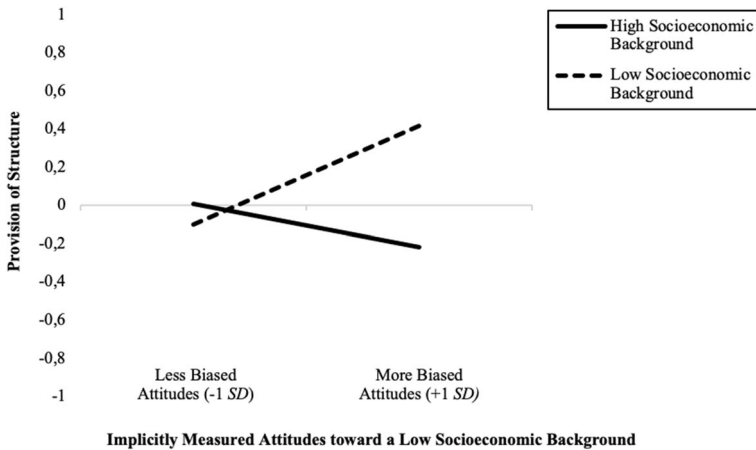


Fig. 2 Interaction effect of socioeconomic background and Implicitly measured attitudes on structure

expected (Hypothesis 2a). For autonomy support and involvement, this interaction was not statistically significant. Yet, for structure, the interaction between socioeconomic background and teachers' Implicitly measured attitudes was significant ($b^*=0.36$, $p=.004$). Teachers with more biased Implicitly measured attitudes against low socioeconomic backgrounds reported to provide the student from a low socioeconomic background with more structure and the student from a high socioeconomic background with less structure, while teachers with less biased Implicitly measured attitudes did not seem to differentiate between the fictional students (see Fig. 2). Furthermore, regarding Hypothesis 2b, we had no specific assumptions on the direction of the interaction effect between socioeconomic background and teachers' Explicitly measured attitudes. Analyses revealed that the interaction was only statistically significant for involvement ($b^*=0.27$, $p=.038$), but not for autonomy support or structure. Teachers with more biased Explicitly measured attitudes reported greater involvement with the student from a low relative to a high socioeconomic background, while teachers with less biased Explicitly measured attitudes reported less involvement with the student from a low compared to the student from a high socioeconomic background (see Fig. 3).

4 Conclusion study 1

In Study 1, we used vignettes featuring fictional students to investigate whether teachers' practices varied based on students' socioeconomic background, and whether differences were more pronounced when teachers had more biased attitudes toward low socioeconomic backgrounds. The findings indicated that teachers

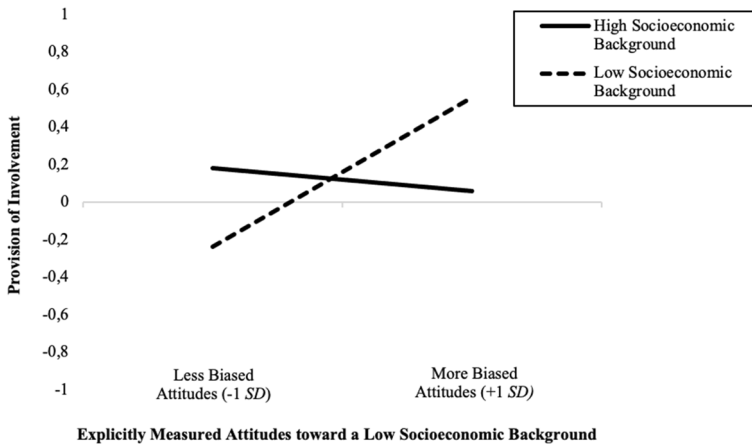


Fig. 3 Interaction effect of socioeconomic background and Explicitly measured attitudes on involvement

reported higher levels of involvement for the student from a high socioeconomic background compared to the student from a low socioeconomic background. Furthermore, teachers who held more biased Implicitly measured attitudes toward low socioeconomic backgrounds reported to provide more structure to the student from a low socioeconomic background, and less structure to the student from a high socioeconomic background. By contrast, teachers with less biased Implicitly measured attitudes did not report to differentiate structure for the students with distinct socioeconomic backgrounds. Also, we found that teachers with more biased Explicitly measured attitudes reported higher levels of involvement with the fictional student from a low socioeconomic background and less involvement with the student from a high socioeconomic background.

5 Method study 2

5.1 Participants and design

In Study 2, we tested the same hypotheses as in Study 1 via a non-experimental field study with a within-subject design. Teachers rated their need support for a student from a high and a student from a low socioeconomic background from their class (within-subject design). A new sample of 57 teachers (91% female) answered questions about their need support toward two students from their own class. Participants were all teachers in Dutch primary education Grade 1 to 6. Their mean age was 35.14 years ($SD = 13.07$, range 21–61), on average, they had 10.89 years of

Table 4 Frequencies of the rated parental educational attainment

	Weak social background	Strong social background
Low educated	14	1
Average educated	24	8
High educated	4	43
I do not know/do not want to say	15	5

teaching experience ($SD=11.33$, range 0–40). One substitute teacher and six pre-service teachers were included in the sample.² Furthermore, in Study 2, the same instruments were used as in Study 1.

5.2 Procedure

Data were collected online from Spring 2021 until December 2021 by inviting teachers through the network of the researchers and on social media platforms for teachers. Teachers were asked to participate in a study about ‘Dealing with differences between students in the classroom’, investigating how students differed from each other and whether and how teachers adapted their teaching practices based on student’s background characteristics. Again, gift cards were raffled among the participants. In Study 2, teachers answered questions about a student from a high and low socioeconomic background from their own class (in random order) concerning their need support, perception of students’ ability, and classroom behavior. Thereafter, teachers rated the educational attainment level of the parents. As in Study 1, some additional questions were asked as part of the bigger project. Then, teachers completed the questionnaire for their Explicitly measured attitudes and were forwarded to the IAT. In this study, we also saw a relatively large number of teachers dropping out before the IAT ($n=19$; 33.33%).

5.3 Instruments

5.3.1 Students from high and low socioeconomic backgrounds

Teachers were asked to select two students from their class: One student with ‘a strong social background’ and one student with ‘a weak social background’. To explain what was meant by a ‘strong’ or ‘weak’ social background teachers received written explanations. These emphasized that students might be from either strong or weak social backgrounds which is determined by a combination of factors. That

² A robustness check with the sample excluding substitute and preservice teachers ($n=50$) showed findings in line with the results from the total sample ($N=57$), hence, substitute and preservice teachers were included in the total sample used for all analyses. See [Appendix A](#) for more details.

is, the educational attainment of the students' parents might be categorized either as high-educated versus low-educated, or based on whether their profession requires high or scientific levels of education versus a low level of education.

To check whether teachers indeed selected a student from a high and a low socioeconomic background, they rated the educational attainment of both parents of the two students (see Table 4). A Wilcoxon signed-rank test based on the highest educational level of either parent showed that teachers rated the student from a high socioeconomic background significantly more often as having parents with higher education, and the parents from the student from a low socioeconomic background to be lower educated; $Z = -4.67$ (corrected for ties), $N\text{-Ties} = 38$, $p < .001$ (two-tailed), with $r = .76$ indicating a medium to large difference.

Moreover, we tested whether the proportion of boys and girls was equal across the different students. Chi-square difference test revealed that there was no significant difference in the proportion of boys that teachers selected for the student from a high (57.9%) and low socioeconomic background (68.4% boys) ($\chi^2(1, 57) = 0.830$, $p = .362$).

5.3.2 Need-supportive teaching

The items measuring teachers' need support (i.e., autonomy support, structure, and involvement) were the same as in Study 1. However, the formulation of the items was slightly adapted as they were about teachers' own students (e.g., 'I like this student'). Moreover, as previously reported, the CFA supported the three-factor structure. Reliability analyses showed that the internal consistency for each scale was satisfactory with McDonald's ω values approaching or above the cut-off score of .70 (Viladrich et al., 2017). See Appendix D for a more detailed description of the CFA and internal consistencies of the scales.

5.3.3 Explicitly and Implicitly measured attitudes

To measure teachers' explicit attitudes toward low socioeconomic backgrounds, the exact same instruments were used as in Study 1. Reliability analyses of the measures in Study 2 showed that the internal consistency for teachers' Explicitly measured attitudes had a McDonald's ω of .66. For teachers' Implicitly measured attitudes (IAT), the internal consistency was Cronbach's $\alpha = .66$. The internal consistencies for both scales were deemed sufficient.

5.3.4 Covariates

In this study, we controlled for students' gender, and teachers' perceptions of academic ability and classroom behavior. Teachers reported students' gender. We generated a variable indicating whether teachers selected two boys, two girls, a boy

from a high and girl from a low socioeconomic background, or vice versa, which were then recalculated into dummy variables.

Further, we measured teachers' perceptions of students' academic ability³ with three items from the Teacher Expectations questionnaire of van den Bergh et al. (2010). The original 6-item questionnaire contains three items focusing on teachers' expectations for students' future success in school (e.g., 'This student will probably have a successful school career') and three items focusing on students' current academic ability (e.g., 'This student performs well in school.'). As the focus of the present study is on teachers' perceptions of students' current academic ability, we only included the three items on students' current abilities. The items were measured on a five-point Likert Scale (1 = *totally disagree*; 5 = *totally agree*) with a higher score indicating more positive perceptions of students' academic ability level. A CFA showed that a single factor model fitted the data well. McDonald's ω values were .90 and .82 for high and low socioeconomic background, respectively, indicating good reliability. To produce one value to include in the analyses, a difference score between the student from the high and low socioeconomic background was calculated.

To measure teacher perceptions of students' classroom behavior, teachers answered three questions from the School Engagement Scale of Fredericks et al. (2004) (e.g., 'This student behaves according to the rules.'). on a five-point Likert Scale (1 = *totally disagree*; 5 = *totally agree*). A higher score indicated more positive classroom behaviors. Factor analyses showed that a single factor model fitted the data well. McDonald's ω values were .87 and .83 for the students from a high and low socioeconomic background, respectively. For this variable, we also calculated a difference score between the student from the high and low socioeconomic background.

5.4 Data analyses

5.4.1 Measurement invariance

To be able to make a valid comparison of the student from a high and low socioeconomic background (within-subject) and teachers' need support (autonomy support, structure, and involvement), we tested whether the measures were scalar invariant using the alignment method (Asparahouf & Muthén, 2014; see for an applied example the supplementary materials of van Vemde et al., 2021). This method is a more flexible way to test for invariance compared to more conventional methods. In short, the alignment method identifies the model with the highest level of invariance and best model fit amongst all groups, by estimating group-specific factor means and variances without requiring exact measurement invariance (Asparahouf & Muthén, 2014). The R^2

³ We also obtained objective data on students' academic abilities; namely, their standardized test results for reading comprehension and mathematics. However, this data could not be used due to the large number of missing data (>40%) and inaccurate values (i.e., teachers reported values which were beyond the bounds of possibility).

Table 5 Descriptive statistics of all study variables measured within-subjects

Variable	High socioeconomic background <i>M (SD)</i>	Low socioeconomic background <i>M (SD)</i>	Mean difference	<i>d</i>
Autonomy support	3.75 (0.73)	2.77 (0.80)	0.98**	0.90
Structure	3.60 (0.81)	4.12 (0.67)	0.52**	-0.49
Involvement	4.51 (0.67)	4.35 (0.59)	0.16	0.25
Perceived academic ability	4.28 (0.80)	2.90 (0.94)	1.38**	1.37
Perceived classroom behavior	3.84 (0.74)	3.38 (0.98)	0.46*	0.35

N=57. For the purpose of interpretability, descriptive statistics were calculated with composite scores in which each item had the same weight. Factor scores were used for further analyses. Differences were calculated with t-tests for paired comparisons

p* < .01 *p* < .001

(average index) for invariance was 0.64, indicating that the model was partly invariant across measurement occasions, which was sufficient to conduct the subsequent analyses (See [Appendix F](#)).

5.4.2 Main analyses

For Study 2, there was a relatively large amount of missing data for teachers' Implicitly measured attitudes (19 cases, 33.3%) because some teachers, due to technical issues, were not successfully forwarded from the questionnaire to the IAT. We could still use the questionnaire data of participants who did not do the IAT, as we did not conceal the aim of the study and asked for full consent beforehand. Concerning the other measures, there were few missing data and the sample sizes ranged from 55 (Explicitly measured attitudes) to 57 (all other measures). We performed Little's test for missing data of the IAT in SPSS 27 (IBM Corp, 2020) to determine whether the missingness was completely at random (MCAR) (Li, 2013). This showed us a significant *p*-value ($\chi^2(7) = 17.28, p = .016$), hence we cannot assume MCAR. To account for missing data of the IAT, we imputed the missing values with mean scores which is a valid way when data is normally distributed (Olinsky et al., 2003). Additionally, as a robustness check, we also conducted the analyses with listwise deletion for the missing cases (see [Appendix A](#)). As in Study 1, we used factor scores rather than latent variables given the relatively small sample size (Bollen, 1989; Tanaka, 1987), and reported Cohen's *d* and partial η^2 as measures of effect size (Cohen, 1988).

Given that teachers answered each question on need support twice (for a student from a high and a low socioeconomic background), these measures were repeated (i.e., nested within teachers). Thus, we conducted a paired comparison of the two measurements via repeated measurement ANOVA in SPSS 27 (IBM Corp, 2020). The dependent variables were teacher-reported autonomy support, structure, and involvement. The within-subject factor socioeconomic background referred to the two measurements within teachers. In a next step, we added the covariates by including gender as categorical variable, and perceived academic abilities and classroom behavior as difference

Table 6 Teachers' need support toward students from different socioeconomic backgrounds

Variable	Model 1			Model 2			Model 3		
	df	F	p	df	F	p	df	F	p
<i>Autonomy support</i>									
Low socioeconomic background (ref: high)	1	76.78	<.001	1	0.20	.657	1	0.02	.892
Difference in perceived ability	-	-	-	1	2.47	.123	1	1.89	.176
Difference in perceived behavior	-	-	-	1	3.36	.073	1	3.21	.080
Gender	-	-	-	3	0.47	.706	3	0.50	.685
Explicit measured attitudes	-	-	-	-	-	-	1	0.27	.608
Implicit measured attitudes	-	-	-	-	-	-	1	0.09	.768
Low socioeconomic background × Explicit measured attitudes	-	-	-	-	-	-	1	0.14	.709
Low socioeconomic background × Implicit measured attitudes	-	-	-	-	-	-	1	5.81	.020
<i>Structure</i>									
Low socioeconomic background (ref: high)	1	11.17	.001	1	3.77	.058	1	3.17	.082
Difference in perceived ability	-	-	-	1	0.60	.447	1	0.92	.343
Difference in perceived behavior	-	-	-	1	1.36	.250	1	1.18	.283
Gender	-	-	-	3	1.22	.312	3	1.46	.237
Explicit measured attitudes	-	-	-	-	-	-	1	5.16	.028
Implicit measured attitudes	-	-	-	-	-	-	1	0.08	.785
Low socioeconomic background × Explicit measured attitudes	-	-	-	-	-	-	1	0.69	.412
Low socioeconomic background × Implicit measured attitudes	-	-	-	-	-	-	1	1.31	.258
<i>Involvement</i>									
Low socioeconomic background (ref: high)	1	156.08	<.001	1	29.25	<.001	1	6.76	.012
Difference in perceived ability	-	-	-	1	0.20	.654	1	0.01	.937
Difference in perceived behavior	-	-	-	1	0.18	.678	1	0.14	.712
Gender	-	-	-	3	0.42	.739	3	0.44	.728
Explicit measured attitudes	-	-	-	-	-	-	1	2.85	.098

Table 6 (continued)

Variable	Model 1		Model 2		Model 3		
	df	F	df	F	df	F	
Implicit measured attitudes	–	–	–	–	1	0.62	.435
Low socioeconomic background × Explicit measured attitudes	–	–	–	–	1	0.59	.446
Low socioeconomic background × Implicit measured attitudes	–	–	–	–	1	1.31	.258

scores (rendering the analyses into a Mixed Design ANCOVA). Lastly, to test for moderation of teachers' attitudes, two two-way interactions between socioeconomic background and teachers' Explicitly and Implicitly measured attitudes (between-subject variables) were included.

6 Results study 2

6.1 Descriptive statistics

Table 5 shows the means and standard deviations of the within-subject variables (i.e., teachers' need support). Moreover, teachers rated their Explicitly measured attitudes toward a low socioeconomic background on average with a mean of 2.83 ($SD=0.67$). For teachers' Implicitly measured attitudes, a one sample t -test indicated that the mean of teachers' Implicitly measured attitudes ($M=0.64$, $SD=0.48$) was significantly higher than zero, $t(37)=8.14$, $p<.001$. This suggests that Implicitly measured attitudes were on average biased against low socioeconomic backgrounds, with Cohen's d of 0.48 indicating a large effect. See [Appendix E](#) for the correlations.

6.2 Teachers' differential need support

In Model 1, we tested whether teachers reported different levels of need support for students from high and low socioeconomic backgrounds (see Table 6). In line with Hypothesis 1a, analyses revealed that teachers reported to provide less autonomy support toward the student from a low compared to a high socioeconomic background, $F(1, 57)=76.78$, $p<.001$, $\eta^2=0.58$, indicating a large effect. Regarding Hypothesis 1b, our expectations for structure were non-directional, analyses showed that teachers provided the student from a low socioeconomic background with more structure compared to the student from a high socioeconomic background, $F(1, 57)=11.17$, $p=.001$, $\eta^2=0.17$, indicating a large effect. In line with Hypothesis 1c, the analysis revealed that teachers reported lower levels of involvement with the student from a low relative to a student from a high socioeconomic background from their class, $F(1, 57)=156.08$, $p<.001$, $\eta^2=0.74$, indicating a large effect.

6.3 Gender, perceived academic ability, and classroom behavior

In Model 2, the differences in students' gender, teachers' perceptions of academic abilities, and perceptions of classroom behavior were added as covariates. In this model, the effects of socioeconomic background on autonomy support and structure were no longer significant (see Table 6), indicating that differences in teachers' autonomy support and structure were due to a combination of other student characteristics rather than socioeconomic background. However, the relationship between

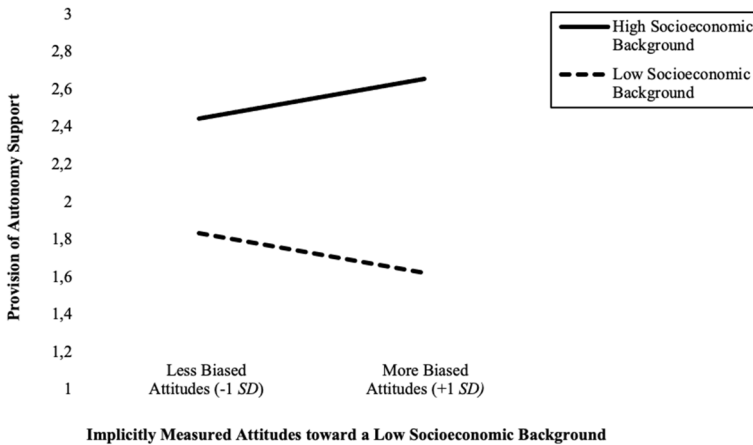


Fig. 4 Interaction between socioeconomic background and Implicitly measured attitudes on autonomy support

socioeconomic background and involvement, ($F(1, 57) = 29.25, p < .001, \eta^2 = 0.36$, remained significant, indicating a large effect.

6.4 Explicitly and Implicitly measured attitudes

In Model 3, we tested for moderation effects of teachers' Implicitly and Explicitly measured attitudes by including two-way interactions (see Table 6). Regarding Hypothesis 2a, we expected positive interaction effects of teachers' Implicitly measured attitudes toward low socioeconomic backgrounds and all three dimensions of need support. For structure and involvement, this interaction was not significant. However, for autonomy support, in line with Hypothesis 2a, we found a significant positive interaction effect between students' socioeconomic background and teachers' Implicitly measured attitudes toward low socioeconomic backgrounds, $F(1, 57) = 5.81, p = .020$. That is, teachers with more biased Implicitly measured attitudes differentiated their autonomy support more strongly than teachers with less biased Implicitly measured attitudes, by providing students from a low socioeconomic background with lower levels of autonomy support than students from a high socioeconomic background (see Fig. 4). Moreover, regarding Hypothesis 2b, for the interaction between socioeconomic backgrounds and teachers' Explicitly measured attitudes toward low socioeconomic backgrounds our expectations were non-directional. Analyses did not show an interaction between socioeconomic background and teachers' Explicitly measured attitudes for all three dimensions of need support (see Table 6).

7 Conclusion study 2

In Study 2, similar to Study 1, we examined whether teachers reported to offer different levels of need support to students from different socioeconomic backgrounds, but now for teachers' own students. The results showed that teachers indeed reported different levels of need support for students from different socioeconomic backgrounds. Students from a low socioeconomic background were attributed less autonomy support, more structure, and less involvement, relative to students from a high socioeconomic background, and effect sizes indicated large differences. The differences in autonomy support and structure were no longer significant after accounting for gender, teachers' perceptions of students' academic ability, and classroom behavior, while the socioeconomic background differences in involvement remained significant. Furthermore, teachers differentiated more strongly in autonomy support toward students from different socioeconomic backgrounds when they had more biased Implicitly measured attitudes toward low socioeconomic backgrounds.

8 General discussion

The increasing educational disparity between students from different socioeconomic backgrounds (Liu et al., 2022), also during primary education (Zumbuehl & Dillingh, 2020), suggests that education does not function as an equalizer. Family background is (still) associated with students' academic opportunities and achievement (e.g., Björklund & Salvanes, 2011). Therefore, we aimed to gain more insight into the underlying mechanisms of educational inequality related to socioeconomic backgrounds emerging in daily classroom processes. The comparison of two studies with different designs but similar measurements and procedures makes a unique contribution to the field.

SDT states that although teachers can differ in *how* they support the psychological needs of different students, they should provide all students with high levels of support for their needs for autonomy, competence and relatedness (Vansteenkiste et al., 2020). Yet, the findings of our studies indicated that teachers differentiate their need support based on students' socioeconomic backgrounds. Specifically, both studies revealed that teachers provided lower levels of involvement to students from lower socioeconomic backgrounds compared to students from high socioeconomic backgrounds. Additionally, Study 2 showed that teachers provided less autonomy support and more structure (a so-called 'demanding or domineering teaching style'; Aelterman et al., 2019) for students from a low relative to a high socioeconomic background. Furthermore, differences in need support were more pronounced when teachers held more biased Implicitly measured attitudes toward low socioeconomic backgrounds. Overall, these findings suggest that teachers are less need-supportive toward students from low socioeconomic backgrounds who are already academically at risk. Hence, these differences in need support may signal that teachers do not provide all students with equitable opportunities, and consequently, differential teaching practices may perpetuate or even exacerbate inequalities between students from different socioeconomic backgrounds.

8.1 Teachers' differential need support

SDT studies suggest that teachers' need support fosters motivation, engagement, and learning of all students (e.g., Froiland et al., 2019; Ryan & Deci, 2020). However, the findings of the present studies suggest that differential need support may be a factor contributing to existing educational inequalities.

First, one of the major factors impeding academic achievement of students from low socioeconomic backgrounds might be a lack of sense of belonging in school. Corroborating this assumption and conform with our expectations (cf. Bakchich et al., 2023), we found in both studies that primary school teachers reported to be less involved with students from low socioeconomic backgrounds compared to students from high socioeconomic backgrounds. Moreover, this finding could not be attributed to students' gender, academic abilities, or their classroom behavior. This implies that classroom interactions between students from low socioeconomic backgrounds and their teachers may lack warmth and attunement, which could cause these students to feel disconnected from their teachers and lower their sense of belonging (see also Ahn & Davis, 2020). In turn, this might hamper the engagement and learning gains for students from low socioeconomic backgrounds (Roorda et al., 2011; Wubbels et al., 2016). Although there are other routes to fulfill students' need for relatedness the present studies did not look into, such as the involvement with peers, many studies highlight the importance of having a high-quality interpersonal relationship with the teacher for student motivation (e.g., Opdenakker et al., 2012; Ryan & Deci, 2020), engagement, and achievement (e.g., Roorda et al., 2011). Moreover, in their meta-analysis, Roorda et al. (2011) found that the effects of student–teacher relations on students' engagement and academic achievement were even stronger for students from low socioeconomic backgrounds than for other students. For these students, a high-quality relationship with their teacher may function as a buffer against other disadvantages. Accordingly, our finding is concerning and illustrates the need to boost teachers' involvement with these students, which can help to promote more inclusive classroom environments. By showing unconditional positive regard (e.g., unconditional acceptance) and for example regularly asking all their students about their welfare and feelings (Ahmadi et al., 2022), teachers may be able to create a safe learning environment in which all students can develop to their full potential.

Second, lack of support for students' psychological needs for autonomy and competence can be psychological barriers impeding students' school success (e.g., Jang et al., 2012; Ryan & Deci, 2020). Previous research suggests that teachers may exert more control over students who are considered 'at-risk' (Hornstra et al., 2015). This may be a strategy to adapt to these students' needs, for instance because of the parenting style these students are used to (Kohn, 1989). Consequently, we expected that teachers would report lower levels of autonomy support and different levels of structure for students from a low compared to a high socioeconomic background. In Study 1, no statistically significant association was found between socioeconomic background and teachers' autonomy support or provision of structure. However, in Study 2, we revealed that teachers reported less autonomy support and more structure for students from a low compared to a high socioeconomic background in their

class, implying a more demanding teaching style. These differences were no longer significant after controlling for students' gender, and differences in teachers' perceptions of student academic ability and classroom behavior. This implies that teachers' differential support for students' needs is likely explained by other factors linked to students' socioeconomic background. This is also supported by the significant correlations between teachers' perceptions of student academic ability classroom behavior and teachers' need support (see Table 15, Appendix E). Nevertheless, even though our findings suggest that differences in autonomy support and structure were explained by other factors than students' socioeconomic backgrounds, we still found that teachers act more demanding toward students from low socioeconomic backgrounds. These differences in need support are concerning as they could hinder motivation, engagement, and learning of these students (Hornstra et al., 2021; Jang et al., 2010), and as such may play an important role in perpetuating the disadvantages of students from low socioeconomic backgrounds.

Additionally, it is important to note that differentiating autonomy support and structure based on differences in students' gender, abilities, or classroom behavior is also undesirable from the perspective of SDT. That is, SDT states that supporting students' needs benefits all students (Ryan & Deci, 2020). Even though the ways in which teachers provide support for each need may differ across students depending on individual student characteristics (Vansteenkiste et al., 2020), the satisfaction of all three basic psychological needs should be achieved for heterogeneous groups of students. To illustrate, Ahmadi et al. (2022) proposed that teachers can provide structure by offering optimal levels of challenge for all students. Yet, the difficulty level of the assignments or type of support provided may differ depending on students' ability levels. Similarly, all students can be assumed to thrive if teachers provide choices (to support autonomy, Ahmadi et al., 2022), but the nature of these choices may depend on individual students' preferences.

8.2 Teachers' attitudes toward low socioeconomic backgrounds

Previous research suggests that teachers' attitudes toward stigmatized groups may contribute to educational inequalities (Turetsky et al., 2021). However, the evidence from experimental studies and field studies is far from conclusive. A review by Denssen et al. (2020a) found that teachers tend to hold biased Implicitly measured attitudes toward students from stigmatized groups, which can affect their judgements of students and student achievement. Likewise, the results of the present studies indicate that teachers with more biased Implicitly measured attitudes differentiated their need support more strongly, by providing more structure (Study 1), and less autonomy support (Study 2) to students from low compared to high socioeconomic backgrounds. With this finding, we add to the current body of literature by showing that teachers' Implicitly measured attitudes toward stigmatized groups do not only affect the expectations teachers have of their students and students' achievement (e.g., van den Bergh et al., 2010) but also their teaching practices. It seems plausible that such differences in teaching practices explain why biased attitudes are associated with student achievement.

The interaction effects did not fully account for the differences in need support based on socioeconomic background, and not all interaction effects between socioeconomic background and attitudes on need support were significant. It appears that in addition to teachers' attitudes, other factors may define why teachers differentiate their need support for students from different socioeconomic backgrounds. Our findings suggest that there may be underlying assumptions or even misconceptions regarding the types of support that are most conducive to the needs of students from different socioeconomic backgrounds (e.g., adapting to the parenting style, or to differences in ability levels). Future research could disentangle the underlying assumptions teachers have which might guide their teaching practices, for instance by conducting (video-stimulated) interviews with teachers and asking them to reflect on their interactions with diverse students.

Furthermore, in Study 1, we found that teachers with more biased Explicitly measured attitudes toward a low socioeconomic background reported more involvement toward the student from a low socioeconomic background. An explanation for this counterintuitive finding may be that teachers who hold more biased attitudes toward a low socioeconomic background may believe that these students experience more barriers and disadvantages, either in school or at home, and therefore need more involvement from their teacher (Hornstra et al., 2015). However, in Study 2, we did not find a similar effect of Explicitly measured attitudes when it came to teachers' involvement with their own students. Other sources of information, such as teachers' knowledge about their students' ability levels and engagement, might come into play once teachers get to know their students. Teachers' knowledge about their students may be more powerful in predicting their differential involvement with students than their Explicitly measured attitudes.

8.3 Implications

The current studies have several important implications for research and practice. First of all, our findings demonstrated that teachers tend to provide students from low socioeconomic backgrounds with lower levels of need support compared to students from high socioeconomic backgrounds, which may contribute to educational inequalities between students from different socioeconomic backgrounds. This suggests that it is important to conduct interventions aiming at fostering equal educational opportunities, for example by encouraging teachers' need-supportive teaching practices for students of different socioeconomic backgrounds. Current SDT-interventions (e.g., Butz & Stupnisky, 2017; Cheon et al., 2018) tend to focus on universal principles of need support, rather than addressing how teachers can deal with differences between students. Interventions that explicitly address how to support the needs of at-risk students may be even more effective.

Second, while teachers may intend to adapt their teaching practices to the needs of students from low socioeconomic backgrounds, the support they offer may undermine these students' basic psychological needs. That is, many teachers seem to think the appropriate teaching style for students with low abilities or students from disadvantaged backgrounds is characterized by low levels of autonomy support combined

with high levels of structure (Hornstra et al., 2015). However, such a demanding teaching style actually may hamper student motivation and learning (Aelterman et al., 2019). Therefore, it is essential to raise awareness among preservice and inservice teachers that this teaching style is not an effective means of supporting at-risk students. Teacher training programs could include strategies for supporting these particular student groups in more need-supportive ways (i.e., offering high autonomy support, high structure, and high involvement simultaneously).

Furthermore, it seems worthwhile for future interventions to help teachers overcome their biased attitudes and subsequent attributions of lower academic success for students from low socioeconomic backgrounds which may result from teacher biases. Teacher expectation interventions are an example of interventions aimed to do so. That is, previous teacher expectation interventions aimed to promote (realistically) high expectations by informing teachers about the effects of their expectations (e.g., Rubie-Davies et al., 2015), and these interventions have been shown to have beneficial effects on students' academic achievement. The findings of the current studies can be used to extend such interventions by providing information on how biased attitudes may contribute to need-thwarting rather than need-supportive teaching styles, and thereby contribute to more inclusive teaching practices.

The studies also have implications for educational research. We corroborated previous findings that teachers differentiate their need support between different students (Domen et al., 2020). Hence, this suggests that need support should be considered a dyadic construct which emerges in the interactions between teachers and individual students rather than a general teaching style. It would be worthwhile to consider this dyadic nature of need support when researchers conceptualize and operationalize teachers' need support. Additionally, educational research also needs to incorporate the nestedness of teachers' interactions with students within specific classrooms and school environments. For instance, it might be fruitful to take into account the socioeconomic composition of the classroom or school, as this might also impact teaching practices (Marchand & Hilpert, 2020).

Additionally, while field studies are helpful in disentangling processes in the complex real-life classroom situations (e.g., Eifler & Petzold, 2019), vignette studies have great potential for controlling and standardizing specific characteristics amongst participants (Alexander & Becker, 1978; Evans et al., 2015; Krolak-Schwerdt et al., 2018). By using a combination of both, a vignette and field study design with otherwise identical materials, we were able to benefit from the advantages of both methods. This approach may be beneficial for future studies, especially when investigating sensitive topics, such as biased attitudes.

8.4 Limitations and future directions

When interpreting the results of the current studies, several limitations should be taken into account. The first limitation refers to the generalizability of both studies. In Study 1, we only used a vignette of a female student from either a low or high socioeconomic background. We opted for only one gender instead of a 2×2 design (socioeconomic background \times gender) to ensure sufficient statistical

power. Nevertheless, there are indicators that teachers' perceptions of boys from low socioeconomic backgrounds are even less favorable than perceptions of girls from similar backgrounds (Auwarter & Aruguete, 2008). Thus, in future studies, it would be interesting to ask teachers about their teaching toward a boy from a high and low socioeconomic background to see whether similar findings will be obtained for boys. Moreover, a 2×2 design could be used to examine whether the effects of socioeconomic background differ for boys and girls, yet this would require a larger sample. Additionally, the student depicted in the vignette was described as having average achievement levels and classroom behaviors, which teachers may not consider to be typical for a student from a low socioeconomic background. The results of the first study might have been different if we had presented a low achieving student or a student with disruptive classroom behaviors. In that case, the role of socioeconomic background might become more salient as teachers might think these students may need to be supported differently.

Second, in Study 1, the manipulation check of the experimental study showed that our manipulation succeeded and that the participants indeed rated the educational level of the parents of the student from a high socioeconomic background higher compared to the student from a low socioeconomic background. However, in both conditions, there were many teachers who indicated a medium educational level. Our experimental study might have yielded stronger results if differences in socioeconomic backgrounds in the vignettes were more pronounced. Related to this, in Study 2, teachers were asked to select students from their class whom they perceived to have the lowest and highest socioeconomic background. Therefore, the large-sized differences in need support obtained in Study 2 represent the differences between the most extreme cases, and we cannot generalize this to more average student groups. Future field research could incorporate a broader range of backgrounds to investigate if our results also apply to other students.

Third, in both studies, we measured teachers' need support through self-report (i.e., questionnaires). Accordingly, we asked teachers how they would teach toward the (fictional) students in question, and we cannot be sure to what extent these reported behaviors align with their actual teaching practices. Observation studies could yield additional insights into this.

Fourth, the questionnaires for teachers' need support and teachers' Explicitly measured attitudes were short versions of existing questionnaires from which we had to remove several questions in order to achieve good model fit and measurement invariance. Consequently, it is possible that we did not fully capture the complete underlying theoretical constructs of teachers' need support and their Explicitly measured attitudes.

Fifth, due to technical issues, we had a relatively large amount of missing data for teachers' Implicitly measured attitudes in both studies. The missing values in Study 1 may have reduced the power. In Study 2, we used means substitution to deal with the missing data, however this may have reduced the variability of the IAT scores (Olinsky et al., 2003) and could have caused a Type 2 error. Nevertheless, the robustness check with listwise deletion yielded similar results (see

[Appendix A](#)). Still future studies should aim to collect data from larger samples as this allows for more power and more appropriate analytical approaches when such situations occur.

8.5 Conclusion

The current studies aimed to examine the mechanisms underlying inequalities linked to students' socioeconomic backgrounds in classrooms. It is important that all children regardless of their (socioeconomic) background receive equal opportunities in education to develop their full potential. Yet, the growing socioeconomic achievement gap highlights that education does not serve as the 'equalizer' we would like it to be (e.g., Liu et al., 2022). To be able to create awareness and take constructive steps in providing all students with equitable educational opportunities, it is important to disentangle the underlying mechanism of the socioeconomic achievement gap. The current studies are innovative in trying to understand educational inequalities by focusing on need-supportive teaching practices, and among the first to demonstrate that teachers' biased Implicitly measured attitudes toward students from low socioeconomic backgrounds can impact their (differential) teaching practices. Altogether, our studies indicated that teacher-student interactions, particularly in case of biased teacher attitudes, may exacerbate inequalities linked to socioeconomic backgrounds. Hence, for future research and interventions, focusing on teacher-student interactions may be a fruitful way to foster inclusive educational environments.

Appendix A

Robustness checks

Robustness checks were conducted to check whether the analyses would yield the same results without substitute teachers and teachers who were still attending teacher training. Moreover, for Study 2 we also performed a robustness check with listwise deletion for the missing values off teachers' Implicitly measured attitudes toward low socioeconomic backgrounds. Due to the smaller power in these robustness check analyses we used a more lenient p -value of .10 for reaching significance.

Robustness check Study 1

When recruiting teachers, we aimed for in-service teachers who were at the time of participation, teaching their own class. However, some teachers participated although they were substitutes ($n=9$) or were still attending teacher training ($n=3$). We examined whether the analyses would yield the same results when the

sample only included in-service teachers with their own class ($n=66$). A robustness check indicated that the results were mostly similar and in the same direction as the results reported above. However, the aforementioned difference in teachers' involvement toward the student from a low socioeconomic background ($n=30$) and the student from a high socioeconomic background ($n=36$) now failed to reach significance ($b=-0.19$, $p=.102$). This could be due to the smaller sample size and reduced power compared to the analyses with the total sample.

Robustness check Study 2

Robustness checks were conducted for the same purpose as in Study 1 since some teachers participated although they did not have their own class ($n=1$) or were still attending teacher training ($n=6$). This showed that analyses yielded similar results for the sample only including in-service teachers with their own class ($n=50$). Moreover, we performed a second robustness check with listwise deletion for the missing values off teachers' Implicitly measured attitudes toward low socioeconomic backgrounds (i.e., IAT score) instead of using imputed mean scores. The analysis ($n=38$) showed similar results; the interaction of socioeconomic background and teachers' Implicitly measured attitudes was still significant ($p=.038$). Besides, teachers provided differential levels of involvement with student from a low versus high socioeconomic background ($p=.064$, $\eta^2=0.11$).

Appendix B

Vignettes used in Study 1

Vignette of the student from a [high/low] socioeconomic background: [Willemijn/Shelly].

You will now be able to read a description of a student named [Willemijn/Shelly]. We will ask you to fill out a number of questions about [Willemijn/Shelly]. Of course you will not have all the information you need based on this short text. However, we would like to ask you to imagine that this is a real student and to estimate what you think is the most appropriate answer, based on this limited information. After these questions you can indicate if you are missing information and what additional information you would like to have.

Do not think too long when answering the questions. It's about your first impression.

This year you are the teacher of Grade 5. [Willemijn/Shelly] is a student in your class. She is a sweet and cheerful girl with many friends. She enjoys working with fellow students and is helpful. While playing outside, she likes to participate in

games such as Kingen (four-compartment game) or round-the-table. In the class, there are sometimes some conflicts between the girls in which [Willemijn/Shelly] occasionally gets involved. She can fix this herself. [Willemijn/Shelly] wants to do well and can worry a lot about her schoolwork. At times, she seems insecure. She rarely raises her hand to answer questions asked in class.

[Willemijn/Shelly] is usually motivated to work. At the start of a period of independent work, she needs guidance from the teacher to get started. With some guidance, she manages to work task-oriented for a short period of time. While working [Willemijn/Shelly] can occasionally get distracted if she does not understand something. She does not quickly ask for help. She works neatly and maintains a low work pace. In mathematics, she occasionally skips steps when calculating and makes mistakes as a result. In the past test period, [Willemijn/Shelly] scored a III for arithmetic-mathematics, an II for reading comprehension and an II for spelling (regular and verbs). She scored a III for vocabulary. The DMT (technical reading) yielded an II and she is now out of the AVIs (AVI-Plus).

With regard to her track recommendation for secondary school, you are in doubt between pre-vocational secondary education and general secondary education. Outside school [Willemijn/Shelly] goes to [violin lessons and hockey/dance classes at the community center]. She takes great pleasure in this. When she is at home she often plays outside with friends and likes to draw. [Willemijn/Shelly] has a younger brother with whom she likes to play games on the iPad.

Appendix C

Items of the questionnaires for teachers' need support and Explicitly measured attitudes

See Tables 7, 8.

Table 7 Items autonomy support, structure, and Involvement

Items teacher reported need support

Autonomy support (It is important to...)

Tell this student every step when it comes to schoolwork (AS1)

Let this student make a lot of their own decisions about the schoolwork (AS2)^aLet this student do things their own way (AS3)^aGive this student as few choices as possible (–) (AS4)^aExplain to this student why we learn certain things in school (AS5)^b*Structure (It is important to...)*

To check regularly whether this student needs help (S1)

Explain something in different ways, when this student does not understand something (S2)

Be clear to this student about what is expected from them (S3)^bBe consistent toward this student (S4)^b

Provide a lot of encouragement for this student (S5)

*Involvement (What is your relationship with this student?)*I like this student (R1)^cI enjoy the time I spend with this student (R2)^c

I understand this student very well (R3)

This student can count on me to be there for them (R4)^c^aAfter factor analyses included in the measure for autonomy support^bAfter factor analyses included in the measure for structure; ^c After factor analyses included in the measure for involvement**Table 8** Items Explicitly measured attitudes toward a low socioeconomic background

Items Explicitly measured attitudes

Most children with higher educated parents perform well in school (1)^a

Children with lower educated parents have more behavioral problems (2)

It is more difficult to teach children with lower educated parents (3)^a

Children with lower educated parents can achieve the same as children with higher educated parents (4)

In general it is more pleasant to teach children with higher educated parents (5)^a

It is better not to have too high expectations for children with lower educated parents (6)

^aAfter factor analyses included in the measure of teachers' explicit attitudes

Appendix D

Background information confirmatory factor analyses

Description. To be able to exploratively compare the results from Study 1 and Study 2, we aimed for a joint solution of the CFAs of teachers' need support and their Explicitly measured attitudes for both studies. In short, we performed the CFAs for

both studies separately, and after comparing the results, eliminated items with low factor loadings (<0.30) in both samples (Perry et al., 2015). This approach was as follows, first, the CFA for need support were conducted for Study 1. For the CFAs we inspected factor loadings and five fit indices: Chi-square test of model fit (p should be $>.05$), comparative fit index (CFI), Tucker Lewis index (TLI) (CFI and TLI should be >0.90), the root mean square error of approximation (RMSEA), and standardized root mean residual (SRMR) (RMSEA and SRMR should be <0.08) (Kline, 2010). Due to the small sample sizes for which some of these indexes are sensitive (e.g., SRMS; RMSEA), we mostly relied on CFI, TLI and factor loadings. The CFA for Study 1 indicated that the three-factor model for need-support was supported, yet some items with low factor loadings (<0.30 ; Perry et al., 2015) were deleted. Next the model which resulted from the CFA for Study 1 was tested through CFAs for Study 2, more specifically for the students from a high and low socioeconomic background simultaneously. Again, this showed that the three-factor model was supported, but some extra items had to be deleted for a sufficient model fit. This model was then one more time tested for Study 1, as we aimed to come up with a similar model for both studies to be able to exploratively compare the results. For teachers' Explicitly measured attitudes a similar procedure was used. Factor loadings and model fit results are presented below.

See Tables 9, 10, 11, 12, 13.

Table 9 Items and standardized factor loadings from CFA for teachers' Explicitly measured attitudes for Study 1 and Study 2

	Study 1	Study 2
<i>Explicitly measured attitudes</i>		
Most children with higher educated parents perform well in school (1)	0.36	0.36
It is more difficult to teach children with lower educated parents (3)	0.54	0.75
In general it is more pleasant to teach children with higher educated parents (5)	0.80	0.67

Table 10 Model fit results of the CFA for teachers' Explicitly measured attitudes presented for Study 1 and Study 2

	Study 1	Study 2
X^2	23.27	21.15
df	3	3
p	$<.001$	$<.001$
CFI	1.00	1.00
TLI	1.00	1.00
RMSEA	$<.001$	$<.001$
SRMR	$<.001$	$<.001$

Table 11 Items and standardized factor loadings from CFA for teachers' need support presented for Study 1 and both within-subject measures of Study 2

	Study 1	Study 2 High Socioeconomic Background	Study 2 Low Socioeconomic Background
<i>Autonomy support</i>			
It is important to ...			
Let this student make a lot of their own decisions about the schoolwork (AS2)	0.95	1.00	0.56
Let this student do things their own way (AS3)	0.53	0.59	0.53
Give this student as few choices as possible (-) (AS4)	0.23	0.45	0.79
<i>Structure</i>			
It is important to ...			
Explain to this student why we learn certain things in school (AS5)	0.55	0.53	0.37
Be clear to this student about what is expected from them (S3)	0.98	0.95	1.06
Be consistent toward this student (S4)	0.70	0.66	0.67
<i>Involvement</i>			
What is your relationship with this student?			
I like this student (R1)	0.96	0.93	0.89
I enjoy the time I spend with this student (R2)	0.88	0.91	0.77
This student can count on me to be there for them (R4)	0.73	0.81	0.45

Table 12 Model fit results of the CFA for teachers' need support presented for Study 1 and both within subject measures of Study 2

	Study 1	Study 2 High socioeconomic background	Study 2 Low socioeconomic background
X ²	29.62	20.31	34.24
df	24	24	24
<i>p</i>	.20	.68	.08
CFI	0.98	1.00	0.92
TLI	0.97	1.00	0.87
RMSEA	.055	<0.001	0.087
SRMR	.072	0.058	0.092

Table 13 Reliability of the scales: McDonald's omega (ω)

	Study 1	McDonald's ω Study 2 High socioeconomic background	Study 2 Low socioeconomic background
Autonomy support	.67	.72	.68
Structure	.79	.77	.81
Involvement	.90	.92	.80
Explicitly measured attitudes	.61	.66	

Appendix E

In Table 14, correlations between all variables of Study 1 are presented. The correlations above the diagonal represent the correlations for the student from a low socioeconomic background ($n=40$) and below the diagonal the correlations for the student from a high socioeconomic background ($n=38$) are presented. These show that for the student from a low socioeconomic background, teachers' provision of

Table 14 Correlations of all variables in Study 1

Variable	1	2	3	4	5
1. Autonomy support	–	.21	.52**	-.07	-.09
2. Structure	.09	–	-.05	-.09	.40*
3. Involvement	.01	-.15	–	.27	-.14
4. Explicitly measured attitudes	.10	.02	-.13	–	-.02
5. Implicitly measured attitudes	.13	-.17	.23	– .01	–

Correlations are calculated with factor scores. * $p < .05$ level ** $p < .01$ level

Table 15 Correlations all variables in Study 2

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. <i>Autonomy support</i> toward the student from a high socioeconomic background	–											
2. <i>Structure</i> toward the student from a high socioeconomic background	-.22	–										
3. <i>Involvement</i> toward the student from a high socioeconomic background	.37**	.04	–									
4. <i>Autonomy support</i> toward the student from a low socioeconomic background	-.003	.27	.03	–								
5. <i>Structure</i> toward the student from a low socioeconomic background	.53**	-.004	.34**	-.25	–							
6. <i>Involvement</i> toward the student from a low socioeconomic background	.28*	.11	.41**	.15	.10	–						
7. <i>Teachers' Explicitly measured attitudes</i>	-.07	-.22	-.23	-.04	-.16*	-.15	–					
8. <i>Teachers' Implicitly measured attitudes</i>	.25	-.04	.26	-.25	.20	.06	.06	–				
9. <i>Perceived academic ability</i> of the student from a high socioeconomic background	.30*	-.22	.20	-.19	.24	-.03	-.24	.08	–			
10. <i>Perceived academic ability</i> of the student from a low socioeconomic background	-.11	.08	-.001	.62**	-.22	-.07	-.19	-.03	-.12	–		
11. <i>Perceived classroom behavior</i> of the student from a high socioeconomic background	.34**	-.38**	.38**	-.02	.12	-.02	.08	.08	.31**	.08	–	
12. <i>Perceived classroom behavior</i> of the student from a low socioeconomic background	-.39**	.47**	.04	.24	-.47**	.19	.13	.08	.19	.06	-.15	–

Correlations are calculated with factor scores. N = 57, except for the correlations between the implicit measure and other variables ($n = 38$). * $p < .05$ level ** $p < .01$ level *** $p < .001$

autonomy support was positively correlated with their provision of involvement. Moreover, also the student from a low socioeconomic background teachers' Implicitly measured attitudes were positively associated with their provision of structure.

Table 15 shows the correlations between all variables included in the analyses of Study 2. Teachers' perceived academic ability toward students from high socioeconomic backgrounds, as well as for students from low socioeconomic backgrounds, correlated significant and positively with their autonomy support, and negatively with their provision of structure toward the student. Besides, teachers' perceived classroom behavior from the student from a high socioeconomic background correlated significant and positively with teachers' autonomy support and involvement and negatively with their provision of structure toward the student. For teachers' perceived classroom behavior for the student from a low socioeconomic background, a significant negative correlation was found with their provision of structure. Last, significant positive correlations between classroom behavior and academic ability levels were found for both students.

Appendix F

Description of measurement invariance analysis

The goal of Study 2 was to compare teachers' reported need support for a student from a high and low socioeconomic background they selected. Before we could make this comparison, it was tested whether the scales for need support (autonomy support, structure, and involvement) were scalar invariant for both measurements by using the Alignment Method (Asparahouf & Muthén, 2014). See for a more detailed description of the alignment method supplementary materials of Van Vemde et al. (2021). The results of the alignment analysis are presented below.

The first step was to estimate the configural model. This is the model with no invariance; the factor loadings and intercepts are allowed to differ between groups, factor means are fixed to zero, and factor variances to one. The configural model had a good fit ($\chi^2(48) = 70.55, p = .019$; RMSEA = 0.091; CFI = 0.923; TLI = 0.884; SRMR = 0.077), hence the alignment method can be used to test for measurement invariance.

The second step was to apply the alignment method. This can be done by choosing either, the fixed or free option, free optimization is recommended since this type works the best in case of large degree of noninvariance. Free optimization did not converge. Therefore, we applied the fixed alignment optimization through which the smallest factor mean is fixed to zero, this was the factor mean of low socioeconomic background. Table 16 shows the results of the alignment analysis.

For each parameter (intercept and loadings per item) the fit function contribution shows how well the parameter contributes to the fit function, with lower values indicating more invariance. Besides, R-squared reflects ‘how much variation across groups can be explained by variation in factor means and factor variances’ (Muthén et al., 2018), with a higher score corresponding a higher degree of invariance. Also, the number of groups among which the parameter is invariant is given. As shown in Table 16, the values for the fit function contribution of all parameters are relatively small, hence indicate invariance for the parameters (intercepts and loadings) across groups. R^2 also indicates approximate measurement invariance as R^2 approaches one for most parameters (intercepts and loadings). Yet, R^2 for one intercept (Rel4), and a few factor loadings (Aut2, Str3 and Rel1) is equal to zero, and has a lower value for some loadings (Aut4, Aut5 and Rel4). However, R^2 can be low if other parameters still show invariance across groups, since this can result from small factor mean

Table 16 Fit statistics of the alignment method for teachers’ need support

Item	Intercepts			Loadings		
	Fit function contribution	R^2	#groups with approximate measurement invariance	Fit function contribution	R^2	# groups with approximate measurement invariance
<i>Autonomy support</i>						
Aut2	-0.465	0.984	2	-0.770	0.000	2
Aut3	-0.345	0.998	2	-0.316	0.999	2
Aut4	-0.810	0.958	2	-0.685	0.350	2
<i>Structure</i>						
Aut5	-0.317	0.962	2	-0.680	0.439	2
Str3	-0.368	0.945	2	-0.437	0.000	2
Str4	-0.333	0.996	2	-0.319	0.989	2
<i>Involvement</i>						
Rel1	-0.316	0.994	2	-0.386	0.000	2
Rel2	-0.451	0.872	2	-0.322	0.880	2
Rel4	-0.738	0.000	2	-0.869	0.120	2

Table 17 Values for intercepts and loadings per parameter and differences between the within-subject groups high- and low socioeconomic background

Item	Intercepts						Loadings					
	Low value		High value	Difference	S.E	<i>p</i>	Low value		High value	Difference	S.E	<i>P</i>
<i>Autonomy support</i>												
Aut2	2.667	2.528	0.139	0.601	.816		0.552	0.999	-0.446	0.399	.267	
Aut3	3.035	3.069	-0.034	0.075	.653		0.555	0.556	-0.002	0.016	.909	
Aut4	2.623	3.043	-0.411	0.395	.298		0.816	0.508	0.308	0.402	.443	
<i>Structure</i>												
Aut5	3.912	3.908	0.004	0.071	.952		0.304	0.486	-0.182	0.525	.470	
Str3	4.140	4.233	-0.093	0.266	.728		1.021	0.868	0.153	0.856	.858	
Str4	4.316	4.292	0.024	0.134	.856		0.455	0.463	-0.008	0.018	.656	
<i>Involvement</i>												
Rel1	4.263	4.260	0.003	0.015	.828		0.716	0.641	0.075	0.300	.802	
Rel2	4.140	4.257	-0.116	0.111	.295		0.633	0.650	-0.017	0.034	.619	
Rel4	4.632	4.425	0.207	0.120	.085		0.232	0.514	-0.282	0.201	.160	

variability or small loadings (Asparahouy, 2016). Also, Table 16 shows that approximate measurement invariance holds across both groups.

In Table 17 results from each parameter (intercepts and loadings) with respect to differences in values between high and low socioeconomic background student, and whether this difference is significant is indicated. This shows that there are no significant differences between the intercepts and factor loadings between the groups, which again supports approximate measurement invariance.

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