Classroom Learning Climate Profiles: Combining Classroom Goal Structure and Social Climate to Support Student School and Behavioral Adjustment

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Abstract

This study seeks to identify the configurations of classroom teaching practices, defined based on the classroom goal structures (mastery-approach, performance-approach, and performance-avoidance) and social climate (academic support, emotional support, mutual respect, task-related interactions) to which a sample of 1,453 7th graders (M_{age}=12.71; 49.90% girls) report being exposed in their language and mathematics classes. This study also seeks to document the longitudinal associations between these profiles and various indicators of students' school functioning (engagement, achievement) and behavioral adaptation (hyperactivity-inattention, opposition-defiance, internalizing behaviors). Latent profile analyses identified five profiles replicated among boys and girls in language and mathematics classes. However, the prevalence of these profiles differed slightly as a function of sex and subject: *Low-all Climate* (10.01-19.71%), *High-all Climate* (8.65-14.82%), *Performance Climate* (26.70-36.22%), *Low Performance Climate* (12.93-24.84%), and *Mastery and Positive Social Climate* (19.42-27.61%). The *Mastery and Positive Social Climate* and the *Low Performance Climate* were associated with the highest levels of school functioning and the lowest levels of behavioral adaptation problems. The *Low-all Climate and the Performance Climate* were conversely associated with low levels of school functioning and high levels of behavioral adaptation problems. Overall, during the school year, engagement decreased, achievement remained stable, and behavior problems increased. Specific changes within each profile are discussed. Girls were more likely to report exposure to classroom climates associated with the most favorable outcomes, whereas the opposite was true for boys. Considering the multidimensional nature of classroom climate, these results have important theoretical and educational implications for promoting student adaptation.

Keywords: Classroom Goal Structure; Student Engagement; Student Achievement; Externalizing Behaviors; Internalizing Behaviors

Educational Impact and Implications Statement

This study identified five profiles of classroom learning climate based on 7th-grade students' simultaneous perceptions of the mastery-approach, performance-approach, performance-avoidance classroom goal structure, and social climate (i.e., emotional support, academic support, mutual respect, task-related interactions) present in their classrooms. Two profiles, the *Mastery and Positive Social Climate* and the *Low Performance Climate*, were associated with students' most positive educational (i.e., engagement and achievement) and behavioral (i.e., hyperactivity-inattention, opposition-defiance, internalizing behaviors) outcomes. The study discusses the implications of the results for school practitioners in light of different theoretical perspectives, such as Achievement Goal Theory and Self-Determination Theory.

Supportive classroom environments equip students to thrive in school. The learning climate to which students feel exposed in their classroom likely contributes to their school functioning (i.e., engagement and achievement) and their behavioral adaptation (i.e., hyperactivity-inattention, opposition-defiance, and internalizing behaviors). However, the classroom learning climate is a complex multidimensional set of teacher practices whose impact cannot be fully understood in isolation (e.g., Gallo et al., 2022; Rasku-Puttonen et al., 2011). Thus, studying how different facets of the classroom climate, such as classroom goal structure (e.g., Ames, 1992; Kaplan, Middleton, et al., 2002; Meece et al., 2006) and social climate (e.g., Fraser, 2000; Haertel et al., 1981) are experienced in combination is likely to help us achieve a finer-grained understanding of the overarching nature of the diverse classroom environments to which students report being exposed. Indeed, a few studies have already suggested the need to conceptualize classroom goal structure through a more multidimensional approach encompassing social climate components (i.e., TARGET; Epstein, 1988; Lüftenegger et al., 2014). In the same line of thinking, this study first seeks to identify the various configurations (or profiles) of classroom climate dimensions to which boys and girls feel exposed in their language and mathematics classes. We also seek to identify which configurations are associated with positive school functioning and behavioral adaptation among students at the beginning of the school year and with changes in these outcomes over the course of the year. Results can potentially help guide teachers and school practitioners in their effort to implement a combination of practices best support their students. Importantly, given that girls and boys sometimes experience school differently, these objectives will systematically be contrasted as a function of participants' sex (e.g., Lietaert et al., 2015; OECD, 2018).

Student's School Functioning and Behavioral Adaptation

According to Stage-Environment Fit Theory (Eccles et al., 1993) and Self-Determination Theory (SDT; Ryan & Deci, 2017), students' school adjustment and behavioral adaptation are expected to result from a good match between their psychological and developmental needs and the learning environment that they experience in their classroom and at school more generally. SDT (Ryan & Deci, 2017) explains that when students feel that their psychological needs for autonomy (i.e., the ability to experience a sense of volition), competence (i.e., the ability to influence one's environment in a desired manner), and relatedness (i.e., the ability to experience a sense of connection with, and appreciation from, peers and teachers) are met, they are more likely to thrive at school, to report a sense of well-being, and to display more adaptive behaviors. Although they do not necessarily focus on the same limited set of needs (e.g., including also the need to experience a sense of emotional and physical security), Stage-Environment Fit Theory (Eccles et al., 1993) similarly assumes that a good match between students' developmental needs and their classroom and school experiences should help support achievement, well-being, and functioning. This theory specifically expects that the extent to which these needs are consistent with the classroom learning climate experienced during the early adolescent period, right after the transition into secondary school, should be critical to support or impede school (e.g., engagement and achievement), behavioral (e.g., hyperactivity-inattention and opposition-defiance), and emotional (e.g., internalizing behaviors) adjustment.

Embedded within Stage-Environment Fit Theory (Eccles et al., 1993), the Expectancy-Value Model of Achievement Motivation (Wigfield & Eccles, 2002) explains that several facets of student's school experiences (including teacher practices and the learning climate of their classroom), help support their academic engagement and achievement as critical components of their school functioning. Engagement refers to students' active investment in learning and completing their schoolwork (Skinner et al., 2009). Whereas motivation refers to a desire to invest energy in a specific activity such as schoolwork, engagement refers to the effective dedication of this energy to the activity. Engagement encompasses three distinct yet interconnected components (i.e., behavioral: e.g., participation, attendance, compliance with rules; emotional: e.g., interest, enjoyment, happiness; and cognitive: e.g., self-regulation, deep-processing strategies; Fredricks et al., 2004). Several recent studies have demonstrated that a global engagement construct adequately reflects these components (Bae & DeBusk-Lane, 2019; Olivier et al., 2020; Wang et al., 2016, 2019). Global engagement is also especially relevant to the prediction of other aspects of students' functioning (e.g., behavior problems, grades, aspirations, etc.), as it is often more strongly associated with those than specific engagement dimensions (Olivier et al., 2020; Wang et al., 2016). Another core component of students' school functioning is their academic achievement, which indicates how well they learned and mastered the content covered in their curriculum (Wilson & Trainin, 2007).

Three main types of behaviors seem to capture the core behavioral and emotional adaptation difficulties manifested in school by students: hyperactivity-inattention, opposition-defiance, and internalizing behaviors (Gresham et al., 2011). Students displaying hyperactivity-inattention struggle to keep their attention on a task, are easily distracted, restless, and tend to act before thinking (APA, 2013; Campbell et al., 2014). Those displaying opposition-defiance often adopt behaviors such as getting angry easily, lying, cheating, breaking the rules, or refusing to follow adults' instructions (APA, 2013; Bierman & Sasser, 2014). Lastly, students with internalizing behaviors report feelings of anxiety or depression, including fear, nervousness, sadness, loneliness, or embarrassment (APA, 2013; Garber & Rao, 2014; Vasey et al., 2014).

In several school systems, early adolescence coincides with the transition from primary to secondary schools, which increases students' risk of experiencing decreased engagement and achievement and increased adaptation difficulties (e.g., Longobardi et al., 2019). Stage-Environment Fit Theory (Eccles et al., 1993) explains this risk by the presence of a gap in secondary schools' ability to support students' development needs relative to the more need-supportive environment offered in primary school. Similarly, SDT (Ryan & Deci, 2017) specifies that teachers' actions can support or thwart students' psychological needs and, in turn, impact their academic, behavioral, and emotional functioning at school. Together, these theoretical perspectives highlight the key role of teachers' practices as factors likely to reduce or increase the gap between students' needs and their learning environment. Beyond helping to maintain engagement and achievement, teachers' ability to rely on a combination of teaching strategies and practices, including the implementation of a classroom goal structure and social climate likely to maximally support their students' developmental needs, also help prevent misbehavior and emotional difficulties (Gay, 2006; McDonald, 2013; Schwab & Elias, 2015; Scott & Nakamura, 2023).

Classroom Goal Structure

Achievement Goal Theory (AGT; Ames, 1992) notes that how students approach or avoid different achievement goals represents a key driver of adaptation. AGT also highlights that various teaching practices create distinctive types of classroom goal structures that likely encourage, or impede, the development of achievement goal orientations associated with positive student outcomes. Classroom goal structure encompasses practices seeking to orient students toward desired learning outcomes (i.e., approach goal structures) or away from undesired learning outcomes (i.e., avoidance goal structures; Ames, 1992; Kaplan, Middleton, et al., 2002; Meece et al., 2006). The trichotomous model of goal structures—including mastery-approach, performance-approach, and performance-avoidance goals—is often used to understand the learning climate of the classroom (Federici et al., 2015; Lam et al., 2015), given that the mastery-avoidance dimension has only been introduced recently (Bardach et al., 2020).

Classroom Mastery-Approach Goal Structures emphasize self-referenced improvement, learning, effort, progression, and cooperative learning (Ames, 1992; Kaplan, Middleton, et al., 2002; Meece et al., 2006). Within these structures, students feel that their teacher values individual improvement over social comparison, allows them to learn at their own pace, and expects mistakes from them even when they try their best (Boden et al., 2020). When students perceive such a classroom goal structure, they tend to display higher levels of engagement and achievement (Federici et al., 2015; Hughes et al., 2011; Shim et al., 2013; Uçar & Sungur, 2017) and are less likely to display behavioral adaptation problems (Baudoin & Galand, 2022; Federici et al., 2015; Kaplan, Gheen, et al., 2002; Poulou, 2014).

Classroom Performance-Approach Goal Structures encourage personal success as the main indicator of achievement (Ames, 1992; Kaplan, Middleton, et al., 2002; Meece et al., 2006). Within these structures, students feel their teacher communicates that correct answers and good grades are the most important. Some conceptualizations of performance-approach classroom goal structures encompass teacher behaviors emphasizing *normative* (e.g., communicating that it is important to perform better than others) or *appearance* (e.g., communicating that it is important to openly disclose who performs best, for instance, by saying which students had the highest scores, comparing students, etc.) goals (Bardach et al., 2022; Midgley et al., 2000; Patrick et al., 2011). In contrast, it is also possible to conceptualize these goals as a *valuing* achievement without necessarily valuing its public display or encouraging social comparisons (e.g., simply communicating that it is important to have good grades) (Elliot & Thrash, 2001). Although perceived exposure to performance approach-goal structures seem to support student achievement (Federici et al., 2015), it might come as a cost for their engagement (Hughes et al., 2011) and may increase their risk of opposition-defiance (Kaplan, Gheen, et al., 2002; Shim et al., 2013) and internalizing behaviors (Baudoin & Galand, 2022; Shim et al., 2013). These adverse effects are more frequent when students perceive that their teachers have a normative or appearance performance-approach focus rather than simply *valuing* high achievement.

Classroom Performance-Avoidance Goal Structures place a high level of importance on avoiding the demonstration of one's incompetence (or low performance) relative to other students (Ames, 1992; Kaplan, Middleton, et al., 2002; Meece et al., 2006). Within these structures, students feel their teacher reinforces the importance of avoiding making mistakes or appearing incompetent in front of others and trying to perform at least as well as their peers. Students who feel exposed to classroom performance-avoidance goals report a generally poorer level of school functioning and behavioral adaptation (Gertsakis et al., 2021; Shim et al., 2013).

Classroom Social Climate

AGT positions mastery-approach classroom goal structures as an ideal learning context to foster student development (Ames, 1992). Ames (1992, also see Anderman et al., 2002) notably highlights the importance of considering the social and affective climate surrounding the classroom tasks as a core component of an efficient mastery approach goal structure. Further developing this idea, Patrick et al. (2011) proposed that teachers can implement four types of social interactions to best communicate a mastery orientation to their students. First, Patrick et al. (2011) noted that teachers can implement a climate of academic support by monitoring students' assignments, ensuring they understand the material, and helping them maximize their learning. Second, teachers can implement a climate of emotional support by respecting students' opinions, sincerely trying to understand students' emotions, and communicating to students that they can rely on them for help and support. Third, teachers can implement a climate of mutual respect by insisting that students respect all opinions and intervening to stop students from mocking, making fun, or being hostile toward others. Fourth, teachers can implement a climate of task-related interactions by offering students opportunities to collaborate, discuss, share ideas, and ask for help from their peers. According to Partrick et al. (2011), these four dimensions (i.e., academic support, emotional support, mutual respect, task-related interactions) reflect a *positive classroom social climate* and correspond to how this climate was operationalized in the present study (for similar operationalizations, see Fraser, 2000; Haertel et al., 1981).

Patrick et al.'s (2011) conceptualization shares similarities with the TARGET dimensions [i.e., Tasks (task type and organization), Authority (autonomy granted to students), Recognition (feedback), Grouping (organization and types of groups), Evaluation (procedures and criteria), and Time (management of learning time)], a multidimensional conceptualization of how teachers can implement an efficient classroom mastery goal structure (e.g., Epstein, 1988; Lüftenegger et al., 2014). Complementing these two perspectives, SDT (Ryan & Deci, 2017) similarly proposes that a classroom climate marked by emotional and academic support combined with mutual respect and task-related interactions should also support students' needs to feel autonomous, competent, and related to their social surroundings. Generally, when students perceive the presence of these characteristics in their classroom, they tend to report more positive school functioning (Han et al., 2019; Hughes & Coplan, 2018; Joe et al., 2017; Jin & Wang, 2019; Kashy-Rosenbaum et al., 2018; Kikas & Magi, 2017; Rimm-Kaufman et al., 2015; Rudasill et al., 2010; Ruzek et al., 2016) and lower level of behavioral difficulties (hyperactivity-inattention: Tennant et al., 2015; opposition-defiance: Madill et al., 2014; Shin & Ryan, 2017; internalizing behaviors: Pössel et al., 2013; Tennant et al., 2015).

The Overarching Learning Climate of the Classroom

When considering the desirability of different facets of the classroom climate, we generally try to identify facets that will help nurture more positive school functioning and less pronounced behavioral adaptation difficulties among students. In this regard, school practitioners and researchers tend to agree. To achieve this dual objective, effective teachers need to combine a wide range of practices (e.g., Rasku-Puttonen et al., 2011). Student perceptions are also crucial to understanding the learning climate of their classroom. It is through those perceptions that these classroom characteristics come to contribute to their school functioning and behavioral adaptation (Lam et al., 2015; Meece et al., 2006; Ryan & Deci, 2017). Thus, properly understanding the complete classroom climate to which students feel exposed in real life requires the joint consideration of various elements rarely studied in combination (Kikas et al., 2016; Rasku-Puttonen et al., 2011). According to Patrick et al. (2011), such an overarching operationalization of the classroom climate should benefit from the dual consideration of classroom goal structures with the social climate of the classroom.

Classroom goal structures and social climate components form what we hereafter refer to as the *classroom learning climate*. Some authors (e.g., Gallo et al., 2022; Halpin & Kieffer, 2015) have highlighted the value of a person-centered approach to understand the diverse configurations of classroom learning climate. A person-centered approach seeks to identify subpopulations of students who feel exposed to quantitatively (i.e., profiles differing in the strength of various indicators of classroom learning climate) and qualitatively (i.e., profiles differing in shape, that is, displaying different configurations of classroom learning climate indicators) distinct profiles of classroom learning climate (e.g., Morin & Litalien, 2019). Although it would be possible to classify classrooms based on whether each dimension occurs at a high or low level, this approach neglects the possibility that some of those combinations may not happen in real life. Some configurations may also include average levels on various classroom learning climate dimensions (Morin et al., 2011). The person-centered approach aims to capture these configurations as they truly occur in real life.

From a theoretical standpoint, while AGT proposes that a mastery-approach classroom goal structure should be ideal for supporting positive student development (Ames, 1992; Meece et al., 2006), it does not position alternative classroom goal structures as being mutually exclusive (Meece et al., 2006). Indeed, as noted in a recent meta-analysis (Bardach et al., 2020), students' perceptions of various dimensions of classroom goal structure share similarities based on their valence (i.e., approach *vs.* avoidance, so that perceptions of mastery-approach goal structures positively correlate with perceptions of performance-approach goal structures) or end goal (i.e., mastery *vs.* performance, so that perceptions of performance-approach goal structure positively correlate with perceptions of performance-avoidance goal structures). From these observations, however, we can see that AGT conceptualizes mastery-approach and performance-avoidance goal structures as incompatible both in terms of valence and end goal.

According to AGT, the similarity between the four dimensions of the classroom social climate (i.e., academic support, emotional support, mutual respect, task-related interactions; Patrick et al., 2011) and the dimensions of the TARGET framework (Epstein, 1988; Lüftenegger et al., 2014) suggest that the classroom social climate and mastery-approach classroom goal structures may tend to co-occur in classrooms. In other words, consistent with the idea that a positive social climate helps communicate a mastery-approach orientation, some profiles should display matching levels of classroom social climate and mastery-approach goal structure, whereas performance goal structures and negative social climates should dominate others. Moreover, students exposed to performance-avoidance goals structures should be unlikely to hold a positive view of their classroom learning climate given that the main objective in such classrooms is to avoid *demonstrating incompetence in front of others* (Iaconelli & Anderman, 2021), an objective that may even overshadow more positive facets of the classroom learning climate.

Furthermore, SDT (Ryan & Deci, 2017) proposes that need-supportive teaching (i.e., practices seeking to help support students' need for autonomy, competence, and relatedness), similar to the various dimensions of a positive classroom climate accompanied by mastery-approach classroom goal structure, should be ideal for supporting student development. In contrast, need-thwarting teaching practices, such as those entailed by classroom performance-approach and performance-avoidance goal structures (e.g., Sarrazin et al., 2005), should interfere with students' school and adaptive functioning.

Contrasting with this perspective, Baumrind's (1978) typology of parenting practices, as applied to the school context (Pellerin, 2005), proposes to categorize teachers' actions along the two dimensions of responsiveness (i.e., warmth, open communication, attention, and thus sharing similarities with a positive social climate) and demandingness (i.e., high expectations for effort and performance and thus sharing similarities with both mastery-approach and performance-approach goal structures). This perspective suggests that a combination of responsiveness and demandingness (i.e., mastery-approach and performance-approach goal structures accompanied by a positive social climate) should result in an authoritative teaching style that best supports student engagement, achievement, and adaptative behavior (Pellerin, 2005). Still, from the same perspective (Pellerin, 2005), some teachers may also display more authoritarian (low responsiveness and high demandingness), permissive (high responsiveness and low demandingness), or indifferent (low responsiveness and low demandingness) styles, all likely to result in more problematic outcomes for students.

In combination, these three theoretical perspectives lead us to expect the following perceived classroom learning climate profiles: (1) high mastery-approach and performance-approach goal structures, positive social climate, and a low performance-avoidance goal structure (*High Approach and Positive Social*; based on valence according to AGT and consistent with Baumrind's *Authoritative* style); (2) high mastery-approach goal structure, positive social climate, and low performance-approach and performance-avoidance goal structure (*High Mastery and Positive Social*; based on end goals according to AGT); (3) high mastery-approach and performance-approach goal structure with negative social climate and a low performance-avoidance goal structure (*High Approach and Negative Social;* equivalent to the *Authoritarian* style in Baumrind's typology); (4) high positive social climate with a low goal structure (*Positive Social*; consistent with Baumrind's *Permissive* style); (5) high performance-approach and performance-avoidance goal structures with low mastery goal structure and a negative social climate (*High Performance and Negative Social*; based on end goals according to AGT); (6) low across all dimensions (consistent with an *Indifferent* teaching style in Baumrind's typology). Interestingly, AGT and SDT both suggest that a profile combining mastery-approach goals with a positive social climate should be ideal (*High Mastery and Positive Social*), whereas according to Baumrind's typology, the ideal combination would also include performance-approach goals (*High Approach and Positive Social*).

From an empirical perspective, a few studies have attempted to identify the classroom learning climate profiles perceived by students. When focusing only on teaching practices that can be considered need-supportive (e.g., encompassing dimensions similar to the TARGET framework), current evidence suggests that students generally tend to perceive their teachers as relying on all of these practices at a similarly low, average, or high level without identifying qualitatively distinct combinations of practices (i.e., Gaias et al., 2019; Holzberger et al., 2019). However, studies encompassing several need-supportive and need-thwarting practices tend to report more diversified profiles. In Table S1, we summarize the results from the six studies relying on profile indicators similar to those used in the current study, although none of these studies considered performance-avoidance goals. At least five of these studies identified profiles similar to our theoretical propositions: (1) *High Approach and Positive Social* profile; (2) *High Mastery and Positive Social* profile; (3) *High Performance-Approach and Negative Social* profile; and (4) *Indifferent* profile. Interestingly, all of these profiles are theoretically consistent with our expectations.

Longitudinal Stability or Change over Time, Sex, and School Subject

When trying to capture the role of students' perceptions of their classroom learning climate for their school functioning and behavioral adaptation, some noteworthy elements need to be considered. Students' school functioning is likely to vary between subjects. Indeed, not all subjects are mastered at the same pace and with the same interest and success by students, which has led researchers to consider engagement and achievement as having a strong subject-specificity (Archambault & Vandenbossche-Makombo, 2014; Fredricks et al., 2019; Gogol et al., 2017; Schunk & Mullen, 2012). Generally, girls feel more engaged and have a higher level of achievement than boys, especially in language classes (Lietaert et al., 2015; OECD, 2018). However, boys are sometimes more engaged in mathematics and outperform girls, although sex differences are not as marked as in language classes (Plante et al., 2013; Rodriguez et al., 2020; Wang & Degol, 2014; OECD, 2018). Some studies also suggest that, compared to language teachers, mathematics teachers are less prone to establishing positive task-related interactions and academic support (Inserra & Short, 2013). Over a single school year, students feel slightly less engaged at the end of the school year compared to the beginning (Janosz et al., 2008), whereas student achievement is generally stable (Rimfeld et al., 2018). Perceptions of the classroom learning climate are likely to bring some changes in student engagement and achievement. For instance, students perceiving a supportive classroom climate might feel more and more engaged over the year and make more effort to succeed than those perceiving an unsupportive climate.

The classroom learning environment can also be perceived differently by boys and girls and between language and mathematics classes. Thus, girls are more likely to report being exposed to a mastery-approach goal structure (Butler, 2012; Rostami et al., 2011) and a more positive social climate (Lietaert et al., 2015). In contrast, boys seem more sensitive to the classroom learning environment. When they positively perceive their classroom learning climate, they remain more engaged and have better achievement, a protective effect not found in girls (Lietaert et al., 2015; Rimm-Kaufman et al., 2015). Positive perceptions of the classroom learning climate should thus help reduce sex differences in engagement and achievement (Hochweber & Vieluf, 2016).

Behavioral adjustment might also vary based on sex and time. Identity theory (e.g., Carter, 2014; Rosenfield, 2000) describes several socialization processes taking root in early infancy (e.g., family expectations, identity internalization), possibly increasing girls' likelihood of experiencing internalizing behaviors (e.g., depression, anxiety) and boys' likelihood of displaying externalizing behaviors (e.g., hyperactivity-inattention and opposition-defiance). Empirical studies also confirm these trends in early adolescence (Kovess Masfety et al., 2021). On their own, changes in behavioral adaptation tend to occur over several years and are rarely detected within a single school year (DeBolle et al., 2015). They also often result from stable interindividual characteristics, such as temperament, personality traits, and executive functions (e.g., Ehrler et al., 1999; Ursache & Cybele Raver, 2014; Yang et al., 2022). Although behavior problems tend to operate partly in a trait-like manner (i.e., stable over time, unlikely to change due to time-specific environmental context), they also possess a state-like component (i.e., likely to vary due to time-specific exposure to specific environmental characteristics). For instance, studies have shown that students' levels of hyperactivity-inattention, opposition-defiance, and internalizing behaviors tended to fluctuate due to time-specific social interactions (e.g., parenting warmth, peer victimization) beyond their tendency to remain relatively stable over time (Gong et al., 2023; Shen et al., 2022; van Dijk et al., 2022) Perceptions of the classroom leaning climate are among such environmental contexts that could help such changes occur within a single school year. From a theoretical standpoint, AGT also postulates that goal orientation comprises a trait-like and a state-like tendency, notably reflecting social influences such as perceptions of the classroom goal structure (Monni et al., 2020). Although never explicitly assessed in relation to teaching practices, students struggling with hyperactivity-inattention, opposition-defiance, or internalizing behaviors seem especially sensitive to their perceptions of the social climate of their classroom, suggesting that problematic social climates could worsen preexisting conditions (Caldarella et al., 2021; Lee & Bierman, 2018).

Along with the theoretical and empirical expectations that the classroom context contributes to student functioning, from a methodological standpoint, causality entails three conditions (e.g., Check & Schutt, 2012): (1) There is an association between variables, (2) this association shows temporal precedence, and (3) this association is nonspurious (e.g., identified via manipulation). Our study cannot pretend to establish causality as there is no manipulation involved, but is able to meet conditions 1 and 2 by assessing associations between the classroom climate profiles and outcomes at the same time point (Condition 1) as well as over time (Condition 2: changes in outcomes over time). This verification thus allows for the identification of which profiles may seem optimal at any point in time, but also of whether these benefits are likely to persist over time. In other words, a positive increase in one outcome in one profile is not interpreted in the same way if this profile showed an initially low or high level on this outcome.

The Present Study

To adequately capture the complex multidimensional nature of student perceptions of their classroom learning climate, the present study seeks to identify the main configurations of classroom goal structures and social climate to which boys and girls feel exposed in their language and mathematics classes. Specifically, our first objective is to identify profiles of students reporting qualitatively distinct configurations of classroom goal structures (mastery-approach, performance-approach, and performance-avoidance) and social climate (academic support, emotional support, mutual respect, and task interactions). We expect that at least four profiles (consistent with theory and previous empirical research) should emerge in the current study: (1) *High Approach and Positive Social* profile; (2) *High Mastery and Positive Social* profile; (3) *High Performance and Negative Social* profile, and (4) *Indifferent* profile. Among other theoretically plausible but not empirically validated profiles are the (5) *High Approach and Negative Social* profile; and the (6) *Positive Social* profile.

Beyond simply identifying the various classroom learning climate profiles, assessing those associated with positive school functioning and behavioral adaptation has important implications for informing on how teachers can improve their classroom learning climate to support their students best. Our second objective is thus to assess how the identified profiles will relate to students' levels of engagement, achievement, hyperactivity-inattention, opposition-defiance, and internalizing behaviors at the beginning of the school year and to changes in these outcomes over one school year. Theories point in different directions regarding which profiles should be associated with the most favorable outcomes. On the one hand, AGT and SDT suggest that a combination of mastery-approach goals with a positive social climate should best support student school functioning and behavioral adaptation. On the other hand, Baumrind's typology expects a classroom climate also including performance-approach goals would best support these outcomes. Moreover, although we anticipate the outcomes will generally remain stable over time, we expect students corresponding to profiles with a more positive learning climate to display some improvement over the year.

Our third objective is to assess whether these profiles and their associations with students' outcomes will be replicated across samples of boys and girls in their language and mathematics classrooms. Consistent with available studies, we anticipate girls will be more likely to correspond to profiles characterized by a positive classroom learning climate than boys. We also expect fewer students will perceive a positive classroom learning climate in their mathematics class relative to their language class. The hypothesized model is displayed in Figure 1.

Method

Participants

This study relies on a sample of 1,453 7th grade students (Mage=12.71; SDage=.49; 49.90% girls; 51.10% boys) recruited in 11 secondary schools (6 public schools including 59.81% of the participants and five private schools including 40.19% of the participants) located in two rural and suburban regions of the greater Montreal area (Québec, Canada). Schools were located in areas with between 14.2% and 16.6% of families having a low socioeconomic status (SES) based on the calculation of the IMSÉ[1]. Most students were White Caucasians (95.7-97.7%), and smaller proportions were Asian (0.5-0.6%), Black (0.8-1.5%), Latin American (0.5-1.4%) or other (0.5-0.8%) cultural backgrounds, which is considered representative of the Quebec student population outside of the city of Montreal (MEES, 2019). Students were nested in 61 classrooms (including 12-34 participating students, with one classroom including 41 students, *M*=25.03).

Procedure

This project was approved by the University's research ethics committee of the third author institution (certificate number S-703528), and participation required active parental and student consent. At the beginning (T1) and end (T2) of the 2016-2017 school year, participants completed a 40-minute[2] paper questionnaire related to their school experiences. A trained research assistant read the questionnaire aloud to the entire class while students answered the items to ensure understanding. As seventh graders spend most of their learning time in language and mathematics classes, these are key to understanding student engagement and achievement (OECD, 2011) and were thus targeted in this study. Parents also provided written consent to transmit students' official grades in language and mathematics to the research team. At each time point, a compensation of 5$ per student was provided to the classroom budget. This measure aimed to increase teachers' engagement in the project as they gathered parents' consent forms. Overall, this led to a 95% participation rate. At T1, 16.9% of participating students had missing data (i.e., not answering one or more items). At T2, 7.0% of participating students were absent on the day of data collection (i.e., attrition), and 10.5% of those who participated had missing data (i.e., not answering one or more items).

Transparency and Openness

We report how we determined the sample size (convenience sampling procedures), all manipulations, and all measures in the study, and we follow JARS (Kazak, 2018). All data, analysis code, and research materials are available upon reasonable request from the corresponding author. Data were analyzed using Mplus, version 8.4 (Muthén & Muthén, 2020). Alternative analyses conducted as part of this study are reported in the Online supplements. This study's design and its analyses are not preregistered.

Readers wishing to learn more about estimating models similar to those used in the present study are refer to: Collins and Lanza (2010) for a comprehensive introduction to latent profile analyses, Morin et al. (2016) for an introduction to tests of profile similarity, Morin and Litalien (2017) for the longitudinal extension of these tests (used in the current study to test similarity between school subjects), and Morin and Litalien (2019) for a comprehensive, user-friendly introduction to the estimation of person-centered analyses.

Measures

Classroom Goal Structure. At T1, students completed the three subscales from the

[1] SES is derived from an index (Index de milieu socio-économique; IMSÉ) accounting for the proportion of families in which the mother does not have a diploma, certificate, or degree (two-third of the weight of the index) and the proportion of households whose parents are unemployed during the Canadian census reference week (one-third of the weight of the index). Families falling within the 30% lowest scores are considered to have low SES.

[2] The research team conducted a pilot study to test the questionnaires. During testing, a research assistant read the questions aloud to help students pay attention and guide their pace. Students who participated in the pilot study were asked whether it would be preferable to divide the questionnaire into two 20-minute periods spaced over a few days or to keep it in a single 40-minute period. Students indicated that they preferred the 40-minute option as long as someone was reading the questions aloud, a procedure that was kept for the main study. Finally, the reliability of scales appearing at the end of the questionnaire (e.g., classroom social climate) was as good as those appearing at the beginning of the questionnaire (e.g., engagement).

Patterns of Adaptive Learning Scales (Midgley et al., 2000) twice, in reference to their language and mathematics classes: (a) mastery-approach goal structures (6 items; e.g., "In our French/mathematics classroom, it is important to try hard."; language: α=.712; mathematics: α=.697; language and mathematics: ω=.783[3]), (b) performance-approach goal structures (3 items; e.g., In our language/mathematics classroom, the main goal is to have good grades"; language: α=.729; mathematics: α=.723; language and mathematics: ω=.783), and (c) performance-avoidance goal structures (5 items; e.g., "In our language/mathematics classroom, it is important to not make mistakes in front of others," language: α=.800; mathematics: α=.796; language and mathematics: ω=.839). These items were rated on a five-point scale (1 "not at all true" to 5 "totally true").

Classroom Social Climate. At T1, students completed four subscales from the Classroom Social Climate Questionnaire (Patrick et al., 2011) twice, in reference to their language and mathematics classes: (a) teacher academic support climate (4 items, e.g., "Your teacher likes to see your work), (b) teacher emotional support climate (4 items; e.g., "Your teacher really understand how you feel about things"), (c) classroom mutual respect climate (5 items; e.g., "My teacher wants us to respect each other's opinions"), and (d) task-related interactions climate (3 items; e.g., "My teacher allows us to discuss our work with classmates"). These items can also be used to estimate a global classroom social climate score through bifactor Confirmatory Factor Analysis (language and mathematics: α=.853; language and mathematics: ω=.911), which is the approach taken in this study. Further information on this approach is provided in Appendix A of the Online supplements. These items were rated on a five-point scale (1 "almost never" to 5 "almost always").

Student Engagement. At T1 and T2, students self-reported their levels of behavioral, emotional, and cognitive classroom engagement twice, in relation to their language and mathematics classes using the School Engagement Dimensions Scale (Archambault & Vandenbossche-Makombo, 2014). This measure includes 11 items for each subject (e.g., behavioral: "It is important for me to try hard in language/mathematics activities."; emotional: "I enjoy language/mathematics."; cognitive: "I double check my language/mathematics assignments to make sure there are no mistakes."; language: α_{T1}=.830; α_{T2}=.841; T1-T2 ω=.915; mathematics: α_{T1}=.833; α_{T2}=.865; T1-T2 ω=.870). All items are rated on a five-point scale (1 "Not at all" to 5 "Very much"). For each subject, we obtained a global engagement score using bifactor Confirmatory Factor analysis (α=.842; ω=.893), following previous recommendations supporting this approach (e.g., Olivier et al., 2020; Wang et al., 2016, 2019).

Student Achievement. Student achievement in language and mathematics was obtained from their official school records at T1 (November) and T2 (June; non-cumulative) and was rated on a 0 to 100 scale. As no standardized ministry evaluation occurs in Grade 7 in the Quebec school system, teachers are responsible for evaluating students throughout the year. This indicates that there might be variations per classroom, reflecting teacher idiosyncratic bias. Two strategies were used to minimize this bias: (1) control for the nested structure of students within classrooms using the type=complex option, and (2) systematically test for invariance between language and mathematics results (further described in the analyses section).

Student Behavior Problems. At T1 and T2, students self-reported their behavior problems using three subscales from the Social Skills Improvement System (Gresham et al., 2011): (a) hyperactivity-inattention (6 items; e.g., "I am easily distracted"; α_{T1}=.804; α_{T2}=.829; T1-T2

[3] Considering that the measurement models reached latent mean invariance across sex and subjects, the composite reliability is the same for the two subjects.

ω=.847), (b) opposition-defiance (8 items; e.g., "I cheat when I play games."; α_{T1}=.826; α_{T2}=.840; T1-T2 ω=.884[4]), and (c) internalizing behaviors (9 items; e.g., "I feel sad"; α_{T1}=.805; α_{T2}=.832; T1-T2 ω=.868). These items were rated on a seven-point scale (1 "not really" to 7 "totally").

Student Sex. Student self-reported their sex (0=boy; 1=girl).

Analyses

Preliminary Analyses

Prior to the main analyses, we estimated a series of factor analyses to confirm the factor structure of all study variables. These analyses are described in Appendix A and Tables S2 to S6 of the online supplements. Descriptive statistics and intra-class correlations (variance at the classroom level [ICC1], level of agreement within classrooms [ICC2]) are reported in Table S7). Factor scores, estimated in standardized units (*M*=0; *SD*=1), were saved from these preliminary analyses to serve as profile indicators for our main analyses (i.e., mastery-approach goal structures, performance-approach goal structures, performance-avoidance goal structures, global classroom social climate, specific teacher academic support climate, specific teacher emotional support climate, specific classroom mutual respect climate, and specific task-related interactions climate).[5] However, considering that three out of four specific factors had low reliability, they were not included in the main analyses. Supplementary analyses, including those, are reported in Appendix C of the online supplements.

We also relied on factor scores extracted from a latent change extension of our longitudinal measurement models to represent the initial levels and amount of change over time occurring in our outcome variables (i.e., T1 and change from T1 to T2 in engagement in language, engagement in mathematics, achievement in language, and achievement in mathematics, hyperactivity-inattention, opposition-defiance, internalizing behaviors). More specifically, results indicate that, on average, students reported a decrease in their levels of engagement between T1 and T2 (language: M=-.311 SD=.037; *p*<.001; mathematics: M=-.405; SD=.042; *p*<.001), whereas their achievement levels remained stable over time (language: M=.002; SD=.050; *p*=.964; mathematics: M=.004; SD=.045; p=.924). Students also reported, on average, a slight increase in adaptation problems between T1 and T2 (hyperactivity-inattention: M=.167; SD=.035; p<.001; opposition-defiance: M=.177; SD=.042; p<.001; internalizing behaviors: M=.120; SD=.037; p<.001).

Correlations between all study variables are reported in Table S8. Consistent with Patrick et al.'s (2011) expectations, classroom mastery-approach goal structures in language and mathematics shared high positive correlations with the classroom social climate global factor (*r*=.696-.701, *p*<.01). Classroom performance-approach goal structures also shared positive, but smaller, correlations with classroom social climate global factor (*r*=.142 to .157, *p*<.01), whereas classroom performance-avoidance goal structures shared negative correlations with classroom social climate global factor (*r*=-.161 to -.185, *p*<.01).

Latent Profile Analyses

Estimation. Latent Profile Analyses (LPA) were estimated to identify the set of profiles that best represented student perceptions of their classroom goal structures and social climate.

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[4] Considering that the measurement models reached latent mean invariance across sex and time, the composite reliability is the same for the two time points.

[5] The global and specific factors representing classroom social climate were obtained using a bifactor CFA model. Bifactor models make it possible to identify a global factor representing the variance shared among all items along with specific orthogonal (i.e., uncorrelated) factors reflecting the variance uniquely attributable to the subscale beyond that explained by the global factors (see Appendix A of the online supplements for details).

These models were estimated using Mplus 8.4's (Muthén & Muthén, 2020) maximum likelihood robust (MLR) estimator, which is adequate for continuous indicators such as the factor scores used in the current study. Models were estimated separately across all sex by school subject combination (boys-language; boys-mathematics; girls-language; girls-mathematics) while relying on Mplus design-based correction procedures (type=complex; Asparouhov, 2005) to control for the nesting of students within classrooms. Models were estimated using 3000 random sets of start values, 500 iterations, and 200 final stage optimizations to avoid converging on a suboptimal local solution (Morin & Litalien, 2019). These models were estimated while allowing the indicators' means, but not their variances, to be freely estimated across profiles. Although there are advantages to the estimation of LPA in which the variance of the indicators is also freely estimated across profiles (Peugh & Fan, 2013), these more complex models resulted in severe convergence difficulties and improper parameter estimates, suggesting overparameterization (Chen et al., 2001) and supporting the superiority of our simpler models (Morin & Litalien, 2019).

Model Selection. The optimal solution was selected based on three criteria: Statistical adequacy, meaningfulness, and theoretical adequacy (Morin et al., 2016b). The following statistical indicators were also examined to guide this decision: Akaïke Information Criterion (AIC), Constant AIC (CAIC), Bayesian Information Criterion (BIC), Sample-Size-Adjusted BIC (ABIC), and adjusted Lo-Mendell-Rubin (aLMR) likelihood ratio test (e.g., Peugh & Fan, 2013)[6]. Lower values on AIC, CAIC, BIC, and ABIC suggest a better solution, whereas a significant (p>.05) p-value on the aLMR supports the value of a solution relative to one including one fewer profile. Statistical research has shown that the BIC, CAIC, and ABIC, but not the AIC and aLMR, were efficient at helping to identify the number of latent profiles (e.g., Diallo et al., 2016, 2017). For this reason, the AIC and aMLR will not be used to guide model comparison and selection and are only reported for transparency purposes. Moreover, due to their sample-size dependency, these indicators often keep improving with the addition of profiles without converging on a clear solution (e.g., Marsh et al., 2009). A graphical examination (referred to as an "elbow plot") is thus recommended to facilitate decision-making (e.g., Morin & Litalien, 2019; Petras & Masyn, 2010). In these plots, the infection point representing the decrease in the value of these indicators associated with adding profiles is a rough guideline for the optimal number of profiles. For purely descriptive purposes, we also report the model entropy as an indicator of classification accuracy (ranging from 0 to 1, with higher values indicating greater accuracy).

Profile Similarity. Following the selection of the optimal LPA solution for each sex by subject combination, tests of profile similarity were conducted to assess the extent to which these solutions were replicated between boys and girls within their language and mathematics classes. These tests were performed following the sequence proposed by Morin et al. (2016b), which involved the estimation of a series of nested models in which parameters are progressively constrained to equality across groups (specified using a multi-group format) and subjects (specified in a repeated measure format): (a) same number of profiles (configural similarity); (b) same within-profile means on the indicators (i.e., same profile shape; structural similarity); (c) same within-profile variances on the indicators (dispersion similarity); (d) same proportion of students in each profile (distributional similarity). The similarity is supported when two indicators out of the CAIC, BIC, and ABIC decrease relative to the previous step (Morin et al., 2016b). Failure to uphold similarity at any stage can be followed by tests of partial similarity limited to a subset of profiles or indicators (Morin et al., 2016b).

Outcomes. Outcomes (T1 and T1-T2 change) were added to the most similar LPA solution

[6] The bootstrap likelihood ratio test is not available when relying on Mplus design-based correction procedures.

(Morin et al., 2016b). Given that the outcomes related to student behavior problems are not subject-specific, whereas the school-related outcomes (engagement and achievement) are, the former set of outcomes was integrated into distinct models to compare their associations with profile membership for boys and girls separately in mathematics (first set of models: M1) and language (second set of models: M2) classes. In contrast, the latter set of outcomes could directly be added o the most similar model retained in the previous stage of analyses to assess the similarity of their associations with profile membership as a function of sex and subject simultaneously (third set of models: M3). In all of these analyses, outcome levels at T1 were first freely estimated across profiles and between samples of boys and girls for M1, M2, and M3, as well as between language and mathematics for M3. In a second model of explanatory similarity, outcome levels at T1 were constrained to be equal across sex within each of the profiles for M1, M2, and M3, as well as between language and mathematics for M3. In a third model, the change in outcome levels between T1 and T2 was also allowed to be freely estimated across samples of boys and girls within each profile in M1, M2, and M3, as well as between language and mathematics for M3. Finally, we estimated a last model of explanatory similarity in which the changes in outcome levels between T1 and T2 were constrained to be equal across sex within each of the profiles for M1, M2, and M3, as well as between language and mathematics for M3. As before, explanatory similarity is supported when two indicators out of the CAIC, BIC, and ABIC show a decrease between the first and second models, as well as between the third and fourth models. Tests of statistical significance for outcome comparisons relied on the multivariate delta method (Raykov & Marcoulides, 2004) implemented using the MODEL CONSTRAINT function. Statistically significant differences between T1 levels reflect that one profile is associated with a lower/higher level of student outcomes compared to another profile. Statistically significant differences between T1-T2 change reflect that one profile is associated with a steeper/flatter level of change compared to another profile.

Results

Latent Profiles

The results from the alternative LPA solutions estimated separately for boys and girls in relation to their language and mathematics classes are reported in Table S9 of the online supplements and graphically illustrated in elbow plots reported in Figure S1 of the same online supplements. In these four models, all information criteria (BIC, ABIC, and CAIC) decreased without reaching a minimum, while the elbow plots tentatively suggested a plateauing in the decrease of these indicators between 4 and 6 profiles. Given these various results, we more carefully examined solutions including 4 to 6 profiles for their theoretical and heuristic meaningfulness and added value. Across all solutions, it was interesting to note that the identified profiles were already visually relatively similar for boys and girls in language and mathematics classes, providing early evidence of configural similarity. In all solutions, the 4-profile solution resulted in four qualitatively distinct profiles (corresponding to a *Low-all Climate*, a *High-all Climate*, a *Performance Climate*, and a *Mastery and Positive Social Climate* profiles). Moreover, the 5-profile solution resulted in the addition of a meaningful profile presenting *Low Performance Climate*, which was qualitatively distinct from the profiles identified in the previous solution. In contrast, the 6-profile solution only resulted in the subdivision of the *Low Performance Climate* profile into two quantitatively but not qualitatively distinct profiles, one of which was relatively small (3%). For these reasons, the 5-profile solution was retained for tests of profile similarity.

Results from tests of profile similarity, also reported in Table 1, supported the configural, structural, and dispersion similarity of this solution across samples of boys and girls in language and mathematics classes, as each added set of constraints resulted in smaller values on at least two out of three indicators (BIC, ABIC, and CAIC). However, the next model of distributional similarity was not supported as it resulted in higher values of BIC and ABIC relative to the previous model of dispersion similarity, suggesting the proportion of boys and girls in each profile across language and mathematics classes was not equivalent. The previous solution of dispersion similarity was retained for interpretation and graphically illustrated in Figure 2, while parameter estimates are reported in Table S10 of the online supplements.

These results first revealed a *Low-all Climate* profile in which students reported low levels on all classroom goal structures and climate indicators. Second, a *High-all Climate* profile was identified and characterized by higher-than-average levels on all classroom goal structures and climate indicators. Third, a *Performance Climate* profile was identified in which students reported higher-than-average, but still moderate, levels of performance-approach and -avoidance goal structures and below-average levels of mastery-approach goal structure and global social climate. Fourth, a *Low Performance Climate* profile was characterized by very low levels of performance-approach and performance-avoidance goal structures, slightly higher-than-average levels on the global social climate indicator, and close to average levels of mastery-approach goal structure. Fifth, a *Mastery and Positive Social Climate* profile was characterized by higher-than-average levels of mastery goal structure and global social climate, slightly higher than average levels of performance-approach goal structure, and lower than average levels of performance-avoidance goal structure.

The range of students corresponding to each profile is reported in Figure 2. These ranges are based on the prevalence of each profile in relation to boys' and girls' perceptions of their language and mathematics classroom climates. The *Performance Climate* profile was the most prevalent among boys and girls across both school subjects (29.34% to 39.59%). Girls corresponded in relatively similar proportions to the *Performance Climate, Low Performance Climate*, and the *Mastery and Positive Social Climate* profiles in language and mathematics (23.17% to 26.25%), whereas they were less likely to correspond to the *Low-all Climate* or *High-all Climate* profiles (8.96% to 12.48%). Apart from their more prevalent correspondence to the *Performance Climate* profile (38.07% to 39.59%), boys corresponded relatively equally to all other profiles (11.36% to 18.71%). Contrary to expectations, the proportions of students perceiving each profile were relatively similar in language and mathematics classes.

Outcomes

Results from the tests of explanatory similarity are reported in Table 1. For the T1 levels of behavior problems, although the model of explanatory similarity was not supported across samples of boys and girls for both the language and mathematics classes, a model of partial similarity was supported, suggesting only a few associations differed between boys and girls at T1 (involving opposition-defiance in the *Low-all Climate* Profile, and internalizing behaviors in the *Performance Climate* profile). However, in relation to the change in behavior problems occurring between T1 and T2, the model of explanatory similarity across samples of boys and girls was supported for both the language and mathematics classes. Lastly, the results also supported the explanatory similarity of the school adaptation outcomes across samples of boys and girls in language and mathematics classes for both the T1 outcome levels and the T1-T2 changes in these levels. These outcome comparisons (at T1 and changes between T1 to T2) are illustrated in Figure 3 (estimates are reported in Table 2).

Engagement. Students corresponding to the *Low-all Climate* profile reported the lowest engagement in both subjects at T1, followed by those corresponding to the *Performance Climate* profile. Students corresponding to the *High-all Climate*, *Low Performance Climate*, and *Mastery and Positive Social Climate* profiles did not differ from one another, except for the *Low Performance Climate* profile, which reported a lower engagement than the *Mastery and Positive Social Climate* profile. Regarding changes between T1 and T2, students corresponding to all profiles reported a significant decrease in their engagement during the school year. This decrease was less pronounced for the *Low-all Climate* profile than for all other profiles. The *High-all Climate* profile also reported a steeper decrease than the *Performance Climate* profile.

Achievement. Students corresponding to the *Low Performance Climate* profile had higher achievement in both subjects at T1 than all other profiles. The *Mastery and Positive Social Climate* profile also had higher achievement than the *Low-all Climate* and the *Performance Climate* profiles. Lastly, the *High-all Climate* profile had higher achievement than the *Low-all Climate* profile. Achievement levels were stable between T1 and T2 for all profiles.

Hyperactivity-inattention. In both subjects, students corresponding to the *Low-all Climate* and *Performance Climate* profiles reported higher levels of hyperactivity-inattention at T1 than those corresponding to the *Low Performance Climate* and *Mastery and Positive Social Climate* profiles. Students corresponding to the *Low-all Climate* profile also reported a higher level of hyperactivity-inattention level at T1 than those corresponding to the *High-all Climate* profile in both subjects. In mathematics only, the students corresponding to the *High-all Climate* profile reported a higher initial level of hyperactivity-inattention than those corresponding to the *Low Performance Climate* and *Mastery and Positive Social Climate* profiles, whereas they did not differ from them in language. The level of change in hyperactivity-inattention from T1 to T2 did not differ between profiles in mathematics. In language, students corresponding to the *Mastery and Positive Social Climate* profiles reported an increase in hyperactivity-inattention steeper than the stable level found in the *Performance Climate* profile.

Opposition-Defiance. In language and mathematics, boys corresponding to the *Low-all Climate* profile reported the highest level of opposition-defiance at T1 compared to all other students, and girls corresponding to the same profile reported higher initial levels of opposition-defiance than those from the *Low Performance* and *Mastery Goals and Positive Social Climate* profiles. In both subjects, students corresponding to these two profiles had the lowest initial levels of opposition-defiance relative to all other profiles. In language, students corresponding to the *Performance Climate* profile reported higher levels of opposition-defiance than those corresponding to the *High-all Climate* profile. In both subjects, students corresponding to the *High-all Climate* profile reported a steeper increase in opposition-defiance between T1 and T2 than students corresponding to the *Performance Climate* profile. In language, students corresponding to the *Mastery Goals and Positive Social Climate* profile also reported an increase in opposition-defiance slightly steeper than that observed in the *Performance Climate* profile.

Internalizing Behaviors. In language and mathematics, girls corresponding to the *Performance Climate* profile reported the highest level of internalizing behaviors at T1 compared to all other students, except those corresponding to the *Low-all Climate* profile, followed by students corresponding to the *Low-all Climate* profile and boys corresponding to the *Performance Goals* profile. Students corresponding to the *High-all Climate* profile also reported a higher initial level of internalizing behaviors than those corresponding to the *Low Performance Climate* profile in mathematics and the *Mastery and Positive Social Climate* profile in both subjects. Most of the profiles displayed a lack of significant change over time. Students corresponding to the *High-all Climate* and the *Mastery and Positive Social Climate* profile (in language only) reported a slight increase in internalizing behaviors, significantly different from the level reported by students corresponding to the *Performance Climate* profile.

Discussion

Each student holds distinct perceptions of the various components of the classroom learning climate to which they are exposed. This study aimed to uncover the configurations taken by these perceptions among different profiles of students while accounting for their perceptions of the goal structure (mastery-approach, performance-approach, and performance-avoidance) and social climate (academic support, emotional support, mutual respect, and task-related interactions) of their language and mathematics classroom. We also sought to document how these configurations, or profiles, of classroom learning climate perceptions were associated with school functioning (i.e., engagement and achievement) and behavioral adaptation (i.e., hyperactivity-inattention, opposition-defiance, and internalizing behaviors) among students to determine if some configurations were preferable to others. Our results revealed five different profiles best summarized the classroom learning climate observed in both subjects: *Low-all Climate* (8.96-18.06% of students), *High-all Climate* (8.70-14.64% of students), *Performance Climate* (29.34-39.59% of students), *Low Performance Climate* (11.36-25.21% of students), and *Mastery and Positive Social Climate* (18.26-26.05% of students). Moreover, our results indicated that two profiles (*Mastery and Positive Social Climate* and *Low Performance Climate*) seemed better suited to support student school functioning and behavioral adaptation at the beginning of the school year. Another profile was adequate (i.e., close to average levels on the outcomes, except engagement which was below average; *High-all Climate*), whereas the last two profiles were problematic (*Performance Climate* and *Low-all Climate*). Determining which profiles were associated with the most positive student outcomes was also guided by coherence between results obtained with the student-reported measures (i.e., engagement and behavior problems) and teacher-reported measures (i.e., achievement). Despite slight variations, these conclusions remained relatively stable between mathematics and language classes, boys and girls, and across the school year.

Classroom Learning Climate

Seventh-grade boys and girls described the learning climate of the classroom according to five distinct configurations. In the *Low-all Climate* profile, students described their language and mathematics teachers as relying on few practices to create a supportive climate. This observation is consistent with other studies in which a subset of teachers has been described as not adopting any supportive teaching practice (e.g., Gallo et al., 2022; Morin & Marsh, 2015; also see Table S1), suggesting that students might perceive their teachers as disengaged, or indifferent, in the classroom (Ansari et al., 2022). Alternatively, students' own disengagement might also alter their perception of the classroom learning environment. In the *Performance Climate* profile, students described their teachers as having a strong focus on achievement, valuing performance, and avoiding any show of incompetence. It is concerning that this profile is the largest (29% to 39% of the students across subjects), which means that an important proportion of seventh graders felt exposed to significant pressure to perform. As we shortly discuss, this type of pressure tends to be associated with undesirable outcomes. This result suggests that reducing the performance expectations students see placed upon themselves could represent a key area of prevention.

As expected and generally consistent with AGT (Meece et al., 2006), we identified a profile marked by mastery, performance goal structures, and a positive social climate. In this *High-all Climate* profile, students saw their teachers as encouraging learning, efforts, progression, achievement, and success (approach and avoidance) while providing a socially supportive structure to help them attain these objectives. This profile further reinforces that mastery and performance goal structures are not incompatible (Bae et al., 2020; Gallo et al., 2022), at least for a small proportion of students. This profile, however, also contrasts with more recent theoretical expectations from AGT, which sees mastery-approach and performance-avoidance goals as incompatible based on their end goal and valence (Bardach et al., 2020).

The last two profiles were respectively expected by AGT and Baumrind's (1978) typology. The *Low Performance Climate* profile was characterized by low levels of performance goal structure, along with a slightly above average level of positive social climate. In contrast, the *Mastery and Positive Social Climate* profile was characterized by perceptions of mastery-approach goal structure with a highly supportive social climate, including a mild performance-approach goal structure. This profile reinforces the idea that mastery- and performance-approach orientations can occur in combination. Moreover, this cooccurrence may be more representative of real-life classrooms, as no profile in this study displayed solely mastery-orientation, suggesting even strongly mastery-oriented teachers tend to rely on performance-approach goals to some extent in a way that does not appear harmful to students.

Our results support Patrick et al.'s (2011) theoretical expectation, also supported by the TARGET framework (Epstein, 1988; Lüftenegger et al., 2014), that perceptions of a positive social climate in the classroom would tend to be associated with mastery-approach goal structures. Indeed, mastery-approach classroom goals cooccurred with high levels of the global social climate factor in four of the five identified profiles. However, in the *Low Performance* profile, students perceived a higher-than-average level of positive social climate but a slightly lower-than-average level of mastery-approach goal structures. This result thus partially invalidates Patrick et al.'s (2011) proposition. Also, a small portion of students may perceive that their teachers value positive social interactions in a way that does not reflect a focus on mastery, which would be consistent with Baumrind's (1978) typology.

Besides, boys were more likely to match the *Low-all Climate* and *Performance Climate* profiles (15-39% relative to 9-31% of the girls), whereas girls were more likely to correspond to *Low Performance Climate* and the *Mastery and Positive Social Climate* profiles (23-26% relative to 11-19% of the boys). These results are consistent with other studies showing that girls report being exposed to more positive classroom practices and climates than boys (Butler, 2012; Lietaert et al., 2015; Rostami et al., 2011). However, the present study could not address whether this difference mainly relies on the level of youth perceptions of their classroom or whether it reflects a true differential treatment of students by their teachers due to their sex. Future research will be needed to unpack these two possibilities.

Classroom Learning Climates Supporting Student School and Adaptation Outcomes

Our results showed that the *Mastery and Positive Social Climate* and the *Low Performance Climate* profiles were associated with the most positive student school functioning and behavioral adaptation. For students corresponding to the *Mastery and Positive Social Climate* profile, longitudinal analyses revealed that these positive outcome levels remained stable over the school year. One exception was their level of hyperactivity-inattention and opposition-defiance in language increased during the school year, which could indicate a regression-to-the-mean effect, or suggest that teachers may become more tolerant of these behaviors considering the high level of engagement and achievement of these students (Lohman & Korb, 2006). Similar to previous findings (Gallo et al., 2022; Iaconelli & Anderman, 2021), these results suggest that it might be desirable to be exposed to teachers who value performance as long as these teachers do not push students too hard at demonstrating it, communicate that mastery remains more important, and provide them with an adequate level of support. Consistent with SDT (Ryan & Deci, 2017), by focusing on effort and progression, creating emotionally supportive interactions, giving constructive feedback, and providing opportunities to collaborate with peers in a respectful environment, these teachers probably support students' motivational needs for autonomy, competence, and relatedness. In turn, these satisfied needs may explain the positive school and behavioral outcomes observed among these students, consistent with the results from previous studies supporting the mediating role of need satisfaction in the associations between classroom climate and student adaptation (e.g., Joussement et al., 2005; Olivier, Galand, et al., 2020; Wang & Eccles, 2013). Besides, and contrary to previous work suggesting the benefits of a positive classroom environment might be greater for boys (Lietaert et al., 2015; Rimm-Kaufman et al., 2015), our results suggest the benefits associated with these two profiles applied similarly to boys and girls.

Turning our attention to the *Low Performance Climate* profile, in which the second most desirable outcomes were observed, our longitudinal results showed that, even if engagement usually decreases normatively over the school year (Janosz et al., 2008), the decrease reported by these students was steeper than among those reporting a *Low-all Climate*. In the *Low Performance Climate* profile, the lack of performance goal structure accompanied a slightly above-average positive social climate. On the one hand, this positive social climate (which encompasses the provision of emotional and academic support by the teacher, the promotion of mutual respect, and engagement in task-related interactions between students) most likely supports students' psychological needs for relatedness (Ryan & Deci, 2017). As previously mentioned, satisfying this need is expected by SDT (Ryan & Deci, 2017) to act as an underlying mechanism explaining students' positive school functioning and behavioral adaptation. On the other hand, this profile might reflect a permissive teaching style according to Baumrind's typology (1978) as applied in the school context (Pellerin, 2005). Permissive teachers are highly responsive to students' needs in a warm, supportive, and accepting manner but do not balance this responsiveness with any form of demands or regulations (i.e., mastery- or performance-approach classroom goals; Baumrind, 1978; Pellerin, 2005). Interpreting the *Low Performance Climate* profile as reflecting a permissive teaching style could also explain why students corresponding to this profile reported a slight decrease in engagement. More precisely, these students may come to see their teacher as tolerant, and thus feel that they may not need to try as hard as they can in their assignments as the school year progresses.

Importantly, a teaching style combining responsiveness with demandingness should produce the most desirable outcomes, according to Baumrind's typology (1978; Pellerin, 2005). The *Mastery and Positive Social Climate* more closely align with this teaching style. Incidentally, this profile was associated with the most desirable student outcomes throughout the year. In sum, apart from a few exceptions (i.e., slight increases in hyperactivity-inattention and opposition-defiance in the *Mastery and Positive Social Climate* profile and steeper decreases in engagement in the *Low Performance Climate* profile relative to other profiles) these two profiles seemed more desirable to the other three over the course of the study. Indeed, the levels of all outcomes observed in these profiles indicated a much better adjustment than in the other profiles across the duration of the study, even when accounting for these slight changes.

Adequate Classroom Learning Climate

The *High-all Climate* profile was associated with generally adequate outcomes. Indeed, boys and girls corresponding to this profile reported average levels of achievement, hyperactivity-inattention, opposition-defiance, and internalizing behaviors slightly less desirable than those reported by students corresponding to the *Mastery and Positive Social Climate* and *Low Performance Climate* profiles. They also reported levels of engagement comparable to students corresponding to the two profiles displaying the most desirable outcomes. Yet, when considering how these students' school and behavioral adjustment evolved during the school year, they reported a significant decrease in engagement (more so than in other profiles), whereas opposition-defiance and internalizing behaviors increased over time at a rate steeper than boys and girls corresponding to the *Performance Climate* in both subjects. Although students from this profile reported that their teachers relied on an above-average level of all practices, they also reported high performance-approach and performance-avoidance goal structures.

Evolving in a learning environment dominated by performance goals not balanced by at least matching levels of mastery goals and positive social interactions likely interferes with student functioning and behavioral adaptation. According to SDT (Ryan & Deci, 2017), a focus on performance might be seen by students as an attempt to control their choices and behaviors (Ciani et al., 2010; Gertsakis et al., 2021; Sarrazin et al., 2005), a practice that would result in thwarting their need for autonomy. This observation is consistent with results showing that a classroom climate dominated by performance goals could be associated with increased student anxiety (Baudoin & Galand, 2022). Likewise, students who defy authority are susceptible to controlling practices and might react by being even more oppositional and defiant (Hand, 2010). Finally, although our results revealed a lack of associations between this profile and changes over time in secondary school students' levels of achievement, Gallo et al. (2022) noted that increases in achievement levels accompanied exposure to a similar climate in primary school. This discrepancy highlights that results obtained in primary school (where students are exposed all day to the same teachers) cannot entirely generalize to the more flexible teaching structure observed in secondary schools. At least in our results and other secondary school studies, perceiving a performance orientation in the classroom does not seem to decrease student achievement further (Federici et al., 2015). However, this might come as a cost for their engagement (Hughes et al., 2011) as these students seem more likely to progressively disengage in class than other students.

Suboptimal Classroom Learning Climates

The *Low-all Climate* and *Performance Climate* profiles appeared suboptimal for students' school functioning and behavioral adaptation. Students exposed to a *Low-all Climate* profile in their language and mathematics classes displayed the lowest levels of engagement and achievement. They showed no longitudinal improvement in these outcomes over the school year. They also reported high levels of hyperactivity-inattention, opposition-defiance, and internalizing behaviors. In this profile, students seem to see their teachers relying on a *laisser-faire* teaching style, which is problematic for various outcomes (Pellerin, 2005). In some respect, the *Performance Climate* profile may even be preferable, potentially because students feel these teachers still care for their success rather than being completely disengaged.

However, students exposed to the *Performance Climate* profile also reported poor outcomes. Indeed, these students displayed an average level of engagement, a below-average level of achievement, and high levels of all three behavioral adaptation problems. Interestingly, these students reported lower levels of performance goal structure than those corresponding to the *High-all Climate* profile, which was associated with better outcomes. This difference highlights the value of balancing performance goals with other supportive practices and mastery-approach goal structures. In sum, our results suggest that whereas performance classroom goal structures are not necessarily harmful when accompanied by other positive practices (Ciani et al., 2010; Gallo et al., 2022), they are problematic when occurring on their own.

Boys and girls seemed to react differently when they felt exposed to a *Low-all Climate* or *Performance Climate* profile. Boys exposed to a *Low-all Climate* profile reported higher levels of opposition-defiance than girls corresponding to the same profile in both subjects. In contrast, girls exposed to a *Performance Climate* profile reported higher levels of internalizing behaviors than boys exposed to the same climate profile in both subjects. Matching the higher prevalence of opposition-defiance in boys (Bierman & Sasser, 2014) and internalizing behaviors in girls (Garber & Rao, 2014; Vasey et al., 2014), feeling exposed to some types of climates in the classroom might be especially damaging for students with preexisting conditions. As profiles are based on student perceptions, it is also possible that boys perceived that the lack of structure, rule enforcement, and caring relationships found in the *Low-all Climate* profile might be due to their teachers struggling to manage their behaviors. Similarly, anxious and depressed girls might be more sensitive to the pressure to perform captured by the *Performance Climate* profile (Fréchette-Simard et al., 2022; Montolio & Taberner, 2021), which matches their tendency to pursue performance, especially avoidance, goals (Baranik et al., 2010). Our results also match research focusing on biological processes, which have shown that exposure to pressure to perform tended to activate women's limbic system (i.e., involved in their behavioral and emotional responses) and men's prefrontal cortex (i.e., involved in their self-regulation and planning skills) (Verma et al., 2011). These differences and the potential bidirectional relations between the classroom learning environment and student school functioning and behavioral adaptation call for studies replicating these results with more objective measures of the learning climate (e.g., Guay et al., 2016; Halpin & Kieffer, 2015).

Classroom Climate Profiles and Changes in School and Behavioral Outcomes

Our longitudinal analyses revealed that, as expected, engagement decreased slightly over the course of the school year (Janosz et al., 2008) while achievement remained stable (Rimfeld et al., 2018). Hyperactivity-inattention, opposition-defiance, and internalizing behaviors slightly increased from the beginning to the end of the school year, which deviated from the stability previously reported in some studies (e.g., DeBolle et al., 2015). These results suggest that there may be more yearly variations in behavioral adjustment than initially anticipated, potentially because studies rarely assess these behaviors twice in the same school year. It might also indicate that these behaviors vary in response to contextual and relational influences (e.g., Gong et al., 2023; van Dijk et al., 2022). Properly distinguishing students' stable (trait-like) and changing (state-like) tendencies is an interesting question for future studies, as the current one did not have enough time points to disaggregate these two components.

The changes observed over time in this study were not necessarily uniform across all profiles. For instance, students corresponding to the *Mastery and Positive Social Climate* profile reported a slight increase in hyperactivity-inattention and opposition-defiance in their Language class, compared to the *Performance Climate* profile. These changes ought to be interpreted in light of the initial level of the outcomes at the beginning of the school year. Indeed, students in the *Mastery and Positive Social Climate* profile started the school year with very low levels on these outcomes. Even after accounting for this slight increase, this profile remains largely preferable over other profiles, such as the *Performance Climate* and the *Low-all Climate* profiles. A similar conclusion applies to the decrease in engagement levels found in students corresponding to the *Low Performance Climate* profile compared to those from the *Low-all Climate* profile, which still remained a more desirable learning environment.

Overall, the fact that little change occurred in specific profiles, and that the significant changes identified were mostly slight negative changes in the outcomes of desirable profiles suggest two possible implications. First, students may adjust to the learning climate of their new classroom early in the school year such that their school and behavioral outcomes do not change beyond this initial level. Confirming this hypothesis would requires comparing student outcomes over multiple time points taken over successive school years. Alternatively, significant changes in school and behavioral outcomes in the desired direction (i.e., increase in engagement and achievement, and decrease in hyperactivity-inattention, opposition-defiance, and internalizing behaviors) resulting from classroom influences might require longer-term exposure to a positive classroom learning environment. To properly capture these potential contributions of the classroom, studies ought to follow students over several school years.

Limitations

A few limitations ought to be taken into consideration when interpreting the results. First, as previously mentioned, classroom learning climate profiles were established based on student perceptions. These perceptions are necessary and highly insightful to our understanding of what drives their school functioning and behavioral adaptation (Meece et al., 2006; Ryan & Deci, 2017) but might not align with teacher perceptions or objective characteristics of the classroom (Bardach et al., 2019). This potentially limits our ability to direct recommendations to teachers, who may not view their practices in a way that matches students' perceptions. Future studies could more systematically compare these perceptions. Students also reported some of the outcomes. Thus, there is a possibility for bidirectional associations between the profiles and the outcomes, given that students with preexisting difficulties (e.g., low engagement, hyperactivity-inattention, opposition-defiance, internalizing behaviors) might also tend to perceive their teacher practices more negatively (e.g., Poulou, 2014). This also calls for further research. Second, the outcomes assessed in the present study might hide underlying multilevel mechanisms. The study focused on students' perceptions of their classroom climate. Yet, it is also possible to conceptualize the classroom climate through multilevel analyses to disaggregate students' individual perceptions from collective classroom perceptions or direct classroom measurement (e.g., Burns et al., 2022; Santana-Monagas et al., 2022), which would have required a much larger sample and complex analyses. Likewise, although we considered all of them as outcomes, we also know that school attitudes and behaviors can both directly contribute to achievement (Connell & Wellborn, 1991; Wigfield & Eccles, 2000), just like behavioral difficulties may interfere with school attitudes (Olivier et al., 2020). These more complex explanatory pathways were not deemed critical to understanding how perceived classroom learning climate profiles related to students' functioning. Still, they are important to consider in future studies designed to capture how these associations unfold over time. Third, the study focused on teacher practices drawn from Achievement Goal Theory (Ames, 1992; Kaplan, Middleton, et al., 2002; Meece et al., 2006) and the classroom social climate model (Fraser, 2000; Haertel et al., 1981; Patrick et al., 2011), which still represents only a limited number of practices potentially used by teachers. Considering an even more diversified set of practices could thus help to enrich further our understanding of what truly happens in the classroom. For instance, Self-Determination Theory emphasizes the potential role of autonomy support, structure, and involvement practices (Ryan & Deci, 2017), while Baumrind's (1978; Pellerin, 2005) focuses on responsiveness and demandingness. Finally, person-centered evidence is achieved by the accumulation of coherent results. Thus, future studies must replicate our results to identify a central set of profiles consistently emerging across various samples from profiles reflecting random sampling variation (Solinger et al., 2013).

Recommendations for Practice and Research

From a practical perspective, this study converges on some key recommendations for practitioners such as teachers, school principals, and school psychologists, which can be communicated through initial and continuous training, professional learning communities, etc. (Owen, 2016). Indeed, various interventions assessed in randomized control trials were successful at improving teachers' classroom practices, some assessed through student perceptions (see Garrett et al. (2019) for a meta-analysis). When considering these recommendations emerging from the current results, it remains important to remember that our results are based on student perceptions and need replication. One possible recommendation when some teachers are suspected of implementing one of the suboptimal climates in their classes, is that rather than pushing them to improve all types of practices assessed in the current study, it might be useful to focus on more precise improvement areas. For instance, some teachers could be supported in converting a *Low-all Climate* profile to a *Low Performance Climate* profile, which mainly requires increasing supportive social interactions. In contrast, teachers relying on a *Performance Climate* or *High-all Climate* profile in their classroom could be more easily supported in achieving a *Mastery and Positive Social Climate* profile. A clear benefit of having identified two profiles associated with positive student outcomes through a person-centered approach is that it provides flexibility in terms of recommendations for intervention. It acknowledges there does not need to be any unique gold standard for teachers. This may also indicate that different students react almost equally positively to different teaching practices. Teachers can then implement practices aligned with their style and preferences while keeping their students' best interests in mind.

From a research and theoretical standpoint, this study advocates for a more integrated and comprehensive assessment of the classroom learning climate as a complex, multifaceted construct transcending theoretical models. Contrary to other studies (Gaias et al., 2019; Holzberger et al., 2019), we found that students do not share a uniform perception of their classroom climate (low, average, high on all components). Their perceptions seemed more complex and multifaceted. A person-centered perspective thus represents a valuable avenue to clarify our understanding of the combined role of various classroom components likely to play a role in students' development, allowing us to approximate the complex multiplicity of classroom environments better.

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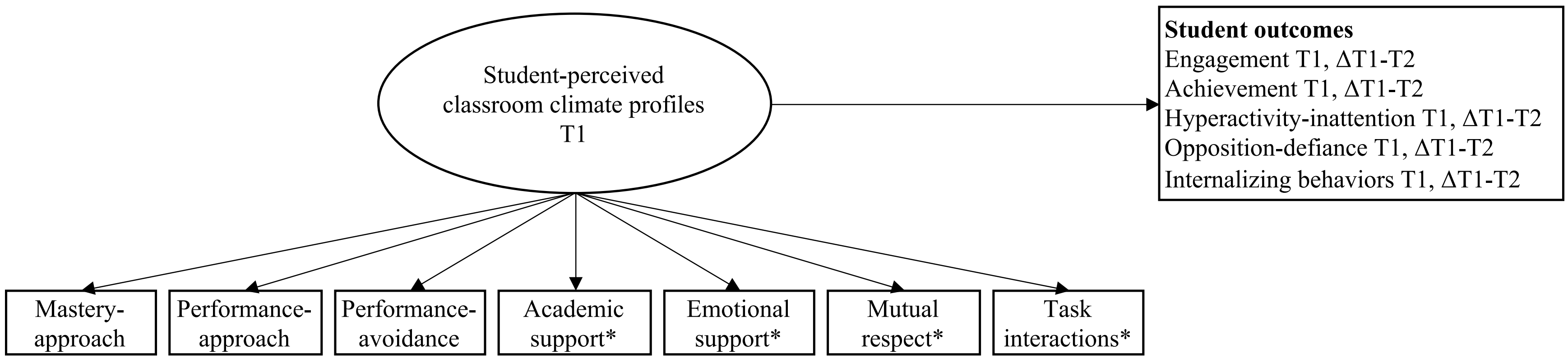

Figure 1.
Hypothesized Model.
Note. The hypothesized model will be contrasted between school subjects (math and language) and between sexes (boys and girls).
*Depending on results from the preliminary analyses, those dimensions might be better represented by a global social climate factor.

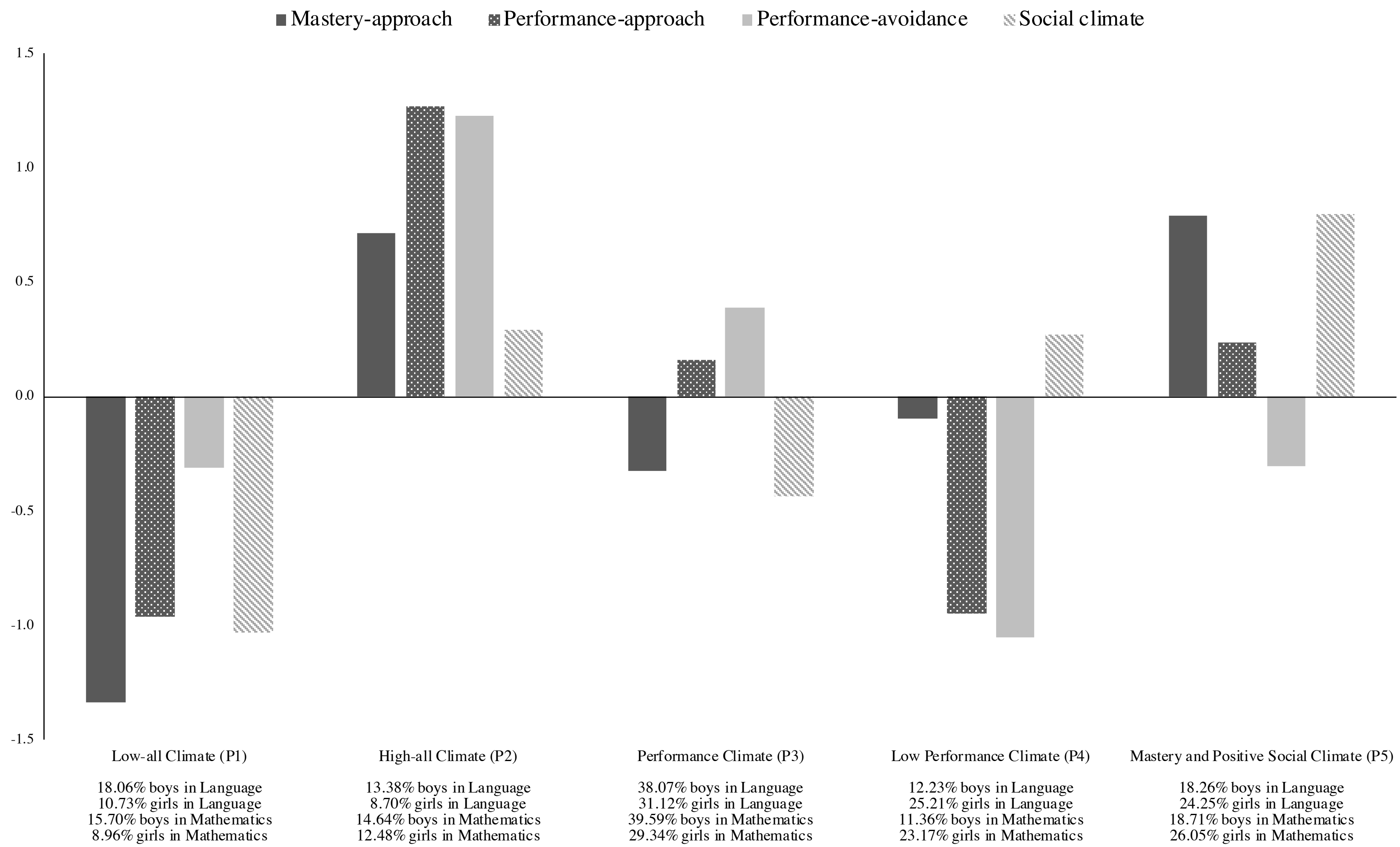

Figure 2.

Mean Levels of the Profile Indicators and Prevalence from the Final Latent Profile Analyses Solution across Sex and Subject.

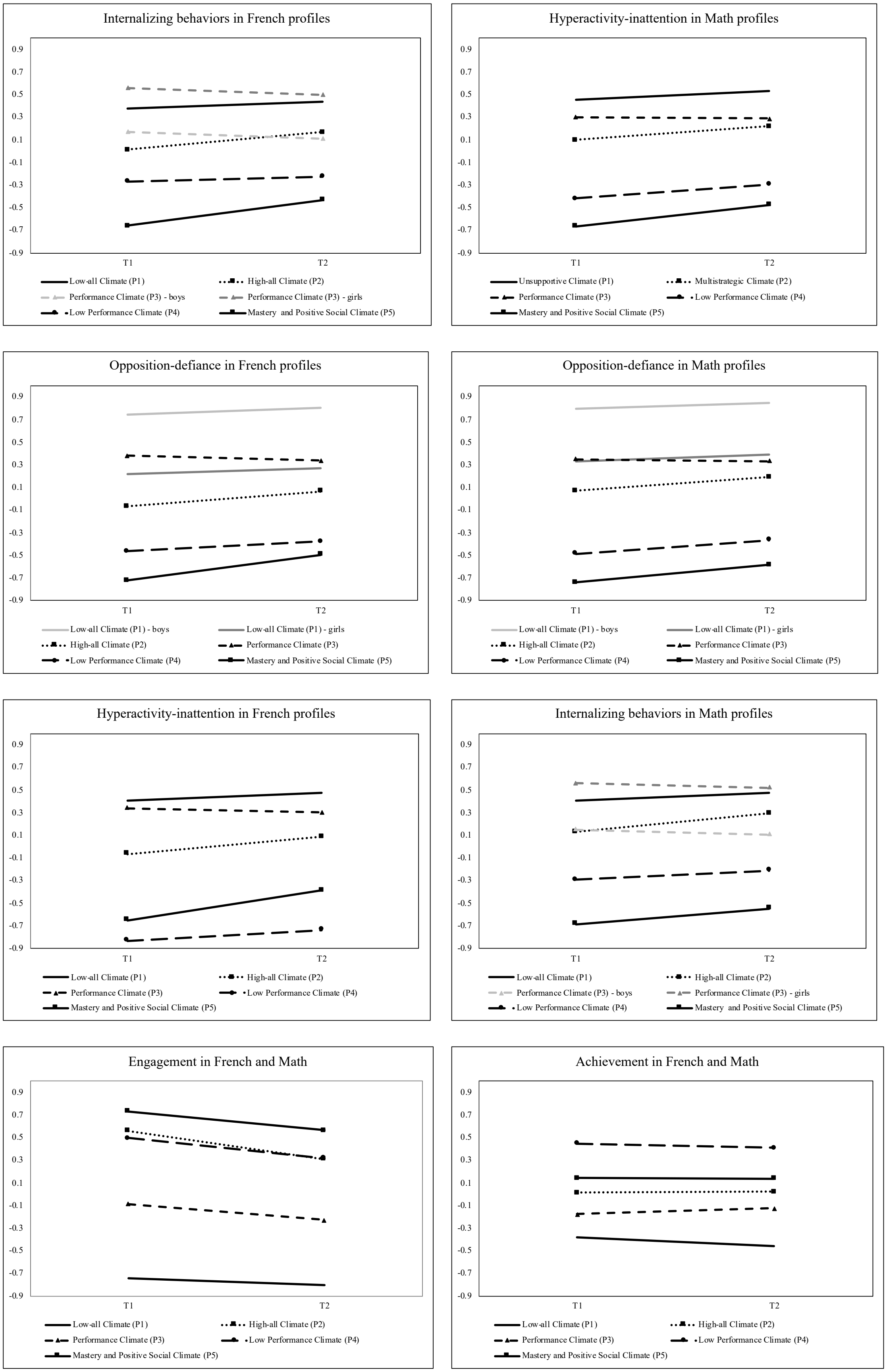

Figure 3.
Profile Outcomes.

Table 1

Results from Profile Similarity Analyses and Explanatory Similarity Analyses.

Model	LL	#fp	SCF	AIC	BIC	ABIC	CAIC	Entropy
Profile Similarity								
Configural	-13735.609	113	1.974	27697.218	28294.015	27935.050	28407.015	.820
Structural	-13854.411	53	2.493	27814.823	28094.736	27926.372	28147.736	.814
Dispersion	-13860.150	41	2.866	27802.300	28018.837	27888.593	28059.837	.813
Distribution	-13911.193	29	3.585	27880.385	28033.545	27941.422	28062.545	.812
Explanatory Similarity: Mathematics and Language Engagement and Achievement								
Free T1	-21468.599	221	1.288	43379.198	44558.229	43856.167	44779.229	1.000
Similar T1	-21931.152	31	2.499	43924.305	44089.689	43991.210	44120.689	1.000
Free with Latent Change	-26647.996	235	1.365	53765.991	55019.712	54273.176	55254.712	1.000
Similar with Latent Change	-27073.365	45	2.748	54236.730	54476.804	54333.850	54521.804	1.000
Explanatory Similarity: Hyperactivity-inattention, Opposition-defiance, and Internalizing Behaviors in Language								
Free T1	-13100.752	42	1.975	26285.504	26509.573	26376.149	26551.573	1.000
Similar T1	-13171.076	27	2.216	26396.153	26540.197	26454.425	26567.197	1.000
Partial Similarity T1	-13149.110	29	2.148	26356.221	26510.935	26418.810	26539.935	1.000
Free with Latent Change	-15905.882	62	2.084	31935.763	32266.532	32069.574	32328.532	1.000
Similar with Latent Change	-15956.650	47	2.187	32007.301	32258.045	32108.738	32305.045	1.000
Explanatory Similarity: Hyperactivity-inattention, Opposition-defiance, and Internalizing Behaviors in Mathematics								
Free T1	-13180.012	42	1.873	26444.025	26668.094	26534.670	26710.094	.780
Similar T1	-13248.187	27	2.170	26550.374	26694.418	26608.646	26721.418	1.000
Partial Similarity T1	-13229.382	29	2.055	26516.764	26671.478	26579.352	26700.478	1.000
Free with Latent Change	-16036.924	62	2.170	32197.848	32528.617	32331.658	32590.617	1.000
Similar with Latent Change	-16060.077	47	2.156	32214.153	32464.898	32315.590	32511.898	1.000

Note. LL = Model LogLikelihood; #fp = Number of free parameters; SCF = Scaling correction factor; AIC = Akaïke Information Criteria; CAIC = Constant AIC; BIC = Bayesian Information Criteria; ABIC = Sample-size adjusted BIC.

Table 2

Mean Comparison Between the Five Profiles between the Boys and Girls samples and Across School Subjects.

	Low-all Climate (P1)	High-all Climate (P2)	Performance Climate (P3)	Low Performance Climate (P4)	Mastery and Positive Social Climate (P5)	Significant differences between profiles
School Outcomes (equivalent in Language and Mathematics)						
Engagement T1	-.743 [-.882;-.604]	.559 [.422;.696]	-.088 [-.168;-.008]	.497 [.368;.625]	.731 [.599;.863]	1<3<2,4,5; 4<5
Engagement T1-T2 change	-.059 [-.129;.012]	-.249 [-.330;-.168]	-.142 [-.178;-.107]	-.179 [-.228;-.129]	-.167 [-.206;-.128]	1>all; 3>2
Achievement T1	-.386 [-.612;-.160]	.014 [-.163;.191]	-.178 [-.330;-.026]	.448 [.323;.572]	.142 [-.023;.306]	4>all; 2>1; 5>1,3
Achievement T1-T2 change	-.074 [-.197;.049]	.009 [-.087;.106]	.053 [-.036;.141]	-.037 [-.115;.041]	-.004 [-.077;.070]	None.
Behavior Problems Outcomes in Language						
Hyperact.-inatt. T1	.405 [.246;.564]	-.065 [-.429;.300]	.339 [.224;.454]	-.833 [-.598;-.177]	-.652 [-.974;-.330]	1>2,4,5; 3>4,5
Hyperact.-inatt. T1-T2 change	.067 [-.031;.164]	.148 [-.064;.359]	-.040 [-.107;.027]	.094 [-.095;.283]	.261 [.006;.516]	5>3
Opposition-defiance T1	b: .747 [.577;.917] g: .216 [-.032;.463]	-.068 [-.412;.276]	.381 [.262;.501]	-.462 [-.626;-.297]	-.720 [-1.014;-.426]	b1>all; g1>4,5; 3>2>4,5
Opposition-defi. T1-T2 change	.055 [-.038;.149]	.135 [-.031;.300]	-.042 [-.108;.023]	.085 [-.069;.240]	.228 [.022;.434]	2,5>3
Internalizing T1	.377 [.199;.554]	.011 [-.357;.380]	b: .174 [.059;.289] g: .561 [.445;.677]	-.268 [-.471;-.064]	-.661 [-.981;-.342]	g3>2,b3,4,5; 1,b3>4,5; 2>5
Internalizing T1-T2 change	.062 [-.041;.165]	.157 [-.047;.361]	-.062 [-.133;.008]	.043 [-.155;.241]	.230 [-.028;.488]	2,5>3
Behavior Problems Outcomes in Mathematics						
Hyperact.-inatt. T1	.452 [.293;.612]	.098 [-.212;.409]	.302 [.182;.422]	-.417 [-.735;-.099]	-.662 [-1.036;-.288]	1>2>4,5; 3>4,5
Hyperact.-inatt. T1-T2 change	.080 [-.032;.193]	.122 [-.019;.263]	-.015 [-.100;.071]	.123 [-.057;.302]	.188 [-.007;.383]	None
Opposition-defiance T1	b: .794 [.604;.984] g: .333 [.085;.580]	.071 [-.206;.348]	.351 [.218;.484]	-.484 [-.723;-.244]	-.739 [-1.048;-.431]	b1>all; g1>4,5; 2,3>4,5
Opposition-defi. T1-T2 change	.057 [-.052;.166]	.118 [.017;.220]	-.018 [-.099;.063]	.119 [-.035;.273]	.156 [-.001;.312]	2>3
Internalizing T1	.403 [.217;.590]	.130 [-.170;.429]	b:.150 [.041;.258] g: .561 [.406;.715]	-.294 [-.596;.009]	-.658 [-1.017;-.300]	g3>2,b3,4,5; 1>b3>4,5; 2>4,5
Internalizing T1-T2 change	.071 [-.047;.189]	.161 [.037;.285]	-.042 [-.131;.047]	.083 [-.119;.286]	.135 [-.071;.341]	2>3

Note. b: boys; g: girls. The outcomes are factor scores estimated with a mean of 0 and a standard deviation of 1 across samples (the results can thus be interpreted in standardized units); 95% confidence intervals are reported in brackets (intervals including the value 0 represent statistically non-significant values, thus an initial value aligned with the sample average, or a non-significant level of change over time). Reported mean differences were significant at $p < .05$.

Online Supplements for:

Classroom Learning Climate Profiles: Combining Classroom Goal Structure and Social Climate to Support Student School Functioning and Behavioral Adaptation

Table S1

Summary of Studies Assessing Subgroups of Classroom Climate and Teacher Practices.

Study	Sample (size, level)	Rated by	Profile/cluster indicators	Retained profiles/clusters
Amoura et al. (2015)	N=260 students Level: undegraduates	Students	Autonomy support Control	1. High autonomy/High control (27.69%) 2. Low autonomy /Low control (21.15%) 3. High autonomy /Low control (33.85% 4. Low autonomy /High control (17.31%)
Bae et al. (2020)	N=101 teachers Level: middle school	Teachers	Pedagogical context knowledge Mastery approach Performance approach Self-efficacy Pedagogical reform values	1. Severely discouraged by reform-oriented (9.91%) 2. Discouraged but reform-oriented (14.85%) 3. Conventional (20.79%) 4. Confident and mastery-oriented (34.65%) 5. Confident with multiple goal orientations (19.80%)
Burgueño et al. (2022)	N=478 students Level: middle school	Students	Autonomy support Competence support Relatedness support Autonomy thwarting Competence thwarting Relatedness thwarting	1. High need support/Low need thwarting (34.94%) 2. Moderate need support/Moderate need thwarting (28.87%) 3. Moderate need support/High need thwarting (17.57%) 4. Low need support/Moderate need thwarting (28.87%)
Gallo et al. (2022)	N=703 students Level: elementary school	Students	Student-teacher closeness Student-teacher conflict Mastery approach Performance approach	1. Average (44.46%) 2. Mastery-Closeness (39.13%) 3. Conflict (6.49%) 4. Approach-Closeness (9.92%)
Jaakkola et al. (2015)	N=4,397 Level: high school	Students	Autonomy climate Task-involving climate (mastery) Ego-involving climate (performance) Social relatedness climate Student enjoyment	1. Low autonomy, relatedness, task, and moderate ego climate (4.12%) 2. Low autonomy, relatedness, high task and ego climate (8.6%) 3. Moderate autonomy, relatedness, task and ego climate (20.2%) 4. High autonomy, relatedness, task, and moderate ego (15.4%) 5. High relatedness and task, moderate autonomy and ego climate (51.6%)
Schenke et al. (2017)	N=1,428 Level: grade 7	Students	Emotional support Autonomy support Performance focus	1. High performance focus (8%) 2. Medium emotional support and high performance focus (6%) 3. Low emotional support (22%) 4. High emotional support (57%) 5. High emotional and autonomy support (7%)

Note. This table reports studies having assessed profiles or clusters of teacher practices based on indicators sharing similarities to those selected in the current study. It is not the result of a systematic literature review.

Appendix A
Preliminary Measurement Models and Descriptive Statistics

Latent Profile Indicators

Analyses. The indicators of classroom goal structure and classroom social climate used in the main analyses were created using factor scores extracted from preliminary measurement models estimated to verify the psychometric properties of these measures. Studies generally agree that the three aspects of classroom goal structure (i.e., mastery-approach, performance-approach, and performance-avoidance) are distinct and non-redundant components of teacher practices (i.e., $r < .5$) (Lam et al., 2015; Patrick et al., 2011) well captured by Confirmatory Factor Analyses (CFA). In contrast, components of the classroom social climate (i.e., academic support, emotional support, mutual respect, task collaboration) are likely not as distinct as studies report a significant overlap between them (i.e., $r \geq .5$) (Morin et al., 2014; Patrick et al., 2011). This suggests that it might be useful to account for the variance shared across all of these dimensions (a global indicator of classroom social climate) beyond their unicity via bifactor CFA (Morin et al., 2016, 2020, 2022). We thus estimated a bifactor-CFA including one global factor (defined from the variance shared among all classroom climate items) and four orthogonal (i.e., uncorrelated) S-factors (reflecting the variance uniquely explained by each subscale beyond that captured by the G-factor) and contrasted it with a more classical four-factor CFA. This bifactor approach thus allowed us to obtain a single global estimate of social climate per subject (language and mathematics) while accounting for the specificity present in the four subscales. The best of those two solutions was then combined with the three-factor solution used to represent classroom goal structure. All of these models were simultaneously estimated across samples of boys and girls, but separately estimated in mathematics and language. We then formally tested the measurement invariance of this model across sex (multi-group) and subject (repeated measures). These tests were performed in the following sequence (Morin et al., 2011; Millsap, 2011): (i) configural invariance (same model with no other constraint); (ii) equal factor loadings (weak invariance); (iii) equal loadings and response thresholds (strong invariance); (iv) equal loadings, thresholds, and item uniquenesses (strict invariance); (v) equal loadings, thresholds, uniquenesses, and latent variances and covariances; (vi) equal loadings, thresholds, uniquenesses, latent variances and covariances, and latent means.

These models were estimated using Mplus 8.4's (Muthén & Muthén, 2020) robust weight least square (WLSMV) estimator. This estimator outperforms Maximum Likelihood estimation with ordinal indicators rated using five or fewer response categories and/or following asymmetric response thresholds (DiStefano et al., 2009), such as those used in this study. These analyses were conducted while controlling for students' nesting into classrooms using the TYPE=COMPLEX function (Asparouhov, 2005). Missing data were handled by using all available information through the missing data procedures implemented in Mplus for WLSMV estimation (Asparouhov & Muthén, 2010) without having to rely on deletion or imputation procedures. These models comprised missing data for only 11.29% of students who did not answer a maximum of 24 out of 60 items.

Model fit was assessed using the chi-square statistic (χ^2), the Root Mean Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI), and the Tucker-Lewis Index (TLI) (Marsh et al., 2005). RMSEA values smaller than .08 and .06 respectively suggest acceptable and excellent model fit. Values above .90 and .95 for the CFI and TLI respectively indicate adequate and excellent model fit. In tests of measurement invariance, increases in RMSEA of more than .015 and decreases in CFI and TLI of more than .010 were considered to indicate non-invariance (Chen, 2007).

Results. Results from the measurement models are reported in Table S1. First, and as expected, the three-factor CFA for classroom social climate revealed high correlations between all four factors (r = .600-.957), suggesting an important overlap. In contrast, the bifactor-CFA resulted in a much higher level of fit to the data, and revealed a well-defined global factor (λ = .342-.819), accompanied by at least two S-factors that retained a meaningful level of specificity.

The combined solution resulted in an adequate level of fit in both subjects and proved to be completely invariant between boys and girls in language and mathematics. The detailed parameter estimates and composite reliability associated with the most invariant solution (used to generate the factor scores to ensure comparability across sex and subject) are reported in Table S2. More specifically, all three factors representing classroom goal structures were defined by adequate factor loadings (λ =

.430-.815) and reliability (ω = .783-.839). Next, the global social climate factor was also well defined (λ = .348-.791) and had a good reliability (ω = .911). The academic support and emotional support S-factors were more weakly defined (λ = -.070-.601) and were associated with weaker reliability (ω = .291-.333). The mutual respect specific factor seemed acceptable, with loadings ranging from .249 to .619 and a reliability of .711. The task-related interaction specific factor was also adequately defined (λ = .261-.614) but had a lower reliability (ω = .573), that remained acceptable for a S-factor estimated as part of bifactor analyses (Morin et al., 2020; Perreira et al., 2018).

Outcomes

Analyses. CFA were used to verify the measurement properties of our outcome measures. First, a one-factor CFA model was used to represent students' global levels of engagement separately in language and mathematics (Olivier et al., 2020). Second, a three-factor CFA was used to assess student behavior problems (i.e., hyperactivity-inattention, opposition-defiance, and internalizing behaviors) following the factor structure proposed by Gresham et al. (2011). We then formally tested the measurement invariance of these three models (mathematics engagement, language engagement, and behavior problems) across sex and over time. At T1, these models included missing data for only 8.12% of students who did not answer a maximum of 12 out of 52 items. At T2, these models included missing data for only 10.53% of the students who did not answer a maximum of 16 out of the 52 items, as well as for 7.02% of the students who were absent for data collection. Model estimation and model fit assessment followed the same procedures used for the profile indicators.

Results. All CFA had an adequate level of fit at both time points. Results from the tests of measurement invariance are reported in Table S3. The behavior problems model and the mathematics engagement models were both fully invariant across boys and girls and over time. The invariance of the language engagement model was also supported up to the invariance of the latent variances and covariances, whereas the results indicated the presence of latent mean differences across sex but not over time. This final model of partial latent mean invariance was retained and revealed that girls reported a level of language engagement .542 SD higher than that of boys at T1 and T2. Parameter estimates and composite reliability are reported in Table S4 for the behavior problems model, and in Table S5 for the engagement models. All three factors of behavior problems were well defined (λ = .492-.809) and had a good composite reliability (ω = .847-.884). The two engagement factors were also well defined (λ = .429-.710) and had a good reliability (ω = .870-.915).

This final model was then converted to a latent change model from which factor scores were extracted to reflect the initial level of the outcomes at T1 and the extent to which they changed between T1 and T2. These factor scores were estimated in standardized units at T1 ($M = 0$; $SD = 1$), whereas the T1-T2 latent change factor was estimated in units reflecting deviation from T1 in SD units. Correlations between all variables are reported in Table S6.

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Table S2

Measurement Models and Measurement Invariance Models across Sex and Subjects (Mathematics and Language) on the Classroom Goal Structure and Classroom Social Climate Measures.

	χ^2	*df*	CFI	TLI	RMSEA	RMSEA 90% CI	$\Delta\chi^2$	Δ*df*	ΔCFI	ΔTLI	ΔRMSEA
Measurement models											
Classroom Social Climate											
Language CFA: 4 factors	335.601*	98	.969	.962	.041	.036; .046					
Mathematics CFA: 4 factors	394.254*	98	.970	.964	.046	.041; .050					
Language CFA: 1 factor	773.278*	104	.913	.899	.067	.062; .071					
Mathematics CFA: 1 factor	798.966*	104	.931	.920	.068	.063; .072					
Language Bifactor-CFA: 1 G- and 4 S-factors	191.721*	88	.986	.982	.028	.023; .034					
Mathematics Bifactor-CFA: 1 G- and 4 S-factors	198.774*	88	.989	.985	.029	.024; .035					
Combined Classroom Goal Structure and Social Climate											
Combined model in Language	1067.804*	371	.942	.932	.036	.033; .038					
Combined model in Mathematics	1152.369*	371	.940	.930	.038	.036; .041					
Measurement Invariance (across Sex and Subject)											
1. Configural invariance	4253.519*	3146	.988	.986	.022	.020; .024	–	–	–	–	–
2. Weak invariance	4313.086*	3260	.988	.987	.021	.019; .023	125.741	114	.000	+.001	-.001
3. Strong invariance	4546.048*	3500	.988	.988	.020	.019; .022	317.045*	240	.000	+.001	-.001
4. Strict invariance	4632.350*	3560	.988	.988	.020	.019; .022	163.721*	60	.000	.000	.000
5. Latent variance-covariance invariance	4735.717*	3638	.988	.988	.020	.019; .022	172.632*	78	.000	.000	.000
6. Latent mean invariance	4850.805*	3654	.987	.987	.021	.020; .023	86.595*	16	-.001	-.001	+.001

Note. $^*p < .05$; χ^2: Chi square test of exact fit and degrees of freedom (*df*); CFI: Comparative Fit Index; TLI: Tucker-Lewis Index; RMSEA: Root Mean Square Error of Approximation and 90% Confidence Interval (CI); Δ: Change according to the previous retained model; $\Delta\chi^2$: Chi square difference test calculated using the Mplus DIFFTEST function for WLSMV estimation.

Table S3

Standardized Factor Loadings (λ) and Uniquenesses (δ) from the Classroom Goal Structure and Classroom Social Climate Measures.

	Mastery-approach	Performance-approach	Performance-avoidance	Global social climate	Specific academic supp.	Specific emotional supp.	Specific mutual respect	Specific task interactions	
Items	λ	λ	λ	λ	λ	λ	λ	λ	δ
Mastery-approach (1)	.649								.578
Mastery-approach (2)	.762								.420
Mastery-approach (3)	.676								.544
Mastery-approach (4)	.675								.544
Mastery-approach (5)	.686								.529
Mastery-approach (6)	.430								.815
Performance-approach (1)		.754							.431
Performance-approach (2)		.690							.524
Performance-approach (3)		.772							.404
Performance-avoid (1)			.507						.743
Performance-avoid (2)			.764						.416
Performance-avoid (3)			.815						.336
Performance-avoid (4)			.707						.500
Performance-avoid (5)			.761						.421
Academic support (1)				.489	.115				.748
Academic support (2)				.374	.205				.819
Academic support (3)				.659	.601				.204
Academic support (4)				.791	.112				.362
Emotional support (1)				.722		*-.070*			.474
Emotional support (2)				.671		.428			.367
Emotional support (3)				.620		.284			.535
Emotional support (4)				.786		*.066*			.378
Mutual respect (1)				.685			.249		.468
Mutual respect (2)				.547			.619		.318
Mutual respect (3)				.596			.434		.457
Mutual respect (4)				.400			.513		.577
Mutual respect (5)				.723			.454		.271
Task collaboration (1)				.406				.614	.458
Task collaboration (2)				.634				.261	.531
Task collaboration (3)				.348				.566	.558
ω	.814	.783	.839	.911	.333	.291	.711	.573	
α Language / α Math	.712/.697	.729/.723	.800/.796	.853	.601/.600	.734/.759	.727/.740	.634/.657	

Note. ω: omega coefficient of composite reliability (McDonald, 1970). α: Cronbach's alpha. Non-statistically significant results ($p \leq .05$) are marked in italics.

Table S4

Outcomes Measurement Invariance Models across Sex and Time on the Outcome Measures

	χ^2	*df*	CFI	TLI	RMSEA	RMSEA 90% CI	$\Delta\chi^2$	Δ*df*	ΔCFI	ΔTLI	ΔRMSEA
Measurement invariance: Engagement in Language											
1. Configural invariance	1146.063*	348	.956	.942	.055	.051; .058	–	–	–	–	–
2. Weak invariance	1024.514*	378	.964	.956	.047	.044; .051	39.583	30	+.008	+.014	-.008
3. Strong invariance	1215.443*	468	.959	.959	.046	.043; .049	327.516*	90	-.005	+.003	-.001
4. Strict invariance	1188.741*	490	.961	.964	.043	.040; .046	47.093*	22	+.002	+.005	-.003
5. Invariance of correlated uniquenesses	1220.925*	538	.962	.968	.041	.038; .044	80.479*	48	+.001	+.004	-.002
6. Latent variance-covariance invariance	1160.261*	541	.966	.971	.039	.036; .042	1.909	3	+.004	+.003	-.002
7. Latent mean invariance	1434.228*	543	.951	.958	.046	.043; .049	59.081*	2	-.015	-.013	+.007
8. Partial latent mean invariance	1210.609*	542	.963	.969	.040	.037; .043	44.012*	1	-.003	-.002	+.001
Measurement invariance: Engagement in Mathematics											
1. Configural invariance	1067.038*	348	.963	.951	.052	.048; .055	–	–	–	–	–
2. Weak invariance	1009.815*	378	.967	.960	.047	.043; .050	73.568*	30	+.004	+.009	-.005
3. Strong invariance	1350.317*	468	.954	.955	.050	.047; .053	549.046*	90	-.013	-.005	+.003
4. Strict invariance	1275.083*	490	.960	.962	.046	.043; .049	34.045*	22	+.006	+.007	-.004
5. Invariance of correlated uniquenesses	1293.520*	538	.961	.967	.043	.040; .046	73.024*	48	+.001	+.005	-.003
6. Latent variance-covariance invariance	1238.690*	541	.964	.969	.041	.038; .044	14.316*	3	+.003	+.002	-.002
7. Latent mean invariance	1206.212*	543	.966	.971	.040	.037; .043	11.910*	2	+.002	+.002	-.001
Measurement invariance: Hyperactivity-inattention, opposition-defiance, and internalizing behaviors											
1. Configural invariance	3694.917*	1928	.944	.939	.035	.033; .036	–	–	–	–	–
2. Weak invariance	3688.342*	1988	.946	.943	.033	.032; .035	11.078*	60	+.002	+.004	-.002
3. Strong invariance	4016.561*	2321	.946	.952	.031	.029; .032	603.447*	333		+.009	-.002
4. Strict invariance	4011.285*	2367	.947	.954	.030	.028; .032	119.171*	46	+.001	+.002	-.001
5. Latent variance-covariance invariance	3931.161*	2385	.951	.957	.029	.027; .031	39.409*	18	+.004	+.003	-.001
6. Latent mean invariance	4249.902*	2391	.941	.949	.032	.030; .033	92.576*	6	-.010	-.008	+.003

Note. $^*p < .05$; χ^2: Chi square test of exact fit and degrees of freedom (*df*); CFI: Comparative Fit Index; TLI: Tucker-Lewis Index; RMSEA: Root Mean Square Error of Approximation and 90% Confidence Interval (CI); Δ: Change according to the previous retained model; $\Delta\chi^2$: Chi square difference test calculated using the Mplus DIFFTEST function for WLSMV estimation.

Model fit of the measurement models estimated separately per time point: Engagement in Language T1: χ^2 = 96.085, df = 28, $p < .001$; RMSEA = .041; CFI = .991; TLI = .983; Engagement in Language T2: χ^2 = 90.801, df = 28, $p < .001$; RMSEA = .040; CFI = .995; TLI = .990; Engagement in Mathematics T1: χ^2 = 111.921, df = 28, $p < .001$; RMSEA = .045; CFI = .990; TLI = .981; Engagement in Mathematics T2: χ^2 = 125.060, df = 28, $p < .001$; RMSEA = .049; CFI = .991; TLI = .982; Behavior problems T1: χ^2 = 1294.233, df = 227, $p < .001$; RMSEA = .057; CFI = .933; TLI = .925; Behavior problems T2: χ^2 = 1597.075, df = 227, $p < .001$; RMSEA = .065; CFI = .923; TLI = .914.

Table S5

Standardized Factor Loadings (λ) and Uniquenesses (δ) from the Engagement in Language and Mathematics Measures.

	Language Engagement		Mathematics Engagement	
	λ	δ	λ	δ
Engagement (1)	.490	.760	.530	.719
Engagement (2)	.446	.801	.429	.816
Engagement (3)	.638	.592	.599	.641
Engagement (4)	.686	.530	.687	.528
Engagement (5)	.699	.512	.707	.500
Engagement (6)	.592	.650	.710	.496
Engagement (7)	.516	.734	.653	.574
Engagement (8)	.539	.710	.653	.574
Engagement (9)	.590	.652	.591	.650
Engagement (10)	.539	.709	.626	.608
Engagement (11)	.467	.782	.554	.693
ω	.915		.870	

Note. ω: omega coefficient of composite reliability (McDonald, 1970).

Table S6

Standardized Factor Loadings (λ) and Uniquenesses (δ) from the Hyperactivity-inattention, opposition-defiance, and Internalizing Behaviors Measures.

	Opposition	Hyperactivity	Internalizing	
	λ	λ	λ	δ
Hyperactivity-inattention (1)	.733			.463
Hyperactivity-inattention (2)	.725			.475
Hyperactivity-inattention (3)	.786			.383
Hyperactivity-inattention (4)	.620			.615
Hyperactivity-inattention (5)	.738			.456
Hyperactivity-inattention (6)	.541			.708
Opposition-defiance (1)		.709		.498
Opposition-defiance (2)		.768		.410
Opposition-defiance (3)		.635		.596
Opposition-defiance (4)		.516		.734
Opposition-defiance (5)		.751		.436
Opposition-defiance (6)		.682		.535
Opposition-defiance (7)		.760		.423
Opposition-defiance (8)		.754		.432
Internalizing (1)			.492	.758
Internalizing (2)			.648	.580
Internalizing (3)			.512	.738
Internalizing (4)			.650	.578
Internalizing (5)			.730	.468
Internalizing (6)			.707	.501
Internalizing (7)			.688	.526
Internalizing (8)			.586	.657
Internalizing (9)			.809	.345
ω	.884	.847	.868	

Note. ω: omega coefficient of composite reliability (McDonald, 1970).

Table S7

Descriptive Statistics[1] and Intra-Class Correlations

	Min.	Max.	Mean	S.D.	ICC1	ICC2
Lang. Mastery-Approach	1	5	4.426	0.518	8.22%	68.26%
Lang. Performance-Approach	1	5	3.997	0.787	7.09%	64.71%
Lang. Performance-Avoidance	1	5	3.023	0.982	7.86%	67.19%
Lang. Climate G-Factor	1	5	4.116	0.555	17.84%	83.91%
Lang. Acad. Support S-factor	1	5	4.169	0.646	1.59%	27.92%
Lang. Emo. Support S-factor	1	5	3.918	0.852	3.59%	47.24%
Lang. Respect S-factor	1	5	4.612	0.563	3.39%	45.70%
Lang. Task collabo. S-factor	1	5	3.484	0.899	10.02%	72.78%
Math. Mastery-Approach	1	5	4.464	0.510	9.49%	71.58%
Math. Performance-Approach	1	5	4.063	0.775	7.25%	65.24%
Math. Performance-Avoidance	1	5	3.064	0.991	7.57%	66.30%
Math. Climate G-Factor	1	5	4.075	0.590	19.13%	85.04%
Math. Acad. Support S-factor	1	5	4.183	0.664	3.55%	46.92%
Math. Emo. Support S-factor	1	5	3.862	0.896	2.98%	42.45%
Math. Respect S-factor	1	5	4.566	0.604	1.28%	23.77%
Math. Task collabo. S-factor	1	5	3.394	0.939	11.11%	75.01%
Lang. Engagement T1	1	5	3.826	0.651	11.52%	75.76%
Lang. Engagement T2	1	5	3.648	0.694	4.02%	50.15%
Math. Engagement T1	1	5	3.889	0.652	14.77%	80.63%
Math. Engagement T2	1	5	3.657	0.755	6.74%	63.45%
Lang. Achievement T1	0	100	74.853	11.773	25.37%	89.09%
Lang. Achievement T2	0	100	73.443	11.552	11.43%	75.61%
Math. Achievement T1	0	100	78.565	12.174	19.30%	85.17%
Math. Achievement T2	0	100	73.981	15.130	7.51%	66.10%
Hyperactivity-inat. T1	1	7	3.835	1.378	4.14%	50.88%
Hyperactivity-inat. T2	1	7	3.996	1.452	3.39%	45.73%
Opposition-defiance T1	1	7	2.058	1.009	10.95%	74.70%
Opposition-defiance T2	1	7	2.166	1.054	5.92%	60.18%
Internalizing T1	1	7	2.672	1.092	3.95%	49.68%
Internalizing T2	1	7	2.752	1.201	4.76%	54.56%

[1]*Descriptive statistics are those from manifest scale scores, and thus do not reflect the true properties of the factor scores (estimated in standardized units with M=0 and SD=1) used in our main analyses.*

Table S8

Correlations.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.Sex															
2.Lang. Mastery-Approach	.083**														
3.Lang. Performance-Approach	-.086**	.562**													
4.Lang. Performance-Avoidance	-.114**	.044	.727**												
5.Lang. Climate G-Factor	.185**	.701**	.157**	-.185**											
6.Lang. Acad. Support S-factor	-.029	.558**	.424**	.209**	.161**										
7.Lang. Emo. Support S-factor	-.039	-.169**	.080**	.281**	.127**	-.159**									
8.Lang. Respect S-factor	.076**	.162**	-.022	-.107**	.101**	-.036	-.213**								
9.Lang. Task collabo. S-factor	.055*	-.050	.099**	.189**	.088**	-.150**	.002	-.088**							
10.Math. Mastery-Approach	.101**	.769**	.477**	.087**	.478**	.470**	-.131**	.156**	-.087**						
11.Math. Performance-Approach	-.073**	.425**	.863**	.684**	.100**	.337**	.111**	-.024	.104**	.539**					
12.Math. Performance-Avoidance	-.111**	.024	.649**	.916**	-.141**	.158**	.285**	-.103**	.208**	.056*	.746**				
13.Math. Climate G-Factor	.144**	.483**	.167**	-.077**	.526**	.198**	.043	.152**	-.057*	.696**	.142**	-.161**			
14.Math. Acad. Support S-factor	.050	.418**	.305**	.163**	.174**	.643**	-.122**	-.052*	-.048	.534**	.402**	.208**	.096**		
15.Math. Emo. Support S-factor	-.065*	-.150**	.100**	.285**	.010	-.082**	.727**	-.144**	.022	-.133**	.092**	.275**	.163**	-.181**	
16.Math. Respect S-factor	.077**	.158**	-.018	-.100**	.165**	-.021	-.123**	.693**	-.050	.142**	-.060*	-.129**	.121**	-.082**	-.197**
17.Math. Task collabo. S-factor	.036	-.049	.129**	.206**	-.046	-.073**	.006	.013	.591**	-.011	.160**	.218**	.120**	-.136**	.049
18.Lang. Engagement T1	.285**	.452**	.136**	-.057*	.518**	.138**	.015	.084**	.035	.353**	.084**	-.056*	.335**	.170**	-.006
19.Lang. Engagement Change	.044	-.108**	-.060*	-.012	-.124**	-.008	-.030	-.026	.032	-.115**	-.058*	-.008	-.099**	-.054*	-.004
20.Math. Engagement T1	.048	.328**	.170**	.031	.278**	.144**	.012	.071**	-.035	.462**	.178**	.003	.519**	.126**	.077**
21.Math. Engagement Change	.069**	-.090**	-.051	-.005	-.059*	-.038	.002	-.008	.018	-.095**	-.060*	-.009	-.067*	-.024	-.014
22.Lang. Achievement T1	.217**	.087**	-.097**	-.125**	.185**	.006	.021	.032	-.030	.101**	-.063*	-.103**	.102**	.069**	-.025
23.Lang. Achievement Change	.018	.015	.036	.017	-.030	.047	-.045	.000	-.016	.052*	.021	-.001	.079**	.012	.001
24.Math. Achievement T1	-.001	.044	-.064*	-.072**	.070**	.034	.022	.037	-.074**	.093**	-.042	-.067*	.166**	-.007	.031
25.Math. Achievement Change	.091**	.036	.014	-.008	.037	.033	-.035	-.038	.014	.048	.018	-.009	-.007	.092**	-.045
26.Hyperactivity-inat. T1	-.029	-.216**	-.005	.104**	-.265**	-.051	-.008	-.037	-.001	-.214**	.015	.115**	-.255**	-.029	-.021
27.Hyperactivity-inat. Change	.042	.041	.024	.011	.052*	.003	.052*	.003	-.027	.030	.016	.011	.037	-.025	.030
28.Opposition-defiance T1	-.238**	-.301**	-.022	.137**	-.367**	-.056*	.018	-.123**	.034	-.306**	.001	.155**	-.344**	-.061*	.009
29.Opposition-defiance Change	.069**	.051*	.021	-.001	.071**	.008	.042	.015	-.058*	.046	.027	.002	.030	.013	-.002
30.Internalizing T1	.112**	-.205**	-.013	.129**	-.258**	-.005	-.009	-.065*	.040	-.216**	.000	.138**	-.284**	.022	-.017
31.Internalizing Change	.089**	.044	.045	.031	.051	.005	.045	.025	-.012	.039	.057*	.041	.012	.002	-.003

Table S8 (continued)
Correlations.

	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
17.Math. Task collabo. S-factor	-.080**															
18.Lang. Engagement T1	.107**	-.010														
19.Lang. Engagement Change	-.033	.023	-.169**													
20.Math. Engagement T1	.015	.075**	.525**	-.082**												
21.Math. Engagement Change	.048	.012	-.045	.406**	-.095**											
22.Lang. Achievement T1	.022	-.059*	.383**	-.091**	.240**	.036										
23.Lang. Achievement Change	-.028	.049	.001	.123**	.068**	.025	-.379**									
24.Math. Achievement T1	-.013	-.012	.164**	-.064*	.370**	.009	.591**	-.030								
25.Math. Achievement Change	.033	.008	.108**	.019	.022	.122**	.005	.302**	-.366**							
26.Hyperactivity-inat. T1	-.068**	.000	-.474**	.099**	-.499**	.009	-.310**	.019	-.297**	.024						
27.Hyperactivity-inat. Change	.014	-.024	.024	-.195**	-.001	-.217**	.054*	-.092**	.055*	-.080**	-.195**					
28.Opposition-defiance T1	-.144**	.021	-.564**	.071**	-.511**	-.006	-.302**	-.004	-.218**	-.049	.736**	-.097**				
29.Opposition-defiance Change	.024	-.058*	.057*	-.224**	.018	-.239**	.085**	-.076**	.061*	-.051*	-.180**	.750**	-.174**			
30.Internalizing T1	-.090**	-.011	-.264**	.068**	-.353**	.019	-.120**	-.005	-.149**	.027	.676**	-.189**	.588**	-.203**		
31.Internalizing Change	.041	-.010	.037	-.167**	-.020	-.181**	.050	-.081**	.026	-.035	-.126**	.783**	-.097**	.771**	-.179**	

Note. *$p < .05$; ** $p < .01$.

[1]*Descriptive statistics are those from standardized factor scores (mean=0; standard deviation=1) which do not reflect the response scale for each measure.*

Appendix B
Additional Information for Analyses Reported in the Article

Table S9

Results from Latent Profile Analyses, Profile Similarity Analyses, and Explanatory Similarity Analyses.

Model	LL	#fp	SCF	AIC	BIC	ABIC	CAIC	Entropy	aLMR (*p*)
LPA Boys in Language									
1 profile	-3712.426	8	1.746	7440.852	7477.574	7452.171	7485.574		
2 profiles	-3451.902	13	1.912	6929.805	6989.479	6948.199	7002.479	0.708	0.001
3 profiles	-3348.212	18	2.112	6732.424	6815.050	6757.894	6833.050	0.756	0.267
4 profiles	-3248.130	23	2.147	6542.259	6647.836	6574.804	6670.836	0.730	0.273
5 profiles	-3158.948	28	1.939	6373.895	6502.424	6413.515	6530.424	0.779	0.168
6 profiles	-3099.412	33	1.851	6264.824	6416.304	6311.519	6449.304	0.805	0.332
7 profiles	-3052.194	38	1.745	6180.388	6354.819	6234.157	6392.819	0.816	0.250
8 profiles	-3022.849	43	1.786	6131.698	6329.081	6192.543	6372.081	0.792	0.550
LPA Boys in Mathematics									
1 profile	-3739.308	8	1.736	7494.616	7531.338	7505.936	7539.338		
2 profiles	-3493.285	13	1.935	7012.569	7072.243	7030.964	7085.243	0.692	0.001
3 profiles	-3384.686	18	1.611	6805.373	6887.998	6830.843	6905.998	0.787	0.005
4 profiles	-3289.611	23	1.870	6625.221	6730.798	6657.766	6753.798	0.735	0.192
5 profiles	-3210.129	28	1.887	6476.257	6604.786	6515.877	6632.786	0.771	0.269
6 profiles	-3149.222	33	1.621	6364.443	6515.923	6411.138	6548.923	0.812	0.061
7 profiles	-3101.092	38	1.635	6278.183	6452.615	6331.953	6490.615	0.818	0.267
8 profiles	-3063.721	43	1.695	6213.441	6410.824	6274.286	6453.824	0.815	0.540
LPA Girls in Language									
1 profile	-3662.250	8.000	2.188	7340.500	7377.190	7351.787	7385.190		
2 profiles	-3481.673	13.000	2.120	6989.346	7048.966	7007.688	7061.966	0.684	0.008
3 profiles	-3349.108	18.000	2.465	6734.215	6816.766	6759.611	6834.766	0.709	0.331
4 profiles	-3244.020	23.000	2.069	6534.040	6639.522	6566.490	6662.522	0.750	0.086
5 profiles	-3157.325	28.000	1.886	6370.650	6499.063	6410.155	6527.063	0.792	0.140
6 profiles	-3089.456	33.000	1.698	6244.912	6396.256	6291.471	6429.256	0.811	0.146
7 profiles	-3053.595	38.000	1.925	6183.190	6357.465	6236.804	6395.465	0.826	0.636
8 profiles	-3017.124	43.000	1.727	6120.249	6317.454	6180.916	6360.454	0.804	0.280
LPA Girls in Mathematics									
1 profile	-3716.022	8.000	2.409	7448.044	7484.734	7459.331	7492.734		
2 profiles	-3519.069	13.000	2.531	7064.139	7123.759	7082.480	7136.759	0.690	0.040
3 profiles	-3392.032	18.000	2.494	6820.065	6902.616	6845.461	6920.616	0.708	0.219
4 profiles	-3276.156	23.000	2.321	6598.312	6703.794	6630.762	6726.794	0.754	0.278
5 profiles	-3202.068	28.000	2.054	6460.135	6588.548	6499.640	6616.548	0.782	0.160
6 profiles	-3147.866	33.000	2.041	6361.733	6513.076	6408.292	6546.076	0.791	0.425
7 profiles	-3105.662	38.000	1.991	6287.324	6461.599	6340.937	6499.599	0.801	0.395
8 profiles	-3063.509	43.000	2.189	6213.019	6410.224	6273.686	6453.224	0.799	0.675

Note. LL = Model LogLikelihood; #fp = Number of free parameters; SCF = Scaling correction factor; AIC = Akaïke Information Criteria; CAIC = Constant AIC; BIC = Bayesian Information Criteria; ABIC = Sample-size adjusted BIC; aLMR = Lo-Mendell-Rubin adjusted likelihood ratio test. One additional indicator, the bootstrap likelihood ratio test (BLRT), is not available when relying on the TYPE=COMPLEX correction for nesting.

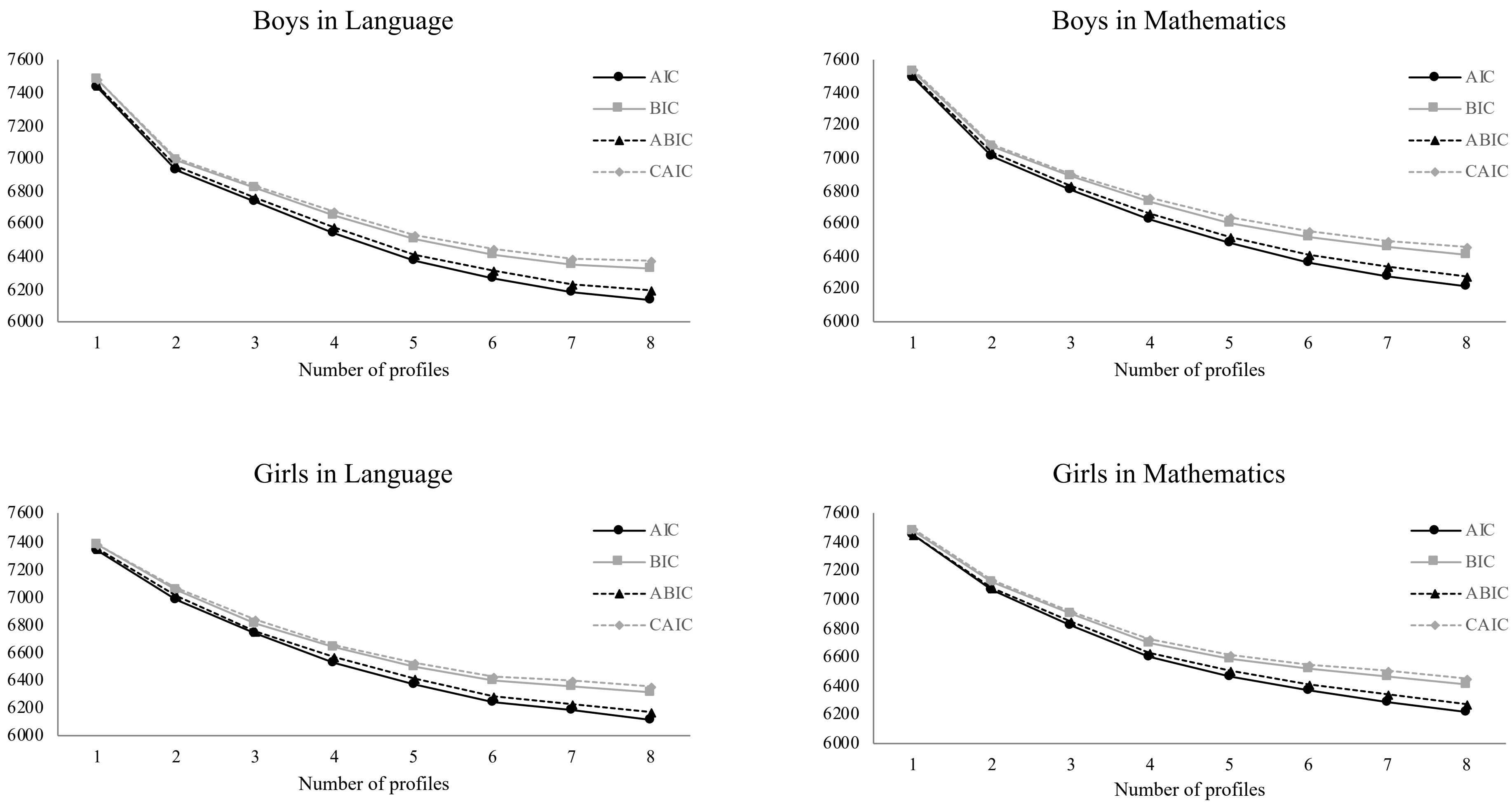

Figure S1

Scree Plots from the Latent Profile Analyses Solutions as a Function of Sex and Subject.

Table S10

Detailed Results from the Final Most Similar Latent Profile Solution Across Sex and Subject

	Low-all Climate (P1)		High-all Climate (P2)		Performance Climate (P3)		Low Performance Climate (P4)		Mastery and Positive Social Climate (P5)			
	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Var.	95% CI
Mastery-approach	-1.338	[-1.529;-1.146]	.712	[.569;.855]	-.323	[-.457;-.190]	-.097	[-.333;.139]	.790	[.665;.915]	.237	[.213;.262]
Performance-approach	-.963	[-1.156;-.769]	1.270	[1.130;1.410]	.159	[.008;.310]	-.950	[-1.214;-.687]	.240	[.023;.458]	.238	[.212;.265]
Performance-avoidance	-.311	[-.507;-.114]	1.224	[1.032;1.416]	.391	[.264;.517]	-1.053	[-1.281;-.825]	-.300	[-.520;-.081]	.339	[.304;.373]
Social Climate	-1.028	[-1.238;-.818]	.289	[.083;.494]	-.437	[-.545;-.330]	.273	[.059;.486]	.795	[.662;.928]	.430	[.385;.476]

Note. These profiles are based on factor scores estimated with a mean of 0 and a standard deviation of 1 across samples (the results can thus be interpreted in standardized units); Var. = Variance. CI = 95% Confidence Interval.

Appendix C
Detailed Analyses Conducted with the Specific Factors

As explained in the main manuscript, "when focusing only on teaching practices that can be considered as need supportive (e.g., combining dimensions similar to the TARGET framework; Gaias et al., 2019; Holzberger et al., 2019), person-centered studies concluded that students mainly tend to perceive their teachers rely on a variety of practices at a similarly low, average, or high level without identifying qualitatively distinct combinations of such practices." Morin and Marsh (2015) explain that this inability to detect qualitatively distinct profiles sometimes stems from the high correlations found between some components used in the identification of these profiles, such as those typically observed among the various indicators of the classroom social climate (Morin et al, 2014; Patrick et al., 2011). Following this initial observation, Morin et al. (2016, 2017) proposed to disentangle the global component common to several teaching practices (i.e., a global indicator of the social climate of the classroom), from the specificity remaining associated with each facet of the social climate left unexplained by this global component.

Analyses reported in the main article were conducted without the specific factors identified as part of the factor analyses conducted on teacher practices. We reran the main analyses including these specific factors to ensure that they did not change the meaningfulness of the profiles. Indeed, the global social learning climate factor estimated in our preliminary analyses and used as an additional profile indicator helped achieve a clearer differentiation between profiles. However, the four specific factors (reflecting the unique nature of academic support, emotional support, mutual respect, and task-related interactions left unexplained by this global indicator) either followed the same trend as the global factor or remained close to the sample average. In plain language, this means that when students report a positive or negative social climate, their perceptions remain consistent across the different indicators of the social climate considered in the present study. This is consistent with the high correlations found in other studies (e.g., Morin et al., 2014; Patrick et al., 2011) and suggests that it may not be necessary to treat these four dimensions separately when trying to achieve a comprehensive picture of classroom learning climates. Below, we report the detailed analyses.

Latent Profiles

The results from the alternative LPA solutions estimated separately for boys and girls in relation to their language and mathematics classes are reported in Table S10 and graphically illustrated in elbow plots reported in Figure S2. In these four models, all information criteria (BIC, ABIC, and CAIC) decreased without reaching a minimum, while the elbow plots tentatively suggested a plateauing in the decrease of these indicators between 4 and 6 profiles. Given these various results, we more carefully examined solutions including 4 to 6 profiles for their theoretical and heuristic meaningfulness and added value. Across all solutions, it was interesting to note that the identified profiles were already visually very relatively similar for boys and girls in language and mathematics classes, providing early evidence of configural similarity. In all solutions, the 4-profile solution resulted in four qualitatively distinct profiles (corresponding to a Low-all Climate, a High-all Climate, a Performance Climate, and a Mastery and Positive Social Climate profiles). Moreover, the 5-profile solution resulted in the addition of a meaningful profile presenting Low Performance Climate, which was qualitatively distinct from the profiles identified in the previous solution. In contrast, the 6-profile solution only resulted in the subdivision of the Low Performance Climate profile into two quantitatively but not qualitatively distinct profiles, one of which was relatively small (3%). For these reasons, the 5-profile solution was retained for tests of profile similarity.

Results from tests of profile similarity, also reported in Table S11, supported the configural, structural, and dispersion similarity of this solution across samples of boys and girls in language and mathematics classes, as each added set of constraints resulted in smaller values on at least two out of three indicators (BIC, ABIC, and CAIC). However, the next model of distributional similarity was not supported as it resulted in higher values of BIC and ABIC relative to the previous model of dispersion similarity, suggesting the proportion of boys and girls in each profile across language and mathematics classes was not equivalent. The previous solution of dispersion similarity was retained for interpretation and graphically illustrated in Figure S3, while parameter estimates are reported in Table S12.

These results first revealed a Low-all Climate profile in which students reported low levels on all classroom goal structures and climate indicators. Second, a High-all Climate profile was identified and characterized by higher-than-average levels on all classroom goal structures and climate indicators. Third, a Performance Climate profile was identified in which students reported higher-than-average, but still moderate, levels of performance-approach and -avoidance goal structures, close to average levels on all specific facets of the social climate, and below average levels of mastery-approach goal structure and global social climate. Fourth, a Low Performance Climate profile was characterized by very low levels of performance-approach and performance-avoidance goal structures, slightly higher-than-average levels on the global social climate indicator, and close to average levels on all other indicators (mastery-approach goal structure and specific facets of the social climate). Fifth, a Mastery and Positive Social Climate profile was characterized by higher-than-average levels of mastery goal structure and global social climate, slightly higher than average levels of performance-approach goal structure and specific levels of academic support climate, lower than average levels of performance-avoidance goal structure, and around average levels of the three other specific facets of the social climate (emotional support, mutual respect, and task-related interactions).

The Performance Climate profile was the most prevalent among boys and girls across both school subjects (26.70% to 36.22%). Girls corresponded in relatively similar proportions to the Performance Climate, Low Performance Climate, and the Mastery and Positive Social Climate profiles in language and mathematics (23.21% to 36.22%), whereas they were less likely to correspond to the Low-all Climate or High-all Climate profiles (8.65% to 13.27%). Apart from their more prevalent correspondence to the Performance Climate profile (26.70% to 34.78%), boys corresponded relatively equally to all other profiles (12.93% to 19.71%).

Outcomes

Results from the tests of explanatory similarity are reported in Table S11. For the T1 levels of behavior problems, although the model of explanatory similarity was not supported across samples of boys and girls for both the language and mathematics classes, a model of partial similarity was supported, suggesting only a few associations differed between boys and girls at T1 (involving opposition-defiance in the Low-all Climate Profile, and internalizing behaviors in the Performance Climate profile). However, in relation to the change in behavior problems occurring between T1 and T2, the model of explanatory similarity across samples of boys and girls was supported for both the language and mathematics classes. Lastly, the results also supported the explanatory similarity of the school adaptation outcomes across samples of boys and girls in language and mathematics classes for both the T1 outcome levels and the T1-T2 changes in these levels. These outcome comparisons are illustrated in Figure S4 (estimates are reported in Table S13).

Engagement. Students corresponding to the Low-all Climate profile reported the lowest engagement in both subjects at T1, followed by those corresponding to the Performance Climate profile. Students corresponding to the High-all Climate, Low Performance Climate, and Mastery and Positive Social Climate profiles did not differ from one another, except for the Low Performance Climate profile, which reported a lower engagement than the Mastery and Positive Social Climate profile. Regarding change between T1 and T2, students corresponding to all profiles reported a significant decrease in their engagement during the school year. This decrease was less pronounced for the Low-all Climate profile than for all other profiles. The High-all Climate profile also reported a steeper decrease than the Performance Climate profile.

Achievement. Students corresponding to the Low Performance Climate profile had higher achievement in both subjects at T1 than all other profiles. The Mastery and Positive Social Climate profile also had higher achievement than the Low-all Climate and the Performance Climate profiles. Lastly, the High-all Climate profile had higher achievement than the Low-all Climate profile. Achievement levels remained stable between T1 and T2 for all profiles.

Hyperactivity-inattention. In both subjects, students corresponding to the Low-all Climate and Performance Climate profiles reported the highest levels of hyperactivity-inattention at T1 compared to those corresponding to the Low Performance Climate and Mastery and Positive Social Climate profiles. Students corresponding to the High-all Climate profile did not differ from any other profile, except the Low Performance Climate profile, who reported lower levels of hyperactivity-inattention than the other two profiles in mathematics only. For all profiles, the level of hyperactivity-inattention remained stable between T1 and T2.

Opposition-Defiance. In language and mathematics, boys corresponding to the Low-all Climate profile reported the highest level of opposition-defiance at T1, followed by students corresponding to the Performance Climate profile and then by girls corresponding to the Low-all profile. In contrast, students corresponding to the High-all Climate, Low Performance Climate, and Mastery and Positive Social Climate profiles reported lower than average levels of opposition-defiance at T1, with the High-all Climate profile reporting higher levels than the Low Performance Climate profile. In terms of change between T1 and T2, none of the students corresponding to most of the profiles reported a significant level of change over time, except those corresponding to the High-all Climate and Low Performance Climate profiles, who reported a slight increase in opposition-defiance in mathematics only.

Internalizing Behaviors. In language and mathematics, girls corresponding to the Performance Climate profile reported the highest level of internalizing behaviors at T1 compared to all other profiles (except the Low-all Climate profile in mathematics), followed by students corresponding to the Low-all Climate profile and boys corresponding to the Performance Goals profile. Students corresponding to the High-all Climate, Low Performance Climate, and Mastery and Positive Social Climate profiles did not differ from one another, except for a lower level of internalizing behaviors reported in the Low Performance Climate profile relative to the High-all Climate profile. Most of the profiles reported a lack of significant change over time, except the High-all Climate, which reported a slight increase in internalizing behaviors in mathematics only.

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Table S11

Results from Latent Profile Analyses per Group.

Model	LL	#fp	SCF	AIC	BIC	ABIC	CAIC	Entropy	aLMR (*p*)
LPA Boys in Language									
1 profile	-6393.401	16	1.558	12818.802	12892.247	12841.442	12908.247		
2 profiles	-6031.862	25	1.654	12113.725	12228.482	12149.099	12253.482	.767	.000
3 profiles	-5897.966	34	1.652	11863.933	12020.003	11912.042	12054.003	.728	.050
4 profiles	-5787.373	43	1.837	11660.747	11858.130	11721.591	11901.130	.751	.491
5 profiles	-5695.951	52	1.732	11495.902	11734.598	11569.481	11786.598	.792	.312
6 profiles	-5619.887	61	1.665	11361.773	11641.782	11448.088	11702.782	.820	.404
7 profiles	-5568.787	70	1.514	11277.575	11598.896	11376.624	11668.896	.823	.323
8 profiles	-5530.041	79	1.542	11218.082	11580.716	11329.866	11659.716	.818	.609
LPA Boys in Mathematics									
1 profile	-6487.183	16	1.571	13006.365	13079.810	13029.005	13095.810		
2 profiles	-6157.971	25	1.692	12365.942	12480.700	12401.317	12505.700	.721	.000
3 profiles	-6015.988	34	1.610	12099.977	12256.047	12148.086	12290.047	.798	.068
4 profiles	-5902.628	43	1.895	11891.256	12088.639	11952.101	12131.639	.758	.524
5 profiles	-5787.739	52	1.604	11679.479	11918.174	11753.058	11970.174	.802	.090
6 profiles	-5728.471	61	1.770	11578.942	11858.950	11665.256	11919.950	.826	.666
7 profiles	-5670.538	70	1.570	11481.076	11802.397	11580.126	11872.397	.844	.254
8 profiles	-5626.398	79	1.440	11410.796	11773.430	11522.581	11852.430	.833	.314
LPA Girls in Language									
1 profile	-6314.971	16	1.997	12661.943	12735.322	12684.517	12751.322		
2 profiles	-6038.237	25	1.843	12126.474	12241.129	12161.746	12266.129	.726	.001
3 profiles	-5869.643	34	2.051	11807.287	11963.317	11855.256	11997.317	.753	.319
4 profiles	-5741.974	43	1.746	11569.948	11767.154	11630.616	11810.154	.781	.088
5 profiles	-5654.259	52	1.661	11412.517	11650.998	11485.882	11702.998	.818	.188
6 profiles	-5579.832	61	1.582	11281.644	11561.421	11367.728	11622.421	.823	.268
7 profiles	-5531.266	70	1.695	11202.533	11523.565	11301.294	11593.565	.819	.736
8 profiles	-5475.763	79	1.634	11109.527	11471.834	11220.986	11550.834	.827	.407
LPA Girls in Mathematics									
1 profile	-6374.246	16	2.115	12780.493	12853.871	12803.067	12869.871		
2 profiles	-6109.786	25	2.160	12269.572	12384.226	12304.844	12409.226	.714	.057
3 profiles	-5966.848	34	2.414	12001.695	12157.625	12049.655	12191.625	.749	.511
4 profiles	-5846.295	43	2.129	11788.590	11975.795	11839.257	12018.795	.764	.330
5 profiles	-5742.004	52	2.304	11588.009	11826.490	11661.374	11878.490	.783	.593
6 profiles	-5676.795	61	1.788	11475.590	11755.347	11561.654	11816.347	.806	.279
7 profiles	-5617.995	70	1.804	11375.990	11697.022	11474.751	11767.022	.810	.478
8 profiles	-5573.421	79	1.849	11304.841	11667.149	11416.300	11746.149	.800	.713

Note. LL = Model LogLikelihood; #fp = Number of free parameters; SCF = Scaling correction factor; AIC = Akaïke Information Criteria; CAIC = Constant AIC; BIC = Bayesian Information Criteria; ABIC = Sample-size adjusted BIC; aLMR = Lo-Mendell-Rubin adjusted likelihood ratio test. One additional indicator, the bootstrap likelihood ratio test (BLRT), is not available when relying on the TYPE=COMPLEX correction for nesting.

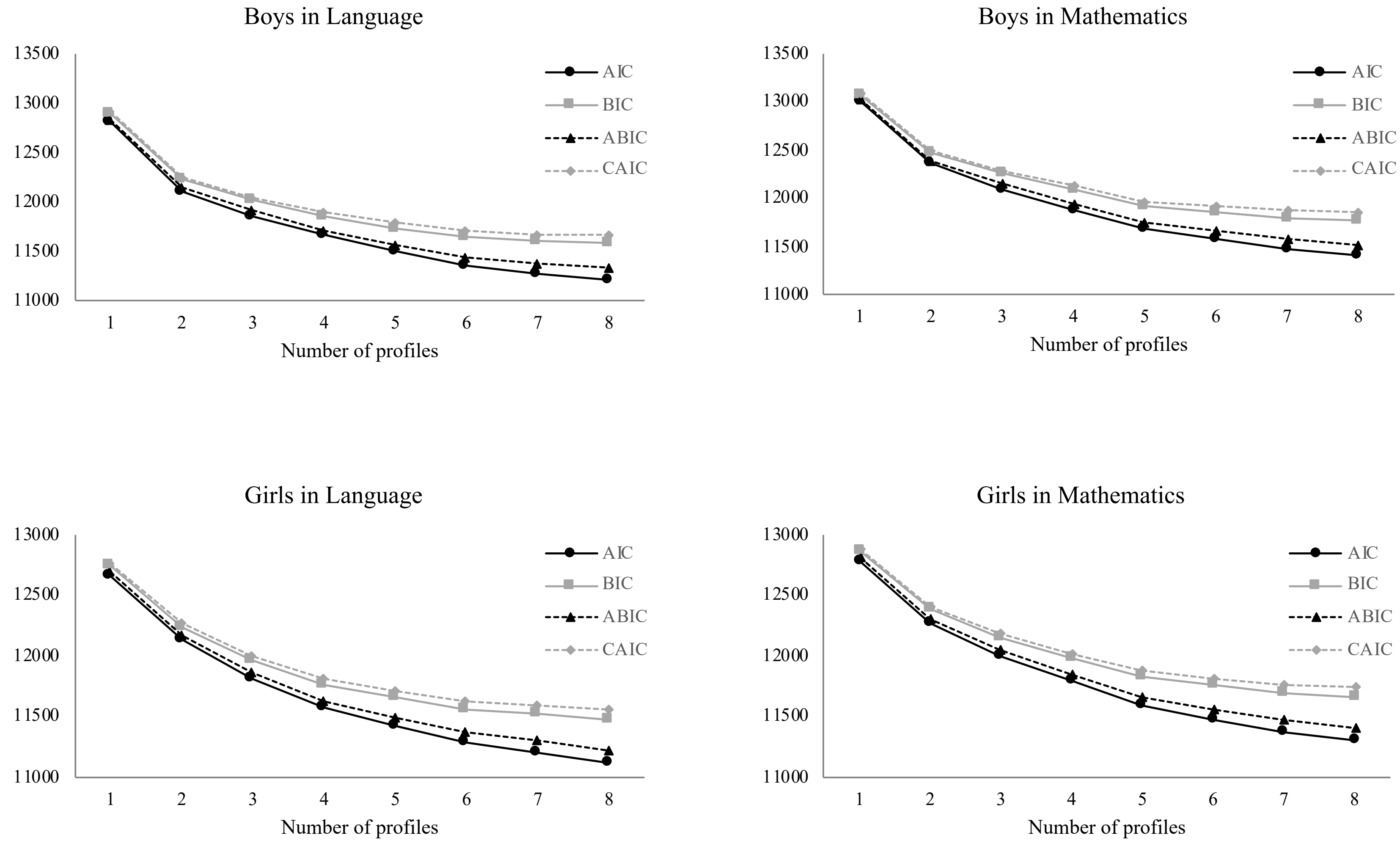

Figure S2

Scree Plots from the Latent Profile Analyses Solutions as a Function of Sex and Subject.

Table S12

Results from Profile Similarity Analyses and Explanatory Similarity Analyses.

Model	LL	#fp	SCF	AIC	BIC	ABIC	CAIC	Entropy
Profile Similarity								
Configural	-23887.093	209	1.843	48192.186	49295.996	48632.070	49504.996	.834
Structural	-24044.048	89	2.219	48266.095	48736.139	48453.414	48825.139	.827
Dispersion	-24059.630	65	2.591	48249.260	48592.551	48386.066	48657.551	.827
Distribution	-24105.192	53	2.916	48316.385	48596.298	48427.934	48649.298	.826
Explanatory Similarity: Mathematics and Language Engagement and Achievement								
Free T1	-31724.753	221	1.248	63891.505	65070.536	64368.474	65291.536	.853
Similar T1	-32191.547	31	2.418	64445.094	64610.478	64511.999	64641.478	.808
Free with Latent Change	-36906.801	235	1.291	74283.601	75537.322	74790.786	75772.322	.841
Similar with Latent Change	-37336.407	45	2.691	74762.814	75002.888	74859.934	75047.888	.809
Explanatory Similarity: Hyperactivity-inattention, Opposition-defiance, and Internalizing Behaviors in Language								
Free T1	-18222.158	42	2.147	36528.315	36752.385	36618.961	36794.385	.846
Similar T1	-18286.254	27	2.011	36626.508	36770.552	36684.780	36797.552	.842
Partial Similarity T1	-18266.074	29	1.951	36590.148	36744.863	36652.737	36773.863	.844
Free with Latent Change	-21039.920	62	2.209	42203.840	42534.609	42337.650	42596.609	.853
Similar with Latent Change	-21092.136	47	2.223	42278.272	42529.016	42379.709	42576.016	.845
Explanatory Similarity: Hyperactivity-inattention, Opposition-defiance, and Internalizing Behaviors in Mathematics								
Free T1	-18372.970	42	1.969	36829.941	37054.010	36920.586	37096.010	.848
Similar T1	-18436.098	27	1.965	36926.197	37070.241	36984.469	37097.241	.846
Partial Similarity T1	-18418.974	29	1.912	36895.948	37050.663	36958.537	37079.663	.847
Free with Latent Change	-21236.773	62	2.044	42597.546	42928.315	42731.356	42990.315	.848
Similar with Latent Change	-21254.345	47	2.044	42602.691	42853.435	42704.128	42900.435	.848

Note. LL = Model LogLikelihood; #fp = Number of free parameters; SCF = Scaling correction factor; AIC = Akaïke Information Criteria; CAIC = Constant AIC; BIC = Bayesian Information Criteria; ABIC = Sample-size adjusted BIC.

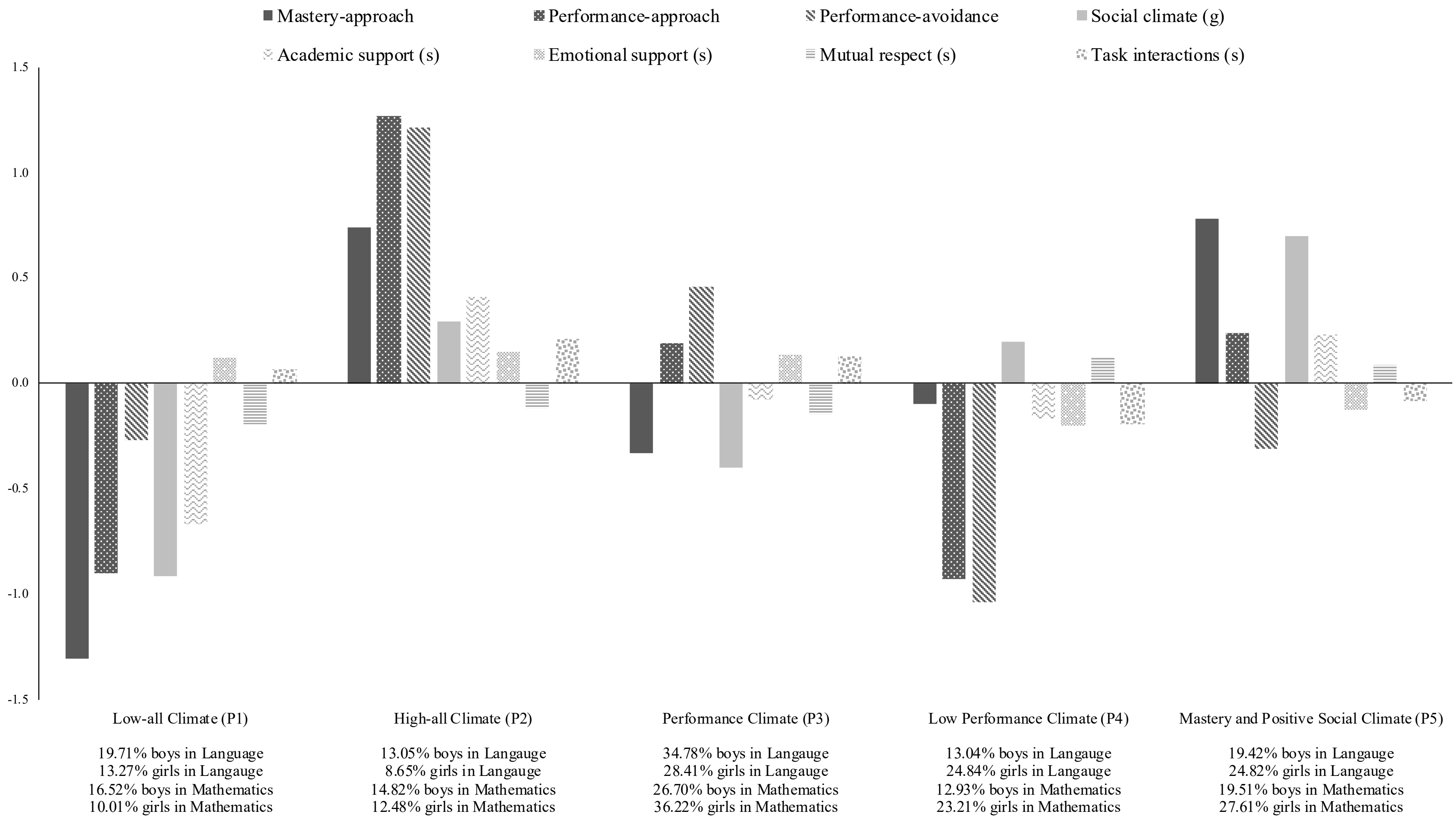

Figure S3.

Mean Levels of the Profile Indicators and Prevalences from the Final Latent Profile Analyses Solution across Sex and Subject.

Note. (g): Global factor; (s): Specific factor.

Table S13

Detailed Results from the Final Most Similar Latent Profile Solution Across Sex and Subject

	Low-all Climate (P1)		High-all Climate (P2)		Performance Climate (P3)		Low Performance Climate (P4)		Mastery and Positive Social Climate (P5)			
	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Var.	95% CI
Mastery-approach	-1.306	[-1.448;-1.164]	.738	[.587; .889]	-.333	[-.467;-.200]	-.097	[-.309; .115]	.784	[.661; .908]	.215	[.191;.239]
Performance-approach	-.901	[-1.093;-.709]	1.266	[1.142; 1.390]	.191	[.054; .328]	-.926	[-1.172;-.680]	.237	[.028; .446]	.244	[.215;.273]
Performance-avoidance	-.269	[-.471;-.066]	1.212	[1.035; 1.390]	.456	[.346; .567]	-1.041	[-1.240;-.842]	-.310	[-.521;-.098]	.329	[.296;.361]
Social Climate (g)	-.914	[-1.064;-.765]	.294	[.071; .517]	-.401	[-.491;-.311]	.200	[.010; .390]	.696	[.536; .856]	.496	[.439;.552]
Academic support (s)	-.668	[-.763;-.572]	.409	[.347; .470]	-.080	[-.197; .037]	-.168	[-.294;-.042]	.229	[.163; .294]	.225	[.197;.252]
Emotional support (s)	.120	[.031; .208]	.147	[.052; .242]	.137	[.070; .203]	-.202	[-.282;-.122]	-.128	[-.203;-.053]	.283	[.263;.303]
Mutual respect (s)	-.194	[-.284;-.103]	-.118	[-.216;-.020]	-.145	[-.206;-.083]	.120	[.017; .222]	.090	[.033; .148]	.371	[.332;.410]
Task collaboration (s)	.065	[-.054; .184]	.210	[.082; .339]	.132	[.053; .211]	-.191	[-.302;-.080]	-.082	[-.183; .019]	.487	[.452;.521]

Note. These profiles are based on factor scores estimated with a mean of 0 and a standard deviation of 1 across samples (the results can thus be interpreted in standardized units); Var. = Variance. CI = 95% Confidence Interval; (g): Global factor; (s): Specific factor.

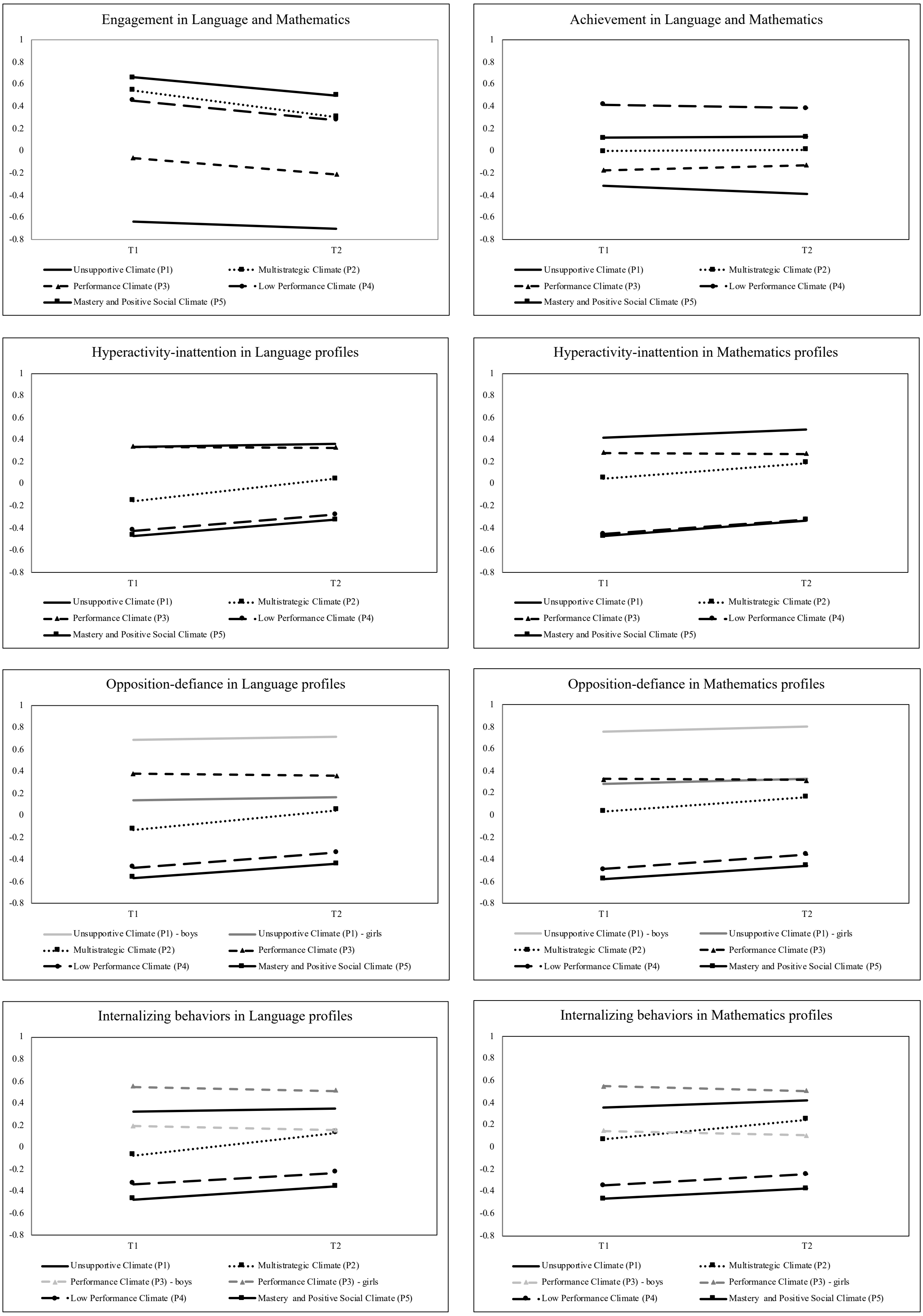

Figure S4.

Profile Outcomes.

Table S14

Mean Comparison Between the Five Profiles between the Boys and Girls samples and Across School Subjects.

	Low-all Climate (P1)	High-all Climate (P2)	Performance Climate (P3)	Low Performance Climate (P4)	Mastery and Positive Social Climate (P5)	Significant differences between profiles
School Outcomes (equivalent in Language and Mathematics)						
Engagement T1	-.635 [-.761;-.508]	.546 [.409;.683]	-.062 [-.145;.021]	.455 [.322;.589]	.664 [.533;.796]	1<3<2,4,5; 4<5
Engagement T1-T2 change	-.072 [-.135;-.009]	-.240 [-.320;-.161]	-.147 [-.182;-.111]	-.177 [-.226;-.127]	-.163 [-.202;-.124]	1>all; 3>2
Achievement T1	-.315 [-.518;-.113]	-.001 [-.179;.176]	-.176 [-.339;-.013]	.419 [.289;.548]	.116 [-.041;.274]	1<2,5; 3<5; 4>all
Achievement T1-T2 change	-.076 [-.185;.034]	.014 [-.084;.112]	.049 [-.045;.142]	-.034 [-.115;.047]	.011 [-.063;.084]	None.
Behavior Problems Outcomes in Language						
Hyperact.-inatt. T1	.330 [.182;.478]	-.155 [-.642;.331]	.339 [.231;.447]	-.426 [-.697;-.155]	-.472 [-.905;-.039]	1,3>4,5
Hyperact.-inatt. T1-T2 change	.034 [-.050;.119]	.201 [-.057;.458]	-.011 [-.085;.064]	.145 [-.017;.308]	.145 [-.111;.401]	None.
Opposition-defiance T1	b: .685 [.520;.850] g:.140 [-.068;.349]	-.128 [-.561;.306]	.375 [.258;.491]	-.473 [-.689;-.256]	-.567 [-.956;-.179]	b1>all; 3>g1>4,5; 3>2>4
Opposition-defi. T1-T2 change	.026 [-.055;.107]	.176 [-.031;.384]	-.018 [-.088;.053]	.134 [-.002;.270]	.127 [-.085;.339]	3<4
Internalizing T1	.326 [.172;.481]	-.076 [-.559;.407]	b: .188 [.070;.305] g: .546 [.417;.674]	-.335 [-.580;-.090]	-.474 [-.883;-.065]	1,b3>4,5; g3>all
Internalizing T1-T2 change	.028 [-.061;.118]	.206 [-.035;.448]	-.036 [-.113;.040]	.102 [-.067;.271]	.114 [-.142;.369]	2>3
Behavior Problems Outcomes in Mathematics						
Hyperact.-inatt. T1	.416 [.272;.560]	.050 [-.351;.452]	.281 [.166;.395]	-.456 [-.752;-.160]	-.476 [-.855;-.097]	1,3>4,5; 2>4
Hyperact.-inatt. T1-T2 change	.075 [-.026;.175]	.140 [-.023;.303]	-.006 [-.089;.077]	.128 [-.022;.277]	.143 [-.020;.306]	None.
Opposition-defiance T1	b: .755 [.578;.931] g: .286 [.066;.506]	.036 [-.315;.388]	.329 [.200;.458]	-.488 [-.721;-.254]	-.576 [-.912;-.240]	b1>all; g1,3>4,5; 2>4
Opposition-defi. T1-T2 change	.048 [-.042;.137]	.129 [.010;.249]	-.011 [-.091;.068]	.131 [.010;.253]	.117 [-.012;.247]	3<4
Internalizing T1	.360 [.206;.513]	.070 [-.318;.459]	b: .146 [.038;.254] g: .548 [.390;.706]	-.348 [-.619;-.078]	-.467 [-.820;-.114]	1,b3>4,5; g3>b3,4,5; 2>4
Internalizing T1-T2 change	.066 [-.032;.165]	.179 [.042;.317]	-.039 [-.127;.049]	.102 [-.054;.258]	.089 [-.070;.248]	2>3

Note. b: boys; g: girls. The outcomes are factor scores estimated with a mean of 0 and a standard deviation of 1 across samples (the results can thus be interpreted in standardized units); 95% confidence intervals are reported in brackets. Reported mean differences were significant at $p < .05$.