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Can School-Wide Positive Behavioral Interventions and Supports (SWPBIS) Improve Adolescents' Perceptions of School Climate?

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Abstract

As school climate plays a key role in adolescents' academic and socio-emotional outcomes, interventions that can enhance this climate are of major interest. In considering research on practices linked to a positive school climate, School-Wide Positive Behavioral Interventions and Supports (SWPBIS) is a promising approach. To date, most SWPBIS studies have been conducted in English-speaking countries and have been based primarily on adults' perceptions or reports (e.g., suspension rates, office discipline referrals). There is a dearth of research on the effectiveness of SWPBIS among adolescents in different cultural contexts. Moreover, little is known about its propensity to influence adolescents' perceptions of school climate dimensions. The present study examined the effects of SWPBIS on different dimensions of school climate as perceived by French adolescents enrolled in Grades 6–9. An experimental effectiveness study was conducted among 84 grades from 21 middle schools. Multilevel analyses were conducted on data from a sample of 6765 adolescents ($M_{\text{age}} = 12.3$ years, $SD =$

1.23; 51% girls) from 40 control and 44 intervention grades, controlling for grade-level school climate dimensions at baseline. The results suggest that SWPBIS had a positive effect on educational, safety, and teacher-student school climate dimensions. No effects were found on belonging, fairness, and between-students school climate dimensions. The findings suggest that SWPBIS has a positive effect on adolescents' perceptions of three school climate dimensions regardless of their initial perception levels. These results may provide avenues for school teams, researchers, and policymakers interested in ways to improve school climate.

Keywords: School climate; SWPBIS; adolescents; effectiveness study; program evaluation; multilevel analysis

Can School-Wide Positive Behavioral Interventions and Supports (SWPBIS) Improve Adolescents' Perceptions of School Climate?

Introduction

School climate plays a major role in adolescents' development as it influences their socio-emotional trajectories and acts as a protective factor against student-level problems (e.g., Coelho et al., 2020; Crowley et al., 2021; Singla et al., 2021; Yang et al., 2020). Interventions that can foster positive perceptions of the school environment have therefore attracted increasing interest (e.g., Bear et al., 2017). Considering theoretical and empirical research on school practices that are likely to modulate school climate (e.g., Bear et al., 2017; Voight & Nation, 2016), the components of School-Wide Positive Behavioral Interventions and Supports (SWPBIS), a systemic and multi-tiered system of support designed in the United States, provide a promising framework to foster positive perceptions of the school environment. Many studies on the effects of SWPBIS have been undertaken in the US context using school-level data and adults' perceptions or reports of adolescents' behavioral outcomes (e.g., suspension rates or office discipline referrals; Gage et al., 2019; Kim et al., 2018; Pas et al., 2019). Given that this framework is now being implemented in education systems around the world (e.g., Bissonnette et al., 2020; Borgen et al., 2021; Borgmeier et al., 2015; Deltour et al., 2021; Hintz et al., 2020; Kahru et al., 2021; Nelen et al., 2020), it seems important to determine whether SWPBIS is associated with positive school climate in different cultural contexts. Additional studies are needed that examine the effects of SWPBIS around the world when implemented in ecological conditions (as opposed to conditions highly controlled by researchers) and using effectiveness studies. Moreover, little is known about the effects of SWPBIS on adolescents' perceptions of school climate when examined at the grade level. The aim of the present study was to examine the effects of SWPBIS on adolescents' perceptions of

six school climate dimensions at the grade level. These effects were investigated in the French context using an experimental effectiveness study.

School Climate

The present study drew on an ecological perspective of adolescent development. According to this perspective, adolescents are influenced by the interplay of contextual factors in the different systems within which they interact, from microsystems (e.g., family, school) to macrosystems (e.g., culture, government; Bronfenbrenner, 1979). In the microsystem, the school and its climate heavily influence adolescents' outcomes (Aldridge & McChesney, 2018). Moreover, the school and its climate are of particular importance during adolescence when students' need for support, safety, and independence are particularly pronounced (e.g., Eccles et al., 1993).

School climate is broadly defined as the quality and character of the school environment. It is based on patterns of students' and teachers' experiences of school life and encompasses the norms, goals, values, interpersonal relationships, practices, and organizational structures of schools that are intended to promote a sense of social, emotional, and physical safety (Cohen et al., 2009). One reason why this concept has gained increased attention in recent years is that school climate is seen as an important factor influencing the well-being and resilience of students. As suggested by the stage-environment fit theory (Eccles et al., 1993), the functioning of individuals is affected by the interaction between their needs and the ability of their environments to satisfy these needs. A school environment that meets basic psychological needs, such as the needs for relatedness, autonomy, and competence (Deci & Ryan, 2002), is an environment conducive to student well-being and resilience (Briere et al., 2013; Loukas & Robinson, 2004; Eccles & Roeser, 2011). Conversely, a school environment that is characterized by a mismatch between student needs and school climate (e.g., degraded interpersonal relationships, a feeling that students are not

stakeholders in the decisions that affect them, a sense that rules are not fair and predictable, difficulties in perceiving expected behaviors) is unlikely to meet these psychological needs and likely to be unfavorable to students' social and emotional adjustment (Eccles & Roeser, 2011).

There is a consensus that school climate is a multidimensional construct that covers many aspects of the school experience (such as safety or relationships) but there is no agreement as to which dimensions should be considered in school climate studies (Grazia & Molinari, 2020; Lewno et al., 2020; Wang & Degol, 2016). The present study was based on the conceptualization of school climate proposed by Janosz and Bouthillier (1998). These authors developed a theoretical approach and validated a six-dimension questionnaire for school climate measurement in French-speaking countries (Janosz et al., 2007). Within this conceptualization, school climate reflects the perceptions of what is generally done, expected, and valued by others in each setting or situation. Thus, school climate encompasses and disseminates the prevailing norms that shape the interpretation of situations by school members and orient their behaviors (Janosz, 2017; Janosz & Bouthillier, 1998). These norms can vary in accordance with six aspects of the school experience, including (a) between-students social climate, (b) student-teacher social climate, (c) the educational climate, (d) the climate of safety, (e) the climate of fairness, and (f) the climate of belonging (Janosz, 2017; Janosz & Bouthillier, 1998). These experiences constitute the six school climate dimensions of their multidimensional measurement. *Between-students* and *teacher-student social climates* refer to the atmosphere that prevails in relationships, the warmth of interpersonal contact, respect between individuals, and the assurance of support from others. The *educational climate* refers to the value placed on education and the extent to which the school is perceived to be dedicated to the success of students and their well-being or to giving meaning to learning. The *climate of safety* refers to people's feelings of security and trust, their perception

of the risk of victimization, and a predictable and consistent daily environment. The *climate of fairness* refers to the perception of the legitimacy and justice of the school rules, their judicious application, or the feeling that merit or disapproval is attached to the behavior rather than to the person. Finally, the *climate of belonging* refers to pride in the school, the school's importance as a living environment, and one's adherence to its values.

Importance of School Climate for Students' Outcomes

A positive school climate is related to a range of positive outcomes for adolescents (Wang & Degol, 2016) including educational (e.g., school engagement or achievement; Fatou & Kubiszewski, 2018; Konold et al., 2018) and health-related outcomes (e.g., fewer mental health issues and risky behaviors; Aldridge & McChesney, 2018). In addition to the direct links between school climate and these key outcomes, several studies have highlighted school climate's frequent buffering effect. A positive school climate protects against the harmful effects of negative processes. For example, although moral disengagement promotes bullying and sexual harassment impairs adolescents' well-being, the magnitudes of these links are significantly mitigated when school climate is positively perceived (Crowley et al., 2021; Teng et al., 2020). Likewise, difficulties experienced by students belonging to a sexual minoritized group are counteracted by a favorable view of the school environment (Denny et al., 2016). Moreover, a positive school climate mitigates the pervasive link between socio-economic status and academic achievement (Bergowitz et al., 2017).

Considering these findings, which also are evidenced by robust longitudinal and experimental methodologies (e.g., Coelho et al., 2020; Dorio et al., 2020; Singla et al., 2021), there is a growing interest worldwide regarding measures that may help promote school climate. This area of research is experiencing notable growth given that school climate is regarded as a more malleable variable than other major sources of influence outside the school, namely biological, family, and socio-economic factors (Wang & Degol, 2016).

Practices to Improve School Climate

The literature highlights three kinds of evidence-based practices for improving school climate. These are related to (a) educational practices, (b) the mobilization of multi-tiered systems of support (MTSS), and (c) professional development. First, several studies have explored the relationship between educational practices and adolescents' perceptions of school climate. For example, Bear et al. (2017) found a positive association between students' view of the use of praise and rewards by their teachers and students' perceptions of school climate (effect size = .40 at the student level and .78 at the school level). A similar positive association was found regarding students' perception of adults' explicit efforts to teach the socio-emotional skills expected in school (Bear et al., 2017; Charlton et al., 2021). Contextual classroom predictors have also been linked to diverse school climate dimensions such as fairness, safety, and the student-teacher relationship (Mitchell & Bradshaw, 2013). These classroom predictors include establishing consistent behavioral expectations, reinforcing behaviors consistent with these expectations, and ensuring that behavioral problems have consistent and standardized consequences. In addition, giving students opportunities to be meaningfully involved (e.g., helping to establish rules for living well together) is linked to a stronger sense of connection to school and the perception of more respectful teacher-student relationships (Shinde et al., 2018; Voight & Nation, 2016).

Second, there is strong evidence regarding the positive effects of MTSS on school safety, belonging, and perceptions of school as a caring place (Charlton et al., 2021; Voight & Nation, 2016). More precisely, an MTSS covers three levels of intervention adapted to students' specific needs, including (a) a *universal level* of intervention for all students in the school, (b) a *selective level* for smaller groups of students with more pronounced needs who would benefit from personalized interventions, and (c) a level of highly individualized interventions. Within each level, schools may implement multiple actions and practices.

Lastly, approaches that initially target adults in schools by means of professional development are particularly promising. Recent intervention studies (Baumsteiger et al., 2021; McIntosh et al., 2021) found positive effects on school climate after adult training even before students had been directly targeted by the intervention (Baumsteiger et al., 2021; in this case the intervention involved 1 year of teacher-focused training). This suggests that targeting adults is critical in facilitating changes in students' views of school climate. Systemic approaches that focus not only on students' skills but also on educators' practices can be highly effective. Both Baumsteiger et al. (2021) and McIntosh et al., (2021) encouraged the use of approaches that reach beyond the classroom level and provide broader tools for changing pedagogy, procedures, and school practices. Given these three kinds of evidence-based practices for school climate improvement, we next describe School-Wide Positive Behavioral Interventions and Supports (SWPBIS) and some of the promising evidence supporting its use (Sugai & Horner, 2006).

School-Wide Positive Behavioral Interventions and Supports: A Relevant Approach for Generating a Positive School Climate

SWPBIS is a form of MTSS (Sugai & Horner, 2006). More specifically, it is intended to improve procedures that promote positive change in school functioning by initially targeting adults' practices through professional development. All adults in the school must work together to adopt shared educational practices and to implement a three-tiered intervention approach. Under the framework of SWPBIS, the universal-level interventions include (a) the definition and teaching of social skills and behavioral expectations at school, consistent with values chosen with students; (b) praise or reward for these behaviors; (c) the use of student data for decision-making; and (d) a predictable and graduated problem-behavior management system. At the selective level, interventions target students for whom universal-level measures are ineffective or have been proven to be insufficient. Check-

In/Check-Out (CICO; Karhu et al., 2021; Mitchell et al., 2021) is an example of this intervention level.¹ Finally, the third intervention tier draws on individual approaches such as functional behavioral assessment (FBA; Gage et al., 2012).²

The groundwork for SWPBIS is carried out with the school staff and involves the creation of a core team. The school is guided by an external coach throughout the implementation process. SWPBIS is often described as creating a positive school environment by establishing the social culture and individualized behavior support needed in a school (Bosworth & Judkins, 2014; Crowley et al., 2021; Sugai & Horner, 2009). For professionals, this type of school-wide approach involves working together, collectively taking advantage of the research findings behind SWPBIS, and adopting culturally appropriate practices.

SWPBIS is likely to improve perceptions of the six school climate dimensions considered in this study. First, SWPBIS covers the three kinds of evidence-based practices found to promote five of the school climate dimensions that were proposed by Janosz et al. (1998; i.e., school belonging, fairness, safety, and between-students and teacher-student positive social climates). SWPBIS can improve these perceptions in various ways. For example, in the case of the teacher-student social climate, schools traditionally try to prevent problematic student behavior by focusing on the associated punishment rather than by engaging in communication about expected behavior (Bosworth & Judkins, 2014; Pas et al., 2011). This often leads to confrontational student-teacher interactions that may damage the perceived school climate (Mitchell & Bradshaw, 2013; Voight & Nation, 2016). In contrast,

¹ CICO requires students to meet briefly and positively with an adult of the school at the beginning of every school day to review previously set expectations, to carry a positive behavior checklist throughout the day to be scored by each teacher, and to meet briefly again with an adult of the school at the end of the school day to review their checklists and expectations.

² FBA is a set of methods that collects information to identify environmental events, antecedents, and consequences that predict or maintain problem behaviors. An FBA attempts to identify the *function* of a challenging behavior to develop an intervention to reduce the occurrence of that behavior and to increase the occurrence of an alternative replacement behavior resulting in the same or similar outcomes.

SWPBIS systematically highlights desired behaviors and requires school adults to attend to these and to acknowledge them. Paying attention to positive behaviors, instead of taking them for granted, requires the school staff to shift their thinking to foster positive adult-student interactions.

To date, there are no empirical data examining the effectiveness of measures promoting the perception of educational climate, which is the sixth school climate dimension. Due to its wide scope, SWPBIS can lead to significant changes in practices in a school; these changes can be perceived and observed by students, thus improving their perception of the educational climate. The creation of a core team, regular visits by an external coach, school-wide harmonization of communication about expected behaviors and the consequences of poor behavior, explicit teaching sessions on expected behaviors, and regular data collection from students are all ambitious measures. They all would highlight school-wide efforts to put students first, which could encourage the latter to adopt a more positive view of the educational climate.

Theoretically, SWPBIS can therefore have beneficial effects on different school climate dimensions. Several empirical studies complement these theoretical considerations by highlighting encouraging effects. For example, the implementation of SWPBIS for 3 years or more enhances school safety, the instructional climate (Caldarella et al., 2011; Horner et al., 2009), and the perception of organizational health (Bradshaw et al., 2008, 2009). However, these pioneering studies have relied on adults' perceptions and some studies have suggested that adult-based data are limited by a frequent discrepancy between the school climate perceptions of teachers and students (Mitchell et al., 2010). SWPBIS is ultimately intended to target students' perceptions and behaviors. Thus, having information on adults' perceptions is crucial, but it is important to also obtain data from the students themselves. Consequently, more studies are needed to explore and expand the limited student-related studies that are

beginning to emerge (Deltour et al., 2022; Elrod et al., 2022; McIntosh et al., 2021; Nelen et al., 2021; Sorlie & Ogden., 2015).

Several of these recent student-based studies have found mixed and inconsistent results. For instance, McIntosh et al. (2021) found an encouraging effect of SWPBIS on an overall school climate index, whereas other studies showed no significant correlation between SWPBIS fidelity and subsequent global school climate (Elrod et al., 2022) or main effects of SWPBIS on feelings of safety (Nelen et al., 2021) or on between-students and teacher-student relations (Sorlie & Ogden, 2015). Additionally, various limitations also reduced the scope of these studies. First, the multi-dimensionality of school climate was not considered, as only safety climate, relational climate, or an overall climate measure (aggregating responses from students, educators, and families; McIntosh et al., 2021) was analyzed. Second, it is difficult to assess the specific effects of SWPBIS in the absence of a control group and baseline data, which was the case in Nelen et al. (2021). Third, some of these studies have exclusively considered elementary-school children (Nelen et al., 2021; Sorlie & Ogden, 2015) or have diluted adolescent data (McIntosh et al., 2021). Finally, there is a dearth of studies examining the effects of SWPBIS in cultural contexts other than in the United States, which is where SWPBIS was developed.

The present study attempts to address these issues by considering the multi-dimensionality of school climate and by using an experimental effectiveness design with French adolescents. Early adolescence is an important period to consider as studies highlight dynamic maturational changes between the ages of 10 and 14 years (Dahl et al., 2018), as well as modifications at different levels, including cognitive, psychological, emotional, social, and behavioral processes (Pfeifer & Allen, 2021). During early adolescence, increasing socio-cognitive and brain changes may be associated with heightened sensitivity to the environment (Blakemore & Mills, 2014). Furthermore, SWPBIS is now being implemented in countries

throughout the world (e.g., Borgen et al., 2020, 2021; Borgmeier et al., 2015; Deltour et al., 2021; Hintz et al., 2020; Kahru et al., 2021; Nelen et al., 2020). Thus, it is necessary to broaden existing knowledge on SWPBIS effects in other cultural contexts and to consider the educational system and the policies specific to the context in which it is being implemented.

School-Wide Positive Behavioral Interventions and Support: A Promising Framework for the French Education System

The organization of the education system in France is slightly different than in other countries in which SWPBIS has been tested to date (e.g., Bradshaw et al., 2008, 2009; Nelen et al., 2021; Sorlie & Ogden, 2015). Specifically, in France, the education system and policies are highly centralized (Powell et al., 2012). The French State plays a dominant role in the organization and funding of education and manages the public education service. It is responsible for education in the broadest sense, including the definition of educational pathways, the setting of national curricula, the teaching organization and content, the definition and awarding of national diplomas and conferring of university degrees, the recruitment and management of personnel, the distribution of education resources, and the control and evaluation of educational policies. This national system has been adopted to ensure overall consistency throughout the educational system. In the 1980s, decentralization laws gave local authorities more responsibility, but this was limited to funding and managing mainly non-educational areas, such as school canteens (Mons, 2004). The centralized management is intended to promote equality. However, it is not necessarily conducive to equity, leaving little room for local adaptations to meet the specific needs encountered in each school context (Caldwell, 1990 and Winkler, 1989, as cited by Mons, 2004). School professionals and beneficiaries, such as teachers and students, would be hardly involved in this system (Oates, 1972, as cited by Mons, 2004).

Moreover, every secondary school has a Principal Educational Advisor (PEA) who is perceived as the reference person for dealing with problematic behavior and student life outside of the classroom. Thus, PEAs are regarded as key persons in any discussion of school climate. Nevertheless, their presence often results in a compartmentalization of educational and pedagogical responsibilities in schools that is not conducive to cooperation between adults (Grimault-Leprince, 2015; Mikailoff, 2020). Put simply – and despite the existence of recent official texts that do not take this perspective – education professionals still tend to make a distinction between (a) pedagogical and teaching responsibilities (e.g., teaching, didacticizing, assessing academic knowledge) that they attribute to teachers alone and (b) educational responsibilities (e.g., citizenship education of students, management of students' daily life in the school outside the classroom, involvement of students in the life of the school, management of student outbursts in class, preventing bullying) that they attribute to the PEA. The very low proportion of French teachers who consider themselves to be properly trained and prepared for managing students' behavior (22%, compared with a mean of 53% in Organization for Economic Co-operation and Development countries [OECD], 2019a) may also contribute to this compartmentalization. In general, there is relatively little cooperation between professionals in French schools compared with schools in other OECD countries (DEPP, 2014). In France, secondary teachers also praise students sparingly (Guimard et al., 2015; Hofstede, 1986; OECD, 2019b) and rarely participate in students' non-instructional life (Mikailoff, 2020).

Finally, beyond features of the education system, there is still considerable room for improvement in France in terms of students' perceptions of their school environment. For example, only 57% of students perceive their teachers to be interested in progress of each student (compared with an OECD mean of 70%) and fewer than one in four students (one in three in OECD countries) reported that adults point out students' strengths to them (OECD,

2019b). Finally, France is the OECD country in which students' sense of belonging is the lowest (i.e., 38% of students feel like they really belong in their school, compared with a mean of 71% in OECD countries; OECD, 2019b).

In such an educational context, SWPBIS offers genuine promise regarding its potential effects on school climate. First, it promotes educational principles and tools focused on students' needs, which the entire educational community must consider. Second, it decompartmentalizes academic, pedagogical, and educational tasks in favor of an overall cooperative approach around students. Third, in a context in which there is still room for improvement in students' perception of school climate, SWPBIS could have especially positive effects.

The Present Study

The evidence that we reviewed here suggests that the SWPBIS framework may have positive effects on the dimensions of school climate. However, to date no studies have examined these effects among non-US adolescents while also considering the multidimensionality of school climate. The present study was designed to investigate the effects of SWPBIS on adolescents' perceptions of school climate dimensions using an experimental effectiveness study and multilevel analyses. SWPBIS is a systemic approach applied across the several grades in a school setting, which is likely to influence adolescents' view of their shared context. Thus, in the present study, school climate dimensions were treated as group-level variables based on adolescents' perceptions. Specifically, we chose to include grade-level because, in France, it is an important context for secondary school students. For instance, throughout the school year, students spend most of their time with other students in the same grade, either in their regular class or in their elective classes, where it is common for students from different classes to be grouped together (e.g., for modern languages, Latin or Greek, physical education).

First, we hypothesized that SWPBIS would have a positive effect on the school climate dimensions perceived by adolescents at the grade level (Hypothesis 1 [H1]). No specific hypothesis was made about which school climate dimensions were more sensitive to SWPBIS. As previously mentioned, this systematic framework would be likely to influence each dimension.

Second, we hypothesized that SWPBIS would have a more beneficial effect on school climate dimensions in grades with a lower baseline level of school climate (Hypothesis 2 [H2]). Indeed, in this case, we expected that these grades would specifically benefit from the educational innovations introduced by SWPBIS and decrease the differences in comparisons with grades reporting a higher baseline level of school climate.

There is evidence that adolescents' school climate perceptions may differ according to age or sex (e.g., Bear et al., 2017; Wang & Dishion., 2012), school size (e.g., Leithwood & Jantzi, 2009), the socioeconomic status of their fellow students (e.g., Bear et al., 2017), their parents' participation in school life (e.g., Voight & Nation, 2016), and team mobility and turnover (e.g., Mitchell et al., 2010). The hypotheses were tested controlling for these predictors.

Method

Context and Procedure

In 2013, the French Framework Act on the Reform of the Schools of the Republic emphasized improving school climate in schools. In the Académie of Besançon, a partnership was established with the local education authority and the university to devise a "School Climate Survey".³ This survey was administered starting in 2015 and included the scales used in the present study to explore adolescents' perceptions of school climate dimensions. The results of these surveys showed that there was room for improvement regarding students'

³ The Académie of Besançon is a French educational district.

perception of school climate. Academic authorities and researchers then identified SWPBIS as a promising approach to improving school climate and implemented it on an experimental basis. The trial was planned on the random assignment of 24 middle schools (20% of the middle schools in the Académie) into intervention and control groups. Given the importance of examining the effects of an intervention under natural conditions (Flay et al., 2005; Kim, 2019), intervention schools implemented SWPBIS in real-world conditions. SWPBIS implementation was driven by the regional education authority and the regular education staff rather than by researchers (see Kubiszewski, 2018, for a complete description of the SWPBIS roll-out).

Baseline data were collected on two occasions, including during the first trimester of 2016 for 10 schools (four intervention and six control) and then during the first trimester of 2017 for nine schools (six intervention and three control). On average, baseline data were collected 4 months prior to the start of SWPBIS in the intervention schools. Only one intervention and one control school had baseline measures obtained in 2015, which was a year before implementation. There were no significant differences in school climate baseline data for schools and grades included in 2015, 2016, and 2017.

The post-test data were obtained during the first trimester of 2018. The average implementation fidelity score in the intervention schools was 48% ($SD = 11.3\%$), as measured by the School Evaluation Tool (Horner et al., 2004). Following this post-test data collection, SWPBIS implementation continued but was not examined for this study. On average, 90.5% ($SD = 5.2\%$) of students at each school participated in the study; no significant differences were identified between control and intervention schools, $t(19) = -0.45, p = .65$. Reasons for student non-participation included (a) the student's absences on the day of the test and on the proposed make-up date, (b) parental or guardian objection to their child's participation, or (c) the student's own refusal.

Data were collected via online self-report questionnaires administered during regular school hours. The Institutional Review Board of Besançon education authority, as well as an internal commission at the researchers' university, approved the study procedure. Informed consent was obtained from all study participants after their parents had been informed of the survey and had passively approved their children's participation (i.e., parents who did not want their child to participate were asked to return the information form). Schools, parents, and students could choose to withdraw from the study at any time. Participants did not receive any compensation.

Participants

To be included in the study, schools had to have completed a school climate survey or must have agreed to do so on several future occasions according to the study schedule. Of the 24 schools that met these criteria and agreed to participate, three schools dropped out during the study. Two of these schools were in the control group and left because they no longer saw the value of their involvement because subsequent access to SWPBIS could not be guaranteed. The third school was in the intervention group and withdrew because of the arrival of a new principal who had projects other than SWPBIS and opposed the school's continued participation in the study. The final school sampled included 21 middle schools (10 in the control group and 11 in the intervention group). The mean population per school was 322 students ($SD = 122$) with no statistically significant differences in school size between intervention and control groups. Each school consisted of four grade levels (Grades 6–9) and thus 84 grades were included in the present study.

Participants included 6765 students (49% boys, 51% girls; $M_{age} = 12.3$ years) from these 84 grades and 21 schools. In total, 70% of students were living with both parents, 16% were in joint custody, 11% were living with only one parent, and 4% were in a different family structure. These distributions were representative of those observed at national level

(Inchley et al., 2020) and did not differ significantly between the intervention and control schools. On average, 44.9% (range = 24%–68%, with no statistical difference between intervention and control groups) of the students came from disadvantaged social backgrounds⁴ (41% at national level; Ministry of Education, 2019). Of these adolescents, 3694 attended the 11 intervention schools (55% of total sample) and the remaining 3071 students attended the 10 control schools (45% of total sample).

Measures

School Climate Dimensions

Socio-Educational Environment Questionnaire. The Socio-Educational Environment Questionnaire (SEEQ; Janosz & Bouthillier, 2007) was designed for adolescents to self-report their perceptions school climate dimensions through 6 subscales. For the present study, five of the six subscales were used, including (a) between-students social climate⁵ (five items; e.g., “In this school, students treat each other with respect”; $\alpha = .77$), (b) teacher-student social climate (five items; e.g., “Students and teachers talk to each other outside of class hours”; $\alpha = .85$), (c) educational climate (seven items; e.g., “In this school, there is a feeling that student success is important to the adults”, “This school makes every effort to get students to succeed”; $\alpha = .90$), (d) climate of belonging (six items; e.g., “I am proud to be a student of this school”; $\alpha = .85$), and (e) climate of safety (five items; e.g., “There is a risk of being assaulted in this school”; $\alpha = .76$). For climate of fairness, items from another questionnaire were used (see below). Students responded on a Likert scale ranging from 1 = “Strongly disagree” to 6 = “Strongly agree”. For each dimension, a mean score was calculated. The validity and reliability of the SEEQ were initially explored in a sample of more than 70,000 French-speaking adolescents from 159 secondary schools (Janosz &

⁴ Students whose parents are non-working or belong to the working class.

⁵ For this dimension, no data were available at baseline.

Bouthillier, 2007). The CFA results for the five-factor model fit the data well, $\chi^2(289) = 791$, CFI = 0.94, RMSEA = 0.05, SRMR = 0.04.

Feeling of Justice Questionnaire. Although the SEEQ contains a subscale of climate of fairness, the Feeling of Justice Questionnaire (FJQ; Friant et al., 2008) was used at the request of the education authority (seven items, e.g., “Generally speaking, this school is a fair place to be”, $\alpha = .82$, CFA results from the present sample: $\chi^2(14) = 42$, CFI = 0.98, RMSEA = 0.06, and SRMR = 0.02). Students responded on a Likert scale ranging from 1 = “Strongly disagree” to 5 = “Strongly agree”. A mean score was calculated. The validity and reliability of this questionnaire was first examined in a sample of 12,151 students from 402 secondary schools (Friant et al. 2008).

Individual and Contextual Predictors

At the individual level (Level 1), we controlled for participants’ demographic characteristics of sex (1 = girl, 2 = boy) and age. At the grade level (Level 2), we controlled for six contextual characteristics in which grades were embedded, including (a) school size (number of students enrolled); (b) resources allocated to the middle-school, with an indicator assigned by the education authority to each middle school; this indicator (ranging from 1.01 to 1.49 in the académie of Besançon) provided a rating of the support that could be offered to students and was reflective of the number of open classes, the size of each class, and the amount of overtime available to be paid; (c) the proportion of students from disadvantaged backgrounds in the school; (d) the academic backlog (i.e., proportion of students in the school who already repeated one or more grades by the time they entered Grade 6); (e) team instability (i.e., proportion of teachers who requested a transfer to another school); and (f) parental involvement in school life (i.e., the proportion of parents who participated in the election of their school representatives). The education authority provided official statistical data regarding these potential contextual confounds.

Data Analysis

Preliminary data analysis included examination of descriptive statistics for all variables. Multilevel analyses in Mplus Version 8.5 (Muthén & Muthén, 2017) were performed to account for the nested structure of the data (i.e., students were nested within grades) and thus to examine the effects of both individual (i.e., sex and age) and contextual (e.g., school size in which grades were embedded) predictors on outcomes. The effects of SWPBIS on educational climate, teacher-student social climate, between-students social climate, climate of safety, climate of belonging, and climate of fairness at Time 2 (T2) were examined controlling for those values at Time 1 (T1). Given that individuals were not followed across time, the study used aggregates of individual perceptions according to grade level. Although still not widespread, other studies are also beginning to examine the effect of SWPBIS at grade level (e.g., Turner et al., 2022). Grade-level variables (i.e., contextual variables, outcome of interest at baseline, and intervention status) were grand-mean centered. Individual variables (i.e., sex and age) were grade-mean centered. To account for the potential non-normal distribution of the residuals, the MLR-estimator was used (Yuan & Bentler, 2000). The Full Information Maximum Likelihood (FIML) estimator, which is a recommended procedure for estimating parameters with incomplete data, was used to account for missing data in Mplus. As is often the case for such complex multilevel models (e.g., Laninga-Wijnen et al., 2020; Larson et al., 2021), one model was computed for each separate outcome at T2 (i.e., educational climate, teacher-student social climate, between-students social climate, climate of safety, climate of belonging, and climate of fairness). Including all outcomes simultaneously would have resulted in too many parameters to estimate and would have resulted in model non-convergence.

The analyses were conducted in four steps. First, unconditional models were tested, and intra-class correlations (ICCs) and design effects were examined. Second, the individual

and contextual predictors were included in the model to explain variance in the outcome variable at Level 1 (i.e., individual) and Level 2 (i.e., contextual). Third, the grade level outcome of interest at T1 (e.g., baseline educational climate perceived at the grade level) was included (except for between-students social climate which was not available). We made this choice because previous results (Brand et al., 2003; 2008) show that school climate ratings remain relatively stable from 1 year to the next, even as the student membership changes because of graduation or student mobility. Fourth, again at the grade level, intervention status (Control vs. SWPBIS, coded as 0 and 1 respectively) and an interaction term (i.e., SWPBIS * outcome of interest at baseline) were included to test whether the effects of SWPBIS on the outcome of interest differed according to the initial school climate perception. This model-building strategy allowed us to estimate the amount of variance in the outcomes that could be attributed to (a) individual and contextual variables, (b) the outcome of interest at baseline, and (c) the SWPBIS intervention group and its interaction with baseline school climate. Data and syntaxes are available upon request from the first two authors.

Results

Descriptive Statistics

Descriptive statistics and correlations for individual-level and grade-level variables were computed separately for participants in intervention and control grades (see Table 1). Mean levels of grade educational climate, climate of safety, and climate of belonging differed between the two groups at baseline, with higher scores for controls. However, the effect sizes were small (Cohen's $d = 0.19$ for educational climate, 0.11 for climate of safety, and 0.22 for climate of belonging). There were moderate to strong correlations (0.63 – 0.86) between school climate dimensions at T1 and the same dimensions at T2.

Intra-class Correlations and Design Effects

Grade-level variations were small to moderate for the grade-related school climate variables with ICCs ranging from 0.06 to 0.14 (all p values $< .001$). In addition, the design effects ranged from 5.76 to 12.12 across school climate dimensions. These values were higher than the one typically recommended (i.e., 2) for the purposes of ignoring the nested data structure (Peugh, 2010). Taken together, these preliminary unconditional model results revealed the importance of adopting a multilevel modeling approach to analysis (see Table 2 and Table 3).

Effects of SWPBIS on Adolescents' Perceptions of School Climate Dimensions

The results of the multilevel models are presented in Table 2 and Table 3. SWPBIS had positive main effects on the school climate dimensions of educational climate, teacher-student social climate, and climate of safety. More precisely, there was a positive effect of SWPBIS at the grade level ($\beta = 0.13, p < .05$) on educational climate. No effects were detected for contextual variables or educational climate at T1 x SWPBIS interaction. This model explained 68.6% of the between-grade variance. Level 2 predictors added at each step of the analysis showed that most of this variance (50.8%) was explained by educational climate at T1, followed by contextual factors (15.2%) and SWPBIS intervention (2.6%).

The grade-level effect of SWPBIS was also significant and positive for teacher-student social climate ($\beta = 0.14, p < .05$). No effects were found for contextual variables (except for rate of academic backlog at entry to Grade 6) and no teacher-student social climate T1 x SWPBIS interaction effects were found. This model explained 63% of the between-grade variance. Teacher-student social climate at baseline (T1) explained most of this variance (37.5%), followed by contextual factors (21.7%) and then SWPBIS intervention (3.8%).

We also found that SWPBIS had a positive effect ($\beta = 0.21, p < .001$) on the climate of safety at the grade level. No effects for contextual variables (except for the rates of disadvantaged students and academic backlog at entry to Grade 6) and no climate of safety T1

x SWPBIS interaction effects were found. This model explained 59.9% of the between-grade variance in climate of safety. In this case, most of the variance (38.7%) was explained by contextual factors, followed by SWPBIS intervention (10.9%) and climate of safety at baseline (T1; 10.3%).

No significant effects were found for SWPBIS on climate of belonging ($\beta = 0.05, p = .51$), climate of fairness ($\beta = 0.08, p = .16$), or between-students social climate ($\beta = 0.13, p = .08$). The full model for climate of belonging, climate of fairness, and between-students social climate explained 65.8%, 57.6%, and 23.6%, respectively, of between-grade variance, with most of the variance explained by respective climate factor at baseline (except for between-students social climate) followed by contextual factors.

Discussion

Current evidence suggests that school climate tends to have a significant impact on students' academic and socio-emotional trajectories. This explains why there has been considerable interest in interventions that enhance school climate and that allow cultural adaptation. The objective of the present study was to examine the effects of a promising multi-tier system of support (i.e., SWPBIS). These effects were examined based on six school climate dimensions in an effectiveness study with a sample of 6765 French adolescents enrolled in 44 intervention and 40 control grades (Grades 6–9). Overall, SWPBIS has a positive effect on several dimensions of school climate (i.e., educational climate, teacher-student social climate, and climate of safety). Moreover, this positive effect was independent of the initial level of each school climate dimension calculated at baseline before SWPBIS implementation.

Effects of School-Wide Positive Behavioral Interventions and Supports on School Climate Dimensions

The results showed a positive effect of SWPBIS on three of the six school climate dimensions, including educational climate, teacher-student social climate, and climate of safety. However, it should be noted that the variance was primarily explained by baseline school climate perceptions, except for climate of safety. This points to considerable inertia within grades in the perception of these dimensions – inertia that has already been documented elsewhere (e.g., Brand et al., 2003). Despite this, and despite controlling for this important predictor, SWPBIS still significantly improved prediction of these three school climate dimensions at T2. The present study thus extends current investigations in the SWPBIS field by documenting convincing effects on adolescents' perceptions within a non-US cultural context. This is an especially important finding because contextual and cultural fit are core principles of SWPBIS, whose applicability still needs to be examined more widely outside the US.

The present results suggest that, even in its early stages, SWPBIS (which was still being implemented at the time of the post-intervention) appeared to show positive effects in the French school context. For example, at T2 SWPBIS had been in the implementation phase for less than 2 years. It is also notable that, as is often the case in early implementation stages (Borgen et al., 2020; Durlak & Dupre, 2008; Gage et al., 2017), schools had not yet reached the commonly acknowledged fidelity threshold. Fidelity is the degree to which an intervention is implemented according to the original protocol or as intended by the program developers (Proctor et al., 2011). For SWPBIS, a fidelity threshold of 70%–80% (depending on the measure used) and sustained implementation (in the order of 3–5 years) are frequently viewed as requirements for intervention effects (e.g., Gage et al., 2017; Horner et al., 2004; Nese et al., 2019; Sorlie et al., 2016). Thus, the present results for these three school climate dimensions are very encouraging and highlight the need to consider the cultural specificities of implementation. For example, these results suggest that, in cultural contexts where

educational practices can be markedly improved by SWPBIS, positive effects may be observed within a shorter time frame and in earlier stages of implementation than those reported thus far. It should be noted that these thresholds were established based on preliminary observations in the US (e.g., Horner, 2004). The introduction of SWPBIS in cultural contexts where there is considerable room for improvement may give rise to positive effects more rapidly. Conversely, in school systems that are already aligned with SWPBIS and where students are familiar with an SWPBIS-type educational paradigm, fidelity may have little or no effect. The Dutch example (i.e., Nelen et al., 2021) supports this postulate. In the Dutch context, schools have been described as already having favorable outcomes in various respects and SWPBIS fidelity did not produce any added value for various outcomes. Nelen et al. hypothesized that there was a ceiling effect in their cultural context, leaving little room for improvement. In the US, Elrod et al. (2022) and Mitchell and Bradshaw (2013; through indirect results) found no effects of SWPBIS on school climate among students. It therefore is possible that the effects of SWPBIS and the thresholds for positive outcomes (particularly regarding school climate) are not universal and depend on the cultural and educational context. This possible "non-universality of threshold" is yet to be discussed and should be further examined in future studies from different countries.

This postulate, as well as the precise features of the context modulating the effects of SWPBIS on school climate (e.g., culture, organization of the education system, teachers' representations of their duties), has yet to be explored and requires more cross-cultural research. In addition, further data collection will be necessary to determine whether the encouraging effects described here are maintained at follow-up and are possibly more pronounced after a longer implementation. For the time being, our results suggest that, in France, students in grades benefiting from SWPBIS perceived three school climate dimensions more favorably than those not exposed to it. In such an educational context,

SWPBIS therefore may create conditions favorable to adolescents' success and well-being (e.g., Aldridge & McChesney, 2018; Halladay et al., 2020; Kutsyuruba et al., 2015; Martin & Collie, 2019).

Finally, no interaction effects between baseline values and SWPBIS were noted for the school climate dimensions considered at T2. This suggests that the positive contribution of SWPBIS to educational climate, teacher-student social climate, and climate of safety did not depend on how these dimensions were perceived prior to its implementation. A stronger effect of SWPBIS for grades whose students had more negative perceptions of school climate dimensions at baseline was expected, but these results show that the benefit was independent of baseline levels. This suggests that, in educational contexts such as the French context, any school (regardless of the school climate that prevails there) could benefit from SWPBIS improving adolescents' perceptions of several dimensions of school climate (educational climate, teacher-student social climate, and safety climate).

School Climate Dimensions Impervious to School-Wide Positive Behavioral

Interventions and Supports

In the present study, there was no significant effect of SWPBIS on between-students social climate, climate of belonging, and climate of fairness. First, regarding between-students social climate, these results are aligned with previous studies that found an absence of an SWPBIS effect (Sorlie & Ogden, 2015). One possible explanation is that the introduction of SWPBIS, which promotes positive changes in students' behaviors by initially targeting staff behaviors, may take time to bring about change in relationships between the students themselves. Indeed, the three school climate dimensions that were positively influenced by SWPBIS in our study can be conceived of as being more inherent to schools' professional practices (e.g., supervision for climate of safety, placing students at the heart of schools' activities, providing support for the educational climate, and creating positive links with

students for teacher-student social climate) than to relationships between students. The changes introduced by SWPBIS would only have a delayed impact on this school climate dimension. Higher implementation fidelity may also be necessary to observe an effect on the relationships between students.

Regarding climate of belonging, the direct role of adults also appears to be more limited. It may take longer for conclusive effects on this dimension to be observed. Climate of belonging could develop based on other school climate dimensions and it may evolve only after the other school climate dimensions have changed (Janosz et al., 1998). Although this has never been empirically examined, climate of belonging could be the result of a sequential process. In this process, climate of belonging would be affected following increases of other school climate dimensions. Longitudinal data collection would be needed to confirm this hypothesis and, more broadly, to explore possible sequential processes linking the school climate dimensions together.

Lastly, given that SWPBIS uses procedures that appear favorable to climate of fairness (e.g., the creation of a predictable environment in terms of both school expectations and consequences for problematic behavior), it is difficult to understand why there was no effect on this dimension. Even if procedures are improved, there may be more stability in students' perceptions of climate of fairness than in the other dimensions of school climate. The lack of statistical significance adds to the body of mixed findings on the effects of SWPBIS on diverse student outcomes (e.g., Borgen et al., 2021, Bradshaw et al., 2010; Ryoo et al., 2018). Further work is needed to gain a better understanding of this result.

Limitations and Strengths

The present results are subject to several methodological limitations. First, it should be noted that many factors likely to affect school climate were not controlled (e.g., the neighborhoods in which the schools were located, ethnicity), some of which are considered

sensitive data in France (e.g., ethnicity). Second, no data on other programs that may have been implemented in control schools were available. Nevertheless, the regional education authority and principals of the control schools issued assurances that no other large-scale interventions were taking place (such as, for example, school-wide systemic implementation of an intervention, use of a multi-tier system of support, regular intervention of a coach). Third, the present results were based on six independent analyses (i.e., one for each school climate dimension). This may have increased the risk of a Type I error, but we made this choice because the model was complex and tested with relatively few units at the grade level ($N = 44$ and 40 grades). There were too many parameters to estimate if all six school climate dimensions had been considered simultaneously. Moreover, variation for the school climate variables at the grade level was quite low (ICCs from .06 to .14). This suggests that although grades differed in terms of average school climate responses, there was also a considerable amount of variation between students within the same grade. The introduction of “grade” as a Level 2 unit of analysis is specific to how prevention and intervention programs are implemented and evaluated in the French educational context. Studies generally target the school level where ICCs for school climate variables are also quite low (often $< .10$ and rarely $> .20$; Marsh, 2012; see also Bear et al., 2011, Konold et al., 2015, or Waasdorp et al., 2020, with ICCs between .02 and .18). Therefore, these low ICCs highlight the need to account for the variability of students' individual perceptions across time in addition to what has been implemented at the grade level. However, given that the present study was not designed to account for this variability, it appears necessary to replicate such findings with a study collecting individual-level data from the same students over time. Moreover, the inclusion of more schools over a longer period would allow for a more rigorous examination of the effects of implementation fidelity in the intervention group (and go beyond simply examining the effects produced by SWPBIS, whether implemented or not).

Beyond these limitations, the data and the results of the present study contribute in various ways to both the SWPBIS and school climate research. Until now, most SWPBIS effects had been found for variables such as suspension rates or office discipline referrals (Gage et al., 2019; Kim et al., 2018; Pas et al., 2019). School climate dimensions were generally not considered despite their significant impact on students' trajectories. In addition, when school climate was measured, studies generally collected adults' reports (Bradshaw et al., 2008, 2009) and rarely considered students' perceptions. There is also a dearth of research on the effects of SWPBIS outside the United States. The present study focused on six school climate dimensions that were estimated by using data from adolescents' perceptions. Furthermore, it is one of the few studies to have documented the effects of SWPBIS in a different cultural context than the one in which it was developed and designed. Lastly, the high ecological validity of the effectiveness study design used here was also a strength that allowed us to overcome some of the limitations of efficacy studies. In efficacy studies, the intervention is driven by the researchers themselves in ideal, highly controlled conditions. Although this type of design often yields convincing results, these results are not necessarily replicated when the intervention is applied in real-life practice (Hagermoser-Sanetti & Collier-Meek, 2019; Kim, 2019). In the present study, the results were obtained under the most ecologically valid conditions possible: SWPBIS was imported, piloted, and directly implemented by regular educational professionals and by their regional education authority.

Conclusion

After controlling for individual and contextual variables, SWPBIS was found to have positive effects on three school climate dimensions perceived by adolescents: educational climate, teacher-student social climate, and climate of safety. These positive associations were independent of baseline school climate values. This suggests that, even in groups where these dimensions are perceived positively, implementing SWPBIS may prove beneficial. These

encouraging conclusions may be of particular interest in cultural contexts where educational practices are further removed from what SWPBIS proposes. Overall, these results suggest that SWPBIS may provide a promising approach that can capture the attention of administrators, researchers and policymakers who are considering measures to improve school climate.

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Declarations of interest

None.

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Table 1
Means (Standard Deviations) and Correlations among Main (Uncentered) Study Variables for SWPBIS and Control Grades

	SWPBIS	Control	t	Cohen's <i>d</i>	1	2	3	4	5	6	7	8	9	10	11	12
1. Age	12.64 (1.21)	12.75 (1.25)	3.80***	0.093	-	-.30**	-.20**	-.13**	.03	-.30**	-.30**	-	-	-	-	-
2. Educational climate T2	4.51 (1.03)	4.44 (1.03)	-2.52*	-0.062	-.22**	-	.59**	.57**	.26**	.63**	.69**	-	-	-	-	-
3. Teacher-student social climate T2	4.13 (0.94)	3.99 (0.97)	-5.65***	-0.138	-.15**	.56**	-	.47**	.26**	.48**	.57**	-	-	-	-	-
4. Between-students social climate T2	4.01 (1.11)	3.99 (1.07)	-0.67	-0.018	-.11**	.55**	.37**	-	.37**	.48**	.50**	-	-	-	-	-
5. Climate of safety T2	4.44 (1.11)	4.41 (1.10)	-1.29	-0.032	.02	.25**	.24**	.29**	-	.30**	.33**	-	-	-	-	-
6. Climate of belonging T2	4.62 (1.19)	4.66 (1.18)	1.39	0.034	-.25**	.60**	.50**	.46**	.29**	-	.57**	-	-	-	-	-
7. Climate of fairness T2	3.39 (0.85)	3.32 (0.87)	-3.50***	-0.086	-.24**	.65**	.57**	.46**	.33**	.54**	-	-	-	-	-	-
<i>Level 2 (n=84 grades)</i>																
1. Between-students social climate T1	x	x			-	x	x	x	x	x	x	x	x	x	x	x
2. Educational climate T2	4.51 (0.43)	4.44 (0.36)	-6.69***	-0.164	x	-	.87**	.88**	.27**	.93**	.69**	.86**	.78**	.11**	.81**	.83**
3. Teacher-student social climate T2	4.13 (0.32)	3.99 (0.33)	-16.47***	-0.402	x	.80**	-	.83**	.44**	.80**	.82**	.77**	.85**	.26**	.80**	.80**
4. Between-students social climate T2	4.01 (0.26)	3.98 (0.32)	-3.26**	-0.086	x	.71**	.62**	-	.54**	.83**	.81**	.75**	.69**	.30**	.66**	.70**
5. Climate of safety T2	4.44 (0.31)	4.41 (0.28)	-4.73***	-0.116	x	.17**	.23**	.22**	-	.30**	.27**	.28**	.34**	.63**	.28**	.30**
6. Climate of belonging T2	4.62 (0.46)	4.66 (0.41)	3.68***	0.090	x	.91**	.72**	.70**	.16**	-	.89**	.81**	.70**	.15**	.78**	.80**
7. Climate of fairness T2	3.40 (0.29)	3.32 (0.87)	-9.82***	-0.240	x	.90**	.79**	.70**	.18**	.83**	-	.81**	.70**	-.02	.79**	.80**
8. Educational climate T1	4.47 (0.42)	4.55 (0.32)	7.939***	0.197	x	.66**	.42**	.39**	-.12**	.69**	.51**	-	.79**	.29**	.87**	.94**
9. Teacher-student social climate T1	4.14 (0.39)	4.11 (0.36)	-2.997**	-0.074	x	.68**	.47**	.48**	.01	.62**	.57**	.89**	-	.33**	.83**	.85**
10. Climate of safety T1	4.52 (0.34)	4.55 (0.19)	4.365***	0.108	x	.034	-.06**	.052	.21**	-.04*	-.05**	.39**	.45**	-	.20**	.31**
11. Climate of belonging T1	4.67 (0.47)	4.77 (0.44)	8.944***	0.222	x	.66**	.33**	.42**	-.12**	.75**	.56**	.91**	.81**	.26**	-	.91**
12. Climate of fairness T1	3.43 (0.33)	3.44 (0.28)	1.101	0.027	x	.69**	.41**	.42**	-.07**	.67**	.59**	.91**	.90**	.35**	.89**	-

Note. Correlations above the diagonal are for the control sample and are below the diagonal for the intervention sample. X = not available. Only the main variables of the study are included. Correlations with contextual variables are available from the authors on request. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2*Main Models and Models with Interactions Predicting Students' Outcomes: Perceptions of Educational Climate, Teacher-Student Social Climate, and Climate of Belonging Within Grade Level*

	Educational climate T2				Teacher-student social climate T2				Climate of belonging T2			
	A. Unconditional model	B. Main models	C. Outcome at baseline	D. SWPBIS and interaction	A. Unconditional model	B. Main models	C. Outcome at baseline	D. SWPBIS and interaction	A. Unconditional model	B. Main models	C. Outcome at baseline	D. SWPBIS and interaction
ICC	0.14				0.11				0.13			
Design effects	12.12				9.73				11.32			
<i>Level 1</i>												
Age	0.034	0.032	0.032	0.032	0.062**	0.063**	0.063**	0.063**	-0.070**	-0.057*	-0.057*	-0.057*
Sex	-0.046*	-0.049*	-0.049*	-0.049*	-0.114***	-0.125***	-0.125***	-0.125***	-0.102***	-0.098***	-0.098***	-0.098***
R ²	0.001	0.001	0.001	0.001	0.005**	0.006**	0.006**	0.006**	0.003*	0.003*	0.003*	0.003*
<i>Level 2</i>												
School size	0.000	-0.001*	-0.001*	0.000	0.000	0.000*	0.000*	0.000	0.001	0.000	0.000	0.000
Resources	0.795	-0.541	-0.541	-0.232	0.508	0.089	0.089	0.427	0.788	-0.234	-0.187	-0.187
Disadvantaged students	0.003	0.000	0.000	-0.002	0.000	-0.003	-0.003	-0.005	-0.001	-0.001	-0.002	-0.002
Backlog before Grade 6	-0.002	-0.005	-0.005	-0.015	-0.014	-0.015	-0.015	-0.025*	-0.008	-0.005	-0.011	-0.011
Team instability	-0.012*	-0.001	-0.001	0.000	-0.004	0.003	0.003	0.004	-0.010	-0.002	-0.002	-0.002
Parental involvement	0.014**	0.001	0.001	0.000	0.011**	0.004	0.004	0.003	0.012	0.005	0.004	0.004
Outcome at baseline	-	0.753***	0.753***	0.671***	-	0.549***	0.549***	0.440***	-	0.706***	0.706***	0.737***
SWPBIS	-	-	-	0.133*	-	-	-	0.139*	-	-	0.052	0.052
BL*SWPBIS	-	-	-	0.124	-	-	-	0.151	-	-	-0.057	-0.057
R ²	.152*	0.660***	0.660***	0.686***	0.217**	0.592***	0.592***	0.630***	0.138	.654***	.654***	.658***
R ² change	.152*	0.508***	0.508***	0.026***	0.217**	0.375***	0.375***	0.038***	0.138	.516**	.516**	0.004***
<i>Model fit</i>												
Log likelihood	-9258.117	-8844.946	-8844.946	-8842.713	-8998.881	-8967.879	-8570.276	-8567.407	-10354.593	-10332.395	-9910.630	-9910.337
Deviance	-18516.234	-17689.892	-17689.892	-17685.426	-17997.762	-17935.758	-17140.552	-17134.814	-20709.186	-20664.790	-19821.260	-19820.674
Free parameters	3	11	12	14	3	11	12	14	3	11	12	14
AIC	18522.234	18508.350	17713.891	17713.425	18003.762	17957.757	17164.552	17162.814	20715.187	20686.790	19845.260	19848.674
BIC	18542.642	18583.168	17795.914	17808.107	18024.214	18032.738	17245.884	17257.702	20735.637	20761.767	19926.592	19943.562

Note. BL = outcome at baseline (T1); AIC = Akaike information criterion; BIC = Bayesian information criterion. Sex: 1 = girls and 2 = boys. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3

Main Models and Models with Interactions Predicting Students' Outcomes: Perceptions of Climate of Fairness, Between-Student Social Climate, and Climate of Safety Within Grade Level

	Climate of fairness T2				Between-students social climate T2				Climate of safety T2			
	A. Unconditional model	B. Main models	C. Outcome at baseline	D. SWPBIS and interaction	A. Unconditional model	B. Main models	C. Outcome at baseline	D. SWPBIS and interaction	A. Unconditional model	B. Main models	C. Outcome at baseline	D. SWPBIS and interaction
	ICC 0.12				0.06				0.06			
Design effect	10.53				5.76				5.76			
<i>Level 1</i>												
Age		-0.007	-0.011	-0.011		0.031	-	0.031		-0.089**	-0.094***	-0.094***
Sex		-0.104***	-0.109***	-0.109***		0.045	-	0.045		0.017	0.022	0.022
R ²		0.004**	0.005**	0.005**		0.001	-	0.001		0.002	0.002	0.002
<i>Level 2</i>												
School size		0.000	0.000	0.000		0.000	-	0.000		0.000	0.000	0.000
Resources		0.248	-0.466	-0.288		0.267	-	0.514		0.684	0.292	0.621
Disadvantaged students		0.000	0.000	-0.002		0.000	-	-0.004		-0.012**	-0.013**	-0.018***
Backlog before Grade 6		-0.001	-0.006	-0.012		-0.018	-	-0.029*		-0.035***	-0.032***	-0.053***
Team instability		-0.003	0.004	0.004		-0.012**	-	-0.011*		-0.008*	-0.002	-0.001
Parental involvement		0.005	-0.003	-0.003		0.005	-	0.003		0.002	-0.001	-0.003
Outcome at baseline		-	0.747***	0.687***		-	X	-		-	0.295**	0.342
SWPBIS		-	-	0.084		-	-	0.131		-	-	0.213***
BL*SWPBIS		-	-	0.081		-	-	-		-	-	-0.110
R ²		0.034	.562***	0.576***		0.195*	-	0.236**		0.387***	0.490***	0.599***
R ² change		0.034	.528***	0.014***		0.195*	-	0.041**		0.387***	0.103***	0.109***
Model fit												
Log likelihood		-8172.104	-7828.399	-7827.309		-8848.182	-	-8846.744		-10104.425	-9708.897	-9702.957
Deviance		-16384480	-15656.798	15654618		-17696.364	-	-17.693.488		-20208.850	-19417.794	-19405.914
Free parameters		3	11	14		11	-	12		11	12	14
AIC		16390.480	16366.209	15682.619		17718.364	-	17717.489		20218.678	19441.793	19433.915
BIC		16401.393	16441.173	15777.491		17750.356	-	17797.762		20300.476	19523.129	19528.807

Note. BL = outcome at baseline (T1); ICC = intraclass correlation; AIC = Akaike information criterion; BIC = Bayesian information criterion; X = not available. Sex: 1 = girls and 2 = boys. * $p < .05$. ** $p < .01$. *** $p < .001$.