

Perceived school climate and school grades in secondary school students: The mediating effect of self-determined motivation

Jérémie Verner-Filion^{a,*}, Marie-Hélène Véronneau^b, Marie-Claire Vaillancourt^b,
Cécile Mathys^c

^a Université du Québec en Outaouais, Canada

^b Université du Québec à Montréal, Canada

^c Université de Liège, Belgium

ARTICLE INFO

Keywords:

School climate
Academic motivation
Grades
Secondary school

ABSTRACT

Students' perception of school climate plays an important role in the quality of their academic experience. However, the effects of perceived school climate on self-determined academic motivation (Ryan & Deci, 2000, 2020) have received little empirical attention to this day. Thus, the present study aimed to investigate the role of school climate in predicting changes in self-determined academic motivation and grades in a longitudinal study with secondary school students. Participants are 957 Belgian students (girls = 52.87 %; $M_{\text{age}} = 14.41$ years, $SD_{\text{age}} = 1.66$ years) who took part in a three-wave, year-long study. Results from structural equation modeling showed that students' positive perceptions of school climate at the beginning of the study (Time 1) were positively related to changes in self-determined academic motivation at the mid-point (Time 2), which in turn were positively associated with changes in grades by the end of the study (Time 3), over and above the effects of gender and age. These results have implications for educational psychology by suggesting that organizational aspects of the school setting can positively influence students' academic grades through increases in the quality of their motivation over time.

1. Introduction

The social environment of adolescents plays a key role in determining their motivation toward school (e.g., Patrick, Ryan, & Kaplan, 2007). Ample evidence has shown that significant adults, such as parents and teachers, can have a positive influence on the quality of students' motivation toward school by supporting their autonomy, rather than interacting in a controlling fashion (e.g., Jungert & Koestner, 2015; Vallerand, Fortier, & Guay, 1997). In addition to direct interactions with parents and teachers, experiences emerging from a coalescence of factors stemming from the general school environment may come to influence adolescents' motivation for school (e.g., Eccles et al., 1993). In fact, students spend a large portion of their time within their academic institution throughout the school year. Consequently, the nature and quality of the school climate may significantly influence the quality of students' motivation towards school and their educational success. Evidence for this claim comes from research showing that positive perceptions of school climate are related to indicators of psychosocial and

academic adjustment, such as low use of violence, substance abuse, and absenteeism, as well as high levels of mental and physical health, and better grades (see Thapa, Cohen, Guffey, & Higgins-D'Alessandro, 2013; Zullig, Koopman, Patton, & Ubbes, 2010, for reviews). However, past research has seldom investigated the mediating variables that may explain this relationship. We propose that perceiving school climate as positive (e.g., fair, instructive, safe, and warm) is beneficial for student's self-determined motivation. More precisely, positive perceptions of school climate should help students to engage in their school tasks out of autonomous (*wanting to*), rather than out of controlled (*having to*) motives. In turn, self-determined motivation should help students reach higher grades in school (Ryan & Deci, 2020). In other words, the association between students' positive perceptions of their school climate and their academic grades is likely to be mediated by their self-determined motivation.

* Corresponding author at: Département des sciences de l'éducation, Université du Québec en Outaouais, 283, boulevard Alexandre-Taché, C.P. 1250, succursale Hull, Gatineau, Québec J8X 3X7, Canada.

E-mail address: jeremie.verner-filion@uqo.ca (J. Verner-Filion).

<https://doi.org/10.1016/j.cedpsych.2023.102202>

2. The school climate

School climate reflects the prevailing expectations, norms, and values in a school (Zullig et al., 2010). Students' perceptions of the school climate help guide their interpretation of the demands that are put upon them and decide how to act accordingly (Janosz, Pascal, & Galand, 2012). School climate has been shown to be stable (Hoy, Hannum, & Tschannen-Moran, 1998), to be distinguishable across different academic institutions (Janosz, Georges, & Parent, 1998), and to influence students' behavior in school (Kidger, Araya, Donovan, & Gunnell, 2012; Wang & Degol, 2016). Moreover, students from the same school can have different perceptions of the school climate, and those individual differences play a role in students' academic adjustment (Way, Reddy, & Rhodes, 2007).

Janosz and colleagues (2007; 1998) have developed a taxonomy describing the components of school climate as perceived by students. Their conceptualization encompasses five dimensions, namely: (a) *educational climate*, which refers to the student's perception of the school staff's efforts to promote quality learning, achievement, and well-being; (b) *security climate*, which relates to the student's perceptions of safety when in school; (c) *relational climate*, which reflects the student's perceptions of the quality of their relationships with their peers and with adults in the school; (d) *affiliation climate*, which refers to the student's sense of pride and importance they grant to their particular school, as well as the degree to which they adhere to the school's norms and values; and (e) *justice climate*, which denotes the student's perception of equity and fairness regarding the school's rules and their application.

The quality of school climate is an important variable to consider when predicting students' adjustment through the secondary school years. In fact, schools that foster a sense of structure, stability and security, as well as opportunities for relational warmth and belongingness, challenges and support in their schoolwork, are beneficial to students' adjustment (Janosz & Bouthillier, 2007; Janosz et al., 1998; Roeser & Eccles, 1998; Zullig et al., 2010). In their review of the topic, Thapa and colleagues (2013) showed that students' favorable perceptions of school climate were related to a host of positive outcomes, such as higher self-esteem and psychological well-being. Research also demonstrated that positive school climate was related to indicators of academic engagement from an affective, behavioral, and cognitive standpoint (Fatou & Kubiszewski, 2018), including low rates of suspension and dropout in secondary school (Lee, Cornell, Gregory, & Fan, 2011). Positive perceptions of school climate have also been linked with grades at different levels of schooling, from elementary to secondary school (Daily, Mann, Kristjansson, Smith, & Zullig, 2019; MacNeil, Prater, & Busch, 2009). However, research has yet to investigate the associations between students' perceptions of school climate and their motivation toward schools, especially when trying to explain their academic grades.

Considering the importance of motivation in the academic domain (Ryan & Deci, 2020), researchers have tried to identify the factors that may promote high-quality motivation in students. In this context, the Self-Determination Theory (SDT) is a useful framework to guide our research efforts (Ryan & Deci, 2017). SDT is a humanistic theory of human motivation that has been applied to a host of domains, including education. Overall, this theory posits that students (like any human) have an innate desire and propensity for growth and optimal development. The theory also proposes that students are influenced by the social context in which they evolve, which will either support or thwart their motivation. Thus, beyond individual differences, such as the satisfaction of the basic psychological needs of autonomy, competence, and relatedness (e.g., Ciani, Sheldon, Hilpert, & Easter, 2011), personality traits (e.g., Turban, Tan, Brown, & Sheldon, 2007), and perfectionism (e.g., Miquelon, Vallerand, Grouzet, & Cardinal, 2005), SDT posits that the social environment also plays a pivotal role in influencing academic motivation (Ryan & Deci, 2017). School climate is a promising topic of study, as it brings together many key aspects of human dynamics in the school that contribute to students feeling safe and connected within

their academic setting. However, little empirical attention has been devoted to the role of perceived school climate on academic motivation. Of importance, studies have yet to investigate the mediating role of academic motivation from the perspective of SDT in the relationship between students' perceptions of school climate and academic grades using a longitudinal design.

3. Academic motivation

Students' motivation toward school is a central factor in determining the quality of academic adjustment. Here again, SDT offers some insight into the psychological dynamics that contribute to adolescents' experiences and success in school. More precisely, SDT suggests that motivation ranges on a continuum from autonomous (*wanting to*), to controlled (*having to*), to the absence of motivation (Ryan & Deci, 2017). At one end of the continuum, individuals who experience autonomous motivation undertake their studies for their own sake and for the inherent pleasure of knowing, accomplishing, or experiencing stimulation while learning. At the other end, students who experience controlled motivation do not undertake their studies for their own sake but as a means to an end, whether it be to relieve internal feelings of guilt, to please one's parents, to get a reward, or to avoid punishment. Amotivation – the absence of motivation – happens when students do not experience any sense of personal causation or volition.

As mentioned above, SDT suggests that the quality of the social environment in which students evolve is likely to influence their academic motivation. As such, positive and supportive settings are likely to contribute to the development and maintenance of self-determined motivation for school. In fact, the role of proximal social agents in the development of motivation has received considerable attention. Research showed that autonomy support provided by parents, teachers, and coaches (for the sports domain) is a key factor in the development of autonomous, rather than controlled, motivation (e.g., Gaudreau et al., 2016; Lavigne, Vallerand, & Miquelon, 2007; Niemiec et al., 2006; Soenens & Vansteenkiste, 2005; Vallerand et al., 1997). In addition to autonomy support, the presence of structure in the classroom has also been identified as a determinant of academic motivation (e.g., Archambault et al., 2020; Jang, Reeve, & Deci, 2010; Vansteenkiste et al., 2012). Yet, the school's social environment also encompasses more distal, structural dimensions that are likely to influence students' motivation. School climate is one of those variables. By evolving in a school that offers a positive environment with regards to their learning (i.e., educational climate), security (i.e., security climate), relationships with others (i.e., relational climate), and sense of belonging (i.e., affiliation climate), while being treated fairly (i.e., justice climate), students would be more likely to enjoy school, to identify to it, and would attend because they want to be at school, rather than feeling constrained to go. More specifically, students who perceive their school climate to be positive at the inception of the academic year are more likely to partake in their academic curriculum out of self-determined academic motivation through the school year.

In turn, self-determined academic motivation has been directly linked with a host of positive academic outcomes, such well-being and persistence in school (Bonneville-Roussy, Evans, Verner-Filion, Vallerand, & Bouffard, 2017; Miquelon et al., 2005; Vallerand et al., 1997). In addition, motivation is a main factor in explaining achievement and grades in the educational domain (e.g., Fortier, Vallerand, & Guay, 1995; Leroy & Bressoux, 2016; Ruiz-Alfonso & León, 2017; Taylor et al., 2014). However, only a handful of studies have investigated these associations using a longitudinal perspective (Affuso, Bacchini, & Miranda, 2017; Froiland & Worrell, 2016; Guay, Ratelle, Roy, & Litalien, 2010; Taylor et al., 2014). As noted by Ratelle et al. (2007), longitudinal studies are important to better understand the developmental sequence stemming from the contextual antecedents of academic motivation (e.g., school climate) to its achievement-related outcomes (i.e., grades). This is especially important when studying adolescent

populations because students' motivation tends to decrease during secondary school years, which may in some cases lead to school dropout (e.g., Gillet, Vallerand, & Lafrenière, 2012; Kiemer, Gröschner, Pehmer, & Seidel, 2015; Scherrer & Preckel, 2019).

4. The present study

The quality of the social environment in which students evolve influences their academic motivation. As such, positive and supportive educational settings are likely to contribute to the development and maintenance of self-determined motivation for school. In turn, self-determined motivation has been linked with academic performance. The main objective of the current study is thus to test the mediating role of academic motivation in the relationship between perceived school climate and academic grades over a year in a sample of secondary school students. Specifically, we hypothesized that: 1) Perceptions of school climate as promoting learning, security, affiliation, justice, and high-quality relationships with peers and adults at school would trigger increases in academic motivation between the beginning (Time 1) and the mid-point (Time 2) of the academic year; 2) Increases in academic motivation would be positively related to increases in grades (measured from school records) from Time 1 to the end of the academic year (Time 3); 3) academic motivation would be a significant mediator of the association between school climate and school grade, and 4) all hypothesized effects would remain significant while controlling for students' gender and age.

5. Method

5.1. Participants and procedure

Participants were 957 Belgian students (506 females, 450 males, 1 missing), with a mean age of 14.410 years ($SD = 1.664$ years) attending a single Catholic French-speaking high school. Most students were originating from Belgium (91.3 %). The socio-economical status of students attending this school was comparable to the national average. Participants from the first through the fifth grade of this secondary school completed paper-pencil questionnaires in class at three occasions over a year. Questionnaires were administered by two trained research assistants. Participants were informed that their participation was voluntary, and that the data would remain anonymous and confidential. All measures were administered in French. The students completed the Time 1 questionnaire in March 2012. Time 2 took place in November 2013, while Time 3 occurred in March 2013.

5.2. Measures

Student's perceptions of school climate. The Socio-Educational Environment of Schools Questionnaire (Janosz & Bouthillier, 2007) includes 166 items capturing three broad dimensions of the socio-cultural environment of schools. Students' perceptions of school climate were assessed using 33 items at Time 1. All items were answered using a six-point scale ranging from 1 (*I do not agree at all*) to 6 (*I strongly agree*). Janosz and colleagues' (2007; 1998; 1997) conceptualization of students' perceptions of school climate encompasses the most commonly acknowledged dimensions in the literature, namely relational climate (10 items; e.g., "Students mostly get on well together at this school"), educational climate (7 items; e.g., "At this school, we can feel it's important to study and obtain a diploma"), climate of security (6 items; e.g., "At this school, many of the students are afraid of other students" – reverse-coded), justice climate (4 items; e.g., "At this school, students are treated fairly"), and affiliation climate (6 items; e.g., "I like this school"). An inspection of the correlations between the five dimensions suggest that they are strongly correlated to one another ($r = 0.163$, $p < .001$ to $r = 0.640$, $p < .001$). Consequently, all five dimensions were aggregated to form a single factor representing school climate ($\alpha =$

0.900, $\omega = 0.898$; Hayes & Coutts, 2020).

Academic motivation. Students' motivation toward their studies was assessed at Time 1 and Time 2 using the 28-item Academic Motivation Scale (AMS; Vallerand et al., 1992). Students were asked to indicate why they did go to school and answered the 28 items using a 5-point Likert-type scale ranging from 1 (*I strongly disagree*) to 5 (*I strongly agree*). This scale contains seven 4-item subscales assessing different types of academic motivation using SDT's perspective. Three subscales assessed students' intrinsic motivation for knowledge (e.g., "Because I experience pleasure and satisfaction while learning new things"), stimulation (e.g., "For the high feeling that I experience while reading about various interesting subjects"), and accomplishment (e.g., "For the pleasure I experience while surpassing myself in my studies"). Along with intrinsic motivation, the scale also assessed another type of autonomous motivation, namely, identified motivation (e.g., "Because I think that a high-school education will help me better prepare for the career I have chosen"). With regards to the controlled end of the continuum, the AMS assesses introjected motivation (e.g., "To prove to myself that I can do better than just a high school degree"), external regulation (e.g., "In order to get a more prestigious job later on"), and amotivation for school (e.g., "Honestly, I don't know; I really feel that I'm wasting my time in school"). Using all of those subscales, the Relative Autonomy Index (RAI; Grolnick & Ryan, 1987) was calculated. The RAI allows for the contrasting of the relative use of autonomous motivation compared to controlled motivation while allowing for a parsimonious representation of motivation. The RAI is calculated using the following formulae: $[(2 * (IM\ knowledge + IM\ accomplishment + IM\ stimulation) / 3 + 1 * identified\ regulation) - ((1 * (external\ regulation + introjected\ regulation) / 2 + 2 * (amotivation)))]$. This algorithm has been vastly used when calculating the RAI within the academic domain (Guay, Mageau, & Vallerand, 2003; Guay et al., 2010; Ratelle, Vallerand, Chantal, & Provencher, 2004; Soenens & Vansteenkiste, 2005; Vallerand et al., 1997). Although the use of the RAI has received some criticism (Chemolli & Gagné, 2014; Losier & Koestner, 1999), results from a recent meta-analysis of over 486 samples and 205,000 participants demonstrated the continuum-like structure of self-determination (Howard, Gagné, & Bureau, 2017). Such results support the validity of the single motivation score in order to represent academic motivation. In the current study, the RAI showed good reliability on the basis of the coherence between the subscales that were combined to compute it, both at Time 1 ($\alpha = 0.873$, $\omega = 0.887$) and Time 2 ($\alpha = 0.872$, $\omega = 0.886$).

Academic grades. Students' grades in French (i.e., students' main language) and mathematics at the beginning (Time 1) and at the end (Time 3) of the study were obtained through school records. Grades were chosen as an outcome measure because they represent a highly valued and easily accessible indicator of academic achievement used by students, parents, and teachers (Gladstone, Häfner, Turci, Kneißler, & Muenks, 2018). Grades in secondary school are also a key factor in shaping students' academic trajectories by influencing the quality of the university, program, or internship to which students will have access to (Hillmert & Jacob, 2010; Parker et al., 2012). Using grades from school records as an indicator of academic achievement has been frequently used in recent research (Bonneville-Roussy et al., 2017; Chatzisarantis et al., 2019; Gladstone et al., 2018; Park, Yu, Baelen, Tsukayama, & Duckworth, 2018). In the current study, grades were reported in percentage, ranging from 20.00 % to 92.50 % at Time 1 and from 15.00 % to 90.00 % at Time 3. Grades in French and mathematics showed good reliability, both at Time 1 ($r = 0.515$, $p < .001$) and Time 3 ($r = 0.419$, $p < .001$).

5.3. Analytical strategy

The main analyses were a path analysis performed using structural equation modeling (SEM) in MPlus 7.3 (Muthén & Muthén, 2012). Prior to analyses, all variables were examined for accuracy of data entry and fit between their distributions and the assumptions underlying

maximum likelihood procedures (Tabachnick & Fidell, 2007). Since motivation has been shown to decrease as students progress through high school (e.g., Gillet et al., 2012; Kiemer et al., 2015; Scherrer & Preckel, 2019) intraclass correlations (ICCs) were inspected to test whether the variance in our variables differed as a function of the grade level of students. Also, because all students attended the same school, and because secondary school students have distinct teachers for all subjects (e.g., French, mathematics, science, etc.), using grade level was the best option to account for the nested nature of the data. Consequently, the analyses were conducted using the TYPE = COMPLEX command in MPlus to control for the fact that students were nested within grade levels. Although past research has suggested that contextual variables (such as classroom climate) could be analyzed as Level-2 variables using multilevel modeling (Marsh et al., 2012), this strategy did not seem appropriate to the current dataset, which comprised students from a single school. Students thus had the same point of reference when completing the school climate questionnaire (i.e., the same school). Thus, the most appropriate strategy in the present case was to analyse the school climate variable as an individual difference variable (i.e., a Level-1 variable). This analytical strategy was in line with our research question, which aimed at investigating the effects of individual differences in students' perceptions of school climate on their self-determined academic motivation and grades over the course of an academic year. In sum, controlling for the nested structure of the data as a function of grade level using the TYPE = COMPLEX command in MPlus appeared to be the best strategy.

The percentage of missing data in the study was also inspected. Given the relatively small amount of missing data for a 1-year longitudinal study (7.6 % of missing data, overall), the default robust full information maximum likelihood (FIML) procedure in MPlus was used. The primary path analysis (SEM) was performed on a raw data file, using measured variables. The robust maximum likelihood estimation (MLR) procedure was used because it is robust to potential deviations in normality in the dataset. Indirect effects were tested using the bias-corrected bootstrap method (5000 samples with 95 % bias-corrected confidence intervals [CIs]) using the maximum likelihood procedure (ML) because bootstrapping is unavailable using MLR estimation. The following fit indices were given priority in model evaluation: the chi-square statistic (χ^2), the comparative fit index (CFI), the Tucker-Lewis index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean squared residual (SRMR). According to Kline (2011) and Tabachnik and Fidell (2007), the χ^2 should not be statistically significant, the CFI and TLI should be 0.950 or higher, while the RMSEA and SRMR should be at 0.060 or lower for acceptable model fit.

6. Results

Descriptive statistics, bivariate correlations, and ICCs are reported in Table 1. We found that all ICCs were lower than 0.066, except for age, which was to be expected as age strongly correlates with academic level. These results mean that most of the variance in our variables lied within each grade level rather than between them. Nonetheless, analyses using the TYPE = COMPLEX command in Mplus were conducted to control for the intragroup variance of the different grade levels of students. As shown in Fig. 1, results revealed that school climate was positively related to student's academic motivation at Time 2 ($\beta = 0.144$, $SE = 0.067$, 95 % CI = 0.046 to 0.233, $p = .030$). In turn, student's motivation

at Time 2 was positively associated with academic grades at Time 3 ($\beta = 0.208$, $SE = 0.022$, 95 % CI = 0.144 to 0.264, $p < .001$). Those results were obtained while controlling for student's baseline levels of academic motivation and grades (Time 1), as well as their age and gender. Overall, the proposed model presented an excellent fit to the data: χ^2 ($df = 5$, $N = 957$) = 4.366, $p = .498$, CFI = 1.000, TLI = 1.000, RMSEA = 0.000 (0.000, 0.042), SRMR = 0.012^{1,2}. Moreover, the use of the TYPE = COMPLEX command shows that the relations between our variables were stable across the different academic levels of students.

Results from the tests of indirect effect provided support for the mediating role of students' motivation in the relationship between students' perceptions of school climate and increases in academic grades over a year ($\beta = 0.030$, $SE = 0.014$, 95 % CI = 0.011 to 0.054, $p = .038$). Overall, our results supported the hypothesis that a globally positive perception of school climate, which is compounded from various experiences including positive relationships with peers and teachers, engaging learning tasks, as well as feelings of security, belongingness, and justice, is associated with increases in the quality of motivation toward school, which are in turn related to increases in academic grades throughout a full academic year.

7. Discussion

The aim of the present study was to test a model in which positive perceptions of school climate would be indirectly related to increases in grades through the mediating effects of increases in academic motivation during the school year. Those associations were hypothesized to remain significant while controlling for students' gender and age. Overall, the results provided support for all hypotheses. Our results have theoretical and practical implications for the field of education, from both an individual and organizational standpoint.

7.1. On the importance of school climate

Over the past decades, research has shown that positive perceptions of school climate are beneficial to students in a number of ways (see Thapa et al., 2013, for a review). According to Janosz and colleagues' (2007; 1998, 1997) conceptualization of school climate, schools should try to provide students with an environment that promotes a sense of justice, security, and belongingness, as well as high-quality learning and positive relationships with peers and adults in schools. The results of this longitudinal study corroborate the potentially beneficial effects of positive perceptions of school climate on the quality of students' academic motivation over the course of a school year. By having the perception of evolving in a positive school climate, students experience higher degrees of self-determined motivation in the context of their studies. Moreover, positive perceptions of school climate were indirectly related to increases in grades through the mediating effect of increases in academic motivation. In line with past research showing associations between motivation and such positive outcomes as psychological well-being (Miquelon et al., 2005) and school persistence (Vallerand et al., 1997), it seems plausible that academic motivation could mediate the

¹ Additional analyses were also conducted to test if our model could be replicated using the results only in French or in mathematics as dependent variables. Both models were structurally identical to the original model and offered satisfactory fit to the data. For French: χ^2 ($df = 5$, $N = 957$) = 10.312, $p = .007$, CFI = 0.988, TLI = 0.974, RMSEA = 0.033 (0.000, 0.062), SRMR = 0.016; for mathematics: χ^2 ($df = 5$, $N = 957$) = 2.974, $p = .704$, CFI = 1.000, TLI = 1.000, RMSEA = 0.000 (0.000, 0.034), SRMR = 0.010.

² An alternative model was analyzed to test one alternative hypothesis (school climate \rightarrow grades \rightarrow motivation) to our initial model. This alternative model did not fit the data as well as our initial model: $\Delta AIC = 21.833$; χ^2 ($df = 5$, $N = 957$) = 23.381, $p = .003$, CFI = 0.962, TLI = 0.917, RMSEA = 0.062 (0.038, 0.088), SRMR = 0.025.

Table 1
Descriptive Statistics and Bivariate Correlations.

	<i>M</i>	<i>SD</i>	<i>Skew.</i>	<i>Kurt.</i>	<i>ICC</i>	1	2	3	4	5	6
1. Gender	–	–	–	–	0.002						
2. Age	14.420	1.666	0.417	–0.273	0.774	–0.054					
3. T1 School Climate	4.049	0.765	–0.459	0.527	0.010	0.156**	–0.035				
4. T1 Academic Motivation	2.035	3.275	–0.551	0.075	0.002	0.217**	–0.024	0.528**			
5. T1 Grades	57.452	14.613	0.122	–0.182	0.066	0.079*	–0.219**	0.252**	0.268**		
6. T2 Academic Motivation	2.504	3.111	–0.653	0.931	0.008	0.207**	0.018	0.404**	0.553**	0.188**	
7. T3 Grades	58.445	13.248	–0.095	–0.114	0.050	0.096**	0.090*	0.172**	0.246**	0.528**	0.313**

Note. * $p < .05$, ** $p < .01$. For gender, male was coded 0 and female was coded 1. Intraclass correlations (ICC) were calculated as a function of the academic year of students (ranging from first to fifth).

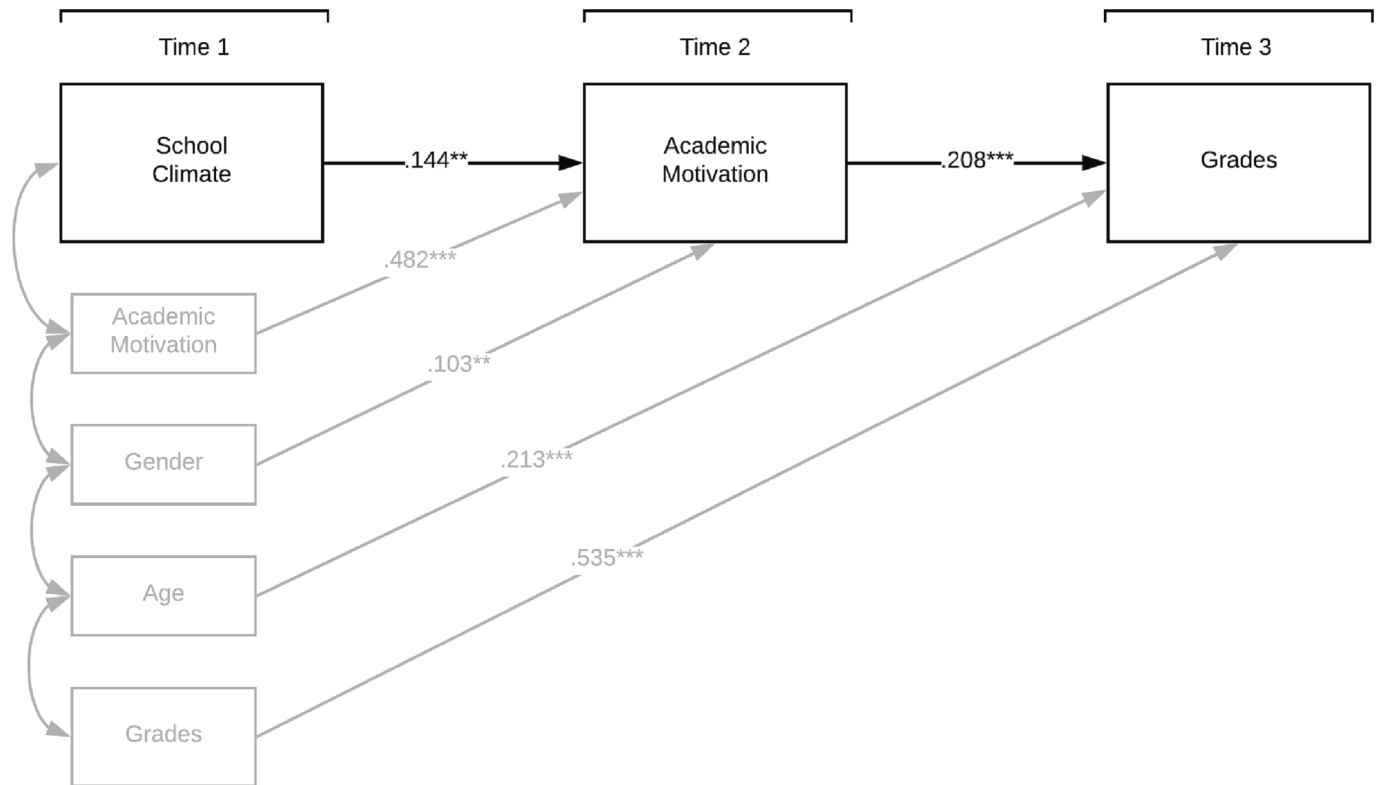


Fig. 1. Final model of the relationship involving perceived school climate, academic motivation and academic achievement. Note. * $p < .05$, ** $p < .01$, *** $p < .001$. N.B. Control variables and their relationships with the mediating variable (i.e., Time 2 academic motivation) and outcome (T3 grades) have been greyed-out to enhance the clarity of the main results.

relationship between perceived school climate and those outcomes as well. Future research is needed to test those hypotheses.

7.2. Implications for SDT

The current study provides additional support for the positive association between academic motivation and academic grades, as put forward by SDT (Affuso et al., 2017; Froiland & Worrell, 2016; Guay et al., 2010; Taylor et al., 2014). Of importance, our findings go beyond typical correlational findings by showing that increases in the quality of students’ academic motivation are positively related to increases in their academic grades across a full academic year.

Further implications for the SDT (Ryan & Deci, 2017) stem from the discovery of a new antecedent of academic motivation—that is, perceived school climate. Past research on the determinants of motivation has mostly investigated the role of proximal social agents. In fact, it has been well-established that academic motivation in adolescent students is nourished by autonomy-supportive teachers and parents (e.g., Jungert & Koestner, 2015; Vallerand et al., 1997). Yet, the effects of

structural, cultural, and organizational aspects of the school context, which translate into students’ perceptions of the school climate, remained relatively uninvestigated. While some research has focused on how the environment provides actual opportunities for autonomy (Philippe & Vallerand, 2008), or how school administrators support teachers’ autonomy (e.g., Vallerand et al., 1997), research has seldom investigated how adolescents’ motivation can be enhanced by broader structural and organizational factors, especially in the academic context.

Although previous studies have already shown that self-determined motivation can foster stronger academic achievement over time, longitudinal studies were still needed to uncover specific aspects of adolescents’ lives that could be efficiently targeted to boost their motivation and ultimately increase their educational success. Our longitudinal design using three time points enabled us to control for baseline levels of academic motivation and grades, and thus to perform a methodologically sound test of mediation. This analysis thus provided clear evidence for the role of environmental factors—that is, school climate—in the development of self-determined motivation through an academic year. Thus, the current research provided further theoretical support for the

importance of self-determined academic motivation as a key process that enhances adolescents' academic grades, and it also provided insights into practical steps that schools can take to improve the quality of students' motivation. In particular, our results suggest that school environments that are fulfilling the students' desires for security, fairness, affiliation, learning, and relational quality help students feel increasingly self-determined in their studies over time. Importantly, this increase in motivation helped students reach higher grades at the end of the year when compared to the beginning. In line with the SDT, our results suggest that the effects of positive perceptions of school climate on grades may be due to an increase in the students' sense of fun, volition, and personal engagement experienced in their studies through the academic year. We hypothesize that positive perceptions of school climate helped students satisfy their basic psychological needs of autonomy, competence, and relatedness in school (Ryan & Deci, 2017), thus enhancing their self-determined academic motivation over time. However, future research incorporating a measure of need satisfaction is needed to test this hypothesis.

Our results can also be interpreted from another perspective, still based on the RAI. As such, feeling that school failed to provide opportunities for safety, fairness, warmth, and learning at the beginning of the year was related to an increase in controlled motivation, relative to autonomous, throughout the academic year. Thus, perceiving the school climate as negative led students to believe that their studies were an instrumental means to either help them obtain a reward (e.g., a diploma, qualifications for a job, a sense of pride or self-worth, etc.) or avoid a punishment (e.g., guilt, disapproval from parents, teachers, or society in general, etc.). In other words, negative perceptions of school climate only led students to further believe that they *had to* go to school. In turn, this increase in controlled motivation was detrimental to their academic grades over time. Overall, the results of the current study provide further support to SDT's tenet that the social environment perceived by students plays a crucial part in helping (or hindering) students to thrive in school.

7.3. Practical implications

From a practical standpoint, current results are encouraging for school staff and administrators, who play a large part in influencing the quality of school climate, as perceived by students. Based on our finding that school climate is a starting point for improving students' motivation and grades, we propose that continuing education training for teachers and other school personnel could aim at making them aware of the five components of school climate and provide tips on how to positively act on each of them on a daily basis (see Voight & Nation, 2016, for a review). Examples of such actions include the creation of opportunities for teachers and school principals to develop high-quality relationships with students, perhaps by organizing together a luncheon, a race, a talent show, or a bake sale, where pleasant interactions and discussions can happen around topics other than formal school subjects. Such activities can help students realize that they can trust their teachers and see that they care and are invested in their well-being, thereby fostering a more positive perception of the relational climate. Relational climate with peers can also be improved by helping students connect with their peers during extracurricular activities, for example. A more secure climate at school could also be achieved by putting in place clear and consistent actions against bullying. School staff may increase students' sense of belongingness by highlighting special achievements from the school community (e.g., a successful fundraiser for a local charity). Furthermore, school administrators can make their environments favorable to learning by providing extra academic support for students who need them, such as teacher-supervised peer tutoring sessions. In their day-to-day interventions, members of the school personnel should be reminded to be mindful of treating students with equality and justice. All of these initiatives can be beneficial for students' positive perceptions of the school climate. In turn, this would contribute to increases in adolescents' self-determined motivation for their studies, and consequently to

improvement in their academic grades.

While past research has shown that a positive school climate is beneficial for a host of academic outcomes (Fatou & Kubiszewski, 2018; Thapa et al., 2013) and that self-determination is conducive to higher grades in the academic domain (Taylor et al., 2014), this study is the first to highlight the quality of the socio-educational environment as a determinant of both increased self-determined motivation and grades across one school year. Last, it is important to note that past research (Heilbrun, Cornell, & Konold, 2018) found that positive perceptions of school climate are related to lower rates of suspensions in school, as well as to lower discrepancies in suspension rates between students from different ethno-cultural backgrounds. Future research is warranted to test if those effects also translate into higher academic motivation and grades. In fact, fostering improvements in the school climate could represent an effective way for school administrators and teachers to increase equity, diversity, and inclusion for all students.

7.4. Strengths and limitations

The current study has some limitations. First, although students' grades were obtained from school records, our other two main variables were self-reported. While students are probably in the best position to report on their school motivation, future studies could benefit from including objective measures of school climate. In fact, recruiting participants from several schools and including objective measures of school climate from independent observers would help determine whether students' subjective perception of school climate remains a significant predictor of academic grades after controlling for objective measures. Recruiting students from distinct schools would further allow for the investigation of the effects of between- and within-school differences in school climate on students' motivation and grades. Such analyses would allow to investigate the role of other potentially relevant characteristics of the school (e.g., rate of suspensions, bullying incidents, staff turnover) or classroom (e.g., goal structure: (mastery/task vs performance/ability; Kaplan, Gheen, & Midgley, 2002; Kaplan & Midgley, 1999).

Second, although our year-long prospective design represents an improvement over cross-sectional designs, the current study does not allow for causal interpretation because its design is not experimental. Along the same lines, future research could further test the directionality of the observed associations using a cross-lagged design—especially when considering that self-determined motivation and academic grades are expected to reciprocally influence one another over time according to the SDT (Deci & Ryan, 2000). Such a design was not possible in our study because all the variables were not assessed at all measurement points. Third, future studies using three or more repeated measurement points for all variables should be used to test the role of perceived school climate on the developmental trajectories of academic motivation and/or grades. Fourth, although grades are highly valued, both within the academic system (i.e., admission to prestigious colleges and universities) and outside (i.e., access to the job market), they represent only a partial indicator of students' functioning. Future studies should try to replicate our current findings using other significant aspects of the academic experience of students, such as their well-being, mental health, academic expectations, or school persistence. Fifth, while the five dimensions of school climate assessed in the model of Janosz et al. (1998; 2007) are encompassed within four of the five historically common climate domains suggested by Zullig et al (2010), it did not measure the quality of the school's facilities. Future research could address this issue.

Finally, future research should also try to replicate the current finding with different populations within the context of education (e.g., elementary school or post-secondary students, students from other countries or from different cultural, socio-demographic or economic backgrounds) to support its generalizability. Because of the ample empirical support of SDT's claim about the universality of the benefits of autonomous motivation (see Chirkov, 2009; Ryan & Deci, 2020), we

believe our results would replicate across different educational contexts. However, we suspect these effects might be stronger with younger students (e.g., elementary and secondary school) compared to older ones (e.g., college or university students). This is because older students are often more autonomous in their studies at baseline, as they have more volition in their choice of program of study, their course load, the institution they attend, or even in their decision to continue (or not) their studies altogether. Thus, we expect that efforts from school staff to create an environment in which students feel safe, respected, and valued would have a greater impact on younger students precisely because a greater number of them attend school because they *have to* – as compared to post-secondary students who pursue their studies more often because they *want to*. The wider range of self-determined motivation levels among secondary school students (from low to high) leaves more room for improvement through interventions on the school climate. Additional work is needed to test this hypothesis. Future research is also required to investigate the effects of additional moderators (e.g., age, gender, ethnicity, presence of learning difficulties, public vs private school) and/or mediators (e.g., need satisfaction/frustration, achievement goals) of the relation between the perceptions of school climate and indicators of students' optimal functioning. Last, investigating whether different facets of school climate might influence students' school motivation, perhaps differently for various subgroups of students, is a promising avenue for future research.

8. Conclusion

In sum, this study is of importance for the field of educational psychology by hinting at structural, cultural, and organizational aspects of adolescents' school experiences by using the rich concept of school climate, and by testing whether perceptions of school climate can affect the quality of their academic motivation. Such findings will contribute to enriching future studies that are anchored in the self-determination framework by highlighting understudied experiences that nourish autonomous motivation in adolescents. In fact, perceiving one's school environment as providing opportunities for quality learning and relationships, while offering a sense of belongingness, safety, and justice, is beneficial to students' motivation and, in turn, to their academic grades.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

References

- Affuso, G., Bacchini, D., & Miranda, M. C. (2017). The contribution of school-related parental monitoring, self-determination, and self-efficacy to academic achievement. *Journal of Educational Research, 110*, 565–574. <https://doi.org/10.1080/00220671.2016.1149795>
- Archambault, I., Pascal, S., Tardif-Grenier, K., Dupéré, V., Janosz, M., Parent, S., & Pagani, L. S. (2020). The contribution of teacher structure, involvement, and autonomy support on student engagement in low-income elementary schools. *Teachers and Teaching: Theory and Practice, 26*(5–6), 428–445. <https://doi.org/10.1080/13540602.2020.1863208>
- Bonneville-Roussy, A., Evans, P., Verner-Filion, J., Vallerand, R. J., & Bouffard, T. (2017). Motivation and coping with the stress of assessment: Gender differences in outcomes for university students. *Contemporary Educational Psychology, 48*, 28–42. <https://doi.org/10.1016/j.cedpsych.2016.08.003>
- Chatzisarantis, N. L. D., Ada, E. N., Ahmadi, M., Caltabiano, N., Wang, D., Thøgersen-Ntoumani, C., & Hagger, M. S. (2019). Differential effects of perceptions of equal, favourable and unfavourable autonomy support on educational and well-being outcomes. *Contemporary Educational Psychology, 58*, 33–43. <https://doi.org/10.1016/j.cedpsych.2019.02.002>
- Chemolli, E., & Gagné, M. (2014). Evidence against the continuum structure underlying motivation measures derived from self-determination theory. *Psychological Assessment, 26*, 575–585. <https://doi.org/10.1037/a0036212>
- Chirkov, V. I. (2009). A cross-cultural analysis of autonomy in education: A self-determination theory perspective. *Theory and Research in Education, 7*(2), 253–262. <https://doi.org/10.1177/1477878509104330>
- Ciani, K. D., Sheldon, K. M., Hilpert, J. C., & Easter, M. A. (2011). Antecedents and trajectories of achievement goals: A self-determination theory perspective. *British Journal of Educational Psychology, 81*, 223–243. <https://doi.org/10.1348/000709910X517399>
- Daily, S. M., Mann, M. J., Kristjansson, A. L., Smith, M. L., & Zullig, K. J. (2019). School Climate and Academic Achievement in Middle and High School Students. *Journal of School Health, 89*(3), 173–180. <https://doi.org/10.1111/josh.12726>
- Eccles, J., Wigfield, A., Midgley, C., Reuman, D., Mac Iver, D., & Feldlaufer, H. (1993). Negative effects of traditional middle schools on students' motivation. *The Elementary School Journal, 93*, 553–574.
- Fatou, N., & Kubiszewski, V. (2018). Are perceived school climate dimensions predictive of students' engagement? *Social Psychology of Education, 21*(2), 427–446. <https://doi.org/10.1007/s11218-017-9422-x>
- Fortier, M. S., Vallerand, R. J., & Guay, F. (1995). Academic motivation and school performance: Toward a structural model. *Contemporary Educational Psychology, 20*, 257–274. <https://doi.org/10.1006/ceps.1995.1017>
- Froiland, J. M., & Worrell, F. C. (2016). Intrinsic motivation, learning goals, engagement, and achievement in a diverse high school. *Psychology in the Schools, 53*, 321–336. <https://doi.org/10.1002/pits>
- Gaudreau, P., Morinville, A., Gareau, A., Verner-Filion, J., Green-Demers, I., & Franche, V. (2016). Autonomy support from parents and coaches: Synergistic or compensatory effects on sport-related outcomes of adolescent-athletes? *Psychology of Sport and Exercise, 25*, 89–99. <https://doi.org/10.1016/j.psychsport.2016.04.006>
- Gillet, N., Vallerand, R. J., & Lafrenière, M.-A.-K. (2012). Intrinsic and extrinsic school motivation as a function of age: The mediating role of autonomy support. *Social Psychology of Education, 15*, 77–95. <https://doi.org/10.1007/s11218-011-9170-2>
- Gladstone, J. R., Häfner, I., Turci, L., Kneißler, H., & Muenks, K. M. (2018). Associations between parents and students' motivational beliefs in mathematics and mathematical performance: The role of gender. *Contemporary Educational Psychology, 54*, 221–234. <https://doi.org/10.1016/j.cedpsych.2018.06.009>
- Grolnick, W. S., & Ryan, R. M. (1987). Autonomy in children's learning: An experimental and individual difference investigation. *Journal of Personality and Social Psychology, 52*, 890–898. <https://doi.org/10.1037/0022-3514.52.5.890>
- Guay, F., Mageau, G. A., & Vallerand, R. J. (2003). On the hierarchical structure of self-determined motivation: A test of top-down, bottom-up, reciprocal, and horizontal effects. *Personality and Social Psychology Bulletin, 29*, 992–1004. <https://doi.org/10.1177/0146167203253297>
- Guay, F., Ratelle, C. F., Roy, A., & Litalien, D. (2010). Academic self-concept, autonomous academic motivation, and academic achievement: Mediating and additive effects. *Learning and Individual Differences, 20*, 644–653. <https://doi.org/10.1016/j.lindif.2010.08.001>
- Hayes, A. F., & Couffts, J. J. (2020). Use Omega Rather than Cronbach's Alpha for Estimating Reliability. But.... *Communication Methods and Measures, 14*(1), 1–24. <https://doi.org/10.1080/19312458.2020.1718629>
- Heilbrun, A., Cornell, D., & Konold, T. (2018). Authoritative school climate and suspension rates in middle schools: Implications for reducing the racial disparity in school discipline. *Journal of School Violence, 17*(3), 324–338. <https://doi.org/10.1080/15388220.2017.1368395>
- Hillmert, S., & Jacob, M. (2010). Selections and social selectivity on the academic track: A life-course analysis of educational attainment in Germany. *Research in Social Stratification and Mobility, 28*(1), 59–76. <https://doi.org/10.1016/j.rssm.2009.12.006>
- Howard, J. L., Gagné, M., & Bureau, J. S. (2017). Testing a continuum structure of self-determined motivation: A meta-analysis. *Psychological Bulletin, 143*, 1346–1377. <https://doi.org/10.1037/bul0000125>
- Hoy, W. K., Hannum, J., & Tschannen-Moran, M. (1998). Organizational climate and student achievement: A parsimonious and longitudinal view. *Journal of School Leadership, 8*, 336–359.
- Jang, H., Reeve, J., & Deci, E. L. (2010). Engaging students in learning activities: It is not autonomy support or structure but autonomy support and structure. *Journal of Educational Psychology, 102*, 588–600. <https://doi.org/10.1037/a0019682>
- Janosz, M., & Bouthillier, C. (2007). Rapport de validation du Questionnaire sur l'Environnement Socioéducatif des écoles secondaires (QES-secondaire). Université de Montréal. Montréal: Université de Montréal.
- Janosz, M., Georges, P., & Parent, S. (1998). L'environnement socioéducatif à l'école secondaire: Un modèle théorique pour guider l'évaluation du milieu. *Revue Canadienne de Psycho-Éducation, 27*, 285–306.
- Janosz, M., LeBlanc, M., Boulerice, B., & Tremblay, R. E. (1997). Disentangling the weight of school dropout predictors: A test on two longitudinal samples. *Journal of Youth and Adolescence, 26*, 733–762. <https://doi.org/10.1023/A:1022300826371>
- Janosz, M., Pascal, S., & Galand, B. (2012). Être témoin de violence à l'école: Son importance et ses liens avec le climat scolaire. In *Prévenir les violences à l'école* (pp. 93–109). Presses Universitaires de France.
- Jungert, T., & Koestner, R. (2015). Science adjustment, parental and teacher autonomy support and the cognitive orientation of science students. *Educational Psychology, 35*, 361–376. <https://doi.org/10.1080/01443410.2013.828826>
- Kaplan, A., Gheen, M., & Midgley, C. (2002). Classroom goal structure and student disruptive behaviour. *British Journal of Educational Psychology, 72*(2), 191–211. <https://doi.org/10.1348/000709902158847>

- Kaplan, A., & Midgley, C. (1999). The relationship between perceptions of the classroom goal structure and early adolescents' affect in school: The mediating role of coping strategies. *Learning and Individual Differences, 11*(2), 187–212. [https://doi.org/10.1016/S1041-6080\(00\)80005-9](https://doi.org/10.1016/S1041-6080(00)80005-9)
- Kidger, J., Araya, R., Donovan, J., & Gunnell, D. (2012). The effect of the school environment on the emotional health of adolescents: A systematic review. *Pediatrics, 129*, 925–949. <https://doi.org/10.1542/peds.2011-2248>
- Kiemer, K., Gröschner, A., Pehmer, A. K., & Seidel, T. (2015). Effects of a classroom discourse intervention on teachers' practice and students' motivation to learn mathematics and science. *Learning and Instruction, 35*, 94–103. <https://doi.org/10.1016/j.learninstruc.2014.10.003>
- Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York: Guilford Press.
- Lavigne, G. L., Vallerand, R. J., & Miquelon, P. (2007). A motivational model of persistence in science education: A self-determination theory approach. *European Journal of Psychology of Education, 22*, 351–369. <https://doi.org/10.1007/BF03173432>
- Lee, T., Cornell, D., Gregory, A., & Fan, X. (2011). High suspension schools and dropout rates for black and white students. *Education and Treatment of Children, 34*, 167–192.
- Leroy, N., & Bressoux, P. (2016). Does amotivation matter more than motivation in predicting mathematics learning gains? A longitudinal study of sixth-grade students in France. *Contemporary Educational Psychology, 44–45*, 41–53. <https://doi.org/10.1016/j.cedpsych.2016.02.001>
- Losier, G. F., & Koestner, R. (1999). Intrinsic versus identified regulation in distinct political campaigns: The consequences of following politics for pleasure versus personal meaningfulness. *Personality and Social Psychology Bulletin, 25*, 287–298. <https://doi.org/10.1177/0146167299025003002>
- MacNeil, A. J., Prater, D. L., & Busch, S. (2009). The effects of school culture and climate on student achievement. *International Journal of Leadership in Education, 12*, 73–84. <https://doi.org/10.1080/13603120701576241>
- Marsh, H. W., Lüdtke, O., Nagengast, B., Trautwein, U., Morin, A. J. S., Abduljabbar, A. S., & Köller, O. (2012). Classroom Climate and Contextual Effects: Conceptual and Methodological Issues in the Evaluation of Group-Level Effects. *Educational Psychologist, 47*(2), 106–124. <https://doi.org/10.1080/00461520.2012.670488>
- Miquelon, P., Vallerand, R. J., Grouzet, F. M. E., & Cardinal, G. (2005). Perfectionism, academic motivation, and psychological adjustment: An integrative model. *Personality and Social Psychology Bulletin, 31*, 913–924. <https://doi.org/10.1177/0146167204272298>
- Muthén, L. K., & Muthén, B. O. (2012). *MPlus. The comprehensive modeling program for applied researchers: User's guide* (7th ed.).
- Niemiec, C. P., Lynch, M. F., Vansteenkiste, M., Bernstein, J., Deci, E. L., & Ryan, R. M. (2006). The antecedents and consequences of autonomous self-regulation for college: A self-determination theory perspective on socialization. *Journal of Adolescence, 29*, 761–775. <https://doi.org/10.1016/j.adolescence.2005.11.009>
- Park, D., Yu, A., Baelen, R. N., Tsukayama, E., & Duckworth, A. L. (2018). Fostering grit: Perceived school goal-structure predicts growth in grit and grades. *Contemporary Educational Psychology, 55*, 120–128. <https://doi.org/10.1016/j.cedpsych.2018.09.007>
- Parker, P. D., Schoon, I., Tsai, Y. M., Nagy, G., Trautwein, U., & Eccles, J. (2012). Achievement, agency, gender, and socioeconomic background as predictors of post-school choices: A multicontext study. *Developmental Psychology, 48*(6), 1629–1642. <https://doi.org/10.1037/a0029167>
- Patrick, H., Ryan, A. M., & Kaplan, A. (2007). Early adolescents' perceptions of the classroom social environment, motivational beliefs, and engagement. *Journal of Educational Psychology, 99*(1), 83–98. <https://doi.org/10.1037/0022-0663.99.1.83>
- Philippe, F. L., & Vallerand, R. J. (2008). Actual environments do affect motivation and psychological adjustment: A test of self-determination theory in a natural setting. *Motivation and Emotion, 32*, 81–89. <https://doi.org/10.1007/s11031-008-9087-z>
- Ratelle, C. F., Guay, F., Vallerand, R. J., Larose, S., & Senécal, C. (2007). Autonomous, controlled, and amotivated types of academic motivation: A person-oriented analysis. *Journal of Educational Psychology, 99*, 734–746. <https://doi.org/10.1037/0022-0663.99.4.734>
- Ratelle, C. F., Vallerand, R. J., Chantal, Y., & Provencher, P. J. (2004). Cognitive adaptation and mental health: A motivational analysis. *European Journal of Social Psychology, 34*, 459–476. <https://doi.org/10.1002/ejsp.208>
- Roeser, R. W., & Eccles, J. (1998). Adolescents' perceptions of middle school: Relation to longitudinal changes in academic and psychological adjustment. *Journal of Research on Adolescence, 8*, 123–158.
- Ruiz-Alfonso, Z., & León, J. (2017). Passion for math: Relationships between teachers' emphasis on class contents usefulness, motivation and grades. *Contemporary Educational Psychology, 51*, 284–292. <https://doi.org/10.1016/j.cedpsych.2017.08.010>
- Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. New York, NY: Guilford Publications.
- Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology, 61*(April), Article 101860. <https://doi.org/10.1016/j.cedpsych.2020.101860>
- Scherrer, V., & Preckel, F. (2019). Development of Motivational Variables and Self-Esteem During the School Career: A Meta-Analysis of Longitudinal Studies. *Review of Educational Research, 89*(2), 211–258. <https://doi.org/10.3102/0034654318819127>
- Soenens, B., & Vansteenkiste, M. (2005). Antecedents and outcomes of self-determination in 3 life domains: The role of parents' and teachers' autonomy support. *Journal of Youth and Adolescence, 34*, 589–604. <https://doi.org/10.1007/s10964-005-8948-y>
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). New York: Allyn & Bacon.
- Taylor, G., Jungert, T., Mageau, G. A., Schattke, K., Dedic, H., Rosenfield, S., & Koestner, R. (2014). A self-determination theory approach to predicting school achievement over time: The unique role of intrinsic motivation. *Contemporary Educational Psychology, 39*, 342–358. <https://doi.org/10.1016/j.cedpsych.2014.08.002>
- Thapa, A., Cohen, J., Guffey, S., & Higgins-D'Alessandro, A. (2013). A review of school climate research. *Review of Educational Research, 83*, 357–385. <https://doi.org/10.3102/0034654313483907>
- Turban, D. B., Tan, H. H., Brown, K. G., & Sheldon, K. M. (2007). Antecedents and outcomes of perceived locus of causality: An application of self-determination theory. *Journal of Applied Social Psychology, 37*, 2376–2404. <https://doi.org/10.1111/j.1559-1816.2007.00263.x>
- Vallerand, R. J., Fortier, M. S., & Guay, F. (1997). Self-determination and persistence in a real-life setting: Toward a motivational model of high school dropout. *Journal of Personality and Social Psychology, 72*, 1161–1176.
- Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Senécal, C., & Vallières, É. F. (1992). The Academic Motivation Scale: A measure of intrinsic, extrinsic and amotivation in education. *Educational and Psychological Measurement, 52*, 1003–1017. <https://doi.org/10.1177/0013164492052004025>
- Vansteenkiste, M., Sierens, E., Goossens, L., Soenens, B., Dochy, F., Mouratidis, A., ... Beyers, W. (2012). Identifying configurations of perceived teacher autonomy support and structure: Associations with self-regulated learning, motivation and problem behavior. *Learning and Instruction, 22*, 431–439. <https://doi.org/10.1016/j.learninstruc.2012.04.002>
- Voight, G., & Nation, M. (2016). Practices for improving secondary school climate: A systematic review of the research literature. *American Journal of Community Psychology, 58*, 174–191. <https://doi.org/10.1002/ajcp.12074>
- Wang, M. T., & Degol, J. L. (2016). School climate: A review of the construct, measurement, and impact on student outcomes. *Educational Psychology Review, 28* (2), 315–352. <https://doi.org/10.1007/s10648-015-9319-1>
- Way, N., Reddy, R., & Rhodes, J. (2007). Students' perceptions of school climate during the middle school years: Associations with trajectories of psychological and behavioral adjustment. *American Journal of Community Psychology, 40*, 194–213. <https://doi.org/10.1007/s10464-007-9143-y>
- Zullig, K. J., Koopman, T. M., Patton, J. M., & Ubbes, V. A. (2010). School climate: Historical review, instrument development, and school assessment. *Journal of Psychoeducational Assessment, 28*, 139–152. <https://doi.org/10.1177/0734282909344205>