



Understanding behavioural engagement and achievement: The roles of teaching practices and student sense of competence and task value

Elizabeth Olivier^{1*} , Benoit Galand², Virginie Hospel² and Sébastien Delliège²

¹Substantive-Methodological Synergy Research Laboratory, Department of Psychology, Concordia University, Montreal, Quebec, Canada

²Université catholique de Louvain, Ottignies-Louvain-la-Neuve, Belgium

Background. Different teaching practices, such as autonomy support and structure, provide students with a positive learning context supporting their engagement, which can operate through their underlying motivation, including sense of competence and task value.

Aims. This study aims at investigating the best configuration (unique or synergistic) between autonomy support and structure to support student behavioural engagement, including compliance, participation, and misbehaviour, and reading achievement. A second objective is to assess students' sense of competence and task value as mediators linking teaching practices to student engagement and achievement.

Sample. The samples included 1,666 7th-grade students and their 85 teachers. Students answered questionnaires and tests at the beginning and the end of the school year.

Methods. Students' perceptions of the use of autonomy support and structure by their Language Arts teacher were aggregated at the classroom level. Students rated their sense of competence and task value in Language Arts class. Twice during the school year, they also reported three facets of their behavioural engagement (compliance, participation, and misbehaviour) and answered a reading comprehension test. Multilevel path analyses using Mplus7 allowed accounting for the nested structure of data.

Results. Student sense of competence mediated the association of student classroom-aggregated perceptions of teacher structure and autonomy support with self-reported participation in the classroom. Task value mediated the association between both teaching practices and student misbehaviour and compliance, as reported by students. Sense of competence was directly associated with later reading achievement, but the indirect effect of teaching practices was not significant. We found no significant interaction (synergistic effect) between teacher autonomy support and structure.

Conclusion. Student classroom-aggregated perception of teacher autonomy support and structure is important to nurture behavioural engagement. However, we found no extra benefit of combining these two dimensions of teaching practices. The processes linking these teaching practices to the three facets of student behavioural engagement

*Correspondence should be addressed to Elizabeth Olivier, Substantive-Methodological Synergy Research Laboratory, Department of Psychology, Concordia University, 7141 Sherbrooke W, Montreal, QC, Canada H4B 1R6 (email: elizabeth.abby.olivier@gmail.com).

were different. As such, to support the various aspects of student engagement, the actions of teachers, as reported by their students, should tap into the mechanisms that are most strongly related to each type of behaviour.

More than prerequisites for educational attainment, student engagement and learning are gateways to professional well-being, life satisfaction, and social success (Lewis, Huebner, Malone, & Valois, 2011; Olsson, McGee, Nada-Raja, & Williams, 2012; Shogren, Garnier Villarreal, Lang, & Seo, 2017). Grounded in Self-Determination Theory (SDT), the Self-System Model of Motivational Development (SSMMD) postulates that student positive engagement and achievement in school take their roots in the learning context (Connell & Wellborn, 1991; Deci & Ryan, 2000). For students to invest energy and learn, they should evolve in an environment supporting personal volition and a sense of being competent at what they do. According to the SSMMD, positive teaching practices are essential ingredients of a classroom promoting student engagement and achievement. This study will investigate how students' classroom-aggregated perception of their teachers' autonomy support and structure contributes to their self-reported behavioural engagement in Language Arts class and actual reading achievement through two motivational processes: sense of competence and task value.

This study has the potential to add to the current state of knowledge in multiple ways. First, researchers have called for a more comprehensive investigation of the distinct and joint contributions of teaching practices (Guay, Roy, & Valois, 2017). This study will do so by assessing two configurations between students' classroom-aggregated perceptions of autonomy support and structure that best promote student behavioural engagement and achievement: the unique and synergistic configurations. Second, as behavioural engagement comprises several distinct behaviours (e.g., participation, compliance, and misbehaviour) (Fredricks *et al.*, 2011), this study will assess whether classroom-aggregated perceptions of teacher autonomy support and structure similarly benefit all three types of behaviours in Language Arts class, as well as student reading achievement. It will further investigate whether the motivational mechanisms (sense of competence and task value) linking teaching practices to student engagement and achievement are similar for the various aspects of teaching practices and student behavioural engagement. Grounded in SDT and SSMMD, this study contributes to guiding decision-makers and practitioners on the best strategies to support student engagement and achievement (Guay, Valois, Falardeau, & Lessard, 2016; Reeve, Jang, Carrell, Jeon, & Barch, 2004).

Teaching practices: Autonomy support and structure

Autonomy support and structure are key aspects of a classroom where students feel motivated to learn (Aelterman *et al.*, 2019). Autonomy support is a set of teaching actions promoting student personal volition. Autonomy-supportive teachers explain to their students why tasks and learning are useful and relevant to them. They encourage independent thinking, questioning, and constructive criticism, which conveys respect for students (Deci & Ryan, 2000). They also allow students to work at their own pace and give them opportunities to make choices, which align the teaching practices with individual interests (Assor & Kaplan, 2001; Belmont, Skinner, Wellborn, & Connell, 1988).

The use of structure in the classroom aims at giving students a sense of their ability to succeed (Connell & Wellborn, 1991). Teacher structure mostly refers to the establishment of clear, predictable, and comprehensive expectations and rules to guide student

attention and actions, as well as consistently enforcing these rules. To provide structure, teachers can also monitor students and give feedback on their abilities to succeed (Belmont *et al.*, 1988; Schunk & Pajares, 2009). Moreover, teachers can help, support, and guide their students towards meeting behavioural and learning expectations, achievement, and success (Skinner & Belmont, 1993).

Student engagement and achievement

Engagement and performance are precursors of the positive schooling outcomes anticipated for students (Janosz *et al.*, 2008). Most students who have good grades show promising engagement trajectories throughout schooling and later on in their professional careers (Olsson *et al.*, 2012). As an indicator of student learning and mastery of academic content, reading achievement is essential for student success in Language Arts, but also in all other subject matter for which learning and success require good reading abilities (Wilson & Trainin, 2007).

Student engagement also facilitates students' learning. Engagement is a multidimensional construct that reflects an underlying motivation to learn (Fredricks, Blumenfeld, & Paris, 2004; Skinner, Furrer, Marchand, & Kindermann, 2008). The present study focuses on the dimension that all conceptualizations agree on: behavioural engagement (Appleton, Christenson, & Furlong, 2008; Reeve & Tseng, 2011). Fredricks *et al.* (2004) defined behavioural engagement as students' positive conduct, involvement in learning and academic tasks, and participation in school-related activities. This dimension is the most crucial predictor of dropout when all dimensions are considered (Archambault, Janosz, Fallu, & Pagani, 2009). Including task- and learning-oriented behaviours such as positive conduct, effort, and participation (Appleton *et al.*, 2008), student behavioural engagement not only predicts academic development, but it also affects the ability of other students in the classroom to focus on academic tasks (Archambault *et al.*, 2009; Barth, Dunlap, Dane, Lochman, & Wells, 2004). While compliance and active participation contribute to a positive classroom climate, withdrawal and disruptiveness deteriorate the climate and demand skilful management from teachers.

Behavioural engagement comprises several distinct sets of behaviours, such as misbehaviour (withdrawal and disruptiveness), participation, and compliance with rules and expectations (Fredricks *et al.*, 2011). Although positive behaviours tend to co-occur in the same students, some students may, for example, follow instructions while not participate, or not pay attention without necessarily being disruptive (Pas, Cash, O'Brennan, Debnam, & Bradshaw, 2015). Several researchers have called for a stricter operationalization of engagement (Azevedo, 2015; Sinatra, Heddy, & Lombardi, 2015). Focusing on each behaviour separately is a strategy to achieve such a consistent operationalization. Advocating for a more fine-grained analysis of student behaviours, Nguyen, Cannata, and Miller (2016) have studied good conduct, participation, and effort as distinct components of student behavioural engagement. Similarly, Hospel, Galand, and Janosz (2016) have disentangled student participation, following instructions, withdrawal, disruptiveness, and absenteeism. An in-depth investigation of the behaviours composing the behavioural dimension of engagement and its antecedents may allow a better grasp of teacher practices supporting specific behaviours in the classroom. The present study assesses three sets of student-reported behaviours included in this dimension (see Table 1): misbehaviour (withdrawal and disruptiveness), compliance with instructions (attention, effort, and homework completion), and participation.

Teaching practices, behavioural engagement, and achievement

The SSMMMD argues that autonomy support and structure are both essential to enhance student engagement and learning (Connell & Wellborn, 1991; Deci & Ryan, 2000). For instance, student perceptions and observer ratings of teacher's autonomy support and structure have been shown to be positively associated with student-reported attention in class (Lietaert, Roorda, Laevers, Verschueren, & De Fraine, 2015), effort (Jang, Reeve, & Deci, 2010), self-regulated learning (Vansteenkiste *et al.*, 2012), and performance in math (Harks, Rakoczy, Hattie, Besser, & Klieme, 2013).

Unique and synergistic configurations

Studies have not yet reached an agreement on how autonomy support and structure practices work in tandem to produce an optimal learning environment. Studies generally assess two possible configurations. On the one hand, some argue that autonomy support and structure both make a unique contribution to student motivation and engagement (Deci & Ryan, 2000). This configuration expects that autonomy support and structure, being two different aspects of teacher pedagogy, will, regardless of the level of the other, benefit student motivation. The results found by Mouratidis, Michou, Aelterman, Haerens, and Vansteenkiste, (2018) and by Nie and Lau (2009) support this conceptualization.

On the other hand, others advocate that autonomy support and structure work best if used together. It may even be that the positive contribution of these teaching practices to student engagement and achievement is conditioned on the simultaneous use of both practices. Reeve, Deci, and Ryan (2004) proposed that only in an autonomy-supportive context can teacher structure enhance student engagement and achievement. Some authors have labelled this conditional configuration a “synergistic” effect between teaching practices (e.g., Vansteenkiste *et al.*, 2012). Some findings support this claim, whereas others do not. For instance, Sierens, Vansteenkiste, Goossens, Soenens, and Dochy (2009) found that students reported higher self-regulated learning when they perceived that their teachers used structure in conjunction with a medium to a high level of autonomy support. Similarly, Vansteenkiste *et al.* (2012) found that students who perceive that their teachers used autonomy support and structure simultaneously were more concentrated, persistent, and less disruptive than students who perceived that their teachers used only one of these practices or none. These studies suggest that autonomy support and structure used in tandem make students feel engaged and have high achievement. In contrast, other studies have found that autonomy support and structure each contribute to student schooling outcomes, motivation, engagement, or achievement – thus supporting the unique contribution hypothesis – but that there is no extra benefit of using both simultaneously (Hospel & Galand, 2016; Jang *et al.*, 2010; Mouratidis *et al.*, 2018). These studies indicate that the two practices are complementary, but not conditional for student engagement. These discrepancies between studies could be the result of the different techniques used. The two studies that found that autonomy support and structure work best in tandem conducted analyses at the student level (which precludes any conclusions regarding classroom learning environment; Sierens *et al.*, 2009; Vansteenkiste *et al.*, 2012). In contrast, the studies that did not find this joint contribution assessed teaching practices at the classroom level (Hospel & Galand, 2016; Jang *et al.*, 2010; Mouratidis *et al.*, 2018).

Table 1. Results from confirmatory factor analysis

		T1	T2	
		Load.	Alpha	Load.
				Alpha
Teaching practices CFA model				
T1: $\chi^2 = 456.84$, $df = 76$, $p < .001$; RMSEA = .05; SRMR = .04; CFI = .94; TLI = .93				
Structure				.80
1.	My teacher explains something twice if we ask him/her	.65		
2.	My teacher checks that each student understands their errors	.56		
3.	My teacher gives clear and simple instructions	.65		
4.	My teacher takes time to explain the instructions to follow	.74		
5.	My teacher helps students who have a personal matter	.52		
6.	My teacher helps students to learn	.69		
7.	My teacher applies the rules the same way for everyone	.50		
Autonomy support				.75
1.	My teacher explains why assignments are important	.51		
2.	My teacher uses everyday life examples to explain the material	.45		
3.	My teacher agrees to discuss the classroom rules with us	.56		
4.	My teacher uses ideas suggested by students	.65		
5.	My teacher gives many choices of assignments	.54		
6.	My teacher allows us to exchange ideas	.61		
7.	My teacher gives us the opportunity to work at our pace	.49		
Student sense of competence CFA model				.70
T1: $\chi^2 = 64.80$, $df = 9$, $p < .001$; RMSEA = .06; SRMR = .03; CFI = .97; TLI = .95				
1.	I think that I am good in Language Arts class	.78		
2.	I know I can succeed in Language Arts class if I really want to	.43		
3.	Compared to other students, I think that I am clever Language Arts	.55		
4.	Whatever I do, I will not understand in some of the Language Arts material. (inverted)	.37		
5.	I think that my reading skills are low Language Arts. (inverted)	.49		
6.	I think that my writing skills are low Language Arts. (inverted)	.57		
Student Task Value CFA Model				.85
T1: $\chi^2 = 354.23$, $df = 54$, $p < .001$; RMSEA = .06; SRMR = .03; CFI = .95; TLI = .93				
1.	Language Arts class is useless	.60		
2.	What we learn in Language Arts is not useful in everyday life. (inverted)	.52		
3.	What we learn in Language Arts helps me succeed in other classes	.45		
4.	It is important for me to show that I can succeed in Language Arts	.50		
5.	I think that it is important to succeed in Language Arts.	.60		
6.	It is important for me to master assignments given by the Language Arts teacher.	.57		

Continued

Table 1. (Continued)

		T1		T2	
		Load.	Alpha	Load.	Alpha
7.	I am very interested in what we learn in Language Arts	.69			
8.	I wish to learn more about Language Arts	.67			
9.	I am bored in most of my Language Arts. (inverted)	.63			
10.	I think that the amount of effort needed to succeed in this course is worth it	.57			
11.	I feel like I work a lot for not much in Language Arts. (inverted)	.51			
12.	No matter how much work is required, I do not think it is worth it. (inverted)	.59			
Student behavioural engagement CFA model					
T1: $\chi^2 = 204.72$, $df = 51$, $p < .001$; RMSEA = .04; SRMR = .03; CFI = .97; TLI = .96					
T2: $\chi^2 = 372.38$, $df = 51$, $p < .001$; RMSEA = .06; SRMR = .04; CFI = .95; TLI = .94					
Misbehaviour					
1.	I throw things in class	.61	.70	.66	.76
2.	I disrupt the classroom (talk with others, ...)	.61		.71	
3.	I pretend to be working	.67		.74	
4.	I do other things (text message, listen to music, ...)	.60		.60	
Participation					
1.	I ask questions to know more in class	.81	.69	.95	.73
2.	I make propositions or bring new ideas in class	.56		.56	
3.	When I do not understand something, I ask for explanations	.61		.60	
Compliance					
1.	I keep my class notes in order	.58	.62	.53	.75
2.	I hand in homework on time	.41		.39	
3.	I am careful not to be distracted	.61		.65	
4.	I pay attention to what the teacher is saying	.72		.79	
5.	When I have difficulties in class, I still make efforts	.65		.67	

Similar or distinct contribution to behavioural engagement

Another point merits further investigation. Teacher autonomy support and structure may relate differently to the specific components of behavioural engagement. For example, autonomy support could lead to student participation, whereas structure could lead to student compliance with classroom rules. Apart from Nguyen *et al.* (2016), no study has investigated this specific matter. Results from their study were inconclusive in the sense that various teaching practices produced similar benefits across the distinct dimensions of student behavioural engagement. However, some studies suggest that there could be different underlying motivational mechanisms, including sense of competence and task value, linking teaching practices to distinct sets of behaviours (Wang & Eccles, 2013). The present study aims to replicate results from the study by Nguyen *et al.* (2016) and further our understanding of underlying mechanisms.

Underlying mechanisms: Sense of competence and task value

The SSMMD argues that autonomy support and structure foster students' sense of being competent at what they do and valuing it (Connell & Wellborn, 1991). As such, self- and

task-related individual perceptions are motivational mechanisms explaining why students exposed to positive teaching practices may be willing to invest effort and energy to learn school material (Skinner, Furrer, *et al.*, 2008). This study focuses on two underlying motivational processes involved in the development of engagement: sense of competence and task value (Deci & Ryan, 2000; Eccles *et al.*, 1983). Students having a high sense of competence perceive that they have the academic abilities to learn and master valued outcomes and challenging tasks (Skinner, Furrer, *et al.*, 2008). They feel able to master school subjects, reach their goals, and perform well compared to others (Connell, 1990; Deci & Ryan, 2000). Moreover, grounded in Expectancy-Value Theory, student task value is also an underlying motivational mechanism involved in the development of engagement (Deci & Ryan, 2000; Eccles *et al.*, 1983). Task value is a subjective evaluation that students make of the subjects they learn and master (Eccles *et al.*, 1983; Skinner, Furrer, *et al.*, 2008). Task value includes beliefs of how interesting and enjoyable a task is, how important this task is for students' perception of themselves, how useful it is for their personal goals, and how much effort and energy mastering it requires (cost) (Wigfield & Eccles, 2000). Although student-perceived competence and task value are concepts grounded in different theoretical frameworks, they are often investigated together (Liem, Lau, & Nie, 2008; Wang & Eccles, 2013).

There is ample evidence suggesting that teacher practices support student sense of competence (Greene, Miller, Crowson, Duke, & Akey, 2004; Guay, Ratelle, Larose, Vallerand, & Vitaro, 2013), and that, in turn, sense of competence relates to student behavioural engagement and achievement (Froiland & Oros, 2013; Malanchini *et al.*, 2017; Plante, de la Sablonnière, Aronson, & Théorêt, 2013; Skinner, Kindermann, & Furrer, 2008; Zhen *et al.*, 2017). Similarly, existing studies have shown that SSMMD-based teaching practices promote perceived value for learning tasks (Harks *et al.*, 2013; Patall, Dent, Oyer, & Wynn, 2013). In turn, task value also supports active behavioural engagement and achievement (Nagengast, Trautwein, Kelava, & Lüdtke, 2013; Plante, de la Sablonnière, Aronson, & Théorêt, 2013; Schoor, 2016).

Four recent studies conducted among adolescents have linked different aspects of teaching practices to behavioural engagement or achievement via sense of competence or task value. Mih and Mih (2013) concluded that classroom perceptions of both teacher autonomy support and structure enhanced student-perceived competence, which, in turn, supported their task effort and persistence. Greene *et al.* (2004) also showed that students who perceive their Language Arts teacher to be highly autonomy supportive reported an enhanced sense of competence, which, in turn, increased their achievement. Similarly, Wang and Eccles (2013) found that school-wide student-rated structure and teachers' tendency to explain why assignments are relevant, but not their provision of choices, led to student compliance with rules and participation in class through the enhancement of sense of competence and task value. Finally, using an experimental design, Harks *et al.* (2013) demonstrated that students who receive autonomy supportive and structured feedback are more likely to perceive that what they learn is useful, which then enhanced their performance in mathematics, compared to students who received feedback solely focused on their performance.

It remains unclear whether these mechanisms similarly link autonomy support and structure to the distinct indicators of student behavioural engagement: participation, compliance, and misbehaviour. A few studies suggest that these mechanisms may operate differently. For instance, relying on student-reported measures, Hospel *et al.* (2016) found that student task value supported both student participation and compliance while also minimizing misbehaviour, whereas student sense of competence was more strongly

related to student participation than other components of behavioural engagement. Other studies have shown that students' sense of competence and task value are important antecedents of achievement in Language Arts (Froiland & Oros, 2013; Froiland & Worrell, 2016; Plante *et al.*, 2013). These results suggest that although both teaching practices may similarly benefit distinct aspects of behavioural engagement and achievement, as found by Nguyen *et al.* (2016), the underlying motivational processes linking teaching practices to student engagement may be different. The present study will assess these mechanisms and also account for important methodological considerations.

Methodological considerations

Investigating teaching practices to which students are exposed in the classroom raises two interconnected issues: the level of analysis and the source of information. First, teaching practices are an inherent characteristic of a classroom and should be studied as such, with multilevel analyses that distinguish the classroom or teacher level and the student level (Marsh *et al.*, 2012). These analyses aim to assess components of a shared environment (e.g., teacher practices in the classroom).

Second, although several informants may report on teaching practices, most studies rely on student ratings. Aggregating the individual perceptions of students at the classroom level provides an evaluation of the shared learning environment (Kunter & Baumert, 2006; Lüdtke, Robitzsch, Trautwein, & Kunter, 2009; Marsh *et al.*, 2012). In this approach, all students from a classroom are considered interchangeable informants of their teachers' practices, which largely reduce idiosyncratic bias and allow researchers to draw conclusions about the learning environment (Lüdtke *et al.*, 2009; Marsh *et al.*, 2012). Thus, this study relies on a classroom-aggregated measure of teacher autonomy support and structure.

Third, evaluating student behavioural engagement also raises the issue of which informant provides the most reliable evaluation. Student-reported measures have the benefit of capturing students' behaviours and their underlying intention (Duckworth & Yeager, 2015). Moreover, adolescent students, like those investigated in this study, are capable of evaluating their own engagement with fidelity (Fredricks *et al.*, 2011; Skinner, Furrer, *et al.*, 2008). Thus, this study relies on student-reported behavioural engagement.

Finally, properly investigating these hypotheses requires studying students within a school year, as they are exposed to the same teacher throughout the year. Also, it is necessary to conduct multilevel analyses to account for students being nested within classrooms, meaning that several students are exposed to the teaching practices of a single teacher. This study will account for these methodological issues.

Aims and hypotheses

This study aims to assess whether classroom-aggregated perceptions of teacher autonomy support and structure at the beginning of the school year are associated with three indicators of student behavioural engagement (participation, compliance with instructions, and misbehaviour) and reading achievement in Language Arts class at the end of the year, through the mediating roles of sense of competence and task value. This study will contrast two hypotheses on the configuration between teacher autonomy support and structure that best support motivation, engagement, and achievement:

Hypothesis 1: Assumes that the unique configuration will provide the best support to student motivation, engagement, and achievement.

Hypothesis 2: Assumes that the synergistic configuration will provide the best support to student motivation, engagement, and achievement.

This study will also assess two hypotheses on the mediating role of student sense of competence and task value:

Hypothesis 3: Assumes that student sense of competence will mediate the associations between teaching practices and student participation and reading achievement.

Hypothesis 4: Assumes that task value will mediate the associations between teaching practices and all aspects of behavioural engagement (i.e., compliance, participation, and misbehaviour) and reading achievement.

Method

Sample and procedures

After contacting the Ministry of Education and obtaining the approval of the University Ethics committee, our research team invited 30 school principals within a 50 km radius around the University to attend a presentation on the research project. Nineteen principals agreed for their school to participate. Within each school, over 90% of Language Arts teachers agreed to participate. The participating school districts also approved this research project. Teachers and students gave their active consent to participate. With the approval of the local school authorities and the ethics committee, a procedure of passive consent was used with the parents to ensure representativeness, as suggested by Pokormy, Jason, Schoeny, Townsend, and Curie (2001). Thus, parents received a letter informing them of the research project and had to return this letter if they did not agree with their child participating.

The sample for this study comprised 1,889 students recruited among 19 French-speaking Belgian secondary schools. All students were in 7th grade, which is the first year of secondary school in Belgium ($M_{\text{age}} = 13.10$, $SD = 0.65$, 51.5% girls). Students were distributed in 85 Language Arts classrooms, and 78.9% of their teachers were female. The participating schools contained on average 4.53 7th-grade classrooms (min = 1, max = 10) and 133.01 participating students (min = 14; max = 244). On average, participating classrooms included 22.4 students (min = 12, max = 26). Data were collected in October (T1) and June (T2) of the 2014–2015 school year. Students had 40 min to answer a pen-and-paper questionnaire. Trained research assistants supervised data collection.

A total of 223 students were left out of the sample because they were absent at one of the days of data collection (October: $n = 119$; June: $n = 104$). Therefore, students with missing data on all predictors or all outcomes were excluded from the study. The final sample for this study included 1,666 students from 85 classrooms. Missing values were handled using the Mplus7 Full Information Maximum Likelihood approach with robust

estimations to account for non-normally distributed variables. The maximum rates of missing data on all variables ranged from 0.32 to 5.64%.

Measures

Teacher structure and autonomy support

Students reported the use of structure and autonomy support by their Language Arts teacher during lessons at T1 on a four-point scale (0 = *disagree* to 3 = *agree*). Items (see Table 1) were drawn from the French adaptations of the Teacher as a Social Context scales (Belmont *et al.*, 1988). Items were selected to tap each component of teaching practices. For structure, the measure included seven items (see Table 1) measuring teachers' instructional adjustment/monitoring, establishing contingencies, explaining expectations, and providing help/support ($\alpha = .80$). For autonomy support, the measure included seven items (see Table 1) measuring teachers' provision of task rationale relevance, respect of students' rhythm, and allowing students to make choices ($\alpha = .75$).

Student evaluations of teacher autonomy support and structure were each aggregated at the classroom level, which is considered a reliable evaluation of teaching practices (Kunter & Baumert, 2006; Lüdtke *et al.*, 2009; Marsh *et al.*, 2012). We tested the agreement between students in the same classroom using the ICC2. The ICC2 (intraclass correlation) is an indicator of the reliability of a classroom-level measure and is analogous to the reliability of a factor based on multiple items (Lüdtke *et al.*, 2009). In this study, autonomy support had an ICC2 of 80% and structure had an ICC2 of 76%, both of which fall within the acceptable threshold of 70–85% indicating acceptable levels of reliability (Lüdtke *et al.*, 2009).

Student sense of competence

Students reported their perceived competence in Language Arts class, reading, and writing at T1 ($\alpha = .70$) on six items (see Table 1) drawn from the French adaptation of the Expectancy-Value Questionnaire (Eccles & Wigfield, 1995). Students rated items on a four-point scale (0 = *disagree* to 3 = *agree*). This measure included students' self-perceived competence and students' ratings of their abilities.

Student task value

Students reported their subjective task value in Language Arts class at T1 with a 12-item scale (see Table 1) drawn from the French adaptation of the Expectancy-Value Questionnaire (Eccles & Wigfield, 1995). This measure tapped into the four components of task value ($\alpha = .85$): importance, interest, utility, and cost (three items each). Students rated items on a four-point scale (0 = *disagree* to 3 = *agree*).

Student behavioural engagement

Behavioural engagement in Language Arts class at T1 and T2 was assessed using 12 student-rated items drawn from a study by Hospel *et al.* (2016). Students answered items on a five-point scale (0 = *never* to 4 = *very often*). Confirmatory factor analyses supported that the items clustered in three factors (see Table 1 for loadings): misbehaviour (including withdrawal and disruptiveness; T1: $\alpha = .70$; T2: $\alpha = .76$),

participation (T1: $\alpha = .69$; T2: $\alpha = .73$), and compliance with instructions (including attention, effort, and homework completion; T1: $\alpha = .62$; T2: $\alpha = .75$).

Reading comprehension score

Reading score was measured using a test of student reading abilities adapted from the Belgian Ministry of Education. The test included two tasks: reading comprehension of a single text and reading comprehension of a portfolio of expository texts. At T1 and T2, students answered multiple-choice questions, short-answer questions, and questions requiring a justification. At each time point, all 41 items were rated as 1 = correct or 0 = incorrect. Using a Multilevel Rasch model in Mplus, we then created a standardized measure of reading abilities (Dellisse, De Croix, Dumay, Dupriez, & Galand, 2016). This scale showed adequate internal consistency (T1: $\alpha = .77$; T2: $\alpha = .81$).

Covariates

Student gender (0 = *female*; 1 = *male*) was self-reported at T1. Students also answered a question to indicate if they had repeated a school year (0 = *never*; 1 = *at least once*). As students were all in 7th grade, there was little variance in their age. Thus, we did not control for student age.

Analytic strategy

Prior to the main analyses, we conducted Confirmatory Factor Analyses (CFA) to confirm the a priori grouping of items in their respective scales (teaching autonomy support and structure; student sense of competence; student task value; and student behavioural engagement). We then saved the factor scores (see Table 1 for details of factor structure) with which the main analyses were conducted. Using Mplus7, we performed multilevel regression analyses with random intercept and fixed slopes. Variables were grand-mean-centred. We conducted the analyses in four steps. In a first step, we tested a null model, which allowed assessing the partition of the variance of student sense of competence, task value, and engagement between the student, classroom, and school levels. In a second step, we added the covariates at the student (gender, grade retention, baseline level of misbehaviour, participation, compliance, and reading score at T1) and classroom levels (gender ratio, repeaters ratio, classroom-average level of baseline misbehaviour, participation, compliance, and reading score at T1). As suggested by Véronneau, Vitaro, Brendgen, Dishion, and Tremblay (2010), we retained only the significant covariates for the following models. In a third step, we assessed the direct associations of classroom-aggregated perception of teacher autonomy support and structure (Hypothesis 1) in two separate models with student sense of competence (Hypothesis 3) and task value (Hypothesis 4) and, in turn, with student-reported misbehaviour, compliance, participation, and achievement. In line with the second objective, in a fourth model, we assessed the Structure $\times$ Autonomy Support interaction (Hypothesis 2). This model also included the direct associations of structure and autonomy support with sense of competence and task value and, in turn, engagement and achievement. As this model included student sense of competence and task value as possible mediators leading to engagement and reading achievement, it also allowed us to assess Hypotheses 3 and 4.

We assessed the fit of each model using indicators provided by Mplus7 and recommended by Little (2013). The chi-square test indicates a good fit when its value is

not significant and is less than three times the degrees of freedom. The Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) indicate an outstanding fit when their value is above .99, a very good fit between .95 and .99, and an acceptable fit between .90 and .95. The Standardized Root Mean Square Residual (SRMR) and the Root Mean Square Error Approximation (RMSEA) indicate an outstanding fit when their value is lower than .01 and a very good fit between .05 and .02.

Results

Preliminary analyses

Student-level correlations are displayed in Table 2. Correlations between all dimensions of behavioural engagement and student perception of teaching practices were in the expected direction. However, autonomy support at T1 was negatively associated with student reading score at T2 at the student-level. Students' perception of teacher structure was positively associated with reading score. Task value and sense of competence were positively associated with student-reported teaching practices, behavioural engagement, and reading score.

Between-school and between-classroom variance

We first assessed a null model to estimate the between-school and between-classroom variance. Results indicate that between 2.01 and 3.75% of the variance in sense of competence, task value, and the three dimensions of behavioural engagement lay between classrooms, whereas between 0.11 and 1.49% of the variance lay between schools. For the reading score of students, 5.31% of the variance lay at the classroom level, and 14.48% lay at the school level. Since the proportion of school-level variance was significant for this last variable, we estimated the school level variance of all four outcomes in the following models, although no school-level variables were included.

Student- and classroom-level covariates model

We tested a model with covariates at the student (i.e., gender, having repeated a school year, baseline level of misbehaviour, participation, compliance, and reading score at T1) and classroom levels (i.e., gender ratio, repeaters ratio, classroom-average level of baseline misbehaviour, participation, compliance, and reading score at T1). The associations between student-level covariates and outcomes are displayed in Table 3. The associations between classroom-level covariates and outcomes were all nonsignificant. Thus, we did not include the classroom-level covariates in the subsequent analyses.

Final models

Structure and autonomy support models

We tested the models separately for the classroom-aggregated perception of autonomy support and structure (Hypothesis 1; see Figure 1). Both models had an adequate fit to the data (autonomy support model: $\chi^2 = 259.97$ (df = 65), $p < .001$, RMSEA = .04, SRMR_{student level} = .07, SRMR_{classroom level} = .14, SRMR_{school level} = .17, CFI = .96, TLI = .94; structure model: $\chi^2 = 267.05$ (df = 65), $p < .001$, RMSEA = .04, SRMR_{student level} = .07, SRMR_{classroom level} = .13, SRMR_{school level} = .17, CFI = .96, TLI = .94). Results

Table 2. Student-level correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Gender													
2 Repeat Year	.02												
3 Reading score T1	-.02	-.26***											
4 Reading score T2	-.04	-.31***	.64***										
5 Misbehaviour T1	.15***	.15***	-.13***	-.15***									
6 Misbehaviour T2	.14***	.14***	-.10***	-.16***	.56***								
7 Participation T1	.04	-.09***	.12***	.13***	-.23***	-.15***							
8 Participation T2	.08**	-.04	.11***	.14***	-.11***	-.23***	.46***						
9 Compliance T1	-.15***	-.17***	.16***	.19***	-.57***	-.44***	.41***	.20***					
10 Compliance T2	-.17***	-.15***	.16***	.19***	-.44***	-.68***	.24***	.36***	.49***				
11 Sense of comp. T1	-.03	-.09***	.24***	.22***	-.17***	.16***	.25***	.25***	.27***	.21***			
12 Task Value T1	-.13***	-.05*	.07*	.10***	-.45***	-.37***	.36***	.23***	.51***	.40***	.38***		
13 Autonomy Supp. T1	-.09***	.07**	-.07**	-.07**	-.16***	-.12***	.22***	.18***	.21***	.16***	.14***	.39***	
14 Structure T1	-.13***	-.03	.04	.08***	-.26***	-.21***	.22***	.17***	.32***	.23***	.19***	.49***	.59***

Note. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 3. Regression paths from covariates at student-level

	Sense comp. T1		Task Value T1		Misbehav. T2		Particip. T2		Compliance T2		Read. ScoreT2	
	β	p	β	p	β	p	β	p	β	p	β	p
Gender	-.04	.221	-.09	<.001	-.04	.086	.07	<.050	-.08	<.001	-.03	.102
Repeat year	-.06	<.050	.03	.313	-.03	.058	.02	.499	-.05	<.010	-.12	<.001
Misbehaviour T1	—	—	—	—	.44	<.001	-.03	.173	.20	<.001	.02	.275
Participation T1	—	—	—	—	-.04	.092	.43	<.001	.03	.205	.03	.175
Compliance T1	—	—	—	—	.14	<.001	-.02	.487	.26	<.001	.04	.141
Reading score T1	.23	<.001	.00	.980	.00	.817	.03	.218	.06	<.001	.58	<.001

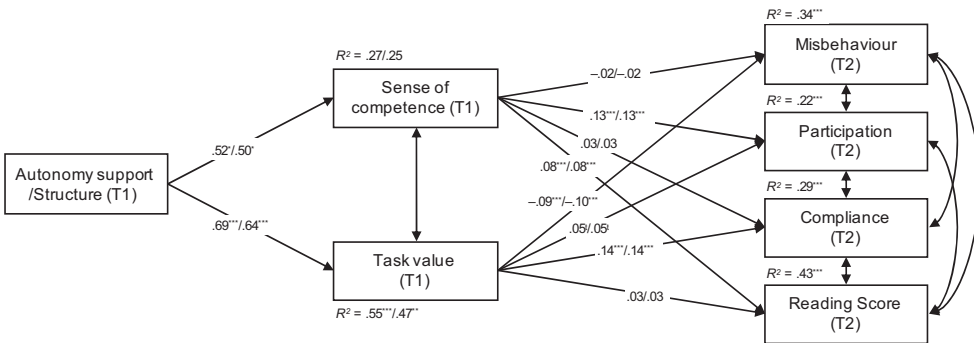


Figure 1. Path analysis models conducted separately with autonomy support and structure. Note. * $p < .050$. ** $p < .010$. *** $p < .001$. For each path, the left beta is that of the autonomy support model and the right beta is that of the structure model.

showed that the two student-reported teaching practices aggregated at the classroom level were associated with student sense of competence and task value. In turn, sense of competence was associated with higher student-rated participation and with reading score. Task value was associated with lower self-reported misbehaviour and higher compliance with instructions at T2 controlling for the level of the outcomes at T1. To assess Hypotheses 3 and 4, we also tested the indirect effects (see Table 4). Results indicated that student classroom-aggregated perceptions of autonomy support and structure at T1 led to higher levels of student-reported sense of competence and, in turn, to higher student-perceived participation at T2. Both teaching practices at the classroom level were also associated with lower perceptions of misbehaviour and higher perceptions of compliance indirectly via task value.

Structure $\times$ Autonomy support interaction model

We tested a model including the two dimensions of practices and their interaction to assess a possible synergistic effect (Hypothesis 2). The fit of this model was acceptable ($\chi^2 = 310.87$ (df = 73), $p < .001$, RMSEA = .04, SRMR_{student level} = .06, SRMR_{classroom level} = .13,

Table 4. Indirect effects

				Autonomy support model		Structure model		
				β (SE)	p	β (SE)	p	
Practice	→	Sense comp.	→	Misbehaviour	-.00 (.00)	.300	-.00 (.00)	.324
Practice	→	Sense comp.	→	Participation	.04 (.02)	<.050	.04 (.02)	<.050
Practice	→	Sense comp.	→	Compliance	.00 (.00)	.244	.00 (.00)	.216
Practice	→	Sense comp.	→	Reading score	.02 (.01)	.122	.02 (.01)	.073
Practice	→	Task Value	→	Misbehaviour	-.03 (.01)	<.001	-.03 (.01)	<.010
Practice	→	Task Value	→	Participation	.03 (.01)	.069	.03 (.01)	.092
Practice	→	Task Value	→	Compliance	.04 (.01)	<.001	.04 (.01)	<.001
Practice	→	Task Value	→	Reading score	.01 (.01)	.097	.01 (.01)	.145

SRMR_{school level} = .15, CFI = .95, TLI = .93). However, neither practice was associated with sense of competence ($\beta = .26, p = .616$ and $\beta = .37, p = .517$). Autonomy support, but not structure, was associated with task value ($\beta = .57, p < .01$ and $\beta = .20, p = .449$). The Structure $\times$ Autonomy Support interaction also was not significantly associated with sense of competence ($\beta = .23, p = .210$) or task value ($\beta = .13, p = .303$), which suggests that there was no synergistic effect of student classroom-aggregated perceptions of teaching practices on student-reported behavioural engagement and achievement through student sense of competence and task value.

Discussion

The learning environment to which students are exposed regularly has the potential to support their engagement and achievement. Teacher autonomy support and structure are among the key components of a positive learning environment. This study aimed at contrasting two possible configurations between autonomy support and structure – unique (Hypothesis 1) and synergistic (Hypothesis 2) – that provide the best support for participation, compliance, low misbehaviour, and high achievement. Results supported Hypothesis 1. The study also assessed whether the positive repercussions of these two teaching practices on student engagement and achievement operated through sense of competence and task value. As expected (Hypothesis 3), students' sense of competence mediated the association between classroom-aggregated perceptions of teacher autonomy support and structure and student participation. Yet, contrary to expectations, although sense of competence was associated with achievement in Language Arts, it did not mediate the association between teaching practices and student achievement. Results also partly support Hypothesis 4, which suggested that task value would act as a mediator linking teaching practices to all three aspects of student engagement and achievement. We found that task value mediated the association between teaching practices and student misbehaviour and compliance, but participation and achievement.

Unique and synergistic contributions of autonomy support and structure

The results of this study suggest that 7th-grade students perceived that their Language Arts teachers use similar levels of autonomy support and structure (highly correlated). As such, when students perceive that their teacher communicates clear expectations, make sure

that students can meet them, helps them to do so, and monitors their understanding, they also report that their teacher acts in a way that allows them to relate to learning and feel that they are pursuing personal goals by offering choices and explaining why subjects are relevant. A few existing studies have also shown that teachers tend to use a similar level of autonomy support and structure (Jang *et al.*, 2010; Mouratidis *et al.*, 2018).

When exposed to a positive learning environment, which comprises autonomy support and structure, students in our sample perceived that they were competent and successful in Language Arts. They were also more likely to evaluate reading as important, useful, and interesting (task value). In turn, sense of competence supported student participation, whereas task value supported compliance and prevented misbehaviour. Such findings are consistent with the expectations set forth by the SSMD, which proposes that teaching practices sustain student engagement by enhancing students' underlying motivation. They also confirm that task value – an Expectancy-Value Theory grounded concept – fits well in the SSMD motivational mechanism, as also found by Liem *et al.* (2008) and Wang and Eccles (2013). Overall, classroom-aggregated perceptions of teacher autonomy support and structure both contributed, indirectly, to student behavioural engagement. These results may indicate that, with the right balance of autonomy support and structure, Language Arts teachers enhance students' subjective desire to learn and master this subject, and their actual engagement.

However, our findings also indicate that no classroom of students reported being exposed to a low structure-high autonomy classroom or vice versa, which was to be expected, given the high correlation between autonomy support and structure. Thus, it remains unclear whether there is an extra benefit of using the two teaching practices in synergy. This discrepancy with existing results may be due to the study design. Studies that found this synergistic effect were conducted at the student-level, whereas our study assesses teaching practices at the classroom-level (Sierens *et al.*, 2009; Vansteenkiste *et al.*, 2012). There are two other possible explanations. On the one hand, it is likely that when teachers rely on one practice, they also balance it with the other to create a learning environment tailored to the motivational characteristics of their students. Studies by Jang *et al.* (2010) and Mouratidis *et al.* (2018) have likewise demonstrated that autonomy support and structure are complementary. On the other hand, students may have a generalized perception of the actions of their teacher in the classroom. As such, they might tend to have a positive or negative perception of all aspects of teaching practices. In the debate on the complex configuration of autonomy support and structure to create a positive learning environment, our study confirms that both are important, but a synergistic configuration did not exist in our sample.

Overall, our results show that student classroom-aggregated perceptions of teacher autonomy support and structure were related similarly to all aspects of students' subjective behavioural engagement. These findings complement those of Nguyen *et al.* (2016), who have demonstrated that all teaching practices were similarly related to various aspects of student behavioural engagement. Our study provides an in-depth understanding of these specific behaviours by showing that, although autonomy support and structure have a similar contribution to student-reported compliance, participation, and misbehaviour, the mechanisms linking practices to engagement are specific to each aspect of student engagement.

The mediating role of sense of competence and task value

In line with the SSMD, Jang *et al.* (2010) have further argued that autonomy support and structure enhance student engagement in different ways. They suggested that autonomy

support operates specifically through personal volition, value, and the importance that students place on learning and mastering tasks, whereas structure operates via students' sense of competence. Results from the present study show that these motivational processes are not specific to the distinct dimensions of teaching practices. Rather, student task value and sense of competence both served as mechanisms linking student classroom-aggregated perception of autonomy support and structure to their perception of compliance, participation, and misbehaviour in Language Arts classes, but not to reading achievement. The different features of a positive learning environment, as evaluated by students, are likely more interconnected to students' underlying motivation and engagement than what was initially thought (Connell & Wellborn, 1991).

Nevertheless, these motivational mechanisms were specific to each type of student behavioural engagement. First, our study confirms Hypothesis 3, which was based on the study by Hospel *et al.* (2016), showing that student sense of competence is more strongly related to student participation than to other dimensions of behavioural engagement. As such, in our sample, student sense of competence indirectly linked students' classroom-aggregated perceptions of high structure and autonomy support to their perception of active participation. Students in classrooms that perceived that the teacher adopts these two practices reported a higher feeling of being competent and successful in reading and Language Arts, which seems to have encouraged students to answer questions, bring new ideas, and ask for explanations. A possible explanation is that students in classrooms that report high autonomy support and structure from their teacher may have more opportunities to develop the self-confidence required to participate, which involves speaking up in front of classmates (Wang & Eccles, 2013). Unlike other behaviours, participation requires students to expose themselves to the judgement of their peers by speaking in front of them. For some students lacking a good sense of competence, such as shy students, talking in front of their peers may prove to be too big of a challenge (Hughes & Coplan, 2010), which may explain why perceived competence is a mechanism specific to student participation.

Second, student classroom-aggregated perceptions of teacher autonomy support and structure enhanced student reports of compliance with instruction and decreased reports of disruptiveness and withdrawal throughout the school year. These benefits of teaching practices operated through student value of Language Arts tasks and assignments, thus partly supporting Hypothesis 4. Paying attention, following instructions, and behaving in class may be the result of students' ability to self-regulate their energies and behaviours, enabling them to work towards goals that are truly important for them (Guay *et al.*, 2017). As such, when students feel that what they do in class is interesting, important, useful, and worth working for, they are more likely to pay attention and do their homework, while less likely to chat with others during lessons or pretend to be working (Wang & Eccles, 2013). Such results are consistent with the SSMD, which argues that positive teaching practices convey meaning for students and guide them to meet expectations, hence supporting their underlying motivation.

Finally, a higher sense of competence directly supported the reading achievement of the 7th-grade students in this study, as found in many other studies (Olivier, Archambault, De Clercq, & Galand, 2018; Valentine, DuBois, & Cooper, 2004). However, student classroom-aggregated perceptions of teaching practices were not associated with students' achievement, even when considering an indirect contribution through sense of competence. Some maintain that achievement is the direct result of students' sense of competence (Bandura, 2001), and others argue that achievement is the outcome of their active engagement in learning (Connell & Wellborn, 1991). Thus, it is possible that, had

we had enough measurement points to test it, reading achievement would have resulted from a second mechanism, namely behavioural engagement (Cr    & Kuncel, 2008).

Limitations

This study focuses on student engagement and reading achievement. Although not a limitation per se, results ought to be interpreted with caution and may not be generalized to other subject matter. We relied on the perceptions that students have of the teaching practices of their teachers. Classroom-level aggregated measures of student perceptions are reliable indicators of a learning environment (Kunter & Baumert, 2006; L  dtke *et al.*, 2009; Marsh *et al.*, 2012). Student ratings also have a good convergent validity with external observations, as well as a higher predictive validity regarding student motivation and engagement than teacher-reported practices (Wagner *et al.*, 2016). Nevertheless, using an external observer or teacher self-report would have provided a complementary evaluation of teaching practices, as each informant has his strengths and weaknesses (Jang *et al.*, 2010).

Also, this study used two time points within the same school year, which allowed to account for student prior engagement and achievement. However, it included a test of mediation models using two time points instead of the recommended three. Some authors argue that using two time points is acceptable when assessing specific hypothesis as we did (Hayes, 2013). Other studies have used a similar approach (e.g., Wang & Eccles, 2013). Finally, 223 students were left out of the sample because they were absent at the time of data collection. As absenteeism is an indicator of school disengagement, these students may have been less engaged than others (Green *et al.*, 2012).

Conclusions

This study adds to a growing body of evidence showing that the actions of teachers in their classroom, including autonomy support and structure, are key contributors to students' self-reported behavioural engagement. This study first shows that students in a same classroom perceived that their Language Arts teachers used similar levels of autonomy support and structure. As such, no classroom reported being exposed to only one practice. Thus, detecting a synergistic effect was not possible. Properly testing a synergistic effect may require conducting experimental manipulations (Sheldon & Filak, 2008; van Loon, Ros, & Martens, 2012). Second, the benefits of these teaching practices operated indirectly through underlying motivational processes specific to different aspects of behavioural engagement. On the one hand, students who value reading were more likely to report that they comply with classroom rules and expectations, as well as refrain from misbehaving. On the other hand, students' sense of competence explained that high autonomy support and structure led them to participate more frequently in class. At a more practical level, these findings suggest that teachers can support the perceived competence, task value, and engagement of their students by adopting a variety of positive teaching practices. For example, they can show that assignments are necessary by using everyday life examples, discuss the classroom rules with students, and make sure that students understand the expectations and how to meet them. These actions may go a long way to support student engagement in school, and in the long run, their desire to persevere and succeed.

Acknowledgements

This study was funded by a grant from the Social Sciences and Humanities Research Council (SSHRC) (#756-2017-0223), awarded to Elizabeth Olivier.

Conflicts of interest

All authors declare no conflict of interest.

Author contributions

Elizabeth Olivier (Conceptualization; Data curation; Formal analysis; Methodology; Writing – original draft) Benoit Galand (Conceptualization; Funding acquisition; Methodology; Supervision; Writing – review & editing) Virginie Hospel (Conceptualization; Writing – review & editing) Sébastien Delliège (Data curation; Methodology; Writing – review & editing).

Ethical approval

This research complies with APA's ethical standards in the treatment of human samples and with the highest ethical standards.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

References

- Aelterman, N., Vansteenkiste, M., Haerens, L., Soenens, B., Fontaine, J. R. J., & Reeve, J. (2019). Toward an integrative and fine-grained insight in motivating and demotivating teaching styles: The merits of a circumplex approach. *Journal of Educational Psychology, 111*(3), 497–521. <https://doi.org/10.1037/edu0000293>
- Appleton, J. J., Christenson, S. L., & Furlong, M. J. (2008). Student engagement with school: Critical conceptual and methodological issues of the construct. *Psychology in the Schools, 45*, 369–386. <https://doi.org/10.1002/pits.20303>
- Archambault, I., Janosz, M., Fallu, J. S., & Pagani, L. S. (2009). Student engagement and its relationship with early high school dropout. *Journal of Adolescence, 32*, 651–670. <https://doi.org/10.1016/j.adolescence.2008.06.007>
- Assor, A., & Kaplan, H. (2001). Mapping the domain of autonomy support: Five important ways to enhance or undermine students' experience of autonomy in learning. In A. Efklides, J. Kuhl & R. M. Sorrentino (Eds.), *Trends and prospects in motivation research* (pp. 101–120). Boston: MA: Kluwer Academic Publishers.
- Azevedo, R. (2015). Defining and measuring engagement and learning in science: Conceptual, theoretical, methodological, and analytical issues. *Educational Psychologist, 50*(1), 84–94. <https://doi.org/10.1080/00461520.2015.1004069>
- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology, 52*(1), 1–26. <https://doi.org/10.1146/annurev.psych.52.1.1>
- Barth, J. M., Dunlap, S. T., Dane, H., Lochman, J. E., & Wells, K. C. (2004). Classroom environment influences on aggression, peer relations, and academic focus. *Journal of School Psychology, 42*, 115–133. <https://doi.org/10.1016/j.jsp.2003.11.004>
- Belmont, M. J., Skinner, E. A., Wellborn, J. G., & Connell, J. P. (1988). *Teacher as a social context: A measure of student perceptions of teacher provision of involvement, structure, and autonomy-support*. Rochester, NY: University of Rochester.

- Connell, J. P. (1990). Context, self, and action: A motivational analysis of self-system processes across the life span. In D. Chicchetti & M. Beeghly (Eds.), *The self in transition: Infancy to childhood* (pp. 61–97). Chicago, IL: University of Chicago Press.
- Connell, J. P., & Wellborn, J. G. (1991). Competence, autonomy, and relatedness: A motivational analysis of self-system process. In M. R. Gunnar & L. A. Sroufe (Eds.), *Self process and development: The Minnesota symposia on child development* (pp. 44–77). Hillsdale, NJ: Lawrence Erlbaum Associates Publishers.
- Crédé, M., & Kuncel, N. R. (2008). Study habits, skills, and attitudes: The third pillar supporting collegiate academic performance. *Perspectives on psychological science*, 3, 425–453. <https://doi.org/10.1111/j.1745-6924.2008.00089.x>
- Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behaviour. *Psychological Inquiry*, 11, 227–268. https://doi.org/10.1207/s15327965pli1104_01
- Dellisse, S., De Croix, S., Dumay, X., Dupriez, V., & Galand, B. (2016). *Quelles conditions favorisent le changement de pratiques lors de la mise en oeuvre d'un dispositif didactique?* Paper presented at the Congrès de l'Actualité de la recherche en éducation et formation, Mons, Belgium.
- Duckworth, A. L., & Yeager, D. S. (2015). Measurement matters: Assessing personal qualities other than cognitive ability for educational purposes. *Educational Research*, 44, 237–251. <https://doi.org/10.3102/0013189X15584327>
- Eccles, J. S., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M., Meece, J. L., & Midgley, C. (1983). Expectancies, values, and academic behaviours. In J. T. Spence (Ed.), *Achievement and achievement motives: Psychological and sociological approaches* (pp. 75–146). San Francisco, CA: Freeman.
- Eccles, J. S., & Wigfield, A. (1995). In the mind of the actor: The structure of adolescents' academic achievement related-beliefs and self-perceptions. *Personality and Social Psychology Bulletin*, 21(3), 215–225. <https://doi.org/10.1177/0146167295213003>
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, 74(1), 59–109. <https://doi.org/10.3102/00346543074001059>
- Fredricks, J. A., McColskey, W., Meli, J., Montrosse, B., Mordica, J., & Mooney, K. (2011). Measuring student engagement in upper elementary through high school: A description of 21 instruments. *Issues and Answers*, 1, 1–80.
- Froiland, J. M., & Oros, E. (2013). Intrinsic motivation, perceived competence and classroom engagement as longitudinal predictors of adolescent reading achievement. *Educational Psychology*, 34(2), 119–132. <https://doi.org/10.1080/01443410.2013.822964>
- Froiland, J. M., & Worrell, F. C. (2016). Intrinsic motivation, learning goals, engagement, and achievement in a diverse high school. *Psychology in the Schools*, 53(3), 321–336. <https://doi.org/10.1002/pits.21901>
- Green, J., Liem, G. A., Martin, A. J., Colmar, S., Marsh, H. W., & McInerney, D. (2012). Academic motivation, self-concept, engagement, and performance in high school: Key processes from a longitudinal perspective. *Journal of Adolescence*, 35, 1111–1122. <https://doi.org/10.1016/j.adolescence.2012.02.016>
- Greene, B. A., Miller, R. B., Crowson, H. M., Duke, B. L., & Akey, K. L. (2004). Predicting high school students' cognitive engagement and achievement: Contributions of classroom perceptions and motivation. *Contemporary Educational Psychology*, 29(4), 462–482. <https://doi.org/10.1016/j.cedpsych.2004.01.006>
- Guay, F., Ratelle, C., Larose, S., Vallerand, R. J., & Vitaro, F. (2013). The number of autonomy-supportive relationships: Are more relationships better for motivation, perceived competence, and achievement? *Contemporary Educational Psychology*, 38(4), 375–382. <https://doi.org/10.1016/j.cedpsych.2013.07.005>
- Guay, F., Roy, A., & Valois, P. (2017). Teacher structure as a predictor of students' perceived competence and autonomous motivation: The moderating role of differentiated instruction. *British Journal of Educational Psychology*, 87(2), 224–240. <https://doi.org/10.1111/bjep.12146>

- Guay, F., Valois, P., Falardeau, É., & Lessard, V. (2016). Examining the effects of a professional development program on teachers' pedagogical practices and students' motivational resources and achievement in written French. *Learning and Individual Differences*, 45, 291–298. <https://doi.org/10.1016/j.lindif.2015.11.014>
- Harks, B., Rakoczy, K., Hattie, J., Besser, M., & Klieme, E. (2013). The effects of feedback on achievement, interest and self-evaluation: the role of feedback's perceived usefulness. *Educational Psychology*, 34(3), 269–290. <https://doi.org/10.1080/01443410.2013.785384>
- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis. A regression-based approach*. New York, NY: The Guildford Press.
- Hospel, V., & Galand, B. (2016). Are both classroom autonomy support and structure equally important for students' engagement? A multilevel analysis. *Learning and Instruction*, 41, 1–10. <https://doi.org/10.1016/j.learninstruc.2015.09.001>
- Hospel, V., Galand, B., & Janosz, M. (2016). Multidimensionality of behavioural engagement: Empirical support and implications. *International Journal of Educational Research*, 77, 37–49. <https://doi.org/10.1016/j.ijer.2016.02.007>
- Hughes, K., & Coplan, R. J. (2010). Exploring processes linking shyness and academic achievement in childhood. *School Psychology Quarterly*, 25, 213–222. <https://doi.org/10.1037/a0022070>
- 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/a00119682>
- Janosz, M., Archambault, I., Morizot, J., & Pagani, L. (2008). School engagement trajectories and their differential predictive relations to dropout. *Journal of Social Issues*, 64(1), 21–40. <https://doi.org/10.1111/j.1540-4560.2008.00546.x>
- Kunter, M., & Baumert, J. (2006). Who is the expert? Construct and criteria validity of student and teacher ratings of instruction. *Learning Environments Research*, 9(3), 231–251. <https://doi.org/10.1007/s10984-006-9015-7>
- Lewis, A. D., Huebner, E. S., Malone, P. S., & Valois, R. F. (2011). Life satisfaction and student engagement in adolescents. *Journal of Youth and Adolescence*, 40(3), 249–262. <https://doi.org/10.1007/s10964-010-9517-6>
- Liem, A. D., Lau, S., & Nie, Y. (2008). The role of self-efficacy, task value, and achievement goals in predicting learning strategies, task disengagement, peer relationship, and achievement outcome. *Contemporary Educational Psychology*, 33(4), 486–512. <https://doi.org/10.1016/j.cedpsych.2007.08.001>
- Lietaert, S., Roorda, D., Laevers, F., Verschueren, K., & De Fraine, B. (2015). The gender gap in student engagement: The role of teachers' autonomy support, structure, and involvement. *British Journal of Educational Psychology*, 85(4), 498–518. <https://doi.org/10.1111/bjep.12095>
- Little, T. D. (2013). *Longitudinal structural equation modeling*. New Nork, NY: The Guildford Press.
- Lüdtke, O., Robitzsch, A., Trautwein, U., & Kunter, M. (2009). Assessing the impact of learning environment: How to use student rating of classroom or school characteristics in multilevel modeling in multilevel modeling. *Contemporary Educational Psychology*, 34(2), 120–131. <https://doi.org/10.1016/j.cedpsych.2008.12.001>
- Malanchini, M., Wang, Z., Voronin, I., Schenker, V. J., Plomin, R., Petrill, S. A., & Kovas, Y. (2017). Reading self-perceived ability, enjoyment and achievement: A genetically informative study of their reciprocal links over time. *Developmental Psychology*, 53, 698–712. <https://doi.org/10.1037/dev0000209>
- 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>
- Mih, V., & Mih, C. (2013). Perceived autonomy-supportive teaching, academic self-perceptions and engagement in learning: Toward a process model of academic achievement. *Cognition, Brain, Behaviours. An Interdisciplinary Journal*, 17, 289–313.

- Mouratidis, A., Michou, A., Aelterman, N., Haerens, L., & Vansteenkiste, M. (2018). Begin-of-school-year perceived autonomy-support and structure as predictors of end-of-school-year study efforts and procrastination: The mediating role of autonomous and controlled motivation. *Educational Psychology, 38*(4), 435–450. <https://doi.org/10.1080/01443410.2017.1402863>
- Nagengast, B., Trautwein, U., Kelava, A., & Lüdtke, O. (2013). Synergistic effects of expectancy and value on homework engagement: The case for a within-person perspective. *Multivariate behaviour Research, 48*(3), 428–460. <https://doi.org/10.1080/00273171.2013.775060>
- Nguyen, T. D., Cannata, M., & Miller, J. (2016). Understanding student behavioural engagement: Importance of student interaction with peers and teachers. *The Journal of Educational Research, 111*(2), 163–174. <https://doi.org/10.1080/00220671.2016.1220359>
- Nie, Y., & Lau, S. (2009). Complementary roles of care and behavioural control in classroom management: The self-determination theory perspective. *Contemporary Educational Psychology, 34*, 185–194. <https://doi.org/10.1016/j.cedpsych.2009.03.001>
- Olivier, E., Archambault, I., De Clercq, M., & Galand, B. (2018). Student self-efficacy, classroom engagement, and academic achievement: Comparing three theoretical frameworks. *Journal of Youth and Adolescence, 48*(2), 326–340. <https://doi.org/10.1007/s10964-018-0952-0>
- Olsson, C. A., McGee, R., Nada-Raja, S., & Williams, S. M. (2012). A 32-year longitudinal study of child and adolescent pathways to well-being in adulthood. *Journal of Happiness Studies, 14*, 1069–1083. <https://doi.org/10.1007/s10902-012-9369-8>
- Pas, E. T., Cash, A. H., O'Brennan, L., Debnam, K. J., & Bradshaw, C. P. (2015). Profiles of classroom behaviour in high schools: Associations with teacher behaviour management strategies and classroom composition. *Journal of School Psychology, 53*(2), 137–148. <https://doi.org/10.1016/j.jsp.2014.12.005>
- Patall, E. A., Dent, A. L., Oyer, M., & Wynn, S. R. (2013). Student autonomy and course value: The unique and cumulative roles of various teacher practices. *Motivation and Emotion, 37*(1), 14–32. <https://doi.org/10.1007/s11031-012-9305-6>
- Plante, I., de la Sablonnière, R., Aronson, J. M., & Théorêt, M. (2013). Gender stereotype endorsement and achievement-related outcomes: The role of competence beliefs and task values. *Contemporary Educational Psychology, 38*(3), 225–235. <https://doi.org/10.1016/j.cedpsych.2013.03.004>
- Pokorny, S. B., Jason, L. A., Schoeny, M. E., Townsend, S. M., & Curie, C. J. (2001). Do participation rates change when active consent procedures replace passive consent. *Evaluation Review, 25*(5), 567–580. <https://doi.org/10.1177/0193841x0102500504>
- Reeve, J., Deci, E. L., & Ryan, R. M. (2004). Self-determination theory: A dialectical framework for understanding sociocultural influences on student motivation. In D. McInerney & S. Van Etten (Eds.), *Research on sociocultural influences on motivation and learning: Big theories revisited* (pp. 31–59). Greenwich, CT: Information Age Press.
- Reeve, J., Jang, H., Carrell, D., Jeon, S., & Barch, J. (2004). Enhancing students' engagement by increasing teachers' autonomy support. *Motivation and Emotion, 28*(2), 147–169. <https://doi.org/10.1023/B:MOEM.0000032312.95499.6f>
- Reeve, J., & Tseng, C.-M. (2011). Agency as a fourth aspect of students' engagement during learning activities. *Contemporary Educational Psychology, 36*, 257–267. <https://doi.org/10.1016/j.cedpsych.2011.05.002>
- Schoor, C. (2016). Utility of reading — Predictor of reading achievement? *Learning and Individual Differences, 45*, 151–158. <https://doi.org/10.1016/j.lindif.2015.11.024>
- Schunk, D. H., & Pajares, F. (2009). Self-efficacy theory. In K. R. Wentzel & A. Wigfield (Eds.), *Handbook of motivation at school* (pp. 35–54). New York, NY: Routledge.
- Sheldon, K. M., & Filak, V. (2008). Manipulating autonomy, competence, and relatedness support in a game-learning context: New evidence that all three needs matter. *British Journal of Social Psychology, 47*(Pt 2), 267–283. <https://doi.org/10.1348/014466607X238797>
- Shogren, K. A., Garnier Villarreal, M., Lang, K., & Seo, H. (2017). Mediating role of self-determination constructs in explaining the relationship between school factors and postschool outcomes. *Exceptional Children, 83*(2), 165–180. <https://doi.org/10.1177/0014402916660089>

- Sierens, E., Vansteenkiste, M., Goossens, L., Soenens, B., & Dochy, F. (2009). The synergistic relationship of perceived autonomy support and structure in the prediction of self-regulated learning. *British Journal of Educational Psychology*, 79(1), 57–68. <https://doi.org/10.1348/000709908X304398>
- Sinatra, G. M., Heddy, B. C., & Lombardi, D. (2015). The challenges of defining and measuring student engagement in science. *Educational Psychologist*, 50(1), 1–13. <https://doi.org/10.1080/00461520.2014.1002924>
- Skinner, E. A., & Belmont, M. J. (1993). Motivation in the classroom: Reciprocal effects of teacher behaviour and student engagement across the school year. *Journal of Educational Psychology*, 85(4), 571–581. <https://doi.org/10.1037/0022-0663.85.4.571>
- Skinner, E. A., Furrer, C., Marchand, G., & Kindermann, T. (2008). Engagement and disaffection in the classroom: Part of a larger motivational dynamic? *Journal of Educational Psychology*, 100, 765–781. <https://doi.org/10.1037/a0012840>
- Skinner, E. A., Kindermann, T. A., & Furrer, C. J. (2008). A motivational perspective on engagement and disaffection: Conceptualization and assessment of children's behavioural and emotional participation in academic activities in the classroom. *Educational and Psychological Measurement*, 69(3), 493–525. <https://doi.org/10.1177/0013164408323233>
- Valentine, J. C., DuBois, D. L., & Cooper, H. (2004). The relation between self-beliefs and academic achievement: A meta-analytic review. *Educational Psychologist*, 39(2), 111–133. https://doi.org/10.1207/s15326985ep3902_3
- van Loon, A.-M., Ros, A., & Martens, R. (2012). Motivated learning with digital learning tasks: What about autonomy and structure? *Educational Technology Research and Development*, 60, 1015–1032. <https://doi.org/10.1007/s11423-012-9267-0>
- 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 behaviour. *Learning and Instruction*, 22, 431–439. <https://doi.org/10.1016/j.learninstruc.2012.04.002>
- Véronneau, M.-H., Vitaro, F., Brendgen, M., Dishion, T. J., & Tremblay, R. E. (2010). Transactional analysis of the reciprocal links between peer experiences and academic achievement from middle childhood to early adolescence. *Developmental Psychology*, 46, 773–790. <https://doi.org/10.1037/a0019816>
- Wagner, W., Göllner, R., Werth, S., Voss, T., Schmitz, B., & Trautwein, U. (2016). Student and teacher ratings of instructional quality: Consistency of ratings over time, agreement, and predictive power. *Journal of Educational Psychology*, 108, 705–721. <https://doi.org/10.1037/edu0000075>
- Wang, M.-T., & Eccles, J. S. (2013). School context, achievement motivation, and academic engagement: A longitudinal study of school engagement using a multidimensional perspective. *Learning and Instruction*, 28, 12–23. <https://doi.org/10.1016/j.learninstruc.2013.04.002>
- Wigfield, A., & Eccles, J. S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology*, 25(1), 68–81. <https://doi.org/10.1006/ceps.1999.1015>
- Wilson, K. M., & Trainin, G. (2007). First-grade students' motivation and achievement for reading, writing, and spelling. *Reading Psychology*, 28(3), 257–282. <https://doi.org/10.1080/02702710601186464>
- Zhen, R., Liu, R.-D., Ding, Y., Wang, J., Liu, Y., & Xu, L. (2017). The mediating roles of academic self-efficacy and academic emotions in the relation between basic psychological needs satisfaction and learning engagement among Chinese adolescent students. *Learning and Individual Differences*, 54, 210–216. <https://doi.org/10.1016/j.lindif.2017.01.017>