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Original Communication

Autonomy-Supportive and Controlling Styles of Teaching

Opposite or Distinct Teaching Styles?

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Abstract. Autonomy-supportive and controlling styles of teaching are usually considered to be the opposite ends of a single continuum. An alternative view, however, is that individuals can perceive both styles simultaneously, which suggests that they are different constructs (Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011). Using cluster analysis, Study 1 (N = 160) confirmed that both teaching styles were perceived by students. Four clusters appeared depending on the student's score on the measures of autonomy and controlling styles (high autonomy–high control; low autonomy–low control; high autonomy–low control; low autonomy–high control). Participants in the high autonomy–low control cluster reported the highest self-determined motivation in their studies. Using path analysis and mediational analyses, Study 2 (N = 127) tested the independence of the two styles by studying the process through which they influenced motivation. The results showed that need satisfaction (specifically, the need for autonomy) mediated the path between perceived autonomy-supportive teacher behavior and motivation, and that need-thwarting (specifically, the need for autonomy and relatedness) mediated the path between perceived controlling teacher behavior and self-determined motivation, which in turn predicted academic performance. These results add to the existing literature supporting the independence of the two styles.

Keywords: interpersonal style, need satisfaction, need-thwarting, self-determined motivation, performance

In the realm of the self-determination theory (SDT; Deci & Ryan, 1985, 2000; Ryan & Deci, 2000), the interpersonal style of supervisors is a significant social factor. It was found to influence self-determined motivation and performance in various contexts such as sports (Gillet, Vallerand, Amoura, & Baldes, 2010), work (Gillet, Berjot, & Paty, 2010), and, as studied here, education (Black & Deci, 2000). It is generally assumed that there are two interpersonal styles: autonomy-supportive and controlling, the former of which leads to self-determined motivation and the latter of which leads to non-self-determined motivation. Thus, the first is considered to be opposed to the second (Deci & Ryan, 1987; Deci, Schwartz, Sheinman, & Ryan, 1981; Vansteenkiste et al., 2012). Such opposition implies that the supervisor's behavior cannot be perceived as *both* autonomy-supportive and controlling (Soenens & Vansteenkiste, 2010). However, a debate exists insofar as behaviors are often far more complex and at times can appear to simultaneously be autonomy-supportive as well as controlling (Grolnick & Ryan, 1989). To illustrate this, some studies showed that these two styles can be perceived by students at the same time, a finding that encourages future research to consider autonomy support and control independently (Balaguer et al., 2012; Bartholomew, Ntoumanis, Ryan, Bosch et al., 2011; Ng, Ntoumanis, & Thøgersen-Ntoumani, 2013; Pelletier, Fortier, Vallerand, & Brière, 2001; Silk, Morris, Kanaya, & Steinberg, 2003; Tessier, Sarrazin, & Ntoumanis, 2008). Moreover, SDT assumes that basic psychological needs mediate the relationship between social factors and motivation (Vallerand, 1997). However, here again, although many studies have confirmed that the autonomy-supportive style predicts motivation through need satisfaction (for a review, see Vallerand & Miquelon, 2008), very few have confirmed the hypothesis that a controlling style predicts motivation through need-thwarting (Ng et al., 2013; Vansteenkiste, Ryan, & Deci, 2008). Only one study has ever simultaneously tested the impact of both styles on motivation through different needs (Ng et al., 2013). This is important insofar as distinct pathways (Vansteenkiste & Ryan, 2013) would add to the reasoning that both styles are not two ends of a single continuum but distinct constructs.

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Based on an educational context, the general aim of these studies is to participate in this debate: Are autonomy-supportive and controlling styles really two sides of the same coin? In other words, are they distinct constructs or opposites of a single continuum? Also, what is the exact role of basic psychological need satisfaction and thwarting in the relationship between interpersonal styles and academic self-determined motivation? To address these questions, we first propose to adopt an intraindividual perspective (cluster analyses) in order to verify whether both styles are clearly perceived by students. Second, we propose to study the process through which autonomy-supportive and controlling styles influence self-determined motivation. If they are indeed distinct variables, they should influence motivation through distinct mediators. However, if they represent two ends of a single continuum, they should influence motivation through the same mediators.

To this end, we propose to test a sequence of the motivational process (Vallerand, 1997) in which social factors (autonomy-supportive and/or controlling behaviors) influence academic self-determined motivation and motivational outcomes (academic performance) through the mediation of psychological needs (need satisfaction and/or need-thwarting).

The Interpersonal Style

As mentioned earlier, the interpersonal style of supervisors is a social factor that has been found to impact self-determined motivation. According to Reeve (2009), an autonomy-supportive style consists of a) adopting the students' perspective, b) welcoming students' thoughts, feelings, and actions, and c) supporting the students' motivational development and capacity for autonomous self-regulation (see also Deci, Eghrari, Patrick, & Leone, 1994; Jang, Reeve, & Deci, 2010; Reeve & Jang, 2006). In concrete terms, the autonomy-supportive style is operationalized through behaviors such as a) nurturing inner motivational sources, b) providing rationales, c) relying on noncontrolling and informational language, d) displaying patience, and e) acknowledging and accepting expressions of negative affect. For instance, Moustaka, Vlachopoulos, Kabitsis, and Theodorakis (2012) showed that participants who were involved in a fitness program in an autonomy-supportive climate reported higher satisfaction of their needs for autonomy and competence as well as higher self-determined motivation and subjective vitality compared to the group in a non-autonomy-supportive climate. Other classifications of the autonomy-supportive style exist in other contexts such as sports (Mageau & Vallerand, 2003) and parenting (Soenens & Vansteenkiste, 2010).

According to Reeve (2009), a controlling style consists of a) forcing subordinates to adopt the teacher's perspective, b) intruding on students' thoughts, feelings, or actions, and c) pressuring students to think, feel, or behave in a specific way. A controlling style is operationalized through behaviors such as a) relying on outer sources of motivation, b) neglecting rationales, c) relying on pressuring-inducing language, d) displaying impatience for students to produce the right answer, and e) asserting power to overcome students' complaints and expressions of negative affect. In other words, controlling supervisors press their subordinates to behave in a particular way, ignoring their feelings and personal needs (Deci & Ryan, 1985; Grolnick & Ryan, 1989), using seductive techniques such as surveillance (Lepper & Greene, 1975), rewards (Deci, 1975), but also intimidation, negative conditional regard, excessive personal control, and controlling feedback promoting ego involvement (Bartholomew, Ntoumanis, Ryan, Bosch et al., 2011; Bartholomew, Ntoumanis, & Thøgersen-Ntoumani, 2009). Soenens and colleagues (2012) showed that teaching perceived as controlling was negatively related to students' self-determined motivation, which was necessary for their use of adaptive cognitive strategies (i.e., deep-level cognitive strategies and metacognitive strategies). Moreover, Pelletier, Fortier, Vallerand, and Brière (2001) showed that a controlling style was related to controlled forms of motivation (introjected and extrinsic regulations) and amotivation. In sum, when the supervisor's interpersonal style is controlling, basic psychological needs are thwarted and the motivation is less self-determined (Soenens et al., 2012). Furthermore, as for autonomy-supportive behaviors, other classifications of controlling behaviors exist, for instance in sports (Bartholomew et al., 2009) and parenting (Soenens & Vansteenkiste, 2010).

Relationships Between Autonomy-Supportive and Controlling Styles

Although most studies support the idea of an autonomy-control continuum (Mageau & Vallerand, 2003; Reeve & Tseng, 2011; Soenens & Vansteenkiste, 2010; Vansteenkiste et al., 2012), some studies run in several contexts suggest that the lack of autonomy support may not systematically be tantamount to control (Bartholomew, Ntoumanis, & Thøgersen-Ntoumani, 2010). Indeed, several studies have reported low to moderate links between autonomy-supportive and controlling styles, suggesting that the continuum approach deserves to be questioned. For instance, in the sports context, Pelletier et al. (2001) assessed the perceptions of coaches' interpersonal style as being autonomy-supportive versus controlling among a sample of swimmers. Results from structural equation modeling indicated that the more the athletes perceived their coach as being autonomy-supportive, the more their motivation was self-determined and the more they persisted in the activity. However, the authors observed a moderate negative link between autonomy-supportive and controlling styles

(β = –.36). They also indicated that perceptions of autonomy-supportive and controlling styles were both positively associated with introjected regulation (i.e., a form of controlled motivation), suggesting that supervisors could sometimes use components of both interpersonal styles. Moreover, and again in a sports context, Balaguer et al. (2012) reported a moderate negative link between the two interpersonal styles among a sample of football players (β = –.30). In the health context, Ng et al. (2013) also reported a lower negative link (β = –.20) and argued that autonomy support and control may be inversely related but not two ends of a continuum. If these styles really represent two ends of the same continuum, the negative relationship should be clearly higher.

Furthermore, in the domain of parenting, Silk et al. (2003) interviewed teenagers about their relationship with their parents. The authors observed that "autonomy" and "control" were two distinct behaviors with different consequences, but that they were not opposed as suggested by the low correlation between the two styles (β = –.18). In the educational domain, Tessier and colleagues (2008) set up trainings for teachers in physical education to favor autonomy-supportive behaviors during their vocational activity. The results showed that being autonomy-supportive did not necessarily diminish teachers' controlling behaviors: Controlling behaviors were still observable by students after the training. Finally, the continuum conception was recently also widely challenged in the sports context (Bartholomew, Ntoumanis, Ryan, Bosch et al., 2011; Bartholomew et al., 2010; Blanchard, Amiot, Perreault, Vallerand, & Provencher, 2009).

Need Satisfaction and Need Thwarting as Mediators

Based on SDT, Vallerand (1997) proposed the hierarchical model of intrinsic and extrinsic motivation (HMIEM), which considers the determinants, the mediators (basic psychological needs), and the consequences associated with each form of motivation at different levels of generality: situational, contextual, and global. Intrinsic motivation, extrinsic motivation, and amotivation are the three central constructs of the model. Motivation at one level of generality influences, and is influenced by, the immediately higher level of generality (top-down effect) and by the immediately lower level (bottom-up effect).

Intrinsic motivation refers to the performance of an activity for the pleasure and satisfaction derived from participation. *Extrinsic motivation* is divided into four different types of behavioral regulation that vary in terms of degree of internalization of the behavior. From the less to the more internalized, there is *external regulation* (e.g., acting for external reasons such as rewards or coercive pressures), *introjected regulation* (e.g., acting to avoid feelings of guilt, shame, or anxiety), *identified regulation* (e.g., acting because the activity can lead to benefits), and *integrated regulation* (e.g., doing the activity corresponds with the individual's self and value system). Although identified and integrated regulation belong to extrinsic motivation, they are considered self-determined forms of motivation, even if they are emitted out of choice, because behaviors are internalized. Finally, amotivation represents a lack of intention and a relative absence of intrinsic or extrinsic motivation to do an activity. For each kind of motivation (intrinsic, extrinsic, and amotivation), cognitive, affective, and behavioral outcomes are considered by the model.

Also, the HMIEM predicts that, at each level of generality, social factors influence motivation through the satisfaction of three basic psychological needs: autonomy (deCharms, 1968; Deci & Ryan, 1985), competence (Deci, 1975; White, 1959), and relatedness (Baumeister & Leary, 1995). However, it is now well recognized in SDT that low need satisfaction is not the same thing as need-thwarting (Sheldon & Hilpert, 2012; Vansteenkiste & Ryan, 2013). Many studies have shown that need satisfaction mediates the link between social factors and self-determined motivation, even if the three needs do not contribute equally to the motivation according to the context (Gillet, Berjot, & Rosnet, 2009; Vallerand, 1997). Standage, Duda, and Ntoumanis (2006), for example, showed that the satisfaction of the need for competence was the major mediator of the relationship between autonomy support and self-determined motivation, followed by the need for autonomy, and the need for relatedness in an educational context. Similar results were reported in recent studies (Amoura, Berjot, & Gillet, 2013). More recently, Cheon and Reeve (2015) tested a teacher-focused intervention to help physical education (PE) teachers to adopt a motivating style. Eight teachers followed the autonomy-supportive intervention program (ASIP), while eight others composed a control group. The aim of the ASIP was to help teachers become more autonomy-supportive toward students (in order to increase need satisfaction) and less controlling (in order to avoid need-thwarting). The ASIP was composed of three parts: The first part was dedicated to a workshop on showing the theoretical importance of autonomy support for students' motivation; in the second part, there was a group discussion on "How can PE teachers motivate and engage amotivated students in an autonomy-supportive way?"; in the third part (which took place 1 week after the second part), there was another group discussion on the practicality and effectiveness of autonomy-supportive behaviors. The results showed that, compared to teachers in the control group, teachers who followed the ASIP were rated by objective raters and perceived by students as being more autonomy-supportive and less controlling. The results also revealed that the students of the teachers in the experimental group reported higher levels of need satisfaction and engagement, and less amotivation.

Surprisingly, very few studies have investigated the role of the more recent concept of need-thwarting (Vansteenkis-

te & Ryan, 2013) in the relationship between the supervisor's style and motivation. A theoretical contribution clearly assumes that "events that are controlling are expected to decrease intrinsic motivation by thwarting the need for autonomy" (Vansteenkiste et al., 2008, p. 26). Also, Baumeister, DeWall, Ciarocco, and Twenge (2005) showed that the thwarting of the need for relatedness impairs behavioral self-regulation (see also Baumeister, Brewer, Tice, & Twenge, 2007). Recently, among a sample of 235 individuals, Ng et al. (2013), using structural equation modeling, showed that the interpersonal style of a significant other influenced autonomous and controlled motivation to exercise as well as amotivation through different cognitive mediators. Autonomy support predicted autonomous motivation through need satisfaction while controlling behaviors predicted controlled motivation and amotivation through need-thwarting. The authors also showed that autonomous motivation positively predicted physical activity and healthy eating, while controlled motivation negatively predicted physical activity. Finally, amotivation predicted unhealthy eating. In a real-life setting, Demeyer et al. (2014) videotaped PE teachers during a specific PE lesson in order to observe their controlling behaviors. Objective external raters assessed the levels of controlling behaviors of PE teachers. The results showed that the students' perceptions of controlling teaching mediated the positive link between teachers' controlling behaviors and a) controlled motivation and b) amotivation. The results also showed that no association was found between observed controlling behaviors and students' a) perceptions of autonomy support and b) autonomous motivation.

Another set of studies linked need-thwarting and psychological adjustment outcomes. Bartholomew, Ntoumanis, Ryan, and Thøgersen-Ntoumani (2011) showed that need satisfaction positively predicted the subjective vitality of athletes, while need-thwarting negatively predicted it and positively predicted exhaustion. More recently, Gunnell, Crocker, Wilson, Mack, and Zumbo (2013) showed that psychological need-thwarting predicted negative affect, but not positive affect or subjective vitality. In another set of studies, Bartholomew, Ntoumanis, Ryan, Bosch et al. (2011, Study 1) showed that the perception of autonomy-supportive behaviors on the part of the coach negatively predicted need-thwarting and positively predicted need satisfaction among female athletes. Finally, need satisfaction was related to vitality. Conversely, psychological control positively predicted need-thwarting, which in its turn predicted depression and eating disorders. In a second study, the authors replicated the effects of style on need satisfaction and need-thwarting. They also replicated the distinct effect of needs on outcomes as need satisfaction was positively linked to positive affect and negatively linked to negative affect and burnout, and need-thwarting was positively linked to negative affect and burnout. Similarly, Balaguer et al. (2012) studied athletes' subjective vitality and burnout using a longitudinal design. They showed that a) an autonomy-supportive style predicted athletes' subjective vitality through need satisfaction, and that b) a controlling style predicted athletes' burnout through need-thwarting. In view of these results, we conclude that the interpersonal styles lead to different psychological outcomes through distinct basic psychological needs (satisfaction or thwarting).

The Present Research

As mentioned previously, those studies tested whether autonomy-supportive and controlling styles are independent of each other. To this end, two outlooks were adopted – one based on students' perceptions of teachers' behaviors and one based on an investigation of the process through which the teachers' interpersonal style influences students' self-determined motivation in their studies (in this case, through the satisfaction or thwarting of basic psychological needs). To the best of our knowledge, very few studies showed that both styles influenced motivation through distinct mediators: need satisfaction and need-thwarting (Cheon & Reeve, 2015; Ng et al., 2013). However, these studies did not explicitly test the independence of the two styles (even if it is suggested by low correlations – which are not a strong argument – between autonomy-supportive and controlling style; Balaguer et al., 2012; Ng et al., 2013; Pelletier et al., 2001; Silk et al., 2003), nor did they use self-determined motivation as a global measure of motivation. We propose to test the independence of autonomy support and controlling styles through the use of an alternative technique (cluster analysis, Study 1) and to replicate Ng et al.'s results with a global index of self-determined motivation in another domain (i.e., education) and with performance as the outcome (Study 2).

Study 1 adopted a person-centered approach (cluster analysis) to test for the independence of styles. This approach enabled us to detect naturally occurring groups of participants according to their relative position on specific variables (Henry, Tolan, & Gorman-Smith, 2005). The analysis grouped participants according to their perception of both styles (as being respectively low and/or high). Moreover, cluster analysis allowed us to treat clusters as an independent variable and thus to compare those clusters with respect to dependent variables (here, self-determined motivation). If autonomy-supportive and controlling styles are two ends of a continuum, participants should group into two clusters: one with participants scoring low on the autonomy subscale and high on the control subscale, and another with participants scoring high on the autonomy subscale and low on the control subscale. However, if as hypothesized autonomy-supportive and controlling styles are not two ends of a continuum, both kinds of behaviors should be observable among teachers (Pelletier et al., 2001; Reeve, 2009; Tessier et al., 2008). Consequently, students should group into four clusters (instead of two) according to their perception of the teacher's style (as being low or

high on both styles), and self-determined motivation should vary as a function of the cluster's configuration. Note that such a configuration of clusters was already observed once by Soenens, Vansteenkiste, and Sierens (2009), who also showed that such clusters predicted outcome variables such as depressive symptoms, self-esteem, and academic and social adjustment. Hence, our hypotheses were:

- *Hypothesis 1:* The first cluster will consist of individuals who perceive a lot of autonomy-supportive and controlling behaviors (high autonomy–high control), the second of those who perceive few autonomy-supportive and few controlling behaviors (low autonomy–low control), the third of those who perceive a lot of autonomy-supportive and few controlling behaviors (high autonomy–low control), and the fourth of those who perceive few autonomy-supportive and a lot of controlling behaviors (low autonomy–high control).
- *Hypothesis 2:* Participants in the high autonomy–low control cluster will show the highest level of self-determined motivation (Black & Deci, 2000; Deci & Ryan, 1987; Kenny, Walsh-Blair, Blustein, Bempechat, & Seltzer, 2010), while those in the low autonomy–high control cluster will show the lowest level of self-determined motivation (Mageau & Vallerand, 2003; Soenens & Vansteenkiste, 2010). The other two groups will show moderate levels of self-determined motivation. More specifically, participants in the high autonomy–high control cluster will be less self-determined because of the controlling aspects of the interpersonal style (Deci & Ryan, 1987), and participants in the low autonomy–low control cluster will be less motivated because of the lack of autonomy support (Soenens & Vansteenkiste, 2010).

The aim of Study 2 was to investigate the role of need satisfaction and need-thwarting as distinct mediators in the relationship between the supervisor's style (autonomy supportive versus controlling) and self-determined motivation, which in turn should predict academic performance. We propose to deal with this question by using path analysis and multiple mediation analyses. Because of the sample size (N = 127), we propose to first consider psychological need satisfaction and thwarting as aggregates (represented by the means of the three satisfaction needs and the three thwarting needs) instead of including the 2 × 3 needs in the model (which would raise the number of parameters to the limits recommended by the literature; Jackson, 2003; Kline, 2011). For the path analysis, our hypotheses were:

- *Hypothesis 3:* Autonomy-supportive and controlling styles will be negatively and moderately correlated (Pelletier et al., 2001).
- *Hypothesis 4:* Need satisfaction will mediate the relationship between autonomy support and self-determined motivation (Cheon & Reeve, 2015; Vallerand, 2007).
- *Hypothesis 5:* Need thwarting will mediate the relationship between control and self-determined motivation (Bartholomew, Ntoumanis, Ryan, Bosch et al., 2011; Bartholomew, Ntoumanis, Ryan, & Thøgersen-Ntoumani, 2011; Cheon & Reeve, 2015; Demeyer et al., 2014; Reeve & Jang, 2006).
- *Hypothesis 6:* Self-determined motivation will predict academic performance (Baard, Deci, & Ryan, 2004; Gillet, Vallerand et al., 2010; Kusurkar, Ten Cate, Vos, Westers, & Croiset, 2013).

In order to extend previous research, we will focus on Hypotheses 4 and 5 to check the mediating role of each need (satisfaction vs. thwarting) in the relationships between interpersonal styles (autonomy supportive vs. controlling) and relative self-determined motivation. This will be done by using multiple mediation analyses (Preacher & Hayes, 2004, 2008), which are more robust than path analyses for tests of mediations. Based on previous literature, our additional hypotheses are:

- *Hypothesis 4a:* Satisfaction of the need for competence will mediate the relationship between autonomy supportive behaviors and relative self-determined motivation (Standage et al., 2006).
- *Hypothesis 5a:* Thwarting of the need for autonomy (Vansteenkiste et al., 2008) and relatedness (Baumeister et al., 2007; Baumeister et al., 2005) will mediate the relationship between controlling behaviors and relative self-determined motivation.

Study 1

Method

Participants and Procedure

Participants were 260 French first-year psychology students (65 males and 195 females). Their mean age was 19.46 years (SD = 1.55). They were recruited in the middle of the first semester during their regular tutorials in social psychology (around the 6th week). Those tutorials were comprised of about 25 students each and consisted of teaching social psychology concepts that the students had heard about in the lectures via concrete exercises and little field studies. All tutorials were taught by the same teacher throughout the semester. So, students had had many interactions with their respective teachers by the 6th week of class. The study was run by an experimenter whom the participants did not know and who presented the study as research about students' feelings during their studies at college. Participants took part in the study voluntarily.

Measures

Academic motivation. Students' motivation was assessed with the French version of the Academic Motivation Scale for College (Vallerand, Blais, Brière, & Pelletier, 1989). This scale consists of 28 items assessing students' reasons to pursue higher education. More precisely, it assesses the seven aspects of behavioral regulation of the self-determination continuum (Deci & Ryan, 1985; Ryan & Deci, 2000): intrinsic motivation to know ("because I experience pleasure and satisfaction while learning new things"), intrinsic motivation to experience stimulation ("for the pleasure that I experience when I read interesting authors"), intrinsic motivation to accomplish ("for the pleasure that I experience while surpassing myself in my studies"), identified regulation ("because this will help me make a better choice regarding my career orientation"), introjected regulation ("to show myself that I am an intelligent person"), external regulation ("because with only a high-school degree I would not find a high paying job later on"), and amotivation ("I once had good reasons for going to college; however, now I wonder whether I should have"). Internal consistency of the different subscales was satisfactory (αs between .78 and .88). Participants were asked to indicate, on a 7-point Likert scale (1 = *does not correspond at all* to 7 = *corresponds exactly*), the extent to which each item represented a reason for which they wanted to continue their studies at a higher level of education. The scores on the seven subscales were combined into a relative autonomy index (RAI; for details, see Grolnick & Ryan, 1987; Ryan & Connell, 1989), which has the advantage of reflecting the global level of self-determined motivation[1]. The RAI is regularly used to assess a global level of motivation (Kusurkar et al., 2013; Soenens et al., 2012). High positive scores on this index reflect high levels of self-determined motivation, whereas low scores reflect low levels of self-determined motivation.

Interpersonal style. Because no valid scale exists in French, students' perceptions of the teacher's autonomy-supportive and controlling style were assessed with the French version of the Perceived Parental Autonomy Support Scale P-PASS (Mageau, Ranger, Koestner, Moreau, & Forest, 2011), which had been adapted to the education context with the authors' permission. This questionnaire consists of 24 items that assess students' perceptions of autonomy-supportive behaviors on the part of their teacher ("My teacher gives me many opportunities to make my own decisions on what I'm doing") and controlling behaviors ("When my teacher wants me to do something differently, he/she makes me feel guilty"). Internal consistency of the autonomy support and psychological control subscales was satisfactory (αs equal to .88 and .89, respectively). A factor analysis run with a varimax rotation due to factor independence and as suggested by authors revealed two factors (confirmed by Cattell's scree test, 1996) that explained 46.22% of the variance. All items loaded on their respective dimension without any cross loadings (loadings ranging from .52 to .70 for autonomy-supportive behaviors and from .49 to .71 for controlling behaviors). Adaptation of the P-PASS has also been found to be valid in other contexts (Moreau & Mageau, 2012).

Results

Descriptive statistics and preliminary analyses

First, the data were checked for the presence of outliers. None were found. The means and correlations between variables are presented in Table 1. The results showed that the perception of autonomy-supportive behaviors from one's supervisor was positively linked to the RAI ($r = .21$, $p < .001$). The results also showed that the perception of controlling behaviors was negatively but not significantly correlated to the RAI ($r = –.09$, *ns*). Moreover, the controlling style was negatively linked to the autonomy-supportive style ($r = – .30$, $p < .001$). This correlation is coherent with SDT, but is quite average if we consider the two constructs as being two ends of a continuum (Bartholomew et al., 2011a; Pelletier et al., 2001; Tessier et al., 2008). Finally, the results showed that the participants' perception of their supervisor as being controlling was moderate, the mean score being situated below the middle of the scale ($M = 3.21$; $SD = 1.07$). This perception was significantly lower than the perceptions of an autonomy-supportive style ($M = 4.45$; $SD = 0.98$; $t = 12.06$, $p < .001$), which was slightly above the middle of the scale.

Table 1. means, standard deviations, and correlations among variables

	M	*SD*	1	2
1. RAI	6.06	3.70	–	
2. Autonomy support	4.45	0.98	0.21**	–
3. Psychological control	3.21	1.07	–0.09	–0.30***

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

Main Analyses

Given that the correlation between autonomy-supportive and controlling styles was moderate ($r = –.30$), multicollinearity was not an issue for subsequent analyses (Hair, Anderson, Tatham, & Black, 1998). First, *z* scores on autonomy support and psychological control were included in a hierarchical cluster analysis using Ward's method of link-

1 The formula used for the RAI was: (intrinsic motivation to know + intrinsic motivation to experience stimulation + intrinsic motivation to accomplish) / 3 * 2 + identified regulation – ((introjected regulation + external regulation) / 2) – (amotivation * 2).

Table 2. Descriptive statistics for the four-clusters solution

	Cluster 1		Cluster 2		Cluster 3		Cluster 4				
	HighA	HighC	LowA	LowC	HighA	LowC	LowA	HighC			
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*	η^2
Autonomy support	4.92	0.53	3.38	0.61	5.16	0.52	3.64	0.79	149.04	.001	.64
Control	3.75	0.56	2.88	0.64	2.25	0.44	4.74	0.69	218.35	.001	.72
RAI	5.85	.45	5.77	0.55	7.01	0.34	5.02	0.56	3.36	.02	.04

Note. RAI = relative autonomy index and reflects relative self-determined motivation. For each dependent variable, all means are significantly different from each other, using Tukey's posthoc test.

age, with the squared Euclidian distance measure (Ward, 1963) in order to identify the perceived interpersonal profiles. The examination of the dendograms and agglomeration schedules run with the squared Euclidian distance measure confirmed that the four-cluster solution was the most suitable. Then, a nonhierarchical cluster analysis (k-means) was run specifying a four-cluster solution (Gore, 2000). Homogeneity within each cluster was satisfactory (i.e., the H coefficients ranged from .75 to .90; Tryon & Bailey, 1970). Table 2 presents the means and standard deviations for our two variables according to clusters. Participants of Cluster 1 (27.69% of the sample; $n = 72$) had moderate to high scores on both measures; this cluster was labeled "High A/High C." The participants of Cluster 2 (21.15%; $n = 55$) had low scores on both measures; it was labeled "Low A/Low C." The participants of Cluster 3 (33.85%; $n = 88$) obtained a high score on the autonomy-supportive style subscale and a low score on the controlling style subscale; it was labeled "High A/Low C." Finally, the participants of Cluster 4 (17.31%; $n = 45$) obtained low scores on the autonomy-supportive subscale and high scores on the controlling subscale; it was labeled "Low A/High C."

A one-way MANOVA was conducted using clusters as the independent variable and the two types of perception (autonomy-supportive and controlling styles) as dependent variables. The results showed significant differences between the four groups, $F(6, 510) = 168.77$, $p < .001$, $\eta^2 = .66$. Follow-up univariate analyses indicated significant group differences ($p < .001$) in the two perception variables. Tukey post hoc tests showed that the means of each cluster differed from each other (all ps $< .01$).

Finally, an ANOVA was run to test the effect of clusters on the relative autonomy index (RAI). The results showed a significant effect of clusters on the RAI, $F(3, 256) = 3.36$, $p < .02$, $\eta^2 = .04$. As shown in Table 2, and as expected, participants in the High A/Low C cluster were more motivated than those in the Low A/High C cluster ($p < .05$). The other two clusters (High A/High C and Low A/Low C) were in between and did not differ from each other. Only the Low A/Low C cluster differed from the highly self-determined cluster (High A/Low C; $p = .05$). Moreover, a subsequent polynomial contrast analysis showed that the general pattern was linear, $F(1, 256) = 8.16$, $p < .01$.

Discussion

Study 1 explored whether students can simultaneously perceive both interpersonal styles in their teacher's behavior and to study the impact of those perceptions on motivation. Consistent with Hypothesis 1 and with some recent studies (Balaguer et al., 2012; Ng et al., 2013; Pelletier et al., 2001), the autonomy-supportive and the controlling styles were only moderately correlated ($r = –.30$), which suggests the absence of a mere opposition between the constructs. Moreover, the results from the cluster analysis showed that both facets of the teachers' interpersonal style (i.e., autonomy-supportive and controlling) were distinctly detected by students as four clusters emerged. Moreover, the four-cluster solution showed that participants could also perceive their teachers as being both highly autonomy-supportive and controlling, or as both weakly autonomy-supportive and controlling. If autonomy-supportive and controlling styles were two ends of one continuum, we would have found two clusters (high autonomy support–high control and low autonomy support–low control) or at best very few participants in the two inconsistent clusters.

The results also confirmed Hypothesis 2 as they showed that students who perceived their teacher as being highly autonomy-supportive and not very controlling were more motivated in a self-determined way than those who perceived their teacher as being not autonomy-supportive but highly controlling (Black & Deci, 2000; Deci & Ryan, 1987; Kenny et al., 2010). Coherent levels of autonomy-supportive and controlling behaviors (i.e., both scores being high or low) led to moderate levels of self-determined motivation toward studies. As suggested by Silk and colleagues (2003), and as parents may do, teachers displaying little autonomy support and little control as well as those displaying high autonomy support and high control might act this way for strategic reasons. For instance, teachers may use specific behaviors that support students' autonomy (e.g., acknowledging their feelings) to counterbalance the negative effects of their controlling behaviors (e.g., fixing performance goals, being strict about deadlines) on students' self-determined motivation. Conversely, teachers who do not support students' autonomy (e.g., little rationale to rules) may strategically display few controlling behaviors (e.g., no assertion of power to overcome students' feel-

ings), again in order to avoid too much impairment of students' motivation.

However, our results can also be interpreted in another way. Indeed, we mainly adopted a nonrecursive approach to interpreting our findings. If a large part of the literature showed that the social context (teachers' behaviors) influences students' motivation, it is important to stress that a recursive approach exists in the literature. For instance, Skinner and Belmont (1993) showed that students' motivation depends on the reciprocal effects of teachers' behaviors and students' engagement. Similarly, Taylor and Ntoumanis (2007) showed that the perception teachers had of the average level of self-determination of their students predicted their reported use of motivational strategies (autonomy-support, structure, and involvement). This relationship was mediated by their own level of self-determination. The authors also showed that students' perceptions of teachers' behaviors had a positive effect on their own self-determination, and this relationship was mediated by the satisfaction of their needs for autonomy and competence. So, these studies remind us to be cautious in the interpretations of our results. Longitudinal studies would be better able to test those possible recursive effects, in particular the effect of students' motivation on the teacher's style of teaching.

In sum, our results are globally consistent with SDT literature that predicts that an autonomy-supportive style leads to self-determined motivation and that a controlling style leads to less self-determined motivation. However, our results showed that both styles can be perceived as either high or/and low, which adds an argument for the independence of autonomy support and control.

Study 2

Method

Participants and Procedure

The participants of Study 2 were 127 French first-year psychology students (100 females and 27 males). Their mean age was 19.17 years (SD = 1. 40). The participants of this study were involved in a more general research project involving 218 students (the mean age was 19.2 years, SD = 1.73), in which the links between personality and performance were being studied. At the beginning of their first semester, the participants' personality was assessed and researchers planned to measure their performance in the social psychology program. With the permission of the researchers, we conducted a second measurement occasion with the motivational variables concerned in this study among a sample of the 127 remaining students (who attended the social psychology lesson at the middle of the semester and who attended the final exam[2]). The two projects (personality and motivation) are not related and no other manuscript or papers have used this sample. Because 218 students attended the first social psychology course at Time 1, and only 127 students attended the course at the middle of the semester, we conducted attrition analyses. The results showed no differences in age, $F(1, 216) = .06$, $p = .80$, sex, χ^2 ($df = 1$, $n = 127$) = .10, *ns*, or performance, $F(1, 192) = .10$, $p = .74$[3].

Then the 127 students were given a nonanonymous questionnaire[4], by an experimenter who was unknown to them, that was presented as research on students' feelings during their first year of college. Their participation implied that they allowed the experimenter to learn their grade on the final examination in social psychology. Hence, only data from participants who 1) had accepted to give their names and 2) took the final examination were collected and analyzed in this study. As in Study 1, the data were collected in the middle of the semester after students had had sufficient time to interact with their regular teacher.

Measures

Interpersonal style. Students' perceptions of autonomy-supportive and controlling style were assessed with the French version of the Perceived Parental Autonomy Support Scale (Mageau et al., 2011), which had been adapted to the education context with the authors' permission. This questionnaire contains a total of 24 items, 12 assessing students' perceptions of autonomy-supportive behaviors ($\alpha = .88$) and 12 assessing their perceptions of controlling behaviors ($\alpha = .89$). An exploratory factor analysis run with varimax rotation as in Study 1 (with the principal component extraction method), revealed two factors (confirmed by Cattell's scree test, 1996) explaining 47.73% of the variance. All items loaded on their respective dimension without any cross loadings (loadings ranging from .51 to .83 for autonomy-supportive behaviors and from .59 to .79 for controlling behaviors).

Need satisfaction. Basic psychological need satisfaction was assessed using the "Échelle de Satisfaction des Besoins Fondamentaux en Contexte Sportif" (Gillet, Rosnet, & Vallerand, 2008), which had been adapted to the education context with the authors' permission. Following the stem "In my studies at the University . . .," students rated items on a 7-point Likert scale, ranging from 1 (*completely disagree*) to 7 (*completely agree*), assessing their perceptions of autonomy ("I feel free to make choices"; $\alpha = .77$), competence ("I often feel very competent"; $\alpha = .86$), and relatedness ("Gen-

2 Insofar as the tutorials were not mandatory, we assume that some students did not attend all social psychology lessons. We also assume that some students did not attend the final examination for various reasons (lack of work, financial reasons, or poor educational guidance).
3 Sixty-six students participated at Time 1 and attended the final examination.
4 The order of different scales included in the questionnaire was mixed.

erally, the other students appreciate me"; α = .86). An exploratory factor analysis, run with an oblique rotation because of the intercorrelations between the three needs, revealed three factors (confirmed by Cattell's scree test, 1996) explaining 66.58% of the total variance. The items of each subscale loaded on their respective dimension without any cross loadings (loadings ranging from .62 to .87 for autonomy, .69 to .87 for competence, and .61 to .75 for relatedness). The factors were correlated with each other, competence satisfaction was correlated with affiliation satisfaction (r = –.43) and autonomy satisfaction (r = –.34), and affiliation satisfaction was correlated with autonomy satisfaction (r = .41). The three subscales were averaged to create a global index of need satisfaction (Bartholomew, Ntoumanis, Ryan, Bosch et al., 2011; Deci et al., 2001; Gagné, 2003; Van den Berghe et al., 2013).

Need thwarting. Need thwarting was assessed using the "Échelle de Frustration des Besoins Psychologiques au Travail (EFBPT)" (Gillet, Fouquereau, Lequeurre, Bigot, & Mokounkolo, 2012), which had been adapted to the education context with the authors' permission. Following the stem, "In my studies at the university . . .," students rated items on a 7-point Likert scale, ranging from 1 (*completely disagree*) to 7 (*completely agree*), assessing their perceptions of autonomy ("I feel forced to be in agreement with the organization of the work which is proposed to me"; α = .75), competence ("Everything is made so that I feel incompetent in certain situations"; α = .76), and relatedness frustration ("I think that other students hate me"; α = .74). The factor analysis run with an oblique rotation revealed three factors (confirmed by the Cattell's scree test, 1996) explaining 66.77% of the variance. All items loaded on their respective dimension without any cross loadings (loadings ranging from .74 to .83 for the need for autonomy, from .66 to .79 for competence, from .66 to .86 for relatedness). Factors were correlated with each other, competence thwarting was correlated with affiliation thwarting (r = .24) and autonomy thwarting (r = .32), and affiliation thwarting was correlated with autonomy thwarting (r = .16). The three subscales were averaged to create a global index of need-thwarting (Bartholomew, Ntoumanis, Ryan, Bosch et al., 2011; Van den Berghe et al., 2013).

Academic motivation. As in Study 1, students' motivation was assessed with the French version of the Academic Motivation Scale for College (Vallerand et al., 1989). The internal consistency of the seven subscales was satisfactory (αs between .74 and .88). The subscales were combined into a relative autonomy index (RAI; for details, see Grolnick & Ryan, 1987; Ryan & Connell, 1989), which represents the extent to which students' behavior is self-determined (Vansteenkiste, Simons, Lens, Soenens, & Matos, 2005).

Academic performance. Students' final grades for the first semester (which ranged from 0 to 20; M = 9.89, SD = 3.75) in social psychology (final examination[5]) served as a measure of objective performance. The students were informed that their grades would be collected at the end of the semester and used for research purposes.

Results

Descriptive and Preliminary Analyses

The data were checked for the presence of outliers; none were found. The means, standard deviations, and relationships between our variables are displayed in Table 3.

Table 3. Means, standard deviations, and correlations for study variables (n = 127)

	M	*SD*	1	2	3	4	5	6	7	8	9	10	11
1. Autonomy support	4.45	0.98	–										
2. Psychological control	2.53	0.97	–.09	–									
3. Global need satisfaction	4.83	0.77	.41***	.13	–								
4. Autonomy satisfaction	5.30	0.89	.52***	.02	.82***	–							
5. Relatedness satisfaction	5.04	0.95	.22*	.02	.82***	.54***	–						
6. Competence satisfaction	4.15	0.96	.29***	.28***	.82***	.53***	.50***	–					
7. Global need-thwarting	2.11	0.68	–.14	.33***	–.34***	–.32***	–.34***	–.17*	–				
8. Autonomy thwarting	2.83	1.01	–.11	.27**	–.30***	–.35***	–.26**	–.14	.76***	–			
9. Relatedness thwarting	1.54	0.78	–.08	.28***	–.18*	–.15	–.27**	–.02	.62***	.20*	–		
10. Competence thwarting	1.96	0.99	–.14	.18*	–.25**	–.19*	–.23**	–.19*	.80***	.41***	.29***	–	
11. Autonomous motivation	7.80	3.46	.32***	–.13	.43***	–.38***	.26**	.31***	–.38***	–.27**	–.35***	–.22*	–
12. Performance	9.89	3.75	–.00	.03	.15	–.04	.26**	.18*	–.04	–.08	–.13	.01	.26**

Note. *p < .05, **p < .01, ***p < .001.

5 In accordance with the usual procedure at French universities, the final examinations were corrected anonymously. Names and grades were then recorded and saved as a file by a secretary.

Path Analysis

A *strictly confirmatory strategic framework* was chosen to test Hypotheses 3 to 6 because of the large literature supporting the HMIEM (Vallerand, 1997). This framework consists of testing the fit of the hypothesized model to the actual data and of rejecting the model in case of a lack of fit without modifications (Byrne, 2010). The tested model only contained observed variables (means of self-report measures and final grades for academic performance) and was tested using AMOS 20 with maximum likelihood estimation. Path analysis was preferred over structural equation modeling due to the low number of participants. Moreover, in order to test the significance of the indirect effects of interpersonal styles on self-determined motivation, a bootstrap analysis was performed (5,000 iterations, bias-corrected confidence intervals 95; Preacher & Hayes, 2008). Bootstrap analyses are robust analyses that can ensure that the observed effect is not a random effect due to the specificities of a sample. According to Preacher and Hayes (2004), bootstrap analysis allows one to test a hypothesis without making specific assumptions about the normality of the distribution. It is also more appropriate with small samples such as ours.

Based on previous studies (Bartholomew, Ntoumanis, Ryan, Bosch et al., 2011), the intercorrelation between need satisfaction and need-thwarting was entered into the model, but not represented in the figure. Following Hu and Bentler's (1999) cut-offs, our results revealed a satisfactory fit of the model to the data. The authors consider that a comparative fit index (CFI) approaching .95, a standardized root-mean-square residual (SRMR) approaching .08, and a root-mean-square error of approximation (RMSEA) approaching .06, reveal a satisfactory model fit. Also, a goodness-of-fit index (GFI; Jöreskog & Sörbom, 1993) approaching .90 reveals a satisfactory fit. For our sample, the chi square value was not significant[6], χ^2 (6, n = 127) = 9.63, *ns*, and the other fit indices were satisfactory: CFI = .96, GFI = .97, SRMR = .05, and RMSEA = .06; CI: .000 –.147.

As shown in Figure 1 and Table 4, autonomy support and control were not significantly linked (β = –.09, *ns*). Autonomy support predicted need satisfaction (β = .38, p < .001), which in turn predicted relative self-determined motivation (ϕσ24 β = .30, p < .001). Control predicted need-thwarting (ϕσ24 β = .39, p < .001), which in turn negatively predicted relative self-determined motivation (ϕσ24 β = –.23, p < .01). Finally, self-determined motivation predicted performance (β = .26, π < .01).

As for the mediational role of need satisfaction, the results showed that the indirect effect of autonomy support

Table 4. Decomposition for the effects of autonomy support and control on relative autonomous motivation through need satisfaction and need-thwarting

	Autonomy support		
	Unst.	*SE*	St.
Need Satisfaction			
Direct Effect	.29***	.06	.38***
Indirect effect	–	–	–
Total effect	.29***	.06	.38***
Relative autonomous motivation			
Direct effect	.53	.29	.15
Indirect effect	.39	.18	.11
Total effect	.92***	.47	.26***
	Control		
Need thwarting			
Direct effect	.29***	.05	.39***
Indirect effect	–	–	–
Total effect	.29***	.05	.39***
Relative autonomous motivation			
Direct effect	–.30	.29	–.09
Indirect effect	–.32	.13	–.09
Total effect	–.62*	.42	–.18*

Note. Unst. = unstandardized; St. = standardized. Confidence intervals are bias-controlled and accelerated. Bootstrap resamples = 5000. N = 127 for all tests. *p < .05, **p < .01, ***p < .001.

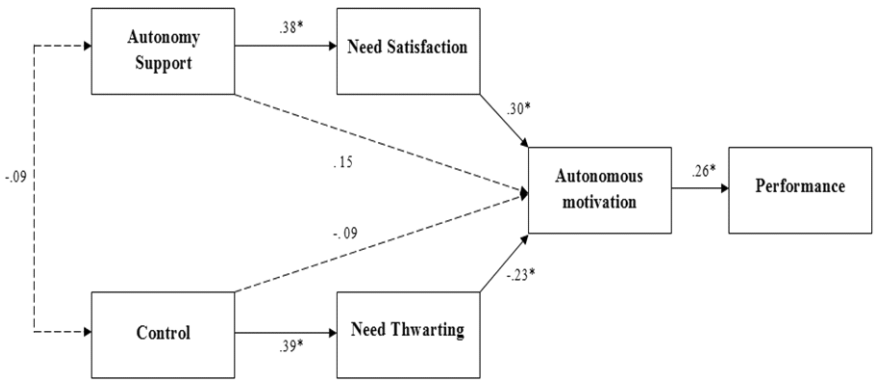

Figure 1. Results of structural equation modeling. Dotted lines represent nonsignificant parameters; lines indicate significant parameters (p < .001). Correlation between disturbance terms were need-thwarting–need satisfaction = –.18, p < .001.

6 The number of parameters estimated was 15.

Table 5. Multiple mediation estimates for the relationship between autonomy support and autonomous motivation

Variables	*b*	*t*	*p*
Autonomy support to mediators			
Autonomy satisfaction	.47	6.92	<.001
Relatedness satisfaction	.22	2.72	<.01
Competence satisfaction	.29	3.55	<.001
Direct effects of mediators on autonomous motivation			
Autonomy satisfaction	1.66	3.84	<.001
Relatedness satisfaction	–.05	–.14	.88
Competence satisfaction	.28	.82	.40
Total effect of autonomy support on autonomous motivation			
Autonomy support	1.11	3.70	<.001
Remaining direct effect of autonomy support on autonomous motivation			
Autonomy support	.23	.73	.46
Partial effect of sex on autonomous motivation	.80	1.19	.23

	b	CI_{lower}	CI_{upper}	*p*
Indirect effects of autonomy support on autonomous motivation via mediators (bootstrap results)				
Total indirect effects	.87	.50	1.54	*ns*
Autonomy satisfaction	.79	.43	1.32	< .001
Relatedness satisfaction	–.01	–.25	.12	*ns*
Competence satisfaction	.08	–.13	.50	*ns*

Note. Confidence intervals are bias-controlled and accelerated. Bootstrap resamples = 5000. $n = 127$ for all tests.

on relative self-determined motivation through need satisfaction was not significant (ϕσ24 β = .15, $p = .06$). Moreover, need satisfaction appeared to fully mediate the relationship between autonomy support and relative self-determined motivation as shown by the significant indirect confidence interval ($p = .003$ two-tailed[7]; lower 95% CI = .11, upper 95% CI = .85).

As for the mediational role of need-thwarting, the results showed that the indirect effects of control on relative self-determined motivation through need-thwarting were not significant (ϕσ24 β = –.09, $p = .31$). Moreover, need-thwarting appeared to fully mediate the relationship between control and relative self-determined motivation as shown by the significant indirect confidence interval ($p = .001$ two-tailed; lower 95% CI = –.67, upper 95% CI = –.12).

Mediation of Specific Needs

To identify which need mediated the link between the interpersonal styles and relative self-determined motivation, we used a multiple mediation analysis (Preacher & Hayes, 2004b, 2008) with a bootstrap procedure (5000 iterations, bias-corrected confidence intervals 95%). We chose to perform this type of analysis rather than three separate simple mediation analyses (Baron & Kenny, 1986) because it directly tests the hypothesis of no difference between a total effect and a direct effect (Preacher & Hayes, 2004). Therefore, it allows one to resolve the statistical power problem often met with Baron and Kenny's procedure, especially when using small samples[8] (Edwards & Lambert, 2007; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Moreover, it also allows one to test an overall mediation effect and to determine the unique mediating effect that a specific variable has within a single model controlling for the presence of the other mediators. Also, this kind of analysis decreases the probability of Type I errors, that is, to conclude that a mediation is present when it does not exist (Preacher & Hayes, 2008). Finally, as already mentioned, those mediations were run using the bootstrap procedure, which consists of producing many new samples based on the original one in order to make inferences about the distribution that we could observe in the general population (here, with 5000 iterations, bias-corrected confidence intervals 95%)[9]. It provides distributions for each statistic from which confidence intervals can be derived. It has also the advantage of making no assumption about the shape of

7 This is a bootstrap approximation obtained by constructing two-sided bias-corrected confidence intervals.

8 That one or both links, the one between the IV and the mediator, on the one hand, and the links between the mediator and the DV, on the other hand, be nonsignificant due to low sample size (so, to conclude that there is an absence of mediation that may in fact exist – Type II error).

9 Preacher and Hayes' macros implemented in SPSS were used to perform the multiple mediation analysis.

Table 6. Multiple mediation estimates for the relationship between control and autonomous motivation

Variables	*b*	*t*	*p*
Control to mediators			
Autonomy thwarting	.28	3.15	<.01
Relatedness thwarting	.21	3.08	<.01
Competence thwarting	.20	2.25	<.05
Direct effects of mediators on autonomous motivation			
Autonomy thwarting	–.65	–2.03	<.05
Relatedness thwarting	1.45	3.15	<.01
Competence thwarting	–1.32	–3.36	<.01
Total effect of control on autonomous motivation			
Autonomy support	–.43	–1.36	.17
Remaining direct effect of control on autonomous motivation			
Autonomy support	.08	.26	.79
Partial effect of sex on autonomous motivation	.33	.46	.64

	b	CI_{lower}	CI_{upper}	*p*
Indirect effects of autonomy support on autonomous motivation via mediators (bootstrap results)				
Total indirect effects	–.52	–1.06	–.22	*ns*
Autonomy thwarting	–.18	–.44	–.03	<.01
Relatedness thwarting	–.28	–.75	–.03	<.01
Competence thwarting	–.04	–.24	.08	*ns*

Note. Confidence intervals are bias-controlled and accelerated. Bootstrap resamples = 5000. $n = 127$ for all tests.

the distributions (Preacher & Hayes, 2004). As with simple and multiple regressions, parameters can be read as regression weights.

A first analysis was run with autonomy support as an independent variable and the three satisfaction needs as mediators. It showed that autonomy support had a significant impact on relative self-determined motivation ($b = 1.11$, $p < .001$) and was significantly linked to satisfaction of the need for autonomy ($b = .47$, $p < .001$), relatedness ($b = .22$, $p < .01$), and competence ($b = .29$, $p < .01$) (see Table 5[10]). However, only satisfaction of the need for autonomy was linked to relative self-determined motivation ($b = .79$, $p < .001$), suggesting that only this need is a mediator in the relationship between autonomy support and self-determined motivation. Confirming this, the results showed that the need for autonomy significantly accounted for the mediational effect: Satisfaction of the need for autonomy accounted for .79 of the total indirect effect of autonomy support on relative self-determined motivation ($b = .87$), and zero was not contained in the confidence interval ($CI_{.99}$: .43, 1.32 and .50, 1.54, respectively; Preacher & Hayes, 2004, 2008).

A second analysis was run with controlling style as an independent variable and the three thwarting needs as mediators. It showed that control did not have a significant impact on relative self-determined motivation ($b = 1.11$, $p = .17$) (see Table 6[11]). However, control was significantly linked to thwarting of the need for autonomy ($b = .28$, $p < .01$), relatedness ($b = .21$, $p < .01$), and competence ($b = .20$, $p < .05$). However, only thwarting of the need for autonomy ($b = –.18$, $p < .05$) and relatedness ($b = –.28$, $p < .01$) was negatively linked to relative self-determined motivation, suggesting that these needs mediated the relationship between control and self-determined motivation. Confirming this, the results showed that thwarting of the need for autonomy accounted for –.18 of the total indirect effect of control on relative self-determined motivation ($b = –.52$) and zero was not contained in the confidence interval ($CI_{.99}$: –.44, –1.32 and –1.06, –.22, respectively). Moreover, the results showed that thwarting of the need for relatedness (which accounted for –.28 of the total indirect effect, $CI_{.99}$: –.75, –.03) also mediated this relationship.

Discussion

The main aim of Study 2 was to test the independence of the autonomy-supportive and controlling styles by studying the process through which each style influences motivation and outcomes. The results supported the proposed model.

Our results again showed that the two styles were only

10 As females ($n = 100$) outnumber males ($n = 27$), analyses were conducted with sex as a covariate.
11 Analyses were also conducted with sex as a covariate.

slightly linked as a nonsignificant and a negative path was observed between the autonomy-supportive and controlling styles. This confirms the results of Study 1 and adds to the few prior studies going in that direction (Amoura, Berjot, Gillet, Caruana, & Finez, 2013; Balaguer et al., 2012; Bartholomew, Ntoumanis, Ryan, Bosch et al., 2011; Bartholomew, Ntoumanis, Ryan, & Thøgersen-Ntoumani, 2011; Ng et al., 2013; Pelletier et al., 2001; Silk et al., 2003; Tessier et al., 2008). Moreover, the path analysis results showed that each of those styles predicted self-determined motivation through distinct pathways. While autonomy support predicted motivation through need satisfaction, as had already been highlighted in the literature (Baard et al., 2004; Vallerand, 2007), control predicted motivation through need-thwarting (Balaguer et al., 2012). This represents another confirmation that both styles might be two separate constructs and not two ends of a single continuum. Finally, a focus on each mediation showed that not all needs contributed to this motivational sequence.

A more precise analysis of the relationships between the supervisor styles and self-determined motivation showed us that, contrary to what we had predicted based on the literature (Standage et al., 2006), satisfaction of the need for autonomy seemed to be the major predictor of academic motivation instead of satisfaction of the need for competence. This result contradicts Hypothesis 4a, which predicted that satisfaction of the need for competence would, in an academic context, explain the relationship between autonomy support and self-determined motivation. This might be due to specificities of the context under study. Indeed, as showed by Gillet et al. (2009), the contribution of the different needs to self-determined motivation can differ depending on context. Because this study took place in the middle of the semester, students may have paid particular attention to the need for autonomy instead of competence, insofar as they had not yet had the possibility to evaluate their competence.

Conversely, as expected this time, control negatively predicted self-determined motivation through thwarting of the need for autonomy (Vansteenkiste et al., 2008) and relatedness (Baumeister & Leary, 1995). Our results also showed that the need for autonomy (thwarting) played a major role in the relationship between the controlling style and self-determined motivation. The low level of self-determined motivation that resulted from thwarting the need for autonomy can be explained by the shift in the perceived locus of causality to the external pole (Reeve, Nix, & Hamm, 2003; Ryan & Connell, 1989). Indeed, according to the cognitive evaluation theory (Deci, 1975; Deci & Ryan, 1980), which is a subtheory of SDT (Deci & Ryan, 2000; Ryan & Deci, 2000), social factors such as the supervisor's interpersonal style influence self-determined motivation through two major cognitive processes: a) changes in the perceived locus of causality and b) changes in perceived competence. The *perceived locus of causality* (PLOC; Ryan & Connell, 1989), which is a causal attribution (deCharms, 1968), refers to the degree to which people believe they are responsible for their own behavior and depends on satisfaction of the need for autonomy. It can be impersonal (amotivation), external (extrinsic regulation), somewhat external (introjected regulation), somewhat internal (identified regulation), or internal (integrated regulation and intrinsic motivation; Deci & Ryan, 1985a; Ryan & Connell, 1989). Thus, in our study, the results suggest that teachers' controlling style led to low self-determined motivation among students especially because of the thwarting of their need for autonomy.

Also, the need for relatedness was also found to play an important role. Because of students' need to interact positively with significant others (including pairs and supervisors) when they explore a relatively new environment (e.g., college), the need for relatedness is also very important in the relationship between control and self-determined motivation (Baumeister et al., 2007; Baumeister et al., 2005). Indeed, this can be explained by students' desire to be respected by their teachers and classmates. According to Niemiec and Ryan (2009), relatedness is deeply associated with a student's feeling that the teacher likes, respects, and values him or her. This seems to have been particularly true in this study.

Finally, academic performance was found to be predicted by self-determined motivation (Baard et al., 2004; Gillet, Vallerand et al., 2010; Kusurkar et al., 2013), confirming the overall relevance of HMIEM (Vallerand, 1997) in the educational context. Although this relationship is predicted by SDT and the HMIEM, few studies observed this effect in the educational context. Our study thus adds to the literature showing an impact of motivation on performance in this specific context.

General Discussion

The present studies tested for the independence of two constructs, namely, autonomy-supportive and controlling styles. In light of the large body of literature that treats these styles as two ends of a continuum, our studies add to the more limited literature suggesting that they should be considered distinct. We did so by using two different methodologies, the first being an intraindividual approach based on the resemblance of participants based on their response with respect to specific variables (here, autonomy-supportive and controlling styles), the second by studying the process through which autonomy-supportive and controlling styles influence self-determined motivation.

The results of Study 1 highlighted four distinct clusters, suggesting that students can perceive incoherent styles of behavior. Indeed, when students are asked to tell whether they have perceived whether their teachers provided them with rationale for rules, or allowed choices during their interactions, students responded according to their experiences. However, they were also asked to report whether they perceived controlling behavior such as threats when they

did not put in enough effort, or guilt when they displayed inadequate behavior. Both kinds of supervisor behavior are simultaneously possible, particularly over a long period of interaction. However, if a final global impression is often expressed as being dichotomous (their supervisor being perceived as either predominantly controlling or autonomy supportive), specifically when overall behavior is appraised, it does not prove that the two styles are incompatible. In other words, a teacher can be globally perceived as being autonomy-supportive or controlling, but he/she can at times act more or less in an autonomy-supportive way and more or less in a controlling way. Our results suggest that students' level of perception of autonomy-supportive and controlling behavior does not lead to the same levels of relative self-determined motivation. It is important to note that our conclusions are based on the perceptions of students and not on teachers' actual behavior. However, students nonetheless perceived those behaviors differently and in different degrees. It would be very interesting to explore the reason for such differences in perception that might come from both the situation and individual characteristics.

In sum, self-determined motivation depends on the level of *perceived autonomy* and the level of *perceived control* provided by the environment. This insight mainly has theoretical implications in the sense that it challenges the conclusions of previous studies that found that a low level of autonomy-supportive behavior equated to controlling behavior. As Bartholomew et al. (2010) stated, "The absence of autonomy support might, for instance, simply be indicative of a more neutral rather than directly controlling style." For instance, in the sports context, Mageau and Vallerand (2003) defined an autonomy-supportive coach as a supervisor who 1) provides choice, specific rules, and limits, 2) provides a rationale for tasks and limits, 3) acknowledges the other person's feelings and perspectives, 4) provides athletes with opportunities for initiative taking and independent work, 5) provides noncontrolling competence feedback, 6) avoids controlling behaviors, and 7) prevents ego involvement in athletes. For these authors, a low display of these seven behaviors implies a controlling style. However, this low display might merely reflect a neutral interpersonal style. Indeed, though these autonomy-supportive behaviors, when performed, clearly lead to self-determined motivation insofar as they satisfy basic psychological needs, the absence of these behaviors does not necessarily thwart psychological needs.

Another way of showing that autonomy supportive and controlling styles are independent is to highlight the specific process through which they impact self-determined motivation. Study 2 showed that if the autonomy-supportive style predicted self-determined motivation through need satisfaction, as already shown in the literature, a controlling style influences self-determined motivation through need-thwarting. Past studies have found that a controlling style has a negative influence on self-determined motivation through low basic psychological need satisfaction (Blanchard et al., 2009). However, as our results suggest, controlling behaviors lead to low self-determined motivation through need-thwarting. This point is important for future research on interpersonal styles since autonomy-supportive and controlling behaviors influence self-determined motivation differently through distinct psychological mediators.

Through our studies, some points of progress can be identified. First of all, we chose first-year students in the middle of the first semester because we believe that at least 6 weeks are needed to observe the effect of teachers' behavior on students' self-determined motivation and academic performance. However, a longitudinal design periodically assessing teachers' objective behaviors (in terms of autonomy support and psychological control), persistence in studies, and performance could reveal more about the motivational effects of teachers' interpersonal style. Second, it is important to keep in mind that powerful statistical procedures such as path analysis and multiple mediation analyses only simulate causality. If the research design was tested on a well-founded theoretical basis, we encourage the use of experimental designs to show causal relationships between the variables intervening in the motivational sequence. Furthermore, as Ng et al. (2013) did in their research, a structural equation model separating latent factors (autonomous motivation, controlled motivation, and amotivation) could be interesting, especially if a multiple mediation analysis revealed which needs are specifically involved in the mediation. Finally, we chose to use path analysis instead of structural equation modeling because of the sample size (which accounts for measurement error) and because of the satisfactory psychometric properties of the scales used. A replication with a larger sample of undergraduate students could strengthen the overall motivational process.

From a practical point of view, it is important to emphasize that the processes associated with an autonomy-supportive style (i.e., need satisfaction and self-determined motivation) lead to positive outcomes which are well known in the literature (for a review, see Moreau & Mageau, 2013). Also, as the literature and our results suggest, the processes associated with a controlling style (i.e., need-thwarting and non-self-determined motivation) lead to negative outcomes (Bartholomew, Ntoumanis, Ryan, Bosch et al., 2011; Bartholomew, Ntoumanis, Ryan, & Thøgersen-Ntoumani, 2011; Reeve & Jang, 2006). Insofar as our measurements were taken early in the academic year (in the middle of the first semester for both studies), the implementation of ASIPs (Cheon & Reeve, 2015; Su & Reeve, 2011) for university teachers as soon as possible in the academic year could increase students' need satisfaction, decrease students' need-thwarting, and have a positive impact on self-determined motivation and its consequences. Moreover, Cheon, Reeve, Yu, and Jang (2014) showed that ASIPs also benefit teachers in that those who attended the program reported greater teaching motivation, better teaching skills, and greater well-being. Because we know that

teachers' motivation influences students' motivation (Radel, Sarrazin, Legrain, & Wild, 2010; Taylor & Ntoumanis, 2007), this kind of program deserves attention from undergraduate teachers.

This set of studies has shown the importance of considering autonomy support and controlling styles independently in an academic context. Basic psychological needs (as being satisfied or thwarted) have been found to mediate the relationship between the environment and self-determined motivation, which in turn predicted academic performance. This research highlights the insights of previous research considering the two styles to be distinct constructs rather than "two sides of the same coin."

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