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14. STIMULATING AUTONOMOUS MOTIVATION IN THE CLASSROOM

The Role of Interpersonal Teacher Agency and Communion

INTRODUCTION

Self Determination Theory (SDT) distinguishes the quality of motivation from its quantity or intensity (Vansteenkiste, Sierens, Soetens, Luyckx, & Lens, 2009). A sequence from controlled to autonomous motivation is adopted; autonomous motivation is seen as the best quality type. Being autonomously motivated, as opposed to controlled, has been found to lead to more volitional persistence, better relationships in social groups, more effective performance, greater health and well-being (Deci & Ryan, 2002), deep-level cognitive processing (Vansteenkiste et al., 2009), and creativity (Ryan & Deci, 2000a). The extent to which students' motivation is controlled or autonomous, describes a difference in the quality of motivation. Autonomous motivation is associated with positive learning outcomes (Black & Deci, 2000; Ryan & Deci, 2002; Vansteenkiste et al., 2009) and cannot be taken for granted, as the degree to which it is activated depends on the social context (Deci, Eghrari, Patrick, & Leone, 1994; Reeve, Ryan, Deci, & Jang, 2008; Ryan & Deci, 2000a). Indeed, from a SDT perspective it is claimed that the teacher is an important agent who can increase the quality of student motivation as they adopt a more supporting or controlling style of teaching (Ryan & Deci, 2002). An autonomy-supportive teaching style is claimed to be important for student autonomous motivation (Black & Deci, 2000; Reeve, 1998; Reeve & Jang, 2006), while other (social) context factors, such as teacher structure (providing support for competence) and involvement (providing support for relatedness) are less related to controlled and autonomous motivation (Vansteenkiste et al., 2009). While SDT claims that the teacher influences students' controlled and autonomous motivation (Deci, Vallerand, Pelletier, & Ryan, 1991), it has not yet been shown whether contextual factors such as the teacher and the class are actually important in stimulating autonomous motivation, or whether the students themselves solely make the difference in the quality of their motivation.

In this chapter, the social context is conceptualized in terms of the interpersonal perceptions students have of their teachers (Wubbels, Brekelmans, van Tartwijk, & den Brok, 2006). That is to what degree do students perceive their teacher as conveying agency (i.e., dominance, interpersonal influence) and communion (friendliness, interpersonal proximity) in class. The goal is to show to what extent

the perceived interpersonal teacher behavior is related to the quality of a student's controlled and autonomous motivation.

CONTROLLED AND AUTONOMOUS MOTIVATION

Different types of self-regulation, increasing in internalization level, underlie controlled and autonomous motivation (Deci et al., 1991; Ryan & Deci, 2000a). In learning situations, self-regulation comprises the reasons for participating in a learning activity and striving for a goal (Lens & Vansteenkiste, 2008). Controlled motivation is based on external and introjected regulation. *External regulation* is the least-internalized form of extrinsic motivation (Deci & Ryan, 2002). When one is externally regulated, reasons for a behaviour are related to external demands such as rewards or punishments. *Introjected regulation* is the second most controlled type of extrinsic motivation and includes behaviour that is partially internalized, but which is not considered part of the integrated self or truly accepted as one's own. Behaviour is therefore manifested to avoid guilt and shame or to attain feelings of worth (Ryan & Deci, 2000b). Autonomous motivation is based on identified and integrated regulation, and intrinsic motivation. When regulation is *identified*, one values the goal of regulation and acknowledges the behaviour as personally important, but not as reflecting one's own values. The most internalized type of extrinsic motivation is *integrated regulation*. This type of regulation arises when values and goals of behaviour are congruent with one's own values, goals, and needs (Deci & Ryan, 2002). This is similar to, but not the same as *intrinsic motivation* as both types hold a total involvement of the self, but when regulation is integrated, actions are performed for personally important outcomes rather than for interest and enjoyment (Deci, Ryan, & Williams, 1996).

Teachers, Classrooms, and Students' Controlled and Autonomous Motivation

Different studies have claimed that teachers are able to promote autonomous motivation and the internalization of regulation by offering autonomy-support in the classroom (e.g. Black & Deci, 2000; Reeve & Jang, 2006). In stimulating autonomous motivation, Ryan and Deci (2000a) claimed that the teacher is a significant agent by providing support for relatedness, competence, and autonomy in the classroom. Autonomous support by the teacher has been characterized by different instructional activities (Reeve, 1998). In their lab-study, Reeve and Jang (2006) found that activities such as providing rationales and listening positively affected internalization, while giving commands and telling the right answer, demonstrated external agency and thwarted the internalization of self-regulation. In this view, teacher behaviour is thought to be an important factor in stimulating student motivation.

Although SDT claims that the teacher can affect student motivation, it has not been investigated whether teacher and classroom effects can be generalized across students; in other words, is it actually possible that motivation is influenced by

other factors than the self? Research, has argued that motivation is an intra-individual concept (Urdan & Schoenfelder, 2006), but most SDT studies that investigated controlled and autonomous motivation (e.g. Black & Deci, 2000; Reeve & Jang, 2006; Ryan & Deci, 2000b) did not consider the question whether teachers differ in the quality of support of motivation of students. Also, while student perceptions of dyadic student-teacher relationships have been studied (Black & Deci, 2000; Reeve & Jang, 2006), classroom effects, e.g., the classroom social environment (Urdan & Schoenfelder, 2006; Vansteenkiste et al., 2009) were not taken into account. However, it is, important to take the teacher, the class, and the student level into account because teachers can act differently in their classes and classroom groups have been shown to have an effect on students´ individually experienced motivation (Marsh, Martin, & Cheng, 2008).

Den Brok et al. (2004) found that in a sample of physics and English as a Foreign Language (EFL) classrooms, on average 10% of the differences between students' pleasure, perceived relevance, confidence, and effort were located at the teacher/class level. In a sample of physics classrooms more than 30% of the variance was at the teacher-class level. Marsh et al. (2008) showed how cross-classified multilevel modelling can be used to disentangle variance in classroom motivation at the school, teacher, class, student, and subject level. They found that student perceptions of the classroom climate were more specific to the classroom group than to the teacher. Nonetheless, most of the variance in motivation was located at the student level; for enjoyment and student-teacher relationships this was about 85 per cent.

Overall, affective-motivational variables seem to be largely determined at the student level, but the extent to which teacher and class affect variance in these variables differs between studies.

Interpersonal Relationships

In addition to providing stimulating instructional activities, Reeve and Jang (2006) point at the importance of high quality interpersonal relationships in order to enhance autonomous motivation. They suggest that high quality interpersonal relationships are effective if they are characterised as high in attunement and supportiveness. Also, Patrick, Ryan, and Kaplan (2007) demonstrated a positive effect for teacher emotional support on students' use of self-regulation strategies. Den Brok et al. (2004) found that interpersonal relationships in the classroom explained large amounts of the variance (up to two thirds) in student affective outcome variables at the teacher-class level.

The present study conceptualizes interpersonal relationships in terms of interpersonal theory (Horowitz & Strack, 2011). An application of interpersonal theory to the classroom context is the Teacher Interpersonal Circle, a circumplex model which describes a teacher's general behavioural patterns (Wubbels et al., 2006). Circumplex models organize interpersonal functioning using two dimensions, *agency* (i.e., dominance, interpersonal influence) and communion (friendliness, interpersonal proximity). The Teacher Interpersonal Circle is used to

map the degree of agency and communion a teacher conveys in class (Brekelmans, Mainhard, den Brok, & Wubbels, 2011; Wubbels et al., 2012). A student's perception of these two dimensions can be used to map dyadic interpersonal relationships, but also to represent, in an aggregated form, the classroom social climate (den Brok, Brekelmans, & Wubbels, 2006; Lüdtke, Robitzsch, Trautwein, & Kunter, 2009; Mainhard, Brekelmans, & Wubbels, 2011).

Agency and communion are independent and can be understood as separate aspects of teacher behaviour (den Brok et al., 2004). As opposed to SDT, in interpersonal theory agency is a 'neutral' dimension in terms of affection, and is interpreted in combination with communion. Depending on the amount of communion, agency in the classroom in combination with relatively high levels of communion manifests structure or behavioural control (Nie & Lau, 2009; see also Brekelmans, 2010), or, in combination with lower levels of communion, external pressure or psychological control (Soenens, Sierens, Vansteenkiste, Dochy, & Goossens, 2012). In SDT, psychological control is especially used to describe the negative impact of teacher behaviour on autonomous motivation (Soenens et al., 2012). However, in line with Nie and Lau (2009), Brekelmans (2010) argues that in the classroom context behavioural agency is needed to engage students in learning and enable individual students to experience autonomy in the classroom.

Studies that have investigated the relation of agency and communion with cognitive and affective outcome variables generally show positive effects (den Brok et al., 2004, Wubbels et al., 2006) although for subject-specific motivation, communion has been found to have a somewhat stronger effect than agency (den Brok et al., 2004). Teachers with relatively higher levels of agency and communion are seen as more interpersonally competent than teachers with lower levels of agency and communion (Brekelmans et al., 2011).

THIS STUDY

The present study relates the extent to which student motivation is autonomous or controlled to students' interpersonal perceptions of their teacher. These perceptions are investigated at the teacher level (i.e., teacher component) which taps a teacher's general interpersonal style in terms of agency and communion, the class level (i.e., class component), which pertains to the specific classroom social environment in terms of teacher agency and communion, and the individual student level (i.e., student component) which taps the student perceived nature of the teacher-student relationship in terms of teacher agency and communion (Lüdtke et al., 2009; Mainhard, Brekelmans, den Brok, & Wubbels, 2011). Previous research has shown that variance in measures of pleasure, confidence, relevance, and effort (den Brok et al., 2004), and enjoyment (Marsh et al. 2008) resides at all of these three levels. Additionally, disentangling student, class, and teacher effects makes it possible to investigate to what degree claims about the central role of the teacher and the classroom social environment for the stimulation of students' autonomous motivation by providing autonomy-support (Black & Deci, 2000; Reeve & Jang, 2006) are justified.

In summary, the present study investigates two questions: (1) To what extent is variance in controlled and autonomous motivation located at the student, class, and teacher level; and (2) To what extent do student, class, and teacher components of students' interpersonal perceptions of their teacher explain variance in students' autonomous and controlled motivation.

Based on the findings of den Brok et al. (2004) we expect that approximately 10% of the variance in students' controlled and autonomous motivation is located at the class and teacher level. In line with our discussion, it was expected that a large part of this variance would be explained by teacher agency and communion. In line with Marsh et al. it would be expected that the class contributes more to student motivation than the teacher (Marsh et al., 2008). The classroom comprises the social environment in which a particular student is taught, while the overall teacher component across classes may only be an implicit factor in student motivation, and therefore less directly linked to student motivation. In line with den Brok et al. (2004) and Wubbels et al. (2006) we expect to find positive effects of agency and communion on the quality of students´ motivation and therefore expect a positive relation with autonomous motivation, and a negative relation with controlled motivation.

METHOD

Sample

Participants were 144 teachers and 3099 students from 67 Dutch schools for secondary education (constituting 276 classrooms). Teachers were recruited through e-mails and phone calls to schools and additionally through advertisements in school magazines. Thirteen teachers participated with one of their classes, the remainder of the teachers with two or three classes. Students from all educational levels participated (practical pre-vocational $n = 254$, pre-vocational $n = 738$, senior general secondary $n = 978$, and pre-university $n = 1068$). Student were aged between 12 and 18 years old. Teachers (45% male, $M_{age} = 42.38$, $SD_{age} = 11.17$) had on average a teaching experience of 12.67 years ($SD = 10.22$, range between 1 and 38 years of experience).

Measures

Controlled and autonomous motivation. Students' controlled and autonomous motivation was mapped with the Academic Self-Regulation Questionnaire (SRQ-A, Ryan & Connell, 1989). The questionnaire used in the study included three topics: reasons for doing homework, reasons for doing class work, and reasons for answering hard questions in class. With the questionnaire, *external* (i.e. "I try to answer hard questions during the lessons of this teacher because I am supposed to"), *introjected* (i.e. "I work on assignments during the lesson of this teacher because I want this teacher to think I am a good student"), *identified* self-regulation (i.e. "I work on assignments during the lesson of this teacher because I want to

learn new things"), and *intrinsic* motivation (i.e. "I try to answer hard questions during the lessons of this teacher because it is fun to answer hard questions") was tapped (24 items, 6 per type of self-regulation). The questionnaire was translated into Dutch with use of forward- backward-translation. Students rated items on a 4-point scale ranging from (1) completely not true to (4) completely true. Internal consistency was acceptable for external regulation (α = .62), and good for introjected regulation (α = .73), identified regulation (α = .79), and intrinsic motivation (α = .83). As in previous studies (e.g. Vansteenkiste, Lens, de Witte, de Witte, & Deci, 2004; Vansteenkiste et al., 2009), the intrinsic and identified scales were averaged into a composite score on *autonomous motivation* (M = 2.42, SD = 0.72), and introjected and external were averaged into *controlled motivation* (M = 2.24, SD = 0.63). However, confirmatory factor analysis showed that such a two factor model did not fit the data well, $\chi^2(274)$ = 11114.43, p <.001, CFI = .55, TLI = .55, RMSEA = .12. In our sample controlled and autonomous motivation were highly correlated (r = .63, p <.001), whereas earlier research found no such correlation (Opdenakker, Maulana, & den Brok, 2012; Vansteenkiste et al., 2004; Vansteenkiste et al., 2009). Nevertheless, internal consistencies of autonomous (α = .86) and controlled motivation (α = .79) were good. We used controlled and autonomous motivation in our analyses separately, but, to account for the correlation between the two constructs, either controlled or autonomous motivation were added as covariates in the multilevel models.

Interpersonal perception of the teacher. Student perceptions of the teacher were mapped with a 24-item version of the Questionnaire on Teacher Interaction (QTI, Wubbels et al., 2006). The QTI includes items such as "this teacher acts hesitantly", and "this teacher is strict" and students rate items on a 5-point Likert type scale ranging from (1) never to (5) always. Agency and communion are calculated by weighting each item differently for the two dimensions, according to their position on the interpersonal circle. For example the item "this teacher is friendly" is more strongly weighted for communion, while "this teacher is uncertain" is more strongly (negatively) weighted for teacher agency (for a comprehensive discussion consult den Brok et al., 2006). Cronbach's alphas for were .79 and .82 for agency and communion respectively. The circular structure and spacing of the QTI items was evaluated with CIRCE (Grassi, Luccio, & Di Blas, 2010) and satisfying model fit indices were found, $\chi^2(28)$ = 11189.12; p < .01, RMSEA = 0.06; CFI = .99, TLI = .98; free circumplex. Cronbach's alphas for agency and communion based on this model were .73 and .91 respectively.

Teacher interpersonal style. The teacher interpersonal style is represented by the shared student perception of all different classes that are taught by the same teacher. It describes the teacher's interpersonal characteristics he or she shows equally in all classrooms. According to Lüdtke et al. (2009), variables used at the class and teacher level are important in learning environment research. However, aggregation of student perceptions at the teacher or class level can only be performed if the psychometric properties of the data are sufficient at both the

student and any higher level of aggregation. Usage of student perceptions at the teacher level was justified as reliability of the teacher-mean rating was reliable for agency (ICC(1) = .45, ICC(2) = .95) and communion (ICC(1) = .43, ICC(2) = .94). The ICC(1) represents the average correlation of two student perceptions within a classroom and the ICC(2) indicates the reliability of a group-mean rating (Lüdtke et al., 2009).

Centring of variables is important in multilevel analysis because it impacts results of the analyses, especially if random slopes are modelled (Hox, 2010). The teacher components of agency and communion were centred on the grand mean, in order to set the mean of the overall perception of agency and communion of a teacher to zero. At the teacher level gender (0 = male, 1 = female), age, and teaching experience were added to the model as covariates. These variables were centred on their grand mean as well.

Classroom social environment. The classroom component reflects the shared part of the perception of students from the same class. It was used here as an indicator of the classroom social environment. The classroom component represented the mean scores of all student perceptions in a particular class. ICC(1) was .51 for agency and .53 for communion. ICC(2) showed sufficient reliability for agency (.92) and communion (.93). The mean class score of agency and communion was added as centred within the teacher, which resulted in scores that represented the deviance of a particular class from a teacher's mean score, with the teacher and individual student components cancelled out. At the class level the covariates school type (0 = pre-university, 4 = practical pre-vocational education), school year (0 = first year, 5 = sixth year), and by the teacher estimated performance ($M = 5.85$, $SD = 1.44$, minimum = 1, maximum = 9) and motivation levels ($M = 5.83$, $SD = 1.30$, minimum = 1, maximum = 9) of that class were centred on their grand mean. Motivation and performance levels were tapped with a single item, in which the teacher estimated the performance and motivation levels of a particular class.

Teacher-student relationship. The student component concerns the unique part of a student's perception of the teacher, given that students are nested under classes and teachers. Thus, the student component is the part of the perception that is unique to the student, with the classroom and teacher components cancelled out. It was represented by student agency and communion scores, which were centred on the group mean in the analyses.

Procedure

The teachers received the student questionnaires together with an instruction of how they had to complete the questionnaire, so that all teachers followed the same procedure. Questionnaires were administered in the normal classroom situation during a lesson. All students completed the QTI, and one half of the students in a class completed the SRQ-A, and the other half of the students in that class

completed a third questionnaire, which was not used in the present study. A student collected the questionnaires and sealed them in an envelope.

Analysis

Data were distributed normally and no univariate outliers were detected. Relationships between agency and communion, and autonomous and controlled motivation were linear.

Five models were tested for both controlled and autonomous motivation; a variance component model (model 1), a model with agency and communion (model 2), a model with agency, communion, and the covariates teacher experience, teacher gender, teacher age, school type, school year, and motivation and performance level of the class according to the teacher (model 3), a model with random slopes (model 4), and a model including cross-level interactions (model 5). Analyses were performed on three levels; the student, class, and teacher level. In model 2 to 5, controlled and autonomous motivation were variably added as covariates because of their apparent overlap.

RESULTS

Descriptive statistics of agency and communion at different levels are presented in Table 1. These show that the mean scores stayed the same at the student, class, and teacher level and that the standard deviations decreased due to aggregation. The correlation of controlled motivation was higher with agency ($r = .17$, $p < .001$) than with communion ($r = .13$, $p < .001$), and the correlation with autonomous motivation was higher for communion ($r = 23$, $p < .001$) than for agency ($r = .11$, $p < .001$).

Table 1. Descriptive statistics of agency and communion at the student, class, and teacher level

Level	Agency				Communion			
	M	*SD*	Min	Max	*M*	*SD*	Min	Max
Student	0.13	0.14	-0.51	0.48	0.19	0.21	-0.59	0.60
Class	0.13	0.11	-0.29	0.34	0.19	0.16	-0.40	0.51
Teacher	0.13	0.10	-0.20	0.33	0.19	0.14	-0.27	0.51

Note. $N_{student} = 3038$, $N_{class} = 276$, $N_{teacher} = 144$. Min = minimum; Max = maximum. Theoretically possible range of the dimensions between +/- 0.81.

Variance Decomposition of Controlled and Autonomous Motivation

12% of variance in *controlled motivation* (see Model 1 in Table 2) was located at the class level was, and 15% resided at the teacher level. Thus, the average

Table 2. Multilevel Models for Controlled Motivation

Parameter	Model 1	Model 2	Model 3	Model 4	Model 5
			Fixed effects		
Intercept	2.26 (.03)	2.24 (.01)	2.24 (.01)	2.24 (.01)	2.24 (.01)
Student level					
Agency		0.26**(.01)	0.26**(.01)	0.24*(.07)	0.25*(.08)
Communion		-0.18**(.01)	-0.18**(.01)	-0.18*(.07)	-0.21*(.07)
Autonomous		0.61**(.01)	0.61**(.01)	0.61**(.01)	0.61**(.01)
Communion*					-1.04(.42)
Communion Class					
Class level					
Agency		0.52*(.03)	0.15 (.03)	0.16 (.25)	0.17 (.25)
Communion		-0.11 (.01)	-0.01 (.01)	-0.08 (.14)	-0.10 (.13)
School type			0.05**(.01)	0.05*(.01)	0.05**(.01)
School year			-0.04**(.01)	-0.04**(.01)	-0.04**(.01)
Motivation level			-0.03*(.01)	-0.03*(.01)	-0.03*(.01)
Performance level			0.04*(.01)	0.04*(.01)	0.04*(.01)
Teacher level					
Agency		0.59**(.14)	0.37*(.13)	0.38*(.13)	0.39**(.13)
Communion		-0.21*(.10)	-0.17 (.08)	-0.16 (.09)	-0.08 (.16)
Gender			0.03 (.02)	0.03 (.02)	0.03 (.02)
Age			-0.00 (.00)	-0.00 (.00)	-0.00 (.00)
Experience			0.00 (.00)	0.00 (.00)	0.00 (.00)
			Random parameters		
σ^2_e (student)	0.30	0.16	0.16	0.15	0.15
σ^2_{u0} (class)	0.05**	0.01**	0.01**	0.01**	0.01**
σ^2_{v0} (teacher)	0.06**	0.01**	0.01**	0.01**	0.01**
σ^2_{u02} (slope communion)				0.31**	0.29**
-2*log likelihood	5367.84	3316.55	3264.33	3244.82	3238.79
Deviance dif.	-	2051.29**	52.22**	19.51†	6.03*

Note. Standard errors are in parentheses.
p < .05, two-tailed. ** *p* < .001, two-tailed. † p <.001, one tailed.

correlation between the reported level of controlled motivation of two students in the same class was .27.

Model statistics for *autonomous motivation* are presented in Model 1 in Table 3. Nine per cent of the variance in autonomous motivation was located at the class level and 13% at the teacher level. Thus, the average correlation between the reported level of autonomous motivation of two students in the same class was .22.

Table 3. Multilevel models for autonomous motivation

Parameter	Model 1	Model 2	Model 3	Model 4	Model 5
			Fixed effects		
Intercept	2.44 (.03)	2.43 (.01)	2.43 (.01)	2.43 (.01)	2.43 (.01)
Student level					
Agency		0.04 (.09)	0.03 (.09)	0.05 (.09)	0.06 (.09)
Communion		0.54**(.07)	0.54**(.06)	0.54**(.07)	0.54**(.07)
Controlled		0.80**(.03)	0.81**(.03)	0.81**(.01)	0.81**(.01)
Communion*					
Communion Class					1.53*(.63)
Class level					
Agency		0.07 (.32)	0.20 (.27)	0.16 (.27)	0.19 (.28)
Communion		0.27 (.15)	0.26 (.15)	0.26 (.15)	0.26 (.15)
School type			-0.03*(.01)	-0.03* (.01)	-0.03*(.01)
School year			0.01 (.01)	0.01 (.01)	0.01 (.01)
Motivation level			0.02 (.01)	0.01 (.01)	0.01 (.01)
Performance level			-0.01 (.01)	-0.01 (.01)	-0.01 (.01)
Teacher level					
Agency		-0.26*(.11)	-0.17 (.13)	-0.20 (.13)	-0.37 (.30)
Communion		0.57**(.07)	0.52**(.09)	0.51**(.09)	0.51** (.09)
Gender			-0.02 (.02)	-0.02 (.02)	-0.02 (.02)
Age			-0.00 (.00)	-0.00 (.00)	-0.00 (.00)
Experience			-0.00 (.00)	-0.00 (.00)	-0.00 (.00)
			Random parameters		
σ^2_e (student)	0.41	0.22	0.22	0.21	0.21
σ^2_{u0} (class)	0.05**	0.01**	0.01**	0.01**	0.01**
σ^2_{v0} (teacher)	0.07**	0.01*	0.00*	0.00*	0.00*
σ^2_{u02} (slope communion)				0.19*	0.18*
-2*log likelihood	6290.25	4131.52	4120.74	4113.84	4107.99
Deviance dif.	-	2158.73**	10.78	6.90†	5.85*

Note. Standard errors are in parentheses.
* *p* < .05, two-tailed. ** *p* < .001, two-tailed. † p <.001, one tailed.

Thus, although most variance in controlled and autonomous motivation is located at the student level, the teacher and the class level both account for some variance in students' motivation, and for both controlled and autonomous motivation the teacher seems to be somewhat more important than the class.

Interpersonal Relationships as Predictors of Controlled and Autonomous Motivation

Controlled motivation. The model including agency and communion fitted the data significantly better than the variance component model, $\Delta\chi^2 (7) = 2051.29$, $p < .001$ (see Model 2 in Table 2). Agency was significantly positive related to controlled motivation at the student, class, and teacher level, while communion showed significant negative relations at the student and teacher level.

Including class and teacher level covariates (Model 3: school type, school year, motivation level, performance level, teacher age, teacher gender, and teaching experience) further improved model fit, $\Delta\chi^2(7) = 52.22$, $p < .001$. All covariates at the class level were significantly related to controlled motivation, and together made that the class component of agency became a non-significant predictor. School type, school year, and performance level had the largest effects on controlled motivation. Students from practical pre-vocational education had more controlled motivation than students from pre-university education, and the older students were, the less controlled motivation they reported. The higher the by the teacher estimated motivation level of a class, the more controlled motivation was thwarted, and the higher the teacher considered the performance level of a class, the more controlled motivation was reported by students.

In Model 4 random slopes were tested. The relation between communion as perceived by individual students (i.e. the student component) and controlled motivation was found to vary across classes, $\sigma^2_{u02} = 0.31$, $\chi^2(274) = 406.68$, $p < .001$. Inclusion of random slopes improved the model fit, $\Delta\chi^2(2) = 19.51$, p (one-tailed) $< .001$. The slopes of the relation between controlled motivation and the individual student perception of communion ranged from -0.28 to 0.91 across classes, which shows that in some classes the student perceptions of communion negatively related to controlled motivation, whereas in other classes this relation was positive.

In order to explain differences in the relationship between individual student perceptions of communion on controlled motivation in different classes, cross-level interactions were tested in Model 5, which again fitted the data better than previous models, $\Delta\chi^2(1) = 6.03$, $p < .05$. This final model shows that both the student component and the teacher component of agency were positively related to students' controlled motivation. This means that teacher agency, as agreed on by all students from that teacher (e.g., the teacher's interpersonal style in terms of agency), was positively related to controlled motivation. Moreover, when a student's perception of teacher agency was above the class mean, this student's controlled motivation was estimated to be higher as well. The average communion in class significantly explained differences in the effect of individually perceived communion on controlled motivation, $t(274) = -2.45$, $p = .02$. The negative coefficient showed that the higher the class mean communion was and the more a student's perception deviated positively from this mean, the less controlled that student's motivation was expected to be.

The standardized coefficients displayed in Table 4 show that the interaction between the individual student perception of communion and the classroom social environment in terms of communion affected controlled motivation the most (β = -.26; medium sized effect). The next most important predictors were school type (β = .08), school year (β = -.08), and by the teacher estimated performance level (β = .08) of the class. The standardized coefficients show that when school type, school year, or performance level increase with one standard deviation, controlled motivation would be predicted to increase with 0.08 standard deviation. However, if the estimated motivation level increases with one standard deviation (1.30), controlled motivation decreases with 0.07 times the standard deviation (0.05). Small sized effects were also found for agency at the student and teacher level on controlled motivation (β = .06 for both).

Table 4. Standardized coefficients of significant predictors of controlled and autonomous motivation

	Model 2		Model 3		Model 4		Model 5	
	β		β		β		β	
Parameter	Co	Au	Co	Au	Co	Au	Co	Au
Intercept								
Student level								
Agency	.06		.06		.05		.06	
Communion		.16	-.06	.16	-.06	.16	-.07	.16
Autonomous								
Communion*CommunionClass							-.26	
Communion*AgencyClass								.23
Class level								
Agency	.09							
Communion								
School type			.08	-.04	.08	-.04	.08	-.04
School year			-.08		-.08		-.08	
Motivation level			-.07		-.07		-.07	
Performance level			.08		.08		.08	
Teacher level								
Agency	.09	.04	.06		.06		.06	
Communion	.05	.11		.10		.10		.10
Gender								
Age								
Experience								

Note. Co = controlled motivation, Au = autonomous motivation.

Compared to a model in which only autonomous motivation was included as a covariate, agency and communion together explained 1%, 4%, and 26% of the

variance in controlled motivation at the student, class, and teacher level, respectively. Agency and communion together explained 5% of the variance in controlled motivation. The interaction of the student component of communion with the amount of agency in the class accounted for 6% of the varying relation of communion with controlled motivation across classes.

Autonomous motivation. Table 4 includes the five models that were fitted for autonomous motivation. Model 2, with agency and communion as predictors, fitted the data significantly better than Model 1, $\Delta\chi^2(7) = 2158.73$, $p < .001$. Both the student and the teacher components of communion positively related to autonomous motivation whereas the teacher component of agency negatively related to autonomous motivation. The class component (i.e. classroom social environment), however, did not affect autonomous motivation.

Several covariates were added in Model 3. However, this model did not fit the data better than model 2, $\Delta\chi^2(7) = 10.78$, $p > .05$. When we investigated random slopes for the student components of agency and communion, the relation between individual student perceptions of teacher communion and autonomous motivation was found to vary across classes, $\sigma^2_{u02} = 0.19$, $\chi^2(274) = 344.60$, $p = .003$. Model 4 did fit the data better than Model 2 and 3, $\Delta\chi^2(2) = 6.90$, p (one-tailed) $< .025$. The slopes of the relation between autonomous motivation and the individual student perceptions of communion ranged between -0.40 and 0.79 across classes.

In Model 5, cross-level interactions were included to investigate whether the varying relation between individual students' perceptions of communion and autonomous motivation could be explained by class factors, $\Delta\chi^2(1) = 5.85$, $p < .05$. A cross-level interaction between individual students' perceptions and the class mean agency was found, $t(274) = 2.42$, $p = .02$. This model also showed that the teacher interpersonal style in terms of communion was related positively to students' autonomous motivation, meaning that the higher the mean level of teacher communion, the more autonomously motivated a student can be expected to be. Furthermore, the positive interaction between the individual student perceptions of communion and the class mean level of agency shows that in classrooms with high mean perceptions of agency, the relation between the individual student perception and autonomous motivation is stronger than in classrooms with low mean perceived agency. Thus, according to our model, highest levels of autonomous motivation can be expected for students that perceive the teacher as more affiliated than the class average in classrooms with a high average perceived agency.

Standardized coefficients (see Table 4) show that the interaction between individual student perceptions of communion and the class mean of teacher agency had the strongest relation with autonomous motivation ($\beta = .23$; medium sized effect). Thereafter, the individual student perceptions of communion were most strongly related to autonomous motivation ($\beta = .16$), but this relation only accounted for variance in classes with at least a mean classroom perception of teacher agency. The relation between the teacher interpersonal style in terms of

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communion and autonomous motivation was somewhat smaller ($\beta = .10$). If the teacher interpersonal style increased with 0.14 (1 *SD*), autonomous motivation was predicted to increase with 0.07.

Compared to a model in which only controlled motivation was included as a covariate, the student, class, and teacher components of agency and communion jointly explained 3%, 0%, and 55% of the variance in autonomous motivation at the student, class, and teacher level, respectively. The total explained variance in autonomous motivation by agency and communion was 10%. The interaction of the student component of communion with the class level of communion accounted for 10% of the variance in the varying relation of student communion and autonomous motivation.

To summarize, differences were found for the relationship between agency and communion, and controlled and autonomous motivation. The main differences were that the individual student perception and the teacher interpersonal style in terms of agency positively related to controlled motivation, whereas the individual student perception and the teacher interpersonal style in terms of communion positively related to autonomous motivation. Furthermore, the varying relation between the individual student perception of communion and controlled and autonomous motivation across classes was for controlled motivation partly explained by the classroom mean communion level and for autonomous motivation by classroom mean agency. Also, agency and communion together accounted for 5% of the variance in controlled motivation and 10% of the variance in autonomous motivation. Finally, school type, school year, motivation level, and performance level were related to controlled motivation, while only school type was related to autonomous motivation.

DISCUSSION

The aim of this study was twofold. First, it was investigated by what means variance in controlled and autonomous motivation is decomposed at the student, class, and teacher level. Second, the extent to which student, class, and teacher components of students' interpersonal perceptions of their teacher accounted for the variance in controlled and autonomous motivation was examined. Results show that variance in students' motivation, was partly accounted for by class and teacher level characteristics. Furthermore, the student and teacher components, but not the class component of students' interpersonal perception, were both related to students' controlled and autonomous motivation.

Most variance in both controlled and autonomous motivation was located at the student level. Nonetheless, more variance than expected resided at the class and the teacher level for controlled (27%) and autonomous motivation (22%). Den Brok et al. (2004) found respectively 13.5% and 31.6 per cent of the variance in pleasure in English as a Foreign Language and Physics students at the teacher-class level. This indicates that motivation as defined by SDT indeed incorporates a social context component. However, SDT claims that the social context is important for the degree to which autonomous motivation is evoked (Deci et al., 1994; Reeve et

al., 2008; Ryan & Deci, 2000a), which seems slightly contradictory to our findings as about the same amount of variance in controlled and in autonomous motivation was located at the teacher and class level. A possible explanation might be that autonomous motivation arises mainly because an activity is seen as interesting and enjoyable (reasons from within the self), while controlled motivation represents student activities evoked by external factors to the self, such as praise or rewards.

Our results show that relatively more variance was located at the teacher level than at the class level, which suggests that a teacher's style is somewhat more important for controlled and autonomous motivation than the specific classroom context. This contradicts research by Marsh et al. (2008) that found that the classroom was more important. However, Marsh et al. defined the classroom climate as a function of the pupils in that classroom, while the present study highlighted teacher interpersonal behaviour as a basis of the classroom social environment.

Students' Individual Interpersonal Perceptions

Differential relations were found for the association of controlled and autonomous motivation students' interpersonal perceptions of their teacher. According to our models, students who perceived the teacher as high in agency will have more controlled motivation than students who perceive the teacher as low in agency. In addition, a teacher who has a interpersonal style characterized by relatively higher levels of agency is predicted to evoke more controlled motivation in students. Interestingly, if a student perceived such a teacher as more affiliative than average, this students controlled motivation will be relatively lower. In general, a lot of agency enhances controlled motivation, while high levels of perceived communion decrease levels in controlled motivation.

Autonomous motivation may be expected to be higher if a student in a class with above average teacher agency perceives the teacher as conveying more communion than the classroom average. However, agency by itself did not relate to autonomous motivation. These findings show that agency and communion have to be interpreted together in order to determine their effect on motivation.

Behavioural and Psychological Control

When a student perceives high teacher agency together with a high level of communion, agency may be typified as *behavioural control* (Nie & Lau, 2009). SDT acknowledges that behavioural control is defined in terms of structure and that structure could facilitate endorsement of social rules (Nie & Lau, 2009). SDT distinguishes basic needs that must be fulfilled in order to be autonomously motivated. These are the need for autonomy, competence, and relatedness. The need for autonomy, in particular, must be fulfilled to reach integration of values (Ryan & Deci, 2000a) and an autonomy-supportive classroom is therefore likely to provide the requirements to satisfy the need for autonomy. Additionally, the need

for relatedness is deemed important for the internalization of regulatory styles (Deci & Ryan, 2002). Behavioural control seems to contain both high agency and high communion and therefore fulfils both the needs for autonomy and relatedness. As a consequence, in class situations behavioural agency would not reduce autonomous motivation, but may be seen as an enabling factor. Therefore, classrooms that offer both much agency and communion offer the most autonomy-support to students.

When a high level of agency is combined with opposing behaviour (i.e., low communion), control may become more external (or psychological), which leads, according to SDT, to controlled motivated students. Therefore, a classroom with high interpersonal agency and little communion seems to represent psychological control, which is deemed detrimental for autonomous motivation because it hampers students' psychological freedom (Deci & Ryan, 2000). In order to increase students' autonomous motivation teachers could therefore first consider how students perceive the amount of communion in the classroom, before they consider the amount of agency they convey.

Limitations and Future Directions

Previous research has addressed autonomous and controlled motivation as two separate factors, resulting in the possibility to score high or low on both autonomous and controlled motivation (Opdenakker et al., 2012; Vansteenkiste et al., 2009). The present study, however, found a substantial correlation between the two factors. This means that at least in the sample discussed, controlled and autonomous motivation cannot be addressed as strictly separate types of motivation.

A second limitation was the relatively small N at the class level, which may have biased our estimates. Due to the small amount of classes per teacher, the teacher component of the effects may be overestimated.

This study underlines that agency and communion should be interpreted together. Agency must be interpreted differently in combination with higher levels of teacher communion than with lower levels of communion. While a combination with higher communion represents strong guidance and teacher leadership (i.e., *psychological* control in terms of SDT), a combination with lower communion represents strict or even confronting teacher behaviour (i.e., *behavioural* control in terms of SDT). The use of a numerical combination of agency and communion is however challenging because of the circularity of such values (see method section of this chapter), to which statistics based on normal distributions of linear data cannot be applied (Fischer, 1993).

CONCLUDING REMARKS

The present study provides an insight in the origin of variance in students' controlled and autonomous motivation, and in the association of students' interpersonal perceptions of their teacher and controlled and autonomous

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motivation. The class and the teacher play a considerable role in both controlled and autonomous motivation. Student perceptions of teacher agency and communion seem to be quite important factor of the teacher influence particularly on autonomous motivation, and therefore, teachers should put as much effort as possible into forming high quality relationships with their students. From an interpersonal perspective, a classroom environment that conveys both high levels of teacher agency and communion is the best way to support students autonomous motivation.

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