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Relations of autonomous and controlled motivation with performance in secondary school students' favoured and disfavoured subjects

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ABSTRACT

Students in secondary education inevitably favour some subjects more than other subjects. This appraisal may affect how motivation relates to performance in these subjects. Whereas autonomous motivation is generally linked to positive school outcomes, the effect of controlled motivation is less clear. This study specifically focused on the associations of controlled motivation with performance in the context of favoured and disfavoured subjects. In the present study, secondary school students ($N=918$) identified 2 favoured and 2 disfavoured subjects. Hierarchical linear modelling was performed to investigate the relationship of autonomous and controlled motivation with performance in these subjects. Results showed that autonomous motivation positively related to performance in both types of subjects. The association of controlled motivation with performance was negative in both contexts, and more negative in disfavoured subjects. For teaching practice, this means that teachers should always stimulate autonomous motivation, even for negatively appraised subjects.

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Introduction

Students who are highly motivated tend to achieve better in school. Autonomous motivation, as defined in self-determination theory (SDT; Ryan & Deci, 2002), is important to enhance positive school outcomes (e.g., Guay & Vallerand, 1997; Soenens & Vansteenkiste, 2005; Taylor et al., 2014). Nevertheless, students' autonomous motivation is unlikely to be equally high for all subjects. In Dutch secondary schools, students have to take up to 15 mandatory subjects each year, especially in the early years. These subjects are not only completely different in content, but are taught by different teachers, comprise different types of tasks, and are taught in different constellations. It is therefore inevitable that students will

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favour some subjects more than other subjects. Autonomous motivation for a disfavoured subject may be relatively low, so students may require some other reason to perform at a sufficient level. This reason may be controlled, which is the other type of motivation distinguished in SDT (Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009). Controlled motivation includes pressure from within the individual and pressure from others.

It is not yet known whether various types of motivation relate differentially to performance in the context of favoured and disfavoured subjects. Several motivation types have been found to vary across school subjects. In these studies, the specific subject has been taken into account, but not students' appraisal of various subjects. In the present study, we investigated the relationship between autonomous and controlled motivation and performance for favoured and disfavoured subjects among students (Years 1–2), thereby taking into account students' appraisal of subjects.

Autonomous and controlled motivation

Self-determination theory (SDT) emphasises the *quality* of motivation (Ryan & Deci, 2000, 2002). By definition, the more self-determined the motivation is, the better its quality (Ryan & Deci, 2002). Self-determined motivation has been both theoretically reasoned (Ryan & Deci, 2000) and empirically shown to be related to positive school outcomes (e.g., Guay & Vallerand, 1997; Vansteenkiste et al., 2009).

SDT distinguishes two types of motivation: autonomous or volitional motivation and controlled motivation (Vansteenkiste et al., 2009). Autonomous motivation can be subdivided into intrinsic motivation and identified or integrated motivation. Intrinsically motivated behaviour truly comes from within the self. In the case of identified or integrated motivation, the individual comes to accept that certain behaviour is personally relevant (Ryan & Deci, 2002). Controlled motivation, on the other hand, includes motivation due to a feeling of pressure from within oneself or from the environment (Ryan & Deci, 2002). This type of motivation is founded on external and introjected regulations (Vansteenkiste et al., 2009). If behaviour is externally regulated, the individual shows behaviour mainly to receive a reward or to avoid punishment. Introjected regulations include behaviour that is somewhat more internalised, but is not part of one's integrated self (Ryan & Deci, 2002).

Controlled motivation has a different motivation source than autonomous motivation, and its origins are not self-determined. While controlled motivated behaviours are not or only slightly internalised, autonomous behaviours are internalised to a greater extent. Motivation research initially placed controlled and autonomous motivation on a continuum of internalisation. (Non-)internalised behaviours were originally found to correlate in a quasi-simplex way (Ryan & Connell, 1989); that is, intrinsic motivation correlated more with identified regulation and less with external regulation. However, more recent studies have reported that autonomous and controlled motivation are orthogonal dimensions of motivation, based on low to moderate, positive or negative correlations of the concepts (Brunet, Gunnell, Gaudreau, & Sabiston, 2015; Lepper, Corpus, & Iyengar, 2005). Various scholars have investigated whether autonomous and controlled motivation can appear at the same time in one person (Ratelle, Guay, Vallerand, Larose, & Senécal, 2007; Vansteenkiste et al., 2009). These person-centred analyses have shown that it is possible to have different combinations of motivation types in one situation.

When it comes to motivation in a learning setting, the educational environment has been found to play a role. Motivation and its correlates were found to be influenced by the type of education involved – secondary or higher education (Ratelle et al., 2007). In higher education, students choose a study track in accordance with their preferences; this differs from secondary education, especially the lower years, where every student has to take a similar programme. Ratelle et al. (2007) found that secondary school students either had solely controlled motivation, or had moderate or high levels of both autonomous and controlled motivation. In this study, students with solely autonomous motivation were not found at the secondary-school level, though they were present in higher education. In contrast, Vansteenkiste et al. (2009) did find the possibility of solely autonomous motivation among both secondary school students and students in higher education. In terms of learning outcomes, Ratelle et al. (2007) concluded that students in higher education showed similar outcomes when they demonstrated solely autonomous motivation or a combination of a high level of controlled and a high level of autonomous motivation; persistence, however, was higher for the solely autonomously motivated students. Furthermore, secondary school students who showed a combination of a high level of controlled and a high level of autonomous motivation demonstrated the highest persistence and achievement levels. In contrast, Vansteenkiste et al. (2009) concluded that solely autonomous motivation led to the best learning outcomes in terms of, for example, grade point average (GPA) and use of metacognitive strategies.

Motivation and performance

Numerous researchers have studied the relations between motivation and performance at school (e.g., Guay & Vallerand, 1997; Hidi & Harackiewicz, 2000; Soenens & Vansteenkiste, 2005). This research consistently supports the expectation of a positive relation between school performance and autonomous types of motivation (Fortier, Vallerand, & Guay, 1995; Guay & Vallerand, 1997; Lepper et al., 2005; Niemiec & Ryan, 2009). In contrast, only a handful of studies have investigated the direct relation between performance and controlled types of motivation. The results of these studies are ambiguous as to the effects of controlled motivation on performance (see Gillet, Vallerand, Lafrenière, & Bureau, 2013). From an SDT perspective, one would expect controlled motivation to negatively predict performance, due to its non-self-determined origin (Ryan & Deci, 2002). This was indeed found in a literature review on educational studies that had used SDT (Guay, Ratelle, & Chantal, 2008). Similarly, in an empirical study Lepper et al. (2005) found a negative correlation between extrinsic motivation and both overall and subject-specific GPA. However, non-effects were also found in some studies: For example, controlled motivation was not found to be substantially related to the pursuit of personal goals (Koestner, Otis, Powers, Pelletier, & Gagnon, 2008). Moreover, a review of strategies to boost the academic motivation of poorly motivated students stressed the additional benefits of extrinsic motivation, in addition to intrinsic motivation (Hidi & Harackiewicz, 2000). Positive effects of controlled motivation were found in various studies, especially in a sports context. For instance, successful athletes were shown to have high levels of controlled motivation, which positively related to sports experiences and outcomes (Chantal, Guay, Dobрева-Martinova, & Vallerand, 1996; Langan et al., 2016).

Langan et al. (2016) studied the separate effect of controlled motivation in addition to autonomous motivation and summarised three competing hypotheses concerning the joint role of controlled and autonomous motivation in sports performance. The first was the SDT-based hypothesis, the second the buffering hypothesis, and the third the additive hypothesis. The SDT-based hypothesis states that autonomous motivation is positive in relation to performance, while controlled motivation, by definition, negatively relates to performance. The buffering hypothesis states that autonomous motivation has a protective role against the negative effects of controlled motivation. The additive hypothesis states that the most positive outcomes are achieved by a combination of a high level of autonomous and a high level of controlled motivation. The researchers found evidence for all three hypotheses, depending on the measure for controlled motivation that was used. For example, when the Behavioural Regulation in Sport Questionnaire (BRSQ) was used, some support was found for the SDT-based and the buffering hypotheses. On the other hand, when the Sport Motivation Scale (SMS) was applied, support was found for the additive and buffering hypotheses (Langan et al., 2016). These ambiguous findings regarding controlled motivation raise the possibility that the relationship between motivation and performance depends on the measure used or on the specific context in which motivation was examined.

Domain specificity of motivation

Research shows that student motivation is to some extent related to the specific domain or subject in school (Bong, 2001; Eccles, Wigfield, Harold, & Blumenfeld, 1993; Green, Martin, & Marsh, 2007; Hornstra, Van der Veen, & Peetsma, 2016). Investigating specificity of motivation across English, mathematics, and science, Green et al. (2007) observed that some concepts, such as valuing, were more subject specific than other concepts, such as anxiety. Enjoyment has also been defined as a factor that is highly subject specific; this was found in a study comparing the subjects mathematics, German, Latin, and English (Goetz, Frenzel, Pekrun, & Hall, 2006). Likewise, other research has revealed the domain specificity of various motivation constructs such as effort and self-efficacy in language and mathematics in upper primary education (Hornstra et al., 2016). The strength of the relation between motivation and achievement was found to differ across subject domains (Hornstra et al., 2016). These differences may not necessarily be due to the nature of the subjects themselves, but could also be due to how students appraise these subjects. Students' emotions towards subjects have been found to be highly domain specific; this applies especially to enjoyment (Goetz et al., 2006). Previous work on domain specificity of motivation and the relation between motivation and performance has not taken into account students' appraisal of different subjects. The present study will add to this by studying students' favoured and disfavoured subjects.

This study

We studied the relationship between motivation and performance in two specific contexts: school subjects favoured or disfavoured by students in lower secondary education. *Favoured* subjects are operationalised as subjects that students like and would like to spend extra time on, and *disfavoured* subjects are defined as subjects that students do not like and would not like to spend extra time on. The appraisal of favoured subjects is

positive, while that of disfavoured subjects is more negative. Students may have various reasons for liking a subject or wanting to spend extra time on it. Interest or enjoyment may be a reason; this refers to intrinsic motivation. Students may also have personal reasons for considering the subject relevant and may want to spend extra time on it for these reasons. The latter type of reason is labelled as identified motivation (Ryan & Deci, 2000). Both intrinsic and identified motivation are part of autonomous motivation. Hence, for a favoured subject, the autonomous motivation is expected to be substantially higher than for a disfavoured subject. Conversely, students may experience more controlled motivation for disfavoured than for favoured subjects; however, given the above-mentioned inconsistencies in the literature, it is difficult to derive a clear-cut hypothesis.

Within both contexts – favoured and disfavoured subjects – we studied the variations in autonomous and controlled motivation, on the one hand, and student performance, on the other. Moreover, based on SDT as well as the empirical literature, we expected a positive association between autonomous motivation and performance in general. Where the relation with controlled motivation is concerned, the empirical literature (see Langan et al., 2016) suggests multiple possibilities: (a) It might relate negatively with performance in both contexts (i.e., the maladaptive or SDT hypothesis); (b) it might relate positively with performance in favoured subjects because controlled motivation adds to autonomous motivation (i.e., the additive hypothesis); or (c) it might negatively relate to performance in disfavoured subjects, but have – due to the protective role of a high level of autonomous motivation – a merely neutral association in favoured subjects (i.e., the buffering hypothesis). The present study set out to test these three hypotheses by studying independent and joint associations between autonomous and controlled motivation and performance in general and in the two contexts of favoured and disfavoured subjects.

Method

Participants

The participants were 918 secondary school students from three different secondary schools and 39 classes. These students were in the first ($n = 450$) or in the second year of secondary education ($n = 468$). Boys ($n = 446$) were slightly underrepresented in comparison with girls ($n = 472$). School 1 was a bilingual general secondary and pre-university school¹; 341 students from this school participated. This is a public school in an urban setting. School 2 was also a general secondary and pre-university school, offering both Dutch-language and bilingual education; 331 students participated. This school is located in a suburban region. From School 3, a pre-university school, 246 students participated. This school is located in an urban region. At all three schools, students were predominantly from a middle-class background. The schools agreed to their students participating in the present research, and informed consent was given by the students' parents. In addition, for the students in School 1, parents provided active consent because this school participated in a larger study that also used interviews.

Procedure

In June 2015, the participants answered questions about their subject-specific motivation for two favoured and two disfavoured school subjects. This measurement took place

before students had received their report cards. The questionnaires were part of a larger study on students' subject-specific motivation in lower secondary school and included questions about four of the students' subjects. It was specified that the students had to choose two subjects which they "liked and would like to spend extra time on", and two subjects which they "did not like, and would not like to spend extra time on". Therefore, every student answered the questions with regard to the particular subjects they chose as their favoured or disfavoured subjects. As a consequence, the specific subjects students had in mind while answering the questions differed, but the emotions they felt towards these subjects, either "like" or "do not like", were similar. Students filled in the questionnaire for two favoured and for two disfavoured subjects. We were not looking for effects on specific subjects; for this reason, answers on two (dis)favoured subjects provide a more reliable and generalizable view of "(dis)favoured subjects".

Questionnaires were administered in students' regular classroom settings during lessons of randomly chosen subjects, by a teacher or by the first author of this paper. Completion of the questionnaire took approximately 30 min, and students were instructed to provide their own opinion. Six versions of the questionnaire were used, which differed only in the sequence of the four subjects (Favoured Subject 1, Favoured Subject 2, Disfavoured Subject 1, and Disfavoured Subject 2); this was to prevent bias based on answering sequence. The procedure was approved by the Psychology Research Ethics Committee of the institution where the first author works.

Measures

Autonomous and controlled motivation were measured using a shortened 8-item version of the originally 16-item version of the academic self-regulation questionnaire used by Vansteenkiste et al. (2009), which was based on the Academic Self-Regulation Questionnaire by Ryan and Connell (1989). The items of both scales completed for the two favoured subjects were taken together for use in the analyses, as were the items for the two disfavoured subjects. An example item for autonomous motivation is: "I study for this subject because it is fun". An example item for controlled motivation is: "I study for this subject because my parents force me to". Questions were answered on a 5-point scale, ranging from *completely untrue* to *completely true*. Hence, average levels of autonomous and controlled motivation could vary between 1 and 5. The eight items that represented the scales best were chosen for the shortened questionnaire. Other items were removed because these represented the scale poorly in an earlier study (Jansen in de Wal, Den Brok, Hooijer, Martens, & Van den Beemt, 2014), would be difficult to answer for students in the first and second year of secondary school, or were very similar to other items. The item choice was discussed with Maarten Vansteenkiste (M. Vansteenkiste, personal communication, October 7, 8, 10, and 24, 2013). Four items together constituted autonomous motivation ($\alpha_{\text{favoured}} = .80$; $\alpha_{\text{disfavoured}} = .87$), and four items together constituted controlled motivation ($\alpha_{\text{favoured}} = .80$; $\alpha_{\text{disfavoured}} = .74$).

Procedures presented in Van de Schoot, Lugtig, and Hox (2012) were used to assess dimensionality and measurement invariance of the shortened questionnaire and its latent constructs. All confirmatory factor analyses (CFAs) were performed using Mplus (version 7.31). Two CFAs with unconstrained factor loadings and intercepts were conducted for favoured subjects ($\chi^2 = 198.2$; $df = 19$; $p < .001$; CFI = .94; TLI = .91; RMSEA = .10), and

disfavoured subjects ($\chi^2 = 502.9$; $df = 19$; $p < .001$; CFI = .86; TLI = .80; RMSEA = .17), separately. For favoured subjects, the fit indices (CFI, TLI) indicate a good fit. For disfavoured subjects, the fit indices reflect a reasonable fit. For both CFA models, the correlation between the two factors is very small ($r = .08$ and $r = .03$). Thus, in both cases the analyses supported that there exist two independent latent constructs (autonomous and controlled motivation). Next, to assess the measurement invariance of the motivation constructs, the four models in Van de Schoot et al. (2012) were analysed, using a two-factor structure. The model of metric invariance had the best fit ($\chi^2 = 851.1$; $df = 46$; $p < .001$; CFI = .873; TLI = .846; RMSEA = .14). The model had a reasonable fit, which supported that there is at least partial measurement invariance: The students attribute the same meaning to the latent constructs for both favoured and disfavoured subjects (Van de Schoot et al., 2012).

Performance consisted of end-of-year report card grades (July 2015) for the two favoured and two disfavoured subjects selected by the students. These report card grades were actual grades collected from school records. In The Netherlands, report card grades are important performance measures, which contain multiple subject grades composed of results on various tests and assignments throughout the school year. At the end of the school year, the report card grades therefore provide an overview of a student's average performance level for each subject during that year (Van der Lans, Van de Grift, & Van Veen, 2015). Report card grades range from 1 (*extremely poor*) to 10 (*perfect*) for every subject. A report card grade for a specific subject is the average of multiple test scores a student has obtained throughout the school year. In a previous longitudinal study, we have shown that report card grade levels tend to decrease between the first and third year of secondary education (Wijsman, Warrens, Saab, Van Driel, & Westenberg, 2016). This means that, on average, students at the beginning of their secondary education start with higher report card grades than they have in their third year, while the standards are the same in all years. Decreasing report card grades are a cause for concern because of the link between low grades and dropout from secondary education (see Bowers, 2011).

Gender and school year (first or second) were also included in the study as control variables, as it has been demonstrated that these factors influence motivation and achievement levels (Wijsman et al., 2016), and the relationship between motivation and achievement (Freudenthaler, Spinath, & Neubauer, 2008).

Analyses

First, a descriptive analysis was performed to obtain an impression of the distribution of the variables. Second, a correlation analysis was performed to get a first view about the interrelationships among the measures and whether the correlations are in line with the hypothesised relationships. Paired samples *t* tests were performed to analyse mean differences between favoured and disfavoured subjects. Next, hierarchical regression analyses were performed using MLwiN (version 2.35). Different levels were subject within student, student within class, class within school, and school. Multiple models were used to test the hypotheses on the relations between motivation and performance in general and separately for favoured and disfavoured subjects. The predictors autonomous and controlled motivation were entered grand-mean centred, while favoured, gender (1 = boy), School 1, School 2, year (1 = second year), pre-university track, and mixed track (= combination of pre-university and general) were dummy coded. The null model served as a variance-

component model. In Model 1, the covariates gender, School 1, School 2, year, pre-university, and mixed track were added first. In Model 2, the predictors autonomous and controlled motivation, together with their interaction, the factors favoured/disfavoured, and the two-way and three-way interactions between favoured and disfavoured subjects and the different motivation variables were added to Model 1. Models 1 and 2 can be used to examine how much the variables of interest add to the prediction of performance with regard to the covariates. To avoid an inflated standard error for the interactions, the two motivation variables were centred around their means. Lastly, to obtain a parsimonious model the non-significant parameters in Model 2 were removed one by one. The final model is Model 3. Finally, the assumptions of the multilevel models were investigated using various residual plots.

Results

Inspection of the data

Not all available data of the study could be used in the analyses. For 20 students, one of their subject report card grades was missing, or they had missing scores on two or more predictor variables. Although hierarchical regression analysis can deal with missing data, these students' scores would not contribute to favoured and disfavoured subjects equally. Therefore, these students were removed from the analysis. Furthermore, four students had extremely low report card grades; that is, more than 3.29 standard deviation below average. To determine whether these four "outliers" were indeed influential cases, multilevel analyses were performed with and without the "outliers". Results of all multilevel analyses were similar. The outliers were therefore not excluded from the sample, leaving a sample of $N = 898$.

Descriptives

Table 1 shows the means and standard deviations of autonomous and controlled motivation and overall report card grades, that is, for the favoured and disfavoured subjects together. Correlations in Table 1 show that autonomous motivation was positively related to grade. At the same time, controlled motivation was negatively related to grade. Autonomous and controlled motivation were positively correlated.

Variations in motivation and performance in favoured and disfavoured subjects

Table 2 shows mean scores on, and correlations between, the variables for favoured and disfavoured subjects separately. We see clear differences in mean level of autonomous

Table 1. Total means, standard deviations, and correlations of autonomous and controlled motivation and report card grade.

	<i>M</i>	<i>SD</i>	<i>Correlations</i>		
			1.	2.	3.
1. Autonomous motivation	3.09	0.55			
2. Controlled motivation	2.36	0.86	.19**		
3. Report card grade	6.96	0.69	.12*	-.11*	

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

motivation and report card grade, both being higher for favoured subjects. Controlled motivation was higher for disfavoured subjects. All mean differences were significant, as can be seen from the paired samples *t* test reported in Table 2. Autonomous motivation was more present than controlled motivation in students' favoured subjects. Regarding students' disfavoured subjects, the level of controlled motivation was higher than autonomous motivation. Report card grades for favoured subjects were higher than for disfavoured subjects.

General relations of covariates with performance

Four multilevel regression analyses were performed to investigate the relations between performance, autonomous and controlled motivation, favoured subjects, gender, the schools, tracks, and year. The four models are presented in Table 3. To assess the hierarchical nature of the data, a variance component model (Model 0) was fitted first. From Model 0, we calculated that 11% of the variance in performance was located at the classroom level, and 89% of the variance at the student level. Because a significant percentage of variance was located at the classroom level, hierarchical regression analyses were deemed appropriate.

Model 1 in Table 3 fitted better than the variance component model ($\chi^2(6) = 124.1$, $p < .001$). The average report card grade of boys was significantly lower ($b = -.298$, $p < .001$) than the average report card grade of girls. The average differences between School 1 and School 3 ($b = .421$, $p < .001$), and School 2 and School 3 ($b = .334$, $p < .001$) were both significant. The minimum and maximum report card grade in the sample were 3.65 and 9.55, respectively. On this scale, an average difference of .421 is substantial, and a difference of .334 is mediocre. Furthermore, the difference between the first and second year of secondary education ($b = -.103$, $p = .028$) and between the pre-university and higher general education tracks ($b = .360$, $p < .001$) was also significant. Compared to Model 0, Model 1 accounted for 1.0% of the variance in performance at the student level.

Relations between motivation and performance in favoured and disfavoured subjects: testing the hypotheses

The correlations in Table 2 show that, for favoured and disfavoured subjects separately, autonomous motivation was positively and significantly correlated with both controlled motivation and report card grade (favoured subjects: $r = .17$ and $r = .15$; and disfavoured

Table 2. Means, standard deviations, correlations, and paired *t* test for favoured and disfavoured subjects.

	Favoured Subjects					Disfavoured Subjects					Paired <i>t</i> test	
	<i>M</i>	<i>SD</i>	Correlations			<i>M</i>	<i>SD</i>	Correlations			<i>t</i>	<i>df</i>
			1.	2.	3.			1.	2.	3.		
1. Autonomous	4.14	0.64				2.04	0.79				67.30**	897
2. Controlled	2.29	0.97	.17**			2.43	0.93	.15**			-5.17**	897
3. Grade	7.39	0.69	.15**	-.09*		6.53	0.91	.11**	-.13**		30.81**	897

Note: Autonomous = autonomous motivation; Controlled = controlled motivation; Grade = report card grade.

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

Table 3. Unstandardized estimates of regression coefficients of the multilevel models with performance as the dependent variable.

	Model 0	Model 1	Model 2	Model 3
Fixed effects				
Intercept	6.96 (.024)**	6.63 (.074)**	6.87 (.096)**	6.94 (.087)**
Gender		-.298 (.042)**	-.306 (.038)**	-.305 (.039)**
School 1		.421 (.057)**	.367 (.061)**	.356 (.060)**
School 2		.334 (.062)**	.325 (.065)**	.319 (.065)**
Year		-.103 (.047)*	-.088 (.049)	-.091 (.049)
Pre-university		.360 (.064)**	.362 (.065)**	.357 (.065)**
Mixed		.058 (.078)	.043 (.080)	.039 (.080)
Autonomous			.195 (.039)**	.145 (.024)**
Controlled			-.112 (.053)**	-.053 (.025)*
Aut*con			.047 (.038)	
Favoured			.517 (.062)**	.545 (.060)**
Favoured*aut			.077 (.049)	
Favoured*con			.011 (.064)	.085 (.033)**
Favoured*aut*con			.036 (.047)	
Random effects				
σ^2 classroom	.089 (.023)**	.033 (.020)	.188 (.020)**	.187 (.020)**
σ^2 student	.750 (.031)**	.742 (.031)**	.400 (.015)**	.401 (.017)**
R^2 student		.010	.467	.465
-2LL	4761.5	4637.4	3990.9	3994.4

Note: Standard errors are in parentheses.

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

subjects: $r = .15$ and $r = .11$). At the same time, the relation between controlled motivation and report card grade was negative in both disfavoured ($r = -.13$) and favoured subjects ($r = -.09$).

In Model 2 in Table 3, the factor favoured/disfavoured and the motivation variables, together with their interactions, were added. Model 2 fitted better than Model 1 ($\chi^2(7) = 646.5$, $p < .001$). Both autonomous ($b = .195$, $p < .001$) and controlled motivation ($b = -.103$, $p = .035$) contributed significantly to report card grade. Both main effects were significant, but the interaction effect was not ($p = .216$). Autonomous motivation predicted performance positively, whereas controlled motivation predicted performance negatively. Furthermore, whether a subject is judged as favoured or disfavoured related to the performance level significantly ($b = .517$, $p < .001$). Performance in favoured subjects was about half a point higher than for disfavoured subjects, which is quite a substantial difference on this scale. Moreover, all three interaction effects were not significant at the 5% level. This indicates that joint effects of both motivation types were not observed. Compared to Model 0, Model 2 accounted for 46.7% of the variance at the student level (R^2 student = .467).

Finally, to obtain a parsimonious model, we removed the non-significant parameters in Model 2 one by one, starting with the parameter with the highest associated p value, until we were left with a model with significant predictors only. The final model is Model 3 in Table 3. In this model, autonomous motivation was positively related to performance ($b = .145$, $p < .001$). No evidence was presented that would suggest that this relationship was different for favoured and disfavoured subjects. Controlled motivation was negatively related to performance ($b = -.053$, $p = .034$). Moreover, the relationship was different for favoured and disfavoured subjects ($p = .010$); for disfavoured subjects the relation is negative ($b = -.053$); for favoured subjects it is slightly positive ($b = .028 = -.053 + .085$).

In Model 3, performance in favoured subjects was higher than in disfavoured subjects ($b = .545$), performance in School 1 ($b = .356$) and School 2 ($b = .319$) was higher than in School 3, the average report card grade of girls was higher than the average report card grade of boys ($b = -.305$), performance in the second year was lower than in the first year ($b = -.091$), and performance in the pre-university track was higher than in the higher general education track ($b = .357$). Compared to Model 0, Model 3 accounted for 46.5% of the variance at the student level ($R^2_{\text{student}} = .465$).

For Models 1 to 3, both the classroom-level and the student-level residuals were normally distributed. Furthermore, the corresponding plots of predicted values versus residuals showed no non-random patterns. We therefore concluded that the assumptions of the multilevel models were reasonably well met.

Discussion

This study explored the relations of autonomous and controlled motivation with performance in students' favoured and disfavoured subjects. Autonomous and controlled motivation were studied in relation to overall performance, and in favoured and disfavoured subjects separately.

First, variations in levels of motivation and performance were found between favoured and disfavoured subjects. As had been expected, it was found that the level of autonomous motivation was significantly higher in favoured subjects than in disfavoured subjects. Controlled motivation was present in both disfavoured and favoured subjects, although the level was relatively low in both types of subjects. This means that we can distinguish between subjects with a combination of a high level of autonomous and a low level of controlled motivation (favoured subjects), and subjects with a combination of low autonomous and low controlled motivation (disfavoured subjects).

Second, a generally positive relation was found between performance and autonomous motivation, and a negative relation between performance and controlled motivation. When autonomous motivation was higher, average report card grades were also higher. In contrast, higher levels of controlled motivation were related to lower average report card grades. These motivational aspects were independent of one another in predicting performance. These contrasting relations of autonomous and controlled motivation with performance are in line with SDT theorising (Ryan & Deci, 2002), because autonomous motivation, especially, has frequently been linked to various positive school outcomes (e.g., Fortier et al., 1995; Guay & Vallerand, 1997; Lepper et al., 2005; Niemiec & Ryan, 2009). While our finding that controlled motivation was a negative predictor of performance is in line with the SDT-based hypothesis, this finding adds to the varying empirical findings on the role of controlled motivation. Whereas in previous research negative correlates of controlled motivation have been found in the school context (Deci, Ryan, & Williams, 1996; Lepper et al., 2005; Scott Rigby, Deci, Patrick, & Ryan, 1992), positive or less negative effects have been found in other contexts (Chantal et al., 1996; Langan et al., 2016). For this reason, the present study took into account two domains: favoured and disfavoured subjects.

Third, as expected, the positive relation between autonomous motivation and performance was found for both favoured and disfavoured subjects. Controlled motivation, on the other hand, was found to negatively predict performance in disfavoured subjects.

Moreover, we found that controlled motivation related more negatively to performance in disfavoured subjects than in favoured subjects. In other words, in the absence of autonomous motivation in disfavoured subjects, performance levels are on average more negatively related with a high level of controlled motivation than if one favours a subject. In this scenario, one does not like the subject, and moreover feels forced to work on it by others or by pressuring thoughts of one's own. With regard to the hypotheses formulated by Langan et al. (2016), who took into account the joint roles of controlled and autonomous motivation in sports performance, our results seem to be in line with the maladaptive SDT-based hypothesis. This hypothesis states that controlled motivation negatively predicts performance in every situation. The association between controlled motivation and performance is negative overall. Therefore, we may conclude that controlled motivation is maladaptive in relation to performance. Additionally, we found partial evidence for the buffering hypothesis, in which favouring a subject attenuates the negative relation of controlled motivation with performance. In a context where a subject is favoured, the association between performance and controlled motivation is slightly positive, whereas this relation is negative in the context of a disfavoured subject. This seems to confirm the hypothesis of the buffering effect. However, no interaction effect was found between autonomous motivation, controlled motivation, and favouring a subject. This means that the more negative relation between performance and controlled motivation in disfavoured subjects may not be dependent on the relatively low level of autonomous motivation in disfavoured subjects. Other factors might strengthen this negative relation of controlled motivation and performance in disfavoured subjects.

In the situation of disfavoured subjects, students may experience little learning enjoyment. As Hagenauer and Hascher (2010) point out, learning enjoyment is thought to be the most activating positive emotion in school. If the level of learning enjoyment is low, this may result in inactivity. Alternatively, as Vansteenkiste et al. (2009) note, the presence of controlled motivation in addition to autonomous motivation may not influence cognitive processing negatively, but may lead to poor regulation of study activities, and stress. This in turn may indirectly lead to relatively low performance levels, via exhaustion, for instance (LePine, LePine, & Jackson, 2004). In conclusion, it seems that in seeking to establish how controlled motivation affects performance, it is important to consider the subject-specific context of favoured or disfavoured subjects. The present study found evidence for the SDT-based maladaptive hypothesis and partial evidence for the buffering hypothesis.

Implications

The findings of this study essentially support SDT: Autonomous motivation is generally more strongly and positively related to performance, even if a student disfavours subjects. At the same time, it proved useful to distinguish between students' favoured and disfavoured subjects. Not only do levels of motivation and performance diverge, but the relation between controlled motivation and performance also differs between these two contexts.

In disfavoured subjects, students experience relatively little autonomous motivation; in this context, it was found that controlled motivation is more detrimental in relation to performance than in a context with more autonomous motivation. An important implication of the present study is that educators need to be aware of this mechanism. If students show little autonomous motivation, teachers might resort to controlling teaching

strategies to stimulate students, as opposed to practising autonomy-supportive teaching (Hornstra, Mansfield, Van der Veen, Peetsma, & Volman, 2015; Reeve, 2009). However, these controlling teaching strategies may lead to even less autonomous motivation (Reeve, 2006) and may perhaps have a detrimental effect on performance. To avoid a downward spiral of this kind, especially in the context of disfavoured subjects, it is important that teachers are aware of students' subject appraisal, and are able to apply autonomy-supportive strategies.

The positive association between favouring a subject and performance on that subject suggests that it is important that a student continues to favour a given subject. Need-supportive teaching may be employed to sustain students' positive affect towards a subject. This entails that the teacher provides students with autonomy support and structure and is involved with the students (Stroet, Opdenakker, & Minnaert, 2013). Additionally, to sustain the overall positive affect towards a subject at a high level, it is important to stress the relevance and importance of the subject (Hulleman, Godes, Hendricks, & Harackiewicz, 2010; Reeve, 2002; Stroet et al., 2013).

Limitations and future directions

In the present study, we studied the relations between motivation and performance, using a cross-sectional design. Our reasoning was that motivation can affect performance levels. However, this relation has been found to be reciprocal (see Taylor et al., 2014). For example, students often enjoy the subjects that they achieve well at (Denissen, Zarrett, & Eccles, 2007). This means that motivation may have been affected by previous performance levels, that is, that performing well causes an increase in motivation. In the present study, due to the cross-sectional design, and the reciprocity of the relationship between motivation and performance, we cannot make any statements about causal relationships.

A second limitation that may restrict the scope of the results of the present study is the fact that the sample consists of students from three schools and two school types. To generalise results to the full population of secondary school students, students from more schools and from all school types should be included. Additionally, although report card grades were conceptualised as actual grades retrieved from the school databases, the motivation measures in the present study were self-reported by students on a questionnaire. This limits the conclusions of this study. Students' varying reasons to judge a subject as favoured or not may have a differing influence on autonomous and controlled motivation, and on the relation between motivation and performance in the subject. The students participating in the present study answered questions about their autonomous and controlled motivation for studying for two subjects they considered as favoured and two subjects they considered as disfavoured. The exact reasons why students like or dislike a particular subject may differ between students. Further research might include the reasons why students favour some subjects and not others. For example, a student may favour a subject because he likes the teacher, or because he sits next to his friend during these lessons, or because it is an easy, challenging, fun, or interesting subject.

A more refined measure, enquiring about the different reasons why a student favours a subject, could provide more insight into which reasons specifically drive the moderating influence of subject favouritism. SDT distinguishes between non-self-determined extrinsic motivation and self-determined extrinsic motivation, where self-determined extrinsic

motivation is a positive predictor of high-quality learning outcomes (Scott Rigby et al., 1992). Autonomous motivation includes not only intrinsic motivation but also the most self-determined type of extrinsic motivation: identified or integrated regulation. Additionally, controlled motivation also consists of different reasons which may be more or less self-determined. These different, more or less self-determined, reasons may relate differently to performance. For example, favouring a subject because you like your teacher may affect motivation and performance differently than favouring a subject because you find it easy. In future research, it would therefore be interesting to unravel the specific reasons why students display controlled motivation.

Note

1. Dutch secondary education is streamed into three levels – pre-vocational education, general education, and pre-university education – with schools offering either one stream or a combination of streams.

Disclosure statement

No potential conflict of interest was reported by the authors.

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