Students' School Performance, Task-Focus, and Situation-Specific Motivation

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1. Introduction

Autonomously motivated students experience interest and enjoyment, while students motivated by control experience expectations, values, pressure, and deadlines (Ryan & Deci, 2000). Although conceptually distinct, autonomous and controlled motivation can be experienced at the same time, because working on a task may be both interesting and also help the student to stay connected with the teacher and earn a good grade (Lepper, Corpus, & Iyengar, 2005; Ratelle, Guay, Vallerand, Larose & Senécal, 2007). While theoretical frameworks pose that motivation is a function of the individual, context (Ratelle et al., 2007) and situation (Ryan & Deci, 2000), it appears that most studies to date have focused on individual differences (i.e., interperson, traits) in motivation (e.g., Ryan & Connell, 1989). There are some studies adopting a person-oriented approach for identifying groups of students with different motivational profiles (e.g., Boiché & Stephan, 2014; Ratelle et al., 2007; Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009), but only few studies have focused on situation-specific (i.e., intraperson, states) aspects of motivation (Tsai, Kunter, Lüdtke, & Trautwein, 2008). Person-oriented studies have indeed found profiles of students who experience both autonomous and controlled motivation within a cross-section of time, begging the question "are students switching between the two types of motivations at different times?" (Ratelle et al., 2007, p. 744). The first aim of this study was to investigate how students' autonomous and controlled motivation vary from one learning situation to another during one week of school. Doing so enables us to apply a process perspective (Schmitz, 2006) to the study of students' real-time motivation in classrooms: that is we focus on sequences of states of learning experiences. Second, as students' motivations have been

shown to be related to their academic performance and task-focused behaviour (Guay, Ratelle, & Chanal, 2008), we additionally investigated these relations in the present study.

1.1 Autonomous and controlled motivation

Over the past 30 years, self-determination theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2000) has been used for understanding students' optimal functioning in school. According to SDT, there are different types of motivation that vary according to their level of self-determination (i.e., the extent to which a behaviour is freely endorsed by individuals), and this has implications on behavioural outcomes (e.g., Ryan & Connell, 1989; Ryan & Deci, 2000). The most central distinction in SDT is between autonomous motivation and controlled motivation, which views motivation as a continuum between intrinsic and extrinsic motivation, i.e., between doing something because it is inherently interesting or enjoyable (intrinsic motivation; Ryan & Deci, 2000), and acting with a feeling of being controlled by external contingencies of rewards or punishment (extrinsic motivation; Deci & Ryan, 2008). Autonomous motivation consists of both intrinsic motivation and forms of extrinsic motivation which the person identifies and values (i.e., identified motivation), and has integrated into the self (i.e., integrated motivation). Controlled motivation comprises forms of motivation which are felt to be compelled by internal (i.e., introjected motivation) or external forces or pressures (i.e., extrinsic motivation; Deci & Ryan, 2008; Sheldon & Elliot, 1998). Intrinsically motivated goals give the individual a sense of personal ownership and are pursued through sustained self-regulation of effort. Extrinsically motivated goals are not pursued with sustained energisation and are likely to wane over time as they do not represent the needs of the individual (Sheldon & Elliot, 1998).

Several studies examining the relations between motivation and different student outcomes have shown the importance of promoting autonomous forms of motivation at

school. Students characterised by autonomous motivation have shown to receive higher grades, to be more persistent, to learn more, and to feel more satisfaction and positive emotions at school compared to those who are motivated by control (for review see, Guay et al., 2008). Although autonomous motivation is clearly an important form of motivation, most learning situations students encounter and activities they carry out at school are not autonomously motivated but controlled, structured or directed by teachers. In educational research concepts such as teacher-centred instruction (vs. student-centred; Cornelius-White, 2007), direct instruction (vs. indirect instruction; Flanders, 1970), teacher-directed instruction (Connor, Morrison, & Petrella, 2004) and cognitive structuring of contents (vs. chaos; Skinner & Belmont, 1993; Hardy, Jonen, Möller, & Stern, 2006) denote instances in which, using the conceptions of STD, teacher control of instructional contents, materials, strategies and events is relatively high.

However, some forms of controlled motivation such as introjected (e.g., wanting to please the teacher) and extrinsic motivation (e.g., being rewarded by a good grade), can also be instrumental for achieving learning goals (Deci & Ryan, 2008). Behaving only in accordance with intrinsic interest, enjoying a particular task, with no attention to external contingencies and constraints may decrease students' learning outcomes, whereas attending to a task only because of external pressures can substantially undermine inherent pleasure that can come from learning (Lepper et al., 2005). While cross-sectional analysis shows that autonomous motivation is positively, and controlled motivation is negatively related with school achievement (e.g., Lepper et al., 2005), person-oriented studies have shown that students with a motivational profile that combined high levels of both autonomous and controlled motivation, experience positive academic outcomes (Ratelle et al., 2007). Another study showed that students with a profile of high autonomy and low controlled motivation had a higher grade point average than those of high autonomous and high controlled

motivation(Vansteenkiste et al., 2009). Motivational profiles relate to different patterns of non-academic outcomes. While Malmberg and Little (2007) found a group of average-performing students called “Strivers” (above average ability beliefs, high effort beliefs and high perceived difficulty) exhibited high levels of both autonomous and controlled motivation, Vansteenkiste et al. (2009) found students with a profile of high autonomous and high controlled motivation expressed relatively high levels of test anxiety and procrastination and lower levels of perceived teacher support.

SDT also argues that autonomous and controlled motivations are not necessarily opposite dimensions but that individuals can report both autonomous and controlled motivations at the same time for a given domain (see Ryan, Plant, & O’Malley, 1995). Consequently, in the present study we examined to what extent controlled motivation contributes to intrinsic motivation. Moreover, as extrinsic and intrinsic motivation have been shown to be weakly or positively associated in between person analysis (Ryan & Connell, 1989; Malmberg & Little, 2007), we in our study explored whether a similar association would be found between our intrapersonal variables, that is autonomous and controlled motivation measured for real-time learning experiences during one week. In addition we explore whether there are individual differences in the associations between intrapersonal autonomous and controlled motivation.

1.2 Organismic Integration Theory

Within SDT, Deci and Ryan (1985; see also Ryan & Deci, 2000) introduced the organismic integration theory (OIT) to explain different forms of extrinsic motivations and contextual factors that facilitate or prevent internalization or integration of these behaviours. According to OIT, externally motivated demands can be integrated in the individual, when the context is conducive. In other words, students can construe extrinsic goals (as most teaching

is) as integrated motivation (i.e., if they subscribe to the goals and accept them as their own) or identified motivation (i.e., if they are convinced of the value of the goal, even though they don't completely subscribe to it), if the context is autonomy supportive, i.e., allowing students to feel competent, related, and autonomous. Stated differently, when the social context is such that students can build their competencies, connect with others, and act in ways that are self-endorsed, they are most inclined to internalize and integrate aspect of their social world, including extrinsic motivations (Ryan & Deci, 2000). In such a context, students would be more likely to engage in a task both because it interests them and because it will enable them to stay connected with the teacher or help them earn a good grade (Lepper et al., 2005; Ratelle et al., 2007). However, the time-perspective within which the integration of extrinsic goals into the self would take place, is not explicitly stated.

Despite the claim that autonomous and controlled motivation are influenced by contextual factors, such as a current situation in a classroom, studies examining whether aspects of motivation vary across lessons are rare (as an exception, Tsai et al., 2008). Thus, it is possible that there is intrapersonal variation in students' autonomous and controlled motivations in day-to-day classroom situations. For example, the study by Tsai et al. (2008) showed that lessons in which students perceived the teacher as taking their perspective and needs into account (i.e., an autonomy supportive climate) were associated with students' higher autonomous motivation to the subject, whereas lessons where teachers disrupted students' natural learning rhythms and did not give time for reflection (i.e., controlling behaviours) were associated with students' lower autonomous experience. In the present study we investigated the extent to which students' autonomous and controlled motivation vary from one learning situation to another during one week of school.

1.3 Task-focus and academic performance

For teachers, students' motivation is typically manifested as their learning-related behaviour in a classroom, such as engagement in learning tasks (Skinner & Pitzer, 2012). Therefore, students' behavioural engagement in learning activities provides a teacher with a window into their motivational processes which are not directly observable (Skinner & Pitzer, 2012), such as autonomous and controlled motivation. However, there needs to be more empirical evidence on the relationship between different motivational constructs, such as behavioural engagement (e.g., on-task attention, effort, persistence; e.g., Skinner, Kindermann, & Furrer, 2009), and autonomous and controlled motivation. For example, it is unclear why autonomous and controlled motivation together facilitate behavioural engagement processes (such as on-task attention, effort, and persistence) for some individuals but leads to disconnection with behavioural engagement in others (for review, see Guay et al., 2008). In addition, variation in students' autonomous and controlled motivation cannot be wholly captured without using situation-specific measures which cover different contextual features in classrooms. Thus, a more integrative approach to investigate the individual and contextual factors that predict students' behavioural engagement is needed (see also, Eccles & Wang, 2012).

There are various overlapping motivational constructs in the field and we are lacking an accepted integrated understanding ("meta-theory") of motivational concepts (Hulleman, Schrager, Bodmann, & Harackiewicz, 2010). In the present study, we operationalise students' behavioural engagement as task-focused behaviour (task-avoidant at the other end of the continuum) which also refers to a behavioural aspect of intrinsic motivation (Nurmi, Hirvonen, & Aunola, 2008): when learning is perceived as inherently interesting, attention is focused on the task at hand and students deploy more task-focused rather than task-avoidant behaviours in learning situations (Nurmi et al., 2008). Also many empirical studies have indicated that intrinsically motivated students invest effort to succeed, are persistent even

when faced with obstacles, and deploy adaptive behaviours to learn (for review see Guay et al., 2008).

Previous research has shown that good performance both in reading (Onatsu-Arvilommi & Nurmi, 2000) and mathematics (Hirvonen, Tolvanen, Aunola, & Nurmi, 2012; Onatsu-Arvilommi et al., 2002) predicts task-focused behaviour, whereas low academic performance predicts task-avoidant behaviours. Although the link between task-focus vs. task-avoidance (cf. behavioural engagement) and academic performance is well established, there are only a few previous studies which have investigated the role that students' autonomous and controlled motivation might play in that association (Reeve & Lee, 2014). Situational investigations of both students' autonomous and controlled motivation, and task-focused behaviour would offer important insights into the nature and degree of support students need in order to be motivated for and focused on a task (Perry, VandeKamp, Mercer, & Nordby, 2002).

1.4. The present study

This study is part of the Learning Every Lesson (LEL) project (Authors-a, b). The rationale of LEL was to investigate relationships between students' beliefs about themselves as learners, their intrapersonal experiences of learning, and their teachers' perceptions of them. We collected data on students' self-beliefs using a paper and pencil questionnaire at onset of the empirical study, and teacher reports of each student's prior achievement and concurrent engagement while students reported on learning experiences. We aimed at collecting data about students' experiences of learning during a typical week in mainstream primary schools. We included all tasks in all school subjects, with all their teachers (see 2.2 Procedure). In order to enhance contextual closeness and reduce retrospection bias (Carson, Weiss, & Templin, 2010; Wilhelm, Perrez, & Pawlik, 2012) we made use of electronic

questionnaires on Personal Digital Assistants (PDAs) for collecting multiple self-reports in real-time (Authors-a).

This would result in hierarchically nested data (i.e., learning experiences nested within students), which would enable us to (1) investigate associations between intrapersonal motivations in real time situations (i.e., between one situation and another), and compare to between person motivational patterns (i.e., between students), (2) use students as "their own controls" in models in which we investigate individual differences in associations between controlled and autonomous motivation (i.e., random slopes models), and (3) investigate the associations between student characteristics and interpersonal and patterns of intrapersonal learning experiences of students (Authors-b).

We set out the rationale for our investigation of intrapersonal motivation based on theoretical assumptions for between person and longer term longitudinal studies, tying theories of motivation with actual process (real-time) data (Schmitz, 2006). First, controlled motivation was assumed to precede autonomous motivation as in experimental designs (Deci, Koestner, & Ryan, 1999). Teacher-directed instructions and demands would vary from one learning situation to another and be associated with autonomous motivation differently by different students. Such internalization could depend on school subject, the learning contents as part of a sequence (e.g., introduction to new topic, revision, consolidation), the type of task students were doing (e.g., well-defined vs. ill-defined, procedural vs. open-ended tasks), characteristics of the student, or whether the teacher is autonomy supportive or not (Vansteenkiste et al., 2009).

Second, we assumed students' prior academic performance would predict controlled and autonomous motivation as well as moderate the association between controlled and autonomous motivation. This allows us to answer the question "do some students feel more autonomously motivated when controlled motivation is high?" and "if so, who?".

Third, teachers' perceptions of student task-focus (a proxy of behavioural engagement and antecedents of motivation) would be predicted by students' motivation (Gill & Remedios, 2013). We thus tested a model in which we specified academic performance as a predictor of controlled and autonomous motivation, and task-focus. Controlled motivation predicted autonomous motivation and task-focus, and autonomous motivation predicted task-focus (see Figure 1).

1.5 Research questions and hypotheses

We examined the following research questions:

(1) Do autonomous and controlled motivation vary within students (i.e., intrapersonal variation from one situation to another)?

We expected (Hypothesis 1) substantive within-student variation in both autonomous and controlled motivation in line with previous studies in which intrapersonal variation has been found to be larger than between-person variation (Schmitz & Skinner, 1993; Authors-b).

(2) Does controlled motivation predict autonomous motivations?

Consistent with STD and OIT we, at the between-student level expected (Hypothesis 2) interpersonal controlled motivation to weakly and positively predict autonomous motivation (Ryan & Connell, 1989) forming a "quasi-simplex structure" [1] (Deci, Koestner, & Ryan, 1999). We explored whether this association would replicate at the within-level for the association between intrapersonal autonomous and controlled motivation.

(3) Does academic performance predict controlled and autonomous motivation, and task-focus?

We expected (Hypothesis 3) academic performance to weakly to moderately negatively predict controlled motivation, weakly to positively predict autonomous motivation (Lepper et al., 2005) and strongly positively predict task-focus (Nurmi et al., 2008).

(4) Do controlled and autonomous motivation predict task-focused behaviour?

As task-focused is defined as a behavioural manifestation of motivation (Eccles et al., 1993; Nurmi et al., 2008), we expected (Hypothesis 4) autonomous motivation to predict teacher reported student task-focus in line with studies of teacher and student reports of motivation and engagement (Gill & Remedios, 2013).

(5) Does the magnitude of the association between controlled and autonomous motivation vary between students? As no study, to the best of our knowledge, has explored the relationship we do not present a hypothesis. If this is the case we also pursue the final research question:

(6) Does academic performance moderate the relation between (within-student) autonomous and controlled motivation?

2. Method

2.1. Sample

We approached schools in two local education authorities (LEA), in southeast England, UK. In total 353 pupils in 16 primary school classrooms (5th and 6th grade) in 11 schools received signed parental or guardian consent for participating in the Learning Every Lesson (LEL) study (roughly 90% participation rate). Following the United Kingdom census categorization (Office for National Statistics, 2001) 239 (75.9%) were of white British ethnicity, 76 (24.1%) ethnic minority (i.e., white other, Asian, Black African, Afro-Caribbean, “other” or mixed), and 38 did not report. Of the students with special education needs (SEN), 37 (11.2%) of these were eligible for support through School Action (i.e., additional interventions implemented by school) and 6 (1.8%) were children with statements (i.e.,

statutory assessment of required special education needs; Department for Education and Skills, 2001).

The sample was taken from two local education authorities (LEA) (two schools in the first LEA, and the remainder in second LEA). The average Multiple Deprivation Index (MDI; a higher value indicating a higher level of disadvantage; Department of the Environment, Transport, and the Regions [DETR], 2000) of the community in which the first LEA was located was 20.05 (Range 17.62 to 28.13), 16.2% of its pupils receiving free school meals (FSM), and 40.2% of its residents were of white ethnicity (our sample was 75% white). The community the second LEA was located in had an average MDI of 14.46 (Range: 3.32 to 31.65), 4.9% of pupils receiving FSM, and 89.7% of its residents were of white ethnicity (our sample was 75% white.

In our study sample of 314 students, students 112 were in Year 5 (35.7%) and 202 in Year 6 (64.3%), 114 were boys (45.9%) and 170 girls (54.1%). Their mean age was 10.5 years (*SD* = .63).

2.2. Procedure

In an introductory session students were shown how to operate a handheld computer, a Personal Digital Assistants (PDA) used to complete the electronic Learning Experience Questionnaire (LEQ). They were taught to identify learning episodes within a lesson (e.g., individual guitar tutorial at the beginning of a lesson and then returning to do mathematics), and two lessons being treated as one learning episode (e.g., when students had a double lesson in outdoor sports). Researchers monitored compliance of both students and teachers and performance of the technology during the data collection period. Time-stamp information suggests that the median electronic questionnaire response time was 109 sec (1 min 49 sec; M = 139 sec, SD = 75 sec; range 3 -540), but not all students “logged out” of the electronic questionnaire when prompted on the last screen. After uploading and error checking the

electronic data there were 4,972 time-stamped learning experiences reported by 323 students, in 16 classrooms (for more detail, see Authors-b).

While students took part in the PDA part of the study, the students' main teacher was asked to report on students' prior academic performance. All teachers who taught the student were asked to complete a one-page brief questionnaire about each participating student. Teaching arrangements differed across the classes. In half of the classrooms, one teacher reported on all his or her students; in four classrooms, two teachers reported on the students; in two classrooms, there was a mix of students with one or two teacher reports, and in another two classrooms, two or three teacher reports. In total twenty-three teachers (20 females and 3 males, mean age 35.5 years, SD = 10.6) produced 493 reports of students. In order to investigate the correspondence between students and teachers views of the students, in the final study sample we included all observation for which both teacher and student reports for any given student were available. This gave 314 students who reported on 3,532 learning episodes, on an average of 11.2 learning episodes (*SD* = 4.8; Range = 1-29) combined with 23 teachers' reports (165 students had one teacher report, 146 had two reports and 3 had three reports, 466 in total). Teachers reported on average 11.2 (SD = 4.8) students each, and differed somewhat in their perceptions of students ($ICC_{teacher}$ = .10; Table 2).

2.2 Measures

We included two constructs at the within-level, and four at the between-level.

2.2.1 Situation-specific motivation

We reworded items and response options from an existing lesson-specific questionnaire (Walls, 2006), and various questionnaires used in both cross-sectional and longer-term longitudinal studies (e.g., Malmberg & Little, 1997). Students reported on their situation-specific motivation each learning episode, by responding to the question "Why were you

doing this task?" on four-point scales (1 = *strongly disagree*, 4 = *strongly agree*). Three items probed autonomous motivation ("I enjoyed it", "I chose to do it", "I was interested in it"); average α = .85 across lessons, *SD* = .09), and two items controlled motivation: "I had to do it" (extrinsic motivation), and "my teacher wanted me to do it" (introjected motivation); average α = .87, *SD* = .11 (Authors-a). The controlled motivation items focus on the role of the teacher, and do not include a reference to a reward for pursuing a task or punishment for not doing so.

2.2.2 Task-focused behaviour

We used teacher-reports of each student's task-focus in school in general. Task-focus was measured with six items modified from the Observer-rating Scale of Achievement Strategies (OSAS; Nurmi, & Aunola, 1998), and the Behavioural Strategy Rating Scale II (BSR-II; Aunola, Nurmi, Parrila, & Onatsu-Arvilommi, 2000; Zhang, Nurmi, Kiuru, Lerkkanen, & Aunola, 2011). Teachers were asked to think about each student's behaviour and work habits in class, and respond on five-point scales (0 = *not at all*, 1 = *rarely*, 2 = *sometimes*, 3 = *often*, 4 = *very often*), to what extent each of the six statements characterize the way each student typically behaves in learning situations. Half of the items were positively worded (indicating task-focus) "actively attempts to solve even difficult tasks", "demonstrates initiative and persistence in activities and tasks", and "tries hard to finish even difficult tasks". The three negatively worded items (indicating task-avoidance) were: "has a tendency to find something else to do, instead of focusing on the task at hand", "gives up easily", and "loses focus if a task or activity is not going well" (α = .88). We specified the construct so that higher values indicated more focus on tasks.

2.2.3 Academic school performance

We used students' teacher-reported curriculum levels in mathematics, English, and science. These relate to the three subjects that students are examined on in the last (6^{th}) year of

primary school (the Key Stage 2 exam). We coded the curriculum levels into integer values ranging from 1 to 5 (1a = 1.67, 2c = 2, 2b = 2.33, 2a = 2.67, 3c = 3, 3b = 3.33, 3a = 3.67, 4c = 4, 4b = 4.33, 4a = 4.67, 5c = 5). In England, these are absolute measures of performance in relation to curriculum standards, and thus provide an index of how successfully students have learned the covered contents. Each sub-step (e.g., "2a" to "2b") represents one term of progress. Each full scale-step (e.g., "2" to "3") represents a school-year of progress. Teacher-reported curriculum levels have been strongly correlated with national (UK) exam results in the 6th grade (r = .77 in English and r = .82 in math, K. Toth, personal communication, 18/06/2013)(see also Authors-a). As the 6th grade students had higher curriculum levels in mathematics ($t_{[268]}$ = -6.79; p <.001), English ($t_{[278]}$ = -6.52; p <.001), and science ($t_{[268]}$ = -8.67; p <.001), we standardised each performance measure prior to analysis (M = 0, SD = 1). Internal consistency of academic performance construct was α = .92.

2.3 Analytic procedures

We specified multilevel structural equation models (MSEM; e.g., Marsh et al., 2009) in *M*plus 7.0 (Muthén & Muthén, 2012), so that items load on their substantive constructs at the within-level (i.e., learning situations $_{(ijk)}$) and at the between-level (i.e., students $_{(jk)}$). We first specified a measurement model in which all constructs were defined as latent variables, autonomous and controlled motivation at both the level of learning experiences (within) and students (between), and task focus and school performance as between-level constructs. We then specified the factor loadings of the three autonomous motivation and two controlled motivation indicators to be equal across the two levels. Task-focus was defined as six items loading on a main factor and the three negatively worded items forming a separate method factor (negative wording; see Zhang et al., 2011). Academic performance was specified using three within-classroom standardized values (M = 0, SD =1) for maths, English and science

curriculum levels. Where possible we adjusted the standard errors for between classroom ($_k$) effects.

Good model fit would be indicated by a value below .05 on the Root Mean Square Error of Approximation (RMSEA), and Standardised Root Mean Square Residual ($SRMR_B$ for between and $SRMR_W$ for within parts respectively), and above .95 on the Comparative Fit Index (CFI), and the Tucker-Lewis Index (TLI)(Browne & Cudeck, 1993). A two-level confirmatory factor analysis, in which academic performance and task-focus were specified as between level constructs and autonomous and controlled motivation specified as both within and between person constructs, fitted data well (n_{ij} = 3,532; n_j = 314; $x^2_{[75]}$ = 131.09; p<.001; CFI = 0.988; TLI = 0.984*;* RMSEA = 0.015; $SRMR_B$ = 0.039; $SRMR_W$ = 0.007). All factor loadings were significant, and all reliabilities (R^2) substantive[2].

In order to test Hypothesis 1 we inspected intraclass correlations and descriptive measures of this model. In order to test Hypotheses 2-4 we specified a model with directional paths as presented in Figure 1. In preparation of answering the fifth and sixth research questions we specified a random intercepts and slopes model. At the within-level we regressed (latent) autonomous motivation on (latent) controlled motivation, and represented the random intercepts and slopes as latent variables at the between-level, using numerical integration for the two-level random effect (Muthén & Muthén, 2012). In the final step (see Figure 2), we included academic performance as a predictor of between-level controlled and autonomous motivation, the autonomous-on-controlled motivation slope (i.e., an individual slope for each student), and task-focus. We allowed the autonomous-on-controlled motivation slope to be correlated with (between-level) controlled and autonomous motivation, and task-focus.

Missingness was negligible (2.3%) and estimated using the Estimation Maximation (EM) procedure in Mplus 7.0 (Muthén & Muthén, 2012). We used the robust maximum

likelihood (MLR) estimator which adjusts standard errors for non-normality in the indicators.

3. Results

Before answering our research questions we inspected the correlational structure of our main constructs (Table 1). At the between-level (i.e., between students) academic performance was positively associated with controlled motivation and task-focus, and unrelated with autonomous motivation. Controlled and autonomous motivation were positively associated with each other and with task-focus. At the within-level (i.e., across learning episodes) controlled and autonomous motivation were positively associated.

We first investigated to what extent autonomous and controlled motivations varied within and between students. As shown in Table 1, the intraclass correlations (i.e., between students) for autonomous and controlled motivation were r_{ICC} = .31 and r_{ICC} = .48, respectively. This means that most of the variances in autonomous and controlled motivation between one learning episode and another (Hypothesis 1), warranting the subsequent MSEM. Less variance was found between classrooms and teacher (see Table 2).

Next, we investigated whether controlled motivation predicted autonomous motivation at the two levels. As shown in the lower (within-student) part of Figure 1, autonomous motivation was higher in situations when controlled motivation was higher (β = .18; p<.01) in line with Hypothesis 2. In the upper (between-student) part, students who on average experienced a higher level of controlled motivation also experienced a higher level of autonomous motivation (β = .32; p<.01).

Hypothesis 3 was partially confirmed. Higher performing students perceived a higher (not lower) level of controlled motivation on average during the week (β = .22; p<.05). Academic performance was unrelated (not positively related) to autonomous motivation, after controlling for controlled motivation. Consistent with our expectation, higher academic

performance predicted a higher level of task-focus (β = .64; p<.001). Also a higher autonomous motivation predicted more teacher rated task-focus (β = .13; p<.05).

We then specified a random slopes model in which we, at the within-level regressed autonomous motivation on controlled motivation. The average autonomous-on-controlled-motivation slope was B = .13 and the slope variance σ^2 = .35 was significant (p<.05). The individual slopes varied from (.13 - 2 × .35) B = -0.57 (higher controlled motivation predicted lower autonomous motivation) to (.13 + 2 × .35) B = 0.84 (higher controlled motivation predicted higher autonomous motivation).

Finally, we estimated random autonomous-on-controlled motivation slopes in our full model (Figure 2). In this model, academic performance predicted the autonomous-on-controlled motivation slope (β = -.19) at the between-level. This slope was unrelated to other constructs in the model. Other parameters remained similar to those in the model depicted in Figure 1. The cross-level interaction effect is depicted in Figure 3. For higher performers (+ 1 SD), autonomous motivation was slightly lower when controlled motivation was higher. For low performers (- 1 SD), a higher-level of controlled motivation predicted a higher level of autonomous motivation.

4. Discussion

Going beyond previous studies of individual differences in, and profiles of student motivation, we investigated students' situation-specific autonomous and controlled motivation and their relations to academic performance and task-focused behaviour. Following Self-Determination and Organismic Integration Theory (STD and OIT; Deci & Ryan, 1985; Ryan & Deci, 2000), we measured autonomous and controlled motivation and investigated how autonomous motivation varied with different levels of controlled motivation, whether these associations were predictable by academic performance, and

whether motivation was observable by their teacher(s). We collected data with user-friendly Personal Digital Assistants (PDAs) and specified multilevel structural equation models (MSEMs). In response to the question posed by Ratelle and colleagues (2007), whether students switch between two types of motivation over different situations (Ratelle et al., 2007, p. 744), we found that students experienced different levels of autonomous and controlled motivation during different learning episodes. Importantly, students differed in the association between autonomous and controlled motivation. Particularly, lower performers experienced a higher level of autonomous motivation when controlled motivation was high. Overall, we emphasize how our findings about situation-specific motivation provide a unique window into students' real-time experiences and processes in school.

4.1 Situation-specific motivation

Overall, we found substantive within-student variability in both autonomous and controlled motivation between learning situations (Hypothesis 1), enabling us to tie theories of motivation with real-time experiences (Schmitz, 2006). There was more within-student variability in autonomous motivation between one learning episode and another ($ICC_{student}$ = .31), than in controlled motivation ($ICC_{student}$ = .48). Such variability would be expected as learning situations varied in school subject, part of a learning sequence, content, and type of tasks students were doing.

Notably, students' autonomous motivation varied more by classroom and by teacher (ICC_{class} = .10 and $ICC_{teacher}$ = .13) than did their controlled motivation (ICC_{class} = .02 and $ICC_{teacher}$ = .01). This could suggest that teachers vary more in the way they support autonomous motivation than in the way they manage controlled motivation. It could also suggest that the classroom climate and student engagement (e.g., Malmberg, Hagger, & Webster, 2014) differ based on the composition of student groups in the sample. For example, teachers in England have been found to use more direct instruction and focus less on

individual students in larger than in smaller groups (Blatchford, Bassett, & Brown, 2011). Future studies in which situation-specific motivations are investigated in a larger sample of classrooms would be necessary to draw robust conclusions about differences between student groups and teachers.

4.2 Academic performance, controlled and autonomous motivation, and task-focused behaviour

In line with OIT, controlled motivation predicted autonomous motivation (Hypothesis 2; Ryan & Connell, 1989). The more controlled motivation students experienced in a situation (i.e., having to do a task and the teacher wanting them to do a task) the more autonomous motivation (i.e., enjoyment, interest and choice) they experienced. Also the more controlled motivation they experienced on average during the week the more autonomous motivation they experienced during the week. Our findings are in line with previous studies in which interpersonal autonomous and controlled motivation have been weakly but positively associated, indicating that students who are motivated by and value their learning tasks during the week, also simultaneously pay attention to the extrinsic demands during that particular week (cf. Lepper et al., 2005; Ratelle et al., 2007).

Only partially in line with Hypothesis 3, academic performance was positively (not negatively; Lepper et al., 2005) related to controlling motivation on average (i.e., these students felt they had to, and their teachers wanted them to carry out tasks) during the week than lower performing students, but performance among them was unrelated (not positively related) to autonomous motivation. One reason for the difference between our finding and those of previous studies might be the operationalisation of controlled motivation. We defined controlled motivation in terms of the person (i.e., the teacher) who insists and wants students to carry out tasks, without reference to rewards for carrying out a task (e.g., grades, positive

relationship, tokens or game time) or punishment for not doing so (e.g., being told off, having privileges withdrawn). The operationalisation of controlled motivation would also need to be distinguished from the students' perception of the ways in which the teacher asks, supports, or demands students to carry out tasks. Future studies would need to include situation-specific measures of autonomy support (Jang, Reeve, & Deci, 2010), emotional and instructional support (Pianta, Belsky, Vandergrift, Hours, & Morrison, 2008), or involvement and structure (Skinner & Belmont, 1993; Vansteenkiste et al., 2011) in order to investigate the hypothesis that students can internalise extrinsic demands when the learning environment in conducive. With such measures it would be possible to investigate if extrinsic motivation is high when the cognitive contents are structured into a logical sequence by the teacher, and classroom discussions are structured by the teacher (Hardy et al., 2006), the likelihood of students internalizing controlled goals into identified and integrated goals over time would be higher (Deci & Ryan, 1985).

Unlike previous between-person studies academic performance was unrelated (not positively related) to autonomous motivation. We need to keep in mind that our academic performance construct was operationalised by a factor consisting of three "core" school subjects (maths, English, and science) while students reported on situation-specific motivation in all school subjects during the week. It would be important in future studies to unpack further whether the relationship between school subject-specific performance and school subject specific motivation would differ between school subjects.

Autonomous motivation predicted teacher-reported task-focus (Hypothesis 4). This finding is understandable as task-focus is the behavioural manifestation of motivation (Gill & Remedios, 2013; Nurmi et al., 2008). Our finding is important as it shows that autonomous motivation is related to behavioural engagement (cf. teacher-perceived student task-focus), even after covarying academic performance and controlled motivation. In other studies a

higher level of task-avoidance has been found predictive of less academic progression over time (Hirvonen et al., 2012). Autonomously motivated students pursue intrinsic goals for achieving longer-term goals congruent with their values and needs. Thus, they are able to self-regulate their behaviour by energizing effort for initiating, working on and completing tasks in the short-term (Boekaerts & Corno, 2005; Sheldon & Elliot, 1998).

4.3 Lower performing students experience higher autonomous motivation when controlled motivation is high

In response to our fifth research question our random slopes model revealed large differences in associations between autonomous and controlled motivation between students, i.e., the magnitude of the association differed from one student to another. These findings expand previous studies of individual differences in motivation (e.g., Deci & Ryan, 1985) and profile analyses of motivation (Ratelle et al., 2007). In response to our final research question, we found a cross-level interaction effect. Autonomous motivation was positively related to controlled motivation particularly among low performing students. Among high performing students higher controlled motivation was related to slightly lower autonomous motivation. In other words, our study indicates that doing tasks to please a teacher and for other external demands facilitates also inherent enjoyment of learning among lower performers, whereas several external demands do not seem to diverge the experience of enjoyment and self-determination (i.e., intrinsic motivation) of higher performers. A plausible reason why controlled motivation would not increase autonomous motivation among higher performers is that these students have already internalized the educational demands and expectations, so that these are an integral part of their value system. More specifically, students who identify with the goals of education, exert effort even when it is not fun anymore (Sheldon & Elliot, 1998).

A positive interpretation of these results for lower performers is that they may benefit more from being reminded about the advantages of learning to enhance their autonomous motivation than higher performers. It is possible that when low performers work hard to please their teachers and because of external demands, they feel more belongingness to their classroom (i.e., fulfilment of the relatedness) which, in turn, facilitates their internalization (Ryan & Deci, 2000). However, students for whom the spark for autonomous motivation is only ignited when controlled motivation is high, run the risk of only initiating tasks and energise short-lived effort if the educational goals are not congruent with internal needs and values (Sheldon & Elliot, 1998; Gollwitzer, 1996).

This result also suggests that students experience the same classroom atmosphere and teacher practices differently depending on their individual characteristics, such as academic performance. Previous studies regarding academic skills have shown that children with different levels of initial skills benefit from different teaching practices. For example, Lerkkanen et al. (2014) found that teacher-directed practices (i.e., high teacher control and low autonomy support) had a negative effect on the reading skills of children who initially had displayed high levels of reading skill, whereas Connor et al., (2004) showed that lower performers benefited from teacher-directed practices in terms of their academic skills. Moreover, Kikas, Peets, and Hodges (2014) found that instruction with a high teacher-directed emphasis was most beneficial for first grade classrooms characterized by many children who have difficulties with working persistently on tasks or have poor initial literacy and math skills.

A particularly important hypothesis for future research would be to investigate if low performers benefit from a high degree of internalization of extrinsic demands (i.e., identified or integrated motivation; Ryan & Deci, 2000), when the quality student-teacher interaction is high (Pianta et al., 2008), when the cognitive contents are structured and there is a high degree

of clarity and amount of information about way to attain educational outcomes (Hardy et al., 20006; Jang et al., 2010; Skinner & Belmont, 1993).

4.4 Limitations and suggestions for further research

Some limitations are obvious in this study. Firstly, the cross-sectional design of the present study does not allow us to make inferences about the causality and direction of effect between academic performance, autonomous and controlled motivation, and task focus (behavioural engagement). Secondly, the current study examined intra-personal variation over learning situations only in respect to autonomous and controlled motivations. To better understand intra-personal variation, future research should also include measures of task-focus and academic success during that same learning situation. Thirdly, similar to Lepper et al. (2005), we included situation-specific measures of intrinsic and extrinsic motivation. Our extrinsic motivation construct represented a relatively controlling end of the extrinsic motivation spectrum, namely introjected ("teacher wanted me to") and extrinsic motivation ("I had to"). To provide a fuller range of the extrinsic motivation spectrum (Ryan & Deci, 2000) future studies should include measures of the relatively more autonomous end of the extrinsic motivation spectrum, namely integrated and identified motivation. However, the number and choice of items to include in an intensive longitudinal study need to be carefully weighed against the time it takes for participants to complete them (Authors-a). Fourthly, our items for measuring situation-specific motivation did not include reference to a reward for pursuing a task or punishment for not doing so. Finally, given the design of our study teacher report measure of students' task-focus was necessarily relatively general (i.e., "how a student usually carries out tasks at school") while students' situation-specific reports honed in on the situation the students were in. In future designs it would be interesting if teachers were able to report on students' situation-specific task-focus across repeated situations. Anecdotal field

notes suggest that teachers think lesson-specific reports of four to six target students per lesson could be possible without being obtrusive to the teacher's work.

5. Conclusions

In order to expand previous between-person (individual differences) and person-oriented (profile analysis) of students' motivation, we investigated situation-specific (intrapersonal) experiences of autonomous and controlled motivation across learning situations during one week, and how these were related to students' teacher-rated academic performance and task-focus. Importantly, we used repeated situational reports collected in real-time during one week of school. This provides important insights into the "ups-and-downs" of everyday learning experiences close in time to the events the students reported on providing a unique window into students' learning experiences (Authors-b; Wilhelm et al., 2012), enabling us to tie theoretical ideas of motivational processes with learning experiences in real-time (Schmitz, 2006). At both the within and between-levels, we replicated previous findings concerning the positive association between autonomous and controlled motivations along the lines posed in theories of self-determination and organismic integration (Deci & Ryan, 2008; Ryan & Deci, 1985). Going beyond previous studies we found substantive within-student variability in motivation during a week, suggesting that students' autonomous motivation could be "switched on or off" depending on the level of controlled motivation in that situation, particularly for lower performing students. Enabling teachers to assist lower performers to integrate such extrinsic demands into longer term personal values in autonomy supportive ways is an important educational goal in its own right.

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Table caption:

Table 1. Descriptives

Figure captions:

Figure 1. Students' academic performance, controlled and autonomous motivation, and task-focus.

Note: Standardized coefficients from Mplus 7.0 presented (Muthén & Muthén, 2012). Only latent constructs and structural paths presented for clarity.

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

Figure 2. Two-level model including random autonomous-on-controlled motivation slope.

Note. Only latent constructs and structural paths presented for clarity. Estimates are unstandardized beta-coefficients from Mplus 7.0 (Muthén & Muthén, 2012). * $p<.05$, ** $p<.01$, *** $p<.001$

Figure 3. Academic performance as a moderator of the effect of situation-specific autonomous motivation regressed on controlled motivation.

Table 1. Descriptives.

Within level (learning episodes)	1.	2.	3.	4.	5.	6.
1. Controlled motivation		**.18** **				
2. Autonomous motivation	.19 ***					
Between level (students)						
3. Academic performance				**0.22** ***	**0.14**	**0.65** ***
4. Controlled motivation			0.18 **		**0.33** ***	**0.19** **
5. Autonomous motivation			0.10	0.24 ***		**0.22** **
6. Task-focus			0.56 ***	0.16 **	0.17 **	
N	3431	3391	311	312	312	314
Min – max	1 to 4	1 to 4	-2.58 to 1.76	1 to 4	1 to 4	0 to 4
M	3.18	2.76	0.04	3.15	2.78	2.47
SD	0.87	0.97	0.88	0.65	0.67	0.91
$ICC_{student}$	0.48[c]	0.31[c]				
$ICC_{classroom}$	0.02[c]	0.10[c]	0.33[a]			0.08[a]
$ICC_{teacher}$			0.51[b]	0.01[d]	0.13[d]	0.10[b]

Note. Observed correlations (pairwise *n*s = 309-314; lower triangle), for between (above) and within (below) levels. Correlations between latent constructs in bold. The ICCs were estimated in separate: [a] = two-level models in which students were nested within classrooms; [b] = two-level models in which students were nested within teachers; [c] = three-level model in which learning episodes were nested within students, nested within classrooms; [d] = in three-level model in which learning episodes were nested within students, nested within teachers (only teacher-level ICC shown).* $p<.05$, ** $p<.01$, *** $p<.001$.

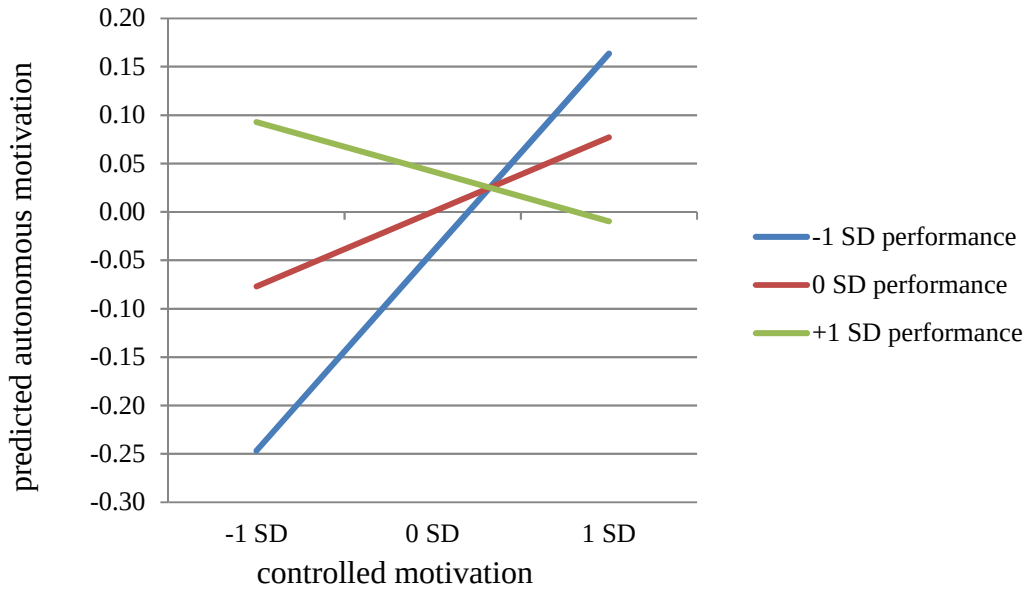

Figure 3. Academic performance as a moderator of the effect of situation-specific autonomous motivation regressed on controlled motivation.

Footnotes in the text

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[1] The term “quasi-simplex-structure” originates from the term “simplex-structure” in longitudinal research. Consider a variable measured at four adjacent time-points (times 1 to 4), and the correlational structure such that variables one time-point apart are strongly auto-correlated, e.g., $r = 0.60$, variables two time-points apart are less strongly correlated $r = 0.36$ ($0.60 \times 0.60 = 0.36$), and variables three time-points apart are even less correlated $r = 0.216$ ($0.60 \times 0.60 \times 0.60 = 0.216$). When an autoregressive model is fitted to this correlational structure, i.e., each variable at time T is regressed on T-1, all βs between adjacent time-points are estimated at 0.60, no longer lags being different from zero. In the same manner motivations which are adjacent in the spectrum from controlled to autonomous motivation: extrinsic, introjected, identified and intrinsic form a quasi-simplex-structure (“quasi” because the data is cross-sectional , not longitudinal) if adjacent motivations are correlated $r = 0.60$ (e.g., extrinsic and introjected motivation), motivations “two steps” apart (e.g., extrinsic and identified) less correlated $r = 0.36$, and motivations at opposite ends the least correlated i.e., extrinsic and intrinsic motivation $r = .216$. Our findings indicate that controlled and autonomous motivations were correlated $\rho_B = .33$ and $\rho_W = .24$ suggesting a quasi-simplex structure among our constructs: $\sqrt[3]{.33} = .69$ and $\sqrt[3]{.24} = .62$.

In the literature we also find alternative operationalizations, e.g., by adding intrinsic and identified motivation into an autonomous construct and adding introjected and extrinsic motivation into a controlled motivation construct (e.g., Vansteenkiste et al., 2009), or by providing negative weights to extrinsic and positive weights to intrinsic vignette scores (Deci, Sheinman, Schwartz, & Ryan, 1981).

[2] As previous studies suggested gender and age differences in academic performance, motivation, and task-focus, we also specified an MSEM which included gender and age as covariates. Also this model fitted data well (n_{ij} = 3,532; n_j = 314; $x^2_{[93]}$ = 179.14; p<.001; CFI = 0.984; TLI = 0.978*;* RMSEA = 0.016; $SRMR_B$ = 0.040; $SRMR_W$ = 0.007). Consistent with previous studies (Hirvonen et al., 2012) we found girls to be more task-focused than boys (β = .17; p<.001). Older students within each class were also more task-focused (β = .14; p<.01), and had higher school performance (β = .14; p<.05)(Crawford, Dearden, & Greaves, 2011). Findings are available from the first author at request.