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Maulana, Ridwan; Opdenakker, Marie-Christine; Bosker, Roel

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Teachers' instructional behaviors as important predictors of academic motivation: Changes and links across the school year

Ridwan Maulana^{a,*}, Marie-Christine Opdenakker^b, Roel Bosker^b

^a Department of Teacher Education, University of Groningen, The Netherlands

^b GION, University of Groningen, The Netherlands

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ABSTRACT

Learning environments play an important role for students' learning and outcomes. Research indicates that many students show poor academic motivation. Teachers' behavior can function as a protective factor for sustaining students' interest and active engagement in schools. However, the knowledge about the dynamic nature of teachers' behavior and how it relates to the development of students' academic motivation is limited. This study is aimed to fill this gap. 566 students from 20 classes completed measures of teachers' instructional behavior and academic motivation in five waves throughout the school year. Results showed that students' perceptions of the quality of teachers' instructional behavior and that of academic motivation declined over time. The decrease in academic motivation was related to the decrease in teachers' instructional behavior. A high quality of teachers' instructional behavior appeared to be a protective factor for the decline in the level of students' academic motivation over time.

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1. Introduction

Academic motivation is an important aspect of students' learning and academic performance and provides cues why some students seem to engage and succeed in learning while others fail (Hidi & Harackiewicz, 2000). Students who believe that they are capable of performing certain tasks (self-efficacy), value learning intrinsically, and have a low level of test anxiety, tend to be more engaged academically, use more cognitive strategies and are more likely to persist in learning (Pintrich & De Groot, 1990). These motivational components play a significant role in academic performance (Jinks & Lorschbach, 2003; Linnenbrink & Pintrich, 2002). Currently, schools and educational researchers have started to pay attention to motivational factors in order to prevent school problems related to low learning interest, low achievement, and high dropout rate (Wang & Eccles, 2013).

To promote academic motivation, it is important to focus on the central figure of classroom learning; the teacher. Teachers are important determinants of classroom learning environments and research has consistently revealed their relevance to students' academic outcomes (Mercer & DeRosier, 2010; Nye, Konstantopoulos, & Hedges, 2004). Specifically, research shows that teachers' behavior is strongly associated with students' academic motivation and achievement (e.g., Maulana, Opdenakker, den Brok, & Bosker, 2011a; Opdenakker & Van Damme, 2009; Pianta, 1999). When students perceive greater social supports

from teachers, they tend to have more positive attitudes and a higher sense of competence in learning (Rice, Barth, Guadagno, Smith, & McCallum, 2013). Unfortunately, research on teacher-student interpersonal relationships suggests that the quality of teachers' interpersonal behavior tends to decrease across the school year (Mainhard, Brekelmans, & Wubbels, 2011; Maulana, Opdenakker, & Bosker, 2013b; Maulana, Opdenakker, Stroet, & Bosker, 2013a; Opdenakker, Maulana, & den Brok, 2012). In a similar vein, there is evidence that students' academic motivation tends to decline, with a large drop as students enter secondary school (Eccles, Wigfield, & Schiefele, 1998). The decline in academic motivation is linked with the decline in the quality of teachers' interpersonal behavior (Maulana et al., 2013b, 2013a; Maulana, Opdenakker, Bosker, & den Brok, 2011b). These studies suggest that teachers' interpersonal behavior should be the priority for schools.

However, teachers' behavior can be studied from multiple perspectives. We know little whether or not teachers' behavior studied from different perspectives will reveal the same patterning with teachers' behavior studied from interpersonal behavior perspective. The present study is aimed at addressing this gap by studying teachers' behavior from an instructional perspective. Specifically, few empirical studies have focused on changes in teachers' behavior (mainly interpersonal behavior), while we found no study focusing on changes in teachers' instructional behavior. Moreover, a limited number of studies reveal a positive relationship between perceptions of changes in learning environments and students' motivational outcomes (Flanders, Morrison, & Brode, 1968; Ryan & Deci, 2001; Way, Reddy, & Rhodes, 2007). To date, there is no study investigating the relationship between teachers'

* Corresponding author at: Department of Teacher Education, University of Groningen, Grote Kruisstraat 2/1, 9712 TS Groningen, The Netherlands.
E-mail address: r.maulana@rug.nl (R. Maulana).

instructional behavior and students' academic motivation in a dynamic and multilevel fashion, taking into account differences between classes and between students within classes over time. Hence, the present study was designed to advance our understanding regarding changes in teachers' instructional behavior and the longitudinal links between teachers' instructional behavior and students' academic motivation across the school year. Such research is important to inform effective classroom practices as well as to identify characteristics of instructional behavior that matter for academic motivation from a longitudinal point of view.

1.1. Teachers' behavior from the instructional perspective

From an eclectic point of view, teachers' instructional behavior is defined as teachers' (and students') role in the learning process that involves the degree to which teachers display instructional clarity to achieve the learning goal, manage classrooms effectively to minimize disruptions and misbehaviors and maximize students' opportunity to learn, and distribute control over students' learning activities (den Brok, Bergen & Brekelmans, 2006a). Within this theoretical framework, effective teaching behavior can be described as performing well on at least the following domains of instructional behavior. First, clarity of instruction refers to the clarity and the explicitness of the teacher with regard to what students have to learn, to do and how. It also refers to the clarity of delivering and explaining the content of the lesson (Brekelmans, Sleegers, & Fraser, 2000). Reviews on educational effectiveness indicate the relevance of clarity of instruction in the form of structured instruction (e.g., Scheerens & Bosker, 1997; Scheerens & Creemers, 1996; Wang, Haertel, & Walberg, 1993). Wang et al. (1993) mention the effectiveness of a more constructivist perspective on learning and instruction by introducing an idea of "academic student-teacher interactions". Another domain is classroom management, which refers to the creation of an orderly learning environment and an orderly organization of learning activities. It deals with the extent to which young students have to obey the teacher's rules and the degree to which inattentive behavior is allowed during the lesson. It also deals with how teachers respond to students' misbehavior during the learning process (Creemers, 1994).

Furthermore, teacher control over students' learning activities is an important domain of teachers' instructional behavior. Teacher control refers to the degree to which teachers and students have control over the learning activities of the student. The literature on teachers' control suggests three gradations of teachers' control including: (1) strong control, referring to an instructional system in which the teacher initiates and fills in students' learning activities; (2) shared control, or activating and facilitating students to take an active part in guiding and completing learning tasks, and (3) loose control, or stimulating and motivating students to complete learning activities with little if any teacher regulation involvement (den Brok et al., 2006a; Vermunt & Verloop, 1999). Strong control is characterized by teachers' behavior such as highlighting main points, providing examples, presenting outlines and providing students with strategies to perform learning strategies. Shared control refers to the share of responsibility over the student's learning activities between the teacher and the student (and between students). Students are continually activated by the teacher (explicitly or implicitly) to engage in learning activities, for example, by asking questions, stimulating students to cooperate and assigning tasks. Loose teacher control focuses on students' own decision making during learning activities. This is characterized by allowing students to operate freely and independently during learning activities. Teachers allow this because they believe that students will start and complete learning activities by their own initiative.

Within popular conceptions of "teaching for active learning" reference is made to teacher-led, student-led and co-student led control. Contradictory to previous theories in which teacher-control was advocated (see model of Direct Instruction; Rosenshine & Stevens, 1986),

contemporary theories on learning and instruction emphasize the importance of students' active involvement in their own learning and the degree to which they control their own learning activities (Shuell, 1996). Until recently, the constructivist versus a more traditional approach to teaching (i.e., direct instruction) remains a hot topic of debate in education (see for example Kirschner, Sweller, & Clark, 2006).

There is evidence that the quality of teachers' behavior tends to change over time. Particularly, studies show that teachers' interpersonal behavior tends to decline across the school year (Brekelmans, 1989; Mainhard et al., 2011; Maulana, Opdenakker, den Brok, & Bosker, 2010; Maulana et al., 2013b, 2013a) and over school years in secondary school (Way et al., 2007). However, other studies indicate relatively stable trends of teachers' interpersonal behavior over time (Brekelmans, 1989; Ryan & Patrick, 2001; Skinner & Belmont, 1993). Therefore, the knowledge about changes in teachers' behavior remains inconclusive. To date, particularly, there is no study documenting the developmental trend of teachers' instructional behavior taking into consideration differences between classes and between students within classes across the school year. This type of research is beneficial for two reasons. Methodologically, hierarchical modeling is more superior for nested data like in the present study because the generated estimates are less sensitive to bias compared to single-level modeling (Snijders & Bosker, 2012). Practically, knowledge about differences between and within classes is important for researchers interested in setting interventions in schools, whether to be targeted at the class or the individual level, to promote a positive growth in instructional behavior over time.

1.2. Academic motivation: the expectancy-value model

In this study, students' academic motivation is studied using the framework of an adaptation of the expectancy-value model of academic motivation (Pintrich & De Groot, 1990). According to this model, there are three components of academic motivation: (1) an expectancy component (self-efficacy), (2) a value component (intrinsic value), and (3), an affective component (test anxiety) that may link to cognitive strategies needed for students' academic achievement. The first two components are considered as the basis of students' learning engagement (Pajares, 1996).

The basic concept of the expectancy component includes students' beliefs of their capabilities to perform the task necessary for accomplishing desired performances (Bandura, 1986). This involves their answers to the question, "Am I able to do this task?" Jinks and Lorschbach (2003) state that self-efficacy consists of two main elements: (1) efficacy information gained from experience and; (2) student beliefs about their abilities, irrespective of their ability. Furthermore, the value component concerns students' goal for the task and their beliefs about the importance and interest of the task. This involves their answer to the question, "Why am I doing this task?" Pintrich (1989) asserts that intrinsic value consists of two elements including: (1) task value referring to importance of and interest in tasks and; (2) students' achievement of goal orientation. Intrinsic value refers to the degree to which students' hold interest and recognize importance of a task, which is connected to their goal orientation. Finally, the affective component involves students' emotional responses to the learning task. This relates to the question, "How do I feel about this task?"

Students who believe they are able and can and will do well are much more likely to be motivated in terms of effort, persistence, and academic behavior than their peers who believe they are less able and do not expect to succeed (Eccles et al., 1998; Pintrich & Schunk, 2002). Confident students will also be more cognitively engaged in learning and thinking and have higher academic performance outcomes than their peers who doubt their capabilities to do well (e.g., Hsieh & Schallert, 2008; Pintrich, 1999; Schunk, Pintrich, & Meece, 2008). Students who believe that the task is interesting and important are much more likely to engage in learning activities (Ames & Archer, 1988; Pintrich & De Groot, 1990). Additionally, test anxiety is considered as the most

relevant element capturing students' emotional feelings in the school context (Pintrich & De Groot, 1990) and is closely associated with task avoidance (Hill & Wigfield, 1984) and school subject avoidance (Maner & Schmidt, 2006).

Although there is extensive literature on cognitive development, there is far less research on the development of motivation as cognitive expertise increases (Pintrich, 2003). This type of research could broaden our understanding on the conditions under which students have a high risk for failure and could help to identify factors that may sustain academic motivation and self-regulation (Schunk, 2005). Generally, research shows that students' academic motivation often declines with development and advancement in school (Wigfield & Eccles, 2002). Particularly, there is evidence that students' ability beliefs and subjective task values tend to decrease over time (Wigfield & Eccles, 2000). Schunck and Pajares (2001) found that students' academic self-efficacy tends to decrease across age of schooling, and that the decrease is more evident during the transition from elementary to secondary education. Similarly, evidence for a significant decline in student intrinsic value over the year of transition to secondary schools and across the first year of secondary schools is also found (Midgley, Feldlaufer, & Eccles, 1989; Pajares & Graham, 1999). Finally, Opdenakker et al. (2012) found that students' autonomous motivation declines across the school year. In conclusion, students generally experience motivational problems across the primary and secondary schooling period, with a critical moment during the transition from primary to secondary education. It is important to find out whether the motivational problem experienced by young students is considered normative, and whether teachers have a powerful impact on mitigating students' motivational problems.

1.3. Teachers' instructional behavior and students' academic motivation

In secondary education, students' perceptions of teachers' supportive teaching behavior are closely linked to their enjoyment in academic subjects (den Brok, Levy, Brekelmans, & Wubbels, 2005) and to positive attitudes towards school subjects and sense of competence (Rice et al., 2013). Self-determination theory recognizes the importance of supportive and involved teachers for fostering students' academic motivation (Maulana et al., 2013b, 2013a; Skinner & Belmont, 1993; Stroet, Opdenakker, & Minnaert, 2013). Furthermore, students' perceptions of the learning environment seem to be relevant to their academic motivation and engagement for school (Skinner & Belmont, 1993; Opdenakker & Minnaert, 2011).¹ Pintrich (2003) discovered that teachers' provision of clear and accurate feedback regarding competence and self-efficacy focusing on the development of competence, expertise, and skill are associated with students' adaptive self-efficacy and competence beliefs in learning.

The relevance of teachers' instruction and students' intrinsic value indicates that mastery goal orientation instruction, instead of performance goal orientation, is related to students' intrinsic motivation (Linnenbrink & Pintrich, 2002). Moreover, Pintrich (2003) showed that teachers' provision of stimulating and interesting tasks, activities, and materials, including some novelty and variety in tasks and activities during instruction is associated with higher levels of students' interest and intrinsic motivation in learning. Lapointe, Legault, and Batiste (2005) discovered that students' perceptions of interpersonal teachers' behavior played a significant role in students' self-efficacy, intrinsic value and test anxiety. Opdenakker et al. (2012) found a positive link between teachers' interpersonal behavior and academic motivation. Maulana, Irnidayanti, Helms-Lorenz, and Van de Grift (2016) found a

positive relationship between teacher relatedness, competence, and autonomy support with student autonomous motivation. Additionally, Maulana, Helms-Lorenz, and Van de Grift (2015) discovered that instructional behaviors such as instructional clarity, classroom management, and control over student learning are linked positively with student academic engagement. The literature not only suggests the importance of student perceptions of supportive teachers' behavior for students' academic motivation, but also indicates that the decline in students' motivation in learning is related to the decline in the quality of learning environments during and after the transition to middle school (Patrick, Turner, Meyer, & Midgley, 2003; Pintrich, Rouser, & De Groot, 1994).

1.4. Aims and hypotheses

There is limited literature on changes and links between teachers' behavior and students' academic motivation reviewed earlier. Hence, the present study was designed to investigate changes in students' perceptions of teachers' instructional behavior and students' academic motivation during the first year of secondary school. Furthermore, we examined the longitudinal link between changes in students' perceptions of teachers' instructional behavior and their academic motivation over time.

Based on past research showing a decline in the quality of teaching behavior (Brekelmans, 1989; Mainhard et al., 2011; Maulana et al., 2010, 2013b, 2013a) and academic motivation (Opdenakker et al., 2012) across the school year, we expect that students' perceptions of teachers' instructional behavior (i.e., clarity of instruction, classroom management, and control) and their academic motivation (i.e., self-efficacy, intrinsic value, test anxiety²) will decrease across the school year (Hypothesis 1). Based on studies indicating a positive link between teacher behavior and academic motivation reviewed above (e.g., Lapointe et al., 2005; Maulana et al., 2015; Opdenakker et al., 2012), we hypothesize that differences and changes in students' perceptions of teachers' instructional behavior will be related positively to differences and changes in academic motivation (Hypothesis 2).

2. Method

2.1. Participants and procedure

A total sample of 566 first year secondary school students (N girls = 260, N boys = 306; age: 11–13 years (mean age = 12.19, SD = 0.55) from 10 mathematics and 10 English as Foreign Language (EFL) classes (N homogeneous classes = 12, N heterogeneous classes = 8³) in The Netherlands completed measures on teachers' instructional behavior and academic motivation across the school year. Researcher-school agreement regarding voluntary participation for conducting the surveys at a regular interval was arranged. Written informed consent from parents and teachers was collected subsequently. Schools were located in a provincial city area and are representative of typical public schools for middle socio-economic status. Demographic characteristics were mixed, they did not differ by homogeneous or heterogeneous classrooms. Eight mathematics and seven EFL teachers (N female = 8, N male = 7) participated in this study. Teachers' experience ranged from three to more than fifteen years. All teachers and the majority of students were of Dutch ethnicity. All teachers were native Dutch and <1% of the students were non-native Dutch.

Surveys were administered in five waves during a school year. In each wave, the Questionnaire on Instructional Behavior (QIB) was administered prior to the distribution of the academic motivation

¹ The importance of student perceptions of teacher behavior is mentioned in the literature of learning and instruction as important mediators between actual teachers' behaviors and actual students' learning and performance (e.g., den Brok et al., 2004; Shuel, 1996).

² Due to the conceptual meaning of test anxiety, a decrease in academic motivation is indicated by an increase in test anxiety.

³ Please see subsection personal and contextual characteristics for further explanation about this class characteristic.

questionnaire.⁴ The first survey was administered in September (baseline) to capture students' initial motivational beliefs. The second survey was conducted in November (2nd month). The third survey was distributed in February (4th month). The fourth survey was done after 28 weeks of the school year (7th month). The last survey was administered around 40 weeks of the school year (10th month), which is comparable to the duration of the school year in The Netherlands.

2.2. Measures

2.2.1. Teachers' instructional behavior

We used the Questionnaire on Instructional Behavior (QIB; den Brok, Bergen, Stahl, & Brekelmans, 2006b) to measure students' perceptions of teachers' instructional behavior. This measure consists of five scales including clarity of instruction (5 items, i.e., "This teacher explains clearly which content you have to study for a test"), classroom management (7 items, i.e., "In this teacher's lesson, you strictly have to follow the rules"), strong teacher control (3 items, i.e., "This teacher provides strategies for planning school work"), shared control (6 items, This teacher appreciates when we show initiative), and loose teacher control (3 items, i.e., "In this teacher's lesson, I can decide by myself how to do tasks"). All statements were provided on a 5-point Likert scale, ranging from 1 (completely not true) to 5 (completely true).

Previous studies showed that the validity and reliability of the QIB were good (den Brok et al., 2006b; Kiany & Shayestefar, 2010). In the present study, reliabilities for all scales were above satisfactory level, ranging from 0.81 (shared control) to 0.95 (classroom management). Scales intra class correlation ranged from 0.16 (clarity of instruction) to 0.46 (strong control), indicating that significant amounts of variance could be found at the teacher-class level as compared to the student level. This means that the QIB scales could differentiate between classes/teachers. Mean inter-scale correlations ranged between 0.15 (loose control) and 0.39 (shared control), meaning that the scales measured different, though partially shared elements of teachers' instructional behavior. Results of exploratory factor analyses indicated that five factors with eigenvalues larger than 1 could be extracted. These scales represented the five scales of the QIB. To confirm whether the five factor model represents an acceptable latent construct of teachers' instructional behavior, we performed confirmatory factor analyses. According to the criteria of fit statistics proposed by Hu and Bentler (1999), results showed that the five-factors model fitted the data reasonably well ($\chi^2 = 1052.5$, $p < 0.05$; CFI = 0.96; TLI = 0.94; RMSEA = 0.07 and SRMR = 0.07).

2.2.2. Perceived academic motivation

Measures of students' perceived academic motivation were adapted from established instruments to match the teaching subject gathered in the present study. Three components were selected that included self-efficacy, intrinsic value and test anxiety. All statements in the measures were provided on a five-point Likert scale (1 = completely not true, 5 = completely true) and were responded in reference to mathematics and EFL subjects. The self-efficacy measure (6 items, Cronbach's $\alpha = 0.91$) was based on the self-efficacy instrument of Midgley et al. (2000). An example of items is "I can do almost all the work in this mathematics/EFL class if I don't give up". The intrinsic value measure (8 items, Cronbach's $\alpha = 0.87$) was based on the measure of Pintrich and De Groot (1990). An example of items is "I think what we are learning in this mathematics/EFL class is interesting". Finally, the measure of test anxiety (5 items, Cronbach's $\alpha = 0.78$) was based on the measure

of Pintrich and De Groot (1990). An example of items is "I am very nervous during a test in this mathematics/EFL class".

2.2.3. Personal and contextual variables

Based on past studies showing the effects of personal and contextual variables such as subject taught, class type, teacher and student sex on teacher behavior and academic motivation (Maulana, Opdenakker, & Bosker, 2013; Opdenakker et al., 2012), we included the mentioned variables as control variables. Time was coded in accordance with the survey intervals (in months). Class type was dummy-coded as: homogeneous (score 0) and heterogeneous (score 1). Homogeneous classes refer to high ability classes. This class type consists of students following a program of either gymnasium (highest ability track) or atheneum (second highest ability track). Heterogeneous classes are mixed-ability classes where early students follow a track preparing for the second highest or second lowest track (in Dutch: atheneum-HAVO class) or lowest or second lowest track (in Dutch: VMBO-HAVO class). Most of the mixed-ability classes were of the first type. All students in homogeneous and heterogeneous classes receive the same subject matter, but the mixed-ability classes receive it at a slower pace. Subject taught (0 = math, 1 = EFL), teachers' gender (0 male, 1 = female) and students' gender (0 = boys, 1 = girls) were included in the analyses as dummy variables. All background variables were treated as covariates.

2.3. Analytic strategy

Multilevel growth curve modeling (MGCM; with MLwiN; Rasbash, Charlton, Browne, Healy, & Cameron, 2005) was used to investigate changes in students' perceptions of teachers' instructional behavior and their academic motivation. Models with three levels were included: measurement occasion (level 1), student (level 2), and class (level 3).⁵ Modeling was done in a stepwise manner and all models were tested subsequently, starting from estimating empty models to adding components (linear to polynomial terms) to obtain adequate representations of the data. Differences in change between classes and between students within classes were examined by introducing random effects of time. Next, determinants and predictors were added to the model. In the final model, only significant predictors at $p < 0.05$ were retained. However, given that the number of classes included in the study is rather limited, a p -value of < 0.10 was additionally retained for some contextual effects in order to increase the statistical power (the significant level clearly increases when the class sample increases). Non-significant predictors were removed stepwise from the model starting from the highest to the lowest p values. The fixed effects in the model were tested by using t -ratio coefficients, considering that absolute t -values should be greater than ± 1.96 ($p < 0.05$) for a significant effect of a variable (Snijders & Bosker, 2012).

3. Results

3.1. Changes in student's perceptions of teachers' instructional behavior

Results reveal that there are differences between classes and between students within classes regarding teachers' instructional behavior. Differences in perceptions of instructional behavior over time are also visible (see Table 1). Teachers' classroom management appears to be the most stable component compared to the other instructional dimensions, while teachers' loose control seems to be the least stable component over time.

The mean trajectories (raw scores) of students' perceptions of teachers' instructional behavior shows a declining pattern with regard

⁴ The QIB was not administered during the first survey because during this period lessons were not started yet. The purpose of the first survey was to gather early students' initial motivation at the start of the school year. The design regarding the distribution of the instruments used made us possible to estimate longitudinal effects of teachers' instructional behavior on students' academic motivation.

⁵ Although our class data are also nested within schools, we did not include school level in MGCM due to insufficient number of schools to establish a representative statistical power.

Table 1
Distribution of the total variance over the class, student and occasion level (percentages).

	Clarity	Management	Strong control	Shared control	Loose control	Self-efficacy	Intrinsic value	Test anxiety
Class level	9%	14%	9%	11%	5%	2%	3%	1%
Student level	21%	20%	20%	20%	17%	27%	29%	25%
Occasion level	70%	66%	71%	69%	78%	71%	68%	74%

to clarity of instruction, classroom management and loose control. Teachers' strong and shared control show a more complex trajectory: both instructional domains increase during the first few months and continue to decrease with decelerating trends across the rest of the school year (see Fig. 1).

Results also show that significant differences between classes and students within classes concerning the level and growth of students' perceptions of teachers' instructional behavior are evident (see Table 2). Concerning differences between classes associated with the linear time effect on teachers' clarity of instruction, classroom management and control, the results show that, the 95% interval contains negative as well as positive time effects. Recalculating the interval limits for a period of 10 months (corresponding to a regular school year), the interval ranges between -1.40 and 0.39 (clarity of instruction), between -0.81 and 0.03 (classroom management), between 1.80 and 3.20 (strong control), between -0.40 and 4.60 (shared control) and between -0.85 and 0.46 (loose control).

3.2. Changes in students' perceived academic motivation

Results show differences between classes and students within classes as well as differences over time regarding students' perceived self-efficacy, intrinsic value, and test anxiety (see Table 1). The total variance at the class level is much smaller than that at the student level, indicating that perceived academic motivation is more attached to individual rather than to classroom characteristics. Compared to the other academic motivation components, students' perceived intrinsic value appears to be a slightly more stable academic motivation component over time.

The general trajectories of academic motivational components show that the level of students' perceived self-efficacy decreases over time. Students' perceived intrinsic value decreases in the beginning, increases in the middle, and decreases in the end of the school year. Additionally, students' perceived test anxiety increases over time (see Table 3, Fig. 2). Students' perceived self-efficacy shows an increasing trend during the

first four months and continues to decrease during the rest of the school year, while their perceived intrinsic value shows a systematic decreasing trend over time. Additionally, a systematic increase in perceived test anxiety during the school year is visible, with a more remarkable increasing trend during the first few months.

The change of students' perceived self-efficacy is best-represented by a linear trend, while the change of perceived intrinsic value and test anxiety are best-represented by polynomial trends (evidence for a quadratic and cubic time effects). While a linear decreasing trend indicates the trajectory of students' perceived self-efficacy over time, their perceived intrinsic value also declines with less deceleration between months seven and 10. Opposite to the change of students' perceived intrinsic value, the change of their perceived test anxiety suggests a linear increasing trend over time with a systematic deceleration as well as acceleration.

Differences between classes and students within classes regarding the linear time effect of all academic motivation components are visible. Additionally, differences between classes concerning the quadratic time effect of intrinsic value are found. Examination of differences between classes associated with the linear time effect on all academic motivation components reveal that, the 95% interval contains negative as well as (small) positive time effects for students' perceived self-efficacy and intrinsic value and only positive time effects for perceived test anxiety. Recalculating the interval limits for a period of 10 months, the interval ranges between -0.58 and 0.08 (self-efficacy), between -3.44 and 0.97 (intrinsic value), and between 0.33 and 0.43 (test anxiety).

3.3. Students' perceptions of teachers' instructional behavior and academic motivation

Results reveal several important links between students' perceptions of teachers' instructional behavior and their academic motivation (see Table 4). First, perceptions of all teachers' instructional behavior domains can explain some of the differences of students' perceived self-efficacy. About 19% of the total variance in students' perceived self-efficacy can be explained by differences in their perceptions of teachers' instructional behavior components.⁶ Perceptions of all teachers' instructional behavior components together explain approximately 68% of the variance at the class level, 39% of the variance at the student level, and 8% of the variance at the occasion (time) level. However, not all perceptions of instructional components have significant unique effects on perceived self-efficacy. Students' perceptions of teachers' clarity of instruction has significant unique effects and appears to be the most significant predictor of students' perceived self-efficacy. Students' perceptions of shared control, classroom management, loose control and strong control respectively seem to be important predictors too, but their effects are much smaller than the effect of teachers' clarity of instruction. Particularly, students' perceptions of teachers' strong control seems to have a negligible unique effect on their perceived self-efficacy. Moreover, the unique effect of perceptions of shared control on perceived self-efficacy is only significant at the $p < 0.10$. Differences between boys and girls in perceived self-efficacy are related to differences in their perceptions of teachers' instructional behavior.

Fig. 1. Growth change of teachers' instructional behavior over time (raw scores).

⁶ The calculation of the percentages of explained variance is based on the multilevel model with time as fixed effect. Clarity of instruction explains 18% of the variance, classroom management 5%, strong teacher control 5%, shared control 8%, and loose teacher control 4%.

Table 2

Results of multilevel models of the change of clarity of instruction, classroom management and control (strong, shared, loose) over time with effects of control variables.

Variable	Clarity (N = 1820)		Management (N = 1823)		Strong control (N = 1807)		Shared control (N = 1823)		Loose control (N = 1819)	
	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE
Fixed effect										
Intercept	4.1161*	0.1428	3.555*	0.1325	3.2070*	0.1799	3.0613*	0.1617	3.5134*	0.1351
Time	−0.0685*	0.0236	−0.0335*	0.0140	0.2294*	0.09733	0.2124*	0.0866	−0.0340*	0.0150
Time ²					−0.0556*	0.0197	−0.0451*	0.0165		
Time ³					0.0032*	0.0012	0.0026*	0.0001		
Subject taught	(ns)		0.2038*	0.1231	−0.0335	0.1189	(ns)		−0.2713*	0.1200
Class type	−0.2364*	0.1408	(ns)		−0.2481*	0.1308	(ns)		(ns)	
Teacher sex	(ns)		(ns)		(ns)		(ns)		0.0859	0.1296
Student sex	(ns)		−0.1181*	0.0552	(ns)		0.1454*	0.0730	(ns)	
Time × subject	(ns)				0.0390*	0.0167	(ns)		0.0448*	0.0125
Time × class type	(ns)		(ns)		(ns)		(ns)		(ns)	
Time × teach. sex	(ns)		(ns)		(ns)		(ns)		−0.0305*	0.0142
Time × stud. sex	(ns)		(ns)		(ns)		−0.0298*	0.0096	(ns)	
Random effect										
Level 3 variance (class)										
Intercept	0.0561	0.0256	0.0586	0.0233	0.0326	0.0218	0.0491	0.0347	0.0363	0.0222
Intercept × time	−0.0056	0.0036	−0.0016	0.0018	0.0015	0.0023	−0.0185	0.0148	−0.0005	0.0019
Time	0.0017	0.0007	0.0004	0.0002	0.0006	0.0004	0.0149	0.0080	0.0001	0.0002
Intercept × time ²							0.0012	0.0011		
Time × time ²							−0.0011	0.0006		
Time ²							0.0001	0.0001		
Level 2 variance (student)										
Intercept	0.3111	0.0452	0.1735	0.0278	0.4470	0.0671	0.3545	0.0479	0.3899	0.0632
Intercept × time	−0.0222	0.0056	−0.0119	0.0035	−0.0355	0.0083	−0.0271	0.0058	−0.0348	0.0082
Time	0.0036	0.0009	0.0018	0.0006	0.0043	0.0013	0.0030	0.0009	0.0047	0.0013
Level 1 variance (occasion) residual	0.3281	0.0166	0.2150	0.0109	0.4957	0.0253	0.3327	0.0170	0.4905	0.0248
Deviance	3929.35		3071.19		4482.82		3865.40		4433.82	

Note. (ns) = not significant. In building the models, we first built full models and retained the most parsimonious models. That is why the ns symbol is used. The italic values represent values that were significant in the absence of other variables, but became not significant after inclusion of other variables.

* $p < 0.10$.

* $p < 0.05$.

Girls perceive less favorable teachers' classroom management, more shared control, and a lower increase of shared control over time compared to boys.

Second, all perceptions of teachers' instructional behavior components are associated with differences in students' perceived intrinsic value. Perceptions of teachers' clarity of instruction appear to be the most important predictor of perceived intrinsic value. About 21% of the total variance in perceived intrinsic value can be explained by differences in perceptions of teachers' instructional behavior.⁷ All instructional behavior components together contribute to explain about 72% of the variance at the class level, 34% of the variance at the student level, and about 9% at the occasion (time) level. All instructional behavior components have significant unique effects on perceived intrinsic value, but the unique effect of strong teacher control is only significant at the $p < 0.10$. Students in homogeneous classes perceive better teachers' clarity of instruction and stronger teacher control than their peers in heterogeneous classes, whereas girls perceive a lower increase of shared control over time than boys.

Finally, not all perceptions of instructional behavior components seem to play a role in explaining differences in perceived test anxiety. When analyzed independently, students' perceptions of teachers' clarity of instruction and classroom management have negative effects on their perceived test anxiety. However, the effect of perceptions of teachers' classroom management seems to be a joint effect with that of clarity of instruction. About 4% of the total variance in perceived test anxiety can be explained by differences in perceptions of teachers' instructional

behavior.⁸ All instructional behavior components together explain 3% of the variance at the class level, 9% at the student level, and 2% at the occasion level. Additionally, students in heterogeneous classes perceive their teachers as having less clarity of instruction than their peers in homogeneous classes.

4. Discussion

The present study aims to supplement the body of knowledge by examining changes and links between students' perceptions of teachers' instructional behavior and academic motivation across the school year. As such, the study has extended the learning environment and the motivation research by linking them together. A new, sophisticated and highly promoted approach (in the effectiveness of teachers' behavior literature) was used: instructional behavior and academic motivation were studied within a longitudinal and multilevel design paying attention to changes over time and to differences between classes and students within classes. The study reveals several important findings and contributes to the existing knowledge base on the instability of teachers' instructional behavior and students' academic motivation over time.

Consistent with our first hypothesis, we found differences and changes in perceptions of teachers' instructional behavior between classes, between students within classes, and across the school year. The change in perceptions of teachers' clarity of instruction, classroom management and loose control over time followed a linear declining trend.

⁷ The calculation of the percentages of explained variance is based on the multilevel model with the time variables as fixed effects. Clarity explains about 18% of the variance, classroom management 7%, strong teacher control 8.5%, shared control about 12%, and loose teacher control about 5%.

⁸ The calculation of the percentages of explained variance is based on the multilevel model with time variables as fixed effects. Clarity of instruction explains about 4% of the total variance and all the other instructional behavior variables explain separately <0.5% of the total variance. In addition, clarity explains about 17% of the variance at class level, about 9% of the variance at student level and about 1% of the variance at occasion level.

Table 3

Results of multilevel models of the change of motivational components over time with effects of control variables.

Variable	Self-efficacy (N = 2341)		Intrinsic value (N = 2347)		Test anxiety (N = 2356)	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Fixed effect						
Intercept	4.0161*	0.0704	4.0617*	0.0961	1.7375*	0.0985
Time	−0.0227*	0.0137	−0.1154*	0.0398	0.4165*	0.0398
Time ²			0.0166*	0.0077	−0.0715*	0.0096
Time ³			−0.0010*	0.0005	0.0040*	0.0007
Subject taught	(ns)		0.0098	0.0963	(ns)	
Class type	(ns)		−0.2552*	0.0893	0.1670*	0.0923
Teacher sex	(ns)		(ns)		(ns)	
Stud. sex	−0.1043*	0.0524	−0.0223	0.0779	0.1292*	0.0653
Time × subject	(ns)		(ns)		(ns)	
Time × class type	(ns)		(ns)		−0.0371*	0.0160
Time × teach. sex	(ns)		(ns)		(ns)	
Time × stud. sex	(ns)		(ns)		−0.0217*	0.0107
Subject taught × stud. sex			0.1937*	0.1102		
Time × subject taught × stud. sex			−0.0128	0.0166		
Random effect						
Level 3 variance (class)						
Intercept	0.0046	0.0058	0.0151	0.0105	0.0133	0.0109
Intercept × time	0.0015	0.0008	−0.0012	0.0053	−0.0003	0.0014
Time	0.0003	0.0002	0.0117	0.0049	0.0004	0.0003
Intercept × time ²			0.0000	0.0005		
Time × time ²			−0.0010	0.0004		
Time ²			0.0001	0.0000		
Level 2 variance (student)						
Intercept	0.1783	0.0243	0.2442	0.0261	0.2825	0.0372
Intercept × time	−0.0069	0.0033	−0.0112	0.0032	−0.0107	0.0049
Time	0.0039	0.0007	0.0035	0.0006	0.0051	0.0010
Level 1 variance (occasion)	0.3705	0.0146	0.3126	0.0124	0.5554	0.0218
Residual						
Deviance	5199.47		4992.01		6156.63	

Note. (ns) = not significant. Models with the inclusion of interaction between subject taught and student gender as well as that of interaction between time, subject taught and student gender for self-efficacy and test anxiety were also investigated. However, the estimates of these interactions are not significant. In building the models, we first built full models and retained the most parsimonious models. That why the ns symbol is used. The italic values represent values that were significant in the absence of other variables, but became not significant after inclusion of other variables.

* $p < 0.10$.

* $p < 0.05$.

On the other hand, the change in perceptions of shared control and teachers' strong control over time was more complex: an increasing trend was evident during the first months, followed by a continuous decreasing trend throughout the rest of the school year. Our findings are in agreement with previous research indicating the deterioration of teachers' interpersonal relationships in (Dutch) classrooms (Mainhard et al., 2011; Maulana et al., 2011b; Opdenakker et al., 2012). Teachers' clarity of instruction, classroom management and teachers' control are important indicators of productive and conducive learning environments for students' academic motivation and learning. Therefore, the deteriorating trends in perceptions of these instructional behavior domains over time can be seen as an inconvenient truth about current (Dutch) learning environments. This may facilitate potential perils for students' development and learning outcomes. If students experience poor instructional behavior, their academic motivation will tend to be poor as well. In the long term, this may become one of the causes for negative experiences in secondary schooling period for many students.

Across the school year, we may expect that tasks (i.e., math and EFL materials) are becoming more complex and students may find it harder to understand. Skehan and Foster (2001) argued that teachers' instruction should be structured and made clear from the beginning to the end

Fig. 2. Growth change of motivational components over time (raw scores).**Table 4**

Results of multilevel models of the link between teachers' instructional behavior and students' motivational components, effects controlled for control variables.

Variable	Self-efficacy (N = 1731)		Intrinsic value (N = 1757)		Test anxiety (N = 1740)	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Fixed effect						
Intercept	2.1051	0.1452	2.1259	0.1703	3.1211	0.2319
Time	−0.0089	0.0068	−0.1405*	0.0790	−0.2030*	0.0987
Time ²			0.0245	0.0161	0.0452*	0.0203
Time ³			−0.0014	0.0009	−0.0025*	0.0012
Subject taught			0.0259	0.0797		
Class type			−0.0126	0.0626	−0.0066	0.1254
Stud. sex	−0.0662	0.0458	0.0259	0.0797	0.1815*	0.0941
Time × class type					−0.0142	0.0141
Time × stud. sex			−0.0126	0.0094	−0.0319*	0.0137
Subject taught × stud. sex			0.0968	0.0889		
Clarity of instruction	0.3290*	0.0319	0.2352*	0.0292	−0.2378*	0.0393
Classroom management	0.0663*	0.0334	0.0917*	0.0317	(ns)	
Strong control	(ns)		0.0411*	0.0237	(ns)	
Shared control	0.0533*	0.0319	0.0879*	0.0293	0.0667*	0.0396
Loose control	0.0548*	0.0239	0.0520*	0.0220	(ns)	
Random effect						
Level 3 variance (class)						
Intercept	0.0000	0.0000	0.0000	0.0000	0.0289	0.0153
Intercept × time	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Time	0.0003	0.0002	0.0033	0.0019	0.0000	0.0000
Intercept × time ²			0.0000	0.0000		
Time × time ²			−0.0003	0.0002		
Time ²			0.0000	0.0000		
Level 2 variance (student)						
Intercept	0.1286	0.0442	0.2292	0.0396	0.5908	0.0772
Intercept × time	−0.0029	0.0058	−0.0139	0.0050	−0.0496	0.0099
Time	0.0015	0.0010	0.0028	0.0008	0.0099	0.0016
Level 1 variance (occasion)	0.4218	0.0222	0.3083	0.0162	0.4975	0.0263
Residual						
Deviance	3877.82		3623.64		4641.67	

Note. (ns) = not significant. In building the models, we first built full models and retained the most parsimonious models. That why the ns symbol is used. The italic values represent values that were significant in the absence of other variables, but became not significant after inclusion of other variables.

* $p < 0.10$.

* $p < 0.05$.

in order to facilitate students in understanding the task material easier. This argument may provide a clue that the decreasing quality of teachers' instructional clarity is possibly related to the increasing level of task complexities students have to deal with over time. Previous research suggests that learning becomes more specific with regard to orientation and position as task difficulties increases (Ahissar & Hochstein, 1997). Consequently, it is important that teachers need to be mindful of instructional clarity and make attempts to adjust instructional clarity in accordance with changes in task complexity levels across the school year.

Furthermore, we found that students' perceived self-efficacy and intrinsic value decreases while their perceived test anxiety increases over time. However, changes in perceived self-efficacy followed a linear declining trend, while changes in perceived intrinsic value and test anxiety followed curvilinear trends. In general, these findings revealed the problematic situation of current students' perceived motivational beliefs that may hamper their healthy development and progress in learning, as recognized by self-determination theory (Maulana et al., 2013b, 2013a).

Consistent with our second hypothesis, we found important links between students' perceptions of teachers' instructional behavior and their perceived academic motivation over time. In general, perceptions of all teachers' instructional behavior domains play a powerful role for students' perceived academic motivation. Notably, students' perceptions of teachers' clarity of instruction appears to be the most important instructional behavior for all of their academic motivation components, accompanied by teachers' classroom management, teacher-student shared control, teachers' loose control and teachers' strong control respectively. The consistency with which perceptions of instructional clarity is related to all academic motivational outcomes suggests the most powerful finding of the present study. This finding builds on the perspective of the expectancy-value theory of motivation stressing the significant interplay between the learning environment and academic motivation (Rodgers & Beverly, 2005). Instructional clarity seems to function as an essential factor for motivating students academically. Poor instructional clarity creates confusion and unnecessary stress for many students and may hamper their self-efficacy. Eventually, academic outcomes are likely to be far from expected because it is difficult to learn if students do not understand teachers' instruction well (Włodkowski, 1999). Knowing that students' perceptions of instructional clarity have a powerful effect on their academic motivation, while their perceptions of the quality of teachers' instructional clarity and academic motivation tend to deteriorate over time, teachers together with school professionals should target interventions to promote teaching skills that maximize instructional clarity. Additionally, effective classroom management is another important aspect to be taken seriously as our study and also other research clearly indicates the significance of this teaching domain for students' academic motivation (Creemers, 1994; Sprick, 2006).

Surprisingly, all teachers' control domains show positive effects on students' perceived self-efficacy and intrinsic value. Hence, these findings contribute to the existing controversy between educational psychology researchers as to the form and the degree of control that teachers should display in the facilitation of students' learning and completion of tasks. Theoretically, teachers' strong control is highly promoted by a particular research tradition of teacher-centered instruction such as "Direct Instruction", while teacher-student shared control is closely associated with the perspective of social-oriented branches of constructivism. Teachers' loose control, on the other hand, is linked to a more radical-individualistic form of constructivism (Lamberigts & Bergen, 2000). Furthermore, the results suggest superior importance of teacher-student shared and teachers' loose control for students' academic motivation. These findings are consistent with the self-determination theory emphasizing the importance of two complementary aspects of instructional approach (structure and autonomy support) for students' academic motivation and engagement

(e.g., Jang, Reeve, & Deci, 2010; Skinner & Belmont, 1993). However, teachers' strong control has an effect on intrinsic value as well (although the effect is only significant at $p < 0.10$). Nevertheless, one may expect that several variables like the type of learner and task history could partially illuminate whether strong control contributes less to academic motivation than other forms of control. That is, if we take into account the type of the learner and task history we probably could find out why some forms of control contribute more and others contribute less to academic motivation. Future research would benefit more from including the type of learner and task history in the investigation of control forms and motivation. Additionally, teachers' clarity of instruction seems to be a protective factor for students test anxiety. Teachers' classroom management seems to play a role in students' test anxiety as well, but its effect only appears jointly with teachers' clarity of instruction.

4.1. Limitations of the study

This study was subject to some limitations. Although the number of students included in the analyses is large enough, the number of classes is rather limited. Hence, caution should be taken into account when interpreting the results of this study until replications of similar studies are available. Additionally, the student informant is the only source we have about the classroom context. Future research should incorporate another source of data such as classroom observation⁹ and teacher reports to enrich our understanding of the complex nature of classroom environments (triangulation). Nevertheless, our findings are in line with the research of Maulana et al. (2013b, 2013a) regarding longitudinal changes and links between teachers' involvement and academic motivation from classroom observation point of view. Furthermore, a few concepts of instructional behavior were operationalized with a rather small amount of items (<4 items), which could have underestimated the power to detect effects of the particular concept. However, our findings are in line with results presented in the literature and correspond with results of a study of Opdenakker and Minnaert (2011) on a much larger sample in the final grade of primary education. For future research, including other subjects, other source of informants (e.g., teachers, principals, school inspectors), other classes (primary education, higher grades in secondary education, lower tracks), larger samples, other countries, and in a reciprocal relationship perspective is called for.

4.2. Conclusions

Overall, the study gives evidence for the importance of learning environment characteristics like teachers' clarity of instruction and classroom management, conditions often mentioned in the teachers' support literature as effectiveness enhancing factors for students' cognitive and affective outcomes. The study also indicates the importance of teaching practices related to teacher-student shared and teachers' loose control. These are learning environment conditions which are in agreement with a constructivist view on learning and are also mentioned in theories on motivation such as the self-determination theory as academically-motivated enhancing factors. This finding of receiving evidence for the effectiveness of characteristics of traditional teaching models as well as for the effectiveness of more constructivist ones in relation to academic motivational outcomes of students is consistent with the work of Opdenakker and Minnaert (2011) and a review study of Scheerens (2007). As such, the outcomes of the study add to the knowledge base of the importance of teachers' support related to non-

⁹ We also conducted an observation study on instructional-related behavior of teachers and the results were in agreement with the present study, which supports the validity of student perceptions. In addition, this finding is also consistent with the research of Maulana, Opdenakker, Stroet and Bosker (2012) that teacher behaviors (as observed by observers) tend to decrease over time.

cognitive outcomes and offers cues to enhance the effectiveness of teachers' behavior that should be a priority for schools.

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Appendix A. Correlations among the five QIB subscales and motivational outcomes subscales

	1	2	3	4	5	6	7
1. Clarity of instruction	–						
2. Classroom management	0.45**	–					
3. Strong control	0.53**	0.30**	–				
4. Shared control	0.55*	0.31**	0.57**	–			
5. Loose control	0.37**	0.05*	0.30**	0.37*	–		
6. Self-efficacy	0.44**	0.25**	0.25**	0.28**	0.21**	–	
7. Intrinsic value	0.45**	0.30**	0.30**	0.35**	0.23**	0.60**	–
8. Test-anxiety	-0.20**	-0.06*	0.08**	-0.07**	-0.06*	-0.27**	-0.17**

* $p < 0.05$.

** $p < 0.01$ (2-tailed).

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