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Differences in students' school motivation: A latent class modelling approach

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Abstract In this study, we investigated the school motivation of 7,257 9th grade students in 80 secondary schools across the Netherlands. Using a multiple goal perspective, four motivation dimensions were included: performance, mastery, extrinsic, and social motivation. Our first aim was to identify distinct motivation profiles within our sample, using the four motivation dimensions in a latent class analysis. Our second aim was to investigate the relationships between students' school motivation profiles and several educational outcomes (school commitment, academic self-efficacy, and academic achievement). The 6-cluster solution model best fitted the data. We found two clusters of students with consistent response patterns across all four motivation scales (well above and well below the average scores, respectively), two clusters of which one showed relatively high scores on mastery and social motivation and the other on performance and extrinsic motivation, and two clusters with extremely low scores on performance motivation and to a lesser extent on extrinsic motivation. The results revealed notable differences in school commitment and academic self-efficacy across the six clusters, but not with regard to academic achievement.

Keywords School motivation · Achievement goal theory · Multiple goal perspective · Secondary education · Latent class modelling

1 Introduction

Numerous publications have demonstrated the importance of student motivation for educational outcomes. School motivation has proven to be a prominent predictor of

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outcomes such as school grades (see Brophy 2004; Schunk et al. 2008 for recent reviews). Students largely differ in their motivation for school, both in terms of quantity and orientation. Whereas some students are focussed on obtaining high grades, others are primarily aimed at mastering the content of a particular task. Which orientation induces the most favourable educational outcomes remains a key question in an on-going debate, one which has been widely assessed in educational research. In the present paper, we have attempted to enhance the understanding of the individual differences in secondary school students' school motivation and their relationships with various educational outcomes. We study motivation in terms of students' goal orientations. The study builds on the multiple goal perspective, that is, the idea that in learning situations students pursue several goals instead of just one (Elliot and McGregor 2001), and that students differ in their goal orientation.¹ The well-established achievement goal framework of Elliot and McGregor (2001) typically concentrates on mastery and performance goal orientations. In the present paper, we followed the recommendations of Maehr (1984) and McInerney and Ali (2006) by adding both social and extrinsic goal orientations to the framework (for further details see the theoretical framework).

Our first aim was to identify distinct motivation profiles among a large sample of secondary school pupils in the Netherlands. For this purpose, latent class analysis was used to categorize the students into meaningful clusters on the basis of the four motivation dimensions (mastery, performance, social, and extrinsic goal orientation). Furthermore, to contribute to the current body of knowledge concerning this topic, our second aim was to examine the relationships between students' motivation profiles and several relevant educational outcomes (e.g. Huang 2012). Hence, the major contribution of the current study to the field of motivation-related research is twofold. Firstly, it elaborates on the idea that students can have multiple goal orientations when they enter the classroom by the inclusion of extrinsic and social goal orientations in the achievement goal framework and it empirically evaluates the existence of these multiple goal orientations. Secondly, and this is particularly relevant for educational practice, the current study investigates whether these different motivation profiles (if we find evidence for their existence) 'matter' as regards their relation with important educational outcomes such as academic achievement. When strong relations are found between particular motivation profiles and these educational outcomes, these goal orientations could be stimulated and endorsed by teachers in their classrooms.

1.1 The achievement goal theory of motivation

An important theoretical framework to study individual differences in students' school motivation is the achievement goal theory of motivation (e.g. Elliot and McGregor 2001). According to this theory, directly influenced by students' goal orientations, students pursue different goals in learning situations. Goal orientation is sug-

¹ Many researchers use the term 'goals' instead of 'goal orientations', whereas their operationalization of the construct is, in our view, more in line with the broader notion of goal orientations rather than striving for particular achievement goals. We therefore chose to use the term 'goal orientations' throughout the manuscript whenever this broader notion is measured. The differences between the two terms will be outlined further in the theoretical framework.

gested to influence one's interpretations of and reactions to achievement-oriented stimuli (Dweck 1986), two highly relevant issues in classroom learning situations. The research originally concentrated on two types of orientations, usually referred to as mastery orientation (or learning or task orientation) and performance orientation (or ego orientation; Elliot and McGregor 2001). Mastery-oriented students attempt to understand the topic at hand, gain knowledge, and improve their skills, whereas performance-oriented students are particularly focussed on outperforming others. Central to a mastery goal orientation is the belief that effort leads to success (Elliot and McGregor 2001; see also Lee et al. 2010). Rather than increasing one's individual knowledge and understanding as a primary objective, a performance goal orientation is, on the other hand, more oriented towards others. Performance goal orientation is related to social comparison (Festinger 1954). It is used as a benchmark by people to evaluate themselves relative to their peers. Here the core aim is to perform better than the other; one's own ability is referenced against the performance of other people (Elliot and McGregor 2001). These differences between mastery goal orientation and performance goal orientation are equal to the differences between mastery and performance goals. That is, mastery goals are focussed on absolute or intrapersonal competence, whereas performance goals are directed at normative competence (Elliot and Thrash 2001, p. 145). Both mastery and performance goal orientations have been found to be positively related to educational outcomes (Coutinho and Neuman 2008; Elliot and Murayama 2008; Giota 2002; Gonida et al. 2009; Harackiewicz et al. 2002; Hulleman et al. 2010; Linnenbrink-Garcia et al. 2008; McInerney 2008; Pajares et al. 2000; Pintrich 2000).

Generally, mastery goal orientation, thus striving towards mastery goals, predicts students' continued interest and engagement in their academic tasks (e.g. Elliot and Murayama 2008; Gonida et al. 2009; McInerney 2008) and their self-efficacy beliefs (e.g. Coutinho and Neuman 2008; Pajares et al. 2000), whereas performance goal orientation, thus striving towards performance goals, generally forecasts school performance, such as grades (e.g. Elliot and Murayama 2008; Giota 2002; Pintrich 2000). However, based on their review study, Linnenbrink-Garcia et al. (2008) stress that, although both mastery and performance approach (Pap) goals to some extent relate to different educational outcomes, potential moderators such as task difficulty, perceived competence, and ability level should be taken into consideration when studying these relations. Furthermore, based on a meta-analysis of 84 studies which measured both goal orientations, Huang (2012) found average correlations of .13 between mastery goal orientation and academic achievement, and correlations of $-.00$ between performance goal orientation and academic achievement. Hulleman et al. (2010) noted that achievement goal researchers sometimes use the same label for conceptually different constructs, which presumably explains these mixed findings for the relation between performance goal orientation and academic achievement. Whereas some scholars measure performance orientation in terms of the desire to outperforming others (a normative performance goal), other scholars define it as the desire to demonstrate competence (an appearance performance goal; see also Senko et al. 2011).

In addition to the distinction between performance and mastery goal orientations, motivation research also makes a separation between approach and avoidance tendencies in this context, resulting in a 2×2 theoretical framework of Pap, performance

avoidance (Pav), mastery approach (Map), and mastery avoidance (Mav). An achievement goal orientation may be focussed on attaining a positive, desirable possibility (an approach goal) or on avoiding a negative, undesirable possibility (an avoidance goal) (Elliot and Thrash 2001, p. 145). Pap-oriented individuals approach achievement-oriented contexts with the superordinate objective of presenting their ability, whereas the main purpose of Pav-oriented individuals is to avoid demonstrating incompetence (both defined in terms of appearance performance goals). The Map orientation refers to those who approach achievement-oriented contexts with the aim of developing task competence. The Mav orientation is particularly aimed at not falling short of the task mastery required and/or retaining one's skills, abilities, or knowledge (Elliot and Thrash 2001). For an extensive explanation of these four dimensions we refer to the studies of Elliot (1999), Elliot and McGregor (2001), Elliot and Murayama (2008), Elliot and Thrash (2001), and Pintrich (2000). Huang (2012) studied the relations between both the two-factor model and the four-factor model and academic achievement. His meta-analysis revealed that the two approach goal orientations are associated with higher academic achievement and the two avoidance goal orientations with lower academic achievement (based on 19 studies). It seems, therefore, that the relationship between performance goal orientation and academic achievement is highly dependent on how the first is measured (see also Hulleman et al. 2010).

1.2 The multiple goal perspective

Based on the 2×2 multidimensional achievement goal framework, several studies have demonstrated that students are usually neither completely performance-nor totally mastery-oriented, but that their focus in terms of the achievement goal orientations is actually mixed (e.g. Barron and Harackiewicz 2001; Button et al. 1996; Dweck 1986; Elliot and Thrash 2001; Fortunato and Goldblatt 2006; Giota 2010; Van Yperen 2006). In this respect it should be noted, however, that there is some debate about the distinction between the approach and the avoidance goal orientations in the four-factor structure of the achievement goal orientations. There are moderate correlations between the two-factor structure approach goal orientations (Pap and Map) ($r = .22$). Furthermore, in the four-factor structure (the 2×2 framework), moderate correlations (between .19 and .36) are found among all combinations of the goal orientations, except for the combination of Map and Pav orientation (Huang 2012). Linnenbrink-Garcia et al. (2012) emphasize that building theory that encompasses the interrelation of motivational goals is necessary to move away from a view of distinct goals operating independently, for example, by applying a person-centred approach (e.g. latent class analysis) rather than a variable-centred approach. Moreover, instead of using the four-dimensional structure, several scholars have opted for a trichotomous framework, consisting of learning goal orientations (i.e. mastery orientation), Pap goal orientations, and Pav goal orientations (e.g. Chan and Lai 2006; Elliot 1999; Elliot and Harackiewicz 1996; Fortunato and Goldblatt 2006; Fryer and Elliot 2007; Tapola and Niemivirta 2008), presumably because these objectives are considered to be the most prevalent types in most achievement settings (e.g. Elliot and Thrash 2001). Furthermore, Van Yperen (2006) reports that, although in his study diverse goal orientation profiles

could be specified, 85 % of his sample (college freshmen in a psychology course) had a dominant achievement goal orientation.

All in all, the multiple goal perspective has been increasingly recognized in motivation research, following the notion that in learning situations students adopt several goals in learning situations. This perspective states that endorsing more than one goal orientation maximizes an individual's motivation (Pastor et al. 2007). In the past decade, cluster analytic procedures have been used for identifying different achievement goal orientation profiles in the three- or four-dimensional achievement goal frameworks (e.g. Fortunato and Goldblatt 2006; Levy-Tossman et al. 2007; Meece and Holt 1993; Pastor et al. 2007; Tapola and Niemivirta 2008; Tuominen-Soini et al. 2011). In these studies, a person-oriented approach is used to identify distinct motivation profiles among a particular student sample. The advantage of using a person-oriented approach (e.g. latent class analysis) is that it focusses on the individual and his/her pattern of characteristics relevant to the issue under consideration (Bergman and Magnusson 1997, p. 293). The objective of performing latent class analysis on a set of variables, in this case three or four goal orientations, is to find an array of latent classes that represent the response patterns in the data (Collins and Lanza 2010). Several distinct motivation profiles have been found in the stated studies. For example, Tuominen-Soini et al. (2011) found a distinct group that had high scores on both approach goals and low scores on both avoidance goals. When a variable-oriented approach (e.g. analysis of variance, regression analysis) had been used in these studies, the different response patterns could not have been identified.

Although the relations between goal orientations and educational outcomes have been studied frequently using a variable-oriented approach, the relations between students' motivation profiles and educational outcomes have not received much attention in educational studies. That is, few studies applied a person-oriented approach to identify students' motivation profiles and then continued by using a variable-oriented approach to analyse the relation between the motivation profiles and educational outcomes. The results of two of these studies were mixed. Whereas the study of Barron and Harackiewicz (2001) suggests that students who pursue both mastery and performance approach goals are the most likely to attain success in education (an additive effect), the study of Meece and Holt (1993) reports that students who exhibit a pattern of high scores on both mastery and performance goals do not perform as well academically as students who only score high on mastery goals. Based on these findings, it remains unclear which motivation profile consistently correlates with favourable educational outcomes and which profile consistently associates with unfavourable outcomes such as underperformance.

1.3 The inclusion of extrinsic and social goal orientations in the achievement goal framework

In studying students' school motivation, McInerney and Ali (2006) proposed to include extrinsic and social goals when studying students' school motivation, an idea based on Maehr's theory of Personal Investment (Maehr 1984). Maehr (1984) suggests that there are four kinds of achievement goals (these are all approach goals): task goals

(‘mastery’), ego goals (‘performance’), social solidarity goals and extrinsic rewards. An extrinsic goal orientation is generally referred to as an individual’s desire for external rewards, such as praise, which functions as an incentive to continue one’s work or task (Ryan and Deci 2000). Although the positive effects of rewards (e.g. tokens) and praise have been recognized (that is, they are frequently being used by teachers), some studies have indicated that an extrinsic goal orientation is maladaptive and leads to lower cognitive outcomes (e.g. Wolters et al. 1996). Furthermore, it has been suggested that extrinsic motivation decreases students’ intrinsic motivation to learn under certain circumstances (Deci and Koestner 1999, 2001) and that it promotes surface learning (e.g. Liem et al. 2008). Nonetheless, similar to the mastery and performance goal orientations, the extrinsic goal orientation is considered to have an influence on students’ behaviour at school. Increasing attention is given to extrinsic goals in the literature, although the constructs received different labels. For example, Grant and Dweck (2003) included non-normative outcome goals (similar to extrinsic goals) next to normative (performance) goals. Although McInerney and Ali (2006; see also Ali and McInerney 2004) acknowledge that extrinsic goal orientations (or as they state ‘extrinsic goals’) can be explained as performance goal orientations (they both draw attention to one’s achievement publicly), there are differences between the two. Whereas extrinsic goal orientation is focussed on the desire to obtain praise and rewards (e.g. from the teacher), performance goal orientation is explicitly oriented towards the desire to compare one’s performance with that of others (social comparison with other students; see also Grant and Dweck (2003) on the distinction between normative and non-normative achievement goals).

As mentioned, it was suggested to include social goal orientations when studying students’ school motivation (see also Urdan and Maehr 1995). Urdan and Maehr (1995) have defined these goal orientations (or as they state ‘social goals’) as the perceived social purposes for academic achievement. In a similar vein, McInerney and Ali (2006) refer to social goals as social-grounded reasons for studying (see also King and McInerney 2012) in the sense of solidarity, resulting from social affiliation and social concern. Like academic goals, social goals can direct students’ learning behaviour in the classroom, for example, to achieve for the sake of the group (Covington 2000). In recent years, increasing attention has been paid to the relevance of social goal orientations (or ‘social goals’) in education next to academic goal orientations (or ‘academic goals’) (Covington 2000; Horst et al. 2007; King and McInerney 2012; King et al. 2010; McInerney 2008; Patrick and Hicks 1997; Ryan and Shim 2008; Wentzel 1996, 1998, 2000). Some researchers, however, stress that in most of these studies, these social goal orientations (or ‘social goals’) are, in fact, measured as goals rather than achievement goals, thus not related to competence (e.g. Zusho and Clayton 2011). Moreover, the relation between social goal orientation and academic achievement has remained unclear, which is partly due to the fact that researchers use different definitions of social goal orientations and social goals (for an overview see King and McInerney 2012). Generally, however, studies have shown a positive relationship between social goal orientation and educational outcomes. Furthermore, it has been suggested that the endorsement of social goals in the classroom is positively related to students’ self-efficacy beliefs (Patrick and Hicks 1997).

So far, the understanding of how social goal orientation relates to performance and mastery goal orientations among secondary school students has been limited. A person-oriented approach (e.g. a cluster analytic procedure) has not been applied to this broader framework that includes social goal orientations, whereas [King et al. \(2010\)](#) report that students' deep learning strategies are predicted by both mastery goals and social goals (measured as goal orientations). They also found that the pursuit of both goals is related to increased efforts in schoolwork. This result suggests that mastery and social goal orientations are somehow related in learning situations. Similarly, [Wentzel \(1996\)](#) reports that in middle school a social goal orientation is positively related to a focus on learning (a mastery goal orientation) and not to a performance goal orientation (see also [Wentzel 1998](#)). In the present paper, we contribute to the current body of knowledge by using a person-oriented approach; a method of coherently studying mastery, performance, social, and extrinsic goal orientations and the relations among them. By applying a cluster analytic procedure, we attempt to identify distinct motivation profiles within a large sample of secondary school pupils and relate these profiles to several educational outcomes (for further details, see paragraph 1.4). By elaborating on the multiple goal perspective, our results may better clarify the importance of social and extrinsic goal orientations in relation with mastery and performance goal orientations and shed more light on the connections between the four goal orientations and important educational outcomes, such as academic achievement, academic self-efficacy, and school engagement. We should note here that, in the literature, a distinction between approach and avoidance goal orientations regarding social and extrinsic goals has not been explored yet, neither in theory nor in empirical studies (see the discussion section for an elaboration about this issue). Moreover, Maehr's theoretical framework including the four motivation types only includes approach goals and no avoidance goals. Therefore, in this paper, our focus is on the four approach tendencies of mastery, performance, social, and extrinsic motivation.

1.4 Aims of the present study

Following the multiple goal perspective, this paper addressed the multiple goal orientations of students in secondary education in the Netherlands. Our first aim was to identify distinct motivation profiles within our sample of 9th grade secondary school pupils. For this purpose, latent class analysis was performed to categorize the students into meaningful clusters based on the four motivation dimensions (mastery, performance, social, and extrinsic). To our knowledge, cluster analytic procedures have never been applied to the framework of [McInerney and Ali \(2006\)](#), in which extrinsic as well as social goal orientations are incorporated. We expected the inclusion of these goal orientations to provide a more precise representation of the complexity of students' multiple goal orientations at school. The present study therefore offers both a theoretical and an empirical contribution to the achievement goal orientation literature.

Our second aim was to examine the relationships between students' motivation profiles and several relevant educational outcomes (see also [Huang 2012](#)). We elaborated on these relationships by examining these outcomes among students with different

motivation profiles. This comparison was assumed to reveal which combinations of goal orientations produce the more favourable educational outcomes. Based on the relationships already established in the literature between achievement goal orientations and educational outcomes, we included four relevant outcomes at the student level as available from the database: school commitment (i.e. students' emotional engagement with the school in general; see e.g. [Martin and Dowson \(2009\)](#) and [Wormington et al. \(2011\)](#) on the interrelations between motivation and engagement in school settings), academic self-efficacy (e.g. [Patrick and Hicks 1997](#)), and students' scores on two achievement tests (see paragraph 2.2 for further details about these measures; e.g. [Huang 2012](#)). The results are analysed separately for the different educational tracks that students pursue in Dutch secondary education, namely preparatory secondary vocational education, senior general secondary education, or pre-university education. Thus, we additionally investigated whether the relationships between the clusters and the educational outcomes differed for students in the lower and higher educational tracks. In sum, we applied a person-oriented approach to identify students' motivation profiles and then continued by using a variable-oriented approach to analyse the relation between the motivation profiles and several educational outcomes. The present study is exploratory in nature. We did not know beforehand how many clusters would constitute the best cluster solution. Consequently, we were unable to specify *a priori* hypotheses regarding the number of clusters. Moreover, it was unknown which motivational patterns would evolve. Some general notions are in place here. Based on the current literature on moderate correlations between mastery and performance orientation, we expected that at least one cluster would consist of students with moderate to high scores on both mastery and performance orientation (see also [Fortunato and Goldblatt 2006](#)). These students would be motivated towards obtaining relevant skills as well as performing well in relation to others. Furthermore, we expected to find at least one cluster which combined relatively high scores on both mastery and social goal orientation and relatively low scores on performance goal orientation (see [Wentzel 1996](#)). We could, however, not formulate theoretically grounded hypotheses about the inclusion of extrinsic and social goal orientations in the multiple goal framework. With regard to the relationship between students' motivational profiles and the educational outcomes, we expected that "unfavourable" clusters regarding students' school motivation (e.g. low scores on performance and mastery goal orientation) would associate with less favourable educational outcomes than the clusters with relatively high scores on at least one of the motivation dimensions (see e.g. [Huang 2012](#)). In a similar vein, we expected that a cluster of students with high scores on all motivation dimensions would associate with the most favourable scores on academic achievement (an additive effect, see [Barron and Harackiewicz 2001](#)).

2 Method

2.1 Participants

The data used were collected as part of a large-scale longitudinal study in primary and secondary education in the Netherlands, the so-called COOL⁵⁻¹⁸ project. In

COOL^{5–18} a representative sample of students is being followed in their educational careers from age 5 to age 18 throughout a full-time education trajectory (Zijsling et al. 2009). In the present study, a sample of 7,257 9th grade students was used (average age: 16 years old). The data collection in the 9th grade was the first moment in secondary education at which students' school motivation was assessed. The students were selected from a response group of 8,884 who had participated in the overall data collection, based on the availability of data on school motivation obtained from the student questionnaire (this was the case for 82 % of the students approached). The students followed one of the three basic educational tracks in secondary education. In the Netherlands, at age 12 or 13, students enter one of these tracks based on their previous achievements and the primary school teacher's recommendation. The lowest track is the preparatory secondary vocational education programme (track C, duration 4 years), which prepares students for senior secondary vocational education. This track is further divided into four sublevels. For ease of interpretation, we chose to label the two lower levels track C 'low' and the two upper levels track C 'high'. The senior general secondary education track (track B, duration 5 years) prepares students for higher professional education. The highest track, pre-university education (track A, duration 6 years) prepares students for university. Thus, both tracks A and B prepare for higher education. Our sample of 7,257 students consisted of 1,381 track C 'low' students (19.0 %) and 1,843 track C 'high' students (25.4 %), 1,827 track B students (25.2 %), 1,793 track A students (24.7 %), and 413 students (5.7 %) for which this information was missing. The students attended 80 different secondary schools throughout the Netherlands. The sample fairly represented all 9th grade students in Dutch secondary education, although the senior general secondary education track was overrepresented as compared to the overall student population in the Netherlands (25 vs. 22 %). The sample consisted of 3,587 boys (49.4 %) and 3,652 girls (50.3 %). This information was unavailable for 18 students (0.2 %). Information about ethnic background was available for 71 % of the overall student sample. Within this group, 7.7 % of the students (396 of the 5,132 students) belonged to a non-Western ethnic minority group (e.g. from Turkey or Morocco). In sum, within our sample of 7,257 students, for 6,265 of them (86 %) the required information was complete (i.e. measures of school commitment, academic self-efficacy, and school achievement).

2.2 Variables and instruments

In 2008, the schools involved in COOL^{5–18} administered a self-report questionnaire, which measured - among others—the variables used in this paper, and two school achievement tests.

School motivation. To measure school motivation, we used a Dutch version of the Inventory of School Motivation (ISM) of McInerney and Ali (2006). The ISM is commonly used in cross-cultural research and has strong psychometric properties (see e.g. McInerney and Ali 2006; McInerney et al. 2003, 2005). The questionnaire used here consisted of 32² translated items (see Ali and McInerney 2004 for this subset of items)

² Originally, 33 items were used, but the translation of one item was ambiguous, thus this item was excluded from the analyses.

on a 5-point Likert scale, ranging from 1 (*strongly disagree* [in Dutch: *klopt helemaal niet*]) to 5 (*strongly agree* [in Dutch: *klopt precies*]). In an earlier stage, confirmatory factor analysis was performed to reproduce the four scales suggested by the literature (Zijlsing et al. 2009). The four scales represent the four approach goal orientations (see previous explanation of the difference between an approach and avoidance goal orientation), referred to as mastery motivation, performance motivation, social motivation, and extrinsic motivation. The internal consistency reliabilities (Cronbach's alpha) for the subscales are: mastery motivation (9 items, $\alpha = .77$), performance motivation (7 items, $\alpha = .84$), social motivation (7 items, $\alpha = .74$), and extrinsic motivation (9 items, $\alpha = .86$). Each of these scales (second order factors) consisted of two subscales (first order factors). The second order factor Mastery contained the first order factors *task* (e.g. "I like to see that I am improving in my schoolwork") and *effort* (e.g. "When I am improving in my schoolwork I try even harder"). The factor Performance included the first order factors *competition* (e.g. "I work harder if I'm trying to be better than others") and *social power* (e.g. "I often try to be the leader of a group"), which are both meant to measure normative performance goal orientations. Furthermore, the second order factor Social consisted of *social concern* (e.g. "It is very important for students to help each other at school") and *affiliation* (e.g. "I prefer to work with other people at school rather than alone"), both focussing on social solidarity tendencies and social-grounded reasons for studying. Finally, the second order factor Extrinsic consisted of *praise* (e.g. "At school I work best when I am praised") and *token* (e.g. "I work hard in class for rewards from the teacher").

School commitment. Students' commitment to school was measured by using an adapted version of the Utrecht-Groningen Identity Development Scale (U-GIDS; Crocetti et al. 2008). This instrument comprises three subscales, including commitment (5 items), in-depth exploration (5 items), and reconsideration of commitment (3 items). Combined, these subscales give an indication of students' commitment to a specific domain (in this paper the school in general). The construct largely overlaps with the construct emotional engagement ("a sense of school belonging") as defined by Fredricks et al. (2004), which is more commonly used in educational psychology literature. Sample items are: "*My school gives me certainty in life*" (commitment), "*I think a lot about my school*" (in-depth exploration), and "*I often think it would be better to try to find a different school*" (reconsideration of commitment; the item scores of this scale were reversed), with answer categories ranging from 1 (*strongly disagree* [in Dutch: *klopt helemaal niet*]) to 5 (*strongly agree* [in Dutch: *klopt precies*]). In our sample, the reliability of the overall school commitment scale was .80. It was available for 7,157 of the 7,257 students (99%).

Academic self-efficacy. To assess students' academic self-efficacy, we used an adapted version of the self-efficacy scale as defined by Midgley et al. (2000). This 6-item scale refers to the students' perceptions of their competence in doing their class work. The answer categories ranged from 1 (*strongly disagree* [in Dutch: *klopt helemaal niet*]) to 5 (*strongly agree* [in Dutch: *klopt precies*]). Sample items were: "*I am certain I can master the skills taught in class this year*", "*I can do almost all the work in class if I don't give up*" and "*Even if the work is hard, I can learn it*". In our overall student sample the reliability of the scale was .82. This measure was available for 7,227 students (>99%).

School achievement. Two standardized achievement tests were used to assess the students' achievements in reading comprehension and mathematics. The reading comprehension test consisted of several short texts about which the students had to answer a number of multiple choice questions, each with four answer categories. For COOL^{5–18} three versions of the test had been developed, two for track C students (one for the lowest two levels and one for the highest two levels within this track) and one for track A and B students. To design the three different tests an item test bank of 46 questions was used. Each test consisted of 11 anchored items and a subsequent number of items developed for the separate educational levels (respectively 10, 12 and 13 items). Using OPLM, the students' scores were placed on one scale, regardless of the educational track they were in and regardless of the test version. These scores represent the percentage of items within the overall item test bank which a student was expected to answer correctly (varying from 0 to 100 %). These percentage scores were used in the present paper. The advantage of using this procedure is that the students' performance scores can easily be compared across different test versions. The reliability of the overall reading comprehension test was .92 while test scores were available for 6,701 students (92 %). The mathematics test was constructed in a similar fashion as the reading comprehension test, based on an item bank of 50 multiple choice questions. Three different versions with 11 anchored items and respectively 18, 19 and 19 items for separate educational levels were used to construct the three tests. Again, OPLM was used to place students' scores on one latent performance scale. The reliability of the overall mathematics test was .94. Test scores were available for 6,681 students (92 %). Both test scores (reading comprehension and mathematics) were available for 6,384 students (88 % of the overall sample of 7,257 students). For 614 students, only one of the two test scores was available (8 %), and for 259 students both test scores were unavailable (4 %).

Table 1 Descriptive statistics of the variables (mean scores, standard deviations between brackets), as indicated separately for the educational tracks and the overall student sample

	Track C low ^a	Track C high ^a	Track B ^a	Track A ^a	Total
Mastery motivation ^b	3.25	3.26	3.30	3.38	3.30 (0.59)
Performance motivation ^b	1.93	1.93	2.02	2.12	2.00 (0.77)
Social motivation ^b	3.05	3.13	3.17	3.23	3.15 (0.66)
Extrinsic motivation ^b	2.63	2.65	2.69	2.64	2.65 (0.78)
School commitment ^b	3.10	3.12	3.15	3.28	3.16 (0.50)
Academic self-efficacy ^b	3.49	3.53	3.43	3.56	3.50 (0.62)
Reading comprehension ^c	48.9	64.8	66.7	79.3	65.6 (18.8)
Mathematics ^c	46.9	60.8	71.5	82.2	66.1 (18.0)

^a Track C refers to preparatory secondary vocational education ('low' indicates the lower two levels, 'high' indicates the upper two levels), Track B to senior general secondary education and Track A to pre-university education

^b The scales run from 1 to 5

^c The scores theoretically run from 0 to 100 %

3 Results

3.1 Descriptive results

Table 1 presents the descriptive statistics for all variables included, for both the different educational tracks separately and the student sample as a whole. The mean scores are shown for the four motivation subscales, school commitment, academic self-efficacy, and the test results for reading comprehension and mathematics.

The final column of Table 1 shows that, on average, the students scored the highest on mastery motivation (3.3 on a 5-point scale), followed by social motivation (3.1), and extrinsic motivation (2.7). The lowest score was found for performance motivation (2.0). This pattern was consistent across all educational tracks. Within all tracks, paired-samples *t* tests for all possible pairs of motivation subscales yielded significant results ($p < .001$ ³) for each pair⁴, indicating that the differences between the scale means were significant. Also, one-way analyses of variance showed that the differences between the tracks were in many cases significant ($p < .001$), except for the extrinsic motivation subscale. We found that track A students had significantly higher scores on the mastery and performance subscales compared to all other tracks. Moreover, their score on social motivation was significantly higher than that of track C low and track C high students. Further, track B students' score on performance motivation was higher than track C low students' scores on this subscale.

The mean scores for school commitment and academic self-efficacy were both above the scale midpoint. One-way analyses of variance revealed significant differences in school commitment between track A students and all other students with track A students having the highest mean score ($p < .001$). The results of Table 1 indicate that the higher one's educational track, the higher one's school commitment. For self-efficacy, we found that track B students had, on average, the lowest scores compared with track C high students and track A students ($p < .001$). Generally, however, when comparing the different tracks, it appears that the differences in motivation, commitment and self-efficacy were rather small. Finally, the results show that, based on the entire student sample across all educational tracks, the scores on reading comprehension and mathematics indicate that a student is expected to answer on average 66 % of the items of both tests correctly (see paragraph 2.2 for an elaboration on the scores used here). Consistent with the system of the educational tracks, the achievement scores increase from track C (the lowest educational level) via track B to Track A (the highest educational level). The differences between the tracks are all significant ($p < .001$) except the difference in reading comprehension between track C high students and track B students ($p = .001$).

Table 2 presents the correlation coefficients among the variables in the overall student sample. In accordance with the literature, we found a moderate correlation

³ In the analyses throughout the manuscript Bonferroni corrections were applied to the alpha level of .001 based on the number of computed tests.

⁴ Technically, means of different scales cannot be compared, as the scales are different (i.e., the metric is arbitrary). Nevertheless, we decided to report paired-samples *t* test results for ease of interpretation of the differences between the average scale scores.

Table 2 Zero-order correlation coefficients among the variables

	1	2	3	4	5	6	7	8
1. Mastery motivation	1							
2. Performance motivation	.36*	1						
3. Social motivation	.47*	.14*	1					
4. Extrinsic motivation	.52*	.56*	.35*	1				
5. School commitment	.40*	.17*	.32*	.23*	1			
6. Academic self-efficacy	.35*	.28*	.16*	.18*	.28*	1		
7. Reading comprehension	.06*	.01	.07*	−.02	.11*	.07*	1	
8. Mathematics	.04*	.09*	.08*	−.01	.13*	.12*	.52*	1

* $p < .001$

between mastery and performance motivation ($r = .36$). We also saw moderate to high correlations between all other combinations of motivation subscales, except for that between performance and social motivation, which was low ($r = .14$). The highest correlation within the four motivation subscales was observed between performance and extrinsic motivation ($r = .56$), followed by the correlation of .52 between mastery and extrinsic motivation.

Additionally, we found moderate correlations between mastery motivation and school commitment ($r = .40$) and between social motivation and school commitment ($r = .32$). Academic self-efficacy was moderately related to mastery motivation ($r = .35$), performance motivation ($r = .28$), and school commitment ($r = .28$). Furthermore, a moderate association was found between the two achievement measures ($r = .52$), while the correlations between the achievement measures and all other variables were .13 at the maximum.

3.2 Different school motivation profiles

Based on the four motivation scales as indicators, a multilevel latent class analysis (MLCA) was applied to the data to classify the students into several clusters (using the Latent Gold 4.5 software; Vermunt and Magidson 2005). Latent class analysis (also referred to as latent profile analysis, e.g. Pastor et al. 2007) is a person-oriented approach (as opposed to a variable-oriented method) in that it focusses on the individual and his/her pattern of characteristics relevant to the issue under consideration (Bergman and Magnusson 1997, p. 293). It is a tool for cluster analysis consisting of ordered or continuous variables. In our study, the students were categorized into clusters with similar response patterns as regards the four motivation scales in order to maximize the between-group heterogeneity and within-group homogeneity. MLCA is a tool for cluster analysis with finite mixture distributions at multiple levels of a hierarchical structure. The basic idea of MLCA is that some of the model parameters (individuals' responses, i.e. the level-1 units) are allowed to differ across higher order units (the clusters, i.e. the level-2 units). In our case, these units were additionally nested within the schools (level-3 units). Our analysis took this nesting into account, that is, the

Table 3 Model comparison of the cluster solutions

	# Latent classes	# Parameters	BIC ^a	Log-likelihood	Class. error (%)
Model 1	1	8	61,421.70	−30,675.29	0.0
Model 2	2	17	55,635.85	−27,742.36	7.7
Model 3	3	26	54,073.38	−26,921.12	11.4
Model 4	4	35	51,511.60	−25,600.23	15.3
Model 5	5	44	50,819.65	−25,214.25	18.7
Model 6	6	53	50,363.15	−24,946.00	20.6
Model 7	7	62	50,260.96	−24,854.90	24.5

^a Lower values of Bayesian information criterion (BIC) indicate a better model fit. They are penalized versions of the log-likelihood, with penalties added for increased model complexity (i.e. more estimated parameters)

probability that belonging to a certain latent class differs across schools. Technical details on this analysis are given by Vermunt (2008). The model fit was based on statistical criteria (Bayesian Information Criterion, or BIC), model parsimony, and model interpretability, following the suggestions of Lukočienė et al. (2010) and Collins and Lanza (2010).

Models which contained 1–7 latent classes were fitted to the data. Table 3 shows for each model the number of latent classes included, the number of parameters estimated, the BIC, the log-likelihood value, and the classification error.

Model 7 turned out to be the best according to the BIC criterion, with a classification error of 24.5 %. Adding more clusters (≥ 8) led to a small decrease in BIC, but also to an increase in classification errors (> 26 %). Since the BIC value of Model 7 was only slightly lower than that of Model 6 and the classification error of Model 6 was lower (almost 4 %) than that of Model 7, we chose to first compare the cluster solutions of Models 6 and 7. Inspection of the 6- and 7-cluster solutions revealed that the 6-cluster solution was better interpretable than the 7-cluster solution. In the 7-cluster solution, some of the clusters appeared to be more or less similar while one of them was very small (2.9 % of the student sample). Hence, Model 6 was the most parsimonious model of the two. Additionally, a comparison of Model 5 and Model 6 revealed that the students in the additional sixth cluster were derived from several clusters in Model 5, which indicated that they formed a separate group as regards their motivation profile. Based on these results and the criteria stated (BIC, model parsimony, and model interpretability), we concluded that model 6 best fitted the data. Hence, we continued our analyses using this model. The entropy statistic (a measure of classification certainty) for the 6-cluster model was .70. Higher values indicate better fit, thus better cluster separation, but there is no clear cut-off point for interpretation. Table 4 presents the results of the 6-cluster solution, describing the motivation profiles within each cluster. The differences between the six clusters in mean scores on the four scales were all significant ($p < .05$).

Table 4 shows that the students in the first three clusters had, on average, higher scores on the four motivation scales than the students in the last three clusters, with only two exceptions (the performance motivation scores of the students in clusters 2

Table 4 The 6-cluster solution of the motivation profiles

		Cluster					
	Mean	1	2	3	4	5	6
<i>Indicators</i>							
Mastery motivation ^a	3.30	3.32	3.52	3.98	2.76	2.94	2.86
Performance motivation ^a	2.00	2.53	1.59	2.82	1.75	1.00	1.20
Social motivation ^a	2.15	3.04	3.56	3.68	2.57	2.98	2.82
Extrinsic motivation ^a	2.65	2.91	2.65	3.68	2.03	1.84	1.88
<i>Cluster sizes</i>							
Probabilistic classification ^b		31.5 %	18.3 %	16.6 %	16.1 %	10.5 %	7.2 %
Modal classification ^b		31.1 %	19.1 %	15.9 %	14.4 %	10.8 %	8.7 %

^a The scales run from 1 to 5

^b Probabilistic classification represents a cluster classification based on the probability indices of being a member of the respective possible clusters. Modal classification represents a cluster classification based on the largest posterior probability (the 'best' cluster for each individual)

Fig. 1 Average scores on the four motivation dimensions for each cluster

and 4). Because of the differences in mean scores between the scales, we compared the scores of each of the six clusters with the overall mean scores in our description below. Figure 1 gives a graphical representation of the average motivation scores on all four scales for each cluster.

Two general patterns evolve in the data, with one group of clusters 1, 3 and 4 and one group of clusters 2, 5 and 6. The clusters within each group form almost parallel lines in Fig. 1. The clusters 2, 5 and 6 typically differ from clusters 1, 3, 4 in the relatively low score on performance motivation in congruence with relatively high

scores on mastery and social motivation. We will now discuss each cluster in more detail.

Cluster 1 covered the largest proportion of students (31 %) who had average scores on mastery and social motivation and above average scores on performance and extrinsic motivation. Somewhat in contrast to cluster 1, cluster 2 (18 %) contained students with below average scores on performance motivation and above average scores on mastery and social motivation. These students had obtained average scores on extrinsic motivation.

Clusters 3 and 4 (in total 33 %) represented students with more consistent response patterns regarding their mean scores on the four scales. Cluster 3 consisted of students who scored well above average on all four scales, whereas in cluster 4 the scores on all scales were below average.

The two remaining clusters (5 and 6), which together covered 18 % of the students, clearly showed extremely low scores on both performance motivation and extrinsic motivation as compared to the overall mean scores on these scales. Also the scores on mastery and social motivation were well below average in these clusters, although they were somewhat higher than the scores in cluster 4 on these two scales (the cluster with a consistent pattern of below average scores on all scales). The main difference between clusters 5 and 6 was that cluster 5 appeared somewhat more socially motivated and somewhat less performance-motivated than cluster 6. This difference was, however, small (≤ 0.2 difference).

3.3 The relations between the motivation profiles and the educational outcomes

Based on the 6-cluster solution described above, we next examined whether the students' school commitment, their academic self-efficacy, and their academic achievement differed across the clusters, and thus across the groups of students with different school motivation profiles. For each cluster Table 5 shows the students' mean scores on school commitment, academic self-efficacy, reading comprehension, and mathematics, both separately for the different educational tracks. The highest mean scores among the six clusters are printed in bold.

In all educational tracks students of cluster 3 had the highest mean scores on both school commitment and academic self-efficacy. These students scored well above the average on all four motivation scales. The students in clusters 4, 5 and 6, those with (well) below average scores on all motivation scales, had the lowest average results on school commitment and academic self-efficacy. Analyses of covariance were performed to test the differences between the clusters while taking the differences between the tracks into account. The differences in school commitment among the clusters were significant ($F [5, 6749] = 141.52, p < .001$, partial eta-squared = 0.11). When we used the sixth cluster as the reference category, contrast estimates revealed that clusters 1–3 significantly differed from cluster 6 ($p < .001$), but clusters 4 and 5 were more similar to cluster 6 regarding the students' scores on school commitment. The model explained 11 % of the variance in school commitment scores. The differences in academic self-efficacy among the clusters were also significant ($F [5, 6809] = 123.85, p < .001$, partial eta-squared = 0.07). Again, clusters 1–3 significantly differed from

Table 5 Students' mean scores on school commitment, school self-efficacy, comprehensive reading, and mathematics (standard deviations between brackets) within the different educational tracks, separately for each cluster

	Cluster ^a						Total
	1	2	3	4	5	6	
School commitment ^b							
Track C low ^d	3.10	3.23	3.40^e	2.94	2.84	2.96	3.10 (0.54)
Track C high ^d	3.09	3.21	3.39	2.89	3.07	2.98	3.12 (0.51)
Track B ^d	3.11	3.27	3.40	2.99	3.01	3.05	3.15 (0.47)
Track A ^d	3.29	3.35	3.52	3.06	3.07	3.09	3.28 (0.45)
Academic self-efficacy ^b							
Track C low	3.53	3.56	3.88	3.34	3.21	3.49	3.49 (0.63)
Track C high	3.59	3.48	3.87	3.33	3.40	3.53	3.53 (0.62)
Track B	3.47	3.41	3.78	3.30	3.22	3.43	3.43 (0.61)
Track A	3.61	3.54	3.84	3.43	3.29	3.56	3.56 (0.62)
Reading comprehension ^c							
Track C low	47.1	51.3	48.5	46.9	52.4	49.2	48.9 (18.5)
Track C high	63.5	66.1	62.9	66.5	65.4	65.2	64.8 (15.9)
Track B	65.3	68.1	68.6	65.9	66.9	67.1	66.7 (15.6)
Track A	79.6	79.2	79.3	79.1	80.4	77.9	79.3 (12.1)
Mathematics ^c							
Track C low	48.0	46.5	46.7	47.9	44.8	46.7	46.9 (14.8)
Track C high	61.2	60.2	60.3	62.1	60.9	59.8	60.8 (14.1)
Track B	71.5	71.9	70.5	72.2	70.6	71.6	71.5 (12.1)
Track A	82.7	82.2	82.7	82.4	80.1	80.5	82.2 (9.9)

Table 5 continued

	Cluster ^a						Total
	1	2	3	4	5	6	
<i>Sample size</i>							
Track C low	391 (28.3 %)	223 (16. %)	237 (17.2 %)	191 (13.8 %)	204 (14.8 %)	135 (9.8 %)	1,381
Track C high	534 (29.0 %)	341 (18.5 %)	280 (15.2 %)	283 (15.4 %)	232 (12.6 %)	173 (9.4 %)	1,843
Track B	603 (33.0 %)	360 (19.7 %)	273 (14.9 %)	267 (14.6 %)	175 (9.6 %)	149 (8.2 %)	1,827
Track A	608 (33.9 %)	397 (22.1 %)	301 (16.8 %)	238 (13.3 %)	118 (6.6 %)	131 (7.3 %)	1,793
Total	2,136 (31.2 %)	1,321 (19.3 %)	1,091 (15.9 %)	979 (14.3 %)	729 (10.7 %)	588 (8.6 %)	6,844

^a Based on the modal classification

^b The scales run from 1 to 5

^c The scores theoretically run from 0 to 100 %

^d Track C refers to preparatory secondary vocational education ('low' indicates the lower two levels, 'high' indicates the upper two levels), Track B to senior general secondary education, and Track A to pre-university education

^e The highest scores per track are printed in bold

cluster 6, but students' scores in clusters 4 and 5 were similar to those of students in cluster 6. The model explained 9 % of the variance in academic self-efficacy scores. Based on these results, we can conclude that the 6-cluster model differentiated between school commitment and academic self-efficacy scores to some extent.

With regard to the achievement measures, the pattern was less consistent. Within (almost) each track a different cluster had the highest or lowest mean score on the achievement measure and the differences in achievement scores across the clusters were small. Analyses of covariance (again with educational track as covariate) revealed no significant differences among the clusters ($F [5, 6477] = 3.94, p = .001$, partial eta-squared < 0.01). The model explained 31 % of the variance in the reading comprehension scores, but this result was based on achievement differences among the tracks, not between the clusters of students with different motivation profiles. Similarly, the mathematics scores did not differ among the clusters ($F [5, 6452] = 2.84, p = .014$, partial eta-squared $= 0.01$). The model explained 49 % of the variance in the mathematics scores, which again could be explained by the differences in achievement among the tracks rather than among the clusters. Based on these findings, we cannot state with certainty that the model was able to differentiate among clusters of students with respect to their academic achievement.

Finally, the rows which indicate the sample sizes per track show that particularly in cluster 5, track C students (both 'low' and 'high' levels) were overrepresented. To a lesser extent, this was also the case for cluster 6, whereas in clusters 1 and 2 track C students (both 'low' and 'high' levels) were underrepresented. The differences among the clusters were significant ($\chi^2 [15] = 100.92, p < .001$). The results indicate that track C students (the lowest educational track) were overrepresented in the less favourable motivation profiles.

4 Discussion and Conclusion

4.1 Reflection on the findings

Using a multiple goal perspective, we investigated the school motivation of more than 7,000 secondary school students in the Netherlands. Our aims were (1) to identify distinct motivation profiles within a large sample of secondary school pupils and (2) to examine the relation between these students' motivation profiles and several relevant educational outcomes.

Via MLCA, we were able to identify six interpretable clusters of students based on their scores on four motivation scales (mastery, performance, extrinsic, social). The results revealed that various combinations of achievement goal orientations coexisted among the students in our sample. In summary, we found students with consistent response patterns regarding the mean scores across all four scales. Furthermore, there were clusters with relatively high scores on mastery and social motivation and with relatively high scores on performance and extrinsic motivation. Finally, the clusters also differed to some extent in the absolute levels of school motivation.

In line with previous studies which have reported moderate correlations between mastery and performance goal orientations (e.g. the meta-analysis of [Huang \(2012\)](#)

estimated a correlation of .22), we found several clusters of students with relatively high scores on these scales. We found a correlation of .36 between the two scales in the overall student sample, which is in accordance with the literature, albeit slightly higher. As expected, we found at least one cluster of students with moderate to high scores on mastery as well as on performance goal orientation. The moderate and in some cases high correlations among the four scales stress the need to further improve the measurement of the four types of goal orientations. We will return to this point further in the discussion.

Subsequently, we found several clusters with relatively high scores on both the social motivation scale and the mastery motivation scale, which confirmed our general expectation that these two motivation dimensions would coexist in at least one cluster. In accordance with the literature, which states that next to academic goals students also pursue social goals (Covington 2000; Horst et al. 2007; King and McInerney 2012; King et al. 2010; McInerney 2008; Patrick and Hicks 1997; Ryan and Shim 2008; Wentzel 1996, 1998, 2000), our results have emphasized that many students are socially oriented in learning situations. Additionally, we looked at extrinsic motivation, and saw that in the 6-cluster solution, relatively high scores on extrinsic motivation mainly coexisted with relatively high scores on performance motivation. The correlation of .56 between extrinsic and performance motivation emphasizes that these scales apparently measured at least some different aspects of the students' performance goal orientations (see also Ali and McInerney 2004; McInerney and Ali 2006), although the constructs seem to be related to a certain extent. In our study, the students' overall mean scores on extrinsic motivation were higher than those on performance motivation, which suggests that the students were generally more oriented towards the teacher (e.g. to receive rewards and praise) than towards their peers (e.g. referencing one's performance against the performance of others).

Although the results underscore the presence of social and extrinsic goal orientations among secondary school pupils, their importance for the educational outcomes included in our study were limited. Whereas meaningful positive associations were found among the four motivation scales, school commitment and academic self-efficacy, the correlations between the motivation scales and the academic achievement measures were very low. We did, however, empirically establish that students who scored (well) above average on all four motivation scales also had the highest scores on school commitment and academic self-efficacy. This result was consistent across all different educational tracks. As also shown by previous studies, a mastery goal orientation (which was prominent in generally all clusters) was positively associated with school commitment (e.g. Gonida et al. 2009; McInerney 2008) and academic self-efficacy (e.g. Coutinho and Neuman 2008; Pajares et al. 2000). Similarly, the latent class analysis revealed that the students with the lowest scores on performance motivation (clusters 5 and 6) also had the lowest scores on school commitment and academic self-efficacy. This result also applied to cluster 4, so basically all students with (well) below average scores on all motivation scales also had low scores on these two educational outcomes. Generally, it appeared that favourable scores on all motivation scales (so not only on mastery motivation) were associated with favourable scores on school commitment and academic self-efficacy. This result is in broad terms consistent with the study of Barron and Harackiewicz (2001), who argue that students

who pursue both mastery and performance goals are the most likely to attain success in education, although they used other measures of educational outcomes. In contrast with [Barron and Harackiewicz \(2001\)](#), we did not find such a relationship for academic achievement. Unfortunately, the design of our study did not allow us to investigate whether a performance goal orientation leads to more unfavourable educational outcomes (e.g. low self-efficacy beliefs), or vice versa, whether low self-efficacy beliefs affect students' goal orientations (e.g. see [Liem et al. 2008](#)).

With regard to the achievement measures, we found that our latent class model was unable to differentiate among the six clusters in terms of academic achievement. Whereas previous studies established that approach goal orientations such as a performance goal orientation predict the school grades of secondary school students (e.g. [Giota 2002](#)), we did not find such relationships in either of the educational tracks. A plausible explanation for this discrepancy is that we did not use school grades to evaluate student performance, but instead tests that were taken under 'low-stake' conditions. That is, there were no consequences attached to the students' scores on the two achievement tests, which could have influenced their academic achievements. Unfortunately, we did not have access to the students' school grades for comparison.

4.2 Limitations of the study

We would like to point out two important limitations here. Firstly, this is a cross-sectional study, thus causal inferences about the relationship between students' motivation profile and their educational outcomes cannot be deduced from the current design. Secondly, we want to include a final note about our results regarding the measurement of students' performance motivation. [Anderman and Anderman \(1999\)](#) state that during adolescence, students tend to become more focussed on performance goals. Our results do not seem to correspond with the shift suggested here. In our study, the students' mean score on performance motivation was much lower than their mean score on mastery motivation (2.0 versus 3.3 on a 5-point scale), while it is unlikely that the students were even less performance-oriented in their previous school years. Using the same goal orientation scales (the ISM), [Driessen et al. \(2009\)](#), for example, reported a similar mean score on performance motivation (2.1) and a slightly higher mean score on mastery motivation (3.8) among 6th grade students. It is therefore more likely that social desirability withheld these students from indicating that they wanted to outperform others. Another possibility could be that Dutch teachers are more focussed on mastery goals in their classrooms than on performance goals, which would explain why the students were more mastery- than performance-oriented. Students' achievement goal orientations do not only depend on their personal preferences; they are partly driven by the learning environment ([Meece et al. 2006](#); [Roeser et al. 1996](#)). Which achievement goals are promoted by the teachers in Dutch secondary education has, to our knowledge, not yet been researched. [Boekaerts et al. \(2006\)](#) have identified considerable gaps in the knowledge about the effects of environmental conditions on students' goals in the classroom. Following the international publications about the influence of the classroom goal structure on students' goal orientations, it has been suggested that the endorsement of mastery and performance goals [...] leads to differ-

ent types of outcomes in the case of adolescents, such as the use of various cognitive processing strategies, different effects on learning, and varying approaches to academic tasks (Anderman et al. 2002, p. 207, see also Midgley et al. 2000; Murayama and Elliot 2009; Tapola and Niemivirta 2008). If we would have been able to triangulate our findings with qualitative data on students' performance motivation, we could have identified whether the students' responses were measured validly.

4.3 Suggestions for further study

Following our mixed results regarding the relationship between students' motivation profiles and their educational outcomes, we would like to give some suggestions for further study. A first suggestion is to measure all constructs (thus not only the academic achievement measures) domain-specific rather than in a more general fashion, which could enhance our understanding of the relationship between domain-specific school motivation and educational outcomes in the same domain (e.g. mathematics).

A second issue which, in our view, needs further attention is the measurement of social goal orientations in the achievement goal framework. King and McInerney (2012) suggest that future researchers may want to consider distinguishing between approach and avoidance forms of social goal orientations, which may lead to a better understanding of the effects of having a social goal orientation on a variety of educational outcomes (e.g. Ryan and Shim 2008). Many different types of social goals and social goal orientations are used in motivation research (e.g. Elliot et al. 2006; McInerney and Ali 2006; Roussel et al. 2011; Ryan and Shim 2008), and it is as yet unclear how these different types relate to the other motivation dimensions and to educational outcomes, such as academic self-efficacy and school grades. Elliot and Murayama (2008) stress that in some papers, social goals are formulated more as concerns and values than as goals (see Hulleman et al. 2010, for a similar discussion about the performance and mastery goal constructs). Also in our study, some of the items used to measure social goal orientation were formulated as concerns rather than as goals or general orientations, which we consider as a limitation.

A third issue for further research would be the inclusion of extrinsic goal orientations in a 4×2 achievement goal framework. Next to the social avoidance goal orientation (e.g. the desire to perform tasks alone), we believe that also in the case of extrinsic goal orientation both forms (approach and avoidance) may be relevant among students. It is not unreasonable to assume that students sometimes pursue extrinsic avoidance goals in education, for example, when they want to avoid being reprimanded by their teachers or parents. This is still an unexplored field in motivation research.

Fourthly, latent transition analysis could be performed to increase our understanding of the development and stability of students' goal orientation profiles throughout secondary education (see e.g. Tuominen-Soini et al. 2011). That is, our MLCA results describe the differences in school motivation based on students' response patterns, however, without making inferences about what may have caused these patterns (e.g. students' learning experiences).

4.4 Practical implications

The results of our model offer suggestions for educational practice in the sense that we found support for the multiple goal perspective, which means that upon entering the classroom students choose several goal orientations instead of just one. The combination of mastery goal orientation and social goal orientation appears typical among secondary education students. If these response patterns also prove to be robust within other student samples, a (quasi-)experimental design in which the interplay between teachers and students is further investigated would enhance our general understanding of how teachers could improve the motivation of different types of students. In more general terms, our finding that social goal orientations are salient among most adolescents (even more so that performance and extrinsic goal orientations) emphasizes that, in secondary school, collaborative learning may fit well into students' approaches to learning.

4.5 Final remarks

All in all, the MLCA results suggest that based on their scores on the four motivation scales as proposed by [McInerney and Ali \(2006\)](#), Dutch secondary school students can be classified into several clusters in terms of their school motivation. Our findings support this multidimensional achievement goal framework, suggesting that students are, to some extent, motivated for school for different combinations of reasons. We would like to stress, however, that these results need to be replicated within different student samples to confirm their robustness. Particularly the overlap in response patterns as observed in clusters 5 and 6 in our study underscores the need to replicate the latent cluster analysis using other samples.

Finally, the main contribution of this study is that it elaborates on the idea that students can have multiple goal orientations when they enter the classroom by the inclusion of extrinsic and social goal orientations next to the more commonly used mastery and performance goal orientations, using a cluster analytic procedure. That being said, the relevance of students' motivation profiles regarding relevant educational outcomes still needs further attention in educational studies, that is, to investigate in which educational contexts particular motivation profiles would be more advantageous than others.

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