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Achievement goal profiles and developments in effort and achievement in upper elementary school

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Background. The multiple goal perspective posits that certain combinations of achievement goals are more favourable than others in terms of educational outcomes.

Aims. This study aimed to examine longitudinally whether students' achievement goal profiles and transitions between profiles are associated with developments in self-reported and teacher-rated effort and academic achievement in upper elementary school.

Sample. Participants were 722 fifth-grade students and their teachers in fifth and sixth grade (N = 68).

Methods. Students reported on their achievement goals and effort in language and mathematics three times in grade 5 to grade 6. Teachers rated students' general school effort. Achievement scores were obtained from school records. Goal profiles were derived with latent profile and transition analyses. Longitudinal multilevel analyses were conducted.

Results. Theoretically favourable goal profiles (high mastery and performance-approach goals, low on performance-avoidance goals), as well as transitions from less to more theoretically favourable goal profiles, were associated with higher levels and more growth in effort for language and mathematics and with stronger language achievement gains.

Conclusions. Overall, these results provide support for the multiple goal perspective and show the sustained benefits of favourable goal profiles beyond effects of cognitive ability and background characteristics.

Students can be motivated for school for a variety of reasons. A major theory in research on academic motivation is the achievement goal theory (AGT), which focuses on the reasons that students have for engaging in achievement behaviour (Dweck, 1986; Nicholls, 1984). Traditionally, AGT research has predominantly examined relationships between separate goals and educational outcomes, yielding mixed results. Whereas mastery goals have been consistently associated with adaptive outcomes, performance goals have been associated with mixed educational outcomes (for reviews, see Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002; Hulleman, Schrager, Bodmann,

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& Harackiewicz, 2010; Senko, Hulleman, & Harackiewicz, 2011). Studies have attempted to resolve this controversy by examining how combinations of goals that students pursue simultaneously (i.e., 'goal profiles') predict various educational outcomes. However, a vast majority of studies on the effect of goal profiles are cross-sectional (see Wormington & Linnenbrink-Garcia, 2016, for a review) and can therefore only provide indications on short-term benefits of specific goal profiles. To gain insight into the sustained benefits of specific achievement goal profiles, longitudinal research is needed. Therefore, the purpose of this study was to extend the knowledge on achievement goal profiles by examining longitudinal relationships between students' achievement goal profiles in two distinct academic subject domains (math and language) and developments in effort and achievement outcomes in the last 2 years of primary school.

Achievement goal theory

In the mid-1980s, AGT was developed to gain insight into the adaptive and maladaptive responses of students to achievement challenges (Dweck, 1986; Nicholls, 1984). Within AGT, goal orientations are interpreted as the reasons and intentions that students have for engaging in achievement tasks (Pintrich, 2003). Students pursuing mastery goals strive towards becoming more competent, whereas students pursuing performance goals aim to demonstrate their competence. Originally, it was assumed that students primarily adopt one goal. Students were considered to be either mastery or performance-oriented (Dweck, 1986; Nicholls, 1984). It has long been thought that mastery goals promote greater educational benefits than performance goals (Dweck, 1986). For various educational outcomes, studies have indeed consistently found positive effects of mastery goals. Students who adopt mastery goals use deep learning strategies that enhance conceptual understanding, perceive tasks as valuable, and show higher persistence when faced with difficulties (Elliott & Dweck, 1988; Elliot & McGregor, 2001; Grant & Dweck, 2003; Greene & Miller, 1996; Meece & Miller, 2001; Wolters, 2004). Furthermore, studies have shown that mastery goals facilitate intrinsic motivation and interest (Elliot & Church, 1997; Harackiewicz *et al.*, 2002). A relationship with effort has been found as well (Gonida, Voulala, & Kiosseoglou, 2009; Miller, Greene, Montalvo, Ravindran, & Nichols, 1996). Several studies also found positive relationships between mastery goals and academic achievement, although relationships tend to be weak and other studies did not find significant relationships between mastery goals and academic achievement (see Hulleman *et al.*, 2010, for a meta-analysis).

Because performance goals were found to be associated with adaptive as well as maladaptive outcomes, researchers proposed the trichotomous achievement goal framework (Elliot, 1999; Elliot & Harackiewicz, 1996), which distinguishes performance-approach goals from performance-avoidance goals. Students with performance-approach goals want to appear competent in comparison with others, and students with performance-avoidance goals focus on avoiding appearing incompetent to others. Performance-avoidance goals have been consistently linked to maladaptive outcomes such as test anxiety, self-handicapping, lower well-being, and low performance on tests (Church, Elliot, & Gable, 2001; Darnon, Butera, Mugny, Quiamzade, & Hulleman, 2009; Elliot, 1999; Elliot & Church, 1997; Elliot & Harackiewicz, 1996; Peetsma & van der Veen, 2013; Sideridis, 2005). For performance-approach goals, however, the relationship with educational outcomes is less straightforward. Positive relations between

performance-approach goals and academic achievement have been found consistently across studies (Church *et al.*, 2001; Elliot & McGregor, 1999; Harackiewicz *et al.*, 2002). Studies have also related performance-approach goals to other adaptive outcomes such as academic self-concept, task value, and effort expenditure (Bong, 2001, 2009; Church *et al.*, 2001; Elliot, McGregor, & Gable, 1999; Skaalvik, 1997), while other studies did not find a relationship with these outcomes (Harackiewicz *et al.*, 2002). In addition, performance-approach goals have also been associated with maladaptive outcomes, such as surface-level learning (Elliot & Harackiewicz, 1996; Graham & Golan, 1991).

The mastery and multiple goal perspective

The mixed findings on performance-approach goals have led to the suggestion that these goals result in either positive or negative outcomes depending on which other goals are simultaneously endorsed (Harackiewicz *et al.*, 2002; Pintrich, 2000). Various studies have identified distinct achievement goal profiles among students and shown that students can indeed pursue multiple goals simultaneously (Jansen in de Wal, Hornstra, Prins, Peetsma, & van der Veen, 2016; Luo, Paris, Hogan, & Luo, 2011; Pastor, Barron, Miller, & Davis, 2007; Schwinger & Wild, 2012; Schwinger, Steinmayr, & Spinath, 2016; Tuominen-Soini, Salmela-Aro, & Niemivirta, 2008, 2012; or see Wormington & Linnenbrink-Garcia, 2016 for a review). Yet, the question of which combination of goals is the most beneficial is still under debate. Supporters of the 'mastery goal perspective' posit that only mastery goals yield educational benefits (Kaplan & Middleton, 2002; Midgley, Kaplan, & Middleton, 2001). Simultaneous pursuit of performance-approach goals will come at a cost and might decrease the benefits of pursuing mastery goals. Proponents of the 'multiple goal perspective', however, suggest that pursuing both mastery and performance-approach goals will result in greater benefits than pursuing only mastery goals (Barron & Harackiewicz, 2001; Harackiewicz *et al.*, 2002). It has been suggested that positive effects of combining mastery and performance-approach goals could come about in three ways (Barron & Harackiewicz, 2001). First, both types of goals could interact and strengthen each other in terms of educational benefits. Second, the effects could be additive. That is, both types of goals can have positive main effects on educational outcomes. Third, both goals could positively predict different educational outcomes, in which case there would be specialized effects. A crucial question in the mastery goal perspective versus multiple goal perspective debate is whether the effects of performance goals are dependent on the extent to which students also endorse mastery goals.

Research on goal profiles

Several studies have attempted to end this controversy and examined how different combinations of goals are associated with different educational outcomes (Wormington & Linnenbrink-Garcia, 2016). By adopting a person-centred approach, students who endorse similar combinations of goals (i.e., 'goal profiles') can be identified. Using such an approach, some researchers have found that a combination of mastery and performance-approach goals with low levels of performance-avoidance goals was associated with the most favourable educational outcomes (Bouffard, Vezeau, & Bordeleau, 1998; Luo *et al.*, 2011; Schwinger *et al.*, 2016). However, the results of other studies (Meece & Holt, 1993; Ng, 2006) have shown

that students with primarily mastery approach goals also show adaptive educational outcomes. In all, the recent review by Wormington and Linnenbrink-Garcia (2016) suggests that profiles characterized by high mastery goals and profiles characterized by high mastery and performance-approach goals are both associated with adaptive educational outcomes.

However, most studies to date on achievement goal profiles are cross-sectional. As it might be possible that higher achievement levels evoke certain goal profiles instead of vice versa (Schwinger & Wild, 2012), longitudinal research is needed to gain more insight into the direction of causality. Additionally, for further validation of the research on multiple goals, longitudinal studies are necessary to examine whether certain combinations of goals are actually predictors of more favourable developments in learning outcomes over time (Wormington & Linnenbrink-Garcia, 2016). Hence, longitudinal research is needed to gain insight into the sustained benefits of certain goal profiles. Furthermore, most studies on the educational benefits of goal profiles have used analytical methods such as median split procedures and cluster analyses, while only few longitudinal studies (Schwinger & Wild, 2012; Schwinger *et al.*, 2016; Tuominen-Soini *et al.*, 2012) used the more advanced method of latent profile analysis (LPA; Pastor *et al.*, 2007; Vermunt & Magidson, 2002). LPA is a model-based approach and has the advantage that the number of profiles is determined with more stringent statistical criteria and that information is available about the accuracy of the classifications (Muthén & Muthén, 2012; Vermunt & Magidson, 2002).

Previous longitudinal studies using LPA found sustained benefits in terms of students' well-being (Tuominen-Soini *et al.*, 2008, 2012). Only two studies (Schwinger & Wild, 2012; Schwinger *et al.*, 2016) were identified that conducted LPA and examined differences in academic achievement. Schwinger and Wild (2012) identified three achievement goal profiles among elementary students, all of which were relatively high on mastery goals. Although their study revealed relatively few differences between profiles, the results indicated that students who endorsed high multiple goals showed the lowest achievement scores. In line with the mastery goal perspective, this could indicate that pursuing performance goals may diminish the benefits of mastery goals. However, as this profile included high performance-approach goals as well as high performance-avoidance goals, the performance-avoidance goals, rather than the performance-approach goals, could account for this finding. Schwinger *et al.* (2016) studied the antecedents and consequences of goal profiles in elementary school students. They identified five different goal profiles and found that performance-approach goals were adaptive for achievement when combined with mastery goals, but not when combined with performance-avoidance goals. Hence, in line with the multiple goal perspective, these outcomes suggest that the effect of performance goals is dependent on the extent to which students also endorse mastery goals.

Another limitation to the current body of work is that previous studies focused on general achievement goals (Schwinger *et al.*, 2016) or achievement goals in a single subject domain (Schwinger & Wild, 2012). Previous research has shown that students pursue similar achievement goals in different subject domains (Bong, 2001; Duda & Nicholls, 1992; Hornstra, van der Veen, & Peetsma, 2016). However, few studies compared the relationship between achievement goals and educational outcomes in different domains. Studies on separate achievement goals suggest that the strength of the relationship between achievement goals and educational outcomes may differ across academic domains, with somewhat stronger relations in mathematics compared to language domains (Bong, 2005; Hornstra *et al.*, 2016; Huang, 2012).

The current study

The purpose of this study was to extend the work on achievement goals by relating students' achievement goal profiles[1] to developments in academic achievement and school effort in two core subject domains, that is, language and mathematics. This study focuses on the educational benefits of different achievement goal profiles of students in the last 2 years of elementary school. Previous research shows that for many students, their motivation starts to decline in this important period in their school career (Bong, 2001, 2009; Hornstra, van der Veen, Peetsma, & Volman, 2013). It is well established that educational outcomes are substantially related to cognitive abilities (Kuncel, Hezlett, & Ones, 2004; Steinmayr & Spinath, 2009) and demographic student characteristics (Hornstra *et al.*, 2013). By taking these factors into account, we could examine whether achievement goal profiles were associated with additional benefits in terms of (developments in) effort and academic achievement.

This study builds on previous work of Jansen in de Wal *et al*. (2016). The aim of the previous study was to examine the prevalence, development, and domain specificity of elementary students' achievement goal profiles. Using latent profile analyses, three types of achievement goal profiles were identified in both language and mathematics. Students in the first profile, which was labelled 'approach-oriented', had relatively high mastery and performance-approach goals and low performance-avoidance goals. The second profile was labelled 'moderate/indifferent'. Students in this profile had average scores on each of the three goals. The last profile was characterized by relatively high avoidance goals, but also relatively high scores on mastery and performance-approach goals, and was labelled 'multiple goals'. Additional information on how these goal profiles were derived is described in the results section of this study. The previous study did not examine how these profiles and transitions between profiles during two consecutive school years were associated with (developments in) educational outcomes. As such, the current study builds upon the previous study by examining which achievement goal profiles and transition patterns that were identified in the previous study are most beneficial in terms of longitudinal developments in effort and achievement. In their recent review, Wormington and Linnenbrink-Garcia (2016) argued for longitudinal studies on achievement goal profiles to gain insight into the sustained benefits of certain goal profiles.

Two hypotheses were formulated for the present study. Based on previous studies showing adaptive outcomes of mastery goals, maladaptive outcomes of performance-avoidance goals, and the research positing that performance-approach goals can be beneficial when combined with high mastery and low performance-avoidance goals (Harackiewicz *et al.*, 2002; Hulleman *et al.*, 2010; Wormington & Linnenbrink-Garcia, 2016), we expected that students with an approach-oriented goal profile will show the most favourable (developments in) effort and achievement outcomes of all three profiles

[1] *Although recent studies support the adoption of a 2 × 2 goal framework (Elliot & Murayama, 2008) that includes mastery-avoidance goals, we adopted a trichotomous goal framework in the present study and did not include mastery-avoidance goals because of several reasons. First, the multiple goal perspective was introduced because of the discrepancy in findings with regard to performance goals, whereas the findings on the educational benefits of mastery goals have been much more coherent (Hulleman* et al., *2010). Second, it has been argued that younger students rarely adopt mastery-avoidance goals and empirical findings (Elliot, 1999), which has been supported in recent studies (Lee & Bong, 2016; Sideridis & Mouratidis, 2008). Third, in a latent profile study, Pastor* et al. *(2007) compared models that included the trichotomous versus the 2 × 2 model. The profiles that were distinguished in the 2 × 2 model did not substantially differ with regard to mastery-avoidance goals, with one exception. That is, one profile was characterized by high mastery-avoidance scores, but only 2% of students were classified in this profile, and students in this profile did not differ from other profiles in GPA scores.*

and students with a multiple goals profile (which entails relatively high performance-avoidance goals) would show the least favourable (developments) in effort and achievement outcomes of all three profiles (hypothesis 1). Also, we expected that students who transition from a theoretically less favourable profile to a more favourable profile (e.g., from multiple goals to moderate/indifferent, or from moderate/indifferent to approach-oriented) would show more positive developments in effort and achievement compared to students who did not transition to another goal profile (hypothesis 2). Both hypotheses were addressed within the domains of language and mathematics. As such, this study provides insight into the question whether there are goal profiles that are more adaptive in one subject domain compared to another subject domain.

Method

Procedure

For the present study, three waves of data were collected from students and teachers in grade 5 to grade 6. Measurements for achievement goals as well as self-reported and teacher-reported effort took place halfway through fifth grade and at the beginning and halfway through sixth grade. In regular classroom conditions, students filled in self-report questionnaires under supervision of a research assistant and the teacher. Teachers filled out questionnaires on each student's school effort as well. Achievement data in math and language were obtained from the school records.

Participants

The sample consisted of 722 students from 37 classes of 25 schools across the Netherlands. Three hundred and sixty-one participants were boys (50%). At the first measurement halfway through fifth grade, the participants were between 8 and 12 years old (M = 10.64, SD = 0.46). The sample could be considered representative in terms of ethnicity and parental educational level with 12.5% of the students being identified as non-Western immigrants and 13.3% of the students' parents classified as having a low educational level, 41.7% as having an average educational level, and 28.3% as having a high educational level (Statistics Netherlands, 2012a,b). For 16.7% of students, no information on parental educational level was available.

Instruments

Goal profiles

The Goal Orientation Questionnaire (Seegers, Van Putten, & De Brabander, 2002) was used to measure achievement goals for both mathematics and language. This questionnaire consists of a total of 17 items with a 5-point Likert scale. Five items measure *mastery approach* orientation (e.g., 'I feel satisfied when I have learned something in mathematics that makes sense to me'), six items measure *performance-avoidance* orientation (e.g., 'During mathematics tasks I am afraid that other students will notice my mistakes'), and five items measure *performance-approach* orientation (e.g., 'I enjoy getting a better grade in mathematics than my classmates'). Equivalent items were used to measure goal orientations for language. Reliability was good for all scales, with values of Cronbach's α ranging from .84 to .94. For both mathematics and language, a confirmatory factor analysis was used to inspect construct validity. A model in which each subscale of the Goal

Orientation Questionnaire loaded only on its own factor fitted well to the data for mathematics, $\chi^2(116) = 450.94$, $p < .001$; CFI = .95; TLI = .94; RMSEA = .07; SRMR = .05, as well as for language, $\chi^2(116) = 379.34$, $p < .001$; CFI = .93; TLI = .92; RMSEA = .06; SRMR = .06. Also, measurement invariance was assessed, and it was found that the constructs were invariant over time and across groups (based on gender, ethnicity, and socio-economic status).

Math achievement

Scores from mathematics tests of the Dutch National Institute for Educational Measurement (CITO) were used as measures for math achievement. These tests are administered twice a year to follow the progress of the students. For this study, the scores on the tests at the end of grade 4 until grade 6 were used. These scores were obtained from the school records. Two different versions, an older and an updated but similar version, were used by the schools. Six schools administered the older version, while most schools used the updated version. To make the scores comparable, the mean and standard deviations of the scores of the old version were transformed to obtain similar mean and standard deviations for both test versions. Previous research showed these tests to be highly reliable ($\alpha > .80$; Evers, 2002; Feenstra, Kamphuis, Kleintjes, & Krom, 2010). In only one school, students ($N = 30$) did not take this test.

Language achievement

The measurements of achievement in language comprised scores on the CITO reading comprehension tests. These tests are administered once a year, halfway through the academic year. The students' scores on the tests of grades 4, 5, and 6 were obtained from the schools. Some schools ($N = 16$) administered an older version of the test to their students, while other schools ($N = 8$) used a recently updated version. In contrast to the mathematics test, no transformations were necessary, as the scales of the older and updated versions were the same. Both versions have good reliability ($\alpha > .80$; Evers, 2002; Feenstra *et al.*, 2010).

Self-reported effort in language and mathematics

A scale by Roede (1989) was used to measure self-reported effort in language and mathematics. Each scale comprised seven items (e.g., 'During class, I work hard on mathematics tasks'; 'During class, I work hard on language tasks'). Students filled out the questionnaire scales at each measurement wave. The reliability of the scales ranged from .77 to .83 between measurements.

Teacher-reported effort

In order to not only rely on self-reported effort, teachers rated each student's effort at each measurement wave (Jungbluth, Peetsma, & Roeleveld, 1996). The scale consisted of three items and measured school effort in general (e.g., 'This student quickly gives up when he or she does not succeed'). Values of Cronbach's α ranged from .82 to .85 between measurements.

Cognitive ability

Cognitive ability was included in the analyses as a control variable to control for its influence on effort and achievement outcomes. A cognitive ability test (Van Batenburg & Van der Werf, 2004) was administered prior to this study, and it consisted of 85 items. There were two verbal subtests, 'categories' and 'analogies', that were used as control variables for language achievement and language effort. The reliabilities of both subtests were $\alpha = .80$ and $\alpha = .81$, respectively (Driessen, Mulder, Ledoux, Roeleveld, & Veen, 2012). Three non-verbal subtests were used as control variables for mathematics achievement and effort: 'composition of figures', 'exclusion', and 'number series'. The reliabilities of these subtests were $\alpha = .73$, $\alpha = .75$, and $\alpha = .73$, respectively (Driessen *et al.*, 2012).

Data analyses

The initial data set was checked for outliers. Extreme values ($M \pm 2\ SD$) that were not consistent with other values of the same case were removed. Missing values (<10% of the data) were considered missing at random, as missing values were due to either students' individual absence on measurement occasions or the fact that a class did not participate in a measurement. As such, missing values were taken into account by the full-information maximum-likelihood (FIML) procedure.

Prior to further analyses, scores on continuous explanatory variables were centred to the overall mean and dummy variables were created for all other explanatory variables and for the achievement goal profiles and transitions. For the transition patterns, it was decided to compare patterns of students who retained the same goal profile throughout the school year to patterns of students who transitioned to a different profile. Students with stable profiles were considered as the reference category. This way, it could be examined whether transitions from less to more theoretically favourable goal profiles were associated with more growth in effort for language and mathematics and with stronger language achievement gains.

To assess the relation between achievement goal profiles, student-reported effort, teacher-reported effort, and achievement in mathematics and language, 3-level multilevel analyses were performed on both mathematics and language achievement scores with students nested in classes and measurement occasions nested within students. In each analysis, gender, ethnicity, SES (as assessed by parental educational level), and cognitive ability were controlled for. For each of the analyses, a series of models were estimated. First, an empty model with only the dependent variable was estimated (model 0). Next, additional models were created that included all control variables (model 1). The last step for all analyses was to add the main effects of achievement goal profiles and transitions as predictors and to add the interactions of the achievement goal profiles and transitions with time as predictors (model 3). The main effects indicate whether certain goal profiles or transition patterns are associated with higher average levels of effort or achievement. The interactions with time show whether the slopes of effort and achievement differ and indicate whether different profiles or transition patterns are associated with different developments over time in effort and achievement.

Chi-square difference tests indicated whether or not model fit significantly improved by adding additional predictors in subsequent models (Hu & Bentler, 1999). During each step, all models fitted the data significantly better than previous models. The significance of specific coefficients for the relation between the independent and dependent variables was tested using Wald's tests (z tests). The set level of significance was 5%. To evaluate the

size of differences between students with different profiles, effect sizes were calculated by means of Cohen's *d*, with .2 being indicative of a small effect, .5 a medium, and .8 a large effect (Cohen, 1988). These effect sizes were calculated based on the mean differences in effort or achievement (gains) between students in different profiles or the mean difference between students who transitioned from a profile and students who retained that same profile.

Results

Descriptive statistics

Table 1 shows the descriptive statistics and variance components of students' self-reported effort in language and math, teacher-reported effort, and achievement in math and language. The variance components indicate that for all variables, most variance was situated at the individual level (45–55%), followed by the time level (33–47%), and a small percentage was situated at the classroom level (4–12%).

Latent profile analysis

In our previous study (Jansen in de Wal *et al.*, 2016), goal profiles were created by performing cross-sectional latent profile analyses in Mplus 6.1. For each domain in each data wave, solutions ranging from one to six profiles were investigated. Various statistical tests and indicators of model fit were considered. For both mathematics and language, we found a 3-profile solution to be the best representative for the sample. Figure 1 shows the types of goal profiles that were distinguished at each measurement wave. The multiple goals profile is characterized by a similar score on all achievement goals. Both other profiles have medium performance-approach goals and medium to high mastery approach goals. Yet the performance-avoidance goals are structurally lower and the mastery goals are higher in the second profile compared to the third profile. Hence, the first and second profiles were referred to as approach-oriented and moderate, respectively. Also, the stability in profile membership was examined in the previous study by examining whether students made transitions between profiles. The six most frequent transition patterns for both domains are presented in Table 2. Only these six patterns are considered in the present study as other patterns occurred very rarely (7.00% for language; 5.55% for mathematics). Patterns indicating that a student retained a similar profile throughout the study were the most common. This was found for 78.12% and 85.22% of the students in language and mathematics, respectively. For more information on how the profiles and transition patterns were derived, we refer the reader to Jansen in de Wal *et al.* (2016).

Relationships between students' achievement goal profiles in language and developments in effort and language achievement

In Table 3, the outcomes of the final multilevel models for language are reported. These results show the associations between students' language-specific achievement goal profiles and developments in teacher-reported effort, students' self-reported effort, and language achievement. Figures 2 and 3 depict these outcomes graphically.

Students' achievement goal profiles in language were found to be a significant predictor of developments in effort and achievement after controlling for gender, ethnic

Table 1. Descriptive statistics of students' self-reported effort in math and language, teacher-reported school effort, and achievement in math and language

	M	*SD*	Min	Max	Skewness	Kurtosis	Variance components (class/student/time)
Self-reported effort language gr 5_middle	3.35	0.57	1.00	5.00	0.12	1.32	0.08/0.45/0.47
Self-reported effort language gr 6_start	3.39	0.59	1.00	5.00	0.18	1.35	
Self-reported effort language gr 6_middle	3.18	0.51	1.00	5.00	−0.21	1.49	
Self-reported effort math gr 5_middle	3.60	0.67	1.00	5.00	0.09	0.23	0.06/0.52/0.42
Self-reported effort math gr 6_start	3.59	0.69	1.00	5.00	−0.06	0.69	
Self-reported effort math gr 6_middle	3.70	0.60	1.00	5.00	−0.33	0.95	
Teacher-reported effort gr 5_middle	3.43	0.96	1.00	5.00	−0.38	−0.33	0.04/0.61/0.34
Teacher-reported effort gr 6_start	3.43	0.83	1.00	5.00	−0.45	−0.24	
Teacher-reported effort gr 6_middle	3.52	0.83	1.00	5.00	−0.44	−0.21	
Achievement language gr 4	35.49	13.28	1.00	114.00	0.55	1.80	0.12/0.55/0.33
Achievement language gr 5	43.52	13.63	6.00	88.00	0.38	0.26	
Achievement language gr 6	55.57	14.47	19.00	100.00	0.21	0.01	
Achievement math gr 4_end	85.47	14.47	29.00	124.00	−0.44	0.62	0.12/0.51/0.36
Achievement math gr 5_middle	96.00	14.35	42.00	141.94	−0.37	0.56	
Achievement math gr 5_end	102.67	12.02	57.00	139.47	−0.37	0.46	
Achievement math gr 6_middle	106.90	12.55	69.45	141.00	−0.28	0.10	

background, SES, and cognitive abilities. More specifically, with regard to self-reported effort in language, it was found that students with an approach-oriented and a moderate/indifferent profile scored significantly higher than students with a multiple goals profile ($b = .64, p < .001$; $b = .43, p = .010$, respectively), but both groups also showed a more negative development in self-reported effort compared to students with a multiple goals profile, which is apparent from the negative interaction between these goal profiles and time ($b = -.18$, $p = .007$; $b = -.13$, $p = .039$, respectively). Hence, as can be seen in Figure 2, the overall scores for the approach-oriented and moderate/indifferent profiles on self-reported effort were higher on all three measurement waves, but (slightly) declined, whereas students in the multiple goals profiles showed a (slight) increase in self-

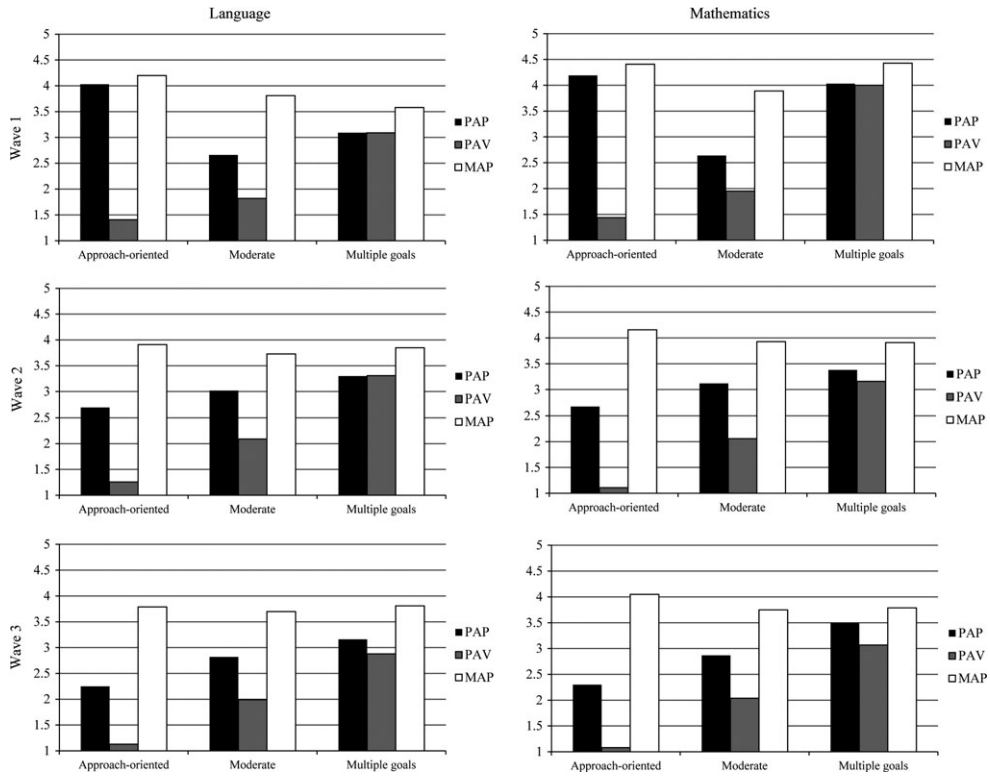

Figure 1. Achievement goal scores in different profiles across waves and domains. Reprinted from Authors (2015). Reprinted with permission.

reported effort. The effect size for the mean difference in self-reported effort between approach- and multiple goals students can be considered medium (d = .61) and small (d = .31) for the difference between moderate and multiple goals students. The effect sizes for differences in developments over time in self-reported effort could both be considered small (d = −.23 and d = −.03 for the approach-oriented and moderate profiles versus the multiple goals profile, respectively). Transitioning from one profile to another did not result in differences in self-reported effort compared to students who did not transition.

Furthermore, it was found that differences in teacher-reported effort between students with an approach-oriented or a moderate/indifferent profile and students with a multiple goals profile did not reach significance (b = 0.47, p = .053; b = 0.46, p = .058, respectively). However, even though these effects did not reach significance, the effect sizes indicate medium-sized effects (d = .47 and d = .52 for the approach-oriented and moderate profiles versus the multiple goals profile, respectively). Transitioning to another profile was not associated with different developments in teacher-reported effort over time.

With regard to language achievement (Figure 3), we did not find an association between profile membership and average achievement scores (b = 2.29, p = .539; b = 2.06, p = .573, for the approach-oriented and moderate/indifferent profile, respectively). However, students with an approach-oriented or moderate profile showed stronger increases in language achievement over time (b = 3.28, p = .019; b = 3.28, p = .049) compared to students with a multiple goals profile. The effect sizes for these

Table 2. Most prevalent transition patterns for reading comprehension and mathematics

Language			Mathematics		
Latent class pattern	*N*	%	Latent class pattern	*N*	%
Moderate (stable)	327	46.78	Moderate (stable)	373	52.98
Approach (stable)	201	28.76	Approach (stable)	196	27.84
Multiple goals → moderate → moderate	46	6.58	Multiple goals → Moderate → Moderate	31	4.40
Multiple goals → Multiple goals → moderate	39	5.58	Multiple goals (stable)	31	4.40
Moderate → Approach → Approach	19	2.72	Approach → Approach → Moderate	23	3.27
Multiple goals (stable)	18	2.58	Moderate → Moderate → Approach	11	1.56
Other	49	7.00	Other	39	5.55

Note. Reprinted from Jansen in de Wal *et al.* (2016). Reprinted with permission.

differences in achievement gains could both be considered medium (d = .56 and d = .46 for the approach-oriented and moderate profiles versus the multiple goals profile, respectively). Moreover, students who transitioned from a multiple goals to a moderate/indifferent profile also showed a stronger increase in language achievement over time as apparent from the significant interaction with time (b = 4.04, p = .012) compared to students who maintained a multiple goals profile. Cohen's d for this difference was .67, which can be considered a large difference.

Relationships between students' achievement goal profiles in mathematics and effort and achievement in math

In Table 4, the results of the final multilevel models for mathematics are reported in which we also controlled for gender, ethnic background, SES, and cognitive abilities. Figures 4 and 5 depict these outcomes graphically. Students with an approach-oriented and a moderate/indifferent profile appeared to score higher on self-reported effort in mathematics than students with a multiple goals profile, which was in line with our hypotheses, but these differences failed to reach significance (b = 0.23, p = .090; b = −.24, p = .056, respectively). Effect sizes suggest a small and a small to medium effect (d = .23 and d = −.36, respectively). All three profiles showed similar developments in self-reported effort over time, and transitioning from one profile to another did not result in differences in self-reported effort compared to students who did not transition. Yet, as shown in the graph in Figure 4, the group who transitioned from a moderate to an approach-oriented profile showed strong gains in self-reported effort compared to the other groups. The effect size for the difference in effort gains was d = .79, which can be considered a large effect. Nonetheless, given the small number of students who made this particular transition (N = 11), this number has to be interpreted with caution.

For teacher-reported effort, it was found that students with an approach-oriented profile in math were rated significantly higher on effort by their teachers than students with a multiple goals profile (b = 0.37, p = .033), whereas the difference between students with a moderate/indifferent profile compared to multiple goals students did not reach significance (b = 0.31, p = .053). For both the approach-oriented and moderate

Table 3. Multilevel final model results of associations between students' achievement goal profiles and developments in self-reported school effort in language, teacher-reported effort, and language achievement

	Self-reported effort language		Teacher-reported effort		Language achievement	
	Coefficient	*SE*	Coefficient	*SE*	Coefficient	*SE*
Fixed effects						
Intercept	3.04***	0.17	3.03***	0.25	18.44***	3.83
Time	0.05	0.06	0.09	0.09	7.31***	1.33
Control variables						
Gender (boy)	−0.13***	0.03	−0.45***	0.05	−0.73	0.78
Ethnicity (non-Western minority)	0.22***	0.06	−0.09	0.09	−3.26*	1.52
SES medium vs. low	0.05	0.05	0.21*	0.08	4.74***	1.24
SES high vs. low	0.05	0.06	0.32*	0.09	8.07***	1.36
Categories	0.00	0.01	0.02	0.01	0.74***	0.16
Analogies	0.00	0.01	0.03***	0.01	0.90***	0.12
Profiles						
Profile approach vs. Multiple goals	0.64***	0.17	0.47†	0.24	2.29	3.72
Profile moderate vs. Multiple goals	0.43*	0.17	0.46†	0.24	2.06	3.65
Profile approach vs. Multiple goals × time	−0.18**	0.07	−0.07	0.09	3.28*	1.39
Profile moderate vs. Multiple goals × time	−0.13*	0.07	−0.06	0.09	2.70*	1.37
Transitions						
Transition multiple–Multiple–Moderate vs. no transition	0.22	0.20	0.18	0.28	−3.98	4.29
Transition multiple–Moderate–Moderate vs. no transition	0.23	0.19	−0.11	0.28	0.54	4.20
Transition moderate–Approach–Approach vs. no transition	0.00	0.16	0.11	0.23	−0.80	3.56
Transition multiple–Multiple–Moderate vs. no transition × time	−0.10	0.08	−0.08	0.10	4.04*	1.61
Transition multiple–Moderate–Moderate vs. no transition × time	−0.07	0.07	0.02	0.10	1.33	1.57
Transition moderate–Approach–Approach vs. no transition × time	0.05	0.06	0.04	0.09	−0.21	1.33
Random effects						
Variance class	0.01	0.01	0.02	0.01	14.64	5.39
Variance student	0.13	0.01	0.35	0.03	73.40	5.43

Continued

Table 3. (*Continued*)

	Self-reported effort language		Teacher-reported effort		Language achievement	
	Coefficient	*SE*	Coefficient	*SE*	Coefficient	*SE*
Variance time	0.14	0.01	0.26	0.01	64.00	2.51
R^2 class (%)	46.3[a]	12.4[b]	43.2[a]	27.5[b]	0.0[a]	0.0[b]
R^2 student (%)	7.4[a]	3.0[b]	25.5[a]	9.0[b]	31.2[a]	4.3[b]
R^2 time (%)	2.2[a]	2.2[b]	0.0[a]	0.0[b]	34.2[a]	0.0[b]
Deviance (χ^2)	379.89***[a]	346.49***[b]	621.70***[a]	500.66***[b]	1833.73***[a]	1635.51***[b]

Notes. [a]R^2/defiance compared to empty model (m0).
[b]R^2/defiance compared to control variable model (m1).
$^{\dagger}p < .10$; $*p < .05$; $**p < .01$; $***p < .001$.

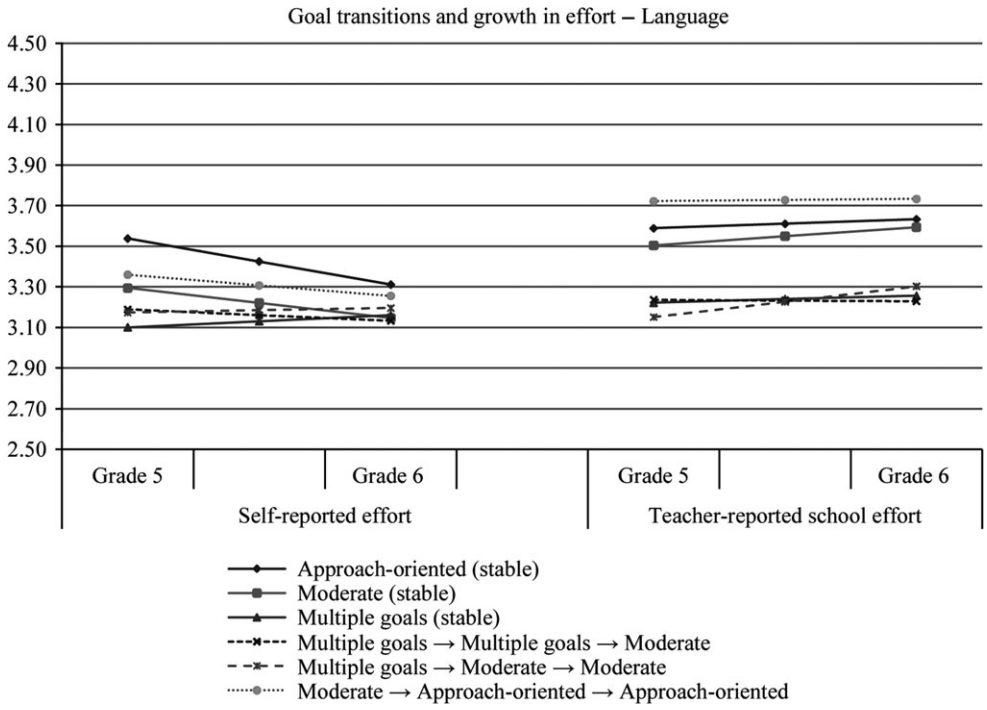

Figure 2. Mean scores on self-reported effort in language for language-specific goal profiles and transition patterns across waves.

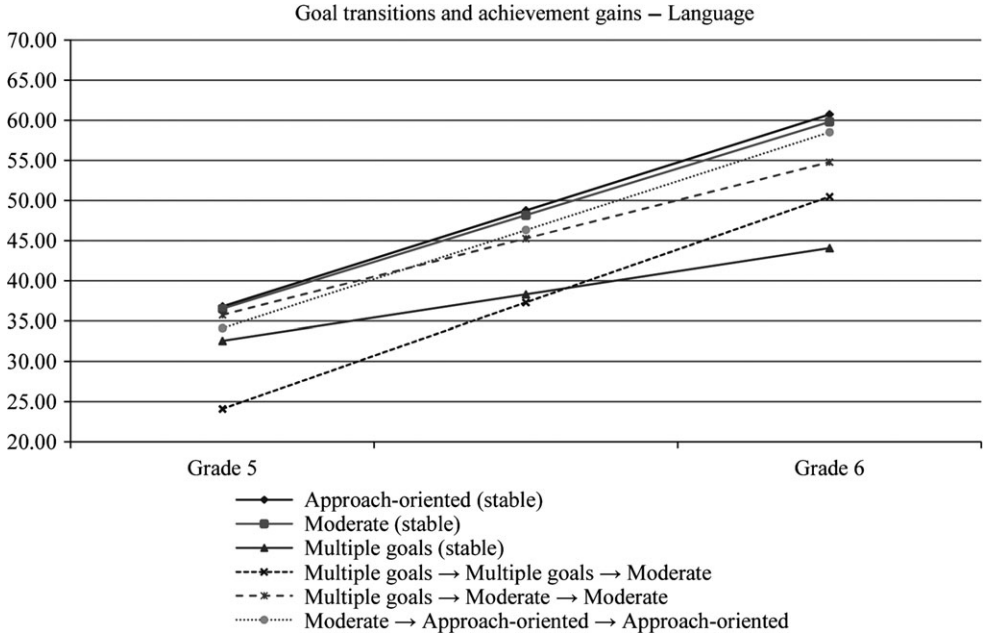

Figure 3. Mean scores in language achievement for language-specific goal profiles and transition patterns across waves.

Table 4. Multilevel final model results of associations between students' achievement goal profiles and developments in self-reported school effort in mathematics, teacher-reported effort, and mathematics achievement

	Self-reported effort math		Teacher-reported effort		Math achievement	
	Coefficient	*SE*	Coefficient	*SE*	Coefficient	*SE*
Fixed effects						
Intercept	3.84***	0.15	3.03***	0.19	83.82***	2.82
Measurement	0.03	0.05	−0.02	0.06	4.10***	0.86
Control variables						
Gender (boy)	0.07†	0.04	−0.45***	0.05	3.31***	0.74
Ethnicity (non-Western minority)	−0.32***	0.07	0.11	0.09	2.63†	1.45
SES medium vs. low	0.00	0.06	0.18*	0.08	3.40**	1.17
SES high vs. low	−0.02	0.07	0.29**	0.09	6.16***	1.28
IQ_figures	0.02†	0.01	0.02	0.01	0.70***	0.17
IQ_exclusion	0.01	0.01	0.04***	0.01	1.03***	0.17
IQ_numbers	0.03**	0.01	0.03*	0.01	1.09***	0.17
Profiles						
Profile approach vs. Multiple goals	0.23†	0.14	0.37*	0.17	1.17	2.35
Profile moderate vs. Multiple goals	−0.24†	0.13	0.31†	0.16	−2.07	2.19
Profile approach vs. Multiple goals*time	−0.02	0.06	0.05	0.07	0.95	0.93
Profile moderate vs. Multiple goals* time	0.05	0.05	0.06	0.07	1.52†	0.89
Transitions						
Transition multiple-Moderate-Moderate vs. no transition	0.12	0.18	0.34	0.24	1.31	3.27
Transition approach-Approach-Moderate vs. no transition	0.18	0.18	−0.03	0.23	−3.18	3.11
Transition moderate-Moderate-Approach vs. no transition	0.08	0.24	−0.54†	0.31	1.00	4.23
Transition multiple-Moderate-Moderate vs. no transition × time	−0.01	0.07	−0.11	0.09	0.76	1.23
Transition approach-Approach-Moderate vs. no transition × time	−0.02	0.07	0.02	0.08	1.07	1.13
Transition moderate-Moderate-Approach vs. no transition × time	0.07	0.09	0.25*	0.11	0.70	1.56
Random effects						
Variance class	0.01	0.01	0.02	0.01	16.68	5.51
Variance student	0.18	0.01	0.36	0.03	68.35	4.77

Continued

Table 4. (*Continued*)

	Self-reported effort math		Teacher-reported effort		Math achievement	
	Coefficient	*SE*	Coefficient	*SE*	Coefficient	*SE*
Variance time	0.17	0.01	0.26	0.01	48.87	1.90
R^2 class (%)	72.4[a]	46.6[b]	46.1[a]	21.1[b]	0.0[a]	0.0[b]
R^2 student (%)	18.3[a]	11.7[b]	22.4[a]	4.8[b]	34.7[a]	4.9[b]
R^2 time (%)	4.0***,[a]	4.0***,[b]	0.2***,[a]	0.2***,[b]	0.0***,[a]	0.0***,[b]
Deviance (χ^2)	464.64***,[a]	410.74***,[b]	511.26***,[a]	386.26***,[b]	1473.57***,[a]	1251.06***,[b]

Notes. [a]R^2/defiance compared to empty model (m0).
[b]R^2/defiance compared to control variable model (m1).
$^{\dagger}p < .10$; $*p < .05$; $**p < .01$; $***p < .001$.

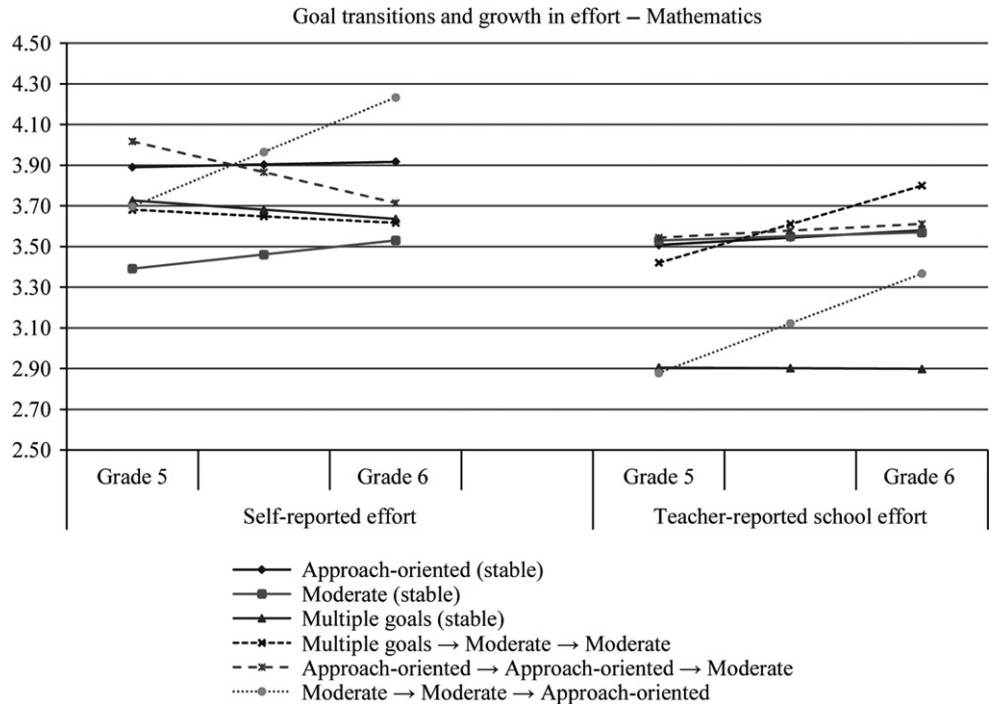

Figure 4. Mean scores on self-reported effort in mathematics for mathematics-specific goal profiles and transition patterns across waves.

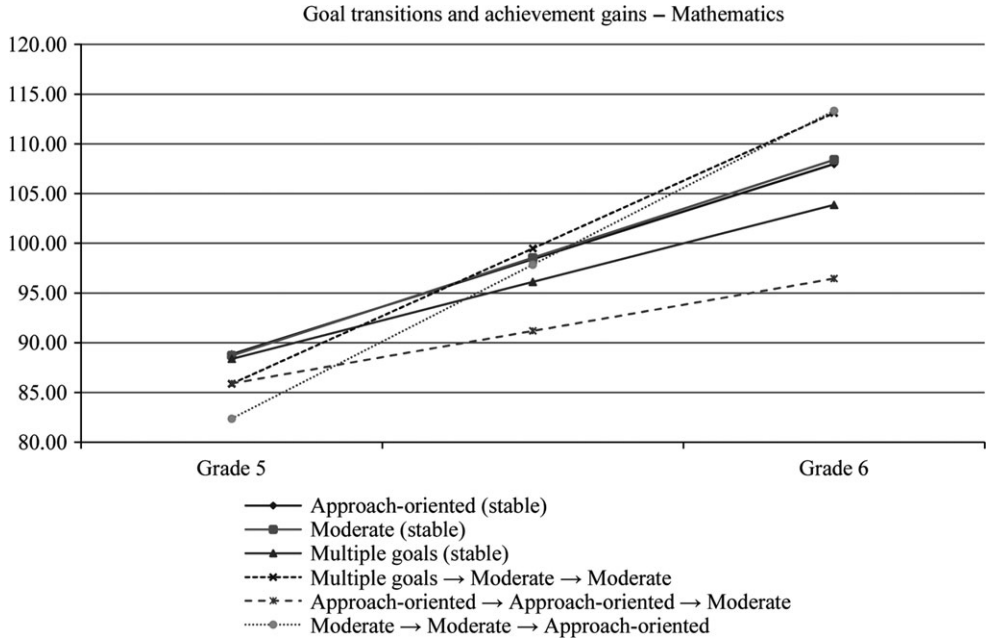

Figure 5. Mean scores in mathematics achievement for mathematics-specific goal profiles and transition patterns across waves.

profile, the difference with the multiple goals profile can be considered large (d = .69 and d = .68, respectively). All three profiles showed similar developments in self-reported effort (i.e., the interactions with time were not significant). When students transitioned from a moderate to an approach-oriented profile, their teachers' ratings of effort increased compared to students who did not make a transition (b = 0.25, p = .032), which can be considered a medium-sized effect (d = .51).

Finally, even though the observed patterns of differences in math achievement appear to be in line with our hypotheses (Figure 5), we did not find any significant associations between profile membership and (developments in) mathematics achievement.

Discussion

The multiple goal perspective posits that certain combinations of achievement goals are more favourable than others in terms of educational outcomes (Harackiewicz *et al.*, 2002). The aim of this study was to examine whether students' achievement goal profiles are indeed associated with differential developments in effort and academic achievement in upper elementary school. In line with our hypotheses, we found meaningful and substantial associations between (transitions in) students' goal profiles and teacher-rated and self-reported effort and achievement outcomes in two distinct subject domains, beyond effects of cognitive ability and background characteristics. These results contribute to research on achievement goals by providing insight into the sustained benefits of adaptive versus maladaptive combinations of achievement goals.

Theoretically, a goal profile with relatively high mastery and performance-approach goals and relatively low performance-avoidance goals would be associated with the most adaptive educational outcomes (Harackiewicz *et al.*, 2002). The results of this study confirmed this expectation. Students with this profile reported the highest effort, were rated highest on effort by their teachers, and showed the largest achievement gains in language. Moreover, when students with a moderate profile transitioned to an approach-oriented profile, their teachers' ratings of their effort increased. Hence, an increase in the level of mastery goals combined with a decrease in the level of performance-avoidance goals resulted in positive developments in effort that were even substantial enough to be detected by their teachers. These findings extend cross-sectional research on goal profiles (Luo *et al.*, 2011; Meece & Holt, 1993; Ng, 2006), suggesting that students with seemingly adaptive goal profiles or students who transition to a more adaptive profile show more (growth in) school effort than students with less-adaptive goal profiles. From a practitioner's point of view, these results suggest that it might be beneficial to support teachers with intervention measures that stimulate the adoption of approach-oriented profiles.

Furthermore, students with a multiple goals profile (relatively high performance-avoidance goals, below-average mastery goals, and slightly above-average performance-approach goals) had the lowest scores on self-reported and teacher-rated effort, and showed less achievement gains in language compared to students in other profiles. These results extend earlier findings by Luo *et al.* (2011) and Tuominen-Soini *et al.* (2012), who both found that students with low mastery/high performance-avoidance profiles reported the lowest levels of effort in school. Earlier studies attributed these maladaptive educational outcomes solely to the adoption of performance-avoidance goals (Elliot, 1999; Elliot & Church, 1997; Elliot & Harackiewicz, 1996), as students with higher levels of performance-avoidance goals suffer relatively often from anxiety and self-handicapping (Church *et al.*, 2001; Darnon *et al.*, 2009; Elliot, 1999; Elliot & Church, 1997; Elliot &

Harackiewicz, 1996; Sideridis, 2005). To protect their self-worth, these students might not give as much effort when confronted with challenging tasks, which might explain the negative influence on achievement scores. However, the results of our study might also indicate that it is actually the combination of high performance-avoidance goals and relatively low mastery goals that cause lower levels of effort and achievement. It could be that these negative effects of performance-avoidance goals are especially likely when mastery goals are low. Adopting mastery goals has been associated with more beneficial learning strategies and higher levels of intrinsic motivation and interest (Elliott & Dweck, 1988; Elliot & McGregor, 2001; Grant & Dweck, 2003; Greene & Miller, 1996; Meece & Miller, 2001; Wolters, 2004). Thus, the effort and performance of students with a multiple goals profile could be suffering from a combination of lack of interest, self-handicapping strategies, and superficial learning strategies. As we did not find a profile that was relatively high on performance-avoidance and mastery goals, we cannot be certain whether the maladaptive outcomes of the multiple goals profile are attributable solely to high avoidance goals or the combination of relatively high avoidance goals with relatively low mastery goals. These results implicate, however, the importance of early recognition of this maladaptive goal profile by educational practitioners and offering interventions that encourage the adoption of a more beneficial goal profile.

Similar patterns of results were found for language and mathematics. In both subject domains, approach-oriented profiles or transitions to this profile were substantially associated with more favourable outcomes in self-reported effort and teacher-rated effort, whereas multiple goals profiles were associated with the least favourable effort outcomes. However, only in the domain of language, goal profiles were also associated with achievement outcomes. In mathematics, we found no differences in achievement between students with different goal profiles. As more beneficial goal profiles in mathematics did result in enhanced effort, but not in stronger achievement gains, this could suggest that students with favourable profiles in mathematics work harder, but not necessarily use the most effective strategies.

Limitations, future research, and implications

The group of students who made a transition was much smaller than the group of students who retained the same profile, which might have influenced the accuracy of the analyses that included transitions. Therefore, these results need to be interpreted with caution. A reason why only a small group of students made a transition in their goal profile during the study might have to do with the duration of the study which was only 1 year. Prolonging the time span of the study and/or including periods in which impactful changes in the learning environment occur, such as the transition from elementary to secondary school, might result in more transitions between achievement goal profiles and different types of transitions.

In all, the results imply that students are not a uniform group; instead, distinct motivational patterns can be distinguished among students, which can have long-term consequences for effort and achievement outcomes. Gaining insight into individual students' goal profiles will help practitioners to address the specific needs of different students. Moreover, research on individual goals (for a review, see Meece, Anderman, & Anderman, 2006) suggests that classroom practices that primarily promote social comparison and competition will diminish students' willingness to invest effort and will hinder achievement. Focusing on learning and individual progress instead might be more successful in terms of enhancing effort and achievement outcomes.

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Author contribution

Lisette Hornstra: data curation; formal analysis; supervision; writing – original draft, review & editing. Marieke Majoor: formal analysis; writing – original draft, review & editing. Thea Peetsma: supervision; funding acquisition; writing – review & editing.

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