Journal of Educational Psychology
2008, Vol. 100, No. 3, 655–671

0022-0663/08/$12.00 DOI: 10.1037/0022-0663.100.3.655

Achievement Goals and Achievement During Early Adolescence: Examining Time-Varying Predictor and Outcome Variables in Growth-Curve Analysis

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The present study advances understanding of (a) the development of achievement goals, (b) the changing association of achievement goals and achievement over time, and (c) the implications of changes in achievement goals for changes in achievement over time. African American and European American adolescents' ($N = 588$) achievement goals and subsequent achievement were assessed at 4 time points (fall and spring of 6th and 7th grades) and modeled using growth-curve analytic techniques. There was an overall decline in all 3 types of achievement goals (mastery, performance-approach, and performance-avoidance goals), because of within-year rather than between-year decreases. The association between mastery goals and achievement was null at Time 1 and then positive at the following 3 time points. The association between performance-approach goals and achievement went from negative to null across time. Changes in students' goals, as well as their initial levels of goals, were particularly important in understanding how mastery goals foreshadow achievement. The implications of the findings for both theory and practice are discussed.

Keywords: achievement goal orientation, middle-school transition, adolescence, motivation, achievement

A prominent construct in current theoretical models of motivation is the achievement goal (Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006). Research using an achievement-goal framework has flourished in recent years. Extant work has primarily focused on the relation of achievement goals to a variety of educationally relevant outcomes and the influence of different instructional contexts on achievement goals (Wigfield et al., 2006). There has been little longitudinal research on achievement goals. Thus, our understanding of how achievement goals change across time and the implications for students' achievement across time is incomplete. Therefore, in this article, we examine the developmental processes of achievement goals and achievement with a longitudinal research design and growth-curve analytic techniques that incorporate changes in the predictor variables (i.e., achievement goals) as well as the outcome variable (i.e., achievement). We begin with an overview of theory and research on the achievement-goal construct, highlighting why a longitudinal analytical approach is appropriate and will advance understanding of the nature of achievement goals and the consequences of achievement goals for achievement. We then discuss our approach and rationale for the three key questions that guide our longitudinal investigation: (a) What is the nature of the development of achievement goals? (b) Does the association between achievement goals and achievement change across time? and (c) Do changes in achievement goals have implications for changes in achievement?

Overview of Theory and Research on Achievement Goals

Achievement goals represent different orientations toward academic competence that students often have in achievement settings (see Elliot, 2005, for a review). Researchers have distinguished between a mastery goal (a focus on developing academic competence) and performance goals (a focus on demonstrating academic competence to others, especially via social comparisons of relative ability; e.g., Ames & Archer, 1988; Dweck & Leggett, 1988; Harackiewicz & Elliot, 1993; Nicholls, 1989). Researchers have found it is important to distinguish performance goals as approach oriented or avoidant oriented (Elliot & Church, 1997; Middleton & Midgley, 1997; Skaalvik, 1997). A performance-approach goal concerns a focus on demonstrating high competence and gaining positive judgments from others. A performance-avoidance goal concerns a focus on avoiding the demonstration of incompetence and preventing negative judgments from others. For example, a student with a mastery goal might reflect on such questions as "Am I learning? Have I improved my skills?"; a student with a performance-approach goal might reflect on such questions as "Do I look smart? Did I do better than others?"; and a student with a performance-avoidance goal might reflect on such questions as "Do I look dumb? Did I perform worse than others?"

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This article was based on a doctoral dissertation submitted by S. Serena Shim to the University of Illinois at Urbana–Champaign. We thank Eva Pomerantz and Phil Rodkin for the helpful suggestions and insightful comments they offered as part of S. Serena Shim's dissertation committee.

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Different goals set in motion disparate cognitive, emotional, and behavioral processes (Dweck & Leggett, 1988; Elliot, 2005). Achievement goals are viewed as a proximal influence on competence-relevant processes and outcomes; they are a precursor to behavior (i.e., why a student does something precedes whether, if, and how they actually do it; Elliot & Church, 1997). Personality or dispositional factors are postulated to partially explain individual differences in achievement goals (e.g., Dweck & Leggett, 1988; Elliot, 1999; Harackiewicz, Barron, & Elliot, 1998). However, theorists describe achievement goals as fluctuating in relation to different experiences in learning environments (Ames, 1992; Maehr & Midgley, 1996). Experimental work has been successful in orienting students to pursue different achievement goals (e.g., Butler, 1993; Elliot & Harackiewicz, 1996; Newman & Schwager, 1995). Observational work that links classroom experiences to personal goals is also evidence for this viewpoint (Linnenbrink, 2005; Patrick, Anderman, & Ryan, 2002; Turner, Meyer, & Midgley, 2003). Thus, achievement goals are conceptualized as dynamic and changing in relation to features of the context.

The analytic methods used to study the effects of goals have not captured the changing nature of achievement goals. The vast majority of quantitative research on the effects of achievement goals (i.e., goals as predictors) falls into one of three designs: (a) goals and outcomes measured together at one point in time (e.g., Middleton & Midgley, 1997; A. M. Ryan & Pintrich, 1997; Wolters, 2004), (b) goals measured at Time 1 and outcomes measured at Time 2 (e.g., Elliot, McGregor, & Gable, 1999; Grant & Dweck, 2003; Harackiewicz, Barron, Tauer, & Elliot, 2002), and (c) goals measured at Time 1 and outcomes measured at Time 1 and Time 2 (e.g., McGregor & Elliot, 2002; Senko & Harackiewicz, 2005; Shim & Ryan, 2005; Stipek & Gralinski, 1996). We propose that growth-curve analytic techniques that incorporate the changing nature of achievement goals are well suited to theoretical conceptualizations of achievement goals and provide a more complete understanding of the development of achievement goals and the consequences for achievement.

What Is the Nature of the Development of Achievement Goals?

Our first concern is to understand the nature of the development of achievement goals during early adolescence. Prior longitudinal research examining the development of achievement goals during early adolescence (i.e., goals as outcomes) has assessed achievement goals at two time points and found that a mastery goal declines and a performance-approach goal increases across the transition to middle school (E. M. Anderman & Midgley, 1997; L. H. Anderman & Anderman, 1999).[1] However, analyzing change across two time points provides a limited understanding of the development of achievement goals. At least three time points are needed to document a trend (Rogosa, 1988). Further, these studies have assessed achievement goals at one point in different grades, and thus, within- and between-school-year changes have not been disentangled. Changes in motivation over time within the same classroom environment may be different from changes that occur as students move into new classrooms or school environments. Such information is particularly important regarding the transition to middle school, given the long-standing concerns that middle-level schools are a major source of declines in motivation during early adolescence (see Eccles, Lord, Roeser, Barber, & Jozefowicz, 1997; Juvonen, Le, Kaganoff, Augustine, & Constant, 2004). Are there normative declines in achievement goals in progress prior to the transition? Are declines in achievement goals seen in the beginning of the middle-school year, or do they unfold during the first year in middle school? The present study addresses such unanswered questions and provides a more complete understanding of the nature of change in goals during early adolescence by estimating growth trajectories across four time points (data were collected in 6-month increments in the fall and spring of both sixth and seventh grades, spanning the transition to middle school). We examine the overall trend in development across the four time points as well as investigate the within- and between-year patterns of change that contribute to any documented trends.

We subsequently examine interindividual differences to see whether growth trajectories vary across individuals and, if so, whether some of this variation can be explained by gender and/or race. Findings regarding gender differences in achievement goals are not entirely consistent, but when differences are found, girls tend to be more mastery oriented than boys (e.g., Ablard & Lipschultz, 1998; Freeman & Anderman, 2005; Kenney-Benson, Pomerantz, Ryan, & Patrick, 2005; Meece & Holt, 1993; Nolen, 1988), and boys tend to be more performance oriented than girls (e.g., L. H. Anderman & Anderman, 1999; Middleton & Midgley, 2002; Roeser, Midgley, & Urdan, 1996; A. M. Ryan, Hicks, & Midgley, 1997; Stipek & Gralinski, 1996). There has been far less research on race differences in achievement goals, but some research suggests that African American students may be higher in mastery (e.g., Kaplan & Maehr, 1999; Middleton & Midgley, 2002) as well as performance-approach and performance-avoidance goals (Middleton & Midgley, 2002). However, given the limited longitudinal analyses of achievement goals, we do not know if gender and race relate to the development of goals across time or if the relation of gender and race to achievement goals changes across time. The relations of gender and race might differ when students are in elementary versus middle school, as both gender and ethnicity take on new significance. Gender and race differences may emerge or grow stronger as students cognitively mature and reflect on their identity in more complex ways during adolescence.

Does the Association Between Achievement Goals and Achievement Change Over Time?

Prior research on achievement goals and achievement has yielded inconsistent findings and spurred debate as to the consequences of achievement goals for achievement (Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002; Midgley, Kaplan, & Middleton, 2001). The consequences of achievement goals may change as students mature and move through the educational system (see Midgley et al., 2001). Growth-curve models that treat

[1] Several other studies have examined the relation of achievement goals across two time points (e.g., Middleton, Kaplan, & Midgley, 2004; or Gehlbach, 2006), but the focus was on stability across time (i.e., correlations, beta coefficients), not normative developmental trends (i.e., mean level differences between the two time points were not reported). Because our study focuses on developmental patterns, we do not review these stability coefficients here.

achievement goals as time-varying predictors are well suited to examine the changes in the achievement goal–achievement relation. To examine the implications of achievement goals for subsequent student achievement, we incorporate the measurements of achievement goals at all four time points into our models for achievement and test whether the effects of goals on subsequent achievement are consistent over time. Because a performance-avoidance goal has consistently been found to be negatively associated with achievement, our focus is on the associations between mastery and performance-approach goals and achievement. When effects are found, a mastery goal is positively related to achievement for younger students (e.g., Kaplan & Maehr, 1999; Midgley & Urdan, 1995; Roeser et al., 1996; A. M. Ryan, Patrick, & Shim, 2005; Wentzel, 1993; Wolters, Yu, & Pintrich, 1996; but see also Pajares, Britner, & Valiante, 2000; Pajares & Valiante, 2001; Pintrich, 2000; Skaalvik, 1997, for studies documenting no relation).[2] A mastery goal has consistently been found to have no association with achievement for college students (see Harackiewicz, Barron, Pintrich, et al., 2002, for a review). A performance-approach goal has been found to have no association with achievement for younger students (e.g., Pajares et al., 2000; Pajares & Valiante, 2001; but see A. M. Ryan et al., 2005, for a study documenting a negative relation). However, a performance-approach goal has consistently been found to have a positive association with achievement for college students (see Harackiewicz, Barron, Pintrich, et al., 2002, for a review). As students advance through the educational system, the context becomes more competitive (e.g., grading on a curve), and a mastery goal may be less adaptive, whereas a performance-approach goal may be more adaptive for achievement. The transition to middle school represents such a change in context (see Eccles, 2005, for a review), and thus, our longitudinal study spanning this transition is at an appropriate time to examine whether the association of achievement goals to achievement changes.

Do Changes in Achievement Goals Have Implications for Changes in Achievement?

Motivational research most typically emphasizes interindividual effects, compared with intraindividual effects. Interindividual effects concern variations between students and document if high or low scores on an aspect of motivation, compared with other students, explain variation in engagement or achievement. Intraindividual effects concern the changes in individuals' motivation that occur across time and document if such within-individual fluctuations are important for changes in engagement or achievement. Our first two research questions concern interindividual analyses and identify general patterns across students (the first pertaining to the development of goals and the second pertaining to the associations of goals to achievement across time). However, we expect that there is variability in those general patterns between students. For example, we may document a general decline in mastery goals over time, but not all students will conform to this general pattern. Our third research question concerns intraindividual analyses and examines the implications for achievement of varying within-individual patterns of change in achievement goals. Examining intraindividual effects contributes to a more complete understanding of how motivational beliefs may support or hinder achievement across time.

Prior research has incorporated intraindividual change in achievement goals using residual scores (Time 2 goal scores are regressed on Time 1 goal scores; see Meece & Miller, 2001). Another approach used was the creation of change scores (goal scores at Time 2 minus goal scores at Time 1; see Gehlbach, 2006). Such studies concluded that when a mastery goal declines, various aspects of engagement, as well as achievement, decline, and when a mastery goal increases, engagement and achievement increase. Another similar study examined change scores in students' perceptions of teacher encouragement of different achievement goals and found that when students' perceptions of their teacher emphasizing mastery goals declined from one year to the next, their engagement and achievement declined (Urdan & Midgley, 2003). No effects for performance goals were found in any of these studies; however, performance-approach and performance-avoidance goals were not distinguished (Gehlbach, 2006; Urdan & Midgley, 2003) or not examined (Meece & Miller, 2001).

Such research recognizes the importance of intraindividual change in achievement goals but does not provide a complete understanding of the implications of changes in students' achievement goals. These analytic approaches examine the direction of change but do not incorporate the general level of achievement goals during the two time periods (e.g., in Urdan & Midgley's 2003 study, approximately three fifths of students were categorized as "no-change," and within this group were students whose goal scores were high, medium, or low at both time points). In contrast, we use growth-curve models to capture both the level of achievement goals and the pattern of change within students across four time points. We include two predictors: students' achievement-goal scores at Time 1 (termed baseline score) and deviations from their Time 1 achievement-goal scores (termed $DevT_1$ score). A baseline score, the most typical predictor examined in longitudinal analyses indicates whether students' achievement goals at the beginning of the study predict the growth trajectory in achievement over time. The $DevT_1$ scores indicate whether gains and losses from Time 1 scores are also important. By including both predictors, we are able to ascertain whether changes in achievement goals, beyond students' initial levels of achievement goals, contribute to an understanding of students' achievement trajectories during early adolescence.

Overview of the Present Research

In summary, in the present study, we use a longitudinal design and growth-curve analytic techniques to advance understanding of

[2] Achievement refers to student grades, not standardized tests. This is appropriate to compare patterns between younger students in public schools and college students, as college students do not routinely take standardized tests, and thus, research on college students' achievement goals and achievement has examined grades as a measure of achievement. In addition, the present study uses grades as an indicator of student achievement, so it makes sense to focus the literature review in this way. Further, in our review of the relationship between achievement goals and achievement, we examine the zero-order correlations, not the unique effects of goals above and beyond other achievement-related variables in multiple regression models. These types of multiple regression models vary greatly across studies and include variables that may be mediators of the relationship between achievement goals and achievement, which is not the focus of the present study.

(a) the normative patterns of development of achievement goals, (b) the potentially changing association of achievement goals and achievement over time, and (c) the implications of within-individual changes in achievement goals (with attention to both direction of change and level of goals) for changes in achievement over time. Our longitudinal design includes four measurements of achievement goals in the fall and spring of sixth and seventh grades. Consistent with our conceptualization that achievement goals predict achievement, our four measurements of achievement (i.e., grade-point average [GPA] computed from report card grades) were collected at the end of the corresponding semesters and thus encompass achievement that extends beyond the measure of achievement goals. When we examined the associations of achievement goals to achievement across time, we controlled for prior achievement (i.e., fifth-grade GPA) because relations between achievement goals and achievement are reciprocal and we wanted to examine the effects of achievement goals on achievement above and beyond the contribution of prior achievement history (see Brophy, 2005; Senko & Harackiewicz, 2005, for a discussion of these issues).

Method

Procedure

The data were collected as part of the University of Illinois at Urbana–Champaign Adolescent Transitions Project, which is a 2-year longitudinal study examining changes in academic and social adjustment across the transition to middle school. Participants attended 1 of 15 elementary schools when they were in sixth grade and moved into one of three middle schools when they were in seventh grade. These predominantly low-income schools (the average rate of eligibility for free or reduced fee lunch was 66% across the elementary schools and 59% across the middle schools) served nonmetropolitan, small urban communities.

Letters describing the project were given to all students to take home to their parents 2 weeks prior to each data collection. The average mobility rate (average percentage of students who transfer in or out of the school within an academic year) in these schools was high (22% across the elementary schools and 24% across the middle schools), and thus, we maximized the sample size by recruiting new students at each time point. If parents did not want their children to participate in the study, they were instructed to have their child return an attached form to the teacher, to call the school, or to call the researchers at the university number provided on the letter. Fewer than 5% of the parents declined to have their child participate at any time point.

Surveys were administered to students in their classrooms. Instructions and items were read aloud while students read along and responded. Students were told that the purpose of the survey was to find out about students' beliefs and behaviors and that completing it was voluntary. Students were assured that the information in the survey would be kept confidential. We visited the schools on 1 additional day to administer make-ups for students who were absent for survey administration.

Participants

A total of 738 students participated in the study at Time 1 and had complete information regarding their achievement goals and achievement. At subsequent time points, we lost some students from our sample (88, 182, and 110, at Times 2, 3, and 4, respectively) and gained some new students (110, 280, and 40, at Times 2, 3, and 4, respectively). Sample instability was due to two factors: school participation and mobility rates. Regarding school participation, we lost some students who went to a nonparticipating middle school and gained some students from nonparticipating elementary schools (in total, three elementary schools and one middle school chose not to participate). After these students were accounted for, the sample instability was comparable with the mobility rates reported by the state for these schools. Because we were examining developmental changes over the middle-school transition, only those students who actually made the transition into middle school (i.e., had data for at least one time point in elementary school and at least one time point in middle school) were included in the analyses. Students who were not African American or European American were dropped because there were too few ($n = 30$) to examine ethnic differences. These restrictions yielded a sample of 588 students (56% girls, 44% boys; 60% African American, 40% European American). There were no significant differences between students in our longitudinal sample and students excluded from our longitudinal sample (i.e., had data at only one of the time points) on achievement goals or achievement at any of the four time points.

Measures

Achievement goals. We used the Patterns of Adaptive Learning Survey (Midgley et al., 1997) to assess achievement goals. *Mastery-approach goal* items (six items) refer to a focus on developing academic competence (e.g., "An important reason I do my work is because I want to improve my skills"). Mastery-avoidance goals are not measured in the present study, and thus, mastery-approach goals are referred to as *mastery goal*s hereafter. *Performance-approach goal* items (five items) refer to a focus on demonstrating high academic competence relative to other students in the class (e.g., "I like to show my teacher that I'm smarter than the other students in my class"). *Performance-avoidance goal* items (five items) concern a focus on avoiding looking inferior relative to other students in the class ("An important reason I do my work is so that the teacher doesn't think I know less than others"). Goals were found to be reliable in the present sample (see Table 1 for alpha coefficients).

Achievement. Students' grades in reading, math, science, English, and social studies were collected from their school records. The grades were coded 1 (*F*) through 13 (*A*+). We computed a GPA for each semester by taking the mean of the five subject grades.

Handling Missing Data

Hierarchical linear modeling (HLM) is flexible in handling missing data at Level 1, but it cannot handle missing values at Level 2. In the current study, we control for prior GPA and use Time 1 achievement goals to calculate the deviation from Time 1 scores ($DevT_1$). Thus, we had four important Level 2 variables (fifth-grade GPA and three Time 1 achievement goals), and students who joined the study after Time 1 did not have these variables. To include the maximum number of students in the

Table 1
Means, Standard Errors, and Reliabilities of Achievement Goals and GPA

	Mastery goals			Performance-approach goals			Performance-avoidance goals			GPA	
Time	*M*	*SE*	α	*M*	*SE*	α	*M*	*SE*	α	*M*	*SE*
1	3.59	.04	.79	3.34	.04	.75	3.29	.05	.72	7.82	.11
2	3.42	.04	.80	3.00	.05	.78	2.92	.05	.75	7.93	.11
3	3.41	.04	.78	3.04	.05	.80	2.89	.05	.66	6.74	.13
4	3.30	.04	.82	2.95	.05	.82	2.77	.05	.67	6.19	.13

Note. GPA = grade point average. Means are averaged from five data sets through PROC MIANALYZE (SAS, 2003).

analyses, missing values for these Level 2 variables were imputed. A fundamental weakness of single value imputation techniques (e.g., mean substitution, person mean substitution, regression imputation) is the underestimation of standard errors, which affects Type I errors (Allison, 2002; Newman, 2003). To avoid this problem, we employed a multiple imputation (MI) method to fill in the missing data. A strength of MI estimate is the decreased sensitivity to violations of multivariate normality (Allison, 2002). In addition, the MI paradigm neither requires nor assumes that nonresponse is ignorable (Schafer, 1997). MI has been used in HLM contexts (Dearing, Kreider, Simpkins, & Weiss, 2006) to deal with missing predictors at Level 2. In MI, a complete data set is created by filling in a random value for each missing data point. This procedure is repeated to create multiple complete data sets, each of which is subsequently analyzed.

Given that 16% of the participants had one or more missing values, we created five independent data sets to obtain 95% of efficiency (Rubin, 1987, p. 114).[3,4] Then correlations, *t* tests, and HLM analyses were performed on the five imputed datasets. We used PROC MIANALYZE (SAS, 2003) to combine the results from these five data sets and generate valid statistical inference of the parameters. PROC MIANALYZE provides a *t* test, taking into consideration both within- and between-imputation variance.

Results

Analyses and Model Specification

The estimated means, standard errors, and reliability coefficients for achievement goals and GPA are provided in Table 1. The presented means are estimated based on the five imputed datasets. Our growth trajectories were fitted to data using PROC MIXED in SAS (Version 9.1; SAS, 2003) with maximum-likelihood estimation.[5] Robust standard errors (which are less biased, even when the random structure of the model is misspecified) were used for testing the fixed effects. All models were simplified until all fixed effects reached significance ($p < .05$). Gender, race, and their interaction terms were tested in preliminary analyses and retained in the final models only when significant. When it yielded a better model fit to data, gender and racial group membership with four categories was used instead of gender or race separately.

What Is the Nature of the Development of Achievement Goals?

To estimate the general trend of the development of achievement goals across four time points, we estimated three growth-curve models with each achievement goal as an outcome variable. We estimated the following growth-curve model to examine the general changes in each achievement goal across the four time points:

$$\text{Level 1: } \text{Goal}_{ij} = \beta_{0j} + \beta_{1j}(\text{Time})_{ij} + \varepsilon_{ij}$$

$$\text{Level 2: } \beta_{0j} = \gamma_{00} + U_{0j}$$
$$\beta_{1j} = \gamma_{10} + U_{1j},$$

where β_{0j} and β_{1j} are the random intercepts and slopes, respectively, and γ_{00} and γ_{10} are the fixed intercepts and slopes, respectively.

The estimated intercepts, which are the average starting points for the population, were 3.57 for mastery goals (95% confidence interval [CI] = 3.49, 3.64), 3.25 for performance-approach goals (95% CI = 3.17, 3.34), and 3.21 for performance-avoidance goals (95% CI = 3.11, 3.30), respectively. All three types of achievement goals showed a general decline over time, as indicated by the estimated fixed effects of time in each of the three models. Mastery goals declined by −.09 (95% CI = −.12, −.06). Performance-approach goals declined by −.11 (95% CI = −.15, −.08). Performance-avoidance goals declined by −.16 (95% CI = −.20, −.12). There was significant individual variability in both the initial levels and rates of changes of the growth trajectories of all three types of achievement goals, as indicated by the random parts of the three models (see Table 2).

There were substantively meaningful distinctions between each of four time points (between Times 1 and 2, children had one teacher in an elementary-school classroom; between Times 2 and 3, children made the transition to a new middle-school environment; and between Times 3 and 4, children rotated amongst different teachers in middle school). We conducted a series of *t*

[3] We imputed missing values in all variables to do descriptive analyses, *t* tests, and correlations. Level 1 variables do not need to be imputed to conduct HLM.

[4] We ran the analyses with the complete data subset (i.e., the subset of students for whom there were no missing data) without imputing missing values, and the conclusions were identical.

[5] Unstructured variance–covariance matrices for the intercepts and slopes were fit. Various Level 1 error covariance matrices, such as autocorrelated errors, moving average, and autocorrelated moving average were examined in the preliminary analyses, but the inclusion of additional parameters was not warranted by likelihood-ratio test. Thus, $\sigma^2 I$ (constant and uncorrelated Level 1 error structures) was used for error covariance matrices.

tests to examine changes in goals across different time points (see Table 3 for the results). The results have shown significant mean differences in all three achievement goals between Times 1 and 2 and between Times 3 and 4. There were no significant mean differences in any of the three achievement goals between Times 2 and 3. Thus, declines were more pronounced within, rather than between, school years. Declines within the school year occurred in both elementary and middle school. The declines that occurred between the end of elementary and the beginning of middle school were not significant, indicating that the middle-school transition was not the major contributing source to the overall pattern of decline found for achievement goals during early adolescence.

Next, we examined whether gender and/or race explained variation in students' growth trajectories in achievement goals (see Table 4 for the results). We entered gender and race as Level 2 predictors in the growth-curve models to examine whether the initial levels (i.e., the intercept) and rates of change (i.e., the slope) of achievement goals are a function of these variables. The HLM equation to estimate the gender and racial differences in the changes in achievement goals across the four measurements takes the following form:

$$\text{Level 1: } \text{Goal}_{ij} = \beta_{0j} + \beta_{1j}(\text{Time})_{ij} + \varepsilon_{ij}$$

$$\text{Level 2: } \beta_{0j} = \gamma_{00} + \gamma_{01}(\text{Gender})_j + \gamma_{02}(\text{Race})_j + \gamma_{03}(\text{Gender} \times \text{Race})_j + U_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}(\text{Gender})_j + \gamma_{12}(\text{Race})_j + \gamma_{13}(\text{Gender} \times \text{Race})_j + U_{1j},$$

where $\text{Gender}_j = 0$ for boys and 1 for girls and $\text{Race}_j = 0$ for European American and 1 for African American.

Table 2
General Trend of Changes in Achievement Goals

Model parameter	Estimate	*SE*	*df*	*t*
Mastery goals				
Fixed-effect parameter				
M initial level	3.57	.04	110	87.60***
M growth rate	−0.09	.02	92	−5.77***
Variance parameter				
Initial status	0.55	.05	8596	11.55***
Covariance	−0.08	.02	101	−4.60***
Linear growth rate	0.04	.01	19	4.43***
Level 1 error	0.34	.02	18	17.66***
Performance-approach goals				
Fixed-effect parameter				
M initial level	3.25	.04	479	78.45***
M growth rate	−0.11	.02	333	−7.23***
Variance parameter				
Initial status	0.58	.06	1000	10.13***
Covariance	−0.01	.02	76	−0.45
Linear growth rate	0.03	.01	19	2.88***
Level 1 error	0.48	.02	56	20.74***
Performance-avoidance goals				
Fixed-effect parameter				
M initial level	3.21	.05	267	67.56***
M growth rate	−0.16	.02	230	−8.37***
Variance parameter				
Initial status	0.65	.08	157	8.39***
Covariance	−0.05	.03	38	−1.80
Linear growth rate	0.04	.02	22	2.23*
Level 1 error	0.73	.04	25	18.73***

Note. *df*s are from PROC MIANALYZE (SAS, 2003), not from hierarchical linear modeling.
*$p < .05$. ***$p < .001$.

Table 3
Mean Differences in Achievement Goals at Four Time Points

Comparison	*M* difference	95% Confidence interval	*SE*	*df*	*t*
Mastery goals					
Time 1-2	.17	.09, .24	.04	1867	4.39***
Time 2-3	.02	−.06, .10	.04	121	0.49
Time 3-4	.10	.03, .17	.04	112	2.90**
Performance-approach goals					
Time 1-2	.33	.24, .43	.05	553	7.25***
Time 2-3	−.04	−.12, .04	.04	99	−0.85
Time 3-4	.09	.01, .18	04	127	2.24*
Performance-avoidance goals					
Time 1-2	.38	.25, .50	.06	68	6.15***
Time 2-3	.02	−.09, .15	.06	52	0.45
Time 3-4	.12	.02, .21	.02	233	2.35*

Note. *t*-test results from five imputed data sets were averaged through PROC MIANALYZE procedure (SAS, 2003). Thus, *df*s are from PROC MIANALYZE, not from *t* tests.
*$p < .05$. **$p < .01$. ***$p < .001$.

A Mastery Goal

Gender and race were associated with the initial level but not the rate of change in mastery goals. Female students started out with higher levels of mastery goals than did male students. African American students had higher levels of mastery goals than did European American students. The finding that neither gender nor race predicted the slope means that these group differences remained constant across the four time points. The separate main effects of gender and race on the intercept indicated that African American girls were the highest, followed by European American girls, African American boys, and European American boys (all pairwise comparisons were significant). Their level of mastery goals varied, but their growth trajectories moved in parallel fashion across time (see Figure 1).[6]

A Performance-Approach Goal

Gender and race were associated with both the initial level and the rate of change in performance-approach goals. There was a Gender × Race interactive effect on the intercept and a main effect of gender on the rate of change. The results indicated that African American boys had the highest level of performance-approach goals at all time points, compared with all other students. European American boys were similar to all girls initially but had higher

[6] Significant random effects were found in all three goal models. The results indicated that there was significant individual variability in both intercept and slope. However, this is not the focus of the current investigation and, hence, is not discussed.

Table 4
Gender and Race Differences in Changes in Achievement Goals

Model parameter	Estimate (95% confidence interval)	*SE*	*df*	*t*
	Mastery goals			
Initial status				
M initial status	3.81 (3.71, 3.90)	0.05	651	77.80***
Gender	−0.17 (−.28, −.06)	0.06	46975	−3.06**
Race	−0.36 (−.47, −.24)	0.06	1227	−6.15***
Linear change				
M change rate	−0.09 (−.12, −.06)	0.02	92	−5.77***
	Performance-approach goals			
Initial status				
M initial status	3.17 (3.03, 3.32)	0.07	1308	42.57***
Gender	0.31 (.10, .52)	0.11	56267	2.94**
Race	0.03 (−.17, .22)	0.10	1084	0.27
Gender × Race	−0.32 (−.60, −.03)	0.15	254	−2.17*
Linear change				
M change rate	−0.15 (−.20, −.11)	0.02	1272	−7.09***
Gender	0.09 (.02, .15)	0.03	1272	2.69**
	Performance-avoidance goals			
Initial status				
M initial status	3.03 (2.91, 3.14)	0.06	506	50.96***
Gender	0.39 (.25, .53)	0.07	801	5.39***
Linear change				
M change rate	−0.16 (−.20, −.12)	0.02	230	−8.37***

Note. Omitted categories are girls and African Americans. Estimates for boys and European Americans are shown in the table. *df*s are from PROC MIANALYZE (SAS, 2003), not from hierarchical linear modeling.
*$p < .05$. **$p < .01$. ***$p < .001$.

levels of performance-approach goals than did all girls later in time (see Figure 2).

A Performance-Avoidance Goal

Gender, but not race, predicted the initial levels of performance-avoidance goals. Boys had higher levels of performance-avoidance goals than did girls at Time 1. Neither gender nor race predicted the rate of change in performance-avoidance goals. Thus, the trajectories of performance-avoidance goals for boys and girls are parallel, but the levels of performance-avoidance goals were consistently higher among boys than girls.

Does the Association Between Achievement Goals and Achievement Change Across Time?

To address whether achievement goals are predictors of achievement across time, we estimated an unconditional model for GPA to ensure that there was significant random variance in the intercept and slope to proceed with modeling achievement goals as predictors of GPA. The intercept for GPA was 8.08, and the slope was −.61, indicating that GPA declined over time.

There was significant variability in both the initial level and rate of change over time, as indicated by the random parts of the model:

$\widehat{\text{var}}(U_{0j})$ = 6.33, 95% CI (5.48, 7.18), and $\widehat{\text{var}}$ (U_{1j}) = .53, 95% CI (.42, .64).

The HLM equation to estimate the effects of achievement goals on growth trajectories of achievement takes the following form:

$$\text{Level 1: } \text{GPA}_{ij} = \beta_{0j} + \beta_{1j}(\text{Time})_{ij} + \beta_{2j}(\text{MG})_{ij} + \beta_{3j}(\text{PAP})_{ij} + \beta_{4j}(\text{PAV})_{ij} + \beta_{5j}(\text{Time})_{ij}(\text{MG})_{ij} + \beta_{6j}(\text{Time})_{ij}(\text{PAP})_{ij} + \beta_{7j}(\text{Time})(\text{PAV}) + \varepsilon_{ij},$$

where $(MG)_{ij}$, $(PAP)_{ij}$, $(PAV)_{ij}$ represent goal scores measured at different time points for mastery, performance-approach, and performance-avoidance goals, respectively.

$$\text{Level 2: } \beta_{0j} = \gamma_{00} + \gamma_{01}(\text{Gender})_j + \gamma_{02}(\text{Race})_j + \gamma_{03}(\text{Gender} \times \text{Race})_j + \gamma_{04}(\text{5th Grade GPA})_j + U_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}(\text{Gender})_j + \gamma_{12}(\text{Race})_j + \gamma_{13}(\text{Gender} \times \text{Race})_j + \gamma_{12}(\text{5th Grade GPA})_j + U_{1j}$$

$$\beta_{2j} = \gamma_{20} + \gamma_{21}(\text{Gender})_j + \gamma_{22}(\text{Race})_j + \gamma_{23}(\text{Gender} \times \text{Race})_j$$

For the remaining $k = 2$ through 7,

$$\beta_{kj} = \gamma_{k0} + \gamma_{k1}(\text{Gender})_j + \gamma_{k2}(\text{Race})_j + \gamma_{k3}(\text{Gender} \times \text{Race})_j.$$

In contrast to predictors like gender or race, achievement goals do change over time. Thus, in addressing our question about whether the association between achievement goals and achievement change across time, we incorporated achievement goals at Level 1. A changing association can be captured by a significant

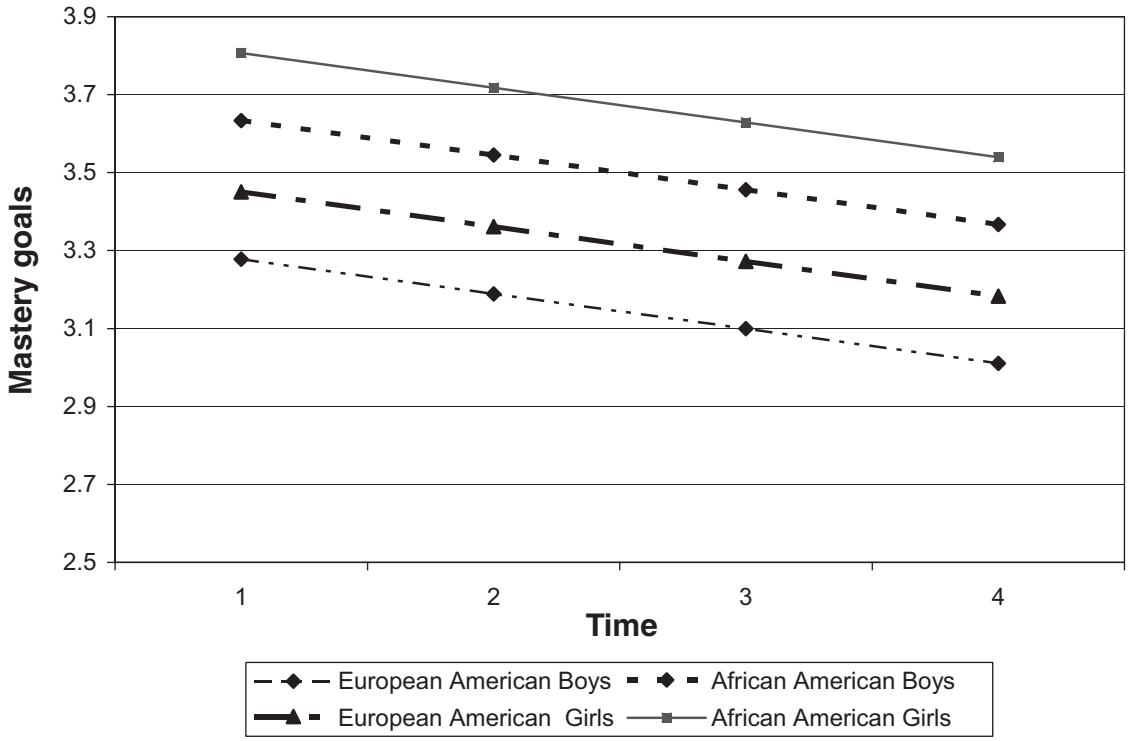

Figure 1. Gender and race differences in the development of mastery goals.

interaction between achievement goals and time.[7] We found significant interactions between mastery goals and time and performance-approach goals and time (see Table 5). As recommended by Singer and Willett (2003), we repeated the analyses three more times with time centered at each of the three subsequent time points so we could compare the associations of goals and achievement at different time points. For example, when time is recentered around Time 2, γ_{20} indicates average association between a mastery goal and GPA at Time 2, whereas when time is recentered around Time 3, γ_{20} indicates average association between a mastery goal and GPA at Time 3.

A mastery goal was a significant positive predictor of GPA at all time points except Time 1. The estimates for the mastery goal effect on the levels of GPA were as follows: Time 1, $\gamma_{20} = .00$ (95% CI = −.13, .13), $t(193) = -.06$, p = ns; Time 2, $\gamma_{20} = .13$ (95% CI = .02, .24), $t(45) = 2.33$, $p < .05$; Time 3, $\gamma_{20} = .26$ (95% CI = .13, .39), $t(32) = 4.11$, $p < .001$; and Time 4, $\gamma_{20} = .40$ (95% CI = .22, .57), $t(46) = 4.57$, $p < .0001$. A performance-approach goal had an initial negative impact that dissipated over time and disappeared once students moved into middle school. The estimates for performance-approach goal effects on the levels of GPA were as follows: Time 1, $\gamma_{30} = -.19$ (95% CI = −.33, −.05), $t(31) = -2.77$, $p < .01$; Time 2, $\gamma_{30} = -.11$ (95% CI = −.23, .01), $t(17) = -1.94$, $p < .10$; Time 3, $\gamma_{30} = -.02$ (95% CI = −.14, .09), $t(22) = -.43$, p = ns; and Time 4, $\gamma_{30} = .06$ (95% CI = −.09, .20), $t(56) = 0.81$, p = ns. A performance-avoidance goal was a significant negative predictor of GPA at all time points. The effect of performance-avoidance goal on the initial level of GPA was −.09 (95% CI = −.02, −.16), $t(223) = 2.43$, $p < .05$. The direction and magnitude of the effect did not change over time, as indicated by nonsignificant Performance-Avoidance Goal × Time interaction term.

Do Changes in Achievement Goals Have Implications for Changes in Achievement?

We conducted growth-curve analyses with two different types of predictors of achievement goals to examine the effects of intraindividual changes in achievement goals.[8] In line with procedures outlined by Singer and Willett (2003), we used Time 1 centering to create two achievement-goal predictors, one representing the initial level of goals and one representing gains and losses from the initial level. The initial levels of goals are Level 2 between-individual variables (termed baseline score, $Time_1Goal = Goal_{1j}$), and deviation scores from the initial levels are Level 1 within-individual predictors of achievement goals (termed $DevT_1$ scores, $DevT_1Goal = Goal_{ij} - \text{Goal}_{1j}$). $DevT_1$ scores were computed by subtracting the Time 1 goal scores from goal scores at four time points, and thus, they represent the deviation at each time point from the initial baseline. The significant effects of $DevT_1$ scores indicate that the students' goal changes from their own initial baseline affect their growth trajectories of GPA. The

[7] Interactions between goals, gender, and race were tested. None of these interactions were significant, and hence, these interaction terms were dropped from the final models.

[8] Analyses with Time 1-centered variables are statistically equivalent with those with raw goal scores (time varying) but enable a different interpretation (see Singer & Willett, 2003, for discussion of this approach).

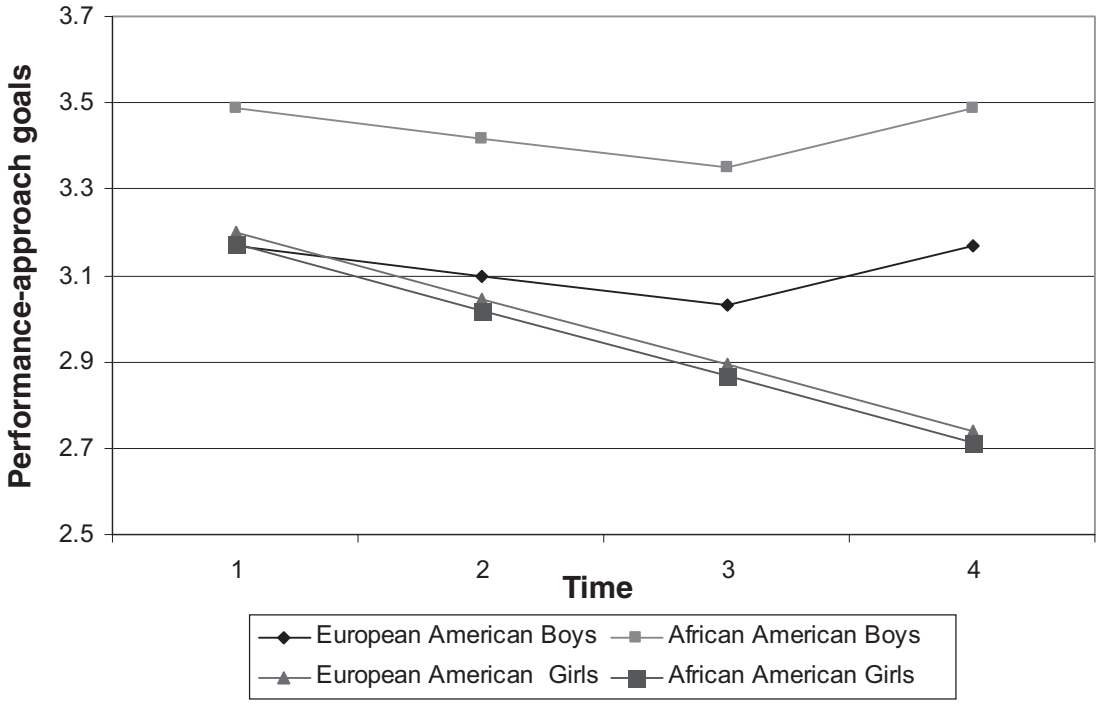

Figure 2. Gender and race differences in the development of performance-approach goals.

HLM equation that estimates the effects of achievement goals on growth trajectories of achievement with Time 1 centering method takes the following form:

$$\text{Level 1: } GPA_{ij} = \beta_{0j} + \beta_{1j}(Time)_{ij} + \beta_{2j}(DevT_1MG)_{ij} + \beta_{3j}(DevT_1PAP)_{ij} + \beta_{4j}(DevT_1PAV)_{ij} + \beta_{5j}(Time)_{ij}(DevT_1MG)_{ij} + \beta_{6j}(Time)_{ij}(DevT_1PAP)_{ij} + \beta_{7j}(Time)_{ij}(DevT_1PAV)_{ij} + \varepsilon_{ij},$$

where $(DevT_1MG)_{ij}$, $(DevT_1PAP)_{ij}$, and $(DevT_1PAV)_{ij}$, represent deviation scores from Time 1 scores for mastery, performance-approach, and performance-avoidance goals, respectively.

$$\text{Level 2: } \beta_{0j} = \gamma_{00} + \gamma_{01}(Gender)_j + \gamma_{02}(Race)_j + \gamma_{03}(Gender$$

Table 5
The Association Between Achievement Goals and GPA at Time 1

Model parameter	Estimate (95% confidence interval)	*SE*	*df*	*t*
Model for initial status				
M initial status	3.37 (2.65, 4.10)	.37	136	9.19***
Fifth-grade GPA	0.68 (.62, .73)	.03	77	25.94***
Race	0.81 (.54, 1.08)	.14	1230	5.81***
Model for time-varying predictors				
Mastery goals	0.00 (−.14, .13)	.07	193	−0.06
Performance-approach goals	−0.19 (−.33, −.05)	.07	31	−2.77**
Performance-avoidance goals	−0.09 (−.16, −.02)	.04	224	−2.43*
Model for linear change				
M change rate	−1.33 (−1.62, −1.05)	.15	573	−9.19***
Model for time by time-varying predictors				
Time × Mastery Goals	0.13 (.07, .20)	.04	396	3.82***
Time × Performance-Approach Goals	0.08 (.02, .14)	.03	824	2.75**

Note. GPA = grade point average. The omitted category is African Americans. Estimates for European Americans are shown in the table. *df*s are from PROC MIANALYZE (SAS, 2003), not from hierarchical linear modeling.
*$p < .05$. **$p < .01$. ***$p < .001$.

$$\times \text{Race})_j + \gamma_{04}(\text{Grade5 GPA})_j + \gamma_{05}(\text{Time}_1\text{MG})_j$$

$$+ \gamma_{06}(\text{Time}_1\text{PAP})_j + \gamma_{07}(\text{Time}_1\text{PAV}) + U_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}(\text{Gender})_j + \gamma_{12}(\text{Race})_j + \gamma_{13}(\text{Gender}$$

$$\times \text{Race})_j + \gamma_{14}(\text{Time}_1\text{MG})_j + \gamma_{15}(\text{Time}_1\text{PAP})_j$$

$$+ \gamma_{16}(\text{Time}_1\text{PAV})_j + U_{1j}$$

For the remaining $k = 2$ through 7, $\beta_{kj} = \gamma_{k0}$, where $(Time_1MG)_j$, $(Time_1PAP)_j$, and $(Time_1PAV)_j$ represent Time 1 scores for mastery, performance-approach, and performance-avoidance goals, respectively.

Because of the inclusion of the time varying predictors at Level 1, the intercept (γ_{00}) and the slope parameter (γ_{10}) represent the average initial level and the rate of change after adjusting for fifth-grade GPA, gender and racial differences, and goal effects. If both the main effects of goals (i.e., γ_{20}, γ_{30}, γ_{40}) and the Goal × Time interaction terms (i.e., γ_{50}, γ_{60}, γ_{70}) are significant, the results would indicate that achievement goals predict both the initial levels and the rates of changes. If only the main effect term of a goal is significant, then the goal affects the level of growth trajectory and the effects are constant over time. If the main effect of goal and the effect of interaction term are in different signs, then the results indicate that the effects of goal undergo qualitative change over time. Insignificant terms are dropped so that final models include only significant fixed effects at the .05 level. The results are shown in Table 6.

Predicting GPA

Mastery goals. Baseline mastery goal scores did not predict the initial levels; however, they positively influenced the rates of change in GPA over time. Thus, students who initially had high mastery goal scores showed more desirable patterns of changes in GPA over time. In addition, the $DevT_1$ positively predicted the growth trajectories of GPA. Thus, gains from the initial baseline score of mastery goals yielded additional benefits in terms of rate of change in GPA.

Performance-approach goals. Baseline performance-approach goal scores predicted neither the levels nor the rates of changes; however, the $DevT_1$ performance-approach goal scores had a negative effect on the intercept but a positive effect on the slope. Thus, inclines or declines from the baseline affected the developmental trajectories of GPA, but as we found in the previous analysis, the effect varied over time. That is, students who showed increases in performance-approach goals from their initial baseline showed more adaptive patterns of changes in GPA, but because of the negative effect on the initial level of GPA, the positive effect on the slope did not compensate for the initial negative effect.

Performance-avoidance goals. Baseline performance-avoidance goal scores predicted initial levels but not the rate of change of GPA. The results indicate that baseline performance-avoidance goals predicted consistently lower levels of GPA across all time points. Gains from the initial baseline lowered the levels of GPA even more, as indicated by the significant effects of $DevT_1$ performance-avoidance goal scores on the initial levels of GPA. Taken together, the results supported the conclusion that performance-avoidance goals were associated with consistently lower levels of GPA.

Supplemental Analyses to Address Causality

In the current study, we examined whether achievement goals predict achievement. The temporal sequence of our design (our

Table 6
The Effects of Achievement Goals on Growth Trajectories of GPA, Using Time 1 Centering Technique

Model parameter	Estimate (95% confidence interval)	*SE*	*df*	*t*
Initial level				
M initial status	3.04 (2.11, 3.96)	.47	222	6.48***
European American boys	0.67 (.31, 1.02)	.18	1963	3.70***
African American boys	−0.25 (−.63, .14)	.20	580	−1.26
European American girls	0.85 (.53, 1.17)	.17	12749	5.14***
Fifth-grade GPA	0.67 (.61, .72)	.03	52	24.47***
T1 mastery goal	0.04 (−.13, .21)	.09	488	0.47
T1 performance-approach goal	−0.05 (−.24, .13)	.09	78	−0.59
T1 performance-avoidance goal	−0.14 (−.27, −.01)	.07	338	2.14*
Time-varying predictors				
$DevT_1$ mastery goal	0.00 (−.27, .26)	.13	19	−0.02
$DevT_1$ performance-approach goal	−0.34 (−.55, −.13)	.10	26	−3.29**
$DevT_1$ performance-avoidance goal	−0.07 (−.15, .01)	.04	434	−1.83†
Linear change				
M rate of change	−1.30 (−1.68, −.93)	.19	679	−6.84***
T1 mastery goal	0.16 (.06, .26)	.05	57	3.21**
T1 performance-approach goal	0.05 (−.03, .13)	.04	137	1.21
$DevT_1$ mastery goal	0.12 (.01, .22)	.05	57	2.28*
$DevT_1$ performance-approach goal	0.15 (.04, .26)	.05	22	2.92**

Note. GPA = grade point average; T1 = Time 1; $DevT_1$ = deviation from T1 score. The omitted category is African American girls. Thus, the estimate for mean initial status represents the mean initial level for African American girls. The estimates for other groups indicate the difference from African American girls. *df*s are from PROC MIANALYZE (SAS, 2003), not from hierarchical linear modeling.
†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

measurements of achievement goals are at the beginning of the semester, and GPA represents achievement across the entire semester), as well as controlling for prior achievement, helped address reciprocal causation concerns but did not preclude the possibility that achievement influences subsequent achievement goals. Thus, we conducted HLM analyses to estimate the effect of prior achievement on growth trajectories of achievement goals (see Table 7 for the results). Previous semester GPA from spring of fifth grade to fall of seventh grade were entered as a time-varying predictor for growth trajectories of achievement goals from fall of sixth grade to spring of seventh grade. Prior achievement level did not predict the growth trajectories of mastery goals. Prior achievement level predicted the levels but not the rates of change in the growth trajectories of performance-approach goals and avoidance goals. These results indicated that roughly a one-letter-grade difference in GPA yielded a one-point drop in performance-approach and avoidance goals in the following semesters. Students who did well in the previous semester were less likely to endorse either performance-approach or avoidance goals. These relationships between prior achievement and subsequent goal adoption did not change over time, as indicated by nonsignificant Goal × Time interaction. Results are provided in Table 7.

Discussion

Motivation, learning, and achievement are not static. However, most of the research on a prominent motivational construct, the achievement goal, has considered measurements of goals at only one or two time points. Thus, the research design and analytic methods have not captured the changing nature of achievement goals. With a longitudinal design and growth-curve analytic techniques that incorporated both measurements of achievement goals and achievement across time, the present study expanded current understanding of the nature and consequences of achievement goals. Our developmental approach provided important insights into the development of achievement goals, the association of achievement goals with achievement across time, and the consequences of changes in achievement goals for achievement.

The Development of Achievement Goals

Consistent with prior research reporting maladaptive changes in motivation, engagement, and achievement during early adolescence (Eccles et al., 1997), achievement goals were found to decline in general, regardless of the type. Previous longitudinal research has assessed achievement goals at only two points in time and in different grades. With four measurements of achievement goals (fall and spring of sixth grade and fall and spring of seventh grade), we were able to distinguish within-school-year from between-school-year changes. The general pattern across these four time points was a decline from fall to spring in sixth grade, stability from spring of sixth grade to fall of seventh grade, and a decline from fall of seventh grade to spring of seventh grade. Previous research has implicated the transition to middle school as the source of the decline in goals (E. M. Anderman & Midgley, 1997; L. H. Anderman & Anderman, 1999). However, with more time points, we found that the major source of the overall decline was within year, not between years. The average level of achievement goals in the beginning of middle school was similar to that in the spring of elementary school, which suggests that moving into

Table 7
The Effect of Prior Achievement Level on Adoption of Achievement Goals

Model parameter	Coefficient (95% confidence interval)	*SE*	*df*	*t*
	Mastery goals			
Initial status				
M initial status	3.57 (3.42, 3.71)	.07	270	48.39***
Time-varying predictors				
Previous semester GPA	0.00 (−.02, .02)	.01	112	−0.02
Linear change				
M change rate	−0.09 (−.12, −.06)	.02	130	−5.74***
	Performance-approach goals			
Initial status				
M initial status	3.51 (3.35, 3.67)	.08	5354	43.47***
Time-varying predictors				
Previous semester GPA	−0.03 (−.05, −.01)	.01	12020	3.64***
Linear change				
M change rate	−0.12 (−.16, −.09)	.02	481	−7.81***
	Performance-avoidance goals			
Initial status				
M initial status	3.55 (3.34, 3.75)	.11	125	33.61***
Time-varying predictors				
Previous semester GPA	−0.04 (−.06, −.02)	.01	168	−3.75***
Linear change				
M change rate	−0.17 (−.21, −.13)	.02	165	−8.72***

Note. GPA = grade point average. *df*s are from PROC MIANALYZE (SAS, 2003), not from hierarchical linear modeling.
***$p < .001$.

a new, larger school environment was not immediately a catalyst for dramatic shifts in level of goals.

A study concerning the change in elementary-school students' achievement goals for different types of literary tasks found declines from fall to spring (Meece & Miller, 2001). Thus, the dissipation of goals in a similar classroom setting may be a trend that is in place prior to middle school. The finding that declines in goals occur with more experience in a specific classroom merits more attention. What aspects of the classroom environment are contributing to this? Does novelty, or an element of the unknown, heighten the pursuit of goals? Much attention has been devoted to classroom features that are associated with student goal pursuit, but researchers generally focuse on between-class differences of data at one time point (Wigfield et al., 2006). Future research that examines how classroom features are related to the development of goals within the same environment could provide important insights into how teachers might best support students' goals.

For mastery and performance-avoidance goals, the developmental pattern was the same for all groups. However, for performance-approach goals, gender and race were important in understanding the developmental patterns (see Figure 3). For girls, performance-approach goals showed a similar pattern to that of the other goals (within-year declines for both elementary- and middle-school years). For boys, performance-approach goals declined during elementary school but increased during middle school. Considered in tandem with a Gender × Race interaction on the intercept, the results indicated that African American boys had the highest level of performance-approach goals of all students, at all time points, whereas European American boys were similar to girls in elementary school but had higher levels of performance-approach goals than did girls by the end of the first year in middle school. It is interesting that boys' performance-approach goals increase after moving into a context that is typically described as more competitive and performance oriented (Eccles et al., 1997; Midgley, 1993). In general, boys' social interactions with peers involve more competition and dominance seeking than do girls' (e.g., Hartup, 1989; Maccoby, 1990; Rose & Rudolph, 2006). Perhaps there is a match between this gendered characteristic and the middle-school context that causes performance-approach goals to increase for boys and not girls. Being better than others in the classroom may become more important to boys during early adolescence because it is in line with societal ideals of masculinity that emphasize competition, winning, and dominance. These issues may be salient for African American boys even earlier, as they had higher performance-approach goals than all other students, even before the increase for boys that occurred in middle school. It is concerning that African American boys had higher performance-approach goals than did all other students in elementary school, given that performance-approach goals had a deleterious impact on achievement in that setting.

Although the developmental patterns for mastery and performance-avoidance goals were the same for all groups, there were gender and race differences in the levels across time. Consistent with prior research, girls and African American students were higher in mastery goals. Also consistent with prior research, boys were higher in a performance-avoidance goal than were girls. However, there were no interactive effects of either gender or race with goals on achievement, which indicated that the relation of goals to achievement was the same for all groups across time. Thus, similar to other aspects of motivation (e.g., ability perceptions), the mean levels may vary, but the nature of the consequences do not (see Graham, 1994, for a review). Future research could further our understanding of group differences by examining if the antecedents of achievement goals are similar for all students.

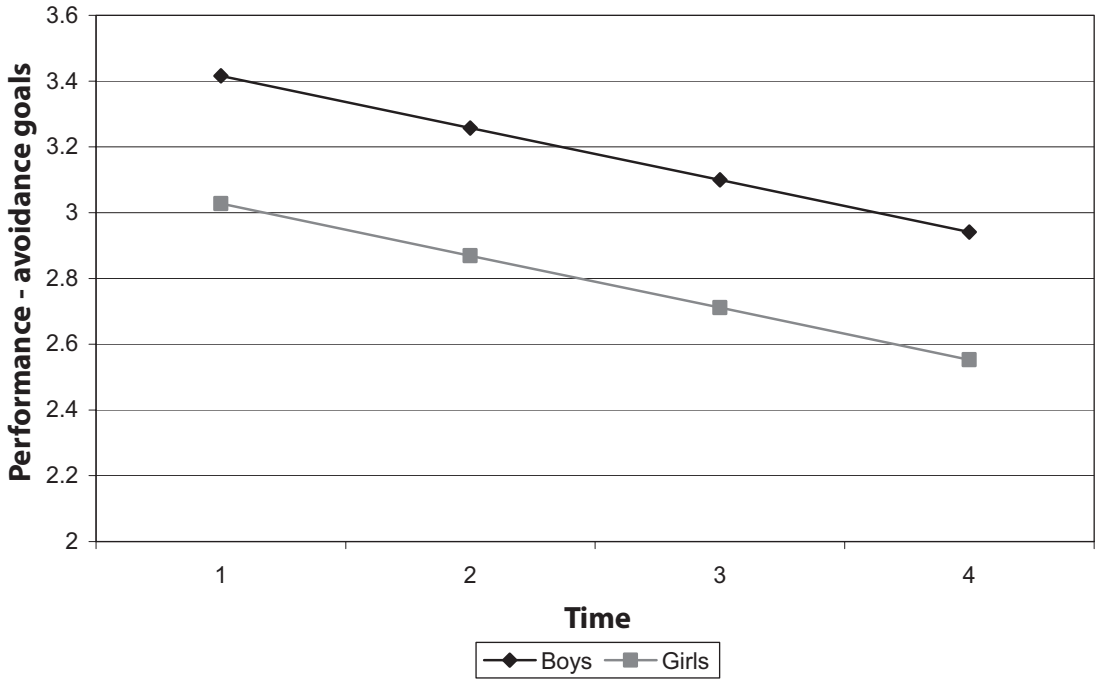

Figure 3. Gender differences in the development of performance-avoidance goals.

It may be that gender and/or ethnicity play a role in students' perceptions of or experiences in classrooms that may explain the different levels of achievement goals.

The Changing Association of Achievement Goals and Achievement Across Time

By treating achievement goals as time-varying predictors of achievement across time, we were able to examine whether the associations of achievement goals to achievement change during early adolescence. Our sample made a transition into middle school during this time, which allowed us to examine these associations across contexts that vary in terms of emphasis on competition and social comparison (see Eccles et al., 1997; Juvonen et al., 2004; Midgley, 1993). When we controlled for prior achievement, a performance-avoidance goal had a consistent negative association with subsequent achievement across the four time points, which is in line with prior research that consistently documents the negative consequences of such goals. When we controlled for prior achievement, mastery goals were positive predictors of subsequent achievement at Times 2–4. Thus, mastery goals fostered the achievement of young adolescents, especially in the middle-school context. Findings for a performance-approach goal captured changing associations across time. A performance-approach goal was detrimental to achievement in the elementary-school context, particularly at Time 1 (negative association was significant at Time 1 and marginally significant at Time 2) and then became unrelated to achievement when students moved into middle school.

It has been suggested that as students advance through the educational system, the context becomes more competitive, and the consequences of achievement goals may change; a performance-approach goal may become more adaptive, and a mastery goal may become less adaptive for achievement (Midgley et al., 2001). The findings for a performance-approach goal were somewhat in line with this idea, as the detrimental effects on achievement dissipated as students moved into middle school. The findings for a mastery goal were contrary to this idea, as mastery goals became increasingly positive predictors of achievement as students moved into middle school. One possibility is that a mastery goal is especially facilitative of achievement in challenging academic situations. Grant and Dweck (2003) found that a mastery goal predicted more adaptive coping and higher achievement in the face of challenge for undergraduate students enrolled in a difficult premedical course. Students in our sample navigated a transition from a small elementary school to a large middle school. Against this backdrop, we saw GPA decline from elementary school to middle school. Thus, students likely experienced academic challenge or uncertainty during this transition. Our data indicate that a mastery goal supported students' achievement during this transition. However, a mastery goal was a positive predictor of achievement in the spring of elementary school, so this would not be a complete explanation.

The pattern of results for achievement goals and achievement are in sharp contrast to those consistently found for college students. For college students, the relationship between achievement goals and achievement is consistently null for a mastery goal and positive for a performance-approach goal (see Harackiewicz, Barron, Pintrich, et al., 2002, for a review). However, our findings are in line with much research on younger samples (e.g., Kaplan & Maehr, 1999; Pajares & Valiante, 2001; A. M. Ryan et al., 2005; Wentzel, 1993). Thus, conclusions about which achievement goals are best for learning and achievement are different for younger students in school and older adolescents in college. In addition to the educational climate becoming more competitive as students progress through the system, there are numerous other differences in context, sample, and developmental stage that may contribute to an explanation of the different patterns. Young adolescent students learn among their peers in classes all day, in contrast with college students who direct their own learning for much of the day. Young adolescent students have frequent assignments and feedback on their learning, whereas college students may only have two or three papers or exams per semester. Younger samples in public schools represent heterogeneity of ability levels from the broad spectrum of society, whereas samples taken from college represent only the upper ability levels. All of these differences may contribute to an explanation of why mastery goals are important to the achievement of young adolescents but not to college students.

The implication of our research is that a mastery goal should be encouraged in early adolescent students because it supports learning and achievement. In recent years (and primarily on the basis of research on college students), mastery goals have been lauded as beneficial for supporting intrinsic motivation but not achievement (e.g., Harackiewicz, Barron, Pintrich, et al., 2002; Harackiewicz & Tauer, 2006). However, achievement is often the main concern of administrators and educators, especially given the current climate of standardized testing brought on by the No Child Left Behind Act of 2001 (2002). If mastery goals are not seen as having benefits for achievement, it is unlikely they will garner much attention for school reform. This could represent a missed opportunity for children in our schools, as much work has been done regarding how to create an educational climate that encourages mastery goals (e.g., Ames, 1992; Maehr & Midgley, 1996). Thus, it is critical to take a developmental perspective and distinguish patterns for younger students from patterns found for college students regarding achievement goals and achievement.

The Implications of Changes in Achievement Goals for Changes in Achievement

The benefits of mastery goals for achievement were also seen in our third set of analyses, in which we used a within-individual approach to assess the development of students' achievement goals. Our first two sets of analyses concerned general patterns and variations between students (the first pertaining to the development of goals and the second pertaining to the associations of goals to achievement across time). Although general patterns are important in understanding normative shifts that occur, they do not address the significant variability in these patterns that exists for individual students. Regarding the development of goals, not all students conform to the general declining pattern of achievement goals. Regarding the changing goals–achievement relationship, there are intraindividual differences that tell us something different about the motivation–achievement link than do the interindividual differences. Similar to most prior research, our examination of general patterns of the link between achievement goals and achievement across time concerned how high or low scores in different types of goals, compared with other students, explained

subsequent variations in achievement. In our final set of analyses, we focused on within-individual change to determine if inclines or declines from student's initial level of goals were important to understanding students' personal trajectory of achievement. Focusing on intraindividual change captures the dynamic nature of achievement goals that is widely acknowledged in theory but seldom captured in analytic approaches.

Fluctuations in mastery and performance-approach goals within individual students were important for a thorough understanding of the effects of achievement goals. In particular, deviation scores provided insight into how a mastery goal promotes positive changes in achievement across time. Above and beyond baseline scores, changes in mastery goals promoted changes in achievement. When we controlled for initial level, students who increased their mastery goals exhibited greater gains in achievement across time. Documenting such effects has important educational implications because it indicates that even for students with a "maladaptive" goal profile (i.e., low mastery goals), teachers only need to move them in the right direction for students to reap some achievement benefits. Encouraging a student to intensify his or her mastery goal may help students actually master the material. Personal reminders from teachers about the importance of a mastery goal may sustain or boost students' focus on mastery goals throughout the year, and such positive developments will, in turn, sustain or improve their achievement over time.

Prior Achievement as a Predictor of Achievement Goals

Our supplemental analyses indicated that prior achievement was not related to subsequent mastery goals and was negatively related to performance goals (both approach and avoidance). When students' grades increased, their performance goals were more likely to go down. These findings are not what one would expect on the basis of prior theory and research indicating that high perceptions of competence lead to approach goals and low perceptions of competence lead to avoidance goals (Elliot, 2005). Because perceived competence and academic performance are moderately to highly correlated, one would expect a similar pattern for GPA. However, the nature of our design and analyses make them hard to directly compare with previous research. We controlled for prior achievement and modeled intraindividual changes in GPA. Thus, we examined the effects of changes in GPA, controlling for prior levels, on changes in achievement goals. With this approach, we documented that changes in achievement were important for performance goals and not for mastery goals. Our results suggest that changes in achievement may affect students' adoption of mastery versus performance goals, rather than approach versus avoidance goals.

It is encouraging that prior achievement is not important to mastery-goal pursuit, as it suggests that low achievers may be just as amenable to intervention as high achievers. We know a great deal about teacher behaviors that are important to students' goals. Ames (1990, 1992) has described how teacher practices in six categories (Task, Authority, Recognition, Grouping, Evaluation, Time) can promote a mastery-goal emphasis in classrooms. Qualitative work has expanded on Ames's work and noted how affect and teacher–student relationships are also critical to fostering a mastery-oriented climate (Patrick, Anderman, Ryan, Edelin, & Midgley, 2001; Patrick, Turner, Meyer, & Midgley, 2003; Turner et al., 2002). Linnenbrink (2005) designed an intervention based on feedback to small groups that was successful in increasing students' mastery goals. Blackwell, Trzesniewski, and Dweck (2007) designed a Web-based intervention that increased students' malleable theory of intelligence, which in turn increased students' mastery goals and grades. Thus, although there are challenges in the current educational climate (see Urdan & Turner, 2005), there is much knowledge about how to encourage mastery goals in students. All of this research could be drawn on to promote mastery goals in early adolescent students and to best support their learning and achievement.

Limitations and Future Research

Although our developmental approach provided new insights regarding achievement goals, there are several limitations that need to be considered and possibly addressed in future research. First, our sample only represented two ethnic groups, and it is therefore not known whether the results would generalize to other ethnic groups. Second, we only examined grades as indicators of achievement. This was appropriate given our focus on within-year and between-year development of goals and achievement. Nonetheless, standardized tests provide different information about students' learning and achievement than do grades, and future work that examines the link between achievement goals and standardized tests across time could broaden our understanding of the implications of goals for achievement (see K. Ryan & Ryan, 2005; K. Ryan, Ryan, Arbuthnot, & Samuels, 2007, for a discussion of achievement goals and standardized-test performance).

Third, a longer time frame would have provided additional understanding of the development of achievement goals. With our four time points of data, we documented within-year, but not between-year, declines in achievement goals in both sixth and seventh grades, indicating that the transition did not immediately have an impact on the average level of goals. However, it may be that the typical yearly pattern for students' goals is to decline across the year and then recover over the summer break, beginning high again the following year. It is possible that the middle-school transition does have an impact on the average level of student goal pursuit by disrupting this cycle. Future research encompassing additional years before the transition could further our understanding of typical cycles of motivation. In a cross-sectional study, Pajares and Cheong (2003) found nonlinear changes in mastery goals and performance-approach goals (decrease from elementary school to middle school and increase in high school for mastery goals and decrease from elementary school to middle school and no change in high school for performance-approach goals). There was no change in performance-avoidance goals. This is another intriguing developmental pattern that could be further investigated with longitudinal data. Although practically challenging, longitudinal studies following students from elementary school to college could better examine the proposition that performance-approach goals exert a positive effect on achievement and mastery goals become null as students advance through the educational system.

Fourth, we asked students about their achievement goals for schoolwork in general, and our results may not generalize across

all subjects. Recent research on achievement goals has investigatedstudents' general goals as well as subject-specific goals.[9] Both approaches are valid because achievement goals are conceptualized as a function of individual differences (i.e., personality, dispositions, or general motives) as well as due to features of the immediate environment. Students tend to approach schoolwork in different subjects in a similar way, as indicated by moderate to large correlations between the goals in different subjects (Bong, 2001; Elliot & McGregor, 2001). Further, achievement goals operate similarly across different academic subject areas (Bong, 2001; Wolters et al., 1996), so measuring at a general level is unlikely to confound results. Nonetheless, there are differences in the nature of knowledge and teaching between subjects that may contribute to different developmental patterns at the subject-specific level, and this could be a fruitful area for future research.

Conclusion

By taking advantage of current advances in growth-curve analytic techniques, we were able to garner a more complete understanding of students' achievement goals and the importance of these goals for achievement. Our focus on the development of goals across time in early adolescence revealed important patterns for this age group. At this stage of life, goals exhibit within-year rather than between-year decreases (with the exception of boys' performance-approach goals, which increase in middle school). As students move through early adolescence, mastery goals become increasingly beneficial for achievement. Performance-approach goals are detrimental in elementary school and provide no benefits in middle school. Performance-avoidance goals consistently undermine achievement throughout early adolescence. Personal increases in mastery goals over time provide a boost to student achievement. The overall implications of the present research is that mastery goals should be supported and encouraged in early adolescent students to best support their achievement. This recommendation is a deviation from recent conclusions based on data from college students regarding achievement goals and achievement. Thus, results highlight that a developmental perspective is critical to understanding achievement goals and achievement. More generally, we hope the results highlight the contribution a developmental approach can make toward understanding motivation and achievement. It is only with a complete understanding of the development of motivation, engagement, and achievement in school that we can make recommendations to educators and parents about what matters for student learning.

[9] Our review of articles concerning achievement goals in the last 5 years of the *Journal of Educational Psychology* indicated that about half of the research measured goals at the general level and about half measured goals specific to a certain subject or class.

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Received July 3, 2007
Revision received December 27, 2007
Accepted January 10, 2008 ■