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Multiple Goals, Multiple Pathways: The Role of Goal Orientation in Learning and Achievement

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Mastery goals have been linked to adaptive outcomes in normative goal theory and research; performance goals, to less adaptive outcomes. In contrast, approach performance goals may be adaptive for some outcomes under a revised goal theory perspective. The current study addresses the role of multiple goals, both mastery and approach performance goals, and links them to multiple outcomes of motivation, affect, strategy use, and performance. Data were collected over 3 waves from 8th and 9th graders ($N = 150$) in their math classrooms using both self-report questionnaires and actual math grades. There was a general decline in adaptive outcomes over time, but these trends were moderated by the different patterns of multiple goals. In line with normative goal theory, mastery goals were adaptive; but also in line with the revised goal theory perspective, approach performance goals, when coupled with mastery goals, were just as adaptive.

The role of different goal orientations in learning and achievement has been a focus of current research in achievement motivation and self-regulated learning, particularly the role of mastery and performance goals (see Ames, 1992; Dweck & Leggett, 1988; Pintrich, 2000; Pintrich & Schunk, 1996, for reviews). In normative models of goal orientation, mastery goals orient students to a focus on learning and mastery of the content or task and have been related to a number of adaptive outcomes, including higher levels of efficacy, task value, interest, positive affect, effort and persistence, the use of more cognitive and metacognitive strategies, as well as better performance. In contrast, performance goals orient students to a concern for their ability and performance relative to others and seem to focus the students on goals of doing better than others or of avoiding looking incompetent or less able in comparison to others. In this normative view of performance goals, performance goals are generally seen as less adaptive in terms of subsequent motivation, affect, strategy use, and performance (Ames, 1992; Dweck & Leggett, 1988; Pintrich, 2000; Pintrich & Schunk, 1996; Urdan, 1997).

However, there may be situations where performance goals may not be maladaptive. For example, Harackiewicz and Elliot and their colleagues (e.g., Elliot, 1997; Elliot & Church, 1997; Elliot & Harackiewicz, 1996; Harackiewicz, Barron, Carter, Lehto, & Elliot, 1997; Harackiewicz, Barron, & Elliot, 1998) have shown that performance goals can result in better performance and achievement, whereas mastery goals are linked to more intrinsic interest in the task. In this revised goal theory perspective, an important distinction has been made by a number of different researchers (Elliot, 1997; Elliot & Church, 1997; Middleton & Midgley, 1997; Skaalvik, 1997) between approach performance goals and avoidance performance goals. Students who are focused on approach performance goals are oriented to doing better than others and to demonstrating their ability and competence, in other words, approaching tasks in terms of trying to outperform others. In contrast, under an avoidance performance orientation, students are attempting to avoid looking stupid or incompetent, which leads them to avoid the task. In both correlational and experimental research where mastery, approach performance, and avoidance performance goals are compared, maladaptive patterns of intrinsic motivation and actual performance occur only in the avoidance performance groups (Elliot, 1997; Elliot & Church, 1997; Elliot & Harackiewicz, 1996; Harackiewicz et al., 1998).

However, in the experimental work, the different goal orientation groups have been compared with each other in between-subjects designs, not allowing for the possibility of examining multiple goals and their interactions. For example, it may be that in the reality of the classroom, students can endorse both mastery and performance goals and different levels of both of these goals (Meece & Holt, 1993; Pintrich & Garcia, 1991). In fact, in some classroom work, mastery and performance goals were orthogonal or slightly positively related to each other (see Pintrich, 2000, for a review). If the two goals are somewhat orthogonal, then it raises the possibility that students could endorse different levels of both goals at the same time. Moreover, different patterns in the levels of the two goals may lead to differential outcomes. That is, there may be an interaction between mastery and performance goals for different motivational or cognitive outcomes.

For example, given the positive patterns found for the separate main effects of mastery goals and approach performance goals (cf. Dweck & Leggett, 1988; Harackiewicz et al., 1998), it could be predicted from a revised goal theory perspective that having high

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levels of both of these goals would be the most adaptive. In this case, following the logic of multiplicative interaction effects, if there are two positive main effects for mastery and approach performance goals, then it may be that a focus on mastery along with a focus on trying to do better than others at the same time (a high-mastery/high-performance pattern) would result in enhanced positive outcomes. That is, as suggested by Harackiewicz et al. (1998), it may not matter what type of goals are pursued, but rather that the goals lead to affective and cognitive involvement in the task. In this enhancement view, with mastery goals leading to intrinsic task involvement and with approach performance goals leading to involvement based on competition and trying harder to do better than others, the overall net effect would be a boost in involvement in the task with a variety of positive outcomes.

On the other hand, normative goal theory would suggest that any concern with performance, even an approach performance orientation, could have negative effects on involvement due to distractions fostered by attention to comparisons with others or to negative judgments regarding the self. Under this dampening or reduction perspective, the overall level of involvement fostered by a mastery goal would be less when students simultaneously endorse an approach performance goal. This lower level of overall involvement would then result in less positive outcomes. Accordingly, under this normative model, it would be hypothesized that the most adaptive pattern of multiple goals would be a high mastery, low approach performance combination.

In classroom research regarding these issues, Wolters, Yu, and Pintrich (1996), using a two-wave correlational design with junior high students, found that higher levels of an approach performance goal predicted higher levels of self-efficacy, task value, and the use of cognitive and metacognitive strategies. Moreover, this main effect of performance goals was independent of the positive main effect of mastery goals, paralleling the findings of Harackiewicz and Elliot (Elliot & Church, 1997; Harackiewicz et al., 1997). Wolters et al. (1996) did not find many significant interactions between the two goals as indexed by multiplicative effects in a regression model (a variable-centered analysis). The few interactions that did come out significantly were in line with normative goal theory, with a high-mastery/low-performance pattern being the most adaptive in terms of self-efficacy, task value, and cognitive and metacognitive strategy use.

In contrast, Midgley and her colleagues (Kaplan & Midgley, 1997; Middleton & Midgley, 1997) have not found many positive relations between approach performance goals and adaptive motivation or cognition in correlational studies of middle school students. Middleton and Midgley (1997), using a variable-centered analysis, found that approach performance goals did not relate to self-efficacy or to self-regulation but were positively related to more test anxiety. Kaplan and Midgley (1997) reported similar results, with performance goals being unrelated to the use of adaptive strategies and positively related to the use of maladaptive strategies for learning.

In other classroom studies with more person-centered analyses (e.g., using median splits or clustering procedures) to create groups of students in contrast to variable-centered analyses, the findings also have been mixed. For example, Meece and Holt (1993) observed that a high-mastery/low-performance group of elementary students had the most adaptive pattern of cognitive strategy use as well as actual achievement, in line with normative goal theory predictions. Pintrich and Garcia (1991), also using cluster analysis with a sample of college students, found that the high-mastery/low-performance group had the most adaptive profile. At the same time, they noted that their low-mastery/high-performance group did display some positive signs of motivation and cognition, at least in contrast to the low-mastery/low-performance group. They suggested that in the absence of a mastery goal, at least a concern with performance motivated their college students to engage in their courses to some degree. In contrast, Bouffard, Boisvert, Vezeau, and Larouche (1995), who used median splits to form groups in another study of college students, found that the highest levels of motivation, cognitive strategy use, self-regulation, and achievement were displayed by the high-mastery/high-performance group. The next best pattern was the high-mastery/low-performance group, followed by the low-mastery/high-performance group, and the least adaptive pattern was found for the low-mastery/low-performance group. These results are more in line with a revised perspective on goal theory that proposes a more adaptive role for performance goals.

In an attempt to synthesize these divergent findings, Pintrich (2000) recently suggested that there may be multiple "pathways," or developmental trajectories, that are fostered by different goal orientations. He suggested that mastery and performance goals could set up and foster different patterns of motivation, affect, strategy use, and performance over time. In this sense, students who adopt different goals might follow different pathways, or trajectories, over time, with some of them ending up in the "same" place in terms of actual achievement or performance but having a very different experience on the way to this overall outcome. For example, to continue the metaphor of a trip and the experiences on a trip, mastery goal students might generally have a "smoother or nicer" experience in terms of their motivation, positive affect, effort, and strategy use along the way to good levels of achievement. That is, given their continued focus on mastery and self-improvement across time and tasks, there could be a cumulative effect of the mastery emphasis such that even in the face of difficulties, these mastery students maintain their focus on learning and involvement with the tasks and sustain an adaptive profile of affect, strategy use, and achievement (Dweck & Leggett, 1988).

In contrast, but in line with a revised goal theory perspective, performance goal students might arrive at the same level of achievement, or even higher achievement, given Harackiewicz et al.'s (1998) findings for approach performance students, accompanied by high levels of efficacy. However, as suggested by normative goal theory, these students may experience less interest, less positive affect, and perhaps more anxiety or negative affect given their concerns about doing better than others. In addition, they may be less likely to demonstrate effort because of their goal of looking smarter than others. If they experience any difficulties or failures along the way, there could be costs for them in terms of their affect (lower interest, more negative affect), or they may invoke different types of effort or strategies to attain their goal of being better than others. Accordingly, although there could be cumulative positive benefits for achievement and efficacy when approach performance goals are adopted, there also could be cumulative costs in terms of increased anxiety or negative affect or loss of interest over time. Thus, both normative and revised goal theory predictions may be accurate, but the accuracy would depend

on which outcome is under consideration over time (Harackiewicz et al., 1998; Pintrich, 2000).

Longitudinal data are important to examine the proposed different trajectories or pathways fostered by different goals. That is, it may not be sufficient to examine different outcomes at one time point only. It may be that some of the positive or negative outcomes do not occur until time has allowed for potential goal effects to accumulate, highlighting the need for longitudinal data. Moreover, the idea of accumulating multiple goal effects over time suggests the importance of a person-centered analysis because the effects would accumulate to the individual person over time. Magnusson (1998; Magnusson & Stattin, 1998) has suggested that the logic of person-centered analysis is best suited to address these types of questions concerning individual development over time.

In this study, data are presented for different outcomes over three waves for junior high students in mathematics classrooms. The main research question concerns how the developmental trends or multiple pathways vary as a function of multiple goals. Following the logic of a person-centered analysis, four groups of students were examined in a repeated measures design as a function of creating a 2 × 2 matrix of mastery and performance goals. Accordingly, comparisons were made between high-mastery/high-performance students, high-mastery/low-performance students, low-mastery/high-performance students, and low-mastery/low-performance students. The key issue was whether group membership moderated the developmental trends in outcomes. The outcomes included four sets of variables: motivational beliefs, affect, strategy use, and classroom performance.

For motivational beliefs, I included self-efficacy, task value, and test anxiety as three motivational outcomes (cf. Pintrich & De Groot, 1990). Given the findings of a general decrease in adaptive motivational beliefs over time, especially in junior high and middle schools (Eccles, Wigfield, & Schiefele, 1998; Wigfield, Eccles, & Pintrich, 1996), I predicted that efficacy and value would decrease and anxiety would increase over time (a time effect). However, these general developmental trends over time should be moderated by group membership. For self-efficacy, I expected that the high-mastery/low-performance group and high-mastery/high-performance group would have similar trajectories over time, but that the two low-mastery groups would have a more significant decrease in efficacy over time (cf. Bouffard et al., 1995; Wolters et al., 1996). I expected that the high-mastery/low-performance group would have higher levels of interest and task value over time in comparison to the high-mastery/high-performance group (Harackiewicz et al., 1998). Given their concern for performance, I hypothesized that the high-mastery/high-performance group would increase more in test anxiety over time than the high-mastery/low-performance group (Middleton & Midgley, 1997).

The second general category of outcome included two affective scales. Positive affect referred to feeling happy, proud, and good about oneself during school. Negative affect concerned the frequency of feeling ashamed, embarrassed, or angry during school. I expected that there would be a time effect with positive affect decreasing and negative affect increasing over time (Eccles et al., 1998; Wigfield et al., 1996). For time by goal group interaction effects, I predicted that the high-mastery/low-performance group would show the most adaptive pattern followed by the high-mastery/high-performance group, low-mastery/high-performance group, and then the low-mastery/low-performance group (Dweck & Leggett, 1988; Pintrich & Garcia, 1991).

The third general category of outcome variables included four strategy variables. Motivational strategies included student attempts to control their own effort levels as well as their willingness to take risks in the classroom setting. One motivational strategy, self-handicapping, included students' withdrawal of effort in the face of difficult tasks or procrastination in doing school work. I predicted that there would be an increase in self-handicapping over time but that this developmental trend would be moderated by goal group. The predicted interaction was that the high-mastery/low-performance group would report the least amount of self-handicapping over time, whereas the high-mastery/high-performance group and the low-mastery/high-performance groups might increase in self-handicapping over time (Midgley, Arunkumar, & Urdan, 1996).

The other motivational strategy included risk taking (see Clifford, 1988) and focused on students' willingness to offer their own ideas in classroom discussions or to try tasks that were new or difficult. I expected that risk taking would decrease over time (Eccles et al., 1998; Wigfield et al., 1996) but that this developmental decrease would be moderated by goal-group membership. As predicted by normative goal theory, the high-mastery/low-performance group was hypothesized to report the least decrease in risk taking, with the high-mastery/high-performance group reporting more of a decrease over time given their concern with looking smarter than others. I predicted that the low-mastery/high-performance group would report the most decrease in risk taking (Dweck & Leggett, 1988).

In terms of cognitive strategies, I investigated two measures, used by Pintrich and De Groot (1990). Cognitive strategy use reflected the students' active cognitive engagement in the tasks in terms of their use of rehearsal, elaboration, and organizational strategies. The second measure concerned the use of metacognitive strategies for planning, monitoring, and regulating cognition. Because these scales index general cognitive involvement, I predicted that they would decrease over time (Eccles et al., 1998; Wigfield et al., 1996) but that the decrease would be moderated by goal-group membership. I expected that both high-mastery groups would report similar decreases in strategy use over time, whereas the two low-mastery groups, especially the low-mastery/low-performance group, would report the most decrease in cognitive strategy use over time (Bouffard et al., 1995; Pintrich, 2000; Pintrich & Garcia, 1991; Wolters et al., 1996).

The final outcome measure that was included in the study was the students' actual classroom performance as indexed by their grades in their math classes. Paralleling the predictions for cognitive strategy use, I expected that grades would decrease over time but that this decrease would change as a function of goal-group membership. I expected that both high-mastery groups would have the least decline and higher levels of performance than the two low-mastery groups with the low-mastery/low-performance group having the lowest level of performance and the largest decrease in grades over time (Pintrich, 2000; Pintrich & Garcia, 1991).

Method

Participants

The participants were 150 students (78 girls, 52%) in the eighth and ninth grades in one junior high school (seventh to ninth grades) in southeastern Michigan. The district was primarily working class in terms of socioeconomic status, and the sample was over 95% Caucasian. At the beginning of the study at Wave 1, the average age of the sample was 13 years, 4 months.

Procedure

The data were collected in three waves, Wave 1 at the beginning of the year in eighth grade (October), Wave 2 at the end of the year in eighth grade (May), and Wave 3 at the end of the year in ninth grade (May). Students were given a self-report questionnaire, an adapted version of the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich & De Groot, 1990; Pintrich, Smith, Garcia, & McKeachie, 1993), to fill out during regular class time. After students were read a set of instructions regarding the confidentiality of their self-reports and the importance of being accurate in their ratings, each item was read aloud to the whole class by trained research assistants. Each class had two research assistants involved in data collection, one reading the items aloud and the other one walking around monitoring progress, ensuring quality responses, answering questions, and helping students with the questionnaire.

There was some attrition over the course of the study, due to students missing one of the waves of survey data collection. There was very little movement out of the district in terms of the collection of the mathematics grade data. Students were included in the study if they filled out all three questionnaires at the three waves, resulting in a overall sample of 150 students. Comparisons of this final sample with the larger sample revealed no large differences on the measures. However, there was still some missing survey data because some students skipped items or skipped a page on the surveys at one of the waves. The data analytic strategy required all cases at all three waves, so these cases were then dropped from the analyses of variance (ANOVAs). For the two cognitive strategies scales, 1 case was missing; for the grade analyses, 2 cases were missing; and for the two affect scales, 26 cases were missing.

Measures

All items on the questionnaire were rated on 7-point Likert scales (1 = *strongly disagree* to 7 = *strongly agree*). Items were worded to have students focus on their mathematics classroom; for example, phrases like "in this class" were part of the stem of the item. The only exception to this was for the two affect scales, which asked students about their affective experience in school in general. See the Appendix for sample items for all self-report scales.

Goal orientation. The measures of personal goal orientation were adapted from Midgley et al. (1998) and included two scales, one focused on mastery and one focused on performance. The items focused on the students' personal goals, not on their perception of the classroom-level goal orientation. The mastery scale had six items pertaining to a personal goal concerned with mastery and learning of the class work ($\alpha = .70$). Performance goal items reflected an approach performance orientation to classroom work, such as trying to be smarter than or outperform others. There were no items included in this scale that referred to an avoidance performance goal orientation such as avoiding looking incompetent. There were five items in this scale with an alpha of .76 at Wave 1. These two scales were positively related ($r = .23$, $p < .01$) to each other.

To examine the interactions between these two goal orientations and to link the interactions to three waves of data over time in a person-centered analysis, the Wave 1 mastery and performance goal scales were dichotomized using median splits. This procedure allowed for the use of repeated measures ANOVAs with multiple dependent variables, in contrast to the use of regression (and cross-product multiplicative terms to index the interaction), which can handle only a single dependent variable. Accordingly, simple linear regressions would not allow for the examination of change over time within groups of students, but the ANOVAs would, albeit they require categorical predictors, hence the median splits. Students scoring below 4.8 on mastery were classified as low mastery and those 4.8 and above were categorized as high mastery. For performance goals, the low-performance group had scores at or below 4.6, and the high-performance group had scores above 4.6. This resulted in 50% ($n = 75$ each) of the sample being classified as either low or high mastery and 47% ($n = 70$) classified as low performance and 53% ($n = 80$) categorized as high performance. Neither of these two categorical predictors was related to gender: mastery goals–gender, $\chi^2(1, N = 150) = .10$, $p < .74$, and performance goals–gender, $\chi^2(1, N = 150) = 1.89$, $p < .17$. In terms of the association between the two categorical variables of mastery and performance goals, the chi-square was not significant at a conventional level, suggesting some orthogonality between the two goals, $\chi^2(1, N = 150) = 2.67$, $p < .10$, although the phi coefficient of .13 was positive, paralleling the positive zero-order correlation between the continuous goal measures. The four cells had the following distribution of participants: low-mastery/low-performance $n = 40$; low-mastery/high-performance $n = 35$; high-mastery/low-performance $n = 30$; and high-mastery/high-performance $n = 45$.

Motivation dependent variables. There were three motivational belief scales: Self-Efficacy, Task Value, and Test Anxiety. Self-Efficacy (items = 4, αs ranged from .81 to .90 across the three waves) concerned students' confidence that they could do the work in the class. Task Value items (items = 6, αs = .75–.85) referred to students' personal interest in the course content and perceived utility of math. Test Anxiety (items = 4, αs = .78–.82) focused on the cognitive interference or worry component of anxiety and concerned worry about doing poorly on tests. These three scales were correlated as in previous studies (e.g., Pintrich & De Groot, 1990), with Self-Efficacy and Task Value positively related to each other (*r*s ranged from .42 to .46) and low to moderate correlations with Test Anxiety (*r*s ranged from −.29 to −.52 for Self-Efficacy–Test Anxiety, and from −.03 to −.11 for Task Value–Test Anxiety).

Affect dependent variables. There were two affect scales included, one for negative affect and one for positive affect experienced in school. The Negative Affect Scale (αs = .66–.72) included four items about how often participants felt angry, ashamed, embarrassed, or frustrated in school. The Positive Affect Scale (items = 4, αs = .80–.86) concerned feeling happy, having fun, feeling proud about oneself, and being in a good mood during school. These two scales were moderately correlated with each other ($r = -.39$, $-.46$, and $-.48$ at the three waves, respectively) but were distinct scales in factor analyses and represented different aspects of affect considered separately in the analyses.

Strategy dependent variables. There were four strategy variables with two motivational strategies of self-handicapping and risk taking. The Self-Handicapping Scale included five items with alphas ranging from .50 to .57. The items concerned procrastinating or holding back effort as a function of concerns about poor grades. Risk taking (items = 4, αs = .55 to .62) was adapted from Clifford (1988) and referred to students' attempts to try to do the work even if they were not sure of the answer and might be wrong.

The Cognitive Strategies Scales were adaptations of the Pintrich and De Groot (1990) MSLQ scales and included a scale focused on general cognitive strategies for learning and a scale on metacognitive strategies for learning. The items (items = 9, αs = .86 to .88) for cognitive strategy use included strategies for rehearsing or memorizing course material as well as attempts to engage the material in a deeper manner through the use of elaborative or organizational strategies. Metacognitive strategy items (items = 7, αs = .64 to .74) included planning, setting goals, monitoring comprehension, and regulating cognition.

These motivational and cognitive strategy scales were moderately correlated with each other, but were distinct enough constructs and scales to consider separately. For example, *r*s ranged from −.20 to −.60 for self-handicapping, with the more adaptive risk taking, cognitive strategy use, and metacognitive strategy use scales. Risk taking, cognitive strategy use, and metacognitive strategy use were positively related to one another (*r*s ranged from .42 to .66).

Math grade. Students' semester grades for mathematics were collected from school records. The Wave 1 math grade was the first semester eighth-grade math letter mark, which was assigned in the January following the Wave 1 questionnaire administration. The Wave 2 math grade was second semester eighth-grade math letter mark (not final eighth-grade mark), which was assigned in June following the Wave 2 questionnaire administration. Finally, the Wave 3 math grade was second semester ninth-grade math letter mark (not final ninth-grade mark), which was assigned in June following the Wave 3 questionnaire administration. Grades were converted from letter grades to a 13-point scale that ranged from 0 (*F*) to 12 (*A*+).

Results

The data were analyzed with a repeated measures ANOVA design with mastery and performance goals as the two between-subject factors and the repeated measures factor defined by the three waves for each dependent variable. These analyses generated two general tests of significance of relevance to the research questions. First, there was the overall main effect of time, which concerned the developmental trends or changes in the dependent measures over time, regardless of goal orientation. Second, there were the effects of a single goal orientation over time (e.g., a mastery goal by time interaction or a performance goal by time interaction) and the two goals' interaction with the dependent measures over time (e.g., a mastery by performance by time interaction). Overall significant results were followed by Scheffé tests. There were some main effects of gender on the dependent variables, but in separate repeated measures ANOVAs to check for interactions between gender and the goal-orientation variables, there was only one significant gender by performance goal interaction (on positive affect, described below) and no significant higher level interactions.

General Developmental Trends in Motivation, Affect, Strategies, and Grades

Table 1 displays the means and standard deviations for all the dependent variables across the three waves of data collection. Also noted in the table is the significance for the overall change over time in these dependent variables from the repeated measures ANOVAs (a time effect). The subscripts in Table 1 represent the results from post hoc tests to reveal where the means differ over the three waves. In general and in line with predictions, motivation, affect, and strategies became less adaptive over time, with adaptive beliefs and strategies declining and other less positive variables increasing with time in school.

For example, as evident in Table 1 and as predicted, self-efficacy decreased over time, $F(2, 294) = 16.59, p < .001$, with self-efficacy stable within eighth grade but dropping significantly in ninth grade. As hypothesized, task value declined within eighth grade, $F(2, 292) = 9.19, p < .001$, but then stabilized as students moved into ninth grade. Test anxiety slightly increased over time, but this difference was not reliable, counter to expectations. In terms of affect, negative affect toward school increased within eighth grade as predicted but then fell to the original eighth-grade level by the beginning of ninth grade, $F(2, 240) = 3.94, p < .02$. Positive affect declined within eighth grade as expected but then stabilized as the students moved into ninth grade, $F(2, 240) = 10.11, p < .001$.

The only gender effects emerged for these motivation- and affect-dependent measures. For self-efficacy (a gender by time interaction), girls started out similar to boys in their efficacy for math but by ninth grade, girls were reporting significantly lower levels of efficacy, $F(2, 280) = 3.10, p < .05$. For negative affect (a gender by time interaction), girls reported lower levels of negative affect in both waves in eighth grade in comparison with boys, but by ninth grade, girls were reporting similar levels of negative affect as boys, $F(2, 232) = 3.57, p < .03$.

For motivational and cognitive strategies, students increased in their reported use of self-handicapping within eighth grade as predicted but did not report more once they moved into the ninth

Table 1
Means and Standard Deviations for Motivation, Affect, Strategies, and Grade by Waves

	Time 1		Time 2		Time 3	
Dependent variables	*M*	*SD*	*M*	*SD*	*M*	*SD*
Motivation						
Self-efficacy	5.49_a***	1.12	5.31_a***	1.36	4.85_b***	1.54
Task value	5.55_a***	1.08	5.20_b***	1.21	5.18_b***	1.35
Test anxiety	3.51	1.67	3.60	1.68	3.77	1.80
Affect						
Negative affect	2.27_a*	1.13	2.54_b*	1.16	$2.35_{a,b}$*	1.03
Positive affect	4.79_a***	1.23	4.27_b***	1.39	4.41_b***	1.34
Strategies						
Self-handicapping	3.39_a****	1.24	3.68_b***	1.09	3.73_b***	1.22
Risk taking	4.83	1.32	4.80	1.29	4.78	1.35
Cognitive strategies	5.32	1.20	5.20	1.26	5.14	1.18
Metacognitive strategies	4.88_a**	1.10	$4.76_{a,b}$**	1.12	4.55_b**	1.37
Math grade	8.11_a****	2.56	7.61_b****	2.79	5.21_c****	3.31

Note. Means within a row with different subscripts are significantly different from one another.
* $p < .02$. ** $p < .003$. *** $p < .001$. **** $p < .0001$.

grade, $F(2, 292) = 8.29$, $p < .001$. Counter to the predictions of a decrease over time, self-reported risk taking was stable over the three waves, as was the reported use of cognitive strategies (see Table 1). The use of metacognitive strategies, however, was reported as declining over time as predicted, $F(2, 290) = 5.94$, $p < .003$. Average math grades also followed expectations and declined within eighth grade as well as in ninth grade, $F(2, 288) = 103.86$, $p < .0001$. The average grade in mathematics after the first semester of eighth grade was a B, after the second semester a B−, but then in ninth grade, the average grade was a C.

Mastery and Performance Goals as Predictors of Developmental Trends in Motivation, Affect, Strategies, and Grades

The tests of most interest in the repeated measures ANOVAs were the effects of mastery goals over time (a two-way interaction of mastery goals by time), the effects of performance goals over time (a two-way interaction of performance goals by time), and the interaction between mastery and performance goals over time (a three way interaction of mastery goals by performance goals by time). All the means over time for the four goal groups for all the dependent variables are recorded in Table 2.

Self-Efficacy. For Self-Efficacy, the mastery goal by time effect and the performance goal by time effect were not significant, but there was a significant mastery by performance by time interaction, $F(2, 294) = 3.18$, $p < .04$. Figure 1 displays a graph of the means over time by the four mastery–performance groups. All groups displayed a general, statistically significant decline over time in Self-Efficacy, except for the low-mastery/low-performance group, as displayed in Table 2. This group had the lowest level of efficacy to begin with, and it remained low over all three waves. The other interesting aspect of Figure 1 is that the highest level of Self-Efficacy at all three waves was in the high-mastery/high-performance group, a pattern that was repeated with other dependent measures as well and is in line with a revised goal theory enhancement prediction for multiple goals.

Task Value. There was both an effect for mastery goals by time, $F(2, 292) = 3.70$, $p < .02$, as well as a mastery by perfor-

Table 2
Means and Standard Deviations for Motivation, Affect, Strategy Use, and Grade by Four Goal Groups

	High-mastery/low-performance (n = 30)		High-mastery/high-performance (n = 45)		Low-mastery/high-performance (n = 35)		Low-mastery/low-performance (n = 40)	
Dependent variables	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Motivation								
Self-efficacy–T1	5.73_{a}	0.84	5.90_{a}	0.97	5.47_{a}	1.31	4.88_{b}	1.04
Self-efficacy–T2	5.31	1.37	5.63	1.20	5.02	1.53	5.15	1.34
Self-efficacy–T3	4.66	1.48	5.25	1.55	4.59	1.65	4.78	1.46
Task value–T1	5.95_{a}	0.80	6.12_{a}	0.72	5.35_{b}	1.00	4.80_{c}	1.18
Task value–T2	$5.42_{a,b}$	1.04	5.58_{a}	1.24	4.75_{c}	1.14	$5.00_{b,c}$	1.21
Task value–T3	5.00_{a}	1.36	5.67_{b}	1.31	4.71_{a}	1.42	$5.18_{a,b}$	1.17
Test anxiety–T1	2.98	1.50	3.85	1.81	3.39	1.74	3.61	1.50
Test anxiety–T2	3.06	1.49	3.80	1.72	3.54	1.80	3.86	1.59
Test anxiety–T3	3.51	1.73	3.66	1.88	3.95	1.71	3.96	1.86
Affect								
Negative affect–T1	2.09	0.82	2.52	1.21	2.09	0.86	2.27	1.29
Negative affect–T2	2.30	0.95	2.62	1.37	2.54	0.98	2.64	1.09
Negative affect–T3	2.18	1.10	2.39	1.13	2.33	0.99	2.45	0.69
Positive affect–T1	5.02_{a}	1.17	5.09_{a}	0.98	$4.72_{a,b}$	1.27	4.32_{b}	1.30
Positive affect–T2	4.62	1.25	4.22	1.50	4.25	1.32	4.06	1.18
Positive affect–T3	$4.47_{a,b}$	1.39	4.79_{a}	1.29	4.08_{b}	1.37	$4.23_{a,b}$	1.23
Strategies								
Self-handicapping–T1	$3.11_{a,b}$	1.13	2.95_{a}	1.52	$3.62_{b,c}$	1.03	3.89_{c}	1.22
Self-handicapping–T2	3.62	1.09	3.46	1.26	3.89	1.03	3.79	0.93
Self-handicapping–T3	$3.78_{a,b}$	1.19	3.26_{a}	1.21	4.11_{b}	1.09	3.88_{b}	1.24
Risk taking–T1	5.42_{a}	1.07	5.39_{a}	1.31	4.37_{b}	1.13	4.17_{b}	1.22
Risk taking–T2	5.11_{a}	1.33	5.10_{a}	1.19	4.38_{b}	1.32	$4.59_{a,b}$	1.25
Risk taking–T3	$4.88_{a,b}$	1.30	5.21_{a}	1.46	4.32_{b}	1.41	4.63_{b}	1.06
Cognitive strategies–T1	5.35	1.12	6.10	0.91	5.02	0.98	4.65	1.25
Cognitive strategies–T2	5.32	1.19	5.70	1.12	4.93	1.16	4.77	1.36
Cognitive strategies–T3	5.04	1.20	5.54	1.10	4.93	1.23	4.91	1.16
Metacognitive strategies–T1	$5.13_{a,b}$	1.01	5.49_{a}	1.04	$4.67_{b,c}$	1.02	4.19_{c}	0.82
Metacognitive strategies–T2	$5.00_{a,b}$	1.06	5.14_{a}	1.11	$4.49_{b,c}$	1.08	4.37_{c}	1.07
Metacognitive strategies–T3	$4.65_{a,b}$	1.31	5.12_{a}	1.26	4.25_{b}	1.33	4.14_{b}	1.31
Math Grade								
Math Grade–T1	7.16	3.21	7.14	3.00	7.50	3.29	6.88	3.18
Math Grade–T2	6.50	3.54	6.55	3.16	6.69	3.47	6.19	3.23
Math Grade–T3	6.33	3.30	6.40	3.07	5.82	3.43	5.77	3.31

Note. Means within a row with different subscripts are significantly different from one another. T1 = Time 1; T2 = Time 2; T3 = Time 3.

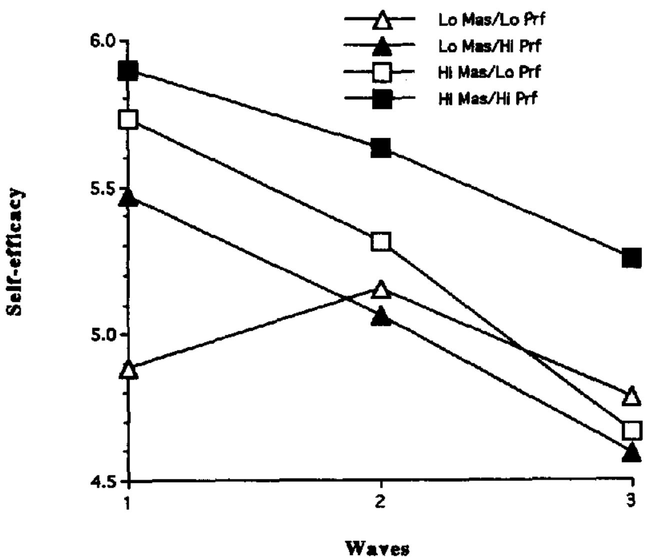

Figure 1. Self-efficacy ratings by mastery and performance goal groups. Lo Mas/Lo Prf = Low mastery/low performance; Lo Mas/Hi Prf = Low mastery/high performance; Hi Mas/Lo Prf = High mastery/low performance; Hi Mas/Hi Prf = High mastery/high performance.

mance by time interaction, $F(2, 292) = 6.50$, $p < .002$. In particular, students low in mastery had lower levels of Task Value than students high in mastery goals at all three waves, as predicted. Moreover, those low in mastery goals did not decline over time in Task Value. Their level of Task Value was low and remained low over the three waves. In contrast, those students high in mastery had higher levels at the beginning of eighth grade but declined over time, a pattern more reflective of the general developmental trend displayed in Table 1, in comparison to those low in mastery.

The three-way interaction between mastery goals, performance goals, and time is graphed in Figure 2. At the beginning of eighth grade, those students low in both mastery and performance goals were the least interested in math and valued it the least, and they remained so over the course of the study, as predicted (the slight rise in Task Value displayed in Figure 2 is not reliable). In contrast, students low in mastery but high in performance goals had higher initial levels of interest and utility value than the low-mastery/low-performance group, but over time declined to the same level of interest as the low-mastery/low-performance group. Students in the high-mastery–low-performance group and the high-mastery/high-performance group had similar levels of interest and value to each other (but higher than the low-mastery/low-performance group and the low-mastery/high-performance group) at the beginning of eighth grade, but the high-mastery/low-performance group declined significantly over time to report the same level of interest and value as the low-mastery/low-performance and low-mastery/high-performance group by the ninth grade. In other words, and contrary to predictions, the high-mastery/high-performance group, although starting higher and declining over time, still had the highest level of interest and value in math in ninth grade relative to the other three groups.

Test Anxiety and Negative Affect. Contrary to the hypotheses, there were no significant differences for Test Anxiety and Negative Affect over time by mastery or performance goals or their interaction. Although not reliably different, it is interesting to note that the high-mastery/high-performance group reported more anxiety and more Negative Affect than the high-mastery/low-performance group, as would be predicted by normative goal theory (see Table 2).

Positive Affect. The three-way interaction of mastery by performance goals by time was significant for Positive Affect, $F(2, 240) = 2.83$, $p < .05$, although there were no significant effects for mastery by time or performance by time interactions. The three-way interaction is graphed in Figure 3. As predicted, the low-mastery/low-performance group had the lowest level of Positive Affect and remained low over time (see Table 2). The other three groups had higher levels of Positive Affect at the start of eighth grade but declined over time; this was especially true for the low-mastery/high-performance group, in line with predictions. In contrast, the high-mastery/high-performance group declined at Wave 2 but rebounded in ninth grade to have the highest level of Positive Affect, as predicted by a revised goal theory model. The high-mastery/low-performance group did not decline in eighth grade as much as the high-mastery/high-performance group, but was somewhat lower at Wave 3 in ninth grade than the high-mastery/high-performance group (see Table 2 and Figure 3).

There also was one gender by performance goal by time interaction for positive affect, $F(2, 232) = 3.25$, $p < .04$. Girls who were high in performance orientation had the largest drop in Positive Affect over the course of the study. All students were dropping in Positive Affect, but these performance-oriented girls started out the highest in Positive Affect but ended up at the same level as the other students.

Self-handicapping. The reported use of self-handicapping and the withdrawal of effort over time was related to both overall level

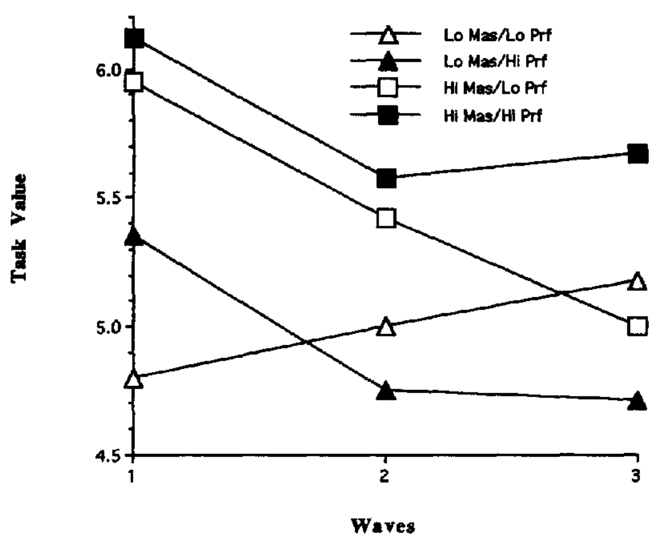

Figure 2. Task value ratings by mastery and performance goal groups. Lo Mas/Lo Prf = Low mastery/low performance; Lo Mas/Hi Prf = Low mastery/high performance; Hi Mas/Lo Prf = High mastery/low performance; Hi Mas/Hi Prf = High mastery/high performance.

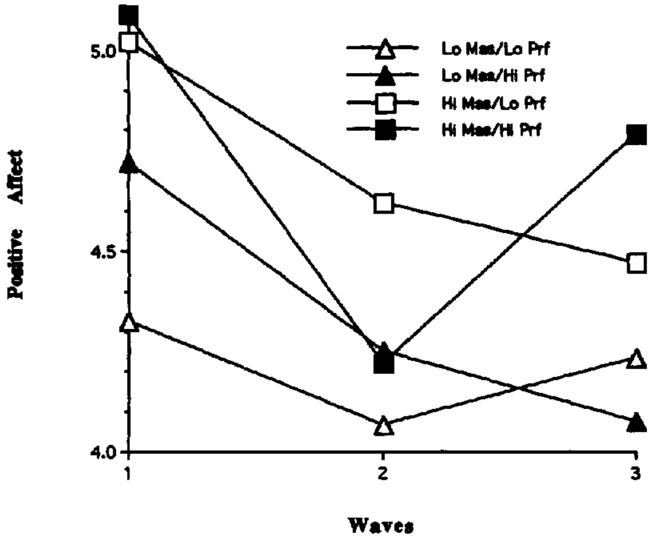

Figure 3. Positive affect ratings by mastery and performance goal groups. Lo Mas/Lo Prf = Low mastery/low performance; Lo Mas/Hi Prf = Low mastery/high performance; Hi Mas/Lo Prf = High mastery/low performance; Hi Mas/Hi Prf = High mastery/high performance.

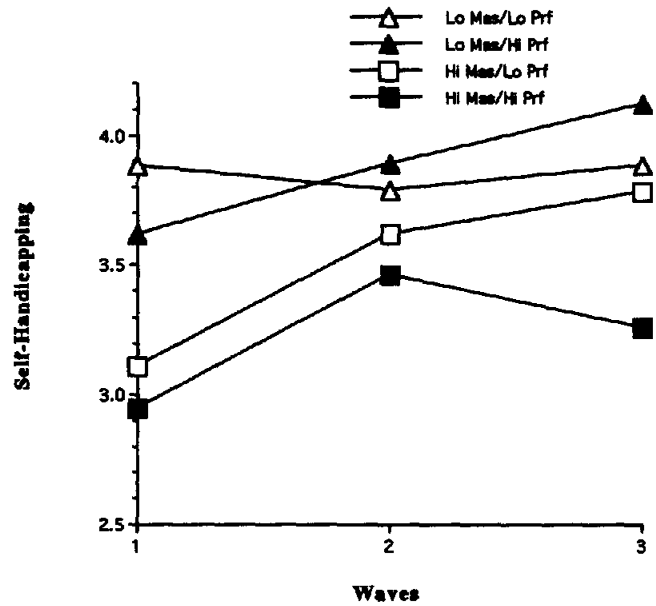

Figure 4. Self-handicapping ratings by mastery and performance goal groups. Lo Mas/Lo Prf = Low mastery/low performance; Lo Mas/Hi Prf = Low mastery/high performance; Hi Mas/Lo Prf = High mastery/low performance; Hi Mas/Hi Prf = High mastery/high performance.

of mastery (a mastery by time interaction), $F(2, 292) = 4.04$, $p < .04$, as well as the interaction between mastery and performance goals (a mastery by performance by time interaction), $F(2, 292) = 4.01$, $p < .04$. Although the high-mastery students reported less self-handicapping than the low-mastery students in general, high-mastery students increased over time in their self-report of self-handicapping, while the low-mastery students remained at a stable high level of self-handicapping. The three-way interaction between mastery and performance goals by time is graphed in Figure 4. The two high-mastery groups (regardless of performance goals) reported the lowest levels of self-handicapping at Wave 1, but by Wave 3, only the high-mastery/high-performance group had maintained this low level of reported self-handicapping, in line with revised goal theory predictions. The high-mastery/low-performance group was now reporting withholding effort at a similar level as the two low-mastery groups.

Risk taking. There was a significant effect of mastery goals by time, $F(2, 292) = 4.31$, $p < .01$, and a mastery goal by performance goal by time interaction, $F(2, 292) = 3.70$, $p < .05$. The effect of mastery by time was as predicted: Students who were higher in mastery goals were more likely to report taking risks in their academic work, but they did decline in risk taking over time. In contrast, low-mastery students reported an increase in risk taking at Time 2 but then reverted back to a lower level of risk taking at Time 3. The three-way interaction is graphed in Figure 5. At Wave 1, it is clear that both low-mastery groups (regardless of performance goals) had the lowest levels of self-reported risk taking and that the two high-mastery groups (regardless of performance goals) had the highest levels of self-reported risk taking. This pattern was maintained at Wave 2, but at Wave 3, the highest level of risk taking was only reported by the high-mastery/high-performance group.

Cognitive strategies. There was an effect of mastery goals by time, $F(2, 290) = 3.50$, $p < .03$, with students high in mastery reporting more use of cognitive strategies for learning at all three waves as predicted by normative goal theory. However, the low-mastery group's self-reported use of cognitive strategies was stable at a lower level over the three waves, while the high-mastery group declined over time in reported use of cognitive strategies. In addition, there also was an effect of performance goals by time,

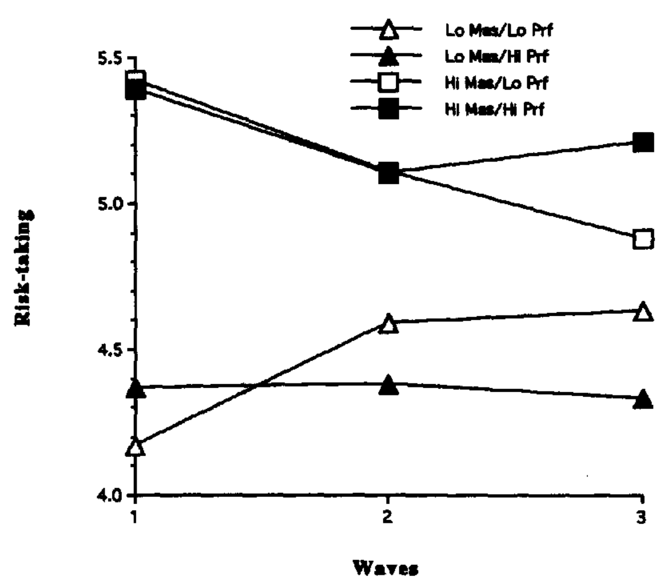

Figure 5. Risk taking by mastery and performance goal groups. Lo Mas/Lo Prf = Low mastery/low performance; Lo Mas/Hi Prf = Low mastery/high performance; Hi Mas/Lo Prf = High mastery/low performance; Hi Mas/Hi Prf = High mastery/high performance.

$F(2, 292) = 5.68, p < .01$, with students high in performance goals also reporting the use of more cognitive strategies over time than those low in performance goals, more in line with a revised goal theory perspective. The low-performance group remained stable in their low report of strategies over time, while the high-performance group declined in self-reported strategy use over time.

Metacognitive strategies. As expected under normative goal theory, the self-reported use of Metacognitive Strategies over time was related to mastery goals (a mastery goal by time interaction), $F(2, 290) = 23.8, p < .001$, with students high in a mastery orientation reporting more self-regulation of their cognition over time in comparison to those low in mastery. However, paralleling the findings for cognitive strategy use, the low-mastery students had a lower but stable level of self-reported metacognition over time, while the high-mastery group declined in metacognition over the three waves.

Math grade. Grades in math class over time were not significantly related to mastery or performance goals in terms of conventional statistical significance, but there was a slight trend for high-performance students to have somewhat higher grades than those low in performance at Wave 1 but to have a similar pattern of decline over time (a performance by time interaction), $F(2, 288) = 3.04, p < .08$. The difference was about one letter grade at Wave 1 (high-performance goal students averaged a little better than a B and those low in performance goals averaged a little better than a B−) and about a half letter grade at Wave 3 (between a C+ and C).

Discussion

In general, it appears that a revised goal theory perspective on approach performance goals as well as normative goal theory are both applicable to the development of motivation and achievement in school contexts. First, the findings regarding the overall general developmental trends in motivation, affect, strategy use, and performance parallel the consistent findings from other developmental and longitudinal studies (Eccles et al., 1998; Wigfield et al., 1996). That is, the general drop in adaptive outcomes over time (decreases in self-efficacy, task value, positive affect, metacognitive strategies, and actual performance) as well as the increase in maladaptive outcomes (increase in self-handicapping) that were found in this study are similar to many other developmental studies. The reliability and similarity of the general developmental trends found in this study make the results regarding how these trends are moderated by multiple goals more important and salient. The results for the multiple goals are discussed in terms of the four different groups of students and their multiple pathways through junior high school mathematics.

A key comparison for testing the relative accuracy of the revised and normative goal orientation models regarding the role of approach performance goals was between the high-mastery/high-performance group and the high-mastery/low-performance group. According to normative goal theory, the high-mastery/low-performance group should have the most adaptive pattern, whereas, under the revised model, the high-mastery/high-performance group may be better on some outcomes. For all the dependent variables, these two groups either did not differ significantly from one another (see Table 2) or, when they did differ, the comparison favored the high-mastery/high-performance group.

For example, the two groups were equal in self-efficacy, cognitive strategy use, and metacognition over time, as predicted and in line with prior research (Pintrich, 2000). Moreover, the differences that were predicted in terms of anxiety, affect, self-handicapping, and risk taking, with the expectation that the high-mastery/high-performance group might have a less adaptive pattern on these variables, did not emerge. For the most part, the high-mastery/high-performance group was not more anxious, did not experience less positive or more negative affect, and did not engage in more self-handicapping or less risk taking in comparison to the high-mastery/low-performance group. Finally, in terms of task value, the high-mastery/high-performance group actually did report higher levels of task value than did the high-mastery/low-performance group over time. As task value includes interest, this result is not quite in line with other findings that have found performance goals unrelated to interest (Harackiewicz et al., 1997, 1998). However, the measure of task value used in this study also included items regarding perceptions of utility and importance of math. In this case, it may be that students who are high mastery and high performance are not more intrinsically interested in math, but they may see math as more important or useful for them.

In any event, it appears that a high approach performance goal, when coupled with a high mastery goal, does not reduce or dampen the general positive effect of a high mastery goal. Students who were concerned about their performance and wanted to do better than others and, at the same time, wanted to learn and understand the material had an equally adaptive pattern of motivation, affect, cognition, and achievement as those just focused on mastery goals. In this sense, the pathways were similar for these two groups, and they seemed to end up at the same level of achievement as well. However, there was not strong support for the enhancement argument of the revised goal theory perspective that a combination of both mastery and performance goals would have a number of beneficial outcomes. In many cases, the means were in the expected direction with the high-mastery/high-performance group having the highest levels of motivation, affect, and strategy use, but these differences were not reliable, so strong claims cannot be made about the enhancing power of being high in both mastery and approach performance goals.

In contrast, and in line with normative goal theory predictions, the low-mastery/high-performance group did not have an adaptive pattern of motivation, affect, and strategy use. This group began the study high in self-efficacy for math but was at the lowest level at Wave 3. They also had a similar pattern with task value and positive affect, starting out at an average level of value and affect (relative to the two high-mastery groups), but by the end of the study were at the lowest levels of value and positive affect, similar to the low-mastery/low-performance group. The same debilitating pattern over time of reported self-handicapping and risk taking emerged for this group. As would be predicted by normative goal theory and prior research (e.g., Midgley et al., 1996), this low-mastery/high-performance group had the highest levels of reported self-handicapping by the end of the study and were much less likely to report that they wanted to take risks in their math classroom. Although this group did not really differ from the other groups on self-reported cognitive or metacognitive strategy use or achievement over time, it seems clear that their pathway through math classrooms was not a particularly easy or positive one. They were less confident, less interested, experienced less positive af-

fect, and were more likely to report withdrawing their effort and engagement in difficult tasks over time. It appears that high approach performance goals without an accompanying focus on mastery goals can lead to maladaptive motivational and affective outcomes over time, in line with normative goal theory (Ames, 1992; Dweck & Leggett, 1988).

Finally, the low-mastery/low-performance group also struggled in their math classrooms on almost all the outcomes examined in this study, in line with predictions and prior research. These students felt less efficacious about their ability to do their math work, and they were less interested and viewed math as less useful and important. They also reported lower levels of feeling happy or proud and were more likely to report withdrawing their effort, procrastinating, and avoiding difficult and challenging tasks. For this group, both normative goal theory and a revised position are in agreement that these students are not on a very adaptive pathway in school.

In summary, both normative goal theory and the revised perspective on performance goals were supported in this study. As normative goal theory suggests (Ames, 1992; Dweck & Leggett, 1988), students who are only concerned about performance, doing better than others, and trying to be smarter than others, with little or no concern for mastery and learning, are likely to follow a fairly maladaptive pathway in terms of their motivation and affect in classroom settings. In contrast, and in line with a revised perspective on approach performance goals (Harackiewicz et al., 1998; Pintrich, 2000; Wolters et al., 1996), students who are concerned with performance and doing better than others while being focused on mastery and learning are not at risk for maladaptive pathways. In fact, these students seem to follow an equally adaptive trajectory that parallels those students who are only focused on mastery and learning goals.

The most important generalization from normative goal theory that a mastery goal orientation is the most adaptive is still accurate. That is, the implication that students should be encouraged to adopt a mastery goal orientation and that classrooms should be structured to facilitate and foster a general mastery orientation is still a valid conclusion. However, a revised perspective on approach performance goals also was supported with implications for classroom practice. That is, if mastery goal students also adopt an approach performance orientation, there seems to be little cost in terms of motivation, affect, cognition, or achievement. Accordingly, as classroom situations often engender some competition and social comparison, invariably, given their general structure, and if students are focused on "approaching" the competition and comparison, there do not have to be detrimental effects if they also are oriented to mastery of their schoolwork.

Although these results are interesting and do add to our understanding of goal theory in classroom settings, there are a number of limitations that need to be addressed in future research. First, the data are drawn from mathematics classrooms. Math classrooms may be more performance oriented in general, and this needs to be examined in future research. There may be a moderating interaction between a student's personal goal orientation and the general classroom orientation (Harackiewicz et al., 1997, 1998; Newman, 1998). It may be that there is an "enhancing" moderator effect if the student and classroom goals are synchronous (e.g., a high performance goal student in a high performance class) or a more debilitating effect if the personal and classroom goals are not congruent. There is a need for more research on these potential moderating effects of classroom goal structures on personal goal–outcome relations in math classrooms as well as in other types of classrooms.

Second, there also may be other moderator effects with other personal characteristics of the students. For example, normative goal theory (e.g., Dweck & Leggett, 1988) suggests that self-efficacy beliefs can moderate the effects of performance goals, with performance goals having detrimental effects only when combined with low efficacy. Although there are mixed findings from both experimental and correlational studies on this issue (cf. Harackiewicz et al., 1998; Kaplan & Midgley, 1997; Miller, Behrens, Greene, & Newman, 1993), it may be that the students who are low-mastery/high-approach performance and also low in self-efficacy may have the most maladaptive patterns of motivation, affect, cognition, and achievement. The issue needs to be examined not just in terms of the approach–avoidance performance distinction, but also in more microgenetic designs that allow for examination of the goal and efficacy processes as they unfold over time, on a more dynamic "on-line" basis, not in terms of longitudinal designs where the intervals are months.

Related to the potential efficacy moderator effect, there also may be a moderating effect of general achievement level or actual performance. For example, in the current data, it may be that the high-mastery/high-performance and high-mastery/low-performance groups are both experiencing relative success in their math performance. In this case, there may be no debilitating effects of having a high-mastery/high-performance multiple-goal pattern. However, if this group of high-mastery/high-performance students began to consistently do poorly or fail, there may be some maladaptive outcomes as would be expected by normative goal theory. In the current data, there was no evidence of differences in general overall level of math achievement (e.g., math grades) by these two groups. In addition, even as both groups began to do much worse on average in the ninth grade (as indexed by grades) there were still no differential reactions or trajectories in terms of motivation, affect, or cognition for these two groups. Nevertheless, a formal statistical test of the potential three-way achievement level by mastery by performance groups interaction is needed to confirm or disconfirm the potential achievement level moderator effect. Future research with larger samples will be needed for this type of multiple level interaction analysis.

Third, the data analysis in the current study focused on the mean level change over time, that is, the repeated measures ANOVAs provided information about only the general trends over time. This type of analysis does not consider the individual differences in variance around those means over time. To examine the different individual level trajectories over time, growth curve modeling procedures are needed. This type of analysis allows for the investigation of how different trajectories develop over time and then whether these different trajectories are actually related to different predictors such as multiple goal patterns. Moreover, this type of hierarchical linear modeling analysis would allow for the use of continuous predictors and their multiplicative interaction terms, thereby providing a much more accurate estimation of the effects of different goals than the median split analysis used in this study. Of course, this type of analysis also requires large samples to provide reliable estimates of the growth parameters. Future longi-

tudinal research on these issues should adopt this type of analysis with larger samples.

Finally, there may be other outcome measures that need to be included in our models of how goals differentially influence motivation, affect, cognition, and achievement. Pintrich (2000) has noted that there are a number of different motivational strategies that individuals can use to regulate their interest, affect, efficacy, and goals in classrooms. I also have suggested that students can use different strategies to regulate the context (i.e., try to change the context) or their behavior in the context. Students with multiple patterns of goals may follow different pathways with these different regulatory strategies, and there is a need for more research on these issues that uses other measures besides self-reports. This type of research will help researchers understand how multiple goals can give rise to multiple pathways or trajectories over the course of development and can foster better understanding of learning and achievement in classroom settings.

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Appendix

Sample Items for Self-Report Scales

Scale	Sample item
Mastery Goals (6 items)	In this class, understanding the work is more important to me than the grade I get.
Approach Performance Goals (5 items)	In this class, I like to show my teacher that I'm smarter than the other kids.
Self-efficacy (4 items)	I am sure I can do an excellent job on the problems assigned in this class.
Task Value (6 items including interest and utility value)	I think that what we are learning in this class is interesting. (interest) I think that what I'm learning in this class is useful for me to know. (utility)
Test Anxiety (4 items)	I worry a great deal about tests in this class.
Negative Affect (4 items)	I often feel angry when I am at school.
Positive Affect (4 items)	I am often happy when I'm at school.
Self-handicapping (5 items)	If I tried hard and did poorly in this class, I wouldn't work as hard next time.
Risk Taking (4 items)	In this class, I'll try to answer the teachers' questions even if there is a chance I'll look silly.
Cognitive Strategy Use (9 items)	When I study for a test in this class, I practice saying the important facts over and over to myself.
Metacognitive Strategy Use (7 items)	I ask myself questions to make sure I know the material I have been studying for this class.

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