The Social–Cognitive Model of Achievement Motivation and the 2 × 2 Achievement Goal Framework

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Two studies examined hypotheses drawn from a proposed modification of the social–cognitive model of achievement motivation that centered on the 2 × 2 achievement goal framework. Implicit theories of ability were shown to be direct predictors of performance attainment and intrinsic motivation, and the goals of the 2 × 2 framework were shown to account for these direct relations. Perceived competence was shown to be a direct predictor of achievement goals, not a moderator of relations implicit theory or achievement goal effects. The results highlight the utility of attending to the approach–avoidance distinction in conceptual models of achievement motivation and are fully in line with the hierarchical model of achievement motivation.

Keywords: achievement, motivation, goals, theories, competence

Three prominent constructs in contemporary research on achievement motivation are implicit theories of ability, achievement goals, and perceived competence. Implicit theories of ability are individuals' lay conceptions of the nature of competence and ability. Achievement goals are individuals' representations of competence-based outcomes that they strive to attain or avoid. Perceptions of competence are individuals' beliefs about what they can and cannot accomplish in competence-relevant settings. Dweck and colleagues (e.g., Dweck, 1986; Dweck & Leggett, 1988) have offered a social–cognitive model of achievement motivation that delineates the conceptual and empirical relations among these three constructs and links them to achievement-relevant outcomes. This model has received considerable attention in the literature over the past two decades.

In the present work, we overview the hypotheses of the social–cognitive model, review research on the model, and consider recently suggested modifications to the model. Then, we offer our own suggestions for modification centered on the 2 × 2 achievement goal framework and delineate specific hypotheses based on our suggested modifications. Finally, we present two studies designed to put our hypotheses to empirical test.

The Social–Cognitive Model

In the social–cognitive model, two implicit theories of ability and two achievement goals are identified. The two implicit theories are entity theory and incremental theory: Entity theory characterizes ability as stable and immutable, whereas incremental theory characterizes ability as amenable to change. The two achievement goals are performance goals and mastery goals: Performance goals focus on demonstrating competence, whereas mastery (i.e., learning[1]) goals focus on developing competence and mastery. Perceived competence is conceptualized as the individual's confidence that he or she has ability or will be able to accomplish the task at hand.

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[1] Dweck (1986) used the term *learning* rather than *mastery* for this type of goal; mastery is used herein, because it is the modal term in the achievement goal literature for this type of goal.

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Both implicit theories and goals are hypothesized to systematically predict outcomes in achievement settings. Entity theory and performance goals are posited to predict a maladaptive set of outcomes, including low levels of persistence, performance, and intrinsic motivation; these negative outcomes are viewed as particularly likely when failure is encountered. Incremental theory and mastery goals are posited to predict an adaptive set of outcomes, including high levels of persistence, performance, and intrinsic motivation; these positive outcomes are anticipated regardless of whether failure is encountered (Dweck & Leggett, 1988).

Implicit theories are portrayed as predictors of achievement goals, which, in turn, lead to achievement-relevant outcomes. Entity theory is posited to prompt performance goals, which are predicted to lead to negative outcomes. Incremental theory is posited to prompt mastery goals, which are predicted to lead to positive outcomes. Thus, performance goals are thought to explain why entity theory has a negative impact on achievement-relevant outcomes, and mastery goals are thought to explain why incremental theory has a positive impact.

Perceived competence is hypothesized to moderate the influence of implicit theories and achievement goals on achievement-relevant outcomes. Specifically, entity theory and performance goals are posited to have inimical effects when perceived competence is low, but not when it is high; incremental theory and mastery goals are posited to have a positive influence on outcomes regardless of perceived competence (Dweck & Leggett, 1988).

Empirical Support for the Social–Cognitive Model and Recent Suggestions for Modification

A considerable amount of research has been conducted on the relations among implicit theories of ability, achievement goals, perceived competence, and achievement-relevant outcomes. The implicit theory hypotheses have received strong support from the existing data. The proposal that entity theory has a negative influence on achievement-relevant outcomes, whereas incremental theory has a positive influence, has been clearly documented in prior research (see Aronson, Fried, & Goode, 2002; Ommundsen, 2001). The data seem to indicate that entity theory has inimical effects regardless of whether failure is encountered, although this issue has received minimal empirical attention (Hong, Chiu, Dweck, Lin, & Wan, 1999). The proposal that entity theory is a positive predictor of performance goal adoption, whereas incremental theory is a positive predictor of mastery goal adoption, has likewise been clearly validated in previous research (see Bempechat, London, & Dweck, 1991; Robins & Pals, 2002).

In contrast, the proposal that performance goals lead to negative outcomes, whereas mastery goals lead to positive outcomes, has garnered mixed support. Performance goals have been shown to lead to negative outcomes in some studies but positive outcomes in others (for a review, see Elliot, 1997). Mastery goals have been shown to lead to a host of positive outcomes, although not performance attainment (for a review, see Urdan, 1997). The data seem to indicate that performance goals have similar effects regardless of whether failure is encountered, but this issue has received a paucity of research attention (Barron & Harackiewicz, 2001).

It is important to note that only a few studies (Roedel & Schraw, 1995; Stipek & Gralinski, 1996) have examined whether achievement goals account for the direct relation between implicit theories of ability and achievement-relevant outcomes; those that have been conducted have not yielded support. The main impediment to documenting an intermediary role for goals is that they have failed to predict outcomes in the hypothesized manner.

The perceived competence hypotheses have also received minimal support from the existing research. The proposal that the impact of implicit theories of ability on achievement-relevant outcomes is moderated by perceived competence has received little support (for a review, see Tabernero & Wood, 1999). The proposal that the influence of achievement goals on outcomes is moderated by perceived competence has received mixed support, with some studies yielding evidence of moderation, but many yielding null results (for a review, see Kaplan & Midgley, 1997).

In sum, the extant data provide only partial support for the social–cognitive model, indicating that modification of the model is necessary. Several modifications have been suggested, such as emphasizing the direct effect of implicit theories on outcomes (rather than the intermediary role of achievement goals) and emphasizing the negative effect of entity theory and performance goals per se (rather than the moderating role of perceived competence; Hong et al., 1999; Kaplan & Midgley, 1997). In the following, we offer alternative suggestions for modification based on the distinction between approach and avoidance motivation and, more specifically, Elliot and colleagues' 2×2 achievement goal framework (Elliot, 1999; Elliot & McGregor, 2001).

Alternative Suggestions for Modification

The 2×2 achievement goal framework crosses the performance-mastery distinction with the approach–avoidance distinction. The performance-mastery distinction is construed as representing how competence is defined (according to a normative standard or a task-based or intrapersonal standard, respectively), and the approach–avoidance distinction is construed as representing how competence is valenced (according to positive possibilities or negative possibilities, respectively). This framework comprises four achievement goals: mastery-approach (focused on attaining task-based or intrapersonal competence), performance-approach (focused on attaining normative competence), mastery-avoidance (focused on avoiding task-based or intrapersonal incompetence), and performance-avoidance (focused on avoiding normative incompetence; see Elliot, 1999, for more detail on these goals and for examples of the most recent addition to the literature—mastery-avoidance goals).

Our contention is that achievement goals have not fared well as predictor and intermediary variables in research on the social–cognitive model because only omnibus performance and mastery goals (i.e., those ignoring or collapsing across the approach–avoidance distinction) have been examined. In research on the 2×2 framework, approach and avoidance forms of both performance-based and mastery-based goals have been shown to have different patterns of antecedents and consequences (for a review, see Elliot, 2005). Thus, measures and manipulations that fail to attend to the approach–avoidance distinction often yield results that are difficult to interpret and that underestimate the predictive and explanatory utility of the achievement goal construct. Accordingly, we believe

that it is best to keep the intermediary role of achievement goals in the social–cognitive model, but to reexamine this role by using the 2 × 2 framework. We posit that implicit theories prompt adoption of the goals delineated in the 2 × 2 framework and that these goals, in turn, lead to achievement-relevant outcomes and account for the direct links between implicit theories and outcomes.

Regarding perceived competence, we view implicit theories and perceived competence as independent antecedents of achievement goal adoption. That is, we think perceived competence is best construed as a predictor of achievement goals, not as a moderator of implicit theory or achievement goal effects (Elliot & Church, 1997).

The Present Research

The present research was designed to examine specific hypotheses based on our suggested modifications of the social–cognitive model. We sought to examine these hypotheses in two studies: a field study focused on predicting math performance and a laboratory experiment focused on predicting IQ test performance and intrinsic motivation. In both studies, we examined the full set of relations postulated in the social–cognitive model as well as our hypothesized modifications. Our specific hypotheses are articulated in the introduction section of each study.

Study 1

Study 1 was a field study focused on math performance in a classroom setting. Entity and incremental theories of ability were assessed separately so that their separate influences could be examined; math performance was examined by controlling for prior math performance.

Our hypotheses regarding the direct influence of implicit theories on performance are in full accord with the social–cognitive model. Entity theory was expected to be a negative predictor of performance, whereas incremental theory was expected to be a positive predictor. These relations have been clearly documented in prior research (see Dweck & Sorich, 1999; Good, Aronson, & Inzlicht, 2003).

In prompting achievement goal adoption, implicit theories were hypothesized to exert their influence on how competence is defined in one's goals, not how competence is valenced in one's goals (this represents a slight shift from the thinking of Elliot & McGregor, 2001). Entity theory was posited to lead to norm-based goals (performance-approach and performance-avoidance), because normative competence feedback provides the most diagnostic information regarding ability (Trope, 1983), and this is the information that is of most direct relevance to entity theorists. Incremental theory was posited to lead to task- or intrapersonally based goals (mastery-approach and mastery-avoidance), because task or temporal competence feedback provides the clearest information regarding the development (or not) of ability (Butler, 2000). Researchers have yet to test implicit theories of ability as predictors of the 2 × 2 achievement goals. Some studies have focused on either domain-general implicit theories or a subset of the 2 × 2 goals (Cury, Da Fonseca, Rufo, & Sarrazin, 2002; Elliot & McGregor, 2001), and these studies have provided partial support for our hypotheses.

Regarding the goal–performance link, we expected performance-based goals but not mastery-based goals to be systematic predictors of performance attainment (see Brophy, 2004; Elliot, 2005). For performance-based goals, the use of others as a performance referent focuses individuals on the external criteria involved in performance evaluation, and an appetitive focus on these criteria (performance-approach goals) was posited to facilitate performance, whereas an aversive focus on these criteria was posited to debilitate performance (Elliot & McGregor, 1999). For mastery-based goals, their task-based or intrapersonal focus is not optimally matched to externally imposed evaluative criteria, and these goals (both mastery-approach and mastery-avoidance) were expected to neither facilitate nor debilitate performance (Elliot, Shell, Bouas Henry, & Maier, 2005). These hypotheses are in accord with the extant data (see Elliot & McGregor, 2001; Zusho, Pintrich, & Cortina, 2005).

Putting the components of the model together entails making hypotheses regarding the role of specific goals as intermediary variables. Entity theory was expected to have a negative impact on performance, and the extent of this negative impact was thought to vary as a function of two kinds of goal adoption. On one hand, entity theory was posited to prompt performance-avoidance goals, and these goals were expected to debilitate performance. Thus, statistically, performance-avoidance goals were hypothesized to mediate the negative impact of entity theory on performance. On the other hand, entity theory was also posited to prompt performance-approach goals, and these goals were expected to facilitate performance. Thus, statistically, performance-approach goals were hypothesized to suppress the negative impact of entity theory on performance.

Incremental theory was expected to have a positive impact on performance, but achievement goals were not hypothesized to play a straightforward intermediary role in this relation. Incremental theory was posited to prompt mastery-approach and mastery-avoidance goals, but neither of these goals was expected to influence performance (see the General Discussion for more on this issue). None of these intermediary variable hypotheses have been examined in prior research.

Finally, perceived competence was hypothesized to exert its influence on the valence but not the definition aspect of competence in goal adoption. High perceived competence was posited to promote a focus on positive possibilities that leads to the adoption of approach goals (mastery-approach and performance-approach), whereas low perceived competence was posited to promote a focus on negative possibilities that leads to the adoption of avoidance goals (mastery-avoidance and performance-avoidance). Several studies have yielded data in accord with these predictions (see Cury, Da Fonseca, et al., 2002; Elliot & Church, 1997), although the hypothesis regarding mastery-avoidance goals has yet to be investigated.

Method

Participants

Four hundred sixty-three (245 male, 218 female) students voluntarily participated in the study, which was conducted in a school district in Marseille, France. The average age of participants was 13.05 years old with a range of 12–14 years.

Procedure

The study was conducted during the second term of the school year. Within the 1st week of the term, participants completed a measure of perceived competence. One week later, participants completed measures of entity theory and incremental theory. After 3 more weeks had elapsed, participants completed the achievement goal measure. All measures were completed in group sessions that ranged in composition from 40 to 100 participants. At the end of the term, participants' math grades for the first and second terms were obtained from school records.

Measures

Implicit theories of ability. Measures of entity and incremental theories of math ability were constructed for this research. Specifically, the research team worked in concert with several math teachers to revise selected items from the Conception of the Nature of Athletic Ability Questionnaire (Sarrazin et al., 1996) to make them applicable to the math domain. An initial study used exploratory factor analysis to refine the initial item set, and a second study used confirmatory factor analysis (CFA) to examine data collected on the final item set (presented herein). Data were collected from 209 (102 male, 107 female) 12- to 15-year-old students in Marseille, France, over two time periods, spaced 3 months apart. CFAs were conducted on the covariance matrices, and the solutions were generated by using maximum likelihood estimation. The results supported the hypothesized two-factor structure at Time 1, $\chi^2(8, N = 209) = 17.45$, $p < .01$; adjusted goodness-of-fit index (AGFI) = .93; comparative fit index (CFI) = .99; root-mean-square error of approximation (RMSEA) = .074; and at Time 2, $\chi^2(8, N = 209) = 8.31$, $p = .40$; AGFI = .97; CFI = 1.00; RMSEA = .013. All items displayed strong loadings on their respective factors (ranging between .87 and .96). The measures were highly internally consistent (alphas ranged from .89 to .94) and evidenced good temporal stability across assessments ($r = .74$ for entity theory; $r = .70$ for incremental theory).

Three items comprised the entity theory measure (e.g., "One has a certain level of ability in math, and there is not much one can do to change it"), and three items comprised the incremental theory measure (e.g., "If one works hard and often, one can change one's level of ability in math"). Participants responded on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*), and average scores were computed for entity theory ($\alpha = .90$) and incremental theory ($\alpha = .91$).

Perceived competence. Dweck's (1999) confidence measure was used in a Likert-type format to assess participants' perceived competence in math (e.g., "I usually think that I'm good in math"). Participants responded to the six items on a scale from 1 (*very true of me*) to 3 (*sort of true for me*); the items were reverse scored (so that high values would indicate high perceived competence) and averaged ($\alpha = .90$).

Achievement goals. Elliot and McGregor's (2001) Achievement Goals Questionnaire was used to assess the four goals in the 2 × 2 model. Three items assess each goal (mastery-approach: e.g., "This term, I want to learn as much as possible"; performance-approach: e.g., "This term, it is important for me to do better than other students"; mastery-avoidance: e.g., "My goal this term is to avoid learning less than I possibly could"; and performance-avoidance: e.g., "My goal this term is to avoid performing worse than other students"). The mastery-avoidance goal items were adjusted slightly to make them less affectively based, and the performance-avoidance goal items were adjusted slightly to make them explicitly normative in focus. Accordingly, we conducted a CFA on the achievement goal items. The analysis was conducted on the covariance matrix, and the solution was generated by using maximum likelihood estimation. The four-factor model delineated by Elliot and McGregor (2001) provided a good fit to the data, $\chi^2(48, N = 463) = 118.35$, $p < .01$; AGFI = .93; CFI = .97; RMSEA = .056; all items displayed strong loadings on their respective factors (.67 to .87). Participants responded on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*), and average scores were computed for each achievement goal variable. Mastery-approach, performance-approach, mastery-avoidance, and performance-avoidance goal alphas were .91, .90, .91, and .89, respectively.

Performance. Participants' math grades for Term 1 (T1) and Term 2 (T2) were used as indicators of math performance. Grades in the class could range from 0 to 20.

Results

Overview

Simultaneous multiple regression was the primary approach used to analyze the data. The basic regression model used in the analyses was composed of the following variables: entity theory, incremental theory, and perceived competence. T1 performance was included in the basic model in all analyses in which T2 performance was the dependent variable (DV). Preliminary analyses examining the main and interactive influence of gender (male = 1, female = −1) revealed no significant results, so gender was excluded from the final analyses. In the following, all significant results from the analyses are presented; if results are not presented, null findings were observed for that variable. Descriptive statistics and correlations among the variables are presented in Table 1.

Basic Model Predicting T2 Performance

To examine the direct influence of the predictor variables on math performance, we regressed T2 performance on the basic model. The analysis yielded an overall effect for the basic model, $F(4, 458) = 87.69$, $p < .001$ ($R^2 = .43$). T1 performance was a significant positive predictor of T2 performance, $F(1, 458) = 236.24$, $p < .001$ ($\beta = .56$). Entity theory was a significant negative predictor of T2 performance, $F(1, 478) = 13.25$, $p < .001$ ($\beta = -.14$), whereas incremental theory, $F(1, 478) = 24.40$, $p < .001$ ($\beta = .19$), and perceived competence, $F(1, 478) = 5.24$, $p < .05$ ($\beta = .08$), were significant positive predictors.

Basic Model Predicting Achievement Goals

Next, we examined the influence of the predictor variables on the achievement goal variables by regressing each type of achievement goal on the basic model.

Mastery-approach goals. The overall model was significant, $F(3, 459) = 15.70$, $p < .001$ ($R^2 = .09$). Incremental theory, $F(1, 459) = 33.52$, $p < .001$ ($\beta = .28$), and perceived competence, $F(1, 459) = 10.82$, $p < .001$ ($\beta = .15$), were significant positive predictors of mastery-approach goals.

Performance-approach goals. The overall model was significant, $F(3, 459) = 14.89$, $p < .001$ ($R^2 = .09$). Entity theory, $F(1, 459) = 30.03$, $p < .001$ ($\beta = .26$), and perceived competence, $F(1, 459) = 14.21$, $p < .001$ ($\beta = .17$), were significant positive predictors of performance-approach goals.

Mastery-avoidance goals. The overall model was significant, $F(3, 459) = 12.89$, $p < .001$ ($R^2 = .08$). Incremental theory was a significant positive predictor of mastery-avoidance goals, $F(1, 459) = 27.04$, $p < .001$ ($\beta = .25$), whereas perceived competence was a significant negative predictor, $F(1, 459) = 10.63$, $p < .001$ ($\beta = -.15$).

Table 1
Study 1: Descriptive Statistics and Intercorrelations Among the Primary Variables

Variable	*M*	*SD*	Observed range	Possible range	Variable 1	2	3	4	5	6	7	8	9
1. Entity theory	3.32	1.61	1–7	1–7	—								
2. Incremental theory	5.25	1.83	1–7	1–7	−.36**	—							
3. Time 1 performance	11.30	3.35	3–18.5	0–20	−.03	.09*	—						
4. Perceived competence	2.30	0.07	1–3	1–3	.01	.01	.21**	—					
5. Mastery-app. goals	5.95	1.69	1–7	1–7	−.07	.27**	.13**	.15**	—				
6. Performance-app. goals	4.07	1.90	1–7	1–7	.23**	−.01	.17**	.17**	.07	—			
7. Mastery-avoid. goals	4.33	2.12	1–7	1–7	−.05	.24**	−.13**	−.14**	.14**	−.01	—		
8. Performance-avoid. goals	3.53	1.88	1–7	1–7	.24**	−.10*	−.19**	−.26**	−.01	.18**	.23**	—	
9. Time 2 performance	12.40	4.06	2–19.5	0–20	−.22**	.29**	.60**	.20**	.15**	.28**	.01	−.27**	—

Note. Mastery-app. goals = Mastery-approach goals; Performance-app. goals = Performance-approach goals; Mastery-avoid. goals = Mastery-avoidance goals; Performance-avoid. goals = Performance-avoidance goals.
* $p < .05$. ** $p < .01$.

Performance-avoidance goals. The overall model was significant, $F(3, 459) = 21.86$, $p < .001$ ($R^2 = .13$). Entity theory was a significant positive predictor of performance-avoidance goals, $F(1, 459) = 26.32$, $p < .001$ ($\beta = .24$), whereas perceived competence was a significant negative predictor, $F(1, 459) = 34.57$, $p < .01$ ($\beta = -.26$).

Achievement Goal Process Models

For the influence of an independent variable (IV) on a DV through a process variable (PV) to be demonstrated, three relations must be established (Baron & Kenny, 1986): (a) an IV must directly predict a DV; (b) an IV must predict a PV; and (c) a PV must predict a DV, and the direct relation between the IV and the DV must be changed (i.e., must decrease or increase) when the PV is controlled. The preceding analyses documented (a) implicit theories as direct predictors of T2 performance and (b) entity theory as a predictor of performance-approach and performance-avoidance goals, and incremental theory as a predictor of mastery-approach and mastery-avoidance goals. In the following analyses, we examined the third requirement for documenting an achievement goal process model by regressing T2 performance on the basic model with the applicable achievement goal variables also in the equation.

In a preliminary analysis, we regressed T2 performance on the basic model with all four achievement goals also in the equation. This analysis was conducted to determine which of the achievement goals were significant predictors of T2 performance and, therefore, could be considered further in more precise process analyses. As anticipated, performance-approach goals were significant positive predictors of T2 performance, performance-avoidance goals were significant negative predictors, and mastery-approach and mastery-avoidance goals evidenced null results. These findings, coupled with those from the preceding analyses, indicate that the direct relation between entity theory and T2 performance might be explained by performance-approach and performance-avoidance goals, whereas the direct relation between incremental theory and T2 performance cannot be explained by mastery-approach and mastery-avoidance goals.

The precise intermediary roles of performance-approach and performance-avoidance goals cannot be tested together, because the two goals are posited to represent qualitatively distinct processes with reciprocal effects. That is, performance-avoidance goals are posited to mediate the negative influence of entity theory on T2 performance, and performance-approach goals are posited to suppress this negative influence. Statistically, mediation produces a decrease in the beta for the direct relation, and suppression produces an increase, so the two processes work against each other and can be detected only if examined separately.

In the mediation analysis, there was an overall effect for the basic model, $F(5, 457) = 72.75$, $p < .001$ ($R^2 = .44$). T1 performance was a significant positive predictor of T2 performance, $F(1, 457) = 223.20$, $p < .001$ ($\beta = .54$), as was incremental theory, $F(1, 457) = 24.80$, $p < .001$ ($\beta = .19$). Performance-avoidance goals were a significant negative predictor of T2 performance, $F(1, 457) = 7.02$, $p < .01$ ($\beta = -.10$). The beta for the direct influence of entity theory on T2 math performance was −.11 as opposed to the original −.14 (a beta decrease of 21.4% and a drop of 38.3% in variance accounted for in the direct relation), and MacKinnon, Lockwood, Hoffman, West, and Sheets's (2002) z' test documented the significance of the influence of entity theory on T2 performance through performance-avoidance goals ($z' = 2.36$, $p < .05$). Entity theory increased performance-avoidance goal adoption, and this increase in performance-avoidance goals debilitated math performance. Performance-avoidance goals mediated the direct relation between entity theory and math performance, because when these goals were accounted for, this direct relation was diminished.

In the suppression analysis, there was an overall effect of the basic model, $F(5, 457) = 84.84$, $p < .001$ ($R^2 = .48$). T1 performance was a significant positive predictor of T2 performance, $F(1, 457) = 223.20$, $p < .001$ ($\beta = .52$), as was incremental theory, $F(1, 457) = 23.37$, $p < .001$ ($\beta = .17$). Performance-approach goals were also a significant positive predictor of T2 performance, $F(1, 457) = 41.99$, $p < .001$ ($\beta = .23$). The beta for the direct influence of entity theory on T2 performance was −.20 as opposed to the original −.14 (a beta increase of 42.9% and an increase of 51.0% in variance accounted for in the direct relation), and the z' test documented the significance of the influence of entity theory on math performance through performance-approach goals ($z' = 4.21$, $p < .001$). Entity theory increased performance-approach

goal adoption, and this increase in performance-approach goals facilitated math performance. Performance-approach goals suppressed the direct relation between entity theory and math performance, because when these goals were accounted for, this direct relation was enhanced.

Moderating Role of Perceived Competence

A series of analyses was conducted to examine the moderating role of perceived competence. The interactive influence of perceived competence was investigated with product terms computed from mean-centered main effects (Aiken & West, 1992).

To test perceived competence as a moderator of the relation between implicit theories and math performance, we regressed T2 performance on the basic model with the Implicit Theory × Perceived Competence interactions included in the equation. Neither of the perceived competence interactions was significant in this analysis. Thus, perceived competence does not appear to moderate the relation between implicit theories and math performance.

To test perceived competence as a moderator of the relation between achievement goals and math performance, we regressed T2 performance on the basic model with an achievement goal and applicable Achievement Goal × Perceived Competence interaction also in the equation. Separate analyses were conducted for each achievement goal. None of the perceived competence interactions were significant in these analyses. Thus, perceived competence does not appear to moderate the relation between achievement goals and the outcome variables.

Ancillary Perceived Competence Analysis

The preceding analyses indicated that perceived competence had a direct influence on T2 performance, that perceived competence was a predictor of performance-approach and performance-avoidance goals, and that performance-approach and performance-avoidance goals were predictors of T2 performance. As such, it is possible that performance-approach and performance-avoidance goals could explain the direct influence of perceived competence on T2 performance. This possibility was not of central interest in the present work, but an ancillary analysis was conducted to examine it. Both performance-approach and performance-avoidance goals would represent mediator variables, because the perceived competence → achievement goal and achievement goal → T2 performance relations were in the same direction. Thus, the two goals were examined together in the same model (only the results of central interest are reported herein).

In the analysis, performance-approach goals were a significant positive predictor of T2 performance ($\beta = .26$, $p < .001$), and performance-avoidance goals were a significant negative predictor ($\beta = -.17$, $p < .001$). The beta for the direct influence of perceived competence on T2 math performance was .01 as opposed to the original .08 (a beta decrease of 87.5% and a decrease of 98.4% in variance accounted for), and the z' test documented the significance of the influence of perceived competence on T2 performance through performance-approach ($z' = 2.82$, $p < .01$) and performance-avoidance ($z' = 3.29$, $p < .001$) goals. Perceived competence increased performance-approach goal adoption and decreased performance-avoidance goal adoption, and both this increase in performance-approach goals and this decrease in performance-avoidance goals facilitated math performance. These goals mediated the direct relation between perceived competence and math performance, because when these goals were accounted for, the direct relation was diminished.

Discussion

The results of this study strongly supported our predictions. Entity theory and incremental theory were negative and positive predictors of math performance, respectively. Entity theory was a positive predictor of performance-approach and performance-avoidance goals, and incremental theory was a positive predictor of mastery-approach and mastery-avoidance goals. Performance-avoidance goals mediated the negative influence of entity theory on math performance, whereas performance-approach goals suppressed this inimical influence. The influence of incremental theory on performance was not mediated by any type of achievement goal. Perceived competence was shown to be a significant predictor of each of the achievement goals as well as math performance, and it did not moderate the influence of implicit theories or achievement goals on math performance. Furthermore, an ancillary analysis indicated that performance-approach and performance-avoidance goals mediated the direct relation between perceived competence and math performance.

Study 2

Study 2 was designed to examine our hypotheses in the experimental laboratory rather than the classroom setting. Implicit theories were manipulated, and a manipulation of initial feedback (positive or negative) was also included to test the hypothesis that entity theory and performance-based goals are particularly deleterious following a failure experience (Dweck & Leggett, 1988). The performance attainment variable in this study was IQ test performance rather than graded math performance, and a second outcome variable, intrinsic motivation, was included. Both IQ test performance and intrinsic motivation were examined by controlling for prior values of each variable. We expected to conceptually replicate each of the relations that were predicted and found in Study 1 for performance; our hypotheses for intrinsic motivation follow. All implicit theory hypotheses (and results) are presented in relative terms (i.e., entity theory, relative to incremental theory), because implicit theories were manipulated in this study, rather than measured independently as in Study 1.

Our hypothesis regarding the direct influence of implicit theory on intrinsic motivation is concordant with the social–cognitive model. Entity theory, relative to incremental theory, was expected to have a negative effect on intrinsic motivation. This hypothesis has received support, albeit only in a single correlational study (Wang & Biddle, 2003).

The influence of implicit theory on achievement goal adoption was expected to conceptually replicate that found in Study 1. Entity theory, relative to incremental theory, was expected to increase performance-approach and performance-avoidance goal adoption and to decrease mastery-approach and mastery-avoidance goal adoption.

Although mastery-based goals were not expected to be robust predictors of performance attainment, we thought that their task-based or intrapersonal focus would make them particularly sensitive predictors of affectively based outcomes, such as intrinsic motivation. The appetitive focus of mastery-approach goals was posited to facilitate intrinsic motivation, whereas the aversive focus of mastery-avoidance goals was posited to undermine intrinsic motivation. The facilitative influence of mastery-approach goals on intrinsic motivation has been documented in a number of studies (see Elliot & Harackiewicz, 1996; Tanaka & Yamauchi, 2001); the undermining influence of mastery-avoidance goals has yet to be documented. The same external evaluative focus that enhances performance for performance-approach goals is not likely to be beneficial for intrinsic motivation, and accordingly, a null relation was anticipated for these goals. The combination of an aversive and an external evaluative focus in performance-avoidance goals was posited to undermine intrinsic motivation. A number of studies have supported these patterns for performance-approach and performance-avoidance goals (see Cury, Elliot, Sarrazin, Da Fonseca, & Ruffo, 2002; Day, Radosevich, & Chasteen, 2003).

With regard to the intermediary role of goals, we expected entity theory, relative to incremental theory, to have a negative effect on intrinsic motivation through two goal adoption processes. First, it was posited to decrease mastery-approach goal adoption, and this decrease in mastery-approach goals was posited to undermine intrinsic motivation. Second, it was posited to increase performance-avoidance goal adoption, and this increase in performance-avoidance goals was posited to undermine intrinsic motivation. As such, statistically, both mastery-approach and performance-avoidance goals were hypothesized to mediate the negative effect of entity theory, relative to incremental theory, on intrinsic motivation. In addition to these relations, entity theory, relative to incremental theory, was posited to decrease mastery-avoidance goal adoption, and this decrease in mastery-avoidance goals was posited to facilitate intrinsic motivation. Thus, statistically, mastery-avoidance goals were posited to suppress the negative effect of entity theory, relative to incremental theory, on intrinsic motivation. None of these hypotheses have been examined in prior research.

The relation between perceived competence and achievement goal adoption was expected to replicate that found in Study 1. High perceived competence was expected to prompt mastery-approach and performance-approach goals, and low perceived competence was expected to prompt mastery-avoidance and performance-avoidance goals.

Method

Participants and Design

Ninety-six (48 male, 48 female) individuals voluntarily participated in the experiment, which was conducted with students in a school district in Marseille, France. The average age of participants was 13.65 years old with a range of 13–15 years. Participants were blocked on gender and randomly assigned to one of four experimental conditions in a 2 (implicit theory: entity vs. incremental) × 2 (initial feedback: positive vs. negative) between-participants factorial design.

Procedure and Manipulations

One week before the experiment, participants completed a measure of perceived competence. In the experiment, participants were run individually by a male experimenter who was unaware of the hypotheses being tested. Upon arrival at the laboratory, participants were introduced to the target task—the Coding subtest of the Wechsler Intelligence Scale for Children—Third Edition (WISC–III; Wechsler, 1996). The task was described to participants as a test of their attentional capacity and speed of information processing, and participants were informed that the task was commonly used to assess the IQ of teenagers.

Participants then completed the 2-min subtest (which was presented on a single page) while the experimenter consulted a note that assigned participants to an initial feedback condition. Next, participants completed a T1 intrinsic motivation measure while the experimenter scored the subtest. The experimenter then presented participants with written feedback that, in both conditions, contained information on the number of correctly solved items (all participants were aware of the total number of items) and norm-based information. The feedback varied in valence. Participants in the *positive feedback* condition were told, "Your score is X [actual score] correct associations between the symbols and the figures in two minutes, and this score represents a good performance, in the 90th percentile, compared to that of other teenagers." Participants in the *negative feedback* condition were told, "Your score is X [actual score] correct associations between the symbols and the figures in two minutes, and this score represents a poor performance, in the 10th percentile, compared to that of other teenagers."

After the feedback, the experimenter provided participants with a written form containing the implicit theory manipulation. First, it was reiterated that the task assessed an important type of ability and was commonly used to test the IQ of teenagers. Then, in the *entity theory* condition, participants were informed:

> In many studies, scientists have shown that: 1) Everyone has a certain level of this type of ability, and there is not much that can be done to really change it, 2) This type of ability depends on gifts or qualities that one has from birth, 3) Even if one makes an effort, one cannot really change one's ability level, and 4) This type of ability is not really modifiable.

A figure was then shown that contained longitudinal data on coding performance that clearly supported the stability position. Finally, participants were informed, "In sum, today we want to test you on a type of ability that is part of the intelligence of teenagers. This ability is relatively stable, so it is very difficult to change it."

In the *incremental theory* condition, participants were informed:

> In many studies, scientists have shown that: 1) Everyone has a certain level of this type of ability, but there are a lot of ways to substantially change it, 2) This type of ability does not depend on gifts or qualities that one has from birth, 3) If one makes an effort, one can change one's ability level, and 4) This type of ability is quite modifiable.

A figure was then shown that contained longitudinal data on coding performance that clearly supported the malleability position. Finally, participants were informed, "In sum, today we want to test you on a type of ability that is part of the intelligence of teenagers. This ability is relatively unstable, so it is possible to change it." The experimenter remained blind to participants' implicit theory condition throughout the experimental session.

Following the implicit theory manipulation, participants completed an implicit theory manipulation check and an achievement goals measure. Next, participants were given 5 min to practice coding problems similar to those on the WISC–III, if they so desired, and then they completed the Coding subtest of the WISC–III. When the performance period ended, the experimenter scored the test and presented all participants with positive

feedback. Participants then completed a T2 intrinsic motivation measure. Finally, participants were thoroughly debriefed. Because of the sensitive nature of the manipulations, a second debriefing was conducted later with both participants and their parents.

Measures

Manipulation check. Three entity items (e.g., "In this session, I think that even if I put in a lot of effort, it's difficult for me to change my performance on the intelligence task") and three incremental items (e.g., "In this session, I think I can change my performance on the intelligence task easily") were used to check the effectiveness of the implicit theory manipulation. Participants responded on a scale from 1 (*no agreement at all*) to 7 (*agree completely*); scores from the incremental items were subtracted from scores from the entity items, and the total was averaged ($\alpha = .94$).

Perceived competence. The same measure used in Study 1 was used to assess perceived competence, although the focus of the items was on intelligence, not math ability ($\alpha = .92$).

Achievement goals. The same measure used in Study 1 was used to assess achievement goals, although the focus of the items was on the task, not the term. Mastery-approach, performance-approach, mastery-avoidance, and performance-avoidance goal alphas were .92, .96, .92, and .94, respectively.

Performance. Participants' scores on the Coding subtest of the WISC–III (Wechsler, 1996) at T1 and T2 were used as indicators of IQ performance. The Coding subtest is a component of the Performance subscale of the WISC–III and entails transcribing a digit-symbol code as quickly as possible for 2 min. It is designed to assess visual–motor coordination, concentration, speed of information processing, and rote learning.

Intrinsic motivation. Elliot and Church's (1997) eight-item Intrinsic Motivation Scale was used to assess intrinsic motivation for the task (e.g., "I enjoy doing this IQ task very much") at T1 and T2. Participants responded on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*), and scores were averaged (αs = .86 and .88 for T1 and T2, respectively).

Results

Overview

Simultaneous multiple regression was the primary approach used to analyze the data. The experimental design was represented by an implicit theory contrast (entity = 1, incremental = −1), an initial feedback contrast (positive = 1, negative = −1), and the Implicit Theory × Initial Feedback interaction created from the mean-centered main effects. The basic regression model used in the analyses was composed of these three variables and perceived competence. T1 performance was included in the basic model in all analyses in which T2 performance was the DV, and, likewise, T1 intrinsic motivation was included in the basic model in all analyses in which T2 intrinsic motivation was the DV. Preliminary analyses examined gender effects; no significant main or interactive effects were observed, so gender was not included in the final analyses. In the following, all significant results from the analyses are presented; if results are not presented, null findings were observed for that variable. Descriptive statistics and correlations among the variables are presented in Table 2.

Manipulation Check

A 2 (implicit theory) × 2 (feedback) analysis of variance was conducted on the implicit theory manipulation check measure. This analysis revealed a main effect only of implicit theory, $F(1, 92) = 907.77$, $p < .001$, indicating that participants in the entity condition ($M = 6.05$) had higher scores on the measure than did those in the incremental condition ($M = 2.24$). This clearly documents the efficacy of the implicit theory manipulation.

Basic Model Predicting Outcomes

T2 performance. To examine the direct influence of the predictor variables on WISC–III performance, we regressed T2 performance on the basic model. The analysis yielded an overall effect for the basic model, $F(5, 90) = 21.66$, $p < .001$ ($R^2 = .55$). T1 performance was a significant positive predictor of T2 performance, $F(1, 90) = 31.58$, $p < .001$ ($\beta = .42$), as was perceived competence, $F(1, 90) = 21.07$, $p < .001$ ($\beta = .34$). The implicit theory effect was significant, $F(1, 90) = 33.41$, $p < .001$ ($\beta = -.41$), indicating that participants in the entity theory condition performed worse than did those in the incremental theory condition.

Table 2
Study 2: Descriptive Statistics and Intercorrelations Among the Primary Variables

Variable	*M*	*SD*	Observed range	Possible range	Variable 1	2	3	4	5	6	7	8	9	10	11
1. Implicit theory					—										
2. Initial feedback					—	—									
3. Time 1 performance	10.55	2.06	4–15	0–20	−.03	.16	—								
4. Time 1 IM	3.94	2.04	1–7	1–7	.01	−.02	.02	—							
5. Perceived competence	2.25	0.85	1–3	1–3	−.01	−.12	.25*	.08	—						
6. Mastery-app. goals	5.53	0.99	2–7	1–7	−.32**	.01	.23*	−.02	.24*	—					
7. Performance-app. goals	2.91	1.68	1–7	1–7	.35**	.05	.27**	.12	.29**	.20*	—				
8. Mastery-avoid. goals	4.49	2.09	1–7	1–7	−.27**	−.01	−.17	.10	−.30**	.08	−.14	—			
9. Performance-avoid. goals	2.59	1.45	1–7	1–7	.38**	.01	−.06	.13	−.39**	−.23	.07	.21*	—		
10. Time 2 performance	13.78	2.26	8–19	0–20	−.42**	.04	.52**	.14	.45**	.27**	.24*	−.01	−.48**	—	
11. Time 2 IM	4.26	2.24	1–7	1–7	−.29**	.01	.28**	.21*	.28**	.44**	.05	−.26**	−.39**	.32**	—

Note. IM = intrinsic motivation; Mastery-app. goals = Mastery-approach goals; Performance-app. goals = Performance-approach goals; Mastery-avoid. goals = Mastery-avoidance goals; Performance-avoid. goals = Performance-avoidance goals.
* $p < .05$. ** $p < .01$.

Intrinsic motivation. To examine the direct influence of the predictor variables on intrinsic motivation, we regressed T2 intrinsic motivation on the basic model. The analysis yielded an overall effect for the basic model, $F(5, 90) = 4.61$, $p < .001$ ($R^2 = .20$). T1 intrinsic motivation, $F(1, 90) = 4.45$, $p < .05$ ($\beta = .20$), and perceived competence, $F(1, 90) = 7.90$, $p < .01$ ($\beta = .27$), were significant positive predictors of T2 intrinsic motivation. The implicit theory effect was significant, $F(1, 90) = 9.20$, $p < .01$ ($\beta = -.30$), indicating that participants in the entity theory condition had lower intrinsic motivation than did those in the incremental theory condition.

Basic Model Predicting Achievement Goals

Next, we examined the influence of the predictor variables on the achievement goal variables by regressing each achievement goal on the basic model.

Mastery-approach goals. The overall model was significant, $F(4, 91) = 4.80$, $p < .01$ ($R^2 = .17$). Perceived competence was a significant positive predictor of mastery-approach goals, $F(1, 91) = 6.65$, $p < .05$ ($\beta = .25$), and the implicit theory effect was significant, $F(1, 91) = 11.16$, $p < .01$ ($\beta = -.32$), indicating that participants in the entity theory condition evidenced less mastery-approach goal adoption than did those in the incremental theory condition.

Performance-approach goals. The overall model was significant, $F(4, 91) = 6.73$, $p < .001$ ($R^2 = .23$). Perceived competence was a significant positive predictor of performance-approach goals, $F(1, 91) = 10.69$, $p < .01$ ($\beta = .30$). The implicit theory effect was also significant, $F(1, 91) = 14.59$, $p < .001$ ($\beta = .35$), indicating that participants in the entity theory condition evidenced greater performance-approach goal adoption than did those in the incremental theory condition.

Mastery-avoidance goals. The overall model was significant, $F(4, 91) = 4.68$, $p < .01$ ($R^2 = .17$). Perceived competence was a significant negative predictor of mastery-avoidance goals, $F(1, 91) = 10.43$, $p < .01$ ($\beta = -.31$), and the implicit theory effect was significant, $F(1, 91) = 8.23$, $p < .01$ ($\beta = -.27$), indicating that participants in the entity theory condition evidenced less mastery-avoidance goal adoption than did those in the incremental theory condition.

Performance-avoidance goals. The overall model was significant, $F(4, 91) = 10.17$, $p < .001$ ($R^2 = .31$). Perceived competence was a significant negative predictor of performance-avoidance goals, $F(1, 91) = 21.25$, $p < .001$ ($\beta = -.41$), and the implicit theory effect was significant, $F(1, 91) = 19.36$, $p < .001$ ($\beta = .38$), indicating that participants in the entity theory condition evidenced greater performance-avoidance goal adoption than did those in the incremental theory condition.

Achievement Goal Process Models

The preceding analyses documented (a) implicit theory as a direct predictor of T2 performance and T2 intrinsic motivation and (b) implicit theory as a predictor of all four achievement goals. In the following analyses, we examined the third requirement for documenting an achievement goal process model by regressing both T2 performance and T2 intrinsic motivation on the basic model with the applicable achievement goal variables also in the equation.

T2 performance. In a preliminary analysis, we regressed T2 performance on the basic model with all four achievement goals also in the equation. As in Study 1, this analysis was conducted to determine which of the achievement goals were significant predictors of T2 performance and, therefore, could be considered further in more precise process analyses. As anticipated, performance-approach goals were significant positive predictors of T2 performance, performance-avoidance goals were significant negative predictors, and mastery-approach and mastery-avoidance goals evidenced null results. These findings, coupled with those from the preceding analyses, indicate that the direct effect of implicit theory on T2 performance might be explained by performance-approach and performance-avoidance goals, but not by mastery-approach and mastery-avoidance goals. Next, we examined the same mediation and suppression processes that we examined in Study 1.

In the mediation analysis, there was an overall effect for the basic model, $F(6, 89) = 20.84$, $p < .001$ ($R^2 = .59$). T1 performance was a significant positive predictor of T2 performance, $F(1, 89) = 36.60$, $p < .001$ ($\beta = .44$), as was perceived competence, $F(1, 89) = 9.18$, $p < .01$ ($\beta = .24$). Performance-avoidance goals were a significant negative predictor of T2 performance, $F(1, 89) = 8.18$, $p < .01$ ($\beta = -.24$). The beta for the direct influence of implicit theory on T2 performance was $-.32$ as opposed to the original $-.41$ (a beta decrease of 22.0% and a drop of 39.1% in variance accounted for in the direct relation), and the z' test documented the significance of the influence of implicit theory on T2 performance through performance-avoidance goals ($z' = 2.41$, $p < .01$). Entity theory, relative to the incremental theory, increased performance-avoidance goal adoption, and this increase in performance-avoidance goals debilitated IQ test performance. Performance-avoidance goals mediated the direct relation between implicit theory and IQ test performance, because when these goals were accounted for, this direct relation was diminished.

In the suppression analysis, there was an overall effect of the basic model, $F(6, 89) = 20.89$, $p < .001$ ($R^2 = .59$). T1 performance was a significant positive predictor of T2 performance, $F(1, 89) = 24.90$, $p < .001$ ($\beta = .37$), as was perceived competence, $F(1, 89) = 14.82$, $p < .001$ ($\beta = .29$). Performance-approach goals were also a significant positive predictor of T2 performance, $F(1, 89) = 8.29$, $p < .01$ ($\beta = .23$). The beta for the direct influence of implicit theory on T2 performance was $-.49$ as opposed to the original $-.41$ (a beta increase of 19.5% and an increase of 42.8% in variance accounted for in the direct relation), and the z' test documented the significance of the influence of implicit theory on math performance through performance-approach goals ($z' = 2.33$, $p < .01$). Entity theory, relative to the incremental theory, increased performance-approach goal adoption, and this increase in performance-approach goals facilitated IQ test performance. Performance-approach goals suppressed the direct relation between implicit theory and IQ test performance, because when these goals were accounted for, this direct relation was enhanced.

T2 intrinsic motivation. In a preliminary analysis, we regressed T2 intrinsic motivation on the basic model with all four achievement goals also in the equation. This analysis was conducted to determine which of the achievement goals were

significant predictors of T2 intrinsic motivation and, therefore, could be considered further in more precise process analyses. As anticipated, mastery-approach goals were significant positive predictors of T2 intrinsic motivation, mastery-avoidance and performance-avoidance goals were significant negative predictors, and performance-approach goals evidenced null results. These findings, coupled with those from the preceding analyses, indicate that the direct effect of implicit theory on T2 intrinsic motivation might be explained by mastery-approach, mastery-avoidance, and performance-avoidance goals, but not by performance-approach goals.

The precise intermediary role of mastery-approach, mastery-avoidance, and performance-avoidance goals cannot be tested together, because the different goals are posited to represent qualitatively distinct processes with reciprocal effects. That is, mastery-approach and performance-avoidance goals are posited to mediate the implicit theory effect on T2 intrinsic motivation, and performance-approach goals are posited to suppress this effect. Thus, as in the intermediary analyses focused on T2 performance in both this study and Study 1, we examined the mediation and suppression processes separately.

In the mediation analysis, there was an overall effect for the basic model, $F(7, 88) = 6.97$, $p < .001$ ($R^2 = .36$). T1 intrinsic motivation was a significant positive predictor of T2 intrinsic motivation, $F(1, 88) = 8.53$, $p < .01$ ($\beta = .26$). Mastery-approach goals were also significant positive predictors, $F(1, 88) = 12.96$, $p < .001$ ($\beta = .34$), and performance-avoidance goals were significant negative predictors, $F(1, 88) = 7.73$, $p < .01$ ($\beta = -.29$). The beta for the direct influence of implicit theory on T2 intrinsic motivation was $-.08$ as opposed to the original $-.30$ (a beta decrease of 73.3% and a drop of 92.9% in variance accounted for in the direct relation), and the z' test documented the significance of the influence of implicit theory on T2 intrinsic motivation through mastery-approach ($z' = 2.44$, $p < .01$) and performance-avoidance ($z' = 2.36$, $p < .01$) goals. Entity theory, relative to the incremental theory, decreased mastery-approach goal adoption and increased performance-avoidance goal adoption, and both this decrease in mastery-approach goals and this increase in performance-avoidance goals debilitated intrinsic motivation. Mastery-approach and performance-avoidance goals mediated the direct relation between implicit theory and intrinsic motivation, because when these goals were accounted for, this direct relation was diminished.

In the suppression analysis, there was an overall effect of the basic model, $F(6, 89) = 6.38$, $p < .001$ ($R^2 = .30$). T1 intrinsic motivation was a significant positive predictor of T2 intrinsic motivation, $F(1, 89) = 7.34$, $p < .01$ ($\beta = .24$). Mastery-avoidance goals were significant negative predictors of T2 intrinsic motivation, $F(1, 89) = 12.32$, $p < .001$ ($\beta = -.35$). The beta for the direct influence of implicit theory on T2 intrinsic motivation was $-.39$ as opposed to the original $-.30$ (a beta increase of 30.0% and an increase of 69.0% in variance accounted for in the direct relation), and the z' test documented the significance of the indirect influence of implicit theory on T2 intrinsic motivation through mastery-avoidance goals ($z' = 2.23$, $p < .05$). Entity theory, relative to the incremental theory, decreased mastery-avoidance goal adoption, and this decrease in mastery-avoidance goals facilitated intrinsic motivation. Mastery-avoidance goals suppressed the direct relation between implicit theory and intrinsic motivation, because when these goals were accounted for, this direct relation was enhanced.

Moderating Role of Perceived Competence

A series of analyses was conducted to examine the moderating role of perceived competence. As in Study 1, the interactive influence of perceived competence was investigated with product terms computed from mean-centered main effects.

To test perceived competence as a moderator of the relation between implicit theory and both IQ test performance and intrinsic motivation, we regressed T2 performance and T2 intrinsic motivation each on the basic model with the Implicit Theory × Perceived Competence interaction included in the equation. Neither of the perceived competence interactions was significant in these analyses. Thus, perceived competence does not appear to moderate the relation between implicit theory and the focal outcome variables.

To test perceived competence as a moderator of the relation between achievement goals and both IQ test performance and intrinsic motivation, we regressed T2 performance and T2 intrinsic motivation each on the basic model with an achievement goal and applicable Achievement Goal × Perceived Competence interaction also in the equation. Separate analyses were conducted for each achievement goal. None of the perceived competence interactions were significant in these analyses. Thus, perceived competence does not appear to moderate the relation between achievement goals and the focal outcome variables.

Ancillary Perceived Competence Analyses

As in Study 1, we conducted an ancillary analysis to test the possibility that performance-approach and performance-avoidance goals mediated the direct effect of implicit theories on T2 performance (only the results of central interest are reported for this and the following analysis). In the analysis, performance-approach goals were a significant positive predictor of T2 performance ($\beta = .24$, $p < .01$), and performance-avoidance goals were a significant negative predictor ($\beta = -.25$, $p < .01$). The beta for the direct influence of perceived competence on T2 IQ test performance was .18 as opposed to the original .34 (a beta decrease of 47.5% and a decrease of 72.0% in variance accounted for), and the z' test documented the significance of the influence of perceived competence on T2 performance through performance-approach ($z' = 2.01$, $p < .05$) and performance-avoidance ($z' = 2.62$, $p < .01$) goals. Perceived competence increased performance-approach goal adoption and decreased performance-avoidance goal adoption, and both this increase in performance-approach goals and this decrease in performance-avoidance goals facilitated IQ test performance. These goals mediated the direct relation between perceived competence and IQ test performance, because when these goals were accounted for, the direct relation was diminished.

We also conducted an ancillary analysis examining mastery-approach, mastery-avoidance, and performance-avoidance goals as mediators of the direct effect of perceived competence on T2 intrinsic motivation. In the analysis, mastery-approach goals were a significant positive predictor of T2 intrinsic motivation ($\beta = .29$, $p < .01$), whereas mastery-avoidance goals ($\beta = -.23$, $p < .01$) and performance-avoidance goals ($\beta = -.23$, $p < .01$) were

significant negative predictors. The beta for the direct influence of perceived competence on T2 intrinsic motivation was .02 as opposed to the original .27 (a beta decrease of 95.6% and a decrease of 99.5% in variance accounted for), and the z' test documented the significance of the influence of perceived competence on T2 intrinsic motivation through mastery-approach ($z' = 1.97$, $p < .05$), mastery-avoidance ($z' = 1.92$, $p < .05$), and performance-avoidance ($z' = 2.01$, $p < .05$) goals. Perceived competence increased mastery-approach goal adoption and decreased mastery-avoidance and performance-avoidance goal adoption, and this increase in mastery-approach goals, as well as this decrease in mastery-avoidance and performance-avoidance goals, facilitated intrinsic motivation. These goals mediated the direct relation between perceived competence and intrinsic motivation, because when these goals were accounted for, the direct relation was diminished.

Discussion

The results of this study strongly supported our predictions. Entity theory, relative to incremental theory, had a negative effect on IQ test performance. Entity theory, relative to incremental theory, increased the adoption of performance-approach and performance-avoidance goals and decreased the adoption of mastery-approach and mastery-avoidance goals. Performance-avoidance goals mediated the relation between implicit theory and IQ test performance, whereas performance-approach goals suppressed this relation. These findings represent a complete conceptual replication of the Study 1 results. In addition, entity theory, relative to incremental theory, had a negative effect on intrinsic motivation. Mastery-approach and performance-avoidance goals mediated the relation between implicit theory and intrinsic motivation, whereas mastery-avoidance goals suppressed this relation. Perceived competence was shown to be a predictor of each of the achievement goals as well as IQ test performance and intrinsic motivation, and it did not moderate the influence of implicit theory or achievement goals on IQ test performance and intrinsic motivation. Furthermore, ancillary analyses indicated that performance-approach and performance-avoidance goals mediated the direct relation between perceived competence and IQ test performance, and mastery-approach, mastery-avoidance, and performance-avoidance goals mediated the direct relation between perceived competence and intrinsic motivation. All findings in this study were documented across prior positive–negative feedback.

General Discussion

The results from the two studies of the present research, a field study and a laboratory experiment, displayed remarkable convergence. Despite the use of different operationalizations of implicit theories of ability, different indicators of performance, and different approaches to performance feedback, our hypotheses received robust support across studies. The results from this research clearly documented the utility of attending to the approach–avoidance distinction in the social–cognitive model of achievement motivation.

Our results demonstrated that implicit theories of ability are direct predictors of performance attainment and intrinsic motivation. These implicit theories were also shown to be predictors of the achievement goals in the 2 × 2 framework, and these goals, in turn, were shown to be proximal predictors of performance and intrinsic motivation and to account for the direct influence of implicit theories on performance and intrinsic motivation. We believe this is the first research to document achievement goals as intermediary variables that explain the direct relation between implicit theories and actual achievement outcomes. Perceived competence was shown to be a predictor of the 2 × 2 achievement goals; perceived competence did not moderate the influence of implicit theories and achievement goals on performance and intrinsic motivation.

It is important to note that our results were obtained while controlling for prior performance or intrinsic motivation, while controlling for perceived competence, and with complete temporal separation of the independent, intermediary, and outcome variables. This degree of control is extremely uncommon in achievement motivation research and lends confidence to the veracity and robustness of the observed relations. Furthermore, our research demonstrated that implicit theories and the goals in the 2 × 2 framework influence achievement outcomes of substantial real-world significance. That is, we found that the way in which ability is framed in an IQ assessment affects performance (via implicit theories and achievement goals). This is a poignant reminder of the need to exercise extreme care in how achievement assessments, and the abilities they are presumed to test, are introduced and characterized. In the contemporary ethos where "high-stakes" achievement tests are prominent, this reminder seems particularly apt. Although the manipulation of implicit theories was rather explicit and strong in our research, we suspect that more subtle communications about the nature of ability and achievement tests have similar effects on performance (see Mueller & Dweck, 1998; Steele & Aronson, 1995).

Most research in the achievement motivation literature in general, and on achievement goals in particular, is conducted with young adults (i.e., undergraduates), but our results were obtained with young adolescent participants. Accordingly, it is noteworthy that the relations between achievement goals and both performance and intrinsic motivation that are typically seen for mastery-approach, performance-approach, and performance-avoidance goals (see Elliot, 1999; Rawsthorne & Elliot, 1999) were also found in the present research. Mastery-avoidance goals are a relatively new addition to the literature, and their predictive pattern has yet to be clearly established. It is important to note that our findings displayed the differential predictive validity of mastery-avoidance goals relative to both mastery-approach and performance-avoidance goals (the two goals with which they share a conceptual aspect; Elliot & McGregor, 2001). For performance attainment, the predictive patterns differed according to the definition aspect of competence (mastery-approach and mastery-avoidance goals were unrelated to performance; performance-avoidance goals were a negative predictor), whereas for intrinsic motivation, the predictive patterns differed according to the valence aspect of competence (mastery-approach goals were a positive predictor; mastery-avoidance and performance-avoidance goals were negative predictors).

Our documentation of achievement goals as mediator variables supports Dweck and Leggett's (1988) initial theorizing, as opposed to more recent suggestions for modification. The added precision of the 2 × 2 framework afforded a strong test of the mediational

role of achievement goals that led to a clear demonstration of the predictive power of the achievement goal construct. Utilization of the 2 × 2 framework also enabled us to demonstrate a second intermediary role for achievement goals—that of suppressor variable. For example, entity theory led to performance-approach goals, and these goals counteracted (suppressed) the overall inimical influence of entity theory on performance. Thus, possession of an entity theory does not produce a uniformly negative effect on achievement behavior; the specific goal that is adopted out of this conception of ability has an important impact on the eventual achievement outcome (see Elliot & Church, 1997, for a parallel regarding fear of failure). Parenthetically, our research illustrates that suppression can have considerable conceptual and empirical value. This is a point oft made by statisticians (J. M. Collins & Schmidt, 1997; MacKinnon, Krull, & Lockwood, 2000) but commonly ignored by researchers, who tend to consider suppression a quantitative annoyance or anomaly.

From a more general perspective, our mediation and suppression results show how achievement goals are the specific channels through which general orientations exert their influence on achievement behavior. In this sense, the modified social–cognitive model may be seen as fitting nicely within the hierarchical model of achievement motivation (Elliot, 1997; Elliot & Thrash, 2001). In this model, the goals of the 2 × 2 framework are viewed as the concrete aims through which individuals carry out their more abstract desires, motives, concerns, and self-conceptions. These abstract orientations do not provide specific guidelines or standards for behavior; thus, individuals commonly adopt more concrete goals that serve as direct regulators, and proximal predictors, of achievement behavior. The present research nicely documents the importance of implicit theories of ability in this achievement motivation hierarchy, but other constructs, such as achievement motives (Elliot & Church, 1997), action-control beliefs (Lopez, 1999), causality orientations (Lee, Sheldon, & Turban, 2003), family obligation (Urdan, 2004), and concerns elicited by achievement environments (Roeser, Midgley, & Urdan, 1996), have also been shown to predict achievement outcomes through their influence on achievement goals. Future research would do well to examine the relative importance of, and degree of conceptual and empirical redundancy among, these different constructs.

The one place in which our hypotheses diverged from the social–cognitive model was regarding perceived competence. Our results supported the proposal that perceived competence is best conceptualized as a predictor of achievement goals, rather than as a moderator of implicit theory or achievement goal effects. Perceived competence appears to influence the valence of the goal that is adopted, but once adopted, the goal itself evokes powerful perceptual–cognitive processes that guide how competence-relevant information is attended to and interpreted (Elliot & Harackiewicz, 1996; Kunda, 1990). Prior feedback had no direct main effect on achievement goal adoption in our research, highlighting the importance of subjective, relative to objective, competence in achievement motivation processes (Bandura, 1986; Schunk, 1995).

The present research yielded clear, consistent, and broad support for our suggested modifications of the social–cognitive model, but additional work is needed to further explore these modifications. For example, research is needed to examine what leads some entity theorists to adopt performance-approach goals (with positive implications), whereas others adopt performance-avoidance and/or mastery-avoidance goals (with negative implications). Plausible candidates worth considering include temperaments, achievement motives, achievement attributions, and specific competence expectancies. Additional research is also needed to investigate the processes through which incremental theory impacts performance. One possibility is that the path from incremental theory to performance does not go through achievement goals at all, but instead goes directly through deep processing, task absorption, or eagerness to engage the task. Another possibility is that mastery-approach goals are operative in an extended incremental-theory process model. For example, incremental theory leads to mastery-approach goals (as documented herein), and these goals may lead to processes that have a reciprocal influence on performance (e.g., task absorption that facilitates performance and inattention to external constraints, such as time limits that undermine performance; see Elliot et al., 2005). Models of this type are typically overlooked because of their conceptual complexity and the difficulty in detecting inconsistent intervening variables (L. M. Collins, Graham, & Flaherty, 1998; MacKinnon et al., 2000), but subsequent research would do well to examine such possibilities.

In conclusion, the present research sought to clarify the roles of and interrelations among three important constructs in the achievement motivation literature: implicit theories of ability, achievement goals, and perceived competence. Our results provided strong support for our suggested modifications of the social–cognitive model of achievement motivation and for the hierarchical model of achievement motivation more generally. At the centerpiece of our theoretical and empirical work was the 2 × 2 achievement goal framework, which brought a conceptual precision and predictive power to our analysis of achievement behavior that the dichotomous achievement goal framework has not displayed. At a broad level, our research reinforces the important position of achievement goals as proximal predictors of achievement outcomes and illustrates the utility of attending to the approach–avoidance distinction in conceptual models of achievement motivation.

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