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Self-efficacy and academic achievement: Why do implicit beliefs, goals, and effort regulation matter?

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ABSTRACT

We examined motivational orientations, cognitive–metacognitive strategies, and resource management in predicting academic achievement. Undergraduates (407) completed the Motivated Strategies Learning Questionnaire, Implicit Theories of Intelligence Scale, Achievement Goal Inventory, and self-reported grade point average. A MANCOVA (controlling for sex and age) indicated that low self-efficacy students tended to believe intelligence is innate and unchangeable and high self-efficacy students pursued mastery goals involving challenge and gaining new knowledge as well as performance goals involving good grades and outperforming others. Further, hierarchical multiple regression analysis indicated that self-efficacy, effort regulation, and help-seeking predicted 18% of the variance in GPA. Interestingly, effort regulation partially mediated the relationship between self-efficacy and GPA. Overall, self-efficacious students are able to achieve academically because they monitor and self-regulate their impulses and persist in the face of difficulties. We discuss implications of these findings for educators seeking to strengthen both self-efficacy and effort regulation towards increasing academic achievement.

1. Introduction

College students' self-efficacy or self-confidence for learning and performance is crucial for their academic achievement (Zimmerman, 2000). Self-efficacy is a multidimensional construct that is fundamental to the social-cognitive approach and conceptualizes individuals as being agentic, purposeful, proactive, self-evaluative, and self-regulatory (Bandura, 1989). A more specific aspect of self-efficacy is academic self-efficacy and this reflects a student's perceived competence with respect to tasks in the academic domain (Schunk & Pajares, 2002). Although researchers have established academic self-efficacy as a significant predictor of academic performance, beyond cognitive ability; less is known about specific mechanisms such as self-regulation strategies that might explain this relationship (Brown et al., 2008; Dahl, Bals, & Turi, 2005; Kornilova, Kornilov, & Chumakova, 2009). Hence, we addressed this critical gap in the literature by examining the role of cognitive and metacognitive strategies, resource management, implicit theories of intelligence, and achievement goals, in explaining the link between self-efficacy and academic achievement. Specifically, we utilized a social-cognitive framework to hypothesize that students with stronger academic self-efficacy would be more likely to use cognitive and metacognitive strategies, successfully manage their resources, believe intelligence is malleable, pursue mastery goals, and report higher academic achievement.

1.1. Self-efficacy and performance

Social cognitive theory posits that self-efficacy is an agentic motivational orientation that fuels persistence in the face of difficulties, increases intentionality and long term planning, and promotes self-regulation and self-correcting actions (Bandura, 2001). In several meta-analyses, self-efficacy has emerged as a robust predictor of motivation and performance across time, a variety of environments, and different populations (Bandura & Locke, 2003; Multon, Brown, & Lent, 1991). Experiences with success or failure are associated with strong or weak feelings of self-efficacy and are predictive of performance for advanced college students (Gore, 2006). It is the motivational component of self-efficacy beliefs that appears to be critically linked to academic performance (Chemers, Hu, & Garcia, 2001; Valentine, DuBois, & Cooper, 2004; Zajacova, Lynch, & Espenshade, 2005). Strong academic performance is associated with increased confidence and likely encourages students to take greater responsibility for successful task completion (Zimmerman & Kitsantas, 2005). Similarly, students with higher aptitude who have better performance and receive more positive evaluations report higher self-efficacy and less apprehension (Pajares & Johnson, 1996). Fluctuations in self-efficacy levels are also reflected across the semester as students receive continuous performance feedback with low achieving students reporting less confidence and high performing students reporting higher self-confidence and greater value for their learning (Zusho & Pintrich, 2003). Thus, it is the complex

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motivational orientation associated with academic self-efficacy that makes it a robust predictor of academic achievement and this motivational component needs further examination.

1.2. Self-efficacy and self-regulation

Some insight into the potential self-regulatory mechanisms that link self-efficacy and performance is offered by Pintrich, Smith, Garcia, and McKeachie's (1993) comprehensive social-cognitive framework as it includes motivational components, cognitive and metacognitive strategies, as well as resource management strategies. For instance, high self-efficacy students who tend to be more persistent, hard working, opt for difficult tasks, and manage their anxiety are also more likely to utilize self-regulating processes such as goal setting, self-evaluation, and self-monitoring (Zimmerman, 2000). Similarly, Kennett and Keefer (2006) noted that self-confident students tend to display greater self-control, work harder when facing failure, prefer learning goals, and obtain better grades. Perhaps students with greater self-efficacy perform at a higher level because they can cope more effectively with cognitive demands (Lane & Lane, 2001), pursue a mastery goal orientation (Hsieh, Sullivan, & Guerra, 2007), perceive their learning tasks to be interesting and valuable, and utilize meaningful learning strategies (Greene, Miller, Crownson, Duke, & Akey, 2004). Thus, self-efficacy appears to be linked indirectly to academic achievement through goal setting or effort regulation strategies that serve as a crucial internal resource (Bandura, 1997; Pajares, 1996; Pintrich, 1999).

More specifically, self-efficacy is likely enhanced when self-regulated learners actively manage their internal and external environment by following a scheduled timetable for study and review, clarifying intentions to achieve, determining the level of effort needed, and knowing whom to ask for help (Pintrich, 2004). Highly self-regulated students also engage in increased effort by completing supplemental problems, completing extra work via online tutorials, achieving mastery over the material, and giving up avoidance behavior (Abara & Lokena, 2010). The importance of self-efficacy becomes more salient when considering procrastinators who perform poorly not because they lack knowledge of useful strategies but because they lack the confidence to apply these strategies in starting and completing tasks (Klassen, Krawchuk, & Rajani, 2008). Implementing metacognitive skills to monitor and adjust effort seems to increase in importance as junior and senior level students begin enrolling in challenging courses (Lynch, 2006). Consequently, coaching students to develop self-regulating learning strategies appears to be an effective mechanism for improving self-efficacy, motivation, and performance (Tuckman, 2003).

1.3. Self-efficacy, implicit theories of intelligence, goals, and performance

According to social-cognitive theory, self-efficacy beliefs function within a broader framework of self theories that determine motivation as well as performance. Dweck (1999) proposed children's implicit theories about their intelligence influence feelings of self-efficacy, the goals they pursue, their level of self-regulation, and their academic achievement. For instance, entity theorists, who believe that intelligence is fixed and determined by innate ability, tend to put forth less effort; incremental theorists who believe that intelligence is malleable and determined by effort, tend to work hard. Such implicit assumptions about intelligence also influence academic goal orientation (Grant & Dweck, 2003) and motivation (Blackwell, Trzesniewski, & Dweck, 2007). For instance, entity theorists' belief in stable knowledge makes them less likely to adopt mastery goals (Braten & Stromso, 2004), less likely to utilize cognitive and metacognitive strategies such as elaborating, planning, and monitoring (Dahl, Bals, & Turi, 2005), more likely to quit in the face of difficulties (Zuckerman, Gagne, & Nafshi, 2006), and more likely to feel threatened by demands for more effort as cues of a lack of ability (Baird, Scott, Dearing, & Hamill, 2009). In contrast, when faced with difficult tasks, incremental theorists are more likely to remain positive, seek mastery, increase effort, and mobilize self-regulating strategies (Robins & Pals, 2002). Incremental theorists also tend to have high self-efficacy, display higher motivation, make greater use of metacognitive strategies of concentration, and engage in less self-handicapping (Ommundsen, Haugen, & Thorleif, 2005).

However, despite the verification that self-efficacy beliefs are associated with self-regulating strategies, there appears to be some inconsistency in the findings regarding goals, motivation, and achievement. For instance, Pintrich (2000) suggests that a strong pursuit of both mastery and performance goals is as adaptive as pursuing only mastery goals with reference to motivation, affect, thoughts, and achievement. Students also appear to customize the strategies they adopt when self-regulating their motivation and persistence at a task. For instance, when faced with a task that emphasizes performance outcomes they might use performance goals, when encountering difficult material they might use information processing strategies, and when trying to stay focused on material that is perceived to be irrelevant they might use extrinsic contingencies (Wolters, 1998). Thus, the complex ways in which self-regulation strategies, implicit theories of intelligence, and achievement goals are linked to the relationship between self-efficacy and academic performance demand further research. Our research attempts to fill this fundamental gap in the literature.

1.4. Rationale for the current studies

Previous researchers suggest that students who are motivated are likely to put forth greater effort; those who are confident are likely to persist; those who are less anxious are likely to be less distracted; those who practice effective cognitive and metacognitive strategies are likely to learn and recall effectively; those who believe they can change their intelligence develop a belief that they have the skills needed to perform; and those who manage their resources strategically are likely to be more efficient; together, all of these qualities are likely to lead to higher academic achievement. Based on prior research and a social-cognitive framework, we predicted that:

Hypothesis 1. Students who have high self-efficacy are more likely to subscribe to an incremental theory of intelligence compared to students with low self-efficacy (who are more likely to subscribe to an entity theory).

Hypothesis 2. Students who have high self-efficacy will prefer learning/mastery goals relative to students with low self-efficacy.

Hypothesis 3. Students who are highly motivated, confident that they can succeed (intrinsic, extrinsic, and task value, control of learning and self-efficacy, low test anxiety), have well developed cognitive and metacognitive strategies (rehearsal, elaboration, organization, critical thinking, and self-regulation), and make effective use of their resources (time and study environment, effort regulation, peer learning, and help seeking) will report a higher grade point average (GPA).

2. Method

2.1. Participants

Our sample for Study 1 included 407 undergraduate students recruited from the Introduction to Psychology subject pool for course credit and from undergraduate psychology courses for extra credit. Participants from the subject pool completed the survey in small groups of about 8–10 students and participants from the undergraduate courses completed the surveys at home and returned them during the next class meeting. The sample included 48.4% men, as well as

51.8% freshmen, 12.3% sophomores, 17.4% juniors and 18.2% seniors. In terms of race/ethnicity, the majority of participants were European American (65.8%) and African American (22.6%), and 11.2% included all other ethnic groups. Participants had a mean age of 20.48 years and their majors were represented by Liberal Arts (29.2%), Science (11.5%), Business Administration (9.1%), Education (8.8%), Applied Sciences and Arts (7.1%), and Mass Communication and Media Arts (5.2%). For Study 2, we included a subset of the sample (N = 257) from Study 1, as only these participants provided additional information regarding their current college grade point average (GPA).

2.2. Measures

Our survey included the following three measures. The 81-item, Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich, Smith, Garcia & McKeachie, 1991), assessed motivational orientations (intrinsic, extrinsic, and task value, control of learning, self-efficacy for learning and performance, and test anxiety), cognitive and metacognitive learning strategies (rehearsal, elaboration, organization, critical thinking, and self-regulation), and resource management strategies (time and study environment, effort regulation, peer learning, and help seeking). All items used a 7-point rating scale (1 = *not at all true of me*, to 7 = *very true of me*). The internal consistency Cronbach's alpha values were .70 and above for all the 15 subscales except four (intrinsic motivation .61, control of learning .58, rehearsal .61, and help-seeking .61). Of the latter, only help-seeking was a significant predictor and any conclusions regarding it are to be viewed with caution.

The survey also included the 8-item, Implicit Theories of Intelligence Scale (Grant & Dweck, 2003), with sample items for entity theory, "Your intelligence is something about you which you can't change very much" and for incremental theory, "You can change even your basic intelligence level considerably", and internal consistency coefficient values of .88 (entity) and .89 (incremental). Finally, an 18-item, Achievement Goal Inventory assessed achievement, normative, and mastery goals with alpha values ranging from .89 to .94 (Grant & Dweck, 2003) with sample items for achievement goals, "A major goal I have in my courses is to perform really well," normative goals, "A major goal I have in my courses is to get higher grades than the other students," and mastery goals, "In my classes I focus on developing my abilities and acquiring new ones."

3. Results

3.1. Multivariate analysis of covariance, study 1

In Study 1, we tested Hypothesis 1 and Hypothesis 2, by conducting a multivariate analysis of covariance (MANCOVA) to determine whether students in high and low self-efficacy groups differed significantly in terms of implicit theories of intelligence and academic goals, while controlling for gender and age (see Table 1). We used a mean split on self-efficacy with the high self-efficacy group scoring above the mean (N = 214) and the low self-efficacy group scoring below the mean (N = 190). We found significant differences between the high self-efficacy and low self-efficacy groups, after controlling for participants age and gender, partial $\eta^2 = .19$, Pillai's Trace = 0.19, $F(8, 390) = 11.383$, $p < .001$. Gender, partial $\eta^2 = .06$, $F(8, 390) = 3.16$, $p = .002$, and age, partial $\eta^2 = .06$, $F(8, 390) = 3.21$, $p = .002$, were significant covariates of implicit theories of intelligence and academic goals. Univariate ANOVAs revealed significant differences between the two self-efficacy groups on entity theory of intelligence and various goals (achievement outcome, achievement ability, normative outcome, learning, and mastery).

Specifically, the low self-efficacy group ($M = 2.71$, $SD = 1.09$) scored significantly higher than the high self-efficacy group ($M = 2.48$, $SD = 1.11$) on entity theory of intelligence, partial $\eta^2 = .01$, $F(1, 397) = 4.95$, $p = .027$. Further, the high self-efficacy group scored significantly higher than the low self-efficacy group on achievement outcome goals, partial $\eta^2 = .07$, $F(1, 397) = 30.77$, $p < .001$, on achievement ability goals, partial $\eta^2 = .02$, $F(1, 397) = 9.55$, $p = .002$, on normative outcome goals, partial $\eta^2 = .03$, $F(1, 397) = 13.22$, $p < .001$, learning goals, partial $\eta^2 = .13$, $F(1, 397) = 57.26$, $p < .001$, and mastery goals, partial $\eta^2 = .12$, $F(1, 397) = 52.06$, $p < .001$.

Table 1
Multivariate Analysis of Covariance (MANCOVA) for differences between high and low self-efficacy groups in theories of intelligence and academic goals (N = 407).

Variable	Self-efficacy group	*M*	*SD*	*F*	Partial η^2
Entity	Low	2.72	1.05	4.95*	.01
	High	2.48	1.11		
Incremental	Low	4.29	0.99	3.34**	.01
	High	4.48	1.12		
Achievement outcome	Low	5.50	0.71	30.77***	.07
	High	5.82	0.45		
Achievement ability	Low	4.47	1.23	9.55***	.02
	High	4.83	1.24		
Normative outcome	Low	4.13	1.26	13.22***	.03
	High	4.58	1.37		
Normative ability	Low	3.13	1.28	.60	.00
	High	3.24	1.49		
Learning	Low	4.74	0.93	57.26***	.13
	High	5.37	0.74		
Challenge mastery	Low	3.62	1.19	52.06***	.12
	High	4.47	1.17		

Note.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

3.2. Correlation analyses, study 2

In Study 2, we tested Hypothesis 3, by conducting correlation analyses for a subset of the participants who provided their grade point average (N = 257, from the overall sample). We found several significant relationships between GPA and the subscales of the MSLQ (see Table 2). Most noteworthy, college GPA was positively correlated with task value, control of learning beliefs, self-efficacy, rehearsal strategies, self-regulation, time management, and effort regulation; and negatively with test anxiety.

3.3. Regression analyses, study 2

For testing Hypothesis 3 further, and for obtaining a more parsimonious and meaningful understanding of the pattern of significant correlations, we conducted hierarchical regression analyses using the stepwise entering method for each block or set of variables (see Table 3). In block one, we entered the subgroup of motivation variables, in block two we entered cognitive and metacognitive learning strategies, and finally in block three we entered resource management strategies, to predict college GPA. From the first subgroup of motivation variables, self-efficacy was the only variable that significantly predicted college GPA, $\beta = .30$, $b = .20$, $t(254) = 4.95$, $p < .001$. From the second subgroup of cognitive and metacognitive learning strategies there were no incremental significant predictors. Finally, from the third and final subgroup of resource management strategies, both effort regulation, $\beta = .32$, $b = .17$, $t(254) = 4.76$, $p < .001$, and help-seeking, $\beta = -.15$, $b = -.07$, $t(254) = -2.51$, $p < .013$ emerged as significant predictors of incremental variance in GPA.

3.4. Mediation analyses

As we sought a more thorough understanding of the mechanisms by which self-efficacy predicts GPA, we drew on prior research and tested effort regulation as a mediator, and found support for its partial mediation of this relationship (Baron & Kenny, 1986). In testing for

Table 2
Intercorrelations between GPA and subscales of the MSLQ: motivational orientations, cognitive–metacognitive strategies, and resource management (N = 257).

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. GPA	–															
Motivational orientations																
2. Intrinsic	.11	–														
3. Extrinsic	.05	.27**	–													
4. Task value	.13*	.57**	.30**	–												
5. Control learning	.14*	.41**	.23**	.39**	–											
6. Self-efficacy	.30**	.53**	.36**	.53**	.35**	–										
7. Test anxiety	−.17**	−.02	.21**	−.01	.01	−.28**	–									
Cognitive–metacognitive																
8. Rehearsal	.19**	.26**	.38**	.35**	.17**	.29**	.13*	–								
9. Elaboration	.09	.41**	.22**	.49**	.18**	.42**	−.07	.46**	–							
10. Organization	.11	.31**	.27**	.29**	.07	.27**	.14*	.53**	.51**	–						
11. Critical thinking	−.02	.46**	.15**	.32**	.23**	.32**	.01	.25**	.56**	.34**	–					
12. Self-regulation	.14*	.51**	.19**	.38**	.20**	.48**	−.07	.47**	.65**	.52**	.62**	–				
Resource management																
13. Time & study	.31**	.33**	.25**	.37**	.20**	.44**	−.11*	.50**	.38**	.40**	.21**	.51**	–			
14. Effort regulation	.39**	.39**	.22**	.44**	.18**	.50**	−.23**	.40**	.38**	.30**	.18**	.47**	.66**	–		
15. Peer learning	−.01	.28**	.20**	.12**	.05	.25**	.10*	.29**	.31**	.30**	.33**	.39**	.14**	.08	–	
16. Help seeking	−.06	.17**	.15**	.22**	−.05	.24**	.06	.26**	.30**	.19**	.18**	.36**	.21**	14**	.56**	–

Note.
* $p<.05$.
** $p<.01$.

mediation, we found a significant relationship between self-efficacy and academic performance as measured by GPA, $\beta = .30$, $b = .20$, $t(254) = 4.95$, $p < .001$ and between self-efficacy and effort regulation, $\beta = .50$, $b = .63$, $t(404) = 11.66$, $p < .001$; see Fig. 1. Further, there was a significant relationship between effort regulation and GPA, $\beta = .32$, $b = .17$, $t(254) = 4.76$, $p < .001$. When accounting for effort regulation, the relationship between self-efficacy and academic performance was reduced from $\beta = .30$ to $\beta = .14$, $b = .09$, $t(254) = 2.06$, $p = .041$, indicating that effort regulation partially mediated the relationship between self-efficacy and GPA. A significant Sobel Test ($p < .001$) supported effort regulation as a partial mediator of the relationship between self-efficacy and academic performance.

4. Discussion

Our results establish that students who have high self-efficacy and confidence in their academic performance are also more likely to believe that intelligence is changeable and determined by effort. We believe these findings are important and encouraging because they dovetail with prior empirical evidence suggesting that students' self-efficacy can be improved and developed (Bandura, 1989). Thus, training students to strengthen their self-efficacy and their belief that they have the ability to determine their performance can facilitate valuing effort and hard work. Our results also indicate that self-confident students are more likely to prefer academic goals such as seeking challenge and new knowledge as well as getting good grades, outperforming other students, and showing their intelligence through their schoolwork. In contrast, students who have lower self-efficacy and are unsure and insecure about their success in college, are more likely to assume that intelligence is a fixed, innate entity that cannot be changed and are less likely to be motivated by either performance or mastery goals. These findings highlight the intricate associations between students' self-efficacy, implicit beliefs about valuing effort, and pursuing a mastery orientation.

We also found self-efficacy expectancies to be important in predicting academic achievement. Students who are more confident and self-assured are more likely to report higher levels of academic performance. In particular, self-efficacy appears to serve an essential function by facilitating the use of various metacognitive strategies and resources that are crucial for academic performance. For instance, students who exert effort regulation and persist when encountering course work that may be difficult or boring are more likely to perform well academically. Such students are likely to be more self-motivated and less likely to seek help from peers or instructors. Further, partial mediation analyses indicate that students with high self-efficacy are more apt to achieve higher grades because they are better able to control their natural impulses when studying material that is challenging, or when they feel lazy and distracted. Self-assured students

Table 3
Summary of hierarchical regression analysis for motivational orientations, cognitive–metacognitive strategies, and resource management strategies predicting GPA (N = 257).

Outcome	Step	Variable	*B*	*SE B*	β	R^2	Adjusted R^2
College GPA	1	Self efficacy	.20	.04	.30***	.09	.08
	2	Self efficacy	.09	.05	.14*		
		Effort regulation	.17	.04	.32***		
						.16	.16
	3	Self-efficacy	.12	.05	.17**		
		Effort regulation	.17	.03	.32***		
		Help seeking	−.07	.03	−.15**		
						.18	.17

Note.
* $p<.05$.
** $p<.01$.
*** $p<.001$.

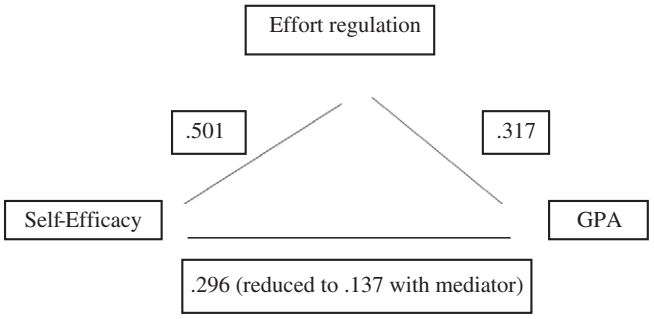

Fig. 1. Mediation analyses showing effort regulation partially mediating the relationship between self-efficacy and GPA.

appear to maintain self-discipline, sustain their motivation and regulate their efforts during the most difficult times, especially when it is easier to quit. Thus, having high self-efficacy facilitates the ability to exert self-control and persist and obtain a higher GPA. The importance of effort regulation is supported by some prior research that identify related mechanisms such as the Big Five personality trait of conscientiousness (Conard, 2006), as well as academic discipline, degree commitment, and emotional control (Robbins, Allen, Casillas, Peterson, & Le, 2006) as predictors of academic achievement, after controlling for cognitive ability. Thus, self-efficacy emerges as a critical internal resource that has the potential for facilitating self-disciplined behavior and enabling students to remain focused while successfully completing their work.

5. Implications, future research, conclusions

Our findings have broad implications for educators, coaches, and administrators. For instance, when planning their syllabi and designing classroom activities, instructors could develop students' self-efficacy by incorporating strategies based on Bandura's (1989) four sources of self-efficacy: mastery experiences, modeling, social persuasion, and managing physiological arousal. Instructors could provide students with opportunities to experience success, observe high achieving role models, rehearse strategies for managing obstacles, and practice tactics for managing performance anxiety. Establishing opportunities that are easy to access and allow for students to experience success are likely to develop and enhance students' academic self-efficacy. Also, providing students with specific instances of role models (such as exceptional students who have performed well in the past or providing examples of expected behavior) is likely to have a positive influence on their self-beliefs about ability and performance. Finally, providing students with support and tools for managing stressful situations can be an invaluable resource for advancing students' self-efficacy and motivation to achieve higher levels of learning and performance. Instructors could also educate students in time management techniques and coach them on self-reflection and self-regulation of effort. Perhaps classroom instructors can devise strategies to help students set goals that focus on mastery and encourage the use of self-regulatory strategies for persisting through difficult and challenging assignments. Instructors who emphasize the practical value of the material that is being learned and the importance of effort are likely to strengthen students' motivational beliefs (Zusho & Pintrich, 2003). Further, providing students with clear examples of passing work, clarifying expectations, and giving ample feedback are all likely to provide scaffolding for students' attempts and help them develop self-efficacy (Lane & Lane, 2001).

Taken together, the results of our studies offer support for the essential role of self-efficacy and effort regulation in predicting academic achievement. Yet, we acknowledge that future researchers could implement several improvements. For example, we used self-reported GPA to assess academic performance. Although Noftle and Robins (2007) report a strong positive correlation between self-reported and official GPA, and Anaya (1999) reports strong positive correlations and higher accuracy between self-reported and actual scores on the Graduate Record Exam for students from selective universities and with higher scores, we acknowledge the limitations of using self-report scores and recommend obtaining students' consent and accessing GPAs from official records so as to reduce potential inflation error. Future researchers can also extend our work by conducting experimental or longitudinal studies that would permit causal inferences between motivational orientations, cognitive and metacognitive strategies, self-beliefs, and performance. However, the results of our study make an important contribution to the field by investigating a complex set of predictors, documenting the importance of implicit theories of intelligence and achievement goals, and establishing the central role of self-efficacy and effort regulation in predicting academic achievement.

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