

Self-Regulation and Ability Predictors of Academic Success During College:

A Predictive Validity Study

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a A topic of long-standing interest for university administrators and faculty is how to help first-year college students succeed academically. On average, only 73.6% of college freshman return for their sophomore year (National Center for Higher Education Management Systems [NCHEMS], 2007). Although academic success in college requires some preexisting capabilities, these abilities do not always differentiate high-achieving students from low-achieving students (Kitsantas, 2002; Zimmerman & Schunk, 2008). By contrast, there is an extensive body of evidence with regard to academic performance suggesting that differences in low- and high-achieving students are closely linked to an individual's level of self-regulation (Zimmerman & Schunk, 2008). Self-regulation refers to the degree to which students are "metacognitively, motivationally, and behaviorally active participants of their own learning process" (Zimmerman, 1989, p. 329). Considering the above evidence, it would be interesting to deter-

Knowledge about self-regulation and motivation processes enables students to maximize their college career paths and allows universities to implement better intervention programs to encourage struggling students to persist and complete their educational studies. College administrators and instructors should focus on developing interventions to instill a healthy sense of self-efficacy in students and teach them how to manage their time effectively. Interventions in the form of learning how to learn courses and/or workshops should be designed specifically for first-year students to provide them with helpful adjustment strategies such as setting strategic goals, planning effectively throughout the first year of undergraduate study, and seeking help when needed. Furthermore, instructors of introductory-level classes should provide first-year students with successful peer role models to enhance their self-efficacy beliefs in completing their course requirements. For example, they can make available samples of past projects to their current students, which may allow them to observe successful peers and encourage them to believe that they can succeed. Equipping students with self-regulatory strategies and positive motivational beliefs earlier on in their studies will prepare and sustain their motivation for more demanding, upper level courses as they progress through their academic career.

Summary

mine how much of the variance in first-year students' academic success is explained by prior ability, self-regulation, and motivational beliefs. Therefore, the scope of this study is to investigate whether student prior ability levels (cumulative high school GPA and verbal and math SAT scores), self-regulatory processes, and motivational beliefs assessed during the first semester of college have a unique ability to predict student academic performance at the end of the first and second year of college.

Importance of Prior Ability

A review of the literature suggests that prior ability is significantly related to college academic performance (DeBerard, Spielmans, & Julka, 2004; Stumpf & Stanley, 2002; Zwick & Sklar, 2005). For example, DeBerard et al. found that cumulative high school GPA was among the strongest predictors that explained 56% of the variance of second-semester college achievement, followed by combined SAT scores. Similarly, Stumpf and Stanley showed that SAT scores and high school GPA significantly predicted the number of students graduating from college. However, these studies typically did not include measures of self-regulated learning and motivation and examined only overall SAT scores (verbal and math combined).

Furthermore, few researchers have attempted to study verbal and math SAT scores separately (Nofle & Robins, 2007; Rhode & Thompson, 2007). According to Nofle and Robins, limited research has examined differences between the verbal and mathematics portion of the SAT as predictors of college performance. Although Nofle and Robins focused on personality outcomes such as conscientiousness and openness, their research provides insight on the possibility that math and verbal SAT scores may explain different dimensions of achievement, motivation, and social cognition. In fact, these researchers found that unlike math SAT scores, verbal SAT scores were significantly correlated with openness. Similarly, in terms of cognition, Rhode and Thompson discovered that certain cognitive factors (e.g., processing speed,

spatial ability), contributed unique variance in explaining math SAT scores but not verbal scores. However, no studies have attempted to explain how verbal and math SAT scores may contribute separately to explaining later performance together with motivation and self-regulation variables.

Research on Self-Regulation and Motivation

From a social cognitive perspective, self-regulation involves: (a) setting specific goals; (b) utilizing task strategies such as elaborating, organizing, and rehearsing; (c) displaying high levels of self-efficacy and intrinsic interest; and (d) self-monitoring and self-reflecting on performance outcomes (Zimmerman & Schunk, 2008). Therefore, academic self-regulation involves students who are independent, self-initiated learners with the ability to use a variety of learning strategies (e.g., organizing, transforming, note taking), to accomplish specific learning goals (Kitsantas, 2002; Zimmerman, 2008). The specific cognitive and behavioral processes examined in the present study include metacognitive learning strategies and time and study environment management, which are both important variables during the college years in regard to academic achievement (Nonis, Philhours, & Hudson, 2006; Shivpuri, Schmitt, Oswald, & Kim, 2006).

Metacognitive Learning Strategies

According to Pintrich, Smith, Garcia, and McKeachie (1993), metacognitive self-regulation is a combination of three processes: planning, monitoring, and regulating. For example, students utilizing strong metacognitive self-regulation strategies would set goals for the task at hand, ask questions to support their understanding of the material, and continually adjust the strategies that they use according to their effectiveness. Researchers have shown that metacognition is not only significantly associated with academic performance (Kornell & Metcalfe, 2006; Zimmerman & Schunk, 2008), but that metacognitive study skills have also been

found to significantly predict initial academic performance above and beyond SAT and ACT scores (Shivpuri et al., 2006).

Time Management

The time and study environment component of academic self-regulation refers to how effectively students regulate study time and the surrounding environment to successfully accomplish learning goals (Pintrich et al., 1993). Indeed, one of the most popular complaints among college students is the lack of time to complete all of their assigned work (Garcia-Ros, Perez-Gonzalez, & Hinojosa, 2004). However, students who are able to manage their time effectively and put themselves in settings that foster, rather than distract, learning have higher GPAs (Britton & Tesser, 1991; Tuckman, 2003) and show more positive adjustment in college (e.g., life satisfaction) than students who lack these skills (Macan, Shahani, Dipboye, & Phillips, 1990). Overall, research evidence shows that organizational and time management strategies are strong predictors of academic achievement (Britton & Tesser, 1991; Garavalia & Gredler, 2002; Nonis et al., 2006) and retention (Goldfinch & Hughes, 2007) in college.

Although both metacognitive learning strategies and time management contribute to a successful academic career, it is important to note that these processes are intimately linked with certain motivational and affective beliefs. Wigfield and Eccles (2000) suggested that motivation to perform academically is a combination of the students' expectation for success and how much value they place on performing well. In the present study, motivation is centered on three concepts: task value, self-efficacy, and the affective component of test anxiety.

Task Value

According to Eccles (2005), *task value* is a multidimensional concept that is comprised of four components: attainment value, interest value, utility value, and cost. The present study assesses three of the four components of task value, measured globally,

which are attainment, interest, and utility value. Attainment value refers to the student's perception of how personally important it is to participate or do well on a given task, while interest value is how personally enjoyable the task is. Utility value is how useful the obtained skills are in future goals (Eccles, 2005). For example, if a student has always enjoyed reading and writing (interest value), believes that it is important for him or her to do well in that subject area (attainment value), and plans to become an author in the future (utility value), he or she would be identified as having a high task value. It is important to note that task value is context-specific. That is, a student may exhibit high task value in the domain of mathematics, but he or she may not exhibit the same level of value in literature. Overall, research suggests that students' performance and future enrollment intentions are significantly predicted by the level of task value (Bong, 2001; Eccles, 2005).

Self-Efficacy

Self-efficacy is defined as the extent to which a student believes he or she is capable of accomplishing a task under certain conditions (Bandura, 1997). Bandura describes self-efficacy as a multidimensional concept that may vary across domains and centers on students' beliefs about their future performance. Thus, self-efficacy is a context-specific construct and addresses student beliefs in their ability to master tasks, rather than generalized performance. There is strong evidence that self-efficacy is a key motivational belief that influences students' academic task choices (Pajares, 2008) and use of effective self-regulatory learning strategies (Greene, Miller, Crowson, Duke, & Akey, 2004). Furthermore, self-efficacy plays an important role in academic performance (Chemers, Hu, & Garcia, 2001; Robbins et al., 2004) including predicting academic achievement above and beyond other motivational concepts such as task value and affective components, including test anxiety (Robbins et al., 2004). For example, in a meta-analysis of 109 studies, Robbins et al. examined nine constructs as predictors of retention and GPA.

The nine factors included achievement motivation, academic goals, institutional commitment, perceived social support, social involvement, academic self-efficacy, general self-concept, academic-related skills (self-regulatory study skills), and contextual influences. The results revealed that out of these nine constructs, academic self-efficacy was the strongest predictor of GPA.

Test Anxiety

Test anxiety is an important affective component that influences student motivation. Test anxiety is defined as a tense cognitive, emotional, physiological, and behavioral response in anticipating negative outcomes in formal testing situations (Bembenutty, 2008; Chapell et al., 2005). Prior research suggests that out of the cognitive and physiological components that make up the concept of test anxiety, the cognitive (or worry) component is what primarily influences outcomes (Hong & Karstensson, 2002). A plethora of empirical studies document the negative effects of anxiety on academic achievement (Chapell et al., 2005; Seipp, 1991; Zeidner, 1998). A meta-analysis by Seipp that included 126 studies showed that students with low test anxiety scored approximately half a standard deviation higher than students with high test anxiety on measures of achievement. More recently, Chapell et al. showed that undergraduate students who reported higher levels of test anxiety scored on average a third of a letter grade lower than students with lower levels of test anxiety.

Students exhibiting high levels of test anxiety may also have different motivational beliefs and academic study skills than those who are less anxious about tests (Bembenutty, 2008). Specifically, Bembenutty found that students who experienced high levels of test anxiety were less efficacious, had less adaptive task values, and used fewer cognitive learning strategies than students who experienced lower levels of anxiety. Furthermore, students who experience test anxiety are more likely to anticipate poor performance and demonstrate poor test taking (Naveh-Benjamin, McKeachie, & Lin, 1987; Schunk, Pintrich, & Meece, 2008). It should be noted, however, that test anxiety is not the only

determinant of the academic achievement of test-anxious students (Bembenutty, McKeachie, Karabenick, & Lin, 1998) and that differences in ability and study habits also can explain the achievement of these students. Therefore, with proper intervention, test anxiety can be alleviated to enhance motivation, self-regulation, and achievement (Schunk et al., 2008).

Purpose of the Study

Overall, the literature suggests both student self-regulatory processes and motivational beliefs are related to concurrent academic performance in specific contexts. However, few researchers have examined prospective relations between motivational variables and later performance at two different time points throughout the college years. The predictive validity of such variables needs further exploration. Additionally, no studies to our knowledge have addressed math and verbal SAT scores as predictors of academic performance separately while adding motivation and self-regulation. If one of these two domains is more useful in predicting students' later academic performance, it would not only be valuable theoretically, but also provide useful information for admissions offices and test developers. Additionally, few studies have examined the combined predictiveness of self-regulation, motivation, and prior ability for students' later academic performance in college. The use of traditional prior ability predictors combined with social-cognitive dimensions of learning has the potential to expand our understanding of the various influences on academic achievement and to design appropriate interventions. Therefore, the present study investigated the role of prior ability measures, self-regulation, and motivation in predicting academic performance among first-year college students during their first and second years of college. It was hypothesized that prior academic measures (high school GPA, SAT scores), self-regulation (metacognitive and time management strategies), and motivational beliefs (task value and self-efficacy), and affective components such as test anxiety would each contribute unique

variance in predicting academic performance (cumulative GPA) at the end of the first and second year of college.

Method

Participants

Undergraduate students ($N = 243$), enrolled in introductory-level courses in their first semester at a large, public, mid-Atlantic university, participated in the present study. Approximately 63.8% of the participants were female and the mean age of participants was 18. The ethnic background of the participants was as follows: 64% White; 7% Black; 4% Hispanic; 15% Asian; 9% Other or Mixed. Of the sample, 94% were first-semester freshman, 4% were second-semester freshman, and 1% were technically sophomores (these last two groups transferred from a community college), and 99% of the sample were full-time students. The percentage of the sample born in the U.S. was 85%, and 79% of the U.S. natives had English as their first language. The average income of student households was \$70,000 per year. The educational level of mothers was some college or professional school and for fathers, a bachelor's degree. Average SAT scores in our sample for math were $M = 552.79$ ($SD = .84.13$) and verbal $M = 539.00$ ($SD = 89.64$). As expected, these scores are slightly above the national averages for that year (math = 516, verbal = 504; College Board, 2002), given that the students of the present study were admitted into college.

Although questionnaires were administered to 243 first-semester first-year students at the end of their first (fall) semester, cumulative GPA was collected at the end of the second (spring) semester ($n = 227$ matched records) and again at the end of the spring semester of their sophomore year ($n = 198$ matched records). The students for whom grades were not available left the university and thus did not have a GPA. Analyses revealed that students who were still enrolled in classes had received a higher cumulative high school GPA (3.37) than students who withdrew

from their studies (3.17), $t(207) = -2.19, p < .05$. Similarly, students who remained in college reported higher use of time management strategies ($M = 4.71$) than those who withdrew ($M = 4.36$), $t(207) = -2.56, p < .05$. The resulting sample size of 198 gives us adequate power to detect even small effect sizes. For example, with multiple regression, an alpha = .05, and eight predictors (as in our model 4 below), we have 93% power to detect a small effect size, 98% power to detect a medium effect size, and nearly 100% power to detect a large effect size (Cohen, 1988).

Measures

Demographics. Basic background information about the student (e.g., age, gender, ethnicity, family income, parental education) was collected via introductory questions on the survey.

The Motivated Strategies for Learning Questionnaire. The Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich et al., 1993) assessed students' motivational beliefs (task value, self-efficacy, and test anxiety) and self-regulation (metacognitive self-regulation and time management). The MSLQ is a widely used self-report measure that utilizes a 7-point Likert scale (1 = *not at all true of me* and 7 = *very true of me*) to evaluate student motivation and learning strategies by college students.

Because the MSLQ is designed to address motivation and self-regulation in a specific domain and context, the wording of the questions on the MSLQ used in this study were slightly modified to address general academic tasks as opposed to performance in a specific context or domain (i.e., changing "in this class" to "in my classes"). Therefore, it is important to stress that the results are based on generalized rather than domain-, context-, or course-specific forms of measurement. Additionally, the self-efficacy variable as measured by the MSLQ, technically addresses two subconstructs: expectancy for success and self-efficacy for mastery. Although these two concepts compliment what Bandura (1997) suggested in that self-efficacy includes judgments about future performance (expectancy for success) and is based upon students' beliefs in their ability to master tasks,

self-efficacy as assessed by the MSLQ measures student general academic efficacy in regard to what students believe they can do in the classes in which they are enrolled.

The MSLQ is comprised of two scales. The first scale measures motivation (6 subscales with 31 items) and the second scale measures student learning strategies (9 subscales with 50 items). The MSLQ subscales used in this study were the following: task value, which contained six items (e.g., “I like the subject matter of my courses”; $\alpha = .69$); self-efficacy, which included eight items (e.g., “I expect to do well in class”; $\alpha = .81$); test anxiety, which included five items (e.g., “I feel my heart beating fast when I take an exam”; $\alpha = .81$); metacognitive self-regulation, which contained 12 items (e.g., “If course materials are difficult to understand, I change the way I read the material”; $\alpha = .74$); and time and study environment management, which included eight items (e.g., “I attend class regularly”; $\alpha = .71$). The task value measure of the MSLQ assesses three components (e.g., attainment, interest, and utility) as a combined, global measure of task value. Although students who are identified as having high or low task value may not necessarily be high or low in all three aspects of task value, global measures of task values are often employed (Crombie et al., 2005).

Prior ability and academic performance. Students’ information about their high school SAT scores and GPA and their college GPA at the end of their first and second year was obtained from institutional records with student and institutional IRB consent.

Procedure

Questionnaires were distributed in a number of introductory courses commonly taken by first-semester students (e.g., Psychology 100, Communication 100) during the second-to-last week of the first semester. Students were instructed to immediately complete the survey or return it at the next class period. The questionnaires included information on what the survey attempted to examine as well as instructions on how to answer

the items. Cumulative college GPA was collected from university records for each participant at the end of the first year (second semester) and also at the end of the second year. Questionnaire completion in the first semester was linked to the receipt of one to two extra credit points for some students in courses for which research participation earned credit.

Results

Preliminary Analyses

Preliminary analyses were conducted to determine whether any of the main variables differed as a function of demographic characteristics (gender, ethnicity, age, and transfer status). In terms of gender, there were no significant differences for any of the self-regulation and motivation variables. However, there were significant gender differences in student cumulative high school GPA and college GPA in the sophomore year where females ($M = 3.41$) had earned a higher high school GPA than males ($M = 3.24$), $t(135) = 2.84$, $p < .01$, and attained higher cumulative college GPAs at the end of their sophomore year, $t(118) = 2.65$, $p < .01$ (females $M = 3.03$; males $M = 2.79$). Additionally, males ($M = 574$) were found to have higher SAT math scores than females ($M = 541$), $t(126) = 2.55$, $p < .05$. As a result, gender was included in the regression analyses as a control.

In regard to ethnicity, ANOVAs were performed based on four categories: Caucasian, African American, Asian American, and other. The "other" category included students of mixed origin, including Hispanic, Native American, and Middle Eastern. No significant differences were found in terms of cumulative high school GPA or college GPA. However, significant differences were found in terms of verbal, $F(3, 202) = 10.76$, $p < .001$ and math SAT scores, $F(3, 202) = 5.27$, $p < .01$. The Bonferroni method for examining multiple group differences revealed that Caucasians ($M = 559.23$) had higher verbal SAT scores than African Americans ($M = 473.64$, $p < .01$) and Asian

Americans ($M = 480.56, p < .001$). Additionally, both Caucasians ($M = 557.75$) and Asian Americans ($M = 572.22$) had higher math SAT scores than African Americans ($M = 468.18, p < .01$). No significant differences were revealed in terms of the self-regulation variables; however, there were significant differences in regard to motivation ($F[9, 516] = 2.21, p < .05$), self-efficacy ($F[3, 214] = 5.31, p < .01$), and task value ($F[3, 214] = 3.54, p < .05$). Post hoc tests revealed that African Americans ($M = 5.46$) had a more adaptive task value than Asian Americans ($M = 4.72, p = .05$), and Caucasians ($M = 5.05$) were more self-efficacious than Asian Americans ($M = 4.38, p < .01$). These differences should be interpreted with caution given the small cell numbers of the African American group ($n = 17$).

Furthermore, there were no significant differences between the students who had transferred from other campuses and the students enrolled with the exception of task value ($t[217] = 2.45, p < .01$), where transfer students ($M = 5.62$) had higher task value scores than traditional students ($M = 5.08$). Moreover, in terms of age, significant correlations emerged between age and verbal SAT scores, high school GPA, and time management, where younger students were more likely to receive higher verbal SAT scores ($r = .36, p < .001$), higher high school GPA ($r = .18, p < .05$), and lower time management strategies ($r = -.17, p < .05$).

Correlation Analyses

Means and standard deviations for all measures are provided in Table 1. Correlations were used to examine the relationships among the college GPA, prior ability, self-regulation, and motivation variables (see Table 1). Overall, significant relationships emerged between all of the variables and first- and third-year GPA. More specifically, of the prior ability measures, the strongest correlation with second-semester GPA was high school cumulative GPA, ($r = .53, p < .001$), followed by verbal SAT score, ($r = .46, p < .001$). Of the self-regulation variables, the strongest correlation with first-year academic performance was time and study environment management ($r = .35, p < .001$).

Table 1
Descriptive Statistics and Pearson Correlations Among Prior Ability, Motivation, Self-Regulation, and Academic Performance

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10
1. Year 1 (Second Semester) GPA	2.93	0.63	1.00									
2. Year 3 (Fifth Semester) GPA	2.95	0.59	0.91***	1.00								
3. SAT Verbal Score	539.00	89.64	0.46***	0.44***	1.00							
4. SAT Math Score	552.79	84.13	0.35**	0.35**	0.48***	1.00						
5. Cumulative HS GPA	3.34	0.40	0.53***	0.55***	0.35**	0.40***	1.00					
6. Meta-Cognitive Self-Regulation	4.29	0.82	0.21**	0.22**	0.04	0.03	0.11	1.00				
7. Time and Study Environment	4.66	0.90	0.35***	0.32***	0.04	-0.07	0.19**	0.41***	1.00			
8. Test Anxiety	3.93	1.27	-0.20**	-0.19**	-0.27**	-0.29**	-0.17**	0.21**	-0.02	1.00		
9. Task Value	5.12	0.94	0.30***	0.32***	0.13	0.09	0.26**	0.59***	0.44***	0.12	1.00	
10. Self-Efficacy	4.93	0.97	0.44***	0.37**	0.30**	0.29**	0.37**	0.55***	0.44***	-0.04	0.75***	1.00

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

The strongest correlations among the motivation variables and first-year academic achievement included self-efficacy ($r = .44, p < .001$) and task value ($r = .30, p < .001$). At the end of the beginning of the fifth semester, the associations between cumulative high school GPA and college GPA ($r = .55, p < .001$) and verbal SAT score and GPA remained strong ($r = .44, p < .001$). Study and time environment also was correlated significantly with later GPA ($r = .32, p < .001$) as well as task value ($r = .32, p < .001$) and self-efficacy ($r = .37, p < .01$).

Regression Analyses

In order to determine the combined effectiveness of the various measures in predicting student academic performance, hierarchical multiple regressions were employed to estimate how much variance in GPA was accounted for by each of the clusters of variables at the end of the first and second year in college. Four regression models were formulated (see Table 2). The first model included gender as a control variable. In the second model, the students' high school SAT scores (verbal and quantitative) and high school GPA were used to predict their first-year college GPA. Results suggested that gender did not play a significant role in predicting second-semester GPA. However, results revealed that prior ability (high school GPA, math SAT, and verbal SAT) accounted for 37% of the variance in student's GPA at the second semester, $R^2 = .37, F(4, 194) = 28.28, p < .001$. In the third model, the students' reports of academic self-regulation (metacognitive and management strategies) also were added. A significant change was detected in accounted GPA variance, $R^2 = .45, F(6, 192) = 27.03, p < .001$. Finally, in the fourth regression model, academic motivation variables (self-efficacy, etc.) were added to the previous predictors. A significant change was detected in accounted variance, $R^2 = .47, F(9, 189) = 18.91, p < .001$. Together, 47% of the variance in students' academic achievement at the end of the second semester was accounted for by all of the variables.

Table 2

Regressions With End of Semester 2 and End of Semester 5 GPA as the Outcome Variable

Variables	Year 1 (Second Semester) GPA					Year 3 (Fifth Semester) GPA				
	R ² Change	F	Sig F Change	Standardized Beta	t	R ² Change	F	Sig F Change	Standardized Beta	t
Model 1: Gender	.01	1.87	.17	.17	-1.37	.04	7.85**	.006	.21	-2.80**
Model 2: Past Performance	.37	28.28**	<.001			.39	27.46**	.001		
Gender				-.03	-0.46				-.14	0.14*
High School GPA				.41	6.23***				.41	5.78***
SAT Verbal				.25	3.79***				.24	3.28***
SAT Math				.08	1.18				.09	1.20
Model 3: Learning Strategies	.45	27.03***	<.001			.46	24.02**	.001		
Gender				-.03	-0.50				-.15	-2.41*
High School GPA				.34	5.40***				.34	4.85***
SAT Verbal				.25	4.07***				.23	3.36**
SAT Math				.12	1.79				.15	2.05*
Metacognitive Self-Regulation				.09	1.51				.05	0.81
Time and Study Environment				.26	4.30***				.25	3.78***
Model 4: Motivation	.47	18.91***	.13			.48	16.20**	.51		
Gender				-.05	-0.88				-.14	-2.26*
High School GPA				.30	4.48***				.33	4.59***
SAT Verbal				.23	3.65***				.22	3.16**
SAT Math				.08	1.23				.14	1.90
Metacognitive Self-Regulation				.03	0.41				.04	0.45
Time and Study Environment				.22	3.55***				.23	3.29**
Test Anxiety				-.04	-0.74				-.06	-0.93
Task Value				-.03	-0.33				.12	1.31
Self-Efficacy				.19	2.03*				-.07	-0.66

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

Of the prior ability measures included in Model 2, at the end of the second semester, only cumulative high school GPA ($\beta = .41, t [194] = 6.23, p < .001$) and verbal SAT scores ($\beta = .25, t [194] = 3.79, p < .001$) significantly predicted academic success at the end of the freshman year of college studies. In Model 3, which included the self-regulatory factors in addition to the prior academic ability measures, time and study environment ($\beta = .26, t [192] = 4.30, p < .001$) played a role in positively predicting academic performance. Cumulative high school GPA ($\beta = .34, t [192] = 5.40, p < .001$) and verbal SAT scores ($\beta = .25, t [192] = 4.07, p < .001$) became less influential in predicting academic performance when the self-regulatory variables were added. Finally, in Model 4, only self-efficacy ($\beta = .19, t [189] = 2.03, p < .05$) played a significant role in predicting academic performance in the second semester out of the other two motivational variables. Interestingly, verbal SAT scores ($\beta = .23, t [189] = 3.65, p < .001$) retained its predictive value along with time management ($\beta = .22, t [189] = 3.55, p < .001$) and cumulative high school GPA ($\beta = .29, t [189] = 4.48, p < .001$) in predicting academic performance when all of the other variables were included.

Regression analyses conducted to predict the end of sophomore year college GPA also are depicted in Table 2. Gender in these analyses became a significant predictor of performance at the end of the fifth semester. Specifically, in Model 1, the analyses showed that gender is a significant predictor of sophomore GPA accounting for 4% of the variance in student GPA, $R^2 = .04, F(1, 171) = 7.85, p < .01$. In Model 2, the regression revealed that the prior ability measures, in addition to gender, significantly accounted for a total of 39% of the variance in student GPA, $R^2 = .39, F(4, 168) = 27.46, p < .001$. When the self-regulatory variables were added into the third model in addition to the prior ability measures, a significant change was revealed in accounted variance, $R^2 = .46, F(6, 166) = 24.02, p < .001$. Finally, in Model 4, where the motivation variables were added in addition to the gender, prior ability, and self-regulation measures, the variance accounted for was 47%, $R^2 = .48, F(9, 163) = 16.20, p < .001$,

revealing that no significant change was detected in explained variance due to the motivation variables.

In Model 1, gender ($\beta = .21, t [171] = -2.80, p < .01$) was a significant predictor of sophomore GPA. In Model 2, gender ($\beta = -.14, t [171] = .14, p < .05$) retained its predictive value, as well as cumulative high school GPA ($\beta = .41, t [168] = 5.78, p < .001$) and verbal SAT scores ($\beta = .24, t [168] = 3.28, p < .01$). When the self-regulation variables were included in the third model, gender ($\beta = -.15, t [166] = -2.41, p < .05$) and time and study environment ($\beta = .25, t [166] = 3.78, p < .001$) continued to significantly predict achievement, in addition to cumulative high school GPA ($\beta = .34, t [166] = 4.85, p < .001$) and verbal SAT scores ($\beta = .23, t [242] = 3.36, p < .01$). Additionally, math SAT scores became a significant predictor as well ($\beta = .15, t [166] = 2.05, p < .05$). Finally, the fourth model, which included all of the motivation variables, indicated that first-year student motivation did not play a significant role in predicting academic performance at the end of the sophomore year. Instead, gender ($\beta = -.14, t [163] = -2.26, p < .05$), prior ability predictors, and high school GPA ($\beta = .33, t [163] = 4.59, p < .001$), verbal SAT scores ($\beta = .22, t [163] = 3.16, p < .002$), in addition to time and study environment management ($\beta = .23, t [163] = 3.29, p < .01$), significantly predicted academic achievement in Model 4. Overall, self-efficacy, time management, and student ability measures (with the exception of math SAT), made separate contributions in predicting academic performance during Year 1; whereas in Year 2, time management, ability predictors (with the exception of math SAT), and gender made separate contributions in predicting academic performance.

Discussion

A major concern for colleges is to ensure that students progress throughout their degree program, do well, and eventually graduate (Chemers et al., 2001; Tuckman, 2003). Although there may be little that can be done in terms of boosting student abili-

ties by examining standard college entrance criteria such as high school GPA and SAT scores, student motivation and academic self-regulatory skills are amenable to change through intervention (Tuckman, 2003). The present study investigated the role that self-regulation and motivation, assessed during the students' first semester in college, may play in predicting college academic performance at the end of their first and second years of college. Further, this study used a global measure of motivation and self-regulation to predict overall college GPA, which is a general, multidimensional outcome. Partial support was found for the hypotheses, as time management strategies during the first and second year and self-efficacy during the first year contributed unique variance in predicting academic performance over and above the contribution of prior ability measures (high school GPA and SAT).

More specifically, in regard to prior ability predictors, our findings suggest that verbal SAT scores are a better predictor of college performance than math SAT scores. These results confirm previous research that has examined the validity of the SATs in terms of minority students or English language learners (Zwick & Sklar, 2005) showing that the strongest predictor of freshman GPA was verbal SAT scores. These findings may suggest that it is important for college admissions committees to place more emphasis on SAT verbal scores than math scores and provide evidence that the SAT scores and overall college GPA are important predictors a year later across a diverse population of students.

In terms of student self-regulated strategies and motivation variables, the data revealed that when predicting second-semester academic performance, time management and self-efficacy each contributed significantly to the model. However, only time management skills continued to predict student GPA a year later. These results complement Britton and Tesser's (1991) findings that short-range planning and time attitudes explained 21% of the variance in cumulative college GPA (after 4 years), which was higher than the variance explained by SAT scores. Based on these findings, teachers and administrators should pay special attention to first-year student time management skills as a potential target for intervention.

Metacognitive self-regulation, however, did not play a significant role in predicting achievement during the first or sophomore year of studies. This finding contradicts previous research suggesting that metacognition is an integral part of student academic achievement (Kornell & Metcalfe, 2006). Perhaps examining individually the multiple dimensions of metacognition (planning, monitoring, and regulating; Pintrich et al., 1993) and doing so in a more specific course setting would produce different results compared to the rather global way meta-cognitive self-regulation was measured in the present study.

First-semester self-efficacy was less relevant in explaining student GPA at the end of the sophomore year. Perhaps this is the result of attempting to measure self-efficacy as a generalized rather than a domain-specific construct (Bandura, 1997). Alternatively, self-efficacy may undergo considerable change over time during the college years and such change may be the reason why these skills assessed in the second semester no longer predicted achievement more than a year later. Self-efficacy may be important during the first year of studies when students are adapting to a new academic environment.

Task value and test anxiety did not contribute any significant variance in explaining student academic achievement at the first or sophomore years of studies after other variables were accounted for in the model. Given that this study involved students enrolled in different college courses, these findings may be the result of attempting to measure these constructs globally across different courses rather than as context-specific variables. For example, in terms of test anxiety, undergraduate course grades may not be based exclusively on tests. Grades also may involve other alternative assessments, including portfolios, research papers, and/or take-home essay exams. In addition, some students may experience test anxiety in some subjects (e.g., math) and yet exhibit no test anxiety in other subjects (e.g., history). However, correlation analyses suggest that these two variables were, in fact, bivariately related to achievement. Specifically, task value was positively correlated and test anxiety was negatively correlated with both

first and sophomore year achievement, which is in line with prior research (Bembenutty et al., 1998).

Finally, gender emerged as a significant predictor of student GPA during the sophomore year whereas it had no influence on student achievement during the second semester of studies. Specifically, gender continued to contribute unique variance in explaining sophomore GPA even when the prior ability, self-regulation, and motivation variables were added. These preliminary analyses suggest that as students progress through college, they become more differentiated by gender with females entering college with a higher high school GPA and showing higher levels of academic achievement than males at the end of the sophomore year. However, males earned higher math SAT scores than females. These findings support prior research that generally shows gender differences in achievement and motivation beliefs, where females tend to fall along the stereotypical lines of having elevated levels of motivation and achievement in language arts (Hyde & Durik, 2005).

Several limitations of the current study should be noted. First, although the sample was somewhat diverse in terms of ethnicity, it is important to note that a vast majority of these students came from middle-class suburban households with an average income of \$70,000 per year. Additionally, the parental level of education also was high. The mother's and father's average level of education was some college or professional school and a bachelor's degree, respectively. Therefore, the findings of the present study only can be generalized to similar college samples. Second, there was systematic attrition over time. The sample size dropped 20% between the students who had originally participated ($N = 243$) and the students who had available information for analysis ($N = 198$) at the end of the second year, with those still in the study performing better in college than those who dropped out of college or the study. Finally, it is important to note that the measures of self-regulation and motivation collected during the first semester of the students' studies were generalized rather than context-specific measures of learning strategies and motivation in their current classes. This may have limited the predictive

validity of the present study because unlike time management strategies, which may be stable across settings, constructs such as self-efficacy, task value, and test anxiety may be influenced by context specificity (Bandura, 1997).

Educational Implications

Overall, the findings of the present study suggest that college administrators and instructors should focus on instilling a healthy sense of self-efficacy and providing students with interventions, perhaps in the form of seminars or workshops, in an effort to teach them how to manage their time more effectively. College administrators also should offer workshops that provide helpful adjustment strategies on how students can seek help if needed and plan effectively throughout the first years of undergraduate study. For example, instructors of introductory-level classes should provide first-year students with other successful peer role models to enhance their self-efficacy beliefs in completing their courses. Instructors also should verbally emphasize that all students can successfully complete the course, provided they strategically plan their learning efforts (Bandura, 1997).

Given that, nationally, approximately one in four first-year college students do not return for their second year (NCHEMS, 2007), it is critical that current methods of student retention should be reevaluated. Knowledge about motivation and self-regulation processes may not only allow students to maximize their college career, but also allow universities to implement better intervention programs to encourage students to continue and eventually finish their education. Study skills courses for first-year students should focus on teaching students how to manage their time effectively in an effort to make a smooth transition to college. Indeed, our preliminary analyses showed that students who did not return to college for the second year had poorer first-semester time management skills than those who remained in college. This suggests that time management may play an important role in academic success across time and emphasizes the importance of intervening early to improve student time management. It also

may be beneficial for students to begin learning time management strategies as early as middle or high school in order to adjust smoothly to college life and academic learning. Overall, in addition to instilling a healthy sense of efficacy in first-year students, college administrators and educators should instruct students in how to manage their time most effectively. The ability to self-regulate and manage time effectively is a learned skill (Zimmerman, 2008; Zimmerman & Schunk, 2008). Time-management is particularly important throughout college, where students are given more freedom to engage in activities, making the ability to balance time between schoolwork, entertainment, and perhaps even employment especially critical for academic success.

The present study also showed that although self-efficacy was an important predictor of achievement during the second semester of studies, it becomes less relevant in explaining achievement in the future during the following year of studies. Therefore, college educators should not only stress a positive sense of self-efficacy in first-year students, but also to students who are further along in their studies because students in their later years of college may experience decreases in their self-efficacy beliefs due to rigorous upper level classes (Lynch, 2008). Additionally, professors teaching upper level or more demanding courses should use different context-specific methods to instill a positive sense of efficacy in their students. For example, college instructors can provide examples of past projects to their current students that allow them to observe their peers' successes and encourages them to believe that they can succeed. Overall, it is particularly important that domain-specific interventions be provided for college students to encourage them to believe that they are capable of succeeding and successfully adjusting to college life (Pajares & Schunk, 2005).

More research needs to be conducted on the development of self-regulatory interventions incorporating a variety of strategies that college administrators and professors could use to increase self-efficacy and time management in undergraduate students. Specifically, future research should examine motivation and self-regulation constructs using different data collection approaches

(e.g., observations, journal reports, student self-reported data) as well as examine other self-regulatory processes such as goal setting, self-monitoring, and self-evaluation. In terms of measurement, researchers should attempt to assess motivation and self-regulation in a specific context or domain in addition to examining the different components of motivational (e.g., task value) and self-regulatory processes (e.g., goal setting, metacognitive monitoring, self-evaluation, help seeking). In closing, the present findings are important not only for students, but also for educators teaching introductory courses who must prepare their first-year students to study effectively on their own. Offering study skills classes with an emphasis on time management skills for first-year students may positively impact student academic achievement.

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