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ABSTRACT

The purpose of this study was to examine the relationships among academic achievement, academic self-regulation, and four social cognitive characteristics: (1) self-efficacy; (2) anxiety; (3) identity style; and (4) stage of change. Participants were 210 college students enrolled in a learning and study strategies course at a private research university. Self-regulation was significantly related to academic achievement. Self-efficacy, stage of change, and identity style were not directly related to academic achievement, but were significantly related to self-regulation. Path analyses found that the relationships between the social-cognitive factors and academic achievement were mediated by self-regulation. (Contains 2 figures, 7 tables, and 65 references.) (SLD)

Running Head: PERSONAL CHARACTERISTICS AND SELF-REGULATION

Social Cognitive Factors Associated with the Academic Self-regulation of Undergraduate College Students Enrolled in a Learning and Study Strategies Course.

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Abstract

The purpose of the present study was to examine the relationship between academic achievement, academic self-regulation and four social-cognitive characteristics: (a) self-efficacy, (b) anxiety, (c) identity style, and (d) stage of change of 210 college students enrolled in a learning and study strategies course at a private research university. Self-regulation was significantly related to academic achievement. Self-efficacy, stage of change, and identity style were not directly related with academic achievement, but were significantly related to self-regulation. Path analyses found that the relationships between the social-cognitive factors and academic achievement were mediated by self-regulation.

Social Cognitive Factors Associated with the Academic Self-regulation of Undergraduate College Students Enrolled in a Learning and Study Strategies Course.

As students transition from high school to college, they need to learn how to take greater personal control of their learning. Researchers have found that the more successful the students are in implementing strategies that lead to personal control of their learning, the more likely they are to be successful learners (Schunk & Ertmer, 1999; Zimmerman & Kitsantas, 1997; Zimmerman & Martinez-Pons, 1990; Zimmerman & Risemberg, 1997). Colleges provide considerable support strategies to help students take control of their learning. These programs include remedial courses, tutoring services, mentoring programs, and study skills courses (Garcia & Pintrich, 1998; Hofer, Yu, & Pintrich, 1998; Pintrich & De Groot, 1990; Schunk, 1994, 1998; Weinstein, Husman, & Dierking, 2000; Weinstein & Van Mater Stone, 1993; Zimmerman & Paulson, 1995).

While there has been research on the effectiveness of academic support services, very little is known about the personal characteristics of the students who require these services and the interaction between these characteristics and the support services (Hofer et al., 1998; Simpson, Hynd, Nist, & Burrell, 1997). It may be that the cognitive and motivational beliefs and strategies that the students bring with them to college may constrain or facilitate the development of greater personal control over the learning process (Hofer et al., 1998). The purpose of the present study was to examine the relationship between four social cognitive factors (self-efficacy, anxiety, identity style, and stage of change) and their relationship with academic self-regulation and achievement.

The Triadic Model of Self-regulation

The social cognitive approach to self-regulation has been discussed extensively in numerous papers (e.g., Schunk, 2001; Zimmerman, 1989, 1998b, 2000); therefore, we will only summarize the basic tenets of the theory. The social cognitive perspective views self-regulation as an interaction of personal, behavioral, and environmental processes (Bandura, 1986b). Thus, it focuses not only on behavioral skills in managing one's environment, but also on the knowledge and sense of efficacy (a personal variable) to employ the skill in relevant contexts. Self-efficacy, defined as a learner's beliefs about his or her capabilities to learn or perform behaviors at designated levels, is considered a key factor in developing self-regulatory behavior. Research has shown that a person's sense of efficacy influences choice of tasks, effort, and persistence. Behaviors also influence personal variables. For example, as students solve chemistry problems successfully (behavior), they track their learning progress (personal variable). This perception conveys to them that they are capable of learning. As a result, they raise their sense of efficacy regarding the task (Schunk, 1989).

Zimmerman (1998b, 2000) has suggested that self-regulatory processes and accompanying beliefs fall in to three cyclical phases: forethought, performance or volitional control, and self-reflection. The forethought phase refers to processes and beliefs that precede efforts to learn and establish the basis for learning. Examples of these processes include goal settings, planning, and numerous self-motivational beliefs such as self-efficacy, outcome expectations, and the extent to which the learner values the task. The performance phase refers to processes that help learners to focus on the task and optimize their performance. Examples of these processes include self-control mechanisms (e.g., self-instruction, imagery, and attention

focusing) and self-observation processes (e.g., self-recording one's behavior). The self-reflection phase refers to processes associated with self-observations: self-judgment and self-reactions. Self-judgment involves evaluating one's performance and ascribing causal meaning concerning the results, such as whether a poor performance is due to one' limited ability or to insufficient effort.

Self-evaluation refers to comparing information gathered about one's performance and comparing it with a standard or goal. That is, answering the question: Did I improve my behavior or performance? These self-reactions, in turn, influence forethought regarding future efforts—thus completing the self-regulatory cycle.

Personal Characteristics Associated with Academic Self-Regulation

Previous research has identified several personal characteristics that affect academic self-regulation and achievement, including: (a) self-efficacy (Bandura, 1983, 1986a; Bandura, Barbaranelli, Caprara, & Pastorelli, 1996; Pintrich, Roeser, & De Groot, 1994; Pintrich & Schunk, 1996; Schunk & Ertmer, 2000; Zimmerman, 1995b, 1998a, 2000), (b) anxiety (Matthews, Schwean, Campbell, Saklofske, & Mohamed, 2000; Meece, Wigfield, & Eccles, 1990; Zimmerman, 1998a), and (c) identity style (Berzonsky, 1992, 1998a; Longo, Dembo, & Guiton, 2000; Marcia, 1966).

Self-efficacy

The more confidence the learner brings to a learning task, the more likely the learner is to exert the time and energy necessary to be successful. Self-efficacy beliefs are defined as people's judgments of their capabilities to accomplish a task in a specific situation (Bandura, 1983, 1986a; Bandura et al., 1996) and are not measures of how the people perceive themselves (Zimmerman,

1995a). Self-efficacy beliefs are based on prior experience on similar tasks and the observation of important social others engaged in similar tasks (Bandura, 1995). Higher self-efficacy beliefs have been linked to positive performance and achievement outcomes (Bandura, 1983, 1986a, 1995; Bandura & Wood, 1989). As a person experiences success in a task, the efficacy for that task and similar tasks in the future increases (Pintrich et al., 1994; Pintrich & Schunk, 1996; Zimmerman, 1995b, 2000). There is a strong correlation between perceived self-efficacy and achievement on academic tasks (Schunk, 1994) and self-efficacy may be a better predictor of future grades than prior academic achievement (Zimmerman 1995c).

Anxiety

Anxiety can have a detrimental effect on academic achievement (Matthews et al., 2000; Meece et al., 1990; Pintrich & Schunk, 1996). While small amounts of anxiety can facilitate learning by motivating the learner to work to remove the feelings of worry, high levels of anxiety are associated with lower levels of effort and academic achievement (Dembo, 1994). When the learner is highly anxious, attentional resources are taken away from cognitively demanding tasks and are focused inward in the form of fear (Rothbart, 1989; Rothbart & Jones, 1998), irritability (Rothbart & Bates, 1998), frustration (Rothbart & Jones, 1998), need for control, and self-consciousness (Matthews et al., 2000). This diversion of mental energy, or *cognitive interference*, leads to poorer achievement as anxious individuals tend to have lower levels of attentional performance and cognitive engagement (Kochanska, 1994; Matthews et al., 2000; Sarason, Sarason, & Pierce, 1995). Anxious individuals also tend to be less efficacious regarding their academic performance (Wells & Matthews, 1994).

Identity Style

Berzonsky (1992, 1998a) developed a social-cognitive model of the processes that underlie the development of Marcia's (1966) four identity statuses (diffuse, foreclosed, moratorium, and achievement). He referred to the processes as identity styles, and these styles distinguish the ways individuals process and evaluate self-relevant information as they construct their self-identity (Longo et al., 2000). The most evolved of these styles is the Informational style, where individuals actively seek out, elaborate, and utilize self-relevant information when involved in problem solving and decision-making. These people have engaged, and are willing to continue to engage, in a high level of self-exploration, a characteristic associated with Marcia's achievement and moratorium identity statuses.

The second of Berzonsky's (1992, 1998a) identity styles is the Normative style. These individuals have made a strong commitment to an identity without engaging in a large amount of self-exploration, or have what Marcia (1966) classified as a foreclosed identity status. Individuals with a Normative identity style have major goals of conforming to the expectations of others and conserving self-constructions in the face of contradictory feedback (Berzonsky, 1992, 1998a). These individuals tend to assume that their identity is determined by external social and environmental standards and tend to use social standards such as religion, family, community, and country when making judgments. Normative individuals tend to have a high need for structure, desire cognitive closure, and be intolerant of ambiguity (Berzonsky, 1998a).

Berzonsky's (1992, 1998a) third identity style is Diffuse/Avoidant. These individuals have neither engaged in self-exploration nor made a commitment to an identity. They tend to avoid dealing with problems, and motivated by hedonistic cues and situational consequences.

Any changes in identity tend to situational and short-term (Berzonsky, 1992). These individuals tend to believe their self-identity is fixed and tend to define themselves based on social standards as reputation, popularity, and the impression they make on others. Diffuse/Avoidant individuals tend to not engage in self-reflection, be controlled by external influences, and are concerned with impression management (Berzonsky, 1998a).

Berzonsky (1992) explored identity style with respect to college students' academic coping and test anxiety. He found that students with Diffuse/Avoidant and Normative styles dealt with stressors by relying on avoidance methods such as distancing and wishful thinking. In contrast, students exhibiting an Informational identity style used more positive coping strategies in dealing with their anxiety. Berzonsky (1998b) also found that students with an Informational style scored significantly higher than both their Normative and Diffuse/Avoidant peers on tasks requiring academic autonomy and self-sufficiency. Berzonsky and Kuk (2000) reported that academic autonomy and educational involvement were positively associated with an Informational style, but negatively associated with a Diffuse/Avoidant style.

Stage of Change

As skillful academic self-regulation is a time-consuming process requiring the learner to make the conscious decision to expend effort, select resources, and to engage in learning rather than other activities, motivation is an important component of self-regulated learning (Zimmerman 1986, 1989, 1995a, 2000; Zimmerman & Kitsantas, 1997). Becoming a self-regulated learner requires many students to change their academic and social behaviors, and these changes are often difficult. Prochaska and Prochaska (1999) identified four reasons why

people don't change, even if their behaviors are harmful and detrimental. They: (a) can't change, (b) don't want to change, (c) don't know what to change, or (d) don't know how to change.

James Prochaska and his colleagues (Brogan, Prochaska, & Prochaska, 1999; Prochaska, DiClemente, & Norcross, 1992; Prochaska, Norcross, & DiClemente, 1994; Prochaska & Prochaska, 1999; Redding et al., 1999; Velicer, Norman, Fava, & Prochaska, 1999; Velicer Rossi, Prochaska, & DiClemente, 1996) developed the transtheoretical model (TTM) to explain the process of change as it applies to the cessation of addictive behaviors such as smoking and obesity and to determine the extent to which the person is motivated to change. We included the TTM in the present investigation because we wanted to determine if it could be applied in a non-medical context. Furthermore, it would be interesting to determine if poor learning and study strategies could be considered a type of dysfunctional behavior similar to the addictive behaviors that Prochaska and his colleagues have been studying for years.

In the TTM, change is not simply a transition from engaging in a risky behavior (such as smoking, over-eating, or not regulating one's behavior) to stopping such a behavior, but is rather a six-step process. The process of change is not a linear progression, but rather a spiraling progression of advances and relapses. Relapses are very common, with fewer than 5% of changers progressing through the stages without at least one setback. In the TTM, relapse episodes are referred to as *recycling*; as personal information that is learned during the relapse is used the next time the person progresses through the stages (Prochaska et al., 1992; Prochaska et al., 1994; Redding et al., 1999). According to the TTM, proper identification of the stage of change that the person is in is important, as this leads to understanding for why the person is in the stage and potential strategies to aid in the progression to the next stage (Redding et al., 1999).

Misalignment between the stage of change the person is in and the change strategies being implemented is a major factor in recycling (Prochaska et al., 1994).

The first stage of change is Precontemplation, where there are no thoughts about changing the behavior in the foreseeable future. Most people in this stage do not want to change (Prochaska et al., 1994; Prochaska & Prochaska, 1999). Two types of students would be in the Precontemplation stage of academic self-regulation: students who are unaware of the existence and need of academic self-regulation, and students who are aware of the need but feel that the cons (decreased social time, increased application of effort, increased appearance of being studious to social others) outweigh the pros (improved grades, improved learning, respect of peers, feelings of achievement).

The second stage is Contemplation, where there are thoughts about changing behaviors in the next six months (Brogan et al., 1999; Prochaska et al., 1992; Prochaska & Prochaska, 1999; Redding et al., 1999; Velicer et al., 1999; Velicer et al., 1996). For students in this stage, there is a realization that the status quo of academic behavior is not effective. These students are considering the possibility of changing their behaviors as the negative results of the existing levels of self-regulation become evident; but are often prevented from transitioning into the next stage because of evidence that the existing self-regulation strategies (or lack thereof) were previously successful.

For students in the Preparation stage, there is an acceptance that existing strategies will no longer be effective. Students make plans, but have not actively begun, to change the behavior. Any sense of ambiguity present during the Contemplation stage is non-existent in the Preparation stage; these students want to change. Students are looking for opportunities to learn and develop

self-regulation strategies (Brogan et al., 1999; Prochaska et al., 1992; Prochaska et al., 1994; Prochaska & Prochaska, 1999; Redding et al., 1999; Velicer et al., 1999; Velicer et al., 1996).

Starting to change the behavior is the hallmark of the fourth stage of the TTM, Action. Fewer than 20% of changers are at the Action stage, yet over 90% of behavioral change programs are designed for changers at this stage (Brogan et al., 1999; Prochaska et al., 1994). In the fifth stage, Maintenance, the person actively works to prevent recycling. This stage often lasts for six months to two years after the Action stage has begun, but in some cases may continue indefinitely (Prochaska et al., 1994). Students in the Action and Maintenance stages are engaged in effective strategies and behaviors, but require support to prevent recycling to earlier, non-effective behaviors (Brogan et al., 1999; Prochaska et al., 1992; Prochaska & Prochaska, 1999; Redding et al., 1999; Velicer et al., 1999; Velicer et al., 1996). The final stage of TTM, Termination, occurs when the person has completely stopped, and is free of the temptation to exhibit, the targeted behavior. Many changers never reach Termination, but continue to require the supports necessary in the Maintenance stage (Prochaska et al., 1994). It may not be possible for students to reach the Termination stage of self-regulation, as effective self-regulation requires the on-going use of effective strategies, not simply the ceasing of poor ones.

In summary, many college students need assistance in developing the academic self-regulation skills necessary to be successful. While there is a large body of literature on the relationship between skillful academic self-regulation and academic achievement (see Pintrich et al., 1994; Schunk & Ertmer, 2000; Schunk & Zimmerman, 1994; Wood & Bandura, 1989; Zimmerman 1986, 2000; Zimmerman & Martinez-Pons; 1988, 1990, 1992 for a representative sample of literature), much less is known how the personal characteristics of the students in a

learning and study strategies course influence the development of self-regulatory skills (Hofer et al., 1998; Simpson et al., 1997). In the present study, the self-efficacy, anxiety, identity style, and stage of change were examined to identify the relationships of these factors with academic self-regulation. The more that is known about these students, both in terms of their academic behaviors and the personal characteristics underlying these behaviors, the more likely that effective interventions can be developed to help these students succeed in the college classroom.

Method

Participants

The sample consisted of 210 undergraduate students at the research university who were enrolled in a learning and study skills class in the Fall 2000 and Spring 2001 semesters and completed a survey at the beginning of the semester. A demographic description and the academic achievement of the students who completed the surveys are included in Table 1. In this study, the data from the students completing the instrument were analyzed to determine which factors were predictive of academic self-regulation and achievement.

Course

The course was a 4-hour per week lecture-tutorial course. Based on a socio-cognitive model of self-regulation (Zimmerman, 1989, 1995c), this course focused on three questions: How do we acquire and apply knowledge?, How do different motivational strategies influence the use of learning strategies?, and What are our personal responsibilities in the learning process? The course assisted students to become more successful learners by teaching them to control major dimensions that affect their learning, including: (a) motivation, (b) methods of learning, (c) time, (d) physical environment, (e) social environment, and (f) performance (Dembo, 2000).

Table 1

Demographic and Achievement Data of Study Participants

	Students in Course (N = 210)
Gender	
Male	96 (45.7%)
Female	114 (54.3%)
Ethnicity	
Caucasian	91 (43.3%)
African-American	42 (20.0%)
Hispanic-American	37 (17.6%)
Asian-American	24 (11.4%)
Native American	1 (0.5%)
Unknown	15 (7.2%)
Prior Academic Achievement (standard deviations in parentheses)	
Admission GPA	3.22 (0.45)
SAT Mathematics	548.41 (70.81)
SAT Verbal	520.10 (76.31)
Academic Achievement while Enrolled in Course (standard deviations in parentheses)	
Grade Earned in Course	302.04 (46.46)
Grade Point Average	2.62 (0.74)

The course met twice a week for a 15-week semester, once in a 2-hour large group lecture section taught by school of education faculty and once in a 2-hour smaller seminar/tutorial section lead by graduate teaching assistants. In the lecture section, students studied cognitive learning theory and motivation and are then taught how to apply the theory and research to change their own academic behavior in the tutorial sessions. Each lecture was preceded by a quiz to determine if the students had pre-read the required materials and arrived to class on time, two important academic self-regulation skills. In the small group sessions, students were provided opportunities to discuss and practice the learning strategies presented in the lecture sessions. Between class sessions, students were given homework assignments to practice skills such as note taking, reading comprehension, setting goals, using self-talk, preparing for and taking exams, and dealing with anxiety. The graduate teaching assistants reviewed the homework assignments with the students. Throughout the semester, each student was involved in two major projects: the development and use of a portfolio that included evidence that the student had applied the motivation and study strategies presented in the course, and a weekly journal that focused on the personal perceptions and beliefs about the student's learning experience (Dembo, 2000).

Instrumentation

Academic achievement. In the present study, two measures of academic achievement were used. The first method was the grade earned in the course. Grade refers not to the letter grade assigned by the instructors at the end of the class, but rather the number of 'points' students earned during the class. Students earned points by attending classes, completing assignments on time, completing quizzes at the beginning of each week's lecture, and

participating in class activities, with a maximum of 380 points possible. These points were the basis for the final grade in the course, motivating the students to take all activities seriously. The grade point average (gpa) of the students with the letter grade earned in the course removed to control for the effect of the direct instruction of academic self-regulation strategies and to assess student achievement in other academic courses was the second measure of achievement.

Self-regulation. The students' self-regulation was measured using 9-items from the 32-item Dynamic and Active Learning Inventory (DALI) (Iran-Nejad & Chissom, 1992). The selected items measured the students' use of proactive learning strategies that are conscious, effortful, focused on the processing of external sources of information in an organized, sequential manner (e.g., "I organize my class notes to consist mainly of the important concepts, definitions, and relevant examples from class and readings.") using a seven-point Likert scale (0 – Never, 6 – Always) (Iran-Nejad 1990; Iran-Nejad & Chissom, 1992), and are necessary to think and learn effectively in school environments (Iran-Nejad, 1990; Shapiro & Livingston, 2000). These nine items were found to be reliable (Cronbach's $\alpha = .7874$).

Self-Efficacy. Self-efficacy was measured using the 9-item Self-Efficacy subscale from the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich, Smith, Garcia, & McKeachie, 1991). The students responded to statements (e.g., "I expect to do very well in this class.") on a seven-point Likert scale (0 - not true of me, 6 - very true of me). This scale was a highly reliable measure (Cronbach's $\alpha = .9183$) in the present study.

Anxiety. Anxiety was measured using the 8-item Anxiety subscale from the Learning and Study Strategies Inventory (LASSI) (Weinstein, Palmer, & Schulte, 1987). Students responded to statements about their anxiety (e.g., I worry that I will flunk out of school.) on a five-point

Likert scale (0 - not at all typical of me, 4 - very much typical of me) (Note that the scale used in the study was the reverse of the scale used in the LASSI, as the LASSI was intended to identify the relative strengths of the students, not the levels of anxiety). In studies of college students, this scale had exhibited a high level of reliability (Cronbach's α ranging from .76 to .81, test-retest correlation coefficient = .83) (Deming, Valeri-Gold, & Idleman, 1994; Weinstein, 1987; Weinstein, Zimmerman, & Palmer, 1988). In the present study, the reliability of this scale was similar to prior studies (Cronbach's α = .7921).

Identity Style. Berzonsky's (1992) Identity Style Inventory (ISI3) was used to assess the students' identity style. The students responded to 30 statements on a five-point Likert scale of (0 - not at all like me, 4 - very much like me) to assess their level each of three identity styles: Informational (11 items, e.g., "When I have to make a decision, I like to spend a lot of time thinking about my options.", Cronbach's α = .6851), Normative (9 items, e.g., "I prefer to deal with situations where I can rely on social norms and standards.", Cronbach's α = .6843), and Diffuse/Avoidant (10 items, e.g., "When I have to make a decision, I try to wait as long as possible in order to see what will happen.", Cronbach's α = .7934). The reliability coefficients were similar to those obtained by Berzonsky (1992) in the development of the ISI3 (Informational = .62, Normative = .66, Diffuse/Avoidant = .73).

In previous studies using the ISI3 (Berzonsky, 1992; Longo et al., 2000), the identity style of each participant was determined by calculating the z-score, relative to the sample, of each participant on each the three subscales and assigning an identity style based on the highest z-score. In the present study, 77 of the 210 participants (36.7%) were identified as Diffuse/Avoidant, 70 (33.3%) as Normative, and 63 (30%) as Informational, a ratio similar to

that found in a prior study of students in the learning and study skills course (38% Diffuse/Avoidant, 31% Normative, 31% Informational, Longo et al., 2000).

Stages of change. The ATTS Inventory (Study Skills Format) was used (N. Dubois, personal communication, September 1, 2000) to determine the stage of change of the students. The ATTS Inventory is based on the University of Rhode Island Change Assessment Scale (URICA) (McConnaughy Prochaska, & Velicer, 1983) with each of the 32 statements modified to reflect the students' own perception of their study skills. The ATTS Inventory assessed the students on four stages of change: (a) Precontemplation ("As far as I am concerned, I don't have any problems with studying that need changing."), (b) Contemplation ("I think I might be ready for some improvement in my study skills and habits."), (c) Action ("I am doing something about the problems with studying that had been bothering me."), and (d) Maintenance ("I'm here to prevent myself from having a relapse of my problem with studying."); using 8 statements for each stage. The students responded to the statements using a five-point Likert scale (0 - strongly disagree, 4 - strongly agree). Each of the four scales was reliable (Precontemplation = .7850, Contemplation = .8216, Action = .8228, and Maintenance = .8375).

Similar to identity style, the stage of change of each participant was determined by calculating the z-score, relative to the sample, of each participant on each the four subscales and assigning an identity style based on the highest z-score. In the present study, 74 of the 210 participants (35.2%) were identified as being in the Precontemplation stage, 41 (19.5%) in the Contemplation stage, 54 (25.7%) in the Action stage, and 41 (19.5%) in the Maintenance stage.

Table 2 presents a summary of the academic achievement and the instrument data. This information was used to determine the factors related to academic self-regulation and success.

Table 2

Summary of Academic Achievement Survey Scores (N = 210)

	M	S.D.	Possible Range	Observed Range
Grade Earned in Course	302.04	46.46	0-380	39-370
Grade Point Average	2.62	0.74	0.00-4.00	0.00-4.00
DALI Self-Regulation	33.69	8.38	0-54	12-50
MSLQ Self-Efficacy	38.31	9.09	0-54	6-54
LASSI Anxiety	16.05	6.37	0-32	0-30
ISI3				
Informational Identity	28.71	5.79	0-44	17-44
Normative Identity	19.76	4.98	0-36	5-32
Diffuse Identity	16.34	7.03	0-40	2-40
ATTS				
Precontemplation	8.29	5.73	0-32	0-29
Contemplation	25.24	5.39	0-32	4-32
Action	19.50	6.09	0-32	0-32
Maintenance	15.71	6.66	0-32	0-32

Procedure

Administering the instrument. A 111-item instrument, composed of the complete DALI (Iran-Nejad & Chissom, 1992), MSLQ Self-Efficacy Scale (Pintrich et al., 1991), LASSI Test Anxiety Scale (Weinstein at al., 1987), ISI3 (Berzonsky, 1992), and ATTS Inventory (N. Dubois, personal communication, September 1, 2000; based on the URICA, McConnaughy, DiClemente, Prochaska, & Velicer, 1989; McConnaughy et al., 1983); was administered to the students during the first class session by either the graduate teaching assistant leading the seminar for one half of the students or by the faculty member teaching the lecture section for the other half of the students. Two forms of the questionnaire, with the subscales in different order, were administered to avoid fatigue effects on scales later in the instrument and to minimize any effects that one scale may have on another scale.

Other student data. At the end of the semester, the researchers obtained student information from the registrar's office. Measures of academic performance prior to enrollment in the learning skills course (grade point average used for admission to the university from high school, junior college, or another university and the SAT scores, both Mathematical and Verbal) were obtained by the researchers and used as statistical controls for prior academic achievement. Gender and ethnicity and measures of students achievement during the semester enrolled in the course (grade point averages and number of units taken) were also obtained from the registrar's office for each of the participants.

Results

The Relationship Between Demographic Variables and the Variables Measured in the Study

Pearson correlations were used to determine if there were significant relationships between the continuous demographic variables, measures of academic self-regulation, measures of academic achievement (grade earned in the course and grade point average), and the four social-cognitive factors (self-efficacy, anxiety, identity style subscales, and stage of change subscales) and are presented in Table 3. Significant correlations between the grade earned in the course and the admission gpa ($r(209) = .290$, $p < .001$), self-regulation and the admission gpa ($r(209) = .164$, $p < .05$), and self-regulation and SAT Mathematics ($r(209) = -.166$, $p < .05$) mean that, for these significant relationships, the demographic variable will be included in the analysis.

Analyses of variance (ANOVAs) were conducted determine if either of the categorical demographic variables in Table 1 (gender or ethnicity) were significantly related to self-regulation or the measures of achievement. Gender was significantly related to the grade earned in the course ($F(1, 208) = 5.884$, $p = .016$) with females ($M = 312.76$) earning significant more points than males ($M = 289.04$), grade point average ($F(1, 208) = 6.665$, $p = .011$) with females ($M = 2.74$) having a significantly higher gpa than males ($M = 2.48$), and self-regulation ($F(1, 208) = 5.118$, $p = .025$) with females having ($M = 34.88$) having higher self-regulation scores than males ($M = 32.36$). Ethnicity was not significantly related to self-regulation, the grade in the course, or with the grade point average (all Fs < 2.411, ps $> .05$).

The Relationship Between Academic Self-Regulation and Achievement

Simultaneous multiple regression analyses were used to examine the relationship between self-regulation and the two measures of academic achievement (grade earned in the course and

Table 3

Correlations of Achievement Data and the Beginning of Semester Measures of Academic Self-regulation and the Social-cognitive Factors (N = 210)

Variable	1	2	3	4	5	6	7	8
1. Grade Earned in EDPT 110	–	.531***	.198**	.290***	.039	.077	.088	.149*
2. Grade Point Average		–	.092	.215**	.075	.186**	-.026	.010
3. Self-Regulation			–	.164*	-.166*	-.074	.079	.433***
4. Admission GPA				–	.263***	.062	.114	.181**
5. SAT Mathematics					–	.234***	-.156*	-.007
6. SAT Verbal						–	-.194**	.031
7. LASSI Anxiety							–	-.137*
8. MSLQ Self-Efficacy								–

Table 3 (continued)

Correlations of Achievement Data and the Beginning of Semester Measures of Academic Self-regulation and the Social-cognitive Factors (N = 210)

Variable	9	10	11	12	13	14	15
1. Grade Earned in EDPT 110	.018	.007	-.075	.077	-.012	-.062	-.118
2. Grade Point Average	.046	-.170*	-.089	.035	-.170*	-.118	-.161*
3. Self-Regulation	.297***	.115	-.220**	-.069	.172*	.284***	.071
4. Admission GPA	-.005	.018	-.050	-.091	-.023	-.045	-.113
5. SAT Mathematics	-.044	-.074	.080	-.007	-.056	-.140*	-.203**
6. SAT Verbal	.054	-.349***	-.093	-.121	-.093	-.122	-.134
7. LASSI Anxiety	.127	.190**	.270***	.126	.350***	.288***	.436***
8. MSLQ Self-Efficacy	.127	.049	-.215**	-.069	-.082	.100	-.136

Table 3 (continued)

Correlations of Achievement Data and the Beginning of Semester Measures of Academic Self-regulation and the Social-cognitive Factors (N = 210)

Variable	9	10	11	12	13	14	15
9. ISI3 Informational	–	.250***	.104	.082	.247***	.332***	.255***
10. ISI3 Normative		–	.297***	.188**	.179**	.231***	.254***
11. ISI3 Diffuse/Avoidant			–	.487***	.124	.015	.358***
12. ATTS Precontemplation				–	-.310***	-.148*	.082
13. ATTS Contemplation					–	.607***	.586***
14. ATTS Action						–	.526***
15. ATTS Maintenance							–

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

grade point average). Measures of prior academic achievement (admission gpa, SAT Mathematics, SAT Verbal) that were significantly correlated with the dependent variable and the self-regulation scales were regressed against the measures of academic achievement. A summary of these analyses is reported in Table 4, with variables listed in order of statistical significance. A follow-up stepwise regression analysis that placed the variables into the regression equation in the order of significance found that the regression equation that included self-regulation scores were significantly related to the grade earned in the course ($F(3, 206) = 9.867$, $p < .001$), with the addition of self-regulation to the demographic variables being a statistically significant change ($F(1, 206) = 5.510$, $p = .020$). These significant regressions indicate that students who entered the course with higher levels of self-regulation tended to do better in the course.

Social-cognitive Factors Associated with Academic Achievement and Self-Regulation

Bivariate relationships of the social-cognitive factors with academic achievement and self-regulation. The first step in examining the relationships between each of the four social-cognitive factors and the measures of academic achievement and self-regulation was to look at the bivariate relationships. The correlations (see Table 3) between the scales for each of the social-cognitive factors (MSLQ Self-Efficacy, LASSI Anxiety, ISI3 Informational, ISI3 Normative, ISI3 Diffuse, ATTS Precontemplation, ATTS Contemplation, ATTS Action, ATTS Maintenance) and both academic achievement and self-regulation were calculated. Self-efficacy was significantly correlated with self-regulation ($r(209) = .433$, $p < .001$) and the grade earned in EDPT 110 ($r(209) = .149$, $p < .05$). Anxiety was not significantly related to any of the measures of self-regulation or academic achievement (all rs $< .089$, ps $> .209$).

Table 4

Summary of Regression Analysis of Academic Achievement on Self-Regulation (N = 210)

	b	beta	t	*p*
Grade Earned in Course				
Gender	-17.869	-.192	-2.783	.006*
Admission GPA	19.014	.187	2.703	.007*
Self-Regulation	0.885	.161	2.347	.020*
Grade Point Average				
SAT Verbal	0.002	.238	3.461	.001*
Admission GPA	0.321	.170	2.383	.018*
Gender	-0.149	.107	-1.396	.164
Self-Regulation	0.006	.069	0.822	.412

Note: * indicates significant relationship ($p < .05$)

The Informational subscale of the ISI3 was significantly correlated with self-regulation ($r(209) = .397$, $p < .001$) but was not related to the measures of achievement. The Normative subscale was significantly related to only the students' grade point average ($r(209) = -.170$, $p < .05$). The Diffuse/Avoidant subscale was negatively correlated with the self-regulation ($r(209) = -.220$, $p < .01$) and had non-significant negative correlations with the measures of achievement. These correlations indicate that high scores on the Informational scale were correlated with higher levels of self-regulation, while high levels on the Diffuse/Avoidant scale were correlated

with lower levels of self-regulation. The Normative subscale was significantly correlated with both the Informational ($r(209) = .250$, $p < .001$) and Diffuse/Avoidant ($r(209) = .297$, $p < .001$) subscales. These correlations are consistent with the description of the Normative identity style where the search for an identity has been focused on (or by) significant social others. As the Normative subscale was correlated with both an identity style associated with high self-regulation (Informational) and an identity style associated with low self-regulation (Diffuse/Avoidant), it is consistent that there would not be significant relationships (either positive or negative) between the Normative identity style and the self-regulation measures.

The Precontemplation subscale of the ATTS was not significantly correlated with the measures of self-regulation or academic achievement (all $rs < .077$, $ps > .280$). The Contemplation subscale was positively correlated with self-regulation ($r(209) = .172$, $p < .05$). The Action subscale was correlated with self-regulation ($r(209) = .284$, $p < .001$) and was non-significantly related to the measures of academic achievement. The Maintenance subscale was negatively correlated with the gpa ($r(209) = -.161$, $p < .05$). These correlations are consistent with the transtheoretical model (TTM) in that students who score high on the Action stage of change subscale are most likely to embrace and use the study skills strategies presented in the course, while students who score high on the Precontemplation or Maintenance subscales are less likely to adopt these strategies, as they do not see a need to do so. The correlations also show the ambivalence of the individuals scoring high in the Contemplation subscale. These individuals are considering the change of study behaviors (as evidenced by the significant correlation with self-regulation) but have not fully embraced self-regulation as the students with high Action scores, as evidence by the weaker correlation with self-regulation.

Table 5

Summary of Analyses of Bivariate Relationships of Each of the Social-Cognitive Factors and Measures of Academic Achievement and Self-Regulation (N = 210)

	F	df	*p*
Grade Earned in Course			
MSLQ Self-efficacy	4.433	1, 208	.037*
LASSI Anxiety	1.153	1, 208	.220
ISI3 Identity Style	1.121	2, 207	.328
ATTS Stage of Change	1.728	3, 206	.163
Grade Point Average			
MSLQ Self-efficacy	0.022	1, 208	.882
LASSI Anxiety	0.137	1, 208	.711
ISI3 Identity Style	2.967	2, 207	.054
ATTS Stage of Change	1.366	3, 206	.255
Self-Regulation			
MSLQ Self-efficacy	47.952	1, 208	< .001*
LASSI Anxiety	1.297	1, 208	.256
ISI3 Identity Style	11.023	2, 207	< .001*
ATTS Stage of Change	6.894	3, 206	< .001*

Note: * indicates significant relationship ($p < .05$)

The relationship between self-efficacy and anxiety and the measures of achievement and self-regulation were also analyzed using simple linear regression. Identity style and stage of change were analyzed using one-way ANOVA's. The results are presented in Table 5.

Self-efficacy was the only social-cognitive factor that was significantly related to the grade earned in the course and had the strongest relationship with self-regulation. Higher levels of self-efficacy were related with higher number of points in the course and self-regulation. Anxiety was not significantly related to the measures of academic achievement or self-regulation. None of the social-cognitive variables were significantly related with the grade point average of the students.

In the relationship between self-regulation and identity style ($F(2, 207) = 11.203$, $p < .001$), students with either an Informational ($M = 36.03$) or Normative ($M = 35.30$) identity style had significantly higher active self-regulation scores than students with a Diffuse/Avoidant style ($M = 30.30$). In the significant relationship between stage of change and self-regulation ($F(3, 206) = 6.894$, $p < .001$), students at the Action stage of change ($M = 37.67$) had significantly higher self-regulation scores than students at the Precontemplation stage ($M = 31.18$), with students at the Contemplation ($M = 33.61$) or Maintenance ($M = 33.05$) stages not significantly different from either group.

The combined relationships of the social-cognitive factors with academic achievement. The second step of exploring the relationship between the four social-cognitive variables and academic achievement was to examine models that included all four of the variables. For each of the dependent measures, two factorial analyses of covariance (ANCOVAs) were performed, one excluding self-regulation and the other including it. Demographic data in Table 1 that were

significantly related to the dependent measures were included as covariates. Table 6 presents the combined relationship of the social-cognitive factors with the grade earned in the course, with the variables listed in the order of variance explained.

Table 6

Summary of Models Analyzing the Relationship of Social-cognitive Factors with the Grade Earned in the Learning and Study Skills Course (N = 210)

	F	df	p	Variance Explained
Grade Earned in the Course without Self-regulation				
ATTS Stage of Change	2.735	3, 183	.045*	.046
Gender	7.064	1, 183	.009*	.040
Admission GPA	5.643	1, 183	.019*	.032
MSLQ Self-efficacy	2.167	1, 183	.143	.013
LASSI Anxiety	1.263	1, 183	.263	.007
ISI3 Identity Style	0.119	2, 183	.888	.001
Total Model	1.681	26, 183	.027*	.205

Table 6 (continued)

Summary of Models Analyzing the Relationship of Social-cognitive Factors with the Grade Earned in the Learning and Study Skills Course (N = 210)

	F	df	p	Variance Explained
Grade Earned in the Course with Self-regulation				
ATTS Stage of Change	2.769	3, 182	.043*	.047
Gender	6.634	1, 182	.011*	.038
Admission GPA	5.276	1, 182	.023*	.030
DALI Self-regulation	1.831	1, 182	.178	.011
LASSI Anxiety	0.894	1, 182	.346	.005
MSLQ Self-efficacy	0.671	1, 182	.414	.004
ISI3 Identity Style	0.049	2, 182	.952	.001
Total Model	1.695	27, 182	.024*	.213

Note: * indicates significant relationship ($p < .05$)

The only social-cognitive factor significantly related to the grade earned in the course was stage of change, both when self-regulation was included and when it was not. Stage of change accounted for the greatest amount of variance in student performance of all the variables (approximately 4.5%). Self-efficacy, which was significant in a unique comparison, became non-significant when included with other factors. Admission gpa and gender remained significant

demographic predictors of performance in the course. The six-variable model that excluded self-regulation accounted for 20.5% of the variance in student performance in the course. The inclusion of self-regulation resulted in a slight increase in the percentage of variance in the grade earned in the course explained to 21.3%. None of the social-cognitive factors were significantly related to the grade point average (all $\underline{F}s < 2.208$, $\underline{p}s > .088$), and self-regulation was significantly related to the gpa ($\underline{F}(1,193) = 3.994$, $\underline{p} = .047$).

The relationships of the social-cognitive factors with self-regulation. Self-efficacy, stage of change, and identity style were significantly related to the self-regulation scores of the students in the course (see Table 7). Self-efficacy was the strongest predictor of self-regulation ($\underline{F}(1,194 = 38.318$, $\underline{p} < .001$). Models using the four social-cognitive factors accounted for 36.7% of the variance in self-regulation scores. Admission gpa and SAT Mathematics scores were included in the ANCOVA, as these variables were significantly correlated with self-regulation.

Path analyses were also used to examine the relationship between the four social-cognitive factors, self-regulation, and the measures of academic achievement (see Figures 1 and 2). Simultaneous multiple regression was used, with only statistically significant paths included. High scores in self-regulation were associated with high scores in self-efficacy, the Action subscale of the ATTS and the Informational subscale of the ISI3; and low scores on the Diffuse/Avoidant subscale of the ISI3. High grades in the course were associated with high scores in self-regulation and low scores on the Contemplation subscale of the ATTS (see Figure 1). The relationships are similar in Figure 2, except for the additional significant inverse relationship between scores on the Normative subscale and grade point average.

Table 7

Summary of Models Analyzing the Relationship of Instrument Scores with Self-Regulation of Students in a Learning and Study Skills Course (N = 210)

	F	df	*p*	Variance Explained
MSLQ Self-efficacy	38.318	1, 194	< .001*	.176
ATTS Stage of Change	5.161	3, 194	.002*	.080
ISI3 Identity Style	4.514	2, 194	.012*	.048
LASSI Anxiety	2.171	1, 194	.142	.012
Admission GPA	1.693	1, 194	.195	.009
SAT Mathematics	1.612	1, 194	.206	.009
Total Model	6.908	15, 194	< .001*	.367

Note: * indicates significant relationship ($p < .05$)

These path analyses, correlations, and the ANOVAs in Tables 4 and 5 show indicate that self-regulation plays an important mediating role in the relationship between the social-cognitive factors and the measures of achievement. Self-efficacy was significantly correlated with the grade earned in the course, but was not significantly related to the grade in combination with the other social-cognitive factors and became even less significantly related when self-regulation was included. Anxiety, stage of change, and identity style also had their direct relationship with the grade in the course weakened by self-regulation (see Table 6). Self-regulation also mediated the effect of the four social-cognitive factors and grade point average. Of the four factors, self-

Figure 1: Path Diagram of the Relationship between the Social-Cognitive Factors, Self-Regulation, and Grade Earned in EDPT 110. (N = 210)

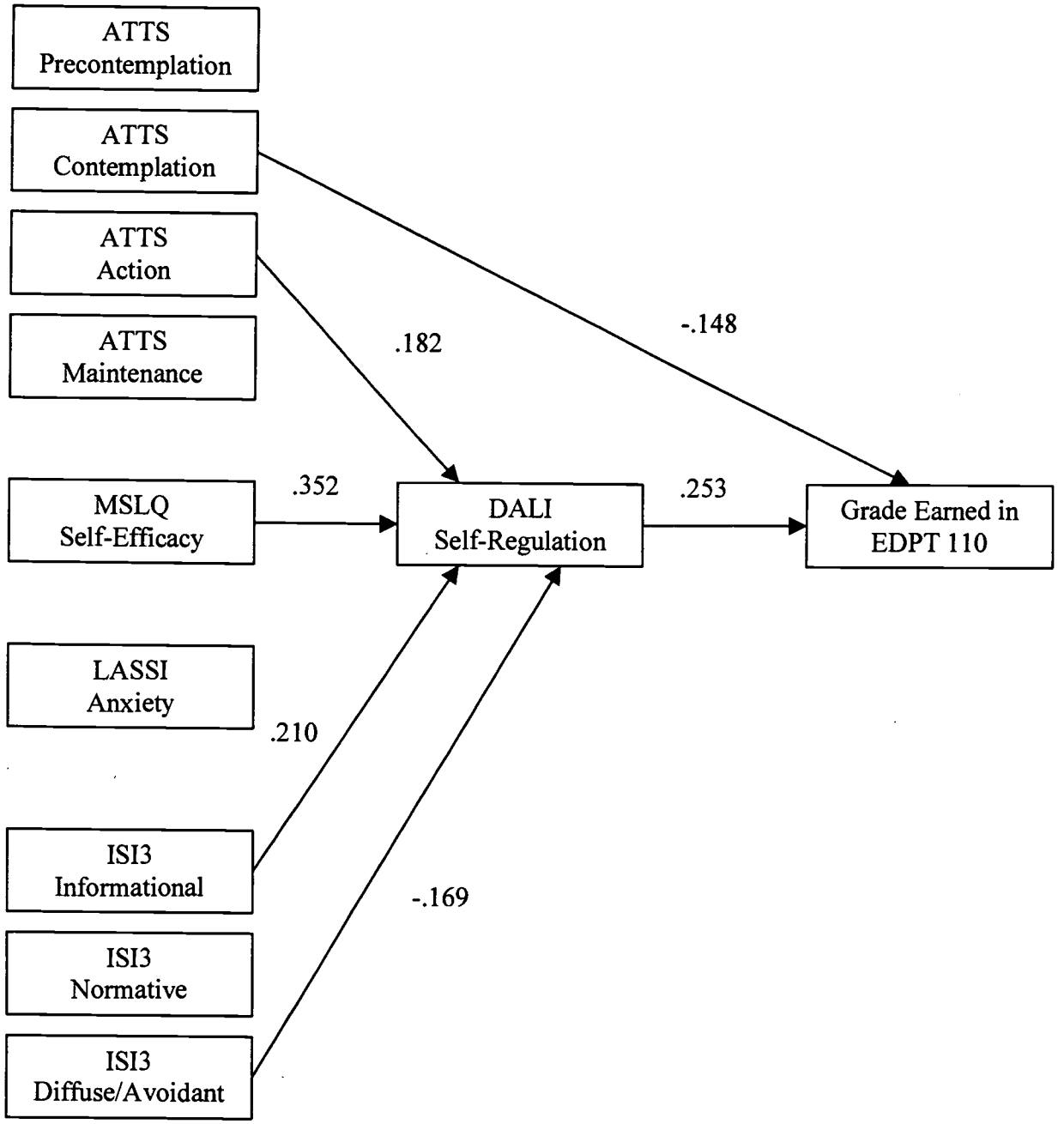
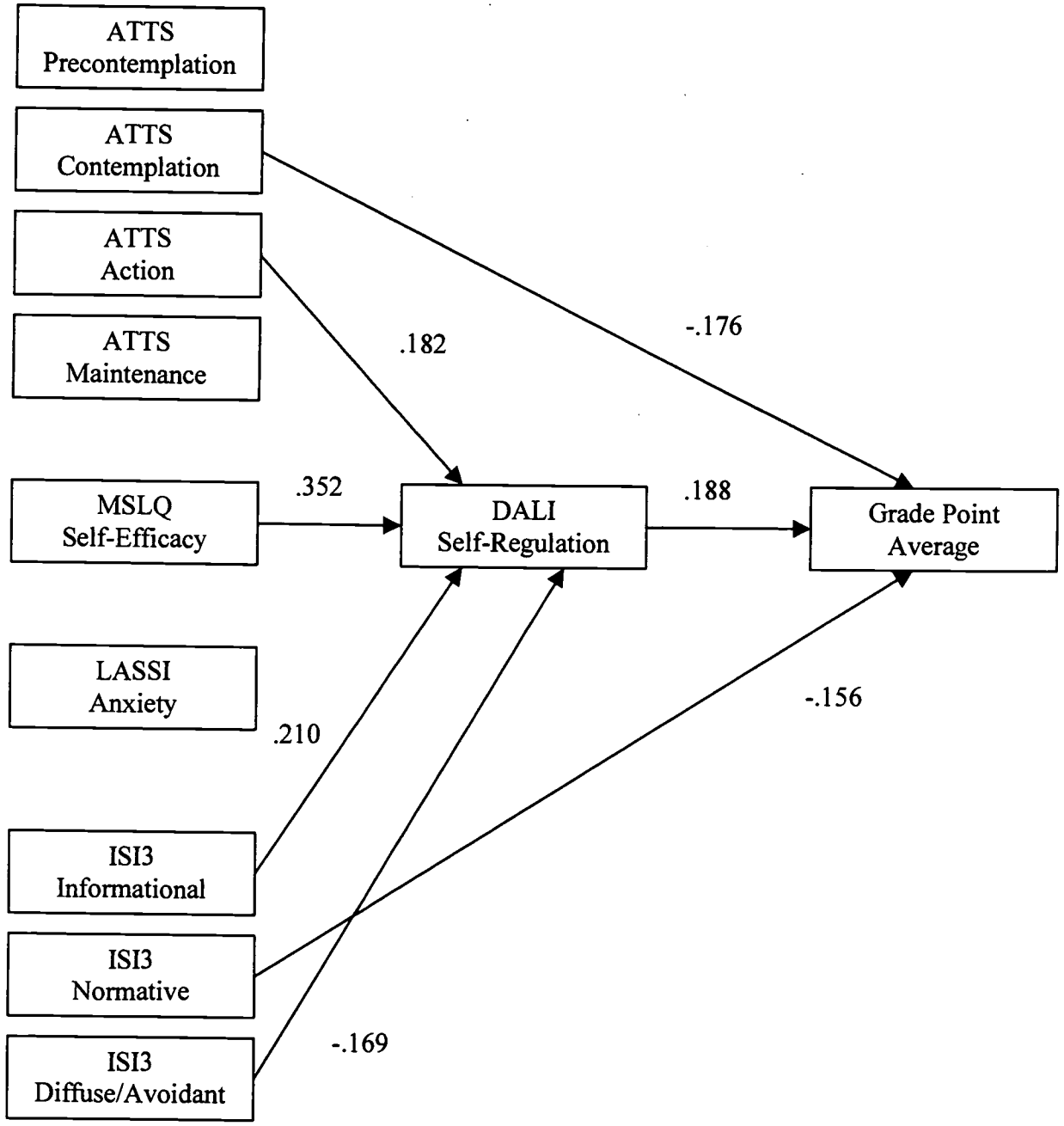


Figure 2: Path Diagram of the Relationship between the Social-Cognitive Factors, Self-Regulation, and Grade Point Average. (N = 210)



efficacy had the strongest relationship with self-regulation. Stage of change had the second strongest relationship with both forms of self-regulation, and identity style had the third strongest. Anxiety was not significantly related to self-regulation either alone or when included in models with other social-cognitive factors.

Discussion

The purpose of the present study was to investigate the relationships between four social-cognitive variables (self-efficacy, anxiety, identity style, and stage of change), academic self-regulation, and academic achievement. Three of the social cognitive variables (self-efficacy, identity style, and stage of change) were significantly related with self-regulation, and self-regulation mediated the relationship that these variables had with achievement. Anxiety, either singularly or in combination with the other social-cognitive variables, was not significantly related with either self-regulation or academic achievement. These findings are presented in the following section.

The Relationship Between Academic Self-Regulation and Achievement

In the present study, there was a significant correlation between self-regulation scores and the grade earned in the course. A possible explanation for this is that a major objective of the course was to become a more self-regulated learner, with an emphasis placed on the students' active involvement in course activities. Students who were relatively strong self-regulators at the beginning of the study may have started the course with an advantage and were thus able to earn more points, resulting in the strong relationship between self-regulation and academic performance measures that included performance in the course.

The relationship between self-regulation and grade point average was much more complex. Self-regulation was not significantly correlated with gpa, but had a mediating role in the relationship between gpa and the social-cognitive variables. The lack of a significant correlation between self-regulation and grade point average may indicate that the students may not yet be successful in transferring the self-regulation skills developed in the learning and study skills course to their other courses, consistent with other studies that found that the near transfer of self-regulation is stronger than the far transfer (see Hattie, Biggs, & Purdie, 1996 for a meta-analysis), or that the other courses do not require self-regulation to the same extent as the learning and study skills course. An earlier study of students in the course (Dembo & Jakubowski, 1999) found that students who completed the course did not have higher gpas than a control group of students with similar academic backgrounds who did not take the course until three semesters after completing the course. These results may indicate a possible delayed effect of the intervention. More research on the transfer of active self-regulation skills and strategies from learning and study skills courses to other academic environments is needed.

The Relationship Between the Four Social-Cognitive Factors and Academic Achievement

The direct relationship between each of the social-cognitive factors and the measures of academic achievement were tested in the present study. Uniquely, only self-efficacy was significantly related to the grade earned in the course and none of the factors were significantly related to the grade point average. The direct relationships were also tested when the relationship between self-regulation and academic achievement was included. The inclusion of self-regulation did have an effect on the relationship between the social-cognitive factors and the grade earned in the course, causing three of the factors to have weaker relationships with the

grade in the course (see Table 6). This lowering of the strength of the relationship between self-efficacy and the grade earned in the course suggests that the effect of self-efficacy on the grade in the course is mediated by self-regulation. The path analyses in Figures 1 and 2 also suggest that the relationship between self-efficacy and academic achievement is mediated by self-regulation, as there is no direct path from self-efficacy to achievement, only an indirect path through self-regulation.

The Relationship Between the Four Social-cognitive Factors and Self-regulation

When the four social-cognitive factors were considered jointly, self-efficacy, stage of change, and identity style were significantly related to self-regulation, and anxiety was not significantly related to self-regulation (see Table 6). Self-efficacy had the strongest relationship with self-regulation, with high self-efficacy scores related to higher self-regulation scores. Stage of change was the second strongest factor, with students at the Action stage of change tending to have higher self-regulation scores than students at the other stages. Students with a Diffuse/Avoidant identity style scored lower in active self-regulation than students with either a Normative or Informational identity style. This information can be helpful in designing programs to help college students who need assistance in developing academic self-regulation skills. To maximize effectiveness, programs should focus on the development of academic self-efficacy of all students; help students at the Precontemplation stage to acknowledge that there is a need to change their study behaviors, and assist students in establishing a stronger identity, ideally one that is based on thorough introspection rather than one based on the perception of others.

Stage of Change and Academic Self-regulation

While the relationship between students at the Action stage and increased achievement through increased self-regulation is clear from the data in the present study and was as expected, the relationships between the other three stages, achievement, and self-regulation are less clear. Students with high scores on the Contemplation subscale of the ATTS tended to have lower grades, but there was no relationship between Contemplation scores and self-regulation when the other social-cognitive variables were present. More research is needed to understand the relationship between the Contemplation stage and the other factors.

The lack of significant relationships between the Precontemplation and Maintenance subscales and the measures of self-regulation and achievement also needs to be studied further. The scores on the Maintenance subscale were negatively correlated with achievement scores, an opposite result of what was expected. It may be that, in the present sample, there was great diversity in the self-regulation skills among the students in this stage. While some of the 34 students at the Maintenance stage may have been maintaining excellent self-regulation skills developed earlier, most of the students may have been actively maintaining poorer self-regulation skills. The presence of these novice self-regulators in the Maintenance stage may explain the negative correlation between the scores on this subscale and academic achievement.

There may also be a wide range of self-regulation skills of students at the Precontemplation stage, with some strong self-regulators identified at this stage because of the way the items on the ATTS were interpreted. The self-reporting of perceptions of study skills may be more subjective than reporting perceptions of behaviors such as smoking or alcohol consumption, behaviors that the URICA was designed to assess. Strong self-regulators may

interpret Precontemplation items as a signal that they need to actively assess their academic behaviors, and novice self-regulators may interpret Maintenance items as confirmation that they are good self-regulators. These differences in interpretation may result in the misidentification of stage of change for some students. More detailed research in needed on students at both the Precontemplation and Maintenance stages to determine the reasons why no clear patterns emerged between these two stages and the measures of self-regulation and achievement in the present study.

More research is needed on the use of the ATTS, both students regularly admitted to universities and developmental students. Additional samples need to be studied to determine if similar relationships between stage of change, self-regulation, and academic achievement are obtained, and to determine the relationship between stage of change and other variables of interest.

Implications for Study Skills Courses

The findings of the present investigation may provide guidance for those responsible for study skills courses and other academic support programs. Intervention programs should focus on the development of self-regulation skills and strategies, as the ability of these students to successfully self-regulate their academic behaviors plays a crucial, mediating role in translating strong social-cognitive characteristics into academic success. The strong relationship between self-efficacy and self-regulation indicates that academic support programs should make the development of self-efficacy a priority. The stronger the belief the students have that they can be successful, the more likely they are to invest and regulate the energy necessary. Study skills

courses should include opportunities for students to learn and successfully apply self-regulation strategies, helping students develop the efficacy necessary to apply these strategies.

Students at the Precontemplation stage of change often do not see the relationship between their self-regulation skills and their achievement, and are thus unwilling to make changes to their academic behaviors, including self-regulation. These students need help in identifying that their academic success is dependent on the execution of effective study skills and assistance in making the necessary changes to their current academic behaviors. Students with a Diffuse/Avoidant identity style need encouragement to invest the energy necessary to actively investigate their identities. Once the students invest this time and energy, they will be more likely to set and internalize academic goals that will encourage them to self-regulate their behaviors. Study skills programs need to help students develop a more evolved identity of themselves as students. This new academic identity will help them by increasing their efficacy and decreasing their anxiety as they change their self-regulatory behaviors

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