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# MOTIVATION AND SOCIAL PROCESSES

# Assessing and Predicting College Students' Use of Strategies for the Self-Regulation of Motivation

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College students ($N = 215$) completed a self-report instrument designed to assess different regulation of motivation strategies as well as aspects of their motivational beliefs, use of cognitive and metacognitive learning strategies, and procrastination. The study serves to extend the research on the self-regulation of motivation through three related findings. One, results indicate that the instrument evaluated in the study provides a reliable and valid method for assessing six motivational regulation strategies in a college population. Two, analyses revealed differences in the extent that students reported using the regulation of motivation strategies, while also showing them to be related to other aspects of self-regulated learning in a theoretically consistent way. Last, findings from a series of multiple regressions indicate that students' engagement in motivational regulation is a function of their existing motivational beliefs and attitudes.

MODELS OF SELF-REGULATED LEARNING have been used as a framework for understanding students' engagement and performance within academic contexts for over 20 years (Corno, 1986; Zimmerman & Martinez-Pons 1986). During this time, the key components of what it means to be a self-regulated learner have grown and evolved. Many early efforts at characterizing self-regulated learning emphasized students' use of cognitive and metacognitive strategies, self-awareness, and feedback. Also, some models added that self-regulated learners were also highly motivated, most commonly by interest, mastery goals, or other intrinsic forms of motivation. The overall objective of the present study was to extend further the research on self-regulated learning by examining college students' regulation of motivation, defined as their endeavors to manage

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their own level of motivation or to purposefully sustain or improve their effort or persistence for academic tasks (Wolters, 2003a).

## Regulation of Motivation

Aspects of the regulation of motivation are apparent when considering many of the most prominent contemporary models of self-regulated learning (Boekaerts, 1996; Pintrich, 2000; Winne & Hadwin, 2008; Zimmerman, 2000). Elements of motivational regulation are also apparent in models focused on volition (Corno, 2001; Kuhl & Kraska, 1989; McCann & Turner, 2004), self-motivation (Cheng & Ickes, 2009; Dishman, Ickes, & Morgan, 1980), self-reinforcement (Heiby, Ozaki, & Campos, 1984), or the regulation of specific forms of motivation (Sansone & Thoman, 2005). Across these models, students' active efforts to intervene in order to sustain or improve their motivation have been labeled and defined somewhat differently. Aspects of this regulatory process, for example, have been termed metamotivation, self-motivation, motivational regulation, and motivational control. In line with earlier work by Wolters (1998; 2003a) and consistent with the framework advanced by Pintrich and his colleagues (Pintrich, 2000, 2004; Garcia & Pintrich, 1994; Pintrich & DeGroot, 1990; Pintrich & Zusho, 2002; Wolters, Pintrich, & Karabenick, 2005), we refer to this process as the self-regulation of motivation or motivational regulation.

From this perspective, there are at least three key facets to the self-regulation of motivation: knowledge of motivation, monitoring of motivation, and control of motivation. The first facet is students' meta-level understanding reflecting their knowledge or beliefs about motivation (Boekaerts, 1996; Cooper & Corpus, 2009; Wolters, 2003a). This meta-level knowledge, for example, would include students' beliefs about the topics, domains, or tasks they find interesting, enjoyable or intrinsically motivating. It would also include the declarative, procedural, and conditional knowledge needed to enact motivational regulation strategies effectively. A second necessary dimension to the regulation of motivation is the monitoring of one's level or state of motivation. That is, students' management of their motivation also depends on their awareness or ability to observe and gather feedback on their ongoing motivation for an academic activity. Last, a third facet of effective motivational regulation is the actual purposeful actions to intervene and control one's own motivation, effort, or persistence. This last dimension involves students' engagement or execution of strategies for the regulation of motivation. These three facets are each necessary for the effective and ongoing self-regulation of motivation.

Given the diverse nature of motivation, the particular strategies that might be used to control motivation for academic tasks are likely quite varied and potentially numerous. In a theoretical review, Wolters (2003a) identified a number of different types of strategies that students may use to control their motivation. These strategies included attempts to regulate various motivational beliefs that have been discussed in the achievement motivation literature such as achievement goals, self-efficacy, task value, and interest in the task. When initiated in order to control such factors as effort and persistence, students' management of their affect, environment, and behavior can also be considered forms of motivational regulation (Boekaerts, 1996; Wolters, 2003a). In the present study, college students were asked to report how often they used an array of regulation of motivation strategies developed from earlier research in this area (Wolters, 1998). Although the use of these strategies most directly reflects attempts to control or manage motivation, effort, or persistence, they are also a function of students' meta-level knowledge and monitoring of their own motivation.

Assessment of the Regulation of Motivation

Despite its inclusion within theoretical models of self-regulated learning, empirical research examining students' regulation of motivation is still limited in a number of ways. In this study, we addressed shortcomings centered on the assessment of motivational regulation strategies and the relation of these strategies to other important aspects of self-regulated learning.

### Limitations of prior assessments

One general limitation of prior work centers on the ability to assess the strategies that students' use to regulate their motivation (Wolters, Benzon, & Arroyo-Giner, 2011). A basis for this limitation is that many prior studies examining motivational regulation focused on a single or a small number of strategies. For example, the insightful work by Sansone and her colleagues (Sansone & Thoman, 2005; Sansone, Weir, Harpster, & Morgan, 1992) has centered on students' tendency to increase their situational interest or enjoyment when completing boring or tedious experimental tasks. Similarly, the line of research pioneered by Zimmerman and Martinez-Pons (1986; 1988; 1990) using a more open-ended questionnaire has tapped into a number of different regulatory strategies but only one or two (e.g., self-consequating, environmental structuring) that might arguably be characterized as forms of motivational regulation. This focus on a smaller number of strategies can also be seen in research examining defensive pessimism (Martin, Marsh, & Debus, 2003).

These studies provide insight and depth to the understanding of the particular strategies that are examined. However, studies that focus on only a few types of motivational strategies are not able to address some key questions. For example, examining a small number of strategies cannot provide insight into relative differences as to which regulation of motivation strategies are used more or less often by students. As an example, the experimental work by Sansone and her colleagues (Sansone & Thoman, 2005; Sansone et al., 1992) makes it difficult to determine whether viewing tasks as a game or otherwise increasing their situational interest is used more or less often than a strategy such as self-consequating. The importance of these types of questions extends beyond simple theoretical curiosity. Knowing what strategies are preferred or used most often by students within more authentic academic contexts provides insight into which ones might best be used as the target of instructional interventions.

A second limitation of prior work is that in many studies the assessment of motivational regulation was based on more global indicators that failed to distinguish among different types of self-regulatory strategies (Wolters et al., 2011). McCann and Garcia (1999), for example, developed a self-report survey that provided a global indication of students' volition. This instrument was designed to tap into a number of fairly distinct types of regulatory strategies but provide one overall score for individual students. Similarly, the instrument developed by Dishman and colleagues (Dishman et al., 1980) to assess self-motivation also captures more than just students' attempts at motivational regulation. In some cases these global measures simply lump together different forms of motivational regulation, where in other cases they confound the regulation of motivation with cognitive or metacognitive strategies. In either case, these broader types of measures are ill-suited for questions that center on specific types of strategies. For example, global measures are not useful for addressing questions about the relation among different forms of motivational regulation, or how particular types of motivational strategies are related to other aspects of self-regulated learning.

## *Instrument development*

These two limitations point to a need for an instrument that effectively assesses a wider variety of distinct motivational regulation strategies. In fact, initial steps in the development of an instrument that addresses this need have been taken already (Schwinger, Steinmayr, & Spinath, 2009; Schwinger, von der Laden, & Spinath, 2007; Wolters 1999a, 1999b; Wolters & Rosenthal, 2000). The self-report surveys used in these studies used items that were based on open-ended responses collected in an earlier study with college students (Wolters, 1998). In this earlier study, participants were asked to report what they would do if they experienced a lack of motivation under a variety of conditions that included three types of motivational problems (e.g., feeling bored, difficult material) within four academic tasks (e.g., studying for a test, reading a textbook). Students' written responses were evaluated and used to derive 14 specific and 4 broader categories that together reflected an array of cognitive, metacognitive and motivational regulation strategies. For example, students' responses reflected strategies designed to sustain or improve their motivation by manipulating their task value, interest, mastery goals, self-efficacy, extrinsic rewards, performance goals, and distractions in the environment (Wolters, 1998).

In an initial follow-up study with some of the same participants, Wolters (1999a) created short self-report scales to reflect two broader categories associated with motivational regulation. A five-item intrinsic regulation scale was designed to tap into students' reported use of strategies to regulate their desire to learn the material and their feelings of competence. A four-item extrinsic regulation scale was designed to reflect students' reported regulation based on increasing their desire to get good grades or do well in the course. Although both scales showed high internal consistency, the utility of these findings were restricted because they were based on only two very broad types of motivational strategies.

Wolters (1999b; Wolters & Rosenthal, 2000) originated an instrument for assessing a broader array of motivational regulation strategies in two additional follow-up studies focusing on younger adolescents. In one, a larger set of motivational regulation items were developed and administered to a group of 88 ninth and tenth graders (Wolters, 1999b). Ultimately, 28 of these items were subjected to an exploratory factor analyses that produced five meaningful factors with reasonably high loadings and high internal consistencies. The five factors were labeled mastery self-talk, performance self-talk, interest enhancement, self-consequating, and environmental control. In a second study, Wolters and Rosenthal (2000) used an instrument with very similar items to examine regulation of motivation in a sample of 115 eighth-grade students. Again, the items were used successfully to form scales with high internal consistency that reflected students' reported use of the same set of five regulation of motivation strategies. The five scales formed in these studies differed in just two minor ways. One, two items in the Wolters and Rosenthal study had been modified to refer to students' behavior in math rather than in school more generally. Two, Wolters and Rosenthal (2000) included one item on the mastery self-talk scale that had been dropped in the prior study.

More recently, Schwinger et al. (2007) developed a German version of Wolters' (1999b) survey and administered it to university students in three related studies. As with the earlier studies (Wolters, 1999b; Wolters & Rosenthal, 2000), strategies for self-consequating, environmental control, mastery self-talk, and performance self-talk emerged as cohesive, reliable scales in all three studies. A general interest enhancement scale consistent with Wolters (1999b) was supported in one study, but in the two remaining studies was split into separate scales; one

centered on sustaining situational interest and one for regulating personal value or significance. On the basis of analysis of open-ended questions in the first of these studies, Schwinger et al. (2007) also devised some new items and found support for additional motivational strategies based on performance-avoidance goals and proximal goal setting. Later, Schwinger et al. (2009) found evidence that this extended German version of the motivational regulation survey produced equivalent scales for high school students.

Together, these earlier studies provide some initial evidence for the reliability and validity of a self-report instrument for assessing a wider collection of regulation of motivation strategies. One major objective of the present study was to extend this work by further developing the self-report instrument designed to assess a larger (but not exhaustive) number of regulation of motivation strategies. The present study included a larger sample of students to allow for further analyses examining the underlying factor structure of data produced by the instrument. Also, the present study is based on a diverse sample of college students that allow for generalization to an older, and perhaps more academically experienced population of students in the United States.

## Relation of Motivational Regulation With Other Aspects of Self-Regulated Learning

Apart from questions regarding its assessment, another ongoing and central issue in the study of the self-regulation of motivation is how it fits with other facets of self-regulated learning. A second major objective of this study, therefore, was to examine the relation of students' use of motivational regulation strategies with other indicators of their self-regulated learning. In particular, we investigate how the regulation of motivation is linked to students' use of cognitive and metacognitive strategies, their existing motivational beliefs and attitudes, and their self-reported procrastination.

### *Relation to cognitive and metacognitive strategy use*

Cognitive and metacognitive activities are typically viewed as core features of what it means to be a self-regulated learner (Boekaerts, 1996; Pintrich, 2000; Winne & Hadwin, 2008; Zimmerman, 2000). Specifically, students' ability to self-regulate their learning is viewed, in large part, as a function of their capacity to use effectively an array of cognitive and metacognitive learning strategies across diverse academic contexts. Consistent with this perspective, much prior work has shown that students' use of these types of strategies tends to be associated positively with their learning, achievement, or performance in academic contexts.

The relation of motivational regulation to these more cognitive and metacognitive aspects of self-regulated learning, however, has not been examined extensively. Still, there is some preliminary evidence that students' reported use of regulation of motivation strategies is associated positively with their use of cognitive and metacognitive learning strategies (Schwinger, et al., 2007; Wolters, 1999b). Specifically, Wolters (1999b) found a pattern of strong positive bivariate relations between students' self-reported use of the motivational regulation strategies and their reported use of metacognitive strategies for planning, monitoring, and self-regulation. To a lesser extent, students' self-reported motivational regulation strategies have also been linked to their reported use of some cognitive strategies (Schwinger et al., 2007; Wolters, 1999b). In the present study, we build on this work by examining the relation of students' reported use of motivational

regulation strategies to indicators of these more traditional dimensions of self-regulated learning in a larger sample of college students.

### Relation to motivational attitudes

As another core feature of self-regulated learning, we also investigate the relation between students' reported use of strategies for regulating their motivation and their existing motivational beliefs and attitudes. Adaptive motivational beliefs and attitudes are now a consistent characteristic associated with being a self-regulated learner (Winne & Hadwin, 2008). However, the relation of motivation and motivational regulation is likely to be complex (Wolters, 2003a). Students who are already highly motivated within a particular context or with regard to a particular task are unlikely to call on these strategies. Their motivation is not in jeopardy so they need not engage strategies designed to bolster it. Alternatively, students who are below some threshold of motivation for a task are also not likely to report using regulation of motivation strategies. For these students, the effort needed to enact these strategies may outweigh any desire or willingness they have to complete the task.

Few studies have directly examined the relations between students' motivation regulation and their existing motivational beliefs and attitudes. Wolters (1998) provided some initial evidence that college students tended to report using forms of motivational regulation that were consistent with their focus on mastery or performance goals. In addition, Wolters and Rosenthal (2000) found that students' reported use of regulation of motivation strategies was tied to their motivational beliefs and attitudes. In this study, high school students who expressed a greater mastery orientation (labeled learning goal orientation) also reported greater use of all five forms of motivational regulation that were examined. At the same time, task value and performance orientation were each positively associated with several motivational regulation strategies (but not the same ones). In contrast, students' self-efficacy failed to predict any of the regulation of motivation strategies when accounting for their level of standardized achievement. Schwinger et al. (2007) also found positive correlations between students' learning and performance approach orientations and their reported use of motivational regulation strategies in a sample of German university students. The present study builds directly on this earlier work by examining similar relations in a sample of American college students.

### Relation to procrastination

We also include a measure of procrastination, or students' perceived tendency to put off or delay academic tasks they are required to complete. Although not often considered a direct measure of students' self-regulated learning, procrastination appears to contradict the characterization of these students as resourceful, organized and motivated (Wolters, 2003b). In particular, delaying the start of academic tasks that might be viewed as difficult, boring, unimportant, or aversive in other ways is inconsistent with the effective regulation of motivation. However, procrastination has also been described as a strategy for generating and harnessing anxiety that can lead to improved performance or completion of otherwise aversive tasks (Schraw, Wadkins, & Olafson, 2007). In one study that specifically aimed to link self-regulated learning and procrastination, Wolters (2003b) found that students' delay or postponement of academic work could be viewed as a function of their self-efficacy and work avoidance orientation. College students who expressed

greater confidence in their abilities tended to report lower levels of procrastination, whereas students who expressed a desire for simple, easy to complete work procrastinated more. In addition, Wolters (2003b) found some limited evidence that students who reportedly used more metacognitive strategies reported less frequent procrastination. It does not appear that any prior research has directly examined the relation of motivational regulation to procrastination.

## Research Goals and Hypotheses

In sum, the present study was designed to address two broad, but related, shortcomings with regard to prior research on the self-regulation of motivation. One, there is not a well-established instrument that can be used to assess a variety of regulation of motivation strategies. Hence, one goal of the present study was to develop further an instrument that could be used to assess a variety of motivational regulation strategies. In particular, we investigated the factor structure that emerged from this self-report instrument when administered to a diverse sample of American college students. We expected this instrument to produce a set of cohesive, reliable, and theoretically meaningful strategies. In addition, we examined the bivariate relations among these strategies and potential mean level differences in the extent to which they reportedly were used by college students. We anticipated positive correlations among the different forms of motivational regulation, but also believed there would be differences in the frequency with which students reported using the various strategies.

Two, the empirical work that links the self-regulation of motivation to other dimensions of self-regulated learning is limited. A second goal of the present study was, therefore, to explore how motivational regulation was related to other core aspects of what it means to be a self-regulated learner. To this end, we examined whether students' reported use of regulation of motivation strategies was consistent with their use of cognitive and metacognitive learning strategies and their reported procrastination. We hypothesized that the motivational regulation strategies would be positively related to their reported use of learning strategies and negatively associated with their level of procrastination. That is, students who reported using cognitive and metacognitive strategies more often would also report using strategies to regulate their motivation more frequently. In addition, we examined whether students' motivational beliefs and attitudes could be used to predict their reported use of motivational regulation strategies. We expected that at least some of students' motivational beliefs and attitudes would be useful for predicting their use of motivational regulation strategies.

## METHOD

### Participants

Participants for this study were 215 students enrolled in either a history (74%) or human development course at a large and diverse urban university. The approximately equal numbers of men (46%) and women were primarily first- or second-year students (84%) with a mean age of 20.3 years ($SD = 2.7$ years). Using a forced-choice item, students identified their own race/ethnicity as African American (20%), Asian (30%), Hispanic (23%), White (22%) or other (5%).

## Procedures

Students were recruited during a regular session by a member of the research team who visited the lecture hall, described the study, and distributed a packet of materials to all students who expressed a willingness to participate. Students were asked to complete and return the packet of materials at a subsequent meeting of the course. Those who returned a packet were provided a small amount of extra course credit for their participation. The materials inside the packet included an informed consent form, a self-report survey, and a standard optical-scanner sheet for recording their responses. A total of 221 packets were returned. Six of these, however, were excluded because they had missing data on more than 10% of the self-report items resulting in the final sample size of 215.

## Measures

The self-report survey was divided into four major sections. In the first, students responded to individual items used to determine their age, sex, ethnicity, and their academic level at the university. The remaining three sections assessed students' motivational beliefs and attitudes, learning strategies and procrastination, and their use of motivational regulation strategies. All of the self-report items in these final three sections were constructed so as to measure students' beliefs, attitudes or behaviors with respect to the specific history or human development course in which they were currently enrolled. All items used a 7-point Likert scale. For the motivational, learning strategies and procrastination items, the scale ranged from 1 (*strongly disagree*) to 7 (*strongly agree*).

### *Motivation*

Using items derived from Pintrich et al. (1993) and from Midgley et al. (1998), four aspects of students' motivation were assessed. *Mastery orientation* included four items and reflected the degree to which students reported completing tasks in order to improve their abilities, increase their understanding, or master the material they were asked to study ($\alpha = .71$). *Performance approach orientation* (4 items, $\alpha = .78$) indicated the degree to which students reported completing their coursework in order to get high grades, extrinsic rewards, or approval from others. This scale, therefore, reflected a form of performance approach goals but did not tap into students' focus on relative ability or doing better than others. *Value* (9 items, $\alpha = .91$) tapped into how useful, important, or personally relevant students viewed the material they were learning. The four *self-efficacy* items represented the degree to which students saw themselves as capable of successfully learning the material and completing the tasks they were assigned in their history or human development course ($\alpha = .84$).

### *Learning strategies and procrastination*

Participants' use of cognitive and metacognitive strategies were assessed with items originally derived from Pintrich et al. (1993) and used previously in Wolters (2003b). *Cognitive strategies* (9 items, $\alpha = .80$) indicated students' reported use of rehearsal, elaboration, and organization strategies when doing their academic work. *Metacognitive strategies* (9 items, $\alpha = .84$) reflected

students' use of planning, monitoring and regulation strategies. *Procrastination* was measured using five items ($\alpha = .88$) created to assess students' tendency to postpone completing their assigned schoolwork (Wolters, 2003b).

### *Motivational regulation strategies*

Students responded to 31 items designed to assess different strategies for self-regulating their motivation by sustaining or improving their effort, persistence, or desire to complete an academic task. Directions for these items prompted students to consider when they were reading or studying for their respective course and did not feel like working hard to finish or for some reason lost motivation for doing the work that needed to get done. Examples such as getting bored, or getting tired of working hard because the material was difficult or seemed unimportant were made salient to students. Directions asked students to read each item and indicate how frequently they would engage in the behavior or action that was described using a 7-point scale from 1 (*not at all*) to 7 (*very often*). Listed in Table 1, the individual items on this instrument were developed originally from the written responses of students in earlier work conducted by Wolters (1998). Except for slight wording modifications designed to encourage students to respond while thinking about their current course (e.g., "this course" in place of " in school") these items were identical to those in earlier studies (Wolters, 1999b; Wolters & Rosenthal, 2000).

## RESULTS

Results are divided into three sections. First, in order to address the goal of developing an instrument to assess an array of regulation of motivation strategies, the internal structure of the regulation of motivation items is evaluated using exploratory factor analysis. Second, descriptive and bivariate analyses for all of the major variables in the study are presented. Also, mean-level differences in students' reported use of regulation of motivation strategies are explored. These analyses also help to establish the instrument as a viable measure of students' regulation of motivation strategies. They also begin to address the second goal of evaluating the relations among the different aspects of self-regulated learning. Last, a set of multiple regressions are presented in which students' reported motivational beliefs along with gender and course are used to predict each of the six reported motivational regulation strategies. The findings of these analyses address the second research goal by providing greater insight into the relation among the regulation of motivation and other core aspects of self-regulated learning.

### Exploratory Factor Analysis

The 31 regulation of motivation items were subjected to an exploratory principal components factor analysis with an oblimin rotation. An exploratory analysis was used because the items were slightly modified from earlier studies (Wolters, 1999b; Wolters & Rosenthal, 2000) and because the prior studies were conducted with relatively small numbers of younger students. On the basis of a minimum eigenvalue, a scree criteria and theoretical meaningfulness of the factors, a six factor solution was deemed most acceptable. Results of these analyses including the eigenvalues and individual factor loadings from the pattern matrix are presented in Table 1.

TABLE 1
Summary of Exploratory Factor Analyses of Motivational Regulation Items

| Item text | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| I think up situations where it would be helpful for me to know the material or skills. | .87 | | | | | |
| I try to make the material seem more useful by relating it to what I want to do in my life. | .78 | | | | | |
| I make an effort to relate what we're learning to my personal interests. | .77 | | | | | |
| I try to connect the material with something I like doing or find interesting. | .70 | | | | | |
| I tell myself that it is important to learn the material because I will need it later in life. | .70 | | | | | |
| I try to make myself see how knowing the material is personally relevant. | .59 | | | | | |
| I remind myself about how important it is to get good grades. | | .84 | | | | |
| I think about how my grade will be affected if I don't do my reading or studying. | | .79 | | | | |
| I remind myself how important it is to do well on the tests and assignments in this course. | | .78 | | | | |
| I convince myself to keep working by thinking about getting good grades. | | .68 | | | | |
| I tell myself that I need to keep studying to do well in this course. | | .51 | | | | −.36 |
| I promise myself some kind of a reward if I get my readings or studying done. | | | .92 | | | |
| I make a deal with myself that if I get a certain amount of the work done I can do something fun afterwards. | | | .91 | | | |
| I tell myself I can do something I like later if right now I do the work I have do get done. | | | .85 | | | |
| I set a goal for how much I need to study and promise myself a reward if I reach that goal. | | | .81 | | | |
| I promise myself I can do something I want later if I finish the assigned work now. | | | .77 | | | |
| I try to get rid of any distractions that are around me. | | | | .90 | | |
| I make sure I have as few distractions as possible. | | | | .81 | | |
| I change my surroundings so that it is easy to concentrate on the work. | | | | .64 | | |
| I try to study at a time when I can be more focused. | | | | .51 | | |
| I make studying more enjoyable by turning it into a game. | | | | | .93 | |
| I try to make a game out of learning the material or completing the assignment. | | | | | .87 | |
| I make doing the work enjoyable by focusing on something about it that is fun. | | | | | .53 | |
| I try to get myself to see how doing the work can be fun. | | | | | .48 | |
| I think of a way to make the work seem enjoyable to complete. | | | | | .42 | |
| I persuade myself to keep at it just to see how much I can learn. | | | | | | −.64 |
| I tell myself that I should keep working just to learn as much as I can. | | | | | | −.64 |
| I challenge myself to complete the work and learn as much as possible. | | | | | | −.51 |
| I convince myself to work hard just for the sake of learning. | .44 | | | | | −.48 |
| I tell myself that I should study just to learn as much as I can. | .38 | | | | | −.45 |
| I eat or drink something to make myself more awake and prepared to work.[a] | | | | | | .39 |
| Eigenvalue | 11.43 | 3.66 | 2.20 | 1.55 | 1.27 | 1.15 |
| Percentage of variance explained | 36.88 | 11.81 | 7.09 | 4.99 | 4.10 | 3.69 |

*Note.* Item loadings below .35 are not shown. 1 = Factor 1/regulation of value; 2 = Factor 2/regulation of performance goals; 3 = Factor 3/self-consequating; 4 = Factor 4/environmental structuring; 5 = Factor 5/regulation of situational interest; 6 = Factor 6/regulation of mastery goals.

[a]Item not used in scale construction or any further analyses.

Together, these six factors accounted for approximately 69% of the total variance. Three items had cross loadings above .35 (see Table 1). One of these was likely due to wording (i.e., "to do well") that did not adequately differentiate between performance and mastery goals. The remaining two seemed to reflect a close association between valuing materials and wanting to learn as much as possible. More critically, the three cross loading items and all the remaining items loaded strongly onto at least one factor that made theoretical sense and so were retained. In contrast, one item failed to load on any factor above .40 and so was dropped from further analyses (see Table 1). As described next, the final six factors reflected coherent, theoretically consistent constructs representing students' reported use of different motivational regulation strategies.

The first factor, which consisted of six items, was named *regulation of value* and reflected students' reported efforts to make doing their coursework more likely by making the material seem more useful, interesting, or important to know ($\alpha = .91$). A representative item from this factor was "I make an effort to relate what we're learning to my personal interests." The second factor included five items that indicated students' perceived tendency to use a strategy labeled *regulation of performance goals* ($\alpha = .84$). These items tapped into students' beliefs about their efforts to highlight the importance of doing well or getting good grades on the work they needed to complete. A sample item was "I remind myself how important it is to do well on the test and assignments in this course." It should be noted that these items are not entirely consistent with the emphasis of some current performance approach goal measures on doing better than others or relative ability. Factor three, which had five items, was labeled *self-consequating* and indicated students' reported use of self-provided rewards for pushing themselves to complete their coursework ($\alpha = .91$). "I promise myself I can do something I want later if I finish the assigned work now" was an example of one item loading on this factor. *Environmental structuring* was used to label the fourth factor which included four items that reflected students' expressed efforts to control aspects of their physical or personal context as a motivational strategy ($\alpha = .77$). For example, this factor included "I change my surroundings so that it is easy to concentrate on the work" as one item. The fifth factor was titled *regulation of situational interest* because it represented a strategy in which students tried to make completing their coursework more enjoyable, fun, or game-like ($\alpha = .88$). As an example, "I make studying more enjoyable by turning it into a game" was one of the five items on this factor. Last, the sixth factor was termed *regulation of mastery goals* because the items tapped into students' reported efforts to highlight their desire to improve their understanding or learn as much as possible ($\alpha = .88$). One of the five items loading on this factor was "I tell myself that I should keep working just to learn as much as I can." Means of the items corresponding to each of the six factors were used to form analogous scales that were then used in all subsequent analyses.

## Descriptive and Bivariate Analyses

Table 2 presents descriptive statistics for all the primary variables in the study. Initial inspection of the means for the six motivational strategies suggested some variability in how often each was reportedly used. A repeated measures analysis of variance indicated a statistical difference among the means, Wilks' lambda $= .37, p < .001$, partial $\eta^2 = .64$. Follow-up *t* tests were conducted and interpreted using an alpha level of .003 ($= .05/15$ comparisons) based on a Bonferroni adjustment. These comparisons indicated that students reported using regulation of performance goals ($M = 5.58, SD = 1.17$), more often than all the other strategies ($ts > 4.85, ps < .001$) and reportedly

TABLE 2
Descriptive Statistics and Bivariate Correlations for Major Variables in the Study

| Variable | M | SD | α | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Value | 5.04 | 1.20 | .91 | — | | | | | | | | | | | |
| 2. Self-Efficacy | 5.11 | 1.28 | .84 | .52** | — | | | | | | | | | | |
| 3. Mastery orientation | 4.22 | 1.14 | .71 | .69** | .49** | — | | | | | | | | | |
| 4. Performance approach orientation | 4.90 | 1.29 | .78 | -.35** | -.19** | -.37** | — | | | | | | | | |
| 5. Procrastination | 4.12 | 1.57 | .88 | -.30** | -.17* | -.33** | .28** | — | | | | | | | |
| 6. Cognitive strategies | 4.41 | 1.07 | .80 | .44** | .32** | .51** | -.06 | -.23** | — | | | | | | |
| 7. Metacognitive strategies | 4.50 | 1.13 | .84 | .47** | .38** | .52** | -.05 | -.19** | .84** | — | | | | | |
| 8. Reg. of performance goals | 5.58 | 1.17 | .84 | .52** | .35** | .33** | .11 | -.14* | .58** | .58** | — | | | | |
| 9. Environmental structuring | 5.19 | 1.22 | .77 | .36** | .36** | .36** | -.02 | -.21** | .44** | .50** | .51** | — | | | |
| 10. Self-consequating | 4.34 | 1.62 | .91 | .40** | .20** | .47** | -.10 | -.17* | .40** | .45** | .38** | .38** | — | | |
| 11. Reg. of mastery goals | 4.30 | 1.34 | .88 | .51** | .25** | .62** | -.25** | -.30** | .60** | .61** | .43** | .34** | .49** | — | |
| 12. Reg. of value | 4.11 | 1.45 | .91 | .55** | .27** | .58** | -.25** | -.20** | .55** | .58** | .36** | .32** | .55** | .75** | — |
| 13. Reg. of situational interest | 3.35 | 1.43 | .88 | .24** | .07 | .41** | -.05 | -.11 | .45** | .44** | .15* | .16* | .51** | .61** | .66** |

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

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relied on improving situational interest ($M = 3.35$, $SD = 1.43$) less often than any other form of motivational regulation ($t$s > 9.37, $p$s < .001). Environmental structuring ($M = 5.19$, $SD = 1.22$) was reportedly used more often than self-consequating ($M = 4.34$, $SD = 1.62$, $t = 7.69$, $p < .001$), regulation of mastery goals ($M = 4.30$, $SD = 1.34$, $t = 8.87$, $p < .001$) and regulation of value ($M = 4.11$, $SD = 1.45$, $t = 10.10$, $p <. 001$). Students reported using self-consequating, regulation of mastery goals, and regulation of value to a similar extent.

The bivariate correlations among all the motivational, learning strategy and behaviors, and regulation of motivation variables also are presented in Table 2. These findings indicate that all of the motivational regulation strategy variables were related positively to one another. The relations among the three self-reported regulation of motivation strategies that reflected more intrinsic forms of motivation (i.e., regulation of value, regulation of situational interest, and regulation of mastery goals) were particularly strong ($r$s > .60, $p$s < .01). Relations among the motivational belief and the motivational regulation variables also revealed an interesting pattern. Value, mastery orientation, and self-efficacy were positively related to each of the motivational regulation strategies with the one exception. Self-efficacy was unrelated to the reported use of the regulation of situational interest strategy. In several cases, these bivariate relations evinced relations that were fairly strong ($r$s ≥ .50, $p$s <.01). This pattern of relations suggests that, on average, students' who indicated that they valued the material, wanted to learn, and were confident they could do well also tended to report using strategies intended to sustain or increase their motivation. In contrast, performance orientation was either unrelated or negatively related to the regulation of motivation strategies, including even the regulatory strategy reflecting efforts to invoke performance goals as a way of improving effort and persistence for a task.

The bivariate relations between students' reported use of cognitive and metacognitive strategies and each of the six motivational regulation strategies was also moderate to strong (.40 ≤ $r$s ≤ .61, $p$s < .01). The strength of these correlations suggest that students' reported use of motivational regulation strategies is best viewed as distinct but closely related to their beliefs about their use of cognitive and metacognitive strategies. Last, the bivariate correlations also indicated that each of the regulation of motivation strategy variables was related negatively to procrastination. Compared to those who did not express regulating their motivation, students who reported using strategies to sustain or increase their motivation reported putting off or delaying the start of their academic work less often.

## Multivariate Regressions

A set of multiple regressions were computed in which the four motivational beliefs were used to predict each of the six motivational regulation strategies. Gender was included in these analyses based on prior studies showing differences between boys and girls in some facets of self-regulated learning (Meece & Painter, 2008). Preliminary analyses indicated also that there were some differences across the two courses in the mean level of motivational beliefs expressed by students. Thus, a dichotomous variable indicating the course in which students were enrolled also was included in these analyses. Because the criterion variables in this set of analyses were correlated (see Table 2), we used a Bonferroni adjustment to set the alpha level for the overall test of each regression to a more conservative .008 (i.e., .05/6 tests).

Findings from the regression analyses are presented in Table 3. Even with the more conservative alpha level, the predictors together explained a substantial amount of variance in each of the regulation of motivation strategy variables ranging from about 21% to more than 40%

TABLE 3
Standardized Coefficients From Initial Regressions Predicting Students' Reported Use of Motivational
Regulation Strategies

| Predictor | Regulation of performance approach orientation | Environmental structuring | Self-consequating | Regulation of mastery orientation | Regulation of value | Regulation of situational interest |
|---|---|---|---|---|---|---|
| Gender | −.22*** | −.06 | .01 | −.01 | .10 | .10 |
| Course | .16** | .11 | −.03 | .09 | −.04 | .03 |
| Mastery orientation | .04 | .21* | .41*** | .55*** | .40*** | .53*** |
| Value | .54*** | .17 | .20* | .21** | .33*** | .03 |
| Performance approach orientation | .38*** | .17* | .11 | .02 | −.02 | .11 |
| Self-efficacy | .15* | .22** | −.09 | −.11 | −.11 | −.19* |
| $R^2$ | .44*** | .22*** | .25*** | .42*** | .39*** | .21*** |

*Note.* For gender, 0 = female, 1 = male. For course, 0 = human development, 1 = history.
***$p < .001$. **$p < .01$. *$p < .05$.

(see Table 3). The strength of these values reflects the generally close connection between students' expressed motivational beliefs and the strategies they reportedly use to regulate their effort and persistence. Gender and course failed to significantly predict any of the strategies except for regulating performance goals. Results indicate that girls more than boys ($\beta = -.22$, $p < .001$), and students in the history course more than the human development course ($\beta = .16$, $p < .01$), reported stressing the need to get better grades as a way of improving their motivation.

Inspection of the standardized coefficients for the motivational predictors indicates that, consistent with prior work (Wolters, 1999b), mastery orientation was a strong individual predictor for each of the motivational strategies except for regulating performance goals (see Table 3). On average, students who reported a greater focus on wanting to learn and improve tended to report using regulatory strategies based on intrinsic forms of motivation as well as environmental structuring and self-consequating more often than students who reported less of a mastery orientation. At the same time and despite its high bivariate correlation with mastery orientation ($r = .69$), value was also a positive predictor for four of the motivational regulation strategies. Students who viewed the material they were learning as more important and useful also tended to report using strategies for self-consequating, regulating mastery goals, regulating value, and regulating performance goals. Similarly, self-efficacy was an individual predictor for three of the regulation of motivation strategies. Students who expressed greater confidence in their ability to be successful tended to report using strategies for environmental structuring and regulation of performance goals more often than their peers (see Table 3). It is interesting to note that, however, students who indicated greater self-confidence reported using situational interest to regulate their motivation less often. Last, students who reported a greater performance orientation also tended to report using strategies to increase motivation based on getting good grades. On average, these students also reported greater use of environmental control strategies.

## Supplemental Analyses

A final set of supplemental analyses were conducted to further explore the relation of the motivational regulation strategies with other indicators of self-regulated learning. For these analyses,

procrastination and metacognitive strategies were added in a second step to the multiple regressions predicting the six motivational regulation strategies. By controlling for covariation based on their common association with students' motivational beliefs, these analyses provide a more rigorous test of the relation between the regulation of motivation strategies and these latter two indicators of students' self-regulated learning than the simple bivariate correlations. Cognitive strategy use was not also included due to its high bivariate correlation with metacognitive strategy use.

The addition of these two variables significantly increased the amount of variance explained for each of the six regulation of motivation strategies by approximately 5 to 12 percent. Further, metacognitive strategy use emerged as a significant and strong predictor for each motivational regulation strategy. Even when accounting for the other predictors, students who reported greater planning, monitoring, and control of their cognitive processing also reported greater use of motivational strategies related to value ($\beta = .44, p < .001$), mastery goals ($\beta = .42, p < .001$), performance goals ($\beta = .37, p < .001$), situational interest ($\beta = .39, p < .001$), self-consequating ($\beta = .28, p < .001$), and environmental structuring ($\beta = .36, p < .001$). In contrast, procrastination failed to predict any of the motivational strategies. This pattern of findings indicates that students' reported use of motivational regulation strategies was closely linked to their reported use of metacognitive strategies, but not with their reported level of academic procrastination.

## DISCUSSION

The present study was designed to increase the understanding of the regulation of motivation and extend its integration into a broader framework of self-regulated learning by addressing two broad goals. One goal was to develop further an instrument that could be used to assess students' reported use of regulation of motivation strategies. A second goal was to explore how motivational regulation was related to other core aspects of what it means to be a self-regulated learner. Together, findings provide evidence that the regulation of motivation is a viable, meaningful, and perhaps important facet of self-regulated learning among college students. This general conclusion is based on several more focused points that can be drawn from the present study. These points, important limitations of the study, and some directions for additional research are presented next.

### Assessing Regulation of Motivation Strategies

In line with the first goal of this research, one conclusion supported by our findings is that the instrument constructed and evaluated within this study provides a viable self-report method for assessing students' reports about six motivational regulation strategies in a college population. All but one of the 31 items initially included in the present study loaded in a theoretically consistent and meaningful way onto one of the six factors which represented different regulation of motivation strategies. Results of the exploratory factor analysis provided strong support for the existence of six separate types of strategies. Because they were derived from earlier work in which college students were free to self-report a wide variety of strategic behaviors these items appear to have both high face and content validity. The scales derived from each of the factors, moreover, demonstrated high internal reliability. Bivariate correlations among these six strategies were positive and fairly strong, yet not substantial enough to indicate that the strategies were tapping into a single underlying construct. In short, the instrument developed and evaluated in

this study appears to be a reasonable self-report method for assessing college students beliefs about their use of six types of strategies linked to the regulation of motivation. One practical implication of the study, therefore, is that this instrument should serve as a useful tool to those who wish to study the self-regulation of motivation in college populations.

The specific strategies that emerged were consistent with the prior work examining self-regulated learning (Corno, 2001; Sansone & Thoman, 2005; Wolters, 2003b; Zimmerman & Martinez-Pons, 1986). More directly, these strategies are consistent with the original study of college students (Wolters, 1998) and other studies using similar items with German university students (Schwinger et al., 2007) and samples of younger adolescents (Schwinger et al., 2009; Wolters, 1999b; Wolters & Rosenthal, 2000). Using a very similar set of items, findings from the American adolescent samples produced five factors whereas in this study there were six. The four strategies now titled regulation of mastery goals, regulation of performance goals, self-consequating and environmental structuring were the same as those found in earlier work (Schwinger et al., 2007; Schwinger et al., 2009; Wolters, 1999b; Wolters & Rosenthal, 2000). The interest enhancement scale produced in Wolters' earlier studies with younger adolescents reflected students' efforts both to make academic tasks more enjoyable and for the materials to be more relevant to their own interests. Consistent with the findings with both older and younger German samples (Schwinger et al., 2007; Schwinger et al., 2009), however, these items split into two different factors or strategies in the present study. This finding is in line with research suggesting that older students may be better able to make conceptual distinctions between closely aligned forms of motivation (Wigfield, Eccles, & Rodriquez, 1998). Unlike younger students, that is, college students may be able to differentiate between concepts like importance and interest and thus distinguish their use of strategies designed to regulate each aspect of motivation.

It is important to note that three of these strategies are also consistent with other work studying self-regulated learning with different methods or instruments. For example, the regulation of situational interest is consistent with experimental work conducted by Sansone and her colleagues (Sansone & Thoman, 2005; Sansone et al., 1992). Also, self-consequating and environmental structuring as regulatory strategies have been supported consistently by research using the more open-ended instrument developed by Zimmerman and Martinez-Pons (1986, 1988, 1990). More recent studies by others (McCann & Turner, 2004) have also found that students report using these types of strategies. Together these studies provide an increasingly strong argument for viewing these regulation of motivation strategies as a prominent facet of what it means to be a self-regulated learner.

In a similar way, five of the strategies supported by this study are consistent with prominent contemporary models of achievement motivation. In line with achievement goal theory (Anderman & Wolters, 2006), two of the strategies involve students' reported efforts to increase the salience of different types of purposes, reasons, or goals they might adopt when engaged in their academic work. Regulation of mastery goals reflected students' beliefs about their effort to make learning, understanding and improving their competence more salient. In contrast, regulation of performance goals involved highlighting the personal importance of doing well and getting good grades. Increasing the relevance, usefulness or importance of the materials or skills one is learning is consistent with current models of Expectancy × Value theories of motivation (Wigfield & Eccles, 2000). Although self-provided rewards for effort or persistence at a task appear rooted in more behavioral views of learning, it is also in line with more general views of extrinsic motivation. Of note, extrinsic forms of motivation often are viewed as maladaptive by some

(Ryan & Deci, 2000) in that they lead to decreases in intrinsic or more self-determined forms of motivation. Students' self-initiated decision to use external rewards as a means of sustaining their effort and persistence at an academic task, however, does not fit easily into this maladaptive view of extrinsic motivation. This strategy seems to emphasize extrinsic motivation because it relies on consequences that are outside the actual task, but it also involves an autonomous self-initiating decision to use these strategies and so may support students' feelings of autonomy.

Management of the environment to avoid distractions or to facilitate concentration on the academic work is, perhaps, least centered on any specific form or model of motivation. Although it has consistently been included in studies of motivational regulation (Schwinger et al., 2009; Wolters, 1999; Wolters & Rosenthal, 2000), this strategy is also unique among those examined because several items emphasize avoiding or removing obstacles that are likely to reduce motivation or make it more difficult to continue working. In contrast, the other five strategies focus on increasing students' desire or willingness to complete the task and not on preventing problems. Further, within some models of self-regulation (Pintrich, 2004), environmental structuring might better be viewed as a strategy for the regulation of context rather than strictly for the regulation of motivation. In light of these points, one might reasonably question whether environmental structuring is best considered a proper regulation of motivation strategy. If students' are blocking out distractions or changing their surroundings with the intent of maintaining or supplementing their willingness to provide effort and complete a particular academic activity, it does fit a general definition of regulation of motivation (Wolters, 2003a). Additional research examining the relations among these strategies would help to tease apart this conceptual issue. However, this distinction might be more important from a theoretical viewpoint rather than a practical one. As with the other motivational regulation strategies, effective environmental structuring should lead to sustained or increased effort on academic tasks. In this sense then, it is clearly consistent with the general understanding of motivational regulation (Wolters, 2003a).

The connection with existing motivational models points to an important caveat to the present findings. The instrument studied here cannot be viewed as assessing all possible types of motivational regulation strategies, or even all the most critical types. There are clearly important aspects of students' motivation that are not well represented by the six types of strategies assessed with the present instrument. For example, none of the strategies clearly reflects students' efforts to bolster or sustain their perceived competence or self-efficacy for completing their academic work. Yet, self-efficacy is a critical aspect of motivation and prior work has found some evidence of this type of regulatory strategy (McCann & Turner, 2004; Wolters, 1998). Also, strategies more closely aligned with motivational constructs such as sense of autonomy, attributions, and goal setting are absent but have been proposed or studied (Schwinger et al., 2009; Wolters, 2003). It is evident that ultimately there are likely to be other important motivational strategies not accounted for by the self-report survey examined in this study. Additional research designed to uncover and assess additional strategies associated with these other important forms of motivation represents another useful line of research.

## Differences Across Motivational Regulation Strategies

A second conclusion supported by the present findings is that college students do not use all types of motivational regulation strategies equally. The students in this study reported using strategies to increase their focus on performance goals or to manage their environment most often. In contrast,

students' indicated that they would work to sustain their motivation through more intrinsic forms of motivation to a lesser extent.

The presence of these mean level differences cannot be considered surprising because students are not expected to use all types of strategies equally. For example, students would also not be expected to use all types of rehearsal or all types of elaboration strategies to the same degree. Still, it is interesting to speculate on why some of these regulatory strategies were reportedly used more often than others within the present sample. In general, there are several common reasons why students may use one type of strategy more often than another, even when considering just those that are for the regulation of motivation. One explanation is that students may have greater declarative or procedural knowledge about some strategies than others. For example, students may be quite familiar with strategies based on improving their grades or doing well on tests whereas they are relatively unaware of strategies based more on situational interest. If so, these knowledge differences may arise from the modeling that teachers or parents provide when they attempt to regulate students' motivation. That is, if adults work to increase students' motivation by emphasizing the importance of grades they may implicitly be encouraging students to rely on similar methods when regulating their own motivation.

A second explanation for the mean level differences in reported strategy use is that students may know about all these strategies but view some as ineffective in general or with regard to the particular context about which they were questioned. Put differently, students may have as much declarative and procedural knowledge with regard to increasing situational interest (i.e., the strategy reportedly used least often) as they do for the other strategies but have conditional knowledge that this type of strategy is ineffective, too effortful, or poorly suited for use when studying for their history or human development course. Note that it is not necessary for this conditional knowledge about the relative effectiveness of different strategies to be accurate for this explanation to hold. Students' actual use of a strategy should vary on the basis of their beliefs about its effectiveness and fit within a particular context, regardless of whether those beliefs are legitimate.

The present study, unfortunately, cannot provide insight into which of the potential reasons these differences exist is most viable. Additional work is needed to determine if the mean level differences found in this study are indicative of a more general pattern, and if so, what the underlying source of this pattern is. In particular, future research needs to evaluate students' beliefs about these strategies, and to test the effectiveness of different strategies within different contexts, tasks, or motivational problems.

## Relation of Motivational Regulation to Other Aspects of Self-Regulated Learning

Consistent with our second goal, another conclusion supported by the findings is that, although intended to sustain or improve their ongoing motivation, students' use of motivational regulation strategies remains rooted in their motivational beliefs and attitudes. As noted by Wolters (2003a), the relation between students' motivation and their use of motivational regulation strategies is likely to be complex and reciprocal. The process of self- regulation of motivation involves monitoring and intervening to sustain or improve one's level of motivation for academic tasks. Engaging motivational regulation strategies such as those studied here, therefore, is most likely to occur when students perceive their motivation and concomitant effort or persistence as falling or reaching levels that are not productive. At the same time, the engagement and execution of

these strategies takes some effort that may draw cognitive resources away from those devoted to actually completing the task. This latter relation suggests that students must have some underlying commitment or minimal level of motivation to ensure that they are willing to provide the effort needed to regulate their engagement in academic tasks. As noted by Wolters (2003a), students who are devoid of any motivation for a task are not likely to choose to devote effort toward ensuring that the task is completed successfully.

In support of this view, we found that the types of regulation of motivation strategies students reportedly used could be predicted using the motivational beliefs and attitudes they expressed. In prior research, mastery orientation consistently has been used to predict positively students' reported use of cognitive and metacognitive strategies (Anderman & Wolters, 2006). Consistent with this pattern, we found evidence that students who saw themselves as more focused on mastery goals also tended to report greater use of four of the six regulation of motivation strategies examined. Students' perceptions regarding the value of course content was also a positive predictor, although less strongly overall, for several of the reported motivational regulation strategies. Together these findings indicate that students who generally view the material as important and useful, and who want to learn and improve their understanding may be more likely to act to sustain or improve their ongoing motivation for academic tasks.

Students who reported a greater focus on performance approach goals also tended to report using a strategy that relied on these types of goals to sustain or increase their effort and persistence for academic tasks. Hence, wanting to do well or get good grades may also be tied to increased motivational regulation, but in a more limited, and perhaps self-perpetuating, fashion. At the same time, students' perceptions of value and self-efficacy were also individual predictors for their reported use of a motivational regulation strategy based on performance approach goals. Students who indicated that they valued the material more and had more confidence in their ability to be successful also reported using performance goals as a basis for regulating their motivation more often. This pattern of relations suggests a potential (but untested) link between more adaptive forms of motivation and the adoption of performance approach goals. That is, students who value and feel confident in their abilities may turn to stressing the desire to get good grades when their overall motivation is waning, resulting in a general shift toward a greater performance approach orientation.

Also in line with our second goal, findings provide evidence that links motivational regulation to the cognitive, metacognitive, and behavioral aspects of self-regulated learning. As evidenced by the bivariate correlations, students who reportedly used more cognitive and metacognitive strategies more frequently also tended to report using motivational strategies more often. The nature of these relations, however, was not so strong as to suggest a unitary underlying construct. Rather, findings suggest that some students may express a greater degree of strategic behavior in each of these different areas. This conclusion was also supported in the supplemental analyses showing that students' beliefs about their metacognitive strategy use were a strong individual predictor for each of the reported motivational regulation strategies. Again, students who expressed a greater tendency to plan, monitor, and control their cognitive engagement were also more likely to report using strategies intended to manage their motivational processing. Together these findings help to form a picture of motivational regulation as an additional aspect of what it means for students to be self-regulated learners. These students are not just skilled at planning, monitoring, and managing the cognitive processing necessary to learn, but are also able to employ regulatory strategies that keep them engaged and working hard at academic tasks. One practical

implication of this finding is that efforts to improve students' self-regulated learning may benefit from including motivational strategies into the instructional plan. Indeed, there is already some evidence that effective instruction geared toward improving students' self-regulated learning does include elements of motivational regulation (Hofer, Yu, & Pintrich, 1998; Tuckman, 2003).

A less consistent but perhaps more interesting pattern of findings emerged when considering the relations between the self-reported procrastination and the motivational strategies. Procrastination was correlated negatively with the motivational regulation strategies as expected. Students who reported delaying their academic work more tended to report less frequent use of five of the six motivational regulation strategies assessed in the present study. However, procrastination was unrelated to students' motivational regulation in the multivariate analyses that accounted for students' motivational beliefs and their reported metacognitive strategy use. This pattern suggests that procrastination may be tied more closely to students' motivational beliefs rather than their use of motivational regulation strategies. However, additional work is needed to better explore these relations.

## Limitations

The findings and implications of this study must be considered in light of certain limitations. One limitation of the present study is that the data are correlational and based on a self-report instrument. We examined a model in which students' reported beliefs about their motivation were used to predict and understand their concurrent reported use of motivational regulation strategies. Although commonly used to study self-regulation, self-report instruments allow for certain biases and inaccuracies that must be seen as shortcomings (Winne & Perry, 2000). Some of these issues (e.g., sampling), furthermore, may be more salient in the present study because the survey was not administered in a consistent and controlled context. In addition, the correlational nature of the data and the expected reciprocal relations among these constructs make it impossible to draw any causal conclusions about these relations. For example, students who expressed a greater mastery orientation tended to report greater use of the regulation of motivation strategies tied to intrinsic forms of motivation. It might also be the case that students' use of these strategies is exactly what pushes them to be more focused on achieving mastery-based goals. Research using more experimental designs and/or other forms of data is needed to explicate the causal connections between these two factors.

A second limitation concerns the contextual nature of motivation and perhaps the usefulness, salience, and potency of particular motivational strategies. The courses from which participants were drawn were geared toward first- and second-year college students and had enrollments over 150 students. On average, the instructional policies and course climate may impact the forms of motivation that drive students' engagement and the type of motivational strategies students use most often. Hence, studies of other types of college courses (e.g., smaller advanced seminars) may show that different motivational strategies are more commonly used. Additional research that examines these constructs within different types of courses and that examines how the instructional practices and course climate might affect the relations would be informative.

Along these same lines, the types of motivational strategies that students use should be dependent on the particular task and the obstacles or reasons why their desire or willingness to provide effort and complete academic tasks is waning. The instrument utilized in this study, for example, directed students to think about studying for a test. The mean levels at which

strategies were endorsed could easily be different if the academic task used to prompt students was changed. In line with Wolters (1998), for example, different types of strategies might emerge as most frequently used if participants were asked to consider attending a lecture or writing a paper. Again, studies that assess motivational regulation across a broader set of academic tasks would provide the insight necessary to understand these issues more completely.

A fourth limitation of the present study was the conceptualization of performance goals. Most recent conceptualizations of performance approach goals now stress that one key element in these types of goals is doing better than others or being judged as higher in ability (Elliot & Murayama, 2008). In contrast, the performance orientation and the regulation of performance goals scales within this study were centered on getting high grades or doing well on tests and assignments which represent a different type of performance approach goal (Hulleman, Schrager, Bodmann, & Harackiewicz, 2010). It would be interesting to know whether students use a motivational regulation strategy tied more to the notion of doing better relative to others and whether it overlaps or is distinct from the one supported here. Also, future research should investigate how the revised form of performance approach goals (as well as performance avoidance goals) is linked to students' motivational regulation.

Despite these limitations, the present study provides a valuable extension of the work on self-regulated learning. It contributes additional empirical support for the inclusion of the regulation of motivation as a core facet of self-regulated learning. As such, it also serves to push the field to continue to investigate and broaden the research in this area. In particular, findings support the need for additional research identifying the range of motivational regulation strategies that are used by students, their relation to other aspects of self-regulated learning, and their role in increasing students' academic achievement.

## AUTHOR NOTES

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