Comparing students' self-discipline and self-regulation measures and their prediction of academic achievement

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ABSTRACT

Using a multi-source, multi-measure research design involving 507 high school students and their teachers, we compared prediction of these students' academic achievement by a composite of students' and teachers' measures of students' self-regulation (SR) with a composite of students' and teachers' measures of students' self-discipline (SD). Hierarchical regression analyses revealed that the SR composite was more predictive of students' grade point average and performance on a state-wide achievement test than the SD composite. Confirmatory factor analyses showed that, although SD and SR latent factors correlated significantly, a two-factor solution provided an acceptable fit for the results. Structural Equation Modeling analyses indicated that the SR latent factor predicted both measures of students' achievement significantly, but the SD factor did not predict either achievement measure significantly. No significant gender differences were found with students' SD, SR, or achievement measures. These results suggest a path for integrating two relatively separate streams in self-regulation research on the basis of a well-established distinction between learning and performance processes.

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1. Introduction

Since the mid-1980s, researchers from diverse theoretical backgrounds have investigated students' self-initiated, strategically guided, and self-sustained efforts to learn as instances of self-regulation (SR). This construct refers to processes that learners use to activate and maintain cognitions, emotions, and behaviors to attain personal goals. These goals enable learners to create self-oriented feedback loops to monitor their effectiveness and to adapt their functioning. In order to set challenging goals and sustain self-regulatory efforts to achieve them on demanding tasks, learners need to possess or develop supportive motivational beliefs. To respond adaptively to personal feedback, learners need to control their cognitions, emotions, and environments. It should be noted that the label SR is similar in meaning to related self-hyphenated terms, such as self-control, self-management, self-directed behavior, and self-discipline (SD). The present research compares SR and SD as constructs and their separate and combined prediction of students' academic achievement.

Historically, SR researchers have studied learners' metacognitive and cognitive processes, such as strategy use (Butler, 1998; Weinstein, Schulte, & Palmer, 1987). For example, Graham and Harris (1989a, 1989b) taught students in special education classes to use a multi-step strategy for writing essays, and this self-regulatory training led to higher levels of learning. However, when Pressley and McCormick (1995) surveyed strategy training research, they found that learning strategies often were not remembered, generalized poorly to new tasks, or were not used proactively by students when studying or practicing in authentic contexts. This led to the investigation of motivational beliefs that were embedded within cycles of SR, such as self-efficacy beliefs and goal orientations that precede attempts to learn as well as self-evaluations and attributions that follow efforts to learn (Zimmerman, 2011). For example, students' perceptions of efficacy regarding their use of learning strategies have predicted an array of motivational outcomes, such as task choice (Bandura & Schunk, 1981; Zimmerman & Kitsantas, 1997) and persistence (Schunk, 1984; Zimmerman & Ringle, 1981). Schunk and his colleagues have conducted extensive training research and found statistically significant[1] positive correlations between perceived efficacy, empowering attributions, and self-regulated performance in diverse areas of

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[1] To avoid confusion about the use of the word "significant" to refer to statistical or to practical results, we labeled all instances of practical significance as such. We labeled all instances of statistical significance that might be misinterpreted, but we did not use this frequently used label when the context was clearly statistical.

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academic functioning, such as math problem solving, writing, and reading (e.g., Schunk, 1984; Schunk & Gunn, 1986; Schunk & Rice, 1989).

In contrast, researchers studying SD have focused on performance processes designed to cope with learning problems, such as hyperactivity, need for immediate gratification, and anxiety. Often these problems adversely affect students' academic functioning, such as procrastination in writing (Benecke & Harris, 1972) and impulsivity during problem solving (Meichenbaum & Goodman, 1971). Many of these problems involved defensive reactions to learning problems, such as helplessness or withdrawal. To overcome these obstacles, students need to control their performance and personal environments in order to maintain their intentions and gain their learning goals (Corno, 1989; Gollwitzer, 1990; Kuhl, 1985). Although researchers' investigations of performance problems produced a distinctive body of research, their choice of labels for their construct was typically self-control or self-regulation (see Baumeister & Vohs, 2004).

Duckworth and Seligman (2005, 2006) chose the label SD to describe the construct they created by combining diverse scales assessing performance problems. They defined SD as "the ability to suppress prepotent responses in the service of a higher goal and further specifying that such a choice is not automatic but rather requires conscious effort" (2006, p. 199). SD is similar to the notion of effortful control, which Rothbart and Bates (1998) defined "as the ability to inhibit a dominant response to perform a subdominant response" (p. 137). That is, SD enables learners to control their present performance in order to attain greater satisfaction (English & English, 1958). Among the examples of academic SD, Duckworth and Seligman (2006) included the following: paying attention to the teacher rather than day dreaming, controlling one's anger instead of having a temper tantrum, persisting on a long term assignments despite boredom and frustration, and reading the directions before beginning a test rather than starting impulsively. These examples reveal a key property of SD: an emphasis on consciously controlling adverse personal performance.

In a multi-method, multi-source study of SD and intelligence, Duckworth and Seligman (2005) combined diverse measures of SD from students, their parents, and their teachers. The students were eighth-graders from an ethnically diverse magnet public school in a northeastern city. These researchers' goal was to create a composite measure of SD that transcends the limitations of any particular measure. This composite involved two student questionnaires, a parent questionnaire, a teacher questionnaire, and a delayed gratification questionnaire. This methodology was chosen because "it provided a sounder measure of trait self-discipline than used in most prior studies of this age group" (p. 942). The validity of this composite trait measure of SD for this sample was assessed by its prediction of two widely used indices of students' academic performance: GPA and a standardized test of academic achievement.

The measures were significantly intercorrelated, and the reliability of a composite of these measures was high at .96. This composite did not correlate significantly with the students' IQ. The correlation between SD and GPA ($r = .67$) was twice the size of the correlation between IQ and GPA ($r = .32$). A multiple regression analysis showed that SD predicted more than twice the variance in GPA than did IQ.

In a subsequent study, Duckworth and Seligman (2006) focused on gender differences in SD by eighth grade students. Prior research by Pomerantz, Altermatt, and Saxon (2002) revealed gender differences in GPA, with girls outperforming boys, but no gender differences in students' performance on achievement tests were found. To investigate whether SD could be the cause of gender differences in GPA, these researchers again selected five measures: two student questionnaires, a parent questionnaire, a teacher questionnaire, and a delay of gratification questionnaire. These measures were found to be highly intercorrelated, and a composite trait score was calculated. These researchers hypothesized that these gender differences in GPA were due to superior levels of SD on the part of girls and to the fact that GPA requires greater persistence than standardized test performance because it is based on many assignments and tests. In support of this hypothesis, these researchers found that girls were significantly higher than boys on the composite SD measure. Hierarchical multiple regression analyses revealed that the composite SD score mediated the relation between gender and students' grades. The direct path from gender to GPA decreased 54% from $B = .26$, $p > .01$ to $B = .12$ $p > .05$ when SD was included as a mediator. Duckworth and Seligman found that girls' superior SD led to their higher GPA than boys, but the girls' greater SD did not enhance their performance on an achievement test compared to boys.

Clearly a composite measure of SD has proven predictive of important academic outcomes, but this finding leads to a number of key theoretical and methodological questions dealing with its relation to SR characteristics. From a theoretical prospective, the distinction between SR and SD parallels that drawn between learning processes and performance outcomes in the self-regulation literature. Learning processes, such as strategies and strategy attributions, are designed to help students acquire capabilities and improve their academic skills (Ames, 1992) whereas performance outcomes or products are designed to focus students on completing a task optimally (Schunk, 2012, p. 376).

Experimental research has shown that students who focus on learning processes are more effective than those who focus on performance outcomes in enhancing students' academic writing (Schunk & Schwartz, 1993a, 1993b). The learning process involved executing a multi-step writing strategy whereas the performance outcome involved focusing on enhancing writing products (four types of paragraphs). Despite considerable experimental evidence that students' attentional focus is an important in self-regulation, there is little evidence to date that a learning/performance distinction is predictive of SD/SR differences across a group of measures.

The present research tests the hypothesis that SR learning measures will predict students' academic achievement better than SD performance measures. The results of efforts to test this hypothesis will permit integration of two relatively separate streams in self-regulation research on the basis of a well-established distinction between learning and performance processes.

In addition to addressing these theoretical questions, we sought to answer several methodological questions dealing with the assessment of SD and SR. Although measures of SD and SR are expected to be correlated, do they assess different latent factors? Duckworth and Seligman (2005, 2006) did not investigate latent factors in their analyses, but instead they relied on a cumulative standard score analysis. We employ Confirmatory Factor Analysis (CFA) to answer this question. A second methodological question involves the relative size of predictions of students' academic achievement by SD and SR latent factors. Structural Equation Modeling (SEM) will be used to address this question along with the issue of the role of students' gender.

In planning the present study, we followed Duckworth and Seligman's multi-method, multi-source design in selecting the SD measures and in creating a parallel set of SR measures. Because these researchers' measures of SD were assessed by questionnaires completed by students and their teachers, SR measures were selected that possessed the same methodological properties. However, even when teachers' reports are included with students' self-reports, questionnaires have limitations as measures of causality among SR processes and academic performance outcomes (Zimmerman, 2008): They do not provide real time evidence of