Investigating grit and its relations with college students' self-regulated learning and academic achievement

Christopher A. Wolters · Maryam Hussain

Abstract We investigated grit and its relations with students' self-regulated learning (SRL) and academic achievement. An ethnically diverse sample of 213 college students completed an online self-report survey that included the Grit Short scale (Duckworth and Quinn Journal of Personality Assessment, 91(2), 166–174, 2009), seven indicators of SRL and their past and present academic achievement. Results indicated that one aspect of grit, perseverance of effort, was a consistent and adaptive predictor for all indicators of SRL including value, self-efficacy, cognitive, metacognitive, motivational, time and study environment management strategies, and procrastination. A second aspect of grit, consistency of interest, was associated only with the latter two facets of SRL. Perseverance of effort predicted achievement before, but not after, accounting for SRL; hence, students' engagement in SRL may serve as a mediating pathway through which this aspect of grit is associated with improved academic outcomes. In contrast, consistency of interest showed no relation to achievement. Implications of the findings for additional research and instruction are discussed.

Over the past 25 years, self-regulated learning (SRL) has emerged as a major framework used to understand, evaluate, and improve students' functioning within academic contexts (Schunk and Zimmerman 2008). Individual differences characterized by many as more stable or trait-like, including personality, intelligence, and achievement motives, also have been investigated repeatedly as an important influence on students' academic functioning (Diseth, and Kobbeltvedt 2010; Komarraju et al. 2009; Richardson et al. 2012). Studies integrating these two perspectives indicate that accounting for both SRL and more stable individual differences may provide for a better understanding of students' academic performance than either one does alone (Bidjerano and Dai 2007; De Feyter et al. 2012; Eilam et al. 2009; Richardson and

C. A. Wolters (✉)
Department of Educational Studies, Dennis Learning Center, 250 Younkin, The Ohio State University, Columbus, OH 43201-2333, USA
e-mail: wolters.21@osu.edu

M. Hussain
Department of Educational Psychology, University of Houston, Houston, TX 77204, USA

Abraham 2009). In the present study, we advance this area of research by investigating the relation of grit, SRL and academic achievement. Although grit is considered distinct from other personal traits and has proven useful for explaining academic outcomes (Duckworth and Quinn 2009; Maddi et al. 2012; Strayhorn 2013), the relation of grit and SRL has not yet been investigated. The present study addresses this gap by exploring whether grit can be used to predict seven indicators of college students' engagement in SRL, and whether grit and SRL together can be used to understand students' academic achievement.

Grit

Grit is defined as a person's trait-level perseverance and passion for long-term goals (Duckworth et al. 2007). As such, grit has been conceived as a stable characteristic or disposition of the individual that, similar to traditional personality traits, influences his/her attitudes and behavior across diverse contexts (Duckworth and Quinn 2009; Kleiman et al. 2013; Reed et al. 2013). Compared to their less gritty peers, individuals with higher levels of grit are expected to exhibit greater persistence in the pursuit of their goals despite setbacks, distractions, or other forms of interference. Within educational contexts, grit is portrayed as a potentially important influence on outcomes such as students' engagement, achievement level, retention and probability of graduation (Duckworth and Quinn 2009; Maddi et al. 2012; Strayhorn 2013).

Although still quite limited, the research examining grit indicates that it can be measured reliably and that it is empirically distinct from other trait-like individual differences. In particular, Duckworth and colleagues (2007) developed an initial self-report measure of grit and provided some evidence that it was different than traditional personality constructs such as conscientiousness. Although analyses with adults suggested that it consisted of two related dimensions, these researchers examined grit using a single 12-item scale. Based on samples from several distinct populations, these researchers showed that this broad indicator of grit was related positively to educational attainment, college grades, self-control, retention within a rigorous military training program, and adolescents' performance in a competitive national spelling bee.

Adding to this research, Duckworth and Quinn (2009) developed a shorter 8-item self-report survey based on a subset of the original grit items. Re-evaluation of data from the participants in Duckworth et al. (2007) with this smaller set of items as well as an additional sample of adults indicated that grit was best modeled as two first-order latent factors that also loaded on to one second-order latent factor. One of the first-order factors, titled consistency of interest, reflected participants' reported tendency to adhere to particular goals over longer periods of time. The second first-order latent factor, termed perseverance of effort, represented participants' reported tendency to sustain the time and energy necessary for accomplishing long term tasks even in the face of distractions. Despite the distinction between these factors, Duckworth and Quinn utilized a single 8-item indicator of grit in several additional studies with adolescents, military cadets and adults. Overall, Duckworth and Quinn replicated many of the earlier findings from Duckworth et al. (2007) including the independence of grit from aspects of personality, and its positive relation to academic success, retention within a rigorous military training program, and ranking in a national spelling bee. They also found that the single short measure of grit was relatively stable across the span of one year among adolescents.

Recent contributions from other researchers tend to confirm the view of grit as a potentially important influence on aspects of individual's persistence and performance, including within

academic contexts. Maddi et al. (2012), for instance, found that a singular indicator of grit was a strong predictor of retention and performance in sample of military cadets. Higher levels of a general measure of grit have also been linked to increased intensity of exercise (Reed et al. 2013) and reduced suicide ideation (Kleiman et al. 2013). In a sample of high school students, MacCann and Roberts (2010) found that both dimensions of grit, but especially the perseverance of effort, were positively correlated with life satisfaction, multiple aspects of conscientiousness and teacher's rating of social behavior, but not to grades or academic readiness. Finally, Strayhorn (2013) found that an overall indicator of grit was a positive predictor of self-reported grades among African-American males attending a university with a predominantly White student population. In this study, grit was a stronger predictor of college grades than high school GPA and other standardized college entrance exams.

Summing across this work, grit appears to represent a compound personal characteristic that is associated with students' tendency to be successful within achievement contexts. The evidence linking grit specifically to students' academic achievement, however, is still very limited and somewhat inconsistent. For instance, the two studies that examined the relation of grit with students' course grades produced conflicting results (MacCann and Roberts 2010; Strayhorn 2013). Further, the pathways through which this impact may be realized have not yet been examined. In particular, the possibility that grit is associated with increased engagement in SRL has not been investigated.

Self-regulated learning

SRL is understood generally to be the process through which students take an active, purposeful role in managing motivational, cognitive and behavioral aspects of their own learning (Pintrich 2004; Zimmerman 2000). This management is accomplished through students' engagement of various sub-processes that include goal setting, activation of relevant prior knowledge, progress monitoring, engagement and regulation of learning strategies, and reflection (Pintrich 2004; Winne and Hadwin 1998). Across these various sub-processes, two consistently critical components of SRL reflect students' motivation and their engagement and use of different cognitive and regulatory strategies.

Motivation

SRL is an effortful process that involves the activation and use of substantial cognitive and metacognitive resources. Hence, motivation is viewed as an important facet of what it takes to engage in SRL (Pintrich and Zusho 2002; Winne and Hadwin 2008; Zimmerman and Schunk 2008). The forms of motivation that have been incorporated into models of SRL are diverse with no clear hegemony (Schunk and Zimmerman 2008). For instance, models of SRL have highlighted the roles of goal setting, achievement goals, interest, value, perceived self-efficacy and attributions (Pintrich and Zusho 2002; Winne and Hadwin 2008). The focus in this study is on two aspects of achievement motivation, perceived self-efficacy and value, which consistently have been used within models of SRL (Pintrich and Zusho 2002; Zimmerman 2000). Self-efficacy, defined as students' beliefs about whether they are capable of successfully reaching particular learning goals, has been intricately linked to their goal setting, choice and effort within academic contexts (Linnenbrink and Pintrich 2003; Pajares 1996; Zimmerman 2000). As well, students who report higher levels of self-efficacy have been found to exhibit increased use of the cognitive and metacognitive strategies central to SRL. Even when examined outside the framework of SRL, self-efficacy has proven to be an

important predictor of success, retention, and performance within college student populations (Richardson et al. 2012; Robbins et al. 2004).

Students' value for the material they are learning is also a key form of motivation within many models of SRL (Pintrich and Zusho 2007; Wigfield and Cambria 2010). Value is a multi-dimensional construct that can incorporate students' personal interest, importance, usefulness, and aspects of situational interest (Wigfield and Eccles 2000). In general, students who perceive the materials or skills they are learning as useful, interesting, important or enjoyable are more likely to engage the regulatory strategies necessary for SRL and evidence higher academic achievement (Pintrich and Zusho 2007; Wigfield and Cambria 2010).

Strategy use

From its inception, the activation and effective use of strategies that promote learning, understanding and achievement has been a hallmark of what it means to engage in SRL (Pintrich 2004; Winne and Hadwin 1998; Zimmerman 2000). Although cognitive and metacognitive learning strategies have been examined most commonly, researchers recognize that other types of strategies are also critical to successful SRL (Pintrich 2004; Wolters 2003a). Consistent with this view, we assess four distinct types of strategies that reflect adaptive aspects of SRL including cognitive, metacognitive, motivational, and time and study environment management.

Generally, cognitive strategies are understood to include different tactics that students use to facilitate the encoding and storage of the material they are supposed to learn (Weinstein et al. 2011). For instance, cognitive strategies include efforts to rehearse, elaborate, or organize material one is trying to learn. Closely linked to these, metacognitive strategies include students' efforts to plan, select, monitor, evaluate and, when necessary, modify or regulate their use of learning strategies (Pintrich et al. 2000). Motivational regulation strategies represent students' efforts to control their own level of motivation or motivational processing (Wolters 2003a). This type of strategy, including self-consequating, self-talk about goals, and making learning tasks more enjoyable, are thought to be particularly important when students are facing obstacles to their continued engagement and effort on academic tasks (Wolters 1998, 2003a). Time management and control of the learning environment also represent important self-regulatory skills (Pintrich 2004; Zimmerman et al. 1994). These more behavioral strategies reflect students' efforts to control when and where they study including the use of planners, to-do lists, and well-organized study spaces.

Overall, there is compelling evidence that the use of SRL strategies is associated positively with students' achievement within academic contexts. The evidence for this connection is strongest for students' use of cognitive and metacognitive strategies (Pintrich and Zusho 2007). Research also shows that college students have a repertoire of motivational regulation strategies and that use of these strategies is associated with increased effort, persistence, and academic performance (Schwinger et al. 2009; Wolters 1998). Although not always conducted using a SRL framework, there is also ample research showing that students who report greater time management tend to get better grades (Claessens et al. 2007; Kitsantas et al. 2008; Macan et al. 1990).

Procrastination

We investigate procrastination as a reflection of students' ability to effectively self-regulate their learning. Procrastination can be defined as students' delay of tasks or decisions that are necessary and will eventually be completed (Steel 2007). Although studied through many

theoretical perspectives, procrastination repeatedly has been portrayed as a failure of effective self-regulation (Steel 2007; Wolters 2003b). Consistent with this view, procrastination by students within academic settings has been associated with lowered academic performance (Schouwenburg et al. 2004). Procrastination also has been linked to maladaptive outcomes such as reduced sense of well-being, depression, stress and fatigue (Schraw et al. 2007; Steel 2007). At the same time, studies have consistently found that procrastination is prevalent among college student populations with some estimates indicating that over 75 % of students reporting that they procrastinate regularly (Ferrari et al. 2007; Schraw, et al. 2007; Steel 2007).

Grit and self-regulated learning

According to Pintrich (2004), one assumption consistent within most models of SRL is that SRL processes serve as a mediator between students' personal and background characteristics and their performance within particular contexts. Dispositions, personality traits, or other stable individual differences such as grit are, therefore, commonly viewed as precursors or potential influences on the attitudes, beliefs, cognitive processes, and behaviors that embody SRL (Bidjerano and Dai 2007; Eilam et al. 2009; Komarraju et al. 2009). In line with this assumption, one would expect that aspects of grit could be used to explain college students' motivation and use of strategies emblematic of SRL. Up to this point, however, no published empirical research has investigated these theoretical links directly. Duckworth et al. (2010) did find that grit was a positive predictor of the deliberate and more effortful forms of practice reported by contestants preparing for a national spelling bee. This study, however, did not assess any of the specific strategies used during the practice time and was focused on early adolescents engaged in an extra-curricular activity. The overall goal of the present study was to address this major gap in prior research by examining the relations between aspects of grit and college students' SRL as represented by measures of their value, self-efficacy, reported use of four types of learning strategies, and procrastination.

Despite the lack of studies examining grit and SRL directly, research investigating similar trait-like individual differences supports the need to investigate these relations. Based on the five-factor model of personality, for instance, greater conscientiousness among college students tends to be associated with higher levels of academic motivation and especially self-efficacy or perceived competence (De Feyter et al. 2012; Komarraju et al. 2009; Richardson and Abraham 2009). As well, college students who are more conscientious also tend to report increased use of some learning strategies typical of SRL (Bidjerano and Dai 2007). Given its association with attributes such as diligence, dependability, organization, punctuality, carefulness and self-control, conscientiousness also has been linked to lower levels of procrastination (vanEerde 2004). Although not found in every case (Trautwein et al. 2009), several studies have concluded that the influence of conscientiousness and other personality traits on students' achievement is mediated by their motivation and use of regulatory strategies (Bidjerano and Dai 2007; De Feyter et al. 2012; Eilam et al. 2009; Richardson and Abraham 2009).

Achievement motives represent another type of trait or stable disposition that has been used to understand students' academic functioning (Bartels et al. 2010; Diseth and Martinsen 2003). Motives linked to wanting to achieve success and to avoid failure both have been used to explain more context specific aspects of students' motivation, especially their achievement goals (Bartels et al. 2010; Chen et al. 2009; Conroy and Elliot 2004; Elliot and Church 1997; Elliot and McGregor 2001; Elliot and Murayama 2008; Michou et al. 2013). Likewise, approach motives have been associated positively with self-reported engagement and the use of deep, metacognitive or other adaptive types of strategies emblematic of SRL (Bartels and

Magun-Jackson 2009; Bartels et al. 2010; Diseth and Kobbeltvedt 2010; Diseth and Martinsen 2003; Michou et al. 2013). In contrast, fear of failure or other avoidance motives have been associated with performance-avoidance goals and test anxiety, along with decreased use of adaptive strategies (Bartels et al. 2010), increased use of surface strategies (Diseth and Kobbeltvedt 2010; Diseth and Martinsen 2003), and increased levels of self-handicapping, procrastination, and other indicators of poor self-regulation (Chen et al. 2009). Finally, studies also show that the relations of achievement motives to students' academic performance may be mediated by more situational forms of motivation and engagement (Diseth and Kobbeltvedt 2010; Diseth and Martinsen 2003; Elliot and Church 1997; Elliot and Murayama 2008).

Research questions

In sum, individual differences similar to grit have been linked to several indicators of students' SRL such as their motivation, use of learning strategies, and procrastination. Research investigating these relations with regard to grit, however, is absent. We address this gap in prior work via four related research questions. One, is grit related to college students' value and self-efficacy? Given its basic conceptual definition as well as past research with conscientiousness and achievement motives, we expected that grit would be associated positively with both of these adaptive motivational beliefs and attitudes. Two, is grit related to more strategic aspects of students' SRL including their use of different regulatory strategies and level of academic procrastination? We expected that grit would be a positive predictor of students' use of regulatory strategies and negatively associated with their self-reported procrastination. Three, is grit related to college students' academic achievement? Although the evidence of this connection is not entirely consistent, we anticipated that grittier students would tend to get better grades. Finally, do the motivational and strategic aspects of SRL mediate the relation between grit and students' academic performance? Given findings with other types of individual differences, we expected that aspects of SRL may also mediate any relation between grit and students' grades.

Method

Participants

The 213 participants for this study came from a large and diverse public university. The students were primarily female ($n=188$, 88 %), and self-reported their race/ethnicity as African-American ($n=45$, 21 %), Asian/Pacific Islander ($n=53$, 25 %), Hispanic ($n=62$, 29 %), White ($n=43$, 20 %), or Other ($n=10$, 5 %). The academic rank reported by the participants included freshman ($n=28$, 13 %), sophomore ($n=51$, 24 %), junior ($n=74$, 35 %), and seniors or post-baccalaureate ($n=60$, 28 %).

Procedures

Participants were recruited through a subject pool associated with multiple undergraduate psychology and educational psychology courses. Students in these courses had access to an electronic list with short descriptions for the studies that could be used to satisfy requirements for participation in research. Students who elected to volunteer for the present study clicked on a link that took them first to a consent document and, if approved, to the actual survey. Surveys were completed during the final two weeks of the autumn semester before the final exam period.

Measures

The primary instrument was an online self-report survey with a total of 136 items. Only data from 78 items related to demographics, grit, achievement motivation, strategy use, procrastination and academic performance were used in the present study. Other than the demographics and performance sections, all items used Likert-styled items with a response scale ranging from 1 (*not at all true of me*) to 5 (*very true of me*).

Grit Participants completed the eight-item Grit Short scale (Duckworth and Quinn 2009). In line with Duckworth and Quinn, a confirmatory factor analysis with the current sample indicated that a measurement model with two first-order latent factors fit the data well (χ^2 (19, N=213) =20.04, p=.392; RMSEA=.02 (90 % confidence interval [CI]=.00, .06), CFI=.997). In contrast, alternative models that reflected all items in one general factor (χ^2 (20, N=213) =125.756, p<.001; RMSEA=.16 (90 % CI=.13, .19), CFI=.645) or that included a second order general factor (χ^2 (36, N=213) =333.81, p<.001; RMSEA=.20 (90 % CI=.18, .22), CFI=.000) did not fit the data well. Given these findings and consistent with prior work with this scale (Duckworth and Quinn 2009), we constructed separate scales representing the two first order factors based on the mean of the relevant items. *Perseverance of effort* reflected students' self-reported tendency to sustain the time and energy necessary for accomplishing long-term tasks. *Consistency of interest* represented students' self-reported tendency to stick with particular goals over longer periods of time. Items for these scales included "*I finish whatever I begin.*" (Perseverance of effort), and "*I often set a goal but later choose to pursue a different one*" (Consistency of effort, reverse coded). Coefficient alphas for each of the scales, as well as all those described below are presented in Table 1.

Motivation Motivation was measured using 11 items modified to assess students' beliefs and attitudes regarding school or learning in general rather than a specific course (Pintrich et al. 1993; Wolters 2003b). Six items represented *value*, or the extent that students perceived coursework as useful, interesting, and important. Five items reflected s*elf-efficacy*, or how confident students felt about their ability to learn and successfully complete their coursework.

Strategy use and procrastination Using modified items from Pintrich et al. (1993) and Wolters (2003b; Wolters and Benzon 2013) to refer to learning or coursework in general, four types of self-regulatory strategies were assessed. *Cognitive strategies* measured participants' reported use of rehearsal, elaboration and organization strategies to complete academic tasks (9 items). *Metacognitive strategies* measured participants' reported use of techniques for planning, monitoring, and managing their learning strategies (9 items). *Time and study environment management* reflected the extent to which students believed they used effective strategies for academic scheduling and regulating where they studied (8 items). *Motivational strategies* measured participants' reported use of strategies for managing their level of motivation and their effort at particular academic tasks (14 items). Finally, *procrastination* was assessed by adapting the 12 items from the Pure Procrastination Scale (Steel 2010) to refer to academic contexts. These items measured students' reported tendency to delay making decisions, begin tasks, or miss deadlines for their academic work. As shown in Table 1, all of the motivation, strategy use, and procrastination scales had moderate to high levels of internal consistency.

Academic performance Prior achievement was based on a single item on which students reported their cumulative high school grade point average (HSGPA). Although not ideal, self-reported grade point average is a widely used measure of academic performance and has

Table 1 Means, standard deviations, and bivariate correlations for grit, self-regulated learning, and achievement variables

	1	2	3	4	5	6	7	8	9	10	11
1. Consistency of interest	–										
2. Perseverance of effort	.12	–									
3. Value	.03	.38	–								
4. Self-efficacy	.03	.41	.57	–							
5. Cognitive strategies	.07	.45	.44	.46	–						
6. Metacognitive strategies	.08	.51	.44	.44	.83	–					
7. Motivational strategies	.04	.51	.50	.42	.69	.71	–				
8. Time & study environment management strategies	.27	.55	.42	.32	.61	.65	.61	–			
9. Procrastination	–.36	–.49	–.28	–.23	–.35	–.41	–.39	–.67	–		
10. Prior achievement	–.12	.09	.11	.19	.11	.09	.09	.09	–.10	–	
11. Current achievement	.10	.29	.20	.26	.22	.24	.24	.41	–.41	.28	–
Alpha	.74	.64	.84	.87	.80	.83	.90	.77	.92	–	–
n	213	213	213	213	213	213	213	213	213	213	211
M	2.84	3.50	3.78	3.79	3.53	3.51	3.61	3.34	2.94	6.32	3.34
SD	0.57	0.72	0.78	0.75	0.68	0.72	0.75	0.71	0.90	2.15	0.48

Note: $r \geq .20$, $p < .01$; $r \geq .24$, $p < .001$

shown a high correlation with actual grade point average (Caskie et al. 2014; Kuncel et al. 2005). Simple mean imputations were used to replace the missing observations for nine students who did not respond or indicated that they did not know their HSGPA. The eight response options for this item were based on 0.25 GPA increments from 8 (4.00–3.76) to 1 (2.00 or below). *Current achievement* was based on three separate items on which students reported the number of courses they were currently taking in which they expected to earn 1) an A, 2) a B or C, and 3) a D or lower. Responses to these items were combined to create one five-level variable with higher scores representing better expected grades in the courses they were taking the semester the survey was completed. Students with the top score (i.e., a 5) reported that they expected to receive an "A" in all of their courses. Students with scores of 4 and lower reported that they were expecting an increasingly larger number of B and C, or D and lower grades.

Results

Results are divided into two sections. First, we present descriptive information and bivariate correlations among the major variables. Second, we discuss findings from three sets of multiple regressions.

Descriptives and correlations

The means and standard deviations for the grit, SRL and achievement variables are presented in Table 1. The mean for perseverance of effort appeared somewhat higher ($M=3.5$) when compared to the mean for consistency of interest ($M=2.84$). Consistent with previous studies using similar scales with college populations (Wolters 2003b), all of the means for the SRL variables fell near the middle of the response scale.

The bivariate correlations among the grit, SRL and achievement measures are also presented in Table 1. Most noteworthy among these results is the low correlation between the two aspects of grit, as well as the distinctive pattern of relations each had with the SRL and achievement measures. Perseverance of effort was positively correlated with both value and self-efficacy, as well as with each of the four types of self-regulatory strategies. In contrast, consistency of interest was correlated only to time and study environment management. Both aspects of grit were correlated negatively with procrastination; only perseverance of effort was correlated positively with current achievement (see Table 1).

Multiple regressions predicting SRL and achievement

Predicting students' motivational beliefs We examined the relations of perseverance of effort and consistency of interest to students' value and self-efficacy in two separate multiple regressions. In addition to the two aspects of grit, prior achievement, sex, and age were included as control variables. Results from these analyses are presented in Table 2. Overall, the model accounted for about 16 % of the variance in value, $F(5, 205) =8.04$, $p<.001$, and about 19 % of the variance in self-efficacy, $F(5, 205) =9.89$, $p<.001$. Perseverance of effort was a significant individual positive predictor for both value, $\beta=.34$, $t(210) =5.20$, $p<.001$, 95 % CI [.23, .51] and self-efficacy, $\beta=.37$, $t(210) =5.78$, $p<.001$, 95 % CI [.25, .52]. Together, these findings indicate that students who tended to report that they sustained their engagement and did not give up on achieving long-term goals also reported, on average, increased value for their schoolwork, and greater confidence that they could successfully learn

Table 2 Results of regression analyses predicting value and self-efficacy

Predictor	Value			Self-efficacy		
	B	SE B	β	B	SE B	β
Age	.02	.01	.12	.02	.01	.15*
Female	−.26	.16	−.11	−.14	.15	−.06
Prior achievement	.03	.02	.09	.04	.02	.11
Perseverance of effort	.37	.07	.34***	.39	.07	.37***
Consistency of interest	−.01	.09	−.01	−.02	.09	−.02
R^2	.16***			.19***		

Note: N=211, * p<.05, *** p<.001

the material. In contrast, consistency of interest failed to emerge as significant individual predictor for either aspect of motivation (see Table 2).

Predicting students' use of strategies and procrastination Next, we conducted a set of five multiple regressions in which the two aspects of grit, the two indicators of motivation, and the same control variables were used to predict the four strategy measures and procrastination. These regressions were completed in two steps; with the grit and control variables entered together in a first block, followed by the two motivational variables in a second block. As presented in Table 3, the set of variables entered in the first block explained a significant amount of variance in cognitive strategies, R^2=.21, $F(5, 205)$ =10.71, p<.001, metacognitive strategies, R^2=.26, $F(5, 205)$ =14.21, p<.001, motivational strategies, R^2=.26, $F(5, 205)$ =14.61, p<.001, time and study environment management strategies, R^2=.35, $F(5, 205)$ =21.93, p<.001, and procrastination, R^2=.36, $F(5, 205)$ =22.57, p<.001. In this first block, perseverance of effort was the only significant predictor of cognitive strategies, β=.43, $t(210)$ =6.77, p<.001, 95 % CI [.29, .53], metacognitive strategies, β=.50, $t(210)$ =7.98, p<.001, 95 % CI [.37, .61], and motivational strategies, β=.51, $t(210)$ =8.32, p<.001, 95 % CI [.41, .67]. Both perseverance of effort and consistency of interest predicted time and study environment management strategies, β=.52, t(210) =8.89, p<.001, 95 % CI [.40, .63], β=.22, $t(210)$ =3.75, p<.001, 95 % CI [.13, .42], and procrastination, β=−.42, $t(210)$=−7.38, p<.001, 95 % CI [−.68, −.39], β=−.32, $t(210)$=−5.47, p<.001, 95 % CI [−.69, −.32].

Adding the two motivational variables in the second step significantly increased the amount of variance explained for cognitive strategies, ΔR^2=.11, $F(7, 203)$ =13.73, p<.001, metacognitive strategies, ΔR^2=.10, $F(7, 203)$ =15.80, p<.001, motivational strategies, ΔR^2=.12, $F(7, 203)$ =18.29, p<.001, and time and study environment management strategies, ΔR^2=.05, $F(7, 203)$ =19.51, p<.001. The amount of variance explained did not significantly change for procrastination, ΔR^2=.01, $F(7, 203)$ =16.58, p=.255, therefore, individual results for the motivation predictors and this dependent variable are not presented or discussed further.

In the second step, value was a positive predictor for cognitive strategies, β=.20, $t(210)$ =2.76, p<.01, 95 % CI [.05, .30], metacognitive strategies, β=.22, $t(210)$ =3.18, p<.01, 95 % CI [.08, .34], motivational strategies, β=.32, $t(210)$ =4.68, p<.001, 95 % CI [.18, .44], and time and study environment management strategies, β=.26, $t(210)$ =3.79, p<.001, 95 % CI [.11, .36]. Self-efficacy, in contrast, was a positive predictor only for cognitive strategies, β=.24, $t(210)$ =3.22, p<.01, 95 % CI [.08, .35] and metacognitive strategies, β=.17, $t(210)$ =2.41, p<.05, 95 % CI [.03, .30].

Table 3 Results of regression analyses predicting strategies for self-regulated learning and procrastination

Predictor	Step 1			Step 2			Step 1			Step 2		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
	Cognitive strategies						Metacognitive strategies					
Age	.00	.01	.01	−.01	.01	−.05	.00	.01	.01	−.01	.01	−.04
Female	−.10	.14	−.05	−.02	.13	−.01	.10	.14	.04	.17	.13	.08
Prior achievement	.02	.02	.07	.01	.02	.03	.02	.02	.05	.01	.02	.01
Perseverance of effort	.41	.06	.43***	.26	.06	.28***	.49	.06	.50***	.35	.06	.36***
Consistency of interest	.04	.08	.03	.04	.07	.04	.03	.08	.02	.03	.07	.03
Value			–	.18	.06	.20**			–	.21	.07	.22**
Self-efficacy			–	.22	.07	.24**			–	.17	.07	.17*
R^2		.21***			.32***			.26***			.35***	
ΔR^2					.11						.09	
	Motivational strategies						Time & study environment management strategies					
Age	−.01	.01	−.07	−.02	.01	−.12*	.00	.01	.00	.00	.01	−.03
Female	−.09	.14	−.04	.01	.13	.00	.04	.13	.02	.10	.12	.05
Prior achievement	.00	.02	.01	−.01	.02	−.03	.03	.02	.08	.02	.02	.05
Perseverance of effort	.54	.07	.51***	.38	.07	.36***	.52	.06	.52***	.43	.06	.26***
Consistency of interest	−.01	.08	−.01	.00	.08	.00	.27	.07	.22***	.28	.08	.22***
Value			–	.31	.07	.32***			–	.24	.06	.26***
Self-efficacy			–	.12	.07	.11			–	.00	.07	.00
R^2		.26***			.39***			.35***			.40***	
ΔR^2			–		.13				–		.05	
	Procrastination											
Age	−.01	.01			−.10		−.01	.01			−.09	
Female	.17	.16			.06		.14	.16			.05	
Prior achievement	−.05	.03			−.12		−.05	.03			−.12	
Perseverance of effort	−.54	.07			−.43***		−.51	.08			−.41***	
Consistency of interest	−.54	.08			−.32***		−.51	.09			−.32***	
Value			–				−.14	.08			−.12	
Self-efficacy			–				.06	.09			.05	
R^2					.35***						.36***	
ΔR^2					–						.01	

Note: N=211; * $p<.05$. ** $p<.01$. *** $p<.001$

Even when accounting for the two motivational beliefs, the pattern of relations for the two aspects of grit remained the same (see Table 3). Perseverance of effort was a positive individual predictor for cognitive strategies, β=.28, $t(210)$ =4.26, $p<.001$, 95 % CI [.14, .39]; metacognitive strategies, β=.36, $t(210)$ =5.56, $p<.001$, 95 % CI [.23, .48]; motivational

strategies, $\beta=.36$, $t(210)=5.84$, $p<.001$, 95 % CI [.25, .51]; and time and study environment management strategies, $\beta=.43$, $t(210)=6.92$, $p<.001$, 95 % CI [.31, .55]. Consistency of interest was a significant individual predictor only for time and study environment management strategies, $\beta=.22$, $t(210)=3.94$, $p<.001$, 95 % CI [.14, .42].

Predicting students' current achievement In a final regression, we examined the control variables, the two dimensions of grit, and the seven indicators of SRL together as potential predictors of students' current academic achievement. The control and grit variables were entered in a first step, followed by the SRL variables in a second step. This design provides insight into whether the two aspects of grit are able to account for variance in college students' academic performance both before and after accounting for their SRL.

As a group, the variables in the first step explained a significant amount of variance in current achievement, $R^2=.15$, $F(5, 202)=7.24$, $p<.001$ with both prior achievement, $\beta=.27$, $t(207)=3.92$, $p<.001$, 95 % CI [.03, .09] and perseverance of effort, $\beta=.23$, $t(207)=3.41$, $p<.01$, 95 % CI [.06, .24] emerging as positive individual predictors.

Adding the SRL variables increase the amount of variance explained in current achievement, $F(12, 195)=6.14$, $p<.001$ to about 27 %. As one might expect, prior achievement remained a strong positive predictor of current, $\beta=.21$, $t(207)=3.17$, $p<.01$, 95 % CI [.02, .08]. As well, time and study environment management strategies, $\beta=.32$, $t(207)=2.99$, $p<.01$, 95 % CI [.07, .35], self-efficacy, $\beta=.18$, $t(207)=2.25$, $p<.05$, 95 % CI [.01, .21] and procrastination, $\beta=-.20$, $t(207)=-2.28$, $p<.05$, 95 % CI [−.20, −.01] emerged as individual predictors of current achievement. Perhaps most noteworthy, after the addition of the SRL variables, perseverance of effort was no longer a significant individual predictor of current achievement, $\beta=-.00$, $t(207)=-.02$, $p=.984$, 95 % CI [−.10, .10] (see Table 4).

Table 4 Results of regression analysis predicting current achievement

Predictor	Current Achievement					
	Step 1			Step 2		
	B	SEB	β	B	SEB	β
Age	.01	.01	.06	.00	.01	.02
Female	−.08	.10	−.05	−.07	.10	−.05
Prior achievement	.06	.02	.27***	.05	.01	.21**
Perseverance of effort	.15	.04	.23**	.00	.05	.00
Consistency of interest	.09	.06	.11	−.02	.06	−.02
Value				−.02	.05	−.04
Self−efficacy				.11	.05	.18*
Cognitive strategies				−.06	.08	−.09
Metacognitive strategies				−.02	.08	−.03
Motivational strategies				−.03	.06	−.04
Time & study environment management strategies				.21	.07	.32**
Procrastination				−.11	.05	−.20*
R^2			.15***			.27***
ΔR^2						.12

Note: $N=208$; * $p<.05$. ** $p<.01$. ***, $p<.001$

Discussion

Grit has been proposed as a stable trait-like characteristic(s) that can be used to explain important academic outcomes among college students (Duckworth and Quinn 2009; Strayhorn 2013). Grittier students, it is argued, are more likely to persevere in the face of adversity and maintain their pursuit of challenging long-term goals such as earning a college degree. Our findings make an important contribution by providing initial evidence that students' engagement in SRL may serve as one key pathway through which grit leads to academic success. In addition, findings provide new and noteworthy support for the need to differentiate between two dimensions of grit. In the remainder of this section, we review the evidence for these contributions, and identify implications for instruction, limitations and directions for future research.

The relation of grit and college students' SRL

Our findings address a notable gap in prior research by providing preliminary evidence that ties grit to core indicators of college students' SRL. Perseverance of effort was a strong positive predictor for two aspects of motivation commonly associated with SRL. Students who indicated that they were more diligent, worked harder, and were less discouraged by setbacks also expressed greater interest, value, and usefulness for their coursework and tended to express increased confidence that they could successfully complete academic tasks. In contrast, consistency of interest, representing students' belief that they maintained pursuit of their goals across time, had no relation to students' value or self-efficacy. To our knowledge, this is the first study to empirically link any indicator of grit to specific forms of achievement motivation.

As a further contribution, we also found that the two aspects of grit could be used to explain four types of strategies emblematic of SRL among college students. Even when accounting for their value and self-efficacy, students who perceived themselves as more diligent and effortful workers also tended to report increased use of cognitive, metacognitive, motivational, and time management strategies central to SRL. Students who reported greater consistency in pursuing their established goals also tended to report increased use of time and study environment management strategies. Although prior work has linked students' use of self-regulation strategies with traits that are similar to grit (Bidjerano, and Dai 2007; Eilam et al. 2009), the present study is the first to do so specifically with a measure of grit.

Our findings are also the first to show that grittier students may be less likely to procrastinate, one principal form of academic self-handicapping that is often portrayed as a failure of SRL (Steel 2007; Wolters 2003b). Findings indicated that both facets of grit were associated with reduced levels of self-reported delays in beginning and completing academic tasks. This connection is consistent with the understanding that grit is a protective factor that may inhibit behaviors that disrupt effective academic functioning (Duckworth et al. 2007; Strayhorn 2013). This finding is also in line with studies showing similar patterns between more adaptive personality traits and procrastination (Steel 2007).

Our findings also contribute to a greater understanding of the influences on college students' SRL. Conceptual models stress that many of the beliefs, knowledge, and strategies necessary for SRL are malleable or can be improved through instruction (Pintrich and Zusho 2007). Nevertheless, most models also assume that SRL is also a function of an individual's stable or trait-like dispositions (Pintrich 2004). Prior support for this assumption has been found with regard to personality traits and achievement motives (Bidjerano and Dai 2007;

Bartels et al. 2010; De Feyter et al. 2012; Diseth and Kobbeltvedt 2010; Komarraju et al. 2009; Michou et al. 2013; Richardson and Abraham 2009). Our findings support and extend this perspective by showing that grit, another dispositional individual difference, also can be used to explain the extent to which a diverse group of college students report several key aspects of SRL.

SRL as a mediator of grit

Our findings also provide insight into the relation of grit to academic performance, and the possibility that engagement in SRL may mediate this relation. Three conditions are necessary to draw the conclusion that SRL mediates the relation between grit and academic performance (Baron and Kenny 1986). One, grit must be related directly to students' academic performance. Our findings met this condition when considering perseverance of effort but not for consistency of interest. Even when accounting for their reported prior performance, students who indicated that they were more diligent and hard-working expected, on average, to obtain higher grades for the current semester than did those students who saw themselves as providing effort less dependably. The lack of a direct relation between consistency of interest and students' self-reported grades precluded any mediating relation for this aspect of grit and this pathway is not discussed further.

A second condition necessary for mediation is that perseverance of effort must be related directly to the potential mediators (Baron and Kenny 1986). As described in the previous section, this condition was met for all seven indicators of SRL that we examined. The third and final condition for mediation also was met for perseverance of effort. Specifically, the strength of relation between perseverance of effort and academic achievement was reduced when accounting for students' motivational beliefs, use of regulatory strategies, and procrastination. In fact, when accounting for these various indicators of SRL, the ability of perseverance of effort to explain current academic achievement was reduced to the point that it was no longer statistically different than zero. This finding suggests that, for students attending a large state university with a diverse population and modest admission standards, the influence of students' grit on their academic achievement may be completely mediated by their engagement in SRL. As well, findings point to self-efficacy, time and study environment management, and procrastination as the most critical pathways for this mediation. Put differently, students with increased perseverance of effort may perform better within postsecondary academic contexts because they are more confident in their ability to succeed, effectively manage when and where they study, and do not unnecessarily postpone completion of their academic work.

This conclusion squarely supports the assumption that students' SRL serves as a mediator between more stable individual characteristics and their engagement, learning and achievement within academic contexts (Pintrich 2004). As well, our findings are in line with earlier work showing that aspects of SRL may mediate the relation between other dispositions or personality traits and students' academic performance (Bidjerano and Dai 2007; De Feyter et al. 2012; Eilam et al. 2009; Richardson and Abraham 2009). Our findings extend this work by showing that perseverance of effort can also be included in models that connect dispositional individual differences with students' SRL and academic achievement.

We add to this research by including a broader spectrum of beliefs, strategies and behaviors indicative of SRL. Another important contribution of the present work, therefore, is to identify additional aspects of SRL that might mediate these relations within college student populations. In particular, our work suggests that college students' tendency to self-regulate their time and study environment, and to avoid unnecessary delays when completing academic tasks is a critical pathway between personal dispositions or traits and students' academic achievement.

Dimensions of grit

Much of the existing research examining grit has examined how best to conceptualize, measure, and differentiate it from other trait-like characteristics (Duckworth et al. 2007; Duckworth and Quinn 2009; Maddi et al. 2012). Although not a central goal of the study, our findings do contribute to this line of research. Unlike many prior studies that utilized younger or somewhat idiosyncratic samples (e.g., military cadets, contestants in a national spelling bee), our participants were a diverse group of students at a large public university with modest admission standards. Based on this population, we found that grit is best conceived as having two distinct dimensions. The first, persistence of effort, reflects students' perception of themselves as diligent, hard-working, and continuing on important tasks even in the face of setbacks. The second, consistency of interest, represents students' perceived tendency to stick with particular long-term goals even when faced with new alternatives. Although prior research has provided evidence of a similar distinction (Duckworth and Quinn 2009), most studies have relied on a single indicator for grit when examining its relation to potential outcomes.

Three facets of our empirical findings support the need to differentiate among the two dimensions of grit. One, the confirmatory factor analysis that investigated this differentiation was a good fit to our data. Specifically, the two factor model differentiating perseverance of effort from consistency of interest showed better fit than models with either a second-order latent factor or a single eight-item factor representing overall grit. This distinction varies from Duckworth et al. (2007) who found support for a distinction between these two dimensions as first-order latent factors, but also a second-order factor representing grit as a whole.

Two, the bivariate correlation between the two aspects of grit was positive but very modest. Hence, students' tendency to perceive themselves as diligent and hardworking did not substantially overlap with their belief that they tended to stick to their long-term goals. Three, the patterns of relations found for the two dimensions of grit in the regressions were quite distinct. Perseverance of effort was a predictor of all seven indicators of SRL that we investigated. In contrast, consistency of interest predicted only the two indicators of SRL that most directly related to behavioral aspects of goal setting and planning (i.e., time and study environment management and procrastination). Overall, our pattern of findings argues against using a single global indicator to explore grit, at least among postsecondary students at a large public university with an ethnically and academically diverse population. Rather, the conceptual distinction between the two aspects of grit first noted by Duckworth et al. appears meaningful and should be continued in future studies.

Implications for practice

In light of the conceptual understanding of grit and SRL, our findings provide at least three implications for educators interested in improving college students' academic performance. Although perseverance of effort was a strong positive predictor of students' SRL and academic performance, it may not be a reasonable target for instructional interventions. Conceptual understandings portray grit more broadly, and perseverance of effort in particular, as having stable trait-like qualities that reflect individuals' genetic inheritance or develop over longer periods of time (Duckworth et al. 2007). As is the case with other immutable dispositions, therefore, it may be impractical for educators to focus on making students "grittier" within a particular course or even within their postsecondary educational experience more generally.

In contrast to grit, the component processes of SRL are viewed as much more malleable and responsive to intervention (Schunk and Zimmerman 1998). There is ample evidence that more

adaptive motivational beliefs, increased use of self-regulation strategies, and reduced procras-tination can all be accomplished through well-designed interventions delivered within post-secondary contexts (Richardson et al. 2012; Robbins et al. 2004; Schouwenburg et al. 2004; Schunk and Zimmerman 2008). Specific techniques to achieve these goals can include adjunct coursework intended for students most deficit in SRL as well as instructional methods infused more broadly into all courses (Hofer et al. 1998). In light of this existing work, efforts to promote college students' academic achievement may be more productive if they focus on the motivational and strategic aspects of SRL rather than on increasing students' grit directly. Of course, research that explores and compares interventions targeting different aspects of grit and SRL are needed to establish this conclusion more convincingly.

Another implication suggested by the connection between perseverance of effort and college students' SRL and academic performance concerns the establishment of long-term goals consistent with college success. Although grittier students may show greater persever-ance and passion for their long-term goals (Duckworth et al. 2007), they may not necessary have established high achievement, completion of a particular major, or graduation as high priority personal goals. Students enter college for many different reasons, such as wanting to avoid the labor market, achieve social goals, or because it was expected by their family. The indirect connection between perseverance of effort and achievement in our study suggests that it may be beneficial for postsecondary educators to ensure that all students view learning, academic achievement, and graduation as personal accomplishments that are central to what they want to achieve in life. Once established, these long term goals should then be pursued more diligently, especially by those who are grittier and have the beliefs, attitudes and skills necessary for SRL.

Finally, even if one assumes that academic success and graduation is something all university students want to achieve, assessing and promoting their level of grit may not be an especially useful endeavor for postsecondary educators. College students are likely to have a large and diverse set of long-term goals in addition to academic success. Conceptual models of grit provide little insight into which of their long-term goals students will give priority or strive to attain most whole-heartedly. It seems likely that even students with very high levels of grit must, at times, give precedence to particular goals, or jettison certain long-term goals completely. Indeed, career counseling rests on the assumption that individuals must refine their interests and, in the process, abandon some of the professional and academic goals they might once have strived to achieve (Platt and Drew 2013). Similarly, models of grit fail to explain how general long-term goals (e.g., graduating from college) get transformed into specific accomplishments (e.g., graduating from the University of Houston with a degree in chemistry). The choice of which particular long-term goals assume priority and are most actively pursued appears still to be a more direct function of motivational factors such as value, importance, and perceived competence. Hence, interventions that target these more local influences on stu-dents' goals, choices and effort may be more effective for instructors and policymakers who want to influence students' academic outcomes.

Limitations and conclusions

One limitation to the present study is the self-report nature of all of the major variables including students' past and current academic achievement. The shared variance inherent in this methodology suggests that the relations found here may be overstated and may be weaker in studies relying on more diverse methods. Future research that assesses grit, SRL and achievement using other valid methodologies should provide useful insights. The correlational design of this study also is a limitation that might inflate the strength of the observed relations

and precludes any causal conclusions about the relations that were found. It would be useful to study these relations with a design that assesses students' trait-like dispositions earlier while tapping into students' engagement, SRL and achievement at later times. This type of design would provide a more robust evaluation and greater insight into the potential causal relations between students' grit and their SRL and achievement. The use of expected, rather than actual, grades is also a specific shortcoming of the present study. Conclusions would be strengthened by research that tests these relations with indicators of academic performance that are more direct (e.g., instructor assigned grades) and more diverse (e.g., specific exam grades, retention, graduation). Finally, our sample was predominantly female; similar research with a more gender-balanced sample would be worthwhile.

Despite these limitations, the present study provides a substantial contribution as a preliminary study that links grit, SRL and achievement within an academically and ethnically diverse population of college students. Our findings demonstrate a number of important relations between these two constructs, as well as their combined connection to students' academic achievement. Findings also highlight a number of potentially fruitful avenues for additional empirical research and instructional applications.

References

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173–1182. doi:10.1037/0022-3514.51.6.1173.

Bartels, J. M., & Magun-Jackson, S. (2009). Approach–avoidance motivation and metacognitive self-regulation: the role of need for achievement and fear of failure. *Learning and Individual Differences, 19*(4), 459–463.

Bartels, J. M., Magun-Jackson, S., & Ryan, J. J. (2010). Dispositional approach-avoidance achievement motivation and cognitive self-regulated learning: the mediation of achievement goals. *Individual Differences Research, 8*(2), 97–110.

Bidjerano, T., & Dai, D. Y. (2007). The relationship between the big-five model of personality and self-regulated learning strategies. *Learning and Individual Differences, 17*(1), 69–81.

Caskie, G. I. L., Sutton, M. C., & Eckhardt, A. G. (2014). Accuracy of self-reported college GPA: gender-moderated differences by achievement level and academic self-efficacy. *Journal of College Student Development, 55*(4), 385–390. doi:10.1353/csd.2014.0038.

Chen, L. H., Wu, C. H., Kee, Y. H., Lin, M. S., & Shui, S. H. (2009). Fear of failure, 2× 2 achievement goal and self-handicapping: an examination of the hierarchical model of achievement motivation in physical education. *Contemporary Educational Psychology, 34*(4), 298–305.

Claessens, B. C., vanEerde, W., Rutte, C. G., & Roe, R. A. (2007). A review of the time management literature. *Personnel Review, 36*(2), 255–276.

Conroy, D. E., & Elliot, A. J. (2004). Fear of failure and achievement goals in sport: addressing the issue of the chicken and the egg. *Anxiety, Stress & Coping, 17*(3), 271–285.

De Feyter, T., Caers, R., Vigna, C., & Berings, D. (2012). Unraveling the impact of the big five personality traits on academic performance: the moderating and mediating effects of self-efficacy and academic motivation. *Learning and Individual Differences, 22*(4), 439–448.

Diseth, Å., & Kobbeltvedt, T. (2010). A mediation analysis of achievement motives, goals, learning strategies, and academic achievement. *British Journal of Educational Psychology, 80*(4), 671–687.

Diseth, Å., & Martinsen, Ø. (2003). Approaches to learning, cognitive style, and motives as predictors of academic achievement. *Educational Psychology, 23*(2), 195–207.

Duckworth, A. L., & Quinn, P. D. (2009). Development and validation of the Short Grit Scale (GRIT–S). *Journal of Personality Assessment, 91*(2), 166–174.

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 92*(6), 1087–1101.

Duckworth, A. L., Tsukayama, E., & May, H. (2010). Establishing causality using longitudinal hierarchical linear modeling: an illustration predicting achievement from self-control. *Social Psychological and Personality Science, 1*(4), 311–317.

Eilam, B., Zeidner, M., & Aharon, I. (2009). Student conscientiousness, self-regulated learning, and science achievement: an explorative field study. *Psychology in the Schools, 46*(5), 420–432.

Elliot, A. J., & Church, M. A. (1997). A hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology, 72*(1), 218–232.

Elliot, A. J., & McGregor, H. A. (2001). A 2× 2 achievement goal framework. *Journal of Personality and Social Psychology, 80*(3), 501–519.

Elliot, A. J., & Murayama, K. (2008). On the measurement of achievement goals: critique, illustration, and application. *Journal of Educational Psychology, 100*(3), 613–628.

Ferrari, J. R., Driscoll, M., & Díaz-Morales, J. F. (2007). Examining the self of chronic procrastinators: actual, ought, and undesired attributes. *Individual Differences Research, 5*(2), 115–123.

Hofer, B. K., Yu, S. L., & Pintrich, P. R. (1998). Teaching college students to be self-regulated learners. In D. Schunk and B. Zimmerman (Eds.), *Self-regulated learning: From teaching to self-reflective practice* (pp. 57–85). New York: The Guilford Press.

Kitsantas, A., Winsler, A., & Huie, F. (2008). Self-regulation and ability predictors of academic success during college: a predictive validity study. *Journal of Advanced Academics, 20*(1), 42–68.

Kleiman, E. M., Adams, L. M., Kashdan, T. B., & Riskind, J. H. (2013). Grateful individuals are not suicidal: buffering risks associated with hopelessness and depressive symptoms. *Personality and Individual Differences, 55*(5), 595–599.

Komarraju, M., Karau, S. J., & Schmeck, R. R. (2009). Role of the big five personality traits in predicting college students' academic motivation and achievement. *Learning and Individual Differences, 19*(1), 47–52.

Kuncel, N. R., Crede, M., & Thomas, L. L. (2005). The validity of self-reported grade point averages, class rank, and test scores: a meta-analysis and review of the literature. *Review of Educational Research, 75*(1), 63–82. doi:10.3102/00346543075001063.

Linnenbrink, E. A., & Pintrich, P. R. (2003). The role of self-efficacy beliefs in student engagement and learning in the classroom. *Reading &Writing Quarterly, 19*(2), 119–137.

Macan, T., Shahani, C., Dipboye, R. L., & Phillips, A. P. (1990). College students' time management: correlations with academic performance and stress. *Journal of Educational Psychology, 82*, 760–768.

MacCann, C., & Roberts, R. (2010). Do time management, grit, and self-control relate to academic achievement independently of conscientiousness? In R. Hicks (Ed.), *Personality and individual differences: Current directions* (pp. 79–90). Bowen Hills, QLD, AUS: Australian Academic Press.

Maddi, S. R., Matthews, M. D., Kelly, D. R., Villarreal, B., & White, M. (2012). The role of hardiness and grit in predicting performance and retention of USMA cadets. *Military Psychology, 24*(1), 19–28.

Michou, A., Mouratidis, A., Lens, W., & Vansteenkiste, M. (2013). Personal and contextual antecedents of achievement goals: their direct and indirect relations to students' learning strategies. *Learning and Individual Differences, 23*, 187–194.

Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research, 66*(4), 543–578.

Pintrich, P. (2004). A conceptual framework for assessing motivation and self–regulated learning in college students. *Educational Psychology Review, 16*, 385–407.

Pintrich, P., & Zusho, A. (2002). The development of academic self–regulation: The role of cognitive and motivational factors. In A. Wigfield & J. Eccles (Eds.), *Development of achievement motivation* (pp. 249–284). San Diego: Academic.

Pintrich, P. R., & Zusho, A. (2007). Student motivation and self-regulated learning in the college classroom. In R. P. Perry & J. C. Smart (Eds.), *The scholarship of teaching and learning in higher education: An evidence-based perspective* (pp. 731–810). The Netherlands: Springer.

Pintrich, P., Smith, D., Garcia, T., & McKeachie, W. (1993). Predictive validity and reliability of the motivated strategies for learning questionnaire (MSLQ). *Educational and Psychological Measurement, 53*, 801–813.

Pintrich, P., Wolters, C., & Baxter, G. (2000). Assessing metacognition and self–regulated learning. In G. Schraw (Ed.), *Metacognitive assessment* (pp. 43–97). Lincoln: University of Nebraska Press.

Platt, A., & Drew, M. (2013). Career counseling. In D. Capuzzi & D. Gross (Eds.), *Introduction to the counseling profession* (6ᵗʰ ed., pp. 369 395). New York: Routledge.

Reed, J., Pritschet, B. L., & Cutton, D. M. (2013). Grit, conscientiousness, and the transtheoretical model of change for exercise behavior. *Journal of Health Psychology, 18*(5), 612–619.

Richardson, M., & Abraham, C. (2009). Conscientiousness and achievement motivation predict performance. *European Journal of Personality, 23*, 589–605.

Richardson, M., Abraham, C., & Bond, R. (2012). Psychological correlates of university students' academic performance: a systematic review and meta-analysis. *Psychological Bulletin, 138*(2), 353–387.

Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis. *Psychological Bulletin, 130*(2), 261–288.

Schouwenburg, H. C., Lay, C. H., Pychyl, T. A., & Ferrari, J. R. (2004). *Counseling the procrastinator in academic settings*[Electronic version]. Retrieved from http://www.elpub.bib.uniwuppertal.de/edocs/dokumente/zsb/fedora/workgr/psyche/conf/groningen05/conf05.pdf

Schraw, G., Wadkins, T., & Olafson, L. (2007). Doing the things we do: a grounded theory of academic procrastination. *Journal of Educational Psychology, 99*, 12–25.

Schunk, D., & Zimmerman, B. (Eds.). (1998). *Self-regulated learning: From teaching to self-reflective practice*. New York: Guilford Press.

Schunk, D., & Zimmerman, B. (Eds.). (2008). *Motivation and self-regulated learning: Theory, research, and applications*. Mahwah: Erlbaum Associates.

Schwinger, M., Steinmayr, R., & Spinath, B. (2009). How do motivational regulation strategies affect achievement: mediated by effort management and moderated by intelligence. *Learning and Individual Differences, 19*, 621–627.

Steel, P. (2010). Arousal, avoidant and decisional procrastinators: Do they exist? *Personality and Individual Differences, 48*, 926–934.

Steel, P. (2007). The nature of procrastination: a meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological Bulletin, 133*(1), 65–94.

Strayhorn, T. L. (2013). What role does grit play in the academic success of Black male collegians at predominantly White institutions?. *Journal of African American Studies*, 1–10. doi: 10.1007/s12111-012-9243-0.

Trautwein, U., Lüdtke, O., Roberts, B. W., Schnyder, I., & Niggli, A. (2009). Different forces, same consequence: conscientiousness and competence beliefs are independent predictors of academic effort and achievement. *Journal of Personality and Social Psychology, 97*(6), 1115–1128.

vanEerde, W. (2004). Procrastination in academic settings and the big five model of personality: A meta-analysis. In H. Schouwenburg, C. Lay, T. Pychyl, & J. Ferrari, (Eds.). *Counseling the procrastinator in academic settings* (pp. 29–40). American Psychological Association.

Weinstein, C. E., Acee, T. W., & Jung, J. (2011). Self-regulation and learning strategies. *New Directions for Teaching and Learning, 2011*(126), 45–53.

Wigfield, A., & Cambria, J. (2010). Students' achievement values, goal orientations, and interest: definitions, development, and relations to achievement outcomes. *Developmental Review, 30*(1), 1–35.

Wigfield, A., & Eccles, J. S. (2000). Expectancy–value theory of achievement motivation. *Contemporary Educational Psychology, 25*(1), 68–81.

Winne, P., & Hadwin, A. F. (1998). Studying as self-regulated learning. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Metacognition in educational theory and practice* (pp. 279–306). Hillsdale: Erlbaum.

Winne, P., & Hadwin, A. (2008). The weave of motivation and self-regulated learning. In D. Schunk & B. Zimmerman (Eds.), *Motivation and self-regulated learning: Theory, research, and applications* (pp. 297–314). New York: Lawrence Erlbaum Associates.

Wolters, C. A. (1998). Self-regulated learning and college students' regulation of motivation. *Journal of Educational Psychology, 90*(2), 224.

Wolters, C. A. (2003a). Regulation of motivation: evaluating an underemphasized aspect of self-regulated learning. *Educational Psychologist, 38*(4), 189–205.

Wolters, C. A. (2003b). Understanding procrastination from a self-regulated learning perspective. *Journal of Educational Psychology, 95*(1), 179–187.

Wolters, C., & Benzon, M. (2013). Assessing and predicting college students' use of strategies for the self-regulation of motivation. *Journal of Experimental Education, 18*, 199–221.

Zimmerman, B. J. (2000). Self-efficacy: an essential motive to learn. *Contemporary Educational Psychology, 25*(1), 82–91.

Zimmerman, B., & Schunk, D. (2008). Motivation: An essential dimension of self-regulated learning. In D. Schunk & B. Zimmerman (Eds.), *Motivation and self-regulated learning: Theory, research, and applications* (pp. 1–30). Mahwah: Lawrence Erlbaum Associates Publishers.

Zimmerman, B., Greenberg, D., & Weinstein, C. (1994). Self-regulating academic study time: A strategy approach. In D. Schunk & B. Zimmerman (Eds.), *Self-regulation of learning and performance: Issues and educational applications* (pp. 181–199). Hillsdale: Lawrence Erlbaum Associates.