

RESEARCH

# Mindset about Talent Moderates the Effect of Grit on Academic Performance: Evidence from West Point Cadets

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## ABSTRACT

Grit, defined as perseverance and passion for pursuing long-term goals, is an important predictor of academic achievement. Whether mindset about talent moderates the relationship between grit and academic achievement has not been tested. Institutional data collected prior to starting at West Point was analyzed using hierarchical multiple regression to assess the predictive power of grit, physical fitness test scores, entrance exam scores, mindset about talent, and the interaction between grit and mindset about talent on first semester and cumulative academic performance for 1140 cadets from the Class of 2019. Hierarchical

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regression results showed that grit, physical fitness, and entrance exam scores significantly predicted first semester grades, as did the grit by mindset about talent interaction. Regression results predicting cumulative academic performance showed grit and entrance exam scores to be significant predictors, along with the grit by mindset interaction. Although entrance exam scores were the best predictor of both outcomes, simple slope analyses showed that the strongest association between grit and academic performance was observed for cadets with fixed mindsets about talent. Having a fixed mindset about talent moderated the relationship between grit and academic performance at two points in time for West Point cadets.

*Keywords:* Grit, Mindset, Military, Performance, Academic Achievement

The United States Military Academy at West Point (USMA) produces approximately one out of every six commissioned Army officers each year (U.S. Army Training and Doctrine Command, 2019). For over 200 years, West Point has been building, educating, training, and inspiring Cadets to become leaders of character within the military and nation (USMA, n.d.-a). To maintain its status as a preeminent leader development institution, West Point consistently assesses and refines its experiential leadership curriculum to optimize performance outcomes. The past two decades have seen a growing interest in how noncognitive constructs such as grit and mindset are associated with various performance outcomes (e.g., Duckworth et al., 2007, 2019; Peterson et al., 2024).

Grit, defined by Duckworth et al. (2007) as perseverance and passion for pursuing long-term goals, predicts performance across numerous domains, including academic performance among Ivy league students (Duckworth et al., 2007) and West Point cadets (Duckworth et al., 2019). Although Credé et al.'s (2017) meta-analysis showed the association between grit and performance outcomes to be modest at best, Lam and Zhou's (2022) meta-analysis found grit to be a modest but consistent predictor of academic achievement, even across cultures. Still, grit might be best considered as simply one of many variables that explain variance in performance outcomes. Prior research with 10 cohorts of West Point

cadets found that grit contributes in different ways depending on the nature of the criterion variable. For example, entrance exam scores best predicted academic achievement, but grit and physical ability predicted similar amounts of additional variance by adding incrementally to the predictive power of entrance exam scores (Duckworth et al., 2019). Indeed, if a long-term goal is to graduate from West Point, then being persistent enough to keep striving towards that goal despite encountering some of the inevitable setbacks and challenges associated with service academy life should also help predict performance. However, the role of an individual's mindset about talent in the grit-academic performance relationship remains unexplored.

Mindsets involve implicit beliefs about whether traits and characteristics, such as intelligence, athleticism, or creativity, are fixed or malleable (Dweck, 1999, 2006; Dweck & Leggett, 1988; Yeager & Dweck, 2012). Whereas grit focuses on the behaviors that a person engages in when pursuing long-term goals and facing challenges or obstacles along the way (Duckworth et al., 2007), mindsets appear to exert influence by affecting goal choices and motivation, along with how people interpret and react to results and feedback (Dweck, 2017). Theoretically, both grit and mindset about talent may influence academic achievement by affecting how students engage in their goal pursuits and respond to setbacks.

Dweck proposed that mindsets exist on a continuum, with a fixed mindset at one end and a growth mindset at the other (see Dweck & Leggett, 1988; Yeager & Dweck, 2012 for reviews). Individuals who operate with fixed mindsets about intelligence or personality tend to believe that these attributes are unchangeable. These individuals would be unlikely to strive for improvement in domains where they believe their existing abilities are fixed. However, a person with a growth mindset would consider the targeted talent or characteristic to be more malleable, such that engaging in deliberate effort to try to develop in a malleable domain might be worthwhile. A growth mindset is associated with embracing challenges, learning from mistakes, and believing that improvement is possible when effort is combined with effective strategies (Dweck, 2017).

Research on mindsets to date has primarily focused on how beliefs about the malleability of intelligence relate to academic achievement. Although some studies found null effects (e.g., Li & Bates, 2019) and meta-analytic findings suggest the overall effect sizes to be small (i.e., Sisk et al., 2018), results generally support the notion that growth mindset is associated with better academic performance. The large-scale *National Study of Learning Mindsets* found growth mindset to be associated with better academic performance for low-achieving students as well as increased enrollment in advanced mathematics courses (Yeager et al., 2019). Rege et al. (2021) found evidence linking growth mindset with challenge-seeking behavior for samples from two different countries. Claro and Loeb (2019) also found growth mindset and academic performance to be positively related, and the 2018 *Programme for International Student Assessment* (PISA) results showed a positive relationship between growth mindset and academic performance in samples from 72 of 76 countries (OECD, 2019). Thus, the combination of high grit and a growth mindset about talent might be especially advantageous for excelling in academics at West Point, though no prior studies have addressed such a possibility.

The purpose of the current study was to extend the understanding of how grit predicts academic achievement in a military education context to include consideration of mindset about talent. We hypothesized that mindset about talent would moderate the relationship between grit and first semester academic performance for cadets at West Point and account for variance above and beyond entrance exam scores, physical fitness assessment scores, and grit scores. We also hypothesized that mindset would moderate the relationship between grit and final cumulative academic performance scores in a similar manner.

## Method

### *Participants*

The initial sample included all cadets ( $N = 1262$ ) in the graduating Class of 2019 at West Point. Demographics resembled other recent cohorts, with approximately 22% female, 61% Caucasian, 12% African American, 11% Hispanic/Latino, 8% Asian, and 8% from other backgrounds or more than one. The average age was 18.35. With both Institutional Review Board approval as an exempt study of secondary data (control numbers 21-121 and CA-2023-63) and USMA approval, cadets' data for each variable described below were obtained from existing institutional records. Cadets with missing or incomplete data were excluded. Demographics for the final sample of 1140 resembled the initial cohort.

### *Procedure and Measures*

All Cadets completed an assessment battery the second or third day of summer training in 2015, which included the eight-item Grit-S scale (Duckworth & Quinn, 2009) and three items that measured mindset (Dweck, 2006). Four grit items tap the perseverance component (e.g., "Setbacks don't discourage me") and four tap consistency of interest, or passion (e.g., "I often set a goal but later choose to pursue a different one"). Cadets rated how much they agreed with each statement on a scale of 1-5, from "not at all like me" to "very much like me." After reverse coding, we calculated

average scores, with higher scores reflecting more grit. The three mindset items tapped beliefs regarding the malleability of talent (e.g., “You have a certain amount of talent, and you can’t really do much to change it”). Participants indicated the extent to which they agreed with each statement on a scale of 0–5, with 0 indicating strong disagreement and 5 indicating strong agreement. All items were negatively worded and reverse coded so that low scores reflected a fixed mindset and high scores reflected growth mindset about talent. Coefficient alpha for the Grit-S and mindset scales reflected acceptable reliability at 0.74 and 0.93, respectively.

Highest college entrance exam score on the SAT or ACT served as an index of prior academic achievement, with ACT scores converted to the SAT scale using published concordance rates (ACT, 2018). Scores on the Cadet Fitness Assessment (CFA), which consisted of six timed tests on activities such as a one-mile run and pull-ups, served as an index of physical ability. The CFA was administered prior to arrival at West Point in 2015. Outcome measures included first semester academic program scores (APST1) and final cumulative scores for the academic program (APSC) at graduation.

### Analytic Strategy

Two separate hierarchical multiple regression analyses were conducted with APST1 and APSC serving as the

dependent variables. Entrance exam score, CFA, and grit were entered as predictors in the first step, mindset was added in the second step, and the grit by mindset interaction was added in the third step. Continuous predictors and the interaction term were mean-centered prior to analyses. To evaluate the influence of missing data, we tested whether data were missing completely at random and then imputed 30 datasets to determine whether the results using the combined parameter estimate were consistent with the simpler complete-case approach. The resulting pooled estimates were not substantially different for either APST1 or APSC, although CFA was a significant predictor of APSC when using imputed data but not when using the complete-case approach. Given that the difference did not involve grit, mindset, or the interaction term, we present and interpret results from the more conservative complete-case analyses.

### Results

Descriptive statistics and correlations among predictor variables are presented in Table 1. Table 2 displays results from hierarchical regression analyses predicting APST1. The analyses showed that entrance exam scores, grit, and CFA predicted APST1 in the first step. Mindset did not result in an improved model or predict APST1 in step 2. However, the grit by mindset interaction in step 3 was statistically significant and improved model prediction, indicating that mindset moderated

**Table 1**  
*Descriptive statistics and intercorrelations among variables*

Variable	Mean (Std. Dev.)	Correlations			
		CFA	EE	Grit	Mindset
Cadet fitness assessment	584.92 (70.31)	–	0.08**	0.06*	-0.01
Entrance exam	1325.19 (114.68)	–	–	-0.09***	-0.12***
Grit	3.70 (0.61)	–	–	–	0.19***
Mindset	2.94 (1.37)	–	–	–	–

CFA: Cadet Fitness Assessment; EE: Entrance exam.  
\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

Table 2

Summary of Hierarchical Regression Analysis for Variables Predicting First Semester Academic Program Scores ( $N = 1112$ )

Variable	Model 1			Model 2			Model 3		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Constant	2.88	0.02		2.88	0.02		2.89	0.02	
CFA	0.00	0.00	0.09**	0.00	0.00	0.09**	0.00	0.00	0.10**
Entrance exam	0.00	0.00	0.63**	0.00	0.00	0.63**	0.00	0.00	0.63**
Grit	0.14	0.03	0.11**	0.14	0.04	0.11**	0.14	0.04	0.11**
Mindset				0.00	0.02	0.00	0.00	0.01	0.01
Grit $\times$ Mindset							-0.07	0.02	-0.08**
$R^2$		0.648			0.648			0.653	
<i>F</i> for change in $R^2$		267.183**			0.020			12.427**	

Note: All variables plus the interaction term were mean centered.

\*\* $p < 0.01$ .

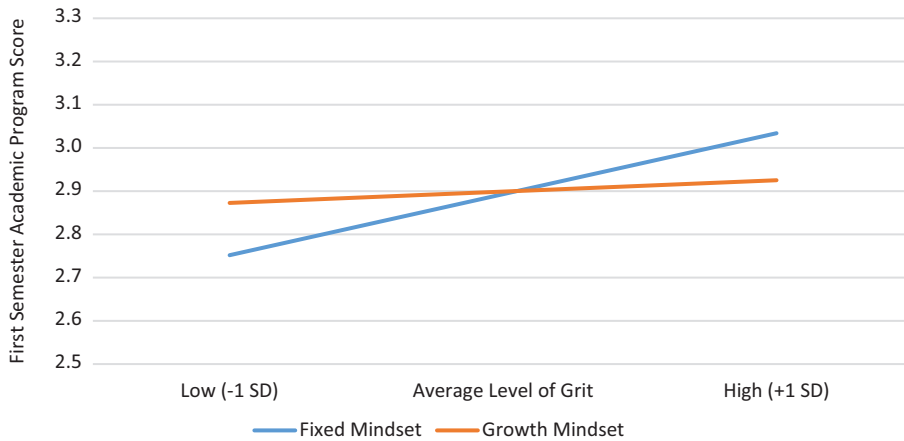
the relationship between grit and first semester academic performance. Following Holmbeck (2002), we probed the significant interaction using post-hoc simple slopes testing at 1 SD above and 1 SD below the mean on mindset scores, which allowed us to retain the variables as continuous. The slope for 1 SD below the mean was considered to represent a relatively fixed mindset, whereas the slope for 1 SD above the mean was considered to represent more of a growth mindset. Simple slope analyses revealed a significant positive association for the fixed mindset and grit association ( $B = 0.234$ ,  $SE = 0.039$ ,  $p < 0.001$ ), but the test for the association between growth mindset and grit was nonsignificant ( $B = 0.044$ ,  $SE = 0.041$ ,  $p = 0.283$ ). In other words, the association between fixed mindset and grit appears to have been driving the observed interaction rather than the association between growth mindset and grit. Figure 1 depicts the interaction predicting APST1 as the outcome.

Results from hierarchical multiple regression analyses predicting final APSC showed that entrance exam scores and grit both predicted APSC in the first step,

although CFA scores did not. Mindset did not result in an improved model or predict APSC in step 2. However, the grit by mindset interaction in step 3 improved model prediction and was statistically significant; mindset moderated the relationship between grit and cumulative academic performance (see Table 3). Tests of simple slopes at 1 SD below and 1 SD above the mean on mindset scores again showed a significant positive association for fixed mindset and grit ( $B = 0.131$ ,  $SE = 0.030$ ,  $p < 0.001$ ), but that the association between growth mindset and grit was nonsignificant ( $B = 0.026$ ,  $SE = 0.030$ ,  $p = 0.397$ ). Figure 2 depicts the interaction predicting APSC as the outcome.

## Discussion

Results showing that entrance exam scores, grit, and physical ability predicted first semester academic performance and that entrance exams scores and grit predicted final cumulative academic program scores are generally consistent with prior research that included 10 cohorts of West Point cadets (i.e., Duckworth et al., 2019). More important, results from the current study also support the hypotheses that mindset moderates the link between

**Figure 1***First Semester Academic Program Score by Grit Level by Type of Mindset***Table 3***Summary of Hierarchical Regression Analysis for Variables Predicting Cumulative Academic Program Scores (N = 959)*

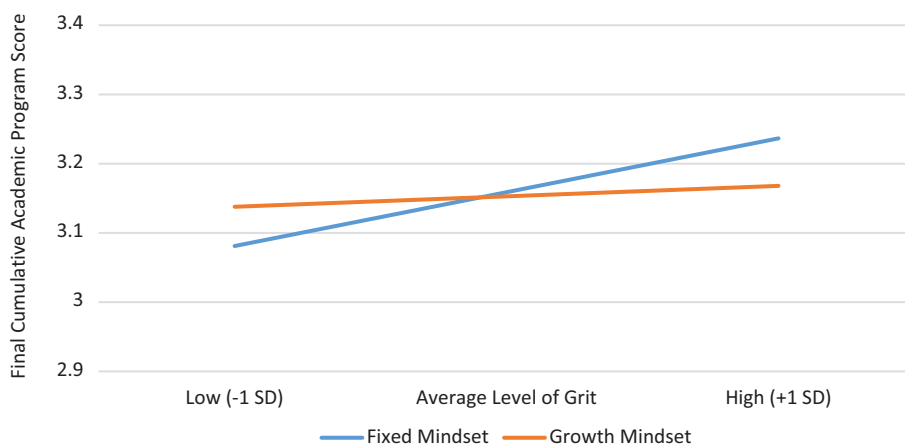
Variable	Model 1			Model 2			Model 3		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Constant	3.12	0.01		3.12	0.01		3.13	0.01	
CFA	0.00	0.00	0.04	0.00	0.00	0.04	0.00	0.00	0.04
Entrance exam	0.03	0.00	0.61**	0.03	0.00	0.61**	0.03	0.00	0.61**
Grit	0.08	0.02	0.09**	0.08	0.02	0.10**	0.08	0.02	0.10**
Mindset				0.00	0.01	-0.01	0.00	0.01	0.00
Grit × Mindset							-0.04	0.02	-0.07**
$R^2$		0.606			0.606			0.610	
<i>F</i> for change in $R^2$		184.857**			0.076			6.776**	

Note: All variables plus the interaction term were mean centered.

\*\* $p < 0.01$ .

grit and academic performance at West Point. First, mindset moderated the relationship between grit and early academic performance, specifically the first semester. Mindset also moderated the link between grit and final cumulative academic performance for West Point graduates. In both cases the pattern was similar: the relationship between grit and academic performance was strongest for cadets with a fixed mindset about talent and nonsignificant for cadets with a growth mindset. In

other words, grit levels mattered most for cadets with a fixed mindset, which is inconsistent with the notion that growth mindset paired with high grit might lead to high levels of academic achievement. Interventions designed to either boost grit or reduce fixed mindset among low grit cadets may prove beneficial. However, promoting a growth mindset among very gritty cadets could ironically undermine their high levels of academic achievement as these cadets appear to be successful in academics

**Figure 2***Final Cumulative Academic Program Score by Grit Level by Type of Mindset*

even if, or perhaps specifically because, they consider their talent levels to be fixed.

Findings from the current study also revealed a modest positive correlation ( $r = 0.19, p < 0.001$ ) between mindset and grit. This finding is consistent with cross-sectional studies examining both variables in the educational domain using samples of children and adolescents from the United States (e.g., Tucker-Drobot et al., 2016; West et al., 2016). However, both Zeng et al. (2019) and Zhao et al. (2018) found the correlation to be stronger in samples of teachers as well as primary and middle school students in China, and there is some evidence that grit and growth mindset influence each other developmentally. Park et al.'s (2020) 2-year longitudinal study of 1600 eighth graders in the United States showed that grit and growth mindset were correlated both between and across waves when measured at 6-month intervals four different times ( $r_s = 0.18-0.23$ ). They suggested that grit and growth mindset influence each other in a virtuous cycle, as each predicted rank order increases in the other over time. Given the observed pattern of results in the current study, where a fixed mindset rather than a growth mindset moderated the

relationship between grit and academic achievement, investigating how these variables may influence each other over time in a military education context merits additional study.

There also are study limitations worth noting. First, there is no means of assessing whether cadets with a fixed mindset believed their talent to be fixed at a low or high level. Without knowing whether they believed their talent to be fixed in an advantageous or disadvantageous way, assessing the potential impact this factor is not possible. For some cadets, successes may have come somewhat easily (and often), and their history of sustained achievement may be linked to the belief that their abilities and achievements are inborn and relatively fixed. For other cadets, success may have come only with persistent effort, which is consistent with prior research showing the perseverance of effort aspect of grit to be more strongly correlated with performance outcomes than the consistency or interest, or passion, component (i.e., Credé et al., 2017). Ascertaining the specific nature of their beliefs about their talent being fixed is worthy of future research. Finally, the current study does not help explain the exact means through which mindset

exerts influence on the relationship between grit and academic performance.

These limitations notwithstanding, results from this study have important implications. The message that cadets need to have grit and other positive traits to develop as a leader of character is stated directly in the description of the performance facet of the West Point Leader Development System (USMA, n.d.-b; see also Peterson et al., 2024). Character is also of central focus at the United States Naval Academy (Macris et al., 2024), the United States Air Force Academy (Abbatiello & Lindsay, 2024), and the United States Coast Guard Academy (Giambra et al., 2024). While grit may not be explicitly labeled as an essential element in their educational and developmental experiences, cadets and midshipmen at these academies are likely to receive similar messages regarding its importance in character. Messages regarding the importance of mindset, on the other hand, are less clear. Regardless, nurturing a growth mindset for cadets who are less gritty or trying to build grit among cadets who have a fixed mindset may enhance academic performance.

## Conclusions

Results from the current study extend knowledge of the role of grit in academic performance at West Point by demonstrating that mindset about talent moderates the relationship between grit and both first semester and final cumulative academic performance. In both cases, a fixed mindset was associated with the strongest relationship between grit and performance. Cadets with fixed mindsets who were high in grit outperformed their less gritty peers who also had fixed mindsets. Thus, the effect of grit on academic performance appears to depend on mindset about talent.

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