PNAS
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Supplementary Information for

Cognitive and Non-Cognitive Predictors of Success

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Supplementary text
Figs. S1 to S5
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Participants

Our sample includes $N = 11{,}258$ cadets matriculating to the United States Military Academy at West Point in 9 out of 11 cohorts entering between 2004 and 2014. Because the Grit Scale was not administered in 2012 and 2013, these cohorts were not included. Participants were 17% female, 74% White, 8% Black, 7% Asian, and 3% of other ethnic backgrounds. The average age of cadets on entry to West Point was 19 years old. Table S6 includes descriptive statistics and bivariate correlations for all predictors, demographic covariates, and outcomes.

Procedure and Measures

Cadets completed the 12-item Grit Scale (1) on either the second or third day of Beast Barracks. Table S12 shows six positively-scored items on this self-report questionnaire indexing perseverance of effort (e.g., "Setbacks don't discourage me"), and six reverse-scored items indexing consistency of interest (e.g., "I become interested in new pursuits every few months."). Cadets endorsed items using a 5-point Likert-type scale ranging from 1 = *not at all like me* to 5 = *very much like me*. The average alpha internal reliability of the scale was .78, and the average correlation between passion and perseverance subscales was $r = 0.34$, $P < 0.001$.

As a measure of cognitive ability, we obtained from West Point admissions records each cadet's highest college entrance exam scores (math and verbal SAT and/or English, math, reading, and science ACT). Most of the cadets in our sample (79.7%) submitted SAT scores; for the 18.8% of cadets who reported only the ACT, we converted ACT scores to SAT equivalent scores using published concordance tables.

As a measure of physical ability, we obtained from West Point admissions records scores for the Candidate Fitness Assessment (CFA), a battery of six timed fitness tests (e.g., one-mile run, pull-ups, and sit-ups) administered by the cadet's high school coach, gym teacher, or other approved official. For cadets entering West Point in 2004 and 2005, only four of these six tests

(called the Physical Aptitude Evaluation) were administered, so for all analyses, we standardized scores within cohort year.

West Point provided data on demographics and all success outcomes, including whether cadets completed Beast Barracks training; whether they graduated from West Point; and cumulative grade point averages (GPAs) for academic, military, and physical performance, respectively.

Analytic Strategy

All analyses were conducted as a mega-analysis with cadet-level data. Analyses were based on all observed data using pairwise deletion. Tables S7 to S11 summarize 11 different models predicting each of the five success outcomes in this investigation. In all models, we controlled for demographic covariates (gender, age, ethnicity, and cohort year) and, in addition, included quadratic terms for all three pre-training variables.

We describe in the main text the results of Model 1, in which these pre-training predictors are entered simultaneously. For comparison, see Models 6, 7, and 8, in which grit, cognitive ability, and physical ability are separately entered, respectively. Given the lack of shared variance among the three pre-training predictors, it is unsurprising that coefficients differ minimally between Model 1 and these alternative models. In the main manuscript, we include graphs for the predicted values of Model 1, and for comparison we include the actual values of Model 1 in Figures S1 to S5 in this supplement.

In Model 2, we show that substituting the Short Grit Scale (Grit-S), an 8-item subset of the 12 items in the original Grit Scale used at least as widely in research on grit as the original Grit Scale (3), produces nearly identical results. In addition, Model 3 shows results for the 6-item passion and perseverance subscales entered separately. Consistent with prior research (1), we

observed directionally identical but generally smaller effects for each subscale than for the full scale.

Model 4 substitutes the Whole Candidate Score for cognitive and physical ability, showing that the predictive validity estimates for grit are comparable to Model 1. The Whole Candidate Score is a composite measure used in the admissions process. These pre-registered analyses (AsPredicted 7017) confirm prior research (1). However, the lack of theoretical validity and inconsistent correlations among its components (i.e., SAT, CFA, extracurricular achievement, athletic achievement, high school rank, teacher recommendations, *r*s from 0.08 to 72) make interpretation of the Whole Candidate Score difficult.

Model 5 includes two-way interactions among pre-training predictors. Models 9, 10, and 11 show two-way interactions between demographic covariates and grit, cognitive ability, and physical ability, respectively.

Cohort Year Interactions

In parallel with an explicit shift from West Point's traditional culture of attrition (i.e., weed out the weak) to a culture of development (i.e., support cadets in meeting high standards) (4), completion of Beast Barracks increased from 94.2% for incoming cadets in 2004 to 99.1% for cadets entering West Point in 2014, and the linear correlation between percentage of cadets completing Beast and cohort year was significant ($r = 0.07$, $P < 0.001$).

Whereas military GPA ($r = -0.09$, $P < 0.001$) and physical GPA ($r = -0.06$, $P < 0.001$) decreased over the observed 10-year period, academic GPA ($r = 0.03$, $P < 0.001$) increased slightly. As shown in Model 11 of Tables S8, S9, and S10, the predictive validities of physical ability for military, academic, and physical GPAs increased slightly in recent years but have remained stable for both cognitive ability and grit.

Unlike Beast Barracks completion, West Point graduation rates were stable over the observed 10-year period ($r = 0.02$, $P = 0.02$). We observed no significant interactions between pre-training variables and cohort year for four-year graduation.

Interactions With Demographic Characteristics and Curvilinearity in Prediction of GPA Outcomes

Cognitive ability was more predictive of academic GPA for non-Asian cadets (β = .44, $P < 0.001$, 99% CI: 0.41–0.47) than for Asian cadets (β = 0.29, $P < 0.001$, 99% CI: 0.21–0.37). Cognitive ability was more predictive of physical GPA for men (β = 0.14, $P < 0.001$, 99% CI: 0.08–0.20) than for women (β = 0.05, $P < 0.001$, 99% CI: 0.02–0.07). Cognitive ability was more predictive of physical GPA for cadets designated as "other race" (β = 0.22, $P < 0.001$, 99% CI: 0.07–0.37) compared to cadets who did not indicate "other race" (β = 0.06, $P < 0.001$, 99% CI: 0.03–0.08).

Of nine quadratic terms assessing non-linear relationships between the three pre-training predictors and three GPA outcomes, three were statistically significant. Generally, these indicated decelerating, as opposed to concave, relationships. Grit predicted monotonic but decelerating increases in military GPA for nearly all values of grit (β = -.02, $P < 0.01$, 99% CI: -0.04– -0.00). Likewise, only increases in physical ability beyond the 99th percentile predicted very slight decreases in military GPA (β = -.04, $P < 0.001$, 99% CI: -0.06– -0.03), and only increases in physical ability beyond the 97th percentile predicted slight decreases in academic GPA (β = -.04, $P <0.001$, 99% CI: -0.06– -0.02).

Figures

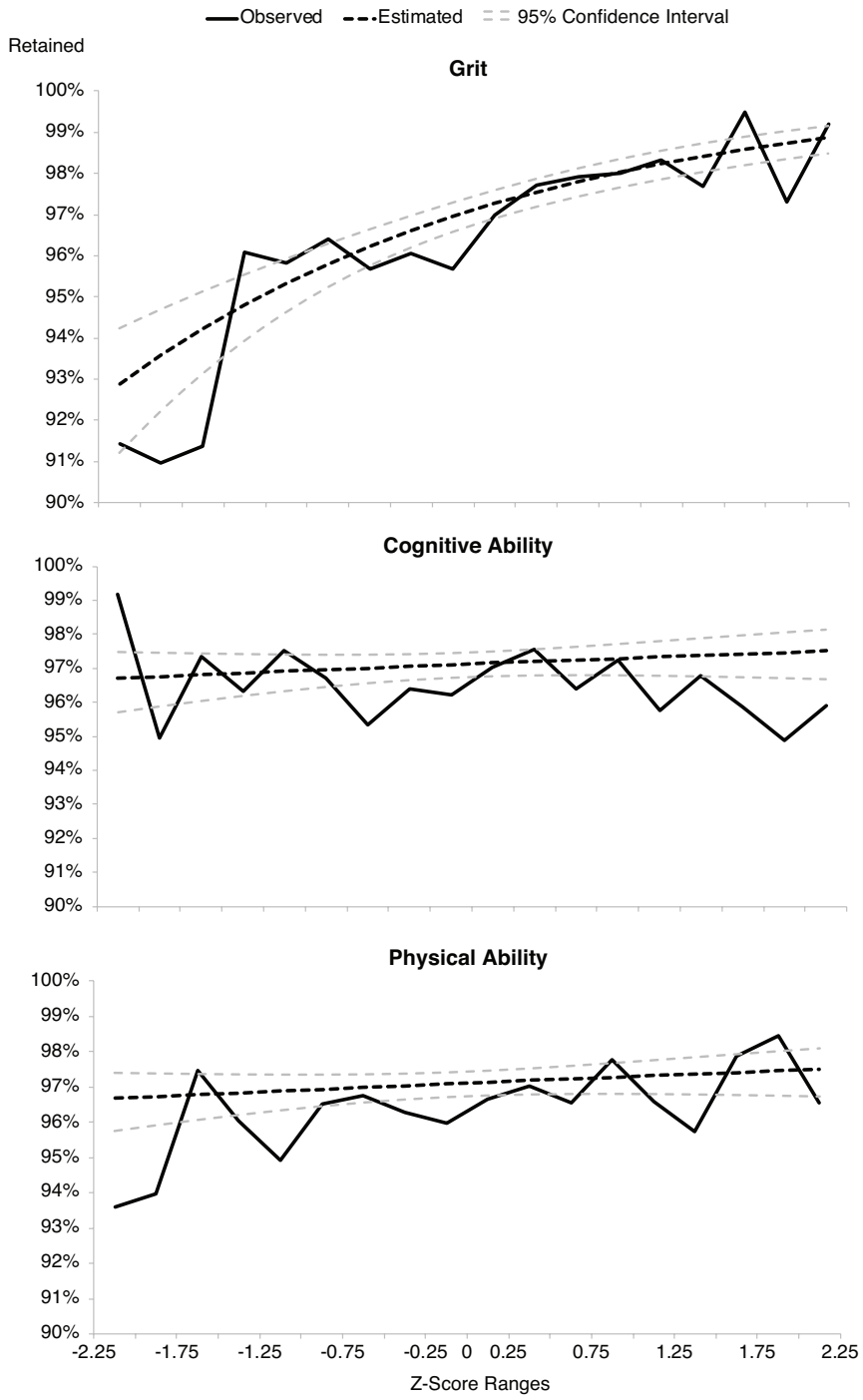

Fig. S1. Probability of completing Beast Barracks training as a function of grit, cognitive ability, and physical ability, controlling for gender, race, age, and cohort year—corresponding to binary logistic regression Model 1 in Table S7. Dotted line shows predicted values, using raw data, and solid line shows values of binned data of 0.25 standard deviations per bin.

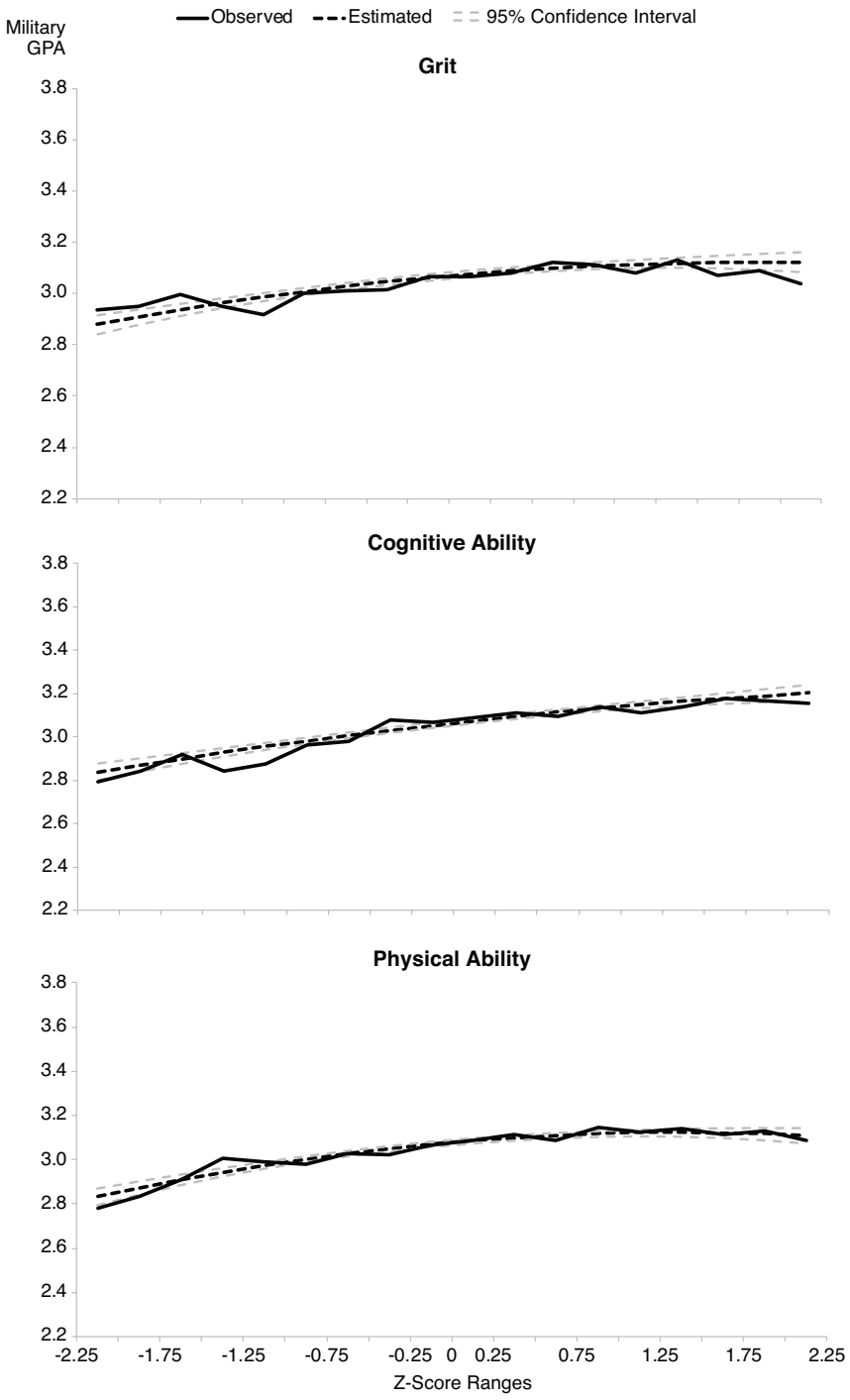

Fig. S2. Military GPA as a function of grit, cognitive ability, and physical ability, controlling for gender, race, age, and cohort year—corresponding to linear regression Model 1 in Table S8. Dotted line shows predicted values, using raw data, and solid line shows values of binned data of 0.25 standard deviations per bin.

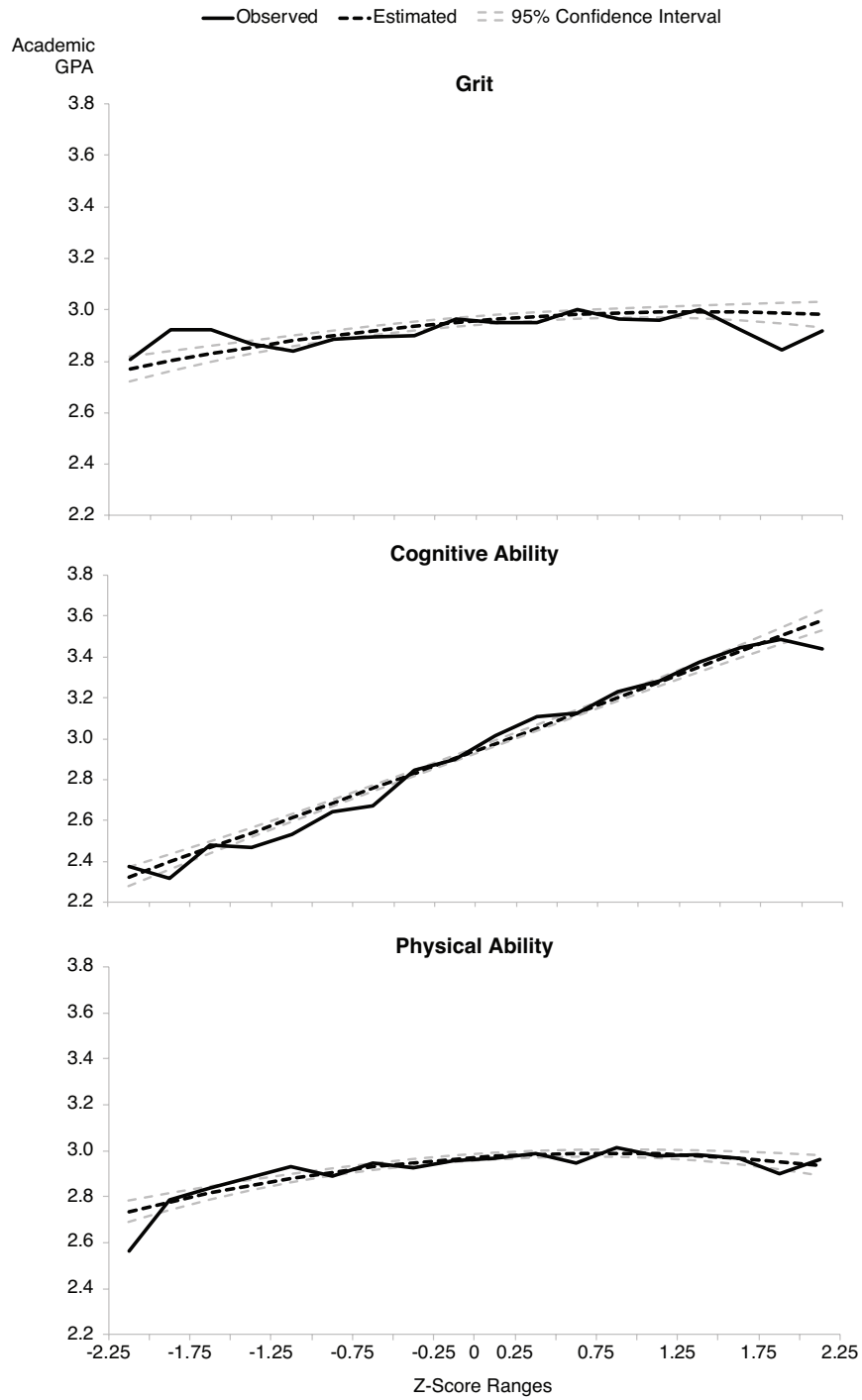

Fig. S3. Academic GPA as a function of grit, cognitive ability, and physical ability, controlling for gender, race, age, and cohort year—corresponding to linear regression Model 1 in Table S9. Dotted line shows predicted values, using raw data, and solid line shows values of binned data of 0.25 standard deviations per bin.

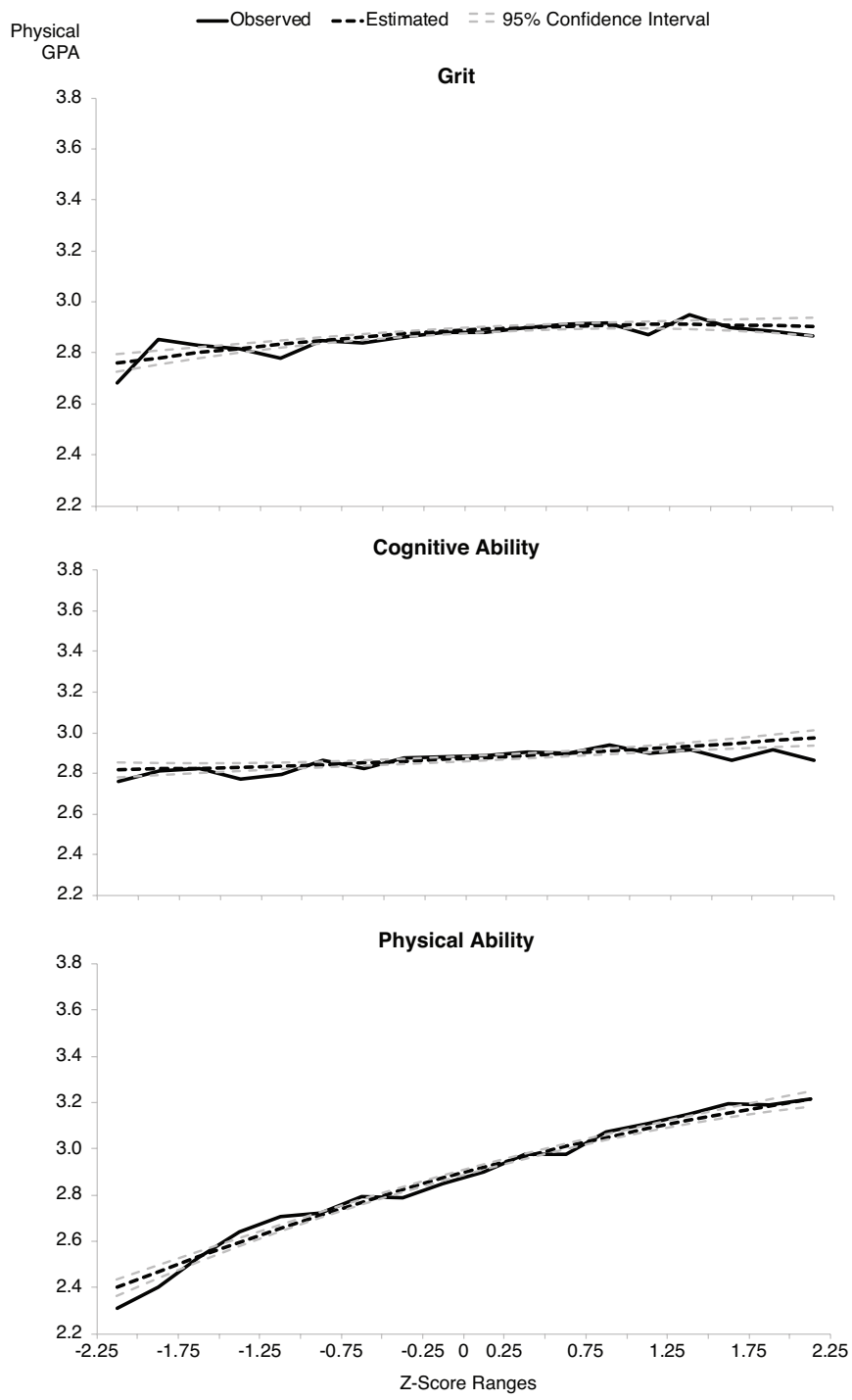

Fig. S4. Physical GPA as a function of grit, cognitive ability, and physical ability, controlling for gender, race, age, and cohort year—corresponding to linear regression Model 1 in Table S10. Dotted line shows predicted values, using raw data, and solid line shows values of binned data of 0.25 standard deviations per bin.

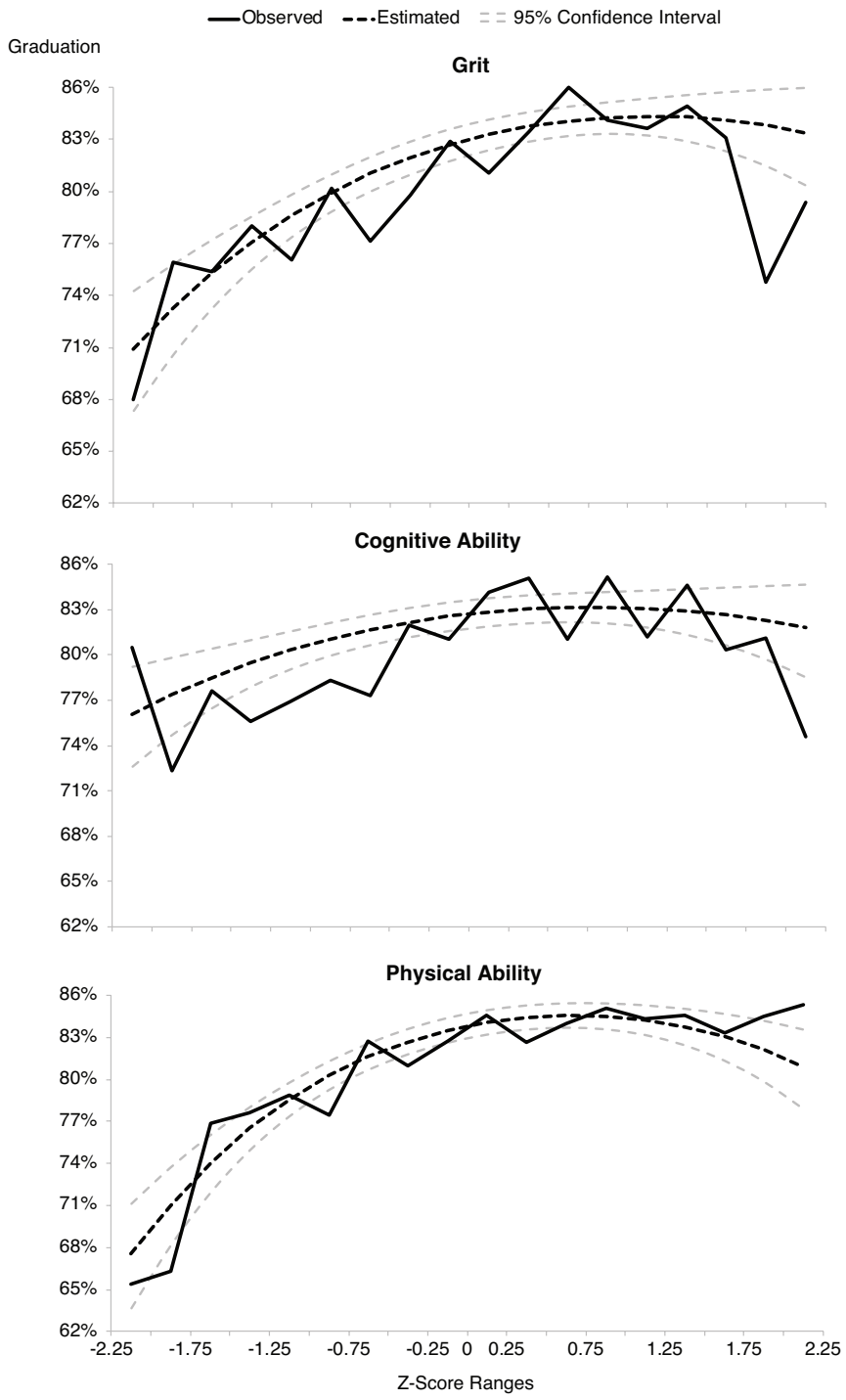

Fig. S5. Probability of graduation from West Point as a function of grit, cognitive ability, and physical ability, controlling for gender, race, age, and cohort year—corresponding to binary logistic regression Model 1 in Table S11. Dotted line shows predicted values, using raw data, and solid line shows values of binned data of 0.25 standard deviations per bin.

Tables

Table S1. Binary Logistic Regression Models Predicting Beast Barracks Completion by Cohort Year

Variable	2004	2005	2006	2007	2008	2009	2010	2011	2014
Grit	1.50**	2.35***	1.34*	1.28	1.90**	1.67*	1.45*	1.68*	1.55
Cognitive ability	1.10	1.00	1.17	1.14	1.18	0.89	1.01	0.78	1.36
Physical ability	1.03	0.89	1.07	1.18	0.97	0.88	1.46*	0.82	1.62
Grit X Grit	0.99	1.04	0.88	0.92	0.96	0.94	1.04	1.26	1.33
Cognitive ability X Cognitive ability	0.92	1.15	1.10	1.11	0.97	0.94	0.93	0.86	0.86
Physical ability X Physical ability	1.12	1.16	1.02	0.80*	0.92	0.96	1.02	1.09	1.42
Female	0.88	0.36**	0.96	0.76	0.80	0.37*	0.83	0.46	0.81
Age	1.16	1.33	1.12	1.20	1.48	0.94	1.11	0.91	1.52
Ethnicity (White is reference)									
Black	2.50	DNE	2.05	2.74	1.41	2.16	2.58	0.57	1.87
Hispanic	1.15	3.36	5.66	0.60	1.15	0.51	1.02	2.32	DNE
Asian	0.86	1.7	1.97	3.65	3.00	2.35	1.81	DNE	0.33
Other race	2.21	1.44	DNE	1.83	0.61	0.41	0.31	0.39	DNE
% Completed	94.19%	95.11%	96.03%	96.69%	96.89%	97.56%	96.46%	97.62%	99.09%
R^2	3.96%	17.83%	4.80%	6.95%	8.15%	7.94%	5.13%	7.83%	9.80%
n	1,203	835	1,260	1,245	1,245	1,222	1,272	1,176	1,072

Note. * $p < .05$, ** $p < .01$, *** $p <$. 001. DNE = Did not estimate coefficient for this specific ethnicity dummy variable due to quasi-separation of the specific coefficient adjusted for other terms in the model.

Table S2. Linear Regression Models Predicting Military GPA by Cohort Year

Variable	2004	2005	2006	2007	2008	2009	2010	2011	2014
Grit	0.15***	0.12***	0.10***	0.09***	0.09**	0.09**	0.13***	0.11***	0.11**
Cognitive ability	0.19***	0.23***	0.19***	0.16***	0.13***	0.14***	0.19***	0.15***	0.20***
Physical ability	0.01	0.08*	0.18***	0.13***	0.14***	0.13***	0.14***	0.10***	0.18***
Grit X Grit	< .001	< .001	-0.01	-0.03	-0.02	< .001	-0.04*	-0.02	-0.06*
Cognitive ability X Cognitive	-0.05	-0.01	-0.02	-0.02	-0.02	0.01	-0.01	0.02	-0.05
Physical ability X Physical	< .001	-0.02	-0.09***	-0.07***	-0.04	-0.04	-0.08***	-0.01	< .001
Female	-0.03	0.04	0.15	0.02	0.27***	0.12	0.27***	0.17*	0.16
Age	0.06*	0.07*	0.05	0.04	0.01	< .001	0.07*	-0.03	0.07
Ethnicity (White is reference)									
Black	-0.23*	-0.54***	-0.68***	-0.36***	-0.67***	-0.45***	-0.27**	-0.31***	-0.47***
Hispanic	-0.19	-0.06	-0.22*	-0.05	-0.24*	0.01	-0.14	-0.31***	-0.21
Asian	-0.14	-0.01	-0.03	-0.08	-0.39***	-0.16	-0.23*	-0.34**	-0.50***
Other race	-0.13	-0.14	-0.12	-0.23	-0.32	0.19	-0.17	-0.32*	-0.31
R^2	6.28%	10.91%	12.66%	9.87%	8.92%	6.46%	12.88%	9.52%	9.57%
n	1,133	788	1,209	1,202	1,205	1,191	1,225	1,147	1,072

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

Table S3. Linear Models Predicting Academic GPA by Cohort Year

Variable	2004	2005	2006	2007	2008	2009	2010	2011	2014
Grit	0.05	0.06	0.07**	0.09***	0.06*	0.02	0.10***	0.06*	0.08**
Cognitive ability	0.44***	0.44***	0.40***	0.40***	0.37***	0.40***	0.50***	0.42***	0.40***
Physical ability	0.01	0.01	0.10***	0.04	0.09**	0.09***	0.05*	0.07**	0.12***
Grit X Grit	0.01	-0.02	-0.01	< .001	< .001	-0.03	-0.04	-0.02	-0.06*
Cognitive ability X Cognitive	-0.02	0.04	< .001	0.03	-0.01	0.03	-0.01	0.01	< .001
Physical ability X Physical	< .001	< .001	-0.07***	-0.08***	-0.03	-0.04*	-0.07***	-0.01	0.01
Female	0.09	-0.01	0.14*	0.04	0.25**	0.07	0.14*	0.13	0.14*
Age	-0.03	-0.03	-0.01	-0.04	-0.08*	-0.02	-0.01	-0.06*	-0.03
Ethnicity (White is reference)									
Black	-0.26*	-0.52***	-0.46***	-0.21	-0.30*	-0.28**	-0.12	-0.24**	-0.22*
Hispanic	-0.10	-0.04	-0.13	0.02	-0.03	-0.12	-0.12	-0.20*	-0.17
Asian	-0.16	0.17	0.02	0.07	-0.15	0.05	-0.13	-0.22*	-0.19
Other race	-0.12	-0.42*	-0.34	-0.12	-0.25	0.10	-0.23	-0.41**	-0.11
R^2	19.56%	21.95%	21.88%	19.04%	14.21%	19.99%	28.96%	25.88%	20.03%
n	1,133	788	1,209	1,202	1,205	1,191	1,225	1,147	1,072

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

Table S4. Linear Regression Models Predicting Physical GPA by Cohort Year

Variable	2004	2005	2006	2007	2008	2009	2010	2011	2014
Grit	0.10***	0.05	0.03	0.07**	0.09**	0.05	0.05	0.06*	< .001
Cognitive ability	0.07**	0.06	0.06*	0.07**	0.09**	0.06*	0.11***	0.02	0.07
Physical ability	0.23***	0.26***	0.37***	0.38***	0.44***	0.40***	0.38***	0.37***	0.47***
Grit X Grit	0.02	< .001	-0.03	0.01	-0.02	-0.01	-0.05*	-0.01	-0.04
Cognitive ability X Cognitive	< .001	0.01	-0.01	0.04*	0.02	0.03	-0.01	0.02	-0.04
Physical ability X Physical	-0.02	-0.04	-0.12***	-0.04*	-0.02	-0.03	-0.01	< .001	< .001
Female	-0.04	-0.08	0.12	-0.06	0.10	-0.06	0.11	0.07	0.08
Age	0.02	-0.04	0.03	< .001	-0.08**	-0.05*	-0.01	-0.08**	0.01
Ethnicity (White is reference)									
Black	-0.31**	-0.53***	-0.36***	-0.24*	-0.18	-0.27**	-0.28**	-0.19*	-0.16
Hispanic	-0.14	-0.01	-0.10	0.11	-0.19*	-0.06	0.01	-0.23**	-0.18
Asian	-0.20*	0.30	-0.13	-0.17	-0.44***	-0.09	-0.11	-0.32**	-0.38**
Other race	-0.55***	-0.20	-0.19	-0.04	-0.10	-0.21	-0.30	-0.28	-0.22
R^2	9.92%	8.78%	19.50%	18.50%	22.83%	19.00%	18.63%	19.05%	16.63%
n	1,133	788	1,209	1,202	1,205	1,191	1,225	1,147	1,072

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

Table S5. Binary Logistic Regression Models Predicting Graduation by Cohort Year

Variable	2004	2005	2006	2007	2008	2009	2010	2011	2014
Grit	1.12	1.25**	1.16*	1.22**	1.22*	1.13	1.27**	1.09	1.18
Cognitive ability	1.11	1.18	1.16	1.04	1.06	1.03	1.05	0.97	1.13
Physical ability	0.96	1.03	1.26**	1.24**	1.19*	1.15*	1.24**	1.08	1.37***
Grit X Grit	0.95	0.92	0.89*	0.95	0.98	0.92	1.01	0.99	0.87*
Cognitive ability X Cognitive	0.85*	1.01	1.04	1.09	0.93	1.00	0.90*	0.87**	0.94
Physical ability X Physical	0.97	0.99	0.86**	0.85**	0.85**	0.85**	0.88*	0.94	0.93
Female	0.79	0.71	0.98	0.88	1.03	0.80	1.18	0.99	0.90
Age	1.01	1.06	1.09	0.85	0.86*	0.88	0.90	0.81*	1.02
Ethnicity (White is reference)									
Black	2.29*	1.38	0.64	0.73	0.51*	0.59	0.77	0.67	0.51**
Hispanic	1.06	2.12	0.93	1.77	0.82	1.25	0.87	0.70	0.61
Asian	0.69	2.18	2.16*	2.97**	0.81	1.84	1.08	1.43	0.70
Other race	1.62	0.87	0.77	1.08	0.71	1.94	0.55	0.51	1.20
% Graduated	80.54%	78.79%	79.85%	81.82%	79.14%	81.35%	82.02%	81.62%	82.47%
R^2	2.75%	4.04%	5.59%	6.64%	5.90%	5.42%	5.98%	4.08%	8.08%
n	1,203	835	1,260	1,245	1,245	1,222	1,272	1,176	1,072

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

Table S6. Descriptive Statistics and Bivariate Correlations

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Pre-training predictors																
1. Grit		-0.07***	0.07***	0.09***	0.08***	0.10***	0.04***	0.08***	0.03**	0.02	-0.01	0.02*	0.03**	-0.04***	< .001	0.02*
2. Cognitive ability			-0.05***	-0.01	0.06***	0.18***	0.44***	0.08***	-0.08***	-0.27***	0.21***	-0.26***	-0.14***	0.09***	-0.04***	0.05***
3. Physical ability				0.02*	0.07***	0.12***	0.04***	0.37***	-0.09***	0.01	0.07***	-0.06***	-0.05***	0.01	-0.02*	< .001
Success outcomes																
4. Beast					0.39***	0.18***	0.13***	0.17***	-0.03**	0.02*	-0.03**	0.03**	0.01	0.01	-0.01	0.07***
5. Graduation						0.49***	0.48***	0.38***	-0.02*	-0.04***	0.04***	-0.06***	-0.01	0.02*	-0.01	0.02*
6. Military GPA							0.65***	0.57***	-0.01	-0.02*	0.18***	-0.18***	-0.06***	-0.03***	-0.03***	-0.09***
7. Academic GPA								0.52***	< .001	-0.15***	0.17***	-0.18***	-0.08***	0.02*	-0.05***	0.03***
8. Physical GPA									-0.04***	-0.04***	0.13***	-0.11***	-0.05***	-0.03***	-0.04***	-0.06***
Covariates																
9. Female										-0.10***	-0.08***	0.06***	0.03**	0.03**	0.01	0.05***
10. Age											-0.03**	0.03***	0.03***	-0.04***	0.02*	-0.01
11. White												-0.49***	-0.51***	-0.46***	-0.28***	-0.06***
12. Black													-0.09***	-0.08***	-0.05***	0.07***
13. Hispanic														-0.08***	-0.05***	0.03**
14. Asian															-0.04***	< .001
15. Other race																-0.01
16. Cohort year																
M	3.75	1264.42	574.36	96.60%	80.83%	3.04	2.93	2.87	16.52%	18.60	74.19%	7.76%	8.42%	6.87%	2.64%	2,008
SD	0.53	128.79	73.10			0.52	0.71	0.51		0.97						
N	11,213	10,866	10,964	11,258	11,256	10,870	10,870	10,870	11,244	11,242	11,258	11,258	11,258	11,258	11,258	11,258

Table S7. Binary Logistic Regression Models Predicting Completion of Beast Barracks

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
Grit	1.54***			1.56***	1.55***	1.58***			1.58***		
Grit-S		1.56***									
Passion			1.33***								
Perseverance			1.30***								
Cognitive ability	1.06	1.06	1.05		1.07		1.00			1.00	
Physical ability	1.08	1.08	1.08		1.10			1.13*			1.13*
Whole Candidate Score				1.15*							
Grit X Grit	0.97			0.97	0.97	0.98			0.98		
Grit-S X Grit-S		0.98									
Passion X Passion			1.00								
Perseverance X Perseverance			0.98								
Cognitive ability X Cognitive ability	0.98	0.98	0.98		0.98		0.96			0.96	
Physical ability X Physical ability	0.99	0.99	0.99		0.99			0.99			0.99
Whole Candidate Score X Whole Candidate Score				0.99							
Grit X Cognitive ability					1.02						
Grit X Physical ability					1.03						
Cognitive ability X Physical ability					0.99						
Female	0.69***	0.66**	0.65**	0.65***	0.67**	0.64***	0.67**	0.67**	0.64***	0.67**	0.67**
Age	1.16*	1.16*	1.16*	1.16*	1.16*	1.12	1.15*	1.12	1.12	1.15*	1.12
Ethnicity (White is reference)											
Black	2.11**	2.10**	2.07**	2.32**	2.11**	2.05**	2.09**	2.08**	2.05**	2.09**	2.08**
Hispanic	1.25	1.24	1.23	1.35	1.25	1.27	1.27	1.34	1.27	1.27	1.34
Asian	1.67*	1.67*	1.69*	1.65*	1.67*	1.68*	1.62	1.58	1.68*	1.62	1.58
Other race	0.95*	0.95	0.95	0.93	0.95	0.92	0.98	0.91	0.92	0.98	0.91
Cohort	1.15***	1.16***	1.16***	1.15***	1.15***	1.15***	1.16***	1.15***	1.15***	1.16***	1.15***
Female X Grit									0.87		
Female X Grit X Grit									1.06		
Female X Cognitive ability										1.08	
Female X Cognitive ability X Cognitive ability										1.11	
Female X Physical ability											1.11
Female X Physical ability X Physical ability											0.96
White X Grit									1.32		
White X Grit X Grit									0.94		
White X Cognitive ability										1.34*	
White X Cognitive ability X Cognitive ability										0.89	
White X Physical ability											1.17
White X Physical ability X Physical ability											0.93
Black X Grit									0.52*		
Black X Grit X Grit									1.17		
Black X Cognitive ability										0.57	
Black X Cognitive ability X Cognitive ability										0.91	
Black X Physical ability											0.88
Black X Physical ability X Physical ability											1.14

Hispanic X Grit									0.68		
Hispanic X Grit X Grit									1.30		
Hispanic X Cognitive ability										1.06	
Hispanic X Cognitive ability X Cognitive ability										1.19	
Hispanic X Physical ability											0.93
Hispanic X Physical ability X Physical ability											1.23
Asian X Grit									1.03		
Asian X Grit X Grit									0.94		
Asian X Cognitive ability										0.74	
Asian X Cognitive ability X Cognitive ability										1.28	
Asian X Physical ability											0.81
Asian X Physical ability X Physical ability											1.41
Other race X Grit									1.19		
Other race X Grit X Grit									1.17		
Other race X Cognitive ability										0.49*	
Other race X Cognitive ability X Cognitive ability										1.01	
Other race X Physical ability											0.86
Other race X Physical ability X Physical ability											0.73*
Age X Grit									1.05		
Age X Grit X Grit									1.04		
Age X Cognitive ability										0.86*	
Age X Cognitive ability X Cognitive ability										0.92	
Age X Physical ability											0.92
Age X Physical ability X Physical ability											1.02
Cohort X Grit									0.99		
Cohort X Grit X Grit									1.01		
Cohort X Cognitive ability										1.00	
Cohort X Cognitive ability X Cognitive ability										0.98	
Cohort X Physical ability											1.01
Cohort X Physical ability X Physical ability											0.99
R^2	5.93%	5.88%	5.88%	6.11%	5.95%	5.97%	3.01%	2.92%	6.72%	3.84%	3.33%
n	10,530	10,530	10,522	10,876	10,530	11,197	10,852	10,962	11,197	10,852	10,962

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

Table S8. Linear Regression Models Predicting Military GPA

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
Grit	0.10***			0.09***	0.10***	0.10***			0.10***		
Grit-S		0.11***									
Passion			0.06***								
Perseverance			0.07***								
Cognitive ability	0.16***	0.16***	0.16***		0.16***		0.15***			0.15***	
Physical ability	0.12***	0.12***	0.12***		0.12***			0.12***			0.12***
Whole Candidate Score				0.31***							
Grit X Grit	-0.02**			-0.02***	-0.02**	-0.02**			-0.02**		
Grit-S X Grit-S		-0.02**									
Passion X Passion			-0.02**								
Perseverance X Perseverance			-0.01								
Cognitive ability X Cognitive ability	-0.01	-0.01	-0.01		-0.01*		-0.02***			-0.02***	
Physical ability X Physical ability	-0.04***	-0.04***	-0.05***		-0.05***			-0.05***			-0.05***
Whole Candidate Score X Whole Candidate Score				-0.02*							
Grit X Cognitive ability					-0.01						
Grit X Physical ability					0.01						
Cognitive ability X Physical ability					-0.01						
Female	0.12***	0.12***	0.12***	0.09***	0.12***	0.03	0.07**	0.09***	0.03	0.07**	0.09***
Age	0.03***	0.03***	0.03***	0.08***	0.03***	-0.01	0.03**	-0.01	-0.01	0.03**	-0.01
Ethnicity (White is reference)											
Black	-0.46***	-0.46***	-0.46***	-0.31***	-0.46***	-0.67***	-0.51***	-0.63***	-0.67***	-0.51***	-0.63***
Hispanic	-0.15***	-0.16***	-0.15***	-0.11***	-0.15***	-0.29***	-0.20***	-0.25***	-0.29***	-0.20***	-0.25***
Asian	-0.23***	-0.23***	-0.22***	-0.22***	-0.23***	-0.20***	-0.26***	-0.22***	-0.20***	-0.26***	-0.22***
Other race	-0.21***	-0.20***	-0.20***	-0.15**	-0.20***	-0.31***	-0.27***	-0.25***	-0.31***	-0.27***	-0.25***
Cohort	-0.03***	-0.03***	-0.03***	-0.04***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***
Female X Grit									-0.03		
Female X Grit X Grit									-0.02		
Female X Cognitive ability										0.06*	
Female X Cognitive ability X Cognitive ability										0.03	
Female X Physical ability											0.03
Female X Physical ability X Physical ability											0.03
White X Grit									0.01		
White X Grit X Grit									0.01		
White X Cognitive ability										0.01	
White X Cognitive ability X Cognitive ability										-0.02	
White X Physical ability											0.01
White X Physical ability X Physical ability											0.01
Black X Grit									< .001		
Black X Grit X Grit									-0.04		
Black X Cognitive ability										< .001	
Black X Cognitive ability X Cognitive ability										0.05	
Black X Physical ability											-0.02

Black X Physical ability X Physical ability											-0.04
Hispanic X Grit									-0.02		
Hispanic X Grit X Grit									0.02		
Hispanic X Cognitive ability										-0.02	
Hispanic X Cognitive ability X Cognitive ability										0.03	
Hispanic X Physical ability											0.03
Hispanic X Physical ability X Physical ability											0.01
Asian X Grit									< .001		
Asian X Grit X Grit									< .001		
Asian X Cognitive ability										-0.07*	
Asian X Cognitive ability X Cognitive ability										-0.05*	
Asian X Physical ability											-0.05
Asian X Physical ability X Physical ability											0.02
Other race X Grit									0.07		
Other race X Grit X Grit									-0.04		
Other race X Cognitive ability										0.11	
Other race X Cognitive ability X Cognitive ability										0.08	
Other race X Physical ability											-0.06
Other race X Physical ability X Physical ability											0.03
Age X Grit									< .001		
Age X Grit X Grit									0.01*		
Age X Cognitive ability										-0.02	
Age X Cognitive ability X Cognitive ability										0.01	
Age X Physical ability											0.01
Age X Physical ability X Physical ability											-0.01
Cohort X Grit									< .001		
Cohort X Grit X Grit									< .001		
Cohort X Cognitive ability										< .001	
Cohort X Cognitive ability X Cognitive ability										< .001	
Cohort X Physical ability											0.01**
Cohort X Physical ability X Physical ability											< .001
R^2	9.75%	9.91%	9.99%	13.46%	9.78%	6.00%	6.78%	6.30%	6.13%	7.13%	6.52%
n	10,172	10,172	10,165	10,505	10,172	10,824	10,491	10,590	10,824	10,491	10,590

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

Table S9. Linear Regression Models Predicting Academic GPA

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
Grit	0.07***			0.03**	0.07***	0.05***			0.05***		
Grit-S		0.08***									
Passion			0.04***								
Perseverance			0.05***								
Cognitive ability	0.41***	0.41***	0.41***		0.41***		0.40***			0.40***	
Physical ability	0.07***	0.07***	0.07***		0.07***			0.04***			0.04***
Whole Candidate Score				0.50***							
Grit X Grit	-0.02*			-0.02**	-0.02*	-0.01			-0.01		
Grit-S X Grit-S		-0.02*									
Passion X Passion			-0.02**								
Perseverance X Perseverance			-0.01								
Cognitive ability X Cognitive ability	0.01	0.01	0.01		0.01		< .001			< .001	
Physical ability X Physical ability	-0.04***	-0.04***	-0.04***		-0.04***			-0.05***			-0.05***
Whole Candidate Score X Whole Candidate Score				0.01							
Grit X Cognitive ability					< .001						
Grit X Physical ability					< .001						
Cognitive ability X Physical ability					-0.01						
Female	0.11***	0.11***	0.11***	0.05*	0.11***	-0.01	0.08**	0.02	-0.01	0.08**	0.02
Age	-0.03***	-0.03***	-0.03***	< .001	-0.03***	-0.14***	-0.04***	-0.14***	-0.14***	-0.04***	-0.14***
Ethnicity (White is reference)											
Black	-0.28***	-0.29***	-0.28***	-0.17***	-0.28***	-0.71***	-0.32***	-0.69***	-0.71***	-0.32***	-0.69***
Hispanic	-0.10**	-0.10**	-0.10**	-0.08*	-0.10**	-0.36***	-0.14***	-0.33***	-0.36***	-0.14***	-0.33***
Asian	-0.08*	-0.08*	-0.07*	-0.05	-0.08*	-0.01	-0.11**	-0.02	-0.01	-0.11**	-0.02
Other race	-0.22***	-0.22***	-0.22***	-0.17**	-0.22***	-0.37***	-0.24***	-0.35***	-0.37***	-0.24***	-0.35***
Cohort	0.01	0.01	< .001	< .001	0.01	0.02***	0.01*	0.02***	0.02***	0.01*	0.02***
Female X Grit									-0.01		
Female X Grit X Grit									< .001		
Female X Cognitive ability										0.02	
Female X Cognitive ability X Cognitive ability										0.01	
Female X Physical ability											0.02
Female X Physical ability X Physical ability											0.02
White X Grit									0.02		
White X Grit X Grit									0.01		
White X Cognitive ability										0.04	
White X Cognitive ability X Cognitive ability										-0.03	
White X Physical ability											-0.02
White X Physical ability X Physical ability											0.01
Black X Grit									-0.01		
Black X Grit X Grit									< .001		
Black X Cognitive ability										0.01	
Black X Cognitive ability X Cognitive ability										0.04	

Black X Physical ability											-0.02
Black X Physical ability X Physical ability											-0.02
Hispanic X Grit									-0.01		
Hispanic X Grit X Grit									< .001		
Hispanic X Cognitive ability										-0.01	
Hispanic X Cognitive ability X Cognitive ability										0.05*	
Hispanic X Physical ability											0.07*
Hispanic X Physical ability X Physical ability											< .001
Asian X Grit									< .001		
Asian X Grit X Grit									< .001		
Asian X Cognitive ability										-0.12***	
Asian X Cognitive ability X Cognitive ability										-0.03	
Asian X Physical ability											-0.08*
Asian X Physical ability X Physical ability											0.01
Other race X Grit									0.07		
Other race X Grit X Grit									< .001		
Other race X Cognitive ability										0.06	
Other race X Cognitive ability X Cognitive ability										0.04	
Other race X Physical ability											0.05
Other race X Physical ability X Physical ability											0.01
Age X Grit									< .001		
Age X Grit X Grit									0.02**		
Age X Cognitive ability										-0.01	
Age X Cognitive ability X Cognitive ability										0.02**	
Age X Physical ability											0.01
Age X Physical ability X Physical ability											< .001
Cohort X Grit									< .001		
Cohort X Grit X Grit									< .001		
Cohort X Cognitive ability										< .001	
Cohort X Cognitive ability X Cognitive ability										< .001	
Cohort X Physical ability											0.01**
Cohort X Physical ability X Physical ability											< .001
R^2	21.23%	21.43%	21.48%	25.07%	21.23%	7.13%	20.03%	7.28%	7.28%	20.36%	7.49%
n	10,172	10,172	10,165	10,505	10,172	10,824	10,491	10,590	10,824	10,491	10,590

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

Table S10. Linear Regression Models Predicting Physical GPA

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
Grit	0.06***			0.07***	0.06***	0.08***			0.08***		
Grit-S		0.08***									
Passion			0.02								
Perseverance			0.08***								
Cognitive ability	0.07***	0.07***	0.07***		0.07***		0.03**			0.03**	
Physical ability	0.36***	0.36***	0.36***		0.36***			0.36***			0.36***
Whole Candidate Score				0.21***							
Grit X Grit	-0.01*			-0.02**	-0.01*	-0.02*			-0.02*		
Grit-S X Grit-S		-0.02*									
Passion X Passion			-0.02**								
Perseverance X Perseverance			-0.01								
Cognitive ability X Cognitive ability	0.01	0.01	0.01		0.01		-0.02*			-0.02*	
Physical ability X Physical ability	-0.04***	-0.04***	-0.04***		-0.04***			-0.04***			-0.04***
Whole Candidate Score X Whole Candidate Score				< .001							
Grit X Cognitive ability					< .001						
Grit X Physical ability					< .001						
Cognitive ability X Physical ability					-0.01						
Female	0.03	0.03	0.03	-0.05*	0.03	-0.09***	-0.09***	0.02	-0.09***	-0.09***	0.02
Age	-0.02	-0.02	-0.02	0.02*	-0.02	-0.04***	-0.03**	-0.03***	-0.04***	-0.03**	-0.03***
Ethnicity (White is reference)											
Black	-0.26***	-0.26***	-0.26***	-0.20***	-0.26***	-0.43***	-0.37***	-0.33***	-0.43***	-0.37***	-0.33***
Hispanic	-0.09**	-0.09**	-0.09**	-0.10**	-0.09**	-0.23***	-0.20***	-0.13***	-0.23***	-0.20***	-0.13***
Asian	-0.19***	-0.19***	-0.18***	-0.19***	-0.19***	-0.16***	-0.19***	-0.20***	-0.16***	-0.19***	-0.20***
Other race	-0.23***	-0.23***	-0.23***	-0.23***	-0.23***	-0.31***	-0.31***	-0.23***	-0.31***	-0.31***	-0.23***
Cohort	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***
Female X Grit									-0.06*		
Female X Grit X Grit									-0.01		
Female X Cognitive ability										0.10***	
Female X Cognitive ability X Cognitive ability										0.02	
Female X Physical ability											0.04
Female X Physical ability X Physical ability											< .001
White X Grit									0.02		
White X Grit X Grit									0.02		
White X Cognitive ability										-0.05*	
White X Cognitive ability X Cognitive ability										-0.01	
White X Physical ability											0.01
White X Physical ability X Physical ability											< .001
Black X Grit									-0.03		
Black X Grit X Grit									-0.04		
Black X Cognitive ability										-0.03	
Black X Cognitive ability X Cognitive ability										< .001	
Black X Physical ability											-0.04

Black X Physical ability X Physical ability											-0.02
Hispanic X Grit									-0.02		
Hispanic X Grit X Grit									< .001		
Hispanic X Cognitive ability										0.02	
Hispanic X Cognitive ability X Cognitive ability										0.03	
Hispanic X Physical ability											0.03
Hispanic X Physical ability X Physical ability											-0.01
Asian X Grit									< .001		
Asian X Grit X Grit									< .001		
Asian X Cognitive ability										< .001	
Asian X Cognitive ability X Cognitive ability										-0.01	
Asian X Physical ability											-0.07*
Asian X Physical ability X Physical ability											0.04
Other race X Grit									-0.02		
Other race X Grit X Grit									-0.01		
Other race X Cognitive ability										0.19**	
Other race X Cognitive ability X Cognitive ability										-0.01	
Other race X Physical ability											0.04
Other race X Physical ability X Physical ability											< .001
Age X Grit									< .001		
Age X Grit X Grit									< .001		
Age X Cognitive ability										-0.02*	
Age X Cognitive ability X Cognitive ability										< .001	
Age X Physical ability											< .001
Age X Physical ability X Physical ability											< .001
Cohort X Grit									< .001		
Cohort X Grit X Grit									< .001		
Cohort X Cognitive ability										< .001	
Cohort X Cognitive ability X Cognitive ability										< .001	
Cohort X Physical ability											0.02***
Cohort X Physical ability X Physical ability											0.01**
R^2	16.83%	17.10%	17.25%	6.53%	16.84%	3.35%	2.70%	15.63%	3.47%	3.00%	16.17%
n	10,172	10,172	10,165	10,505	10,172	10,824	10,491	10,590	10,824	10,491	10,590

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

Table S11. Binary Logistic Regression Models Predicting Graduation from West Point

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
Grit	1.18***			1.18***	1.18***	1.18***			1.18***		
Grit-S		1.21***									
Passion			1.11***								
Perseverance			1.12***								
Cognitive ability	1.08*	1.08*	1.07*		1.07*		1.05			1.05	
Physical ability	1.18***	1.18***	1.18***		1.18***			1.19***			1.19***
Whole Candidate Score				1.29***							
Grit X Grit	0.94***			0.94***	0.94***	0.94***			0.94***		
Grit-S X Grit-S		0.96*									
Passion X Passion			0.95**								
Perseverance X Perseverance			0.99								
Cognitive ability X Cognitive ability	0.95**	0.95**	0.95**		0.95**		0.94***			0.94***	
Physical ability X Physical ability	0.89***	0.89***	0.89***		0.89***			0.89***			0.89***
Whole Candidate Score X Whole Candidate Score				0.94**							
Grit X Cognitive ability					0.97						
Grit X Physical ability					1.00						
Cognitive ability X Physical ability					0.98						
Female	0.92	0.91	0.91	0.90	0.92	0.85**	0.85*	0.93	0.85**	0.85*	0.93
Age	0.94*	0.94*	0.94*	0.99	0.94*	0.90***	0.92**	0.92***	0.90***	0.92**	0.92***
Ethnicity (White is reference)											
Black	0.73***	0.72***	0.72***	0.86	0.73***	0.59***	0.67***	0.64***	0.59***	0.67***	0.64***
Hispanic	1.01	1.00	1.01	1.07	1.01	0.89	0.94	0.97	0.89	0.94	0.97
Asian	1.25*	1.25*	1.25*	1.19	1.25*	1.19	1.18	1.16	1.19	1.18	1.16
Other race	0.90	0.90	0.90	0.92	0.90	0.79	0.82	0.89	0.79	0.82	0.89
Cohort	1.03**	1.03***	1.03**	1.02**	1.03**	1.02**	1.03**	1.03***	1.02**	1.03**	1.03***
Female X Grit									0.94		
Female X Grit X Grit									0.99		
Female X Cognitive ability										1.08	
Female X Cognitive ability X Cognitive ability										1.10*	
Female X Physical ability											1.11
Female X Physical ability X Physical ability											1.00
White X Grit									1.09		
White X Grit X Grit									0.94		
White X Cognitive ability										1.04	
White X Cognitive ability X Cognitive ability										0.94	
White X Physical ability											1.04
White X Physical ability X Physical ability											1.01
Black X Grit									0.94		
Black X Grit X Grit									1.03		
Black X Cognitive ability										0.82	
Black X Cognitive ability X Cognitive ability										1.01	
Black X Physical ability											0.95
Black X Physical ability X Physical ability											1.04

Hispanic X Grit									0.92		
Hispanic X Grit X Grit									1.05		
Hispanic X Cognitive ability										0.95	
Hispanic X Cognitive ability X Cognitive ability										1.08	
Hispanic X Physical ability											1.02
Hispanic X Physical ability X Physical ability											0.92
Asian X Grit									0.93		
Asian X Grit X Grit									1.09		
Asian X Cognitive ability										0.86	
Asian X Cognitive ability X Cognitive ability										0.99	
Asian X Physical ability											0.89
Asian X Physical ability X Physical ability											1.07
Other race X Grit									1.15		
Other race X Grit X Grit									1.11		
Other race X Cognitive ability										1.09	
Other race X Cognitive ability X Cognitive ability										0.97	
Other race X Physical ability											0.88
Other race X Physical ability X Physical ability											0.93
Age X Grit									1.00		
Age X Grit X Grit									1.03		
Age X Cognitive ability										0.94*	
Age X Cognitive ability X Cognitive ability										0.98	
Age X Physical ability											1.00
Age X Physical ability X Physical ability											1.00
Cohort X Grit									0.99		
Cohort X Grit X Grit									1.00		
Cohort X Cognitive ability										1.01	
Cohort X Cognitive ability X Cognitive ability										0.99	
Cohort X Physical ability											1.02*
Cohort X Physical ability X Physical ability											1.00
R^2	3.64%	3.66%	3.72%	3.77%	3.67%	2.26%	1.40%	2.34%	2.46%	1.89%	2.54%
n	10,530	10,530	10,522	10,876	10,530	11,196	10,851	10,962	11,196	10,851	10,962

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

Table S12. Grit Scale

Item	Subscale	Included in Grit-S
I finish whatever I begin.	Perseverance	Yes
Setbacks don't discourage me.	Perseverance	Yes
I am diligent.	Perseverance	Yes
I am a hard worker.	Perseverance	Yes
I have achieved a goal that took years of work.	Perseverance	No
I have overcome setbacks to conquer an important challenge.	Perseverance	No
I often set a goal but later choose to pursue a different one.	Passion	Yes
My interests change from year to year.*	Passion	No
I have been obsessed with a certain project for a short time but later lost interest.*	Passion	Yes
I have difficulty maintaining my focus on projects that take more than a few months to complete.*	Passion	Yes
I become interested in new pursuits every few months.*	Passion	No
New ideas and new projects sometimes distract me from old ones.*	Passion	Yes

Note. *Reverse-scored item

References

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