

Grit: Perseverance and Passion for Long-Term Goals

Angela L. Duckworth
University of Pennsylvania

Christopher Peterson
University of Michigan

Michael D. Matthews and Dennis R. Kelly
United States Military Academy, West Point

The importance of intellectual talent to achievement in all professional domains is well established, but less is known about other individual differences that predict success. The authors tested the importance of 1 noncognitive trait: grit. Defined as perseverance and passion for long-term goals, grit accounted for an average of 4% of the variance in success outcomes, including educational attainment among 2 samples of adults ($N = 1,545$ and $N = 690$), grade point average among Ivy League undergraduates ($N = 138$), retention in 2 classes of United States Military Academy, West Point, cadets ($N = 1,218$ and $N = 1,308$), and ranking in the National Spelling Bee ($N = 175$). Grit did not relate positively to IQ but was highly correlated with Big Five Conscientiousness. Grit nonetheless demonstrated incremental predictive validity of success measures over and beyond IQ and conscientiousness. Collectively, these findings suggest that the achievement of difficult goals entails not only talent but also the sustained and focused application of talent over time.

Keywords: achievement, success, personality, persistence, performance

Compared with what we ought to be, we are only half awake. Our fires are damped, our drafts are checked. We are making use of only a small part of our possible mental resources. . . . men the world over possess amounts of resource, which only exceptional individuals push to their extremes of use. (William James, 1907, pp. 322–323)

In 1907, William James proposed “a program of study that might with proper care be made to cover the whole field of psychology” (p. 332). James encouraged psychologists to address two broad problems: First, what are the types of human abilities and, second, by what diverse means do individuals unleash these abilities?

In the century that has passed since James’s suggestion, psychological science has made impressive progress in answering the first of

these two questions. In particular, we know a great deal about intelligence, or general mental ability, a construct for which formal study was initiated by a British contemporary of James, Sir Francis Galton. Notwithstanding vigorous debates over the dimensionality and origins of intelligence, we know more about IQ—how to measure it reliably and precisely and what outcomes it predicts—than any other stable individual difference. In contrast, we know comparatively little about why, as James put it, most individuals make use of only a small part of their resources, whereas a few exceptional individuals push themselves to their limits.

In this article, we reiterate James’s second question in the following terms: Why do some individuals accomplish more than others of equal intelligence? In addition to cognitive ability, a list of attributes of high-achieving individuals would likely include creativity, vigor, emotional intelligence, charisma, self-confidence, emotional stability, physical attractiveness, and other positive qualities. A priori, some traits seem more crucial than others for particular vocations. Extraversion may be fundamental to a career in sales, for instance, but irrelevant to a career in creative writing. However, some traits might be essential to success no matter the domain.¹ We suggest that one personal quality is shared by the most prominent leaders in every field: grit.

We define grit as perseverance and passion for long-term goals. Grit entails working strenuously toward challenges, maintaining

Angela L. Duckworth, Department of Psychology, University of Pennsylvania; Christopher Peterson, Department of Psychology, University of Michigan; Michael D. Matthews, Department of Behavioral Sciences and Leadership, United States Military Academy, West Point; Dennis R. Kelly, Institutional Research and Analysis Branch, United States Military Academy, West Point.

This research was supported by a National Science Foundation Graduate Fellowship and a grant from the John Templeton Foundation. For helpful comments on a draft of this article, we thank Sigal Barsade, Dianne Chambless, Martha Farah, Gary Latham, Paul Rozin, Richard Shell, Dean Simonton, and especially Martin Seligman. We are grateful to Robert Gallop and Paul McDermott for guidance on statistical analyses. Finally, we thankfully acknowledge the efforts of Paige Kimble, Edgar Knizhnik, Patty Newbold, Patrick Quinn, and Cybelle Weeks in data acquisition and management.

Correspondence concerning this article should be addressed to Angela L. Duckworth, Department of Psychology, University of Pennsylvania, 3451 Walnut Street, Philadelphia, PA 19104. E-mail: angela_duckworth@yahoo.com

¹ In this article, we are concerned with objective accomplishments. That is, we are interested in vocational and avocational achievements that are recognized by other people, in contrast to those that are primarily of subjective value to the individual. We do not examine success in other important domains of life, such as parenting, citizenship, friendship, and so on. Thus, we use terms like *success* and *achievement* to refer to the accomplishment of widely valued goals.

effort and interest over years despite failure, adversity, and plateaus in progress. The gritty individual approaches achievement as a marathon; his or her advantage is stamina. Whereas disappointment or boredom signals to others that it is time to change trajectory and cut losses, the gritty individual stays the course.

Our hypothesis that grit is essential to high achievement evolved during interviews with professionals in investment banking, painting, journalism, academia, medicine, and law. Asked what quality distinguishes star performers in their respective fields, these individuals cited grit or a close synonym as often as talent. In fact, many were awed by the achievements of peers who did not at first seem as gifted as others but whose sustained commitment to their ambitions was exceptional. Likewise, many noted with surprise that prodigiously gifted peers did not end up in the upper echelons of their field.

More than 100 years prior to our work on grit, Galton (1892) collected biographical information on eminent judges, statesmen, scientists, poets, musicians, painters, wrestlers, and others. Ability alone, he concluded, did not bring about success in any field. Rather, he believed high achievers to be triply blessed by "ability combined with zeal and with capacity for hard labour" (p. 33). Similar conclusions were reached by Cox (1926) in an analysis of the biographies of 301 eminent creators and leaders drawn from a larger sample compiled by J. M. Cattell (1903). Estimated IQ and Cattell's rank order of eminence were only moderately related ($r = .16$) when reliability of data was controlled for. Rating geniuses on 67 character traits derived from Webb (1915), Cox concluded that holding constant estimated IQ, the following traits evident in childhood predicted lifetime achievement: "persistence of motive and effort, confidence in their abilities, and great strength or force of character" (p. 218).

As context for the current research, we briefly review more recent research on individual differences that bear on success. We leave aside for the moment questions about how goals are set and maintained, how values and expectancies affect goal attainment, and so on. We also omit from our review situational factors and social and cultural variables that influence achievement. For a broader review than is possible here, we refer the reader to Simonton (1994) and Latham and Pinder (2005).

Talent and Achievement

Intelligence is the best-documented predictor of achievement (Gottfredson, 1997; Hartigan & Wigdor, 1989). Reliable and valid measures of IQ have made it possible to document a wide range of achievement outcomes affected by IQ, including college and graduate school grade point average (GPA; e.g., Bridgeman, McCamley-Jenkins, & Ervin, 2000; Kuncel, Hezlett, & Ones, 2001), induction into Phi Beta Kappa (Langlie, 1938), income (Fergusson, Horwood, & Ridder, 2005), career potential and job performance (Kuncel, Hezlett, & Ones, 2004), and choice of occupation (Chown, 1959). The predictive validities of intelligence rise with the complexity of the occupation considered. When corrected for attenuation due to reliability of measures and restriction on range, correlations between IQ and these various outcomes can be as high as $r = .6$, meaning that IQ may account for up to one third of the variance in some measures of success (Neisser et al., 1996).

However, in the Terman longitudinal study of mentally gifted children, the most accomplished men were only 5 points higher in IQ than the least accomplished men (Terman & Oden, 1947). To be sure, restriction on range of IQ partly accounted for the slightness of this gap, but there was sufficient variance in IQ ($SD = 10.6$, compared with $SD = 16$ in the general population) in the sample to have expected a much greater difference. More predictive than IQ of whether a mentally gifted Terman subject grew up to be an accomplished professor, lawyer, or doctor were particular noncognitive qualities: "Perseverance, Self-Confidence, and Integration toward goals" (Terman & Oden, 1947, p. 351). Terman and Oden, who were close collaborators of Cox, encouraged further inquiry into why intelligence does not always translate into achievement: "Why this is so, what circumstances affect the fruition of human talent, are questions of such transcendent importance that they should be investigated by every method that promises the slightest reduction of our present ignorance" (p. 352).

Reviewing the biographical details of Darwin, Einstein, and other geniuses, Howe (1999) disputed the assumption that high achievement derives directly from exceptional mental ability: "Perseverance is at least as crucial as intelligence. . . . The most crucial inherent differences may be ones of temperament rather than of intellect as such" (p. 15). Likewise, summarizing an extensive body of research on the development of expertise, Ericsson and Charness (1994) concluded that in chess, sports, music, and the visual arts, over 10 years of daily "deliberate practice" set apart expert performers from less proficient peers and that 20 years of dedicated practice was an even more reliable predictor of world-class achievement. Like Howe, Ericsson and Charness suggested that inborn ability is less important than commonly thought: "More plausible loci of individual differences are factors that predispose individuals toward engaging in deliberate practice and enable them to sustain high levels of practice for many years" (p. 744).

Personality and Achievement

The Big Five model has provided a descriptive framework for much of the contemporary empirical work on traits that predict success (Goldberg, 1990; John & Srivastava, 1999; McCrae & Costa, 1987; Tupes & Christal, 1992). In a 1991 meta-analysis, Barrick and Mount concluded that Big Five Conscientiousness related more robustly to job performance than did Big Five Extraversion, Openness to Experience, Neuroticism, or Agreeableness (Barrick & Mount, 1991). Uncorrected correlations between conscientiousness and job performance ranged from $r = .09$ to $r = .13$, depending on the occupational group. In a meta-analysis of confirmatory studies of personality measures as predictors of job performance, Tett, Jackson, and Rothstein (1991) observed a sample-weighted mean correlation between conscientiousness and job performance of $r = .12$.

One might conclude from these meta-analyses that at best, any given personality trait accounts for less than 2% of variance in achievement. If so, compared with IQ, personality would seem inconsequential. Alternatively, it is possible that more narrowly defined facets of Big Five factors may more robustly predict particular achievement outcomes (Paunonen & Ashton, 2001). It is also possible that there exist important personality traits not represented as Big Five facets. A serious limitation of the Big Five

taxonomy derives from its roots in the factor analyses of adjectives. Traits for which there are fewer synonyms (or antonyms) tend to be omitted. We agree with Paunonen and Jackson (2000) that

the ultimate test of whether a dimension of behavior is important to the understanding of human behavior depends not on the size of the factor in the language of personality. . . if such dimensions are able to account for criterion variance not accounted for by the Big Five personality factors, then those dimensions need to be considered separately in any comprehensive description of the determinants of human behavior. (p. 833)

Thus, although we recognize the utility of the Big Five taxonomy as a descriptive framework in which newly characterized personality traits should be situated, we do not believe that it provides an exhaustive list of traits worth studying.

Conscientious individuals are characteristically thorough, careful, reliable, organized, industrious, and self-controlled. Whereas all of these qualities bear a plausible contribution to achievement, their relative importance likely varies depending upon the type of achievement considered. For example, Galton (1892) suggested that self-control—the ability to resist temptation and control impulses—is a surprisingly poor predictor of the very highest achievements:

People seem to have the idea that the way to eminence is one of great self-denial, from which there are hourly temptations to diverge. . . . This is true enough of the great majority of men, but it is simply not true of the generality of those who have gained great reputations. Such men, biographies show to be haunted and driven by an incessant instinctive craving for intellectual work. (p. 36)

Consistent with Galton's distinction, Hough (1992) distinguished between achievement and dependability aspects of conscientiousness. According to Hough, the achievement-oriented individual is one who works hard, tries to do a good job, and completes the task at hand, whereas the dependable person is self-controlled and conventional (p. 144). In a meta-analysis, Hough found scales classified as measuring achievement orientation predicted job proficiency ($r = .15$) and educational success ($r = .29$) better than did dependability ($r = .08$ and $r = .12$, respectively).

Grit overlaps with achievement aspects of conscientiousness but differs in its emphasis on long-term stamina rather than short-term intensity. The gritty individual not only finishes tasks at hand but pursues a given aim over years. Grit is also distinct from dependability aspects of conscientiousness, including self-control, in its specification of consistent goals and interests. An individual high in self-control but moderate in grit may, for example, effectively control his or her temper, stick to his or her diet, and resist the urge to surf the Internet at work—yet switch careers annually. As Galton (1892) suggested, abiding commitment to a particular vocation (or avocation) does not derive from overriding "hourly temptations."

Grit also differs from need for achievement, described by McClelland (1961) as a drive to complete manageable goals that allow for immediate feedback on performance. Whereas individuals high in need for achievement pursue goals that are neither too easy nor too hard, individuals high in grit deliberately set for themselves extremely long-term objectives and do not swerve from them—even in the absence of positive feedback. A second important

distinction is that need for achievement is by definition a nonconscious drive for implicitly rewarding activities and, therefore, impossible to measure using self-report methods (McClelland, Koestner, & Weinberger, 1992). Grit, in contrast, can entail dedication to either implicitly or explicitly rewarding goals. Further, we see no theoretical reason why individuals would lack awareness of their level of grit.

Development of the Grit Scale

The aforementioned reasoning suggests that grit may be as essential as IQ to high achievement. In particular, grit, more than self-control or conscientiousness, may set apart the exceptional individuals who James thought made maximal use of their abilities. To test these hypotheses, we sought a brief, stand-alone measure of grit that met four criteria: evidence of psychometric soundness, face validity for adolescents and adults pursuing goals in a variety of domains (e.g., not just work or school), low likelihood of ceiling effects in high-achieving populations, and most important, a precise fit with the construct of grit.

We reviewed several published self-report measures but failed to find any that met all four of our criteria. The only stand-alone measure of perseverance we found, the Perseverance Scale for Children (Lufi & Cohen, 1987), is not face valid for adults. The Passion Scale (Vallerand et al., 2003) assesses commitment to a subjectively important activity but not perseverance of effort. The tenacity scale used by Baum and Locke (2004) and derived from Gartner, Gatewood, and Shaver (1991) was developed for entrepreneurs and is not face valid for adolescents. Similarly, the Career Advancement Ambition Scale (DesRochers & Dahir, 2000) refers to attitudes toward one's "profession" and "firm." Cassidy and Lynn (1989) developed a need for achievement questionnaire that taps work ethic and desire for excellence, which are consonant with the construct of grit, but also several irrelevant qualities such as the needs for money, domination of others, superiority over competitors, and social status. Finally, the goal commitment scale by Hollenbeck, Williams, and Klein (1989) assesses state-level, not trait-level, goal commitment.

The Present Research

In the absence of adequate existing measures, we developed and validated a self-report questionnaire called the Grit Scale. We expected grit to be associated with Big Five Conscientiousness and with self-control but, in its emphasis on focused effort and interest over time, to have incremental predictive validity for high accomplishment over and beyond these other constructs.

We also tested the hypothesis that grit would be unrelated to IQ. Whereas personality and IQ represent independently flourishing literatures, few contemporary investigations have incorporated both kinds of measures. Thus, we have learned surprisingly little about how personality traits and intelligence are related and about their relative contributions to performance. There are notable exceptions to this trend (cf. Ackerman & Heggestad, 1997; Chamorro-Premuzic & Furnham, 2005), but in general, psychology has ignored the recommendations of Wechsler (1940) and R. B. Cattell and Butcher (1968), who cautioned that the independent study of either noncognitive or cognitive individual differences, to the exclusion of the other, would be impoverished.

Study 1

Study 1 was a cross-sectional study for which the major purpose was to develop and validate a self-report measure of grit in a large sample of adults aged 25 years or older. The predictive validity of grit was assessed by its association with higher levels of lifetime schooling among individuals of identical age.

The broad age range of the adults in Study 1 allowed us to venture a second question: Does grit grow with age? Although personality traits are by definition relatively stable over time, Big Five Conscientiousness and stability of vocational interests both increase over the life span (McCrae et al., 1999; Srivastava, John, Gosling, & Potter, 2003; Swanson, 1999). Thus, we expected older adults to be slightly higher in grit than younger individuals.

Method

Participants and procedure. Beginning in April 2004, we set up a link on the www.authentic happiness.org website inviting visitors to help validate the Grit Scale. This noncommercial, public website provides free information about psychology research and access to a variety of self-report measures to over 500,000 registered users. All participants indicated how old they were (25 to 34 years, 35 to 44 years, 45 to 54 years, 55 to 64 years, and 65 years and older) and their level of education (some high school, high school graduate, some college, Associate's degree, Bachelor's degree, or postcollege graduate degree). By October 2005, we collected data on 1,545 participants aged 25 and older ($M = 45$ years; 73% women, 27% men).

Development of the Grit Scale. We began by generating a pool of 27 items tapping the construct of grit. Our overarching goal for scale development was to capture the attitudes and behaviors characteristic of the high-achieving individuals described to us in early, exploratory interviews with lawyers, businesspeople, academics, and other professionals. We intentionally wrote items that would be face valid for both adolescents and adults and that did not specify a particular life domain (e.g., work, school). We included items that tapped the ability to sustain effort in the face of adver-

sity (e.g., "I have overcome setbacks to conquer an important challenge," "I finish whatever I begin"). We also considered that some people sustain effort not because of subjective interest but rather because they are afraid of change, compliant with the expectations of others, or unaware of alternative options. Thus, several Grit Scale items ask about the consistency of interests over time. For example, two reverse-scored items were "My interests change from year to year" and "I have difficulty maintaining my focus on projects that take more than a few months to complete." Items are rated on a 5-point scale from 1 = *not at all like me* to 5 = *very much like me*.

We considered item-total correlations, internal reliability coefficients, redundancy, and simplicity of vocabulary to eliminate 10 items. On the remaining 17 items, we conducted an exploratory factor analysis on half of the observations chosen at random ($n = 772$). We sought a solution that satisfied tests for number of factors (e.g., R. B. Cattell's scree test), retained 5 or more items with loadings of at least .40, yielded internally consistent factors that made psychological sense, and best approximated simple structure. A two-factor oblique solution with promax rotation satisfied these criteria. See Table 1 for the 12 retained items and corrected item-total correlations with each item's respective factor. We considered the possibility that these two factors were an artifact of positively and negatively scored items but were convinced that the factor structure reflected two conceptually distinct dimensions. The first factor contained 6 items indicating consistency of interests, and the second factor contained 6 items indicating perseverance of effort. Because we expected that stamina in the dimensions of interest and effort would be correlated, we accepted this oblique solution in which the two factors were correlated at $r = .45$.

To test the integrity of the final two-factor solution, we confirmed that the specificity of each factor (i.e., the portion of reliable variance not shared by the other factor) was larger than the error variance for that factor. Further, confirmatory factor analysis with the remaining 773 observations in our sample supported this two-factor solution (comparative fit index = .83 and root-mean-square error of approximation = .11). The resulting 12-item Grit

Table 1
Common Factor Analysis of Grit Scale With Promax Rotation

Factor and Grit Scale item	Promax loading	Item-total r
Consistency of Interests		
I often set a goal but later choose to pursue a different one. ^a	.61	.51
New ideas and new projects sometimes distract me from previous ones. ^a	.77	.54
I become interested in new pursuits every few months. ^a	.73	.59
My interests change from year to year. ^a	.69	.51
I have been obsessed with a certain idea or project for a short time but later lost interest. ^a	.66	.44
I have difficulty maintaining my focus on projects that take more than a few months to complete. ^a	.47	.62
Perseverance of Effort		
I have achieved a goal that took years of work.	.65	.62
I have overcome setbacks to conquer an important challenge.	.68	.53
I finish whatever I begin.	.54	.68
Setbacks don't discourage me.	.58	.59
I am a hard worker.	.44	.70
I am diligent.	.64	.82

Note. The last column displays the corrected item-total correlations for each item with its respective factor (i.e., either Consistency of Interests or Perseverance of Effort).

^a Item was reverse scored.

Scale demonstrated high internal consistency ($\alpha = .85$) for the overall scale and for each factor (Consistency of Interests, $\alpha = .84$; Perseverance of Effort, $\alpha = .78$). In subsequent analyses, neither factor was consistently more predictive of outcomes than the other, and in most cases, the two together were more predictive than either alone. Therefore, we proceeded using total scores from the full 12-item scale as our measure of grit.

Results and Discussion

As we predicted, more educated adults were higher in grit than were less educated adults of equal age. We treated age and educational attainment as categorical variables. Two-way analysis of variance models were used to test for differences in grit by education and age. The interaction term was not significant, indicating that differences in grit for levels of education were not differential across age and that the differences in grit for levels of age were not differential across education. We therefore fit a reduced model excluding the interaction term. Main effects for each term indicated a highly significant difference in grit for the levels of each term adjusted for the other effect, $F(5, 1535) = 15.48, p < .001, \eta_p^2 = 0.05$, for education; $F(4, 1535) = 11.98, p < .001, \eta_p^2 = 0.03$, for age.

As illustrated in Figure 1, post hoc comparisons revealed that when age is controlled for, postcollege graduates were higher in grit than most other groups. Similarly, participants with an Associate's degree were significantly higher in grit than those with less education and, interestingly, also higher in grit than those with a Bachelor's degree, although this difference failed to reach significance.

Figure 2 shows that when education level is controlled for, grit increased monotonically with age; however, 25- to 34-year-olds did not differ significantly from 35- to 44-year-olds, and 45- to 54-year-olds did not differ significantly from 55- to 64-year-olds. We confirmed that this effect was not an artifact of older participants simply having more life experience and, therefore, a greater likelihood of endorsing Grit Scale items asking about past experiences (e.g., "I have overcome setbacks to conquer an important challenge.") Excluding the 3 items phrased in the past tense did not change the relationship between Grit Scale scores and age. Summary statistics for Study 1 and all subsequent studies can be found in Table 2.

The cross-sectional design of Study 1 limits our ability to draw strong causal inferences about the observed positive association between grit and age. Our intuition is that grit grows with age and that one learns from experience that quitting plans, shifting goals,

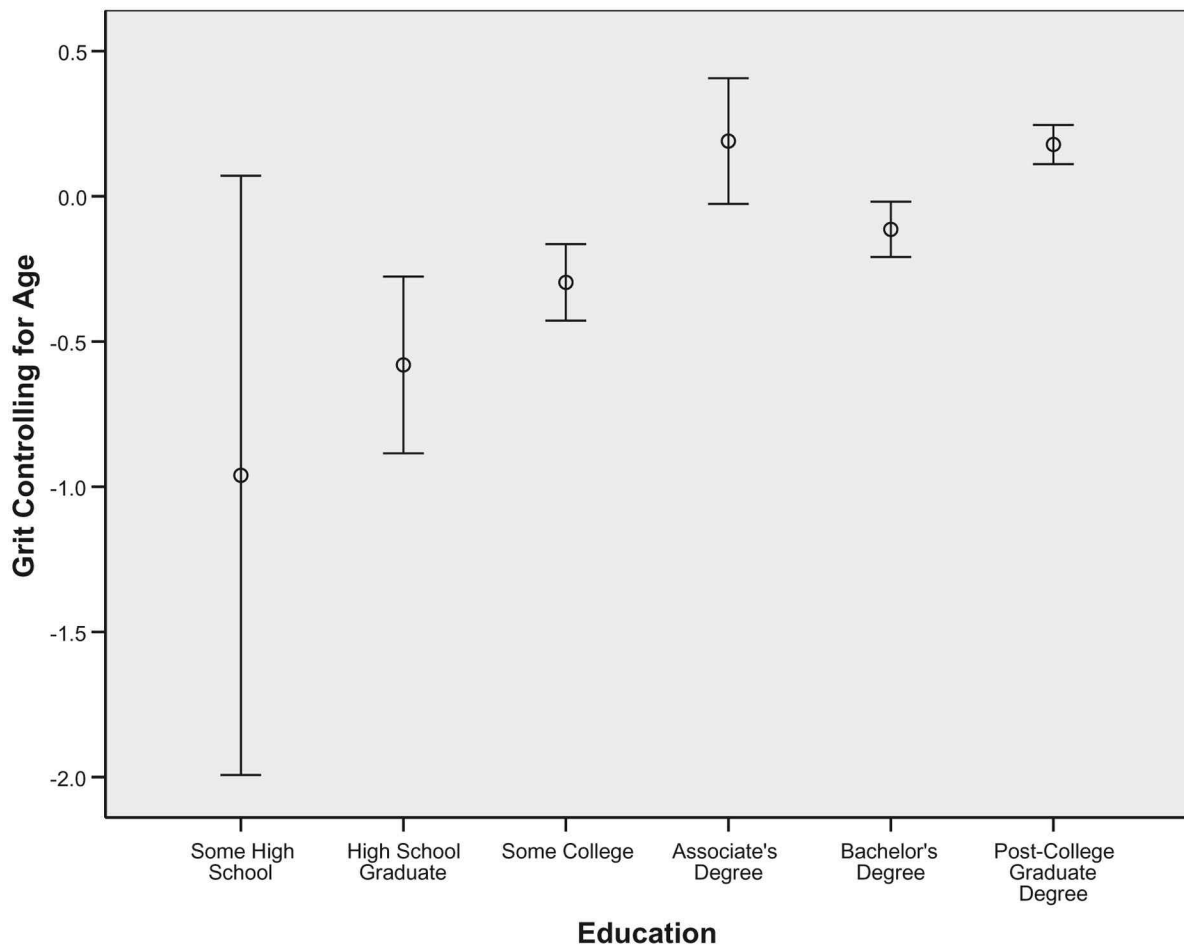


Figure 1. Grit as a function of educational attainment, controlling for age in Study 1 participants. Error bars represent 95% confidence intervals of the mean.

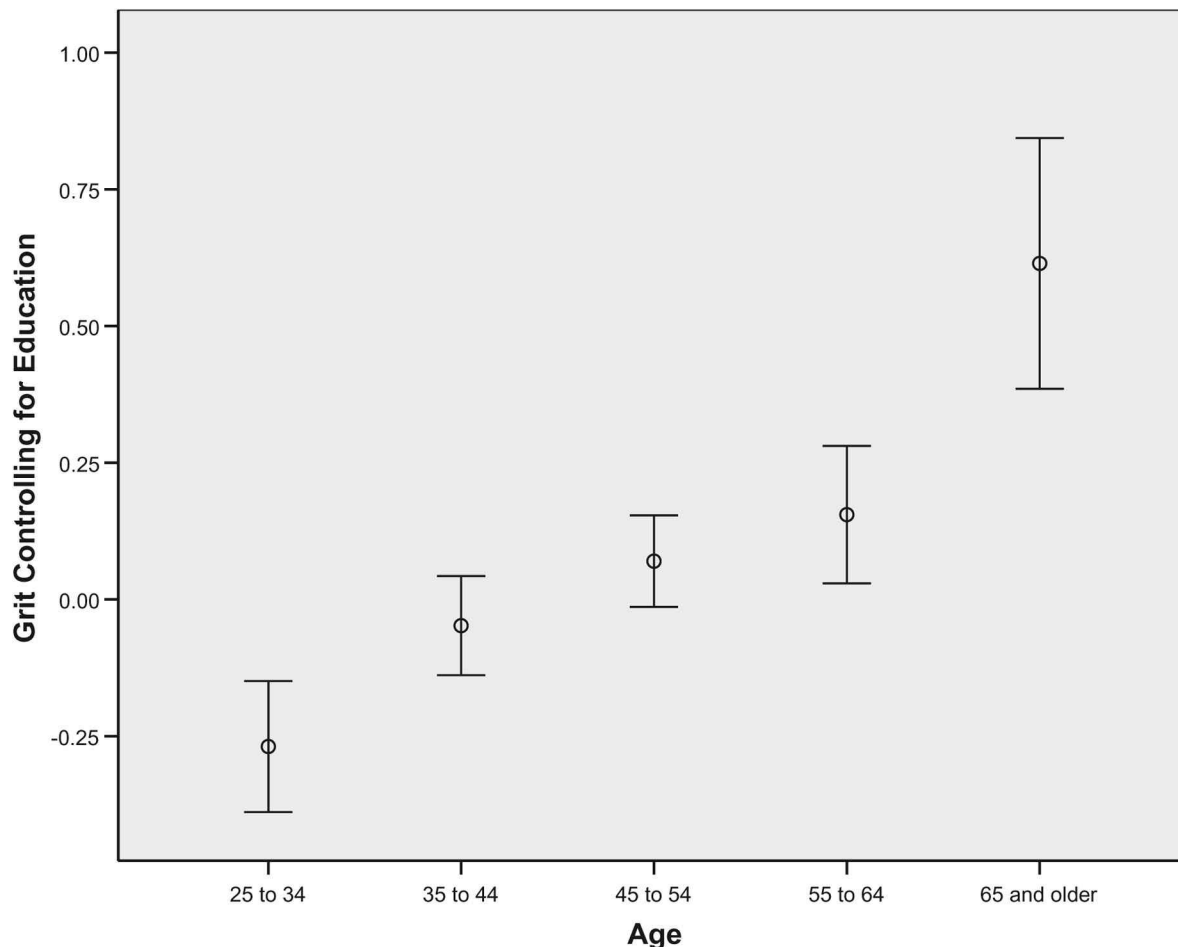


Figure 2. Grit as a function of age (in years), controlling for educational attainment in Study 1 participants. Error bars represent 95% confidence intervals of the mean.

and starting over repeatedly are not good strategies for success. In fact, a strong desire for novelty and a low threshold for frustration may be adaptive earlier in life: Moving on from dead-end pursuits is essential to the discovery of more promising paths. However, as Ericsson and Charness (1994) demonstrated, excellence takes time, and discovery must at some point give way to development.

Alternatively, McCrae et al. (1999) speculated that maturational changes in personality, at least through middle adulthood, might be

genetically programmed. From an evolutionary psychology perspective, certain traits may not be as beneficial when seeking mates as when providing for and raising a family. A third possibility is that the observed association between grit and age is a consequence of cohort effects. It may be that each successive generation of Americans, for social and cultural reasons, has grown up less gritty than the one before (cf. Twenge, Zhang, & Im, 2004).

Similarly, we interpret the observed association between grit and education as evidence that sticking with long-range goals over time makes possible completion of high levels of education. But, it is also possible that when evaluating one's ability to stay focused on goals, overcome setbacks, and so on, personal academic accomplishments were particularly salient and, therefore, spuriously inflated grit scores. Finally, because all information in Study 1 was self-reported and because grit was not compared with other traits, we cannot rule out the possibility that observed positive associations were the consequence of social desirability bias.

Study 2

In Study 1, grit was associated with educational attainment and age. The purpose of Study 2 was to test whether these relationships

Table 2
Summary Statistics for Grit Scale Across Studies

Sample characteristics	α	N	M	SD
Study 1: Adults aged 25 and older	.85	1,545	3.65	0.73
Study 2: Adults aged 25 and older	.85	690	3.41	0.67
Study 3: Ivy League undergraduates	.82	138	3.46	0.61
Study 4: West Point cadets in Class of 2008	.77	1,218	3.78	0.53
Study 5: West Point cadets in Class of 2010	.79	1,308	3.75	0.54
Study 6: National Spelling Bee finalists	.80	175	3.50	0.67

would hold when conscientiousness and other Big Five traits were controlled for. That is, does grit provide incremental predictive validity over and beyond Big Five traits? Also, is there evidence that grittier individuals make fewer career switches than their less gritty peers?

Method

Beginning in April 2006, we revised our online study on www.authentichappiness.org. By September 2006, 706 participants aged 25 and older completed the same measures as in Study 1. In addition, participants indicated “the number of times I have changed careers” and completed the Big Five Inventory (BFI; John & Srivastava, 1999), a widely used 44-item questionnaire that has demonstrated convergent validity with Costa and McCrae’s (1992) NEO Five-Factor Inventory and Goldberg’s (1992) Trait Descriptive Adjectives measures of Big Five traits. Participants endorse items such as “I see myself as someone who is talkative” using a 5-point Likert scale, where 1 = *disagree strongly* and 5 = *agree strongly*. Observed internal reliabilities of the BFI subscales measuring conscientiousness, extraversion, neuroticism, agreeableness, and openness to experience were $\alpha = .86, .89, .85, .82,$ and $.84,$ respectively. Only 16 participants (2%) reported as their highest education level either “high school” or “some high school.” Therefore these individuals were excluded from analysis. The resultant sample comprised 690 participants ($M = 45$ years, $SD = 11$; 80% women, 20% men).

Results and Discussion

As we expected, grit related to Conscientiousness ($r = .77, p < .001$) more than to Neuroticism ($r = -.38, p < .001$), Agreeableness ($r = .24, p < .001$), Extraversion ($r = .22, p < .001$), and Openness to Experience ($r = .14, p < .001$).

The incremental predictive validity of grit for education and age over and beyond conscientiousness and other Big Five traits was supported. In a two-way analysis of variance predicting grit from education and age, both education, $F(3, 682) = 11.54, p < .001, \eta_p^2 = .05,$ and age, $F(4, 682) = 15.32, p < .001, \eta_p^2 = .08,$ were significant predictors. When conscientiousness was added as a covariate to the above model, both education, $F(3, 657) = 10.63, p < .001, \eta_p^2 = .05,$ and age, $F(4, 657) = 8.45, p < .001, \eta_p^2 = .05,$ remained significant predictors. Further, when neuroticism, agreeableness, extraversion, and openness to experience were added to this analysis of covariance model as additional covariates, both education, $F(3, 653) = 11.48, p < .001, \eta_p^2 = .05,$ and age, $F(4, 653) = 6.94, p < .001, \eta_p^2 = .04,$ remained significant predictors. As illustrated in Figure 3, post hoc comparisons revealed that individuals who had completed only “some college” were lower in grit than any other group, and individuals who had earned an Associate’s degree or a graduate degree were higher in grit than individuals with a Bachelor’s degree. Figure 4 shows that grit was lowest among 25- to 34-year-olds and highest among those 65 years and older.

Similarly, grit had incremental predictive validity for number of lifetime career changes over and beyond age, conscientiousness, and other Big Five traits. Because the distribution of lifetime career changes was skewed right ($M = 2.25, SD = 2.04$), we performed a median split to compare individuals with high versus

low career changes. We also standardized all continuous predictor variables prior to analysis to allow for a more intuitive understanding of odds ratios (ORs). In a binary logistic regression predicting high versus low career change from grit, age, and all Big Five traits, grit was the only significant predictor ($OR = 0.65, \beta = -.44, p = .001$). Individuals who were a standard deviation higher in grit than average were 35% less likely to be frequent career changers.

Study 3

Studies 1 and 2 established an association between grit and educational attainment in two diverse sample of adults. Because we were interested in predicting performance among high achievers, Study 3 tested whether grit was associated with cumulative GPA among undergraduates at an elite university. Further, using SAT scores as a measure of general mental ability, we tested whether grit would be orthogonal to intelligence and, therefore, explain variance in GPA over and beyond that explained by intelligence.

Method

Participants. Participants were 139 undergraduate students (69% women, 31% men) majoring in psychology at the University of Pennsylvania. The average SAT score of this participant pool was 1,415, a score achieved by fewer than 4% of students who take the SAT.

Procedure and measures. Participants were recruited through an e-mail invitation sent to approximately 350 psychology majors in fall 2002. The invitation emphasized the voluntary and confidential nature of the study and provided a website address where participants could complete the Grit Scale and report additional information, including current GPA, expected year of graduation, gender, and SAT scores. Following Frey and Detterman’s (2004) study, we used SAT scores as a measure of general mental ability.

Results and Discussion

Gritty students outperformed their less gritty peers: Grit scores were associated with higher GPAs ($r = .25, p < .01$), a relationship that was even stronger when SAT scores were held constant ($r = .34, p < .001$). As we expected, SAT scores were also related to GPA ($r = .30, p < .001$).

It is interesting to note that grit was associated with lower SAT scores ($r = -.20, p < .03$), suggesting that among elite undergraduates, smarter students may be slightly less gritty than their peers. This finding was somewhat surprising given that Ackerman and Heggestad (1997) found conscientiousness and IQ to be orthogonal. However, our result is consistent with that of Moutafi, Furnham, and Paltiel (2005), who found in a large sample of job applicants that conscientiousness and general intelligence were inversely correlated at $r = -.24$. It is possible, as Moutafi et al. have suggested, that among relatively intelligent individuals, those who are less bright than their peers compensate by working harder and with more determination.

Study 4

The question of what predicts success in the most challenging environments is particularly important to military decision makers.

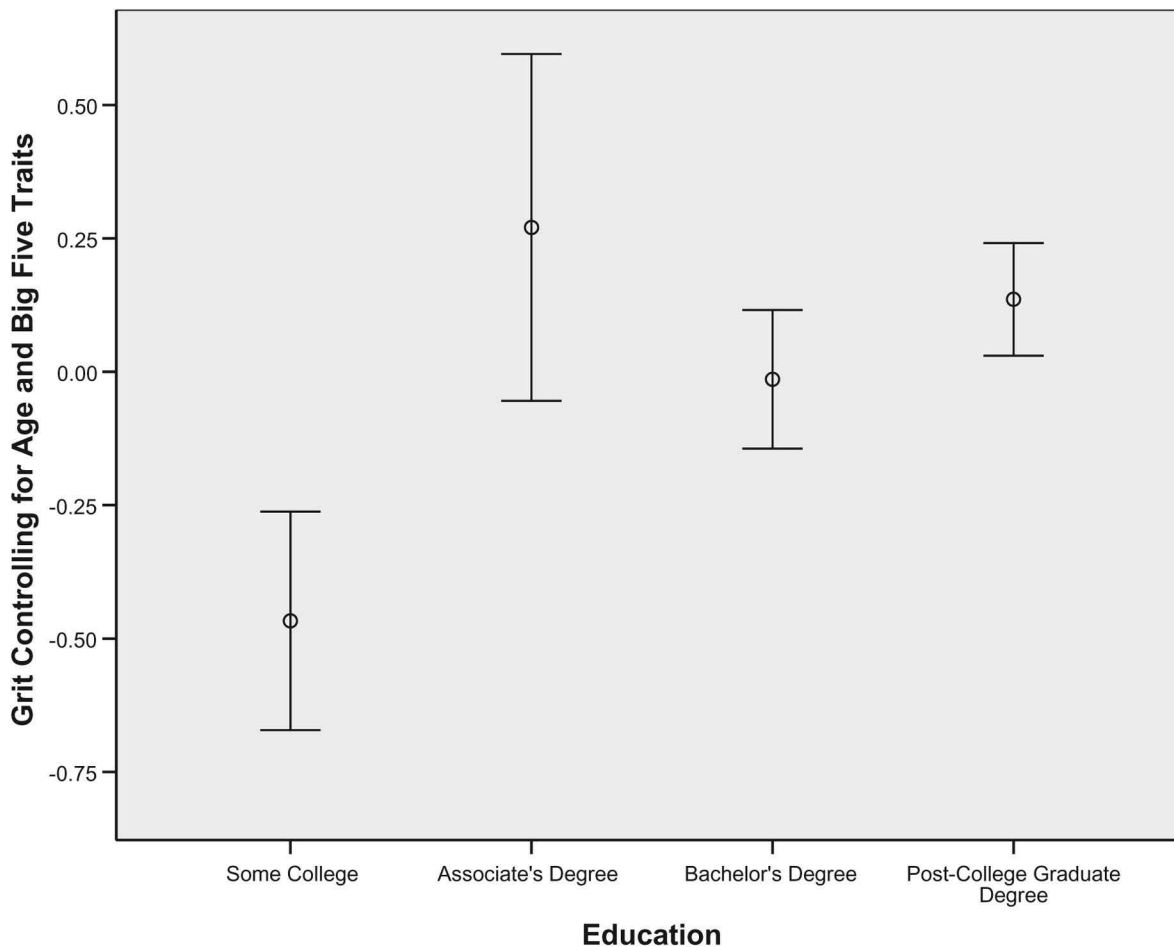


Figure 3. Grit as a function of educational attainment, controlling for age and Big Five traits in Study 2 participants. Error bars represent 95% confidence intervals of the mean.

The United States Military Academy, West Point, graduates more than 900 new officers annually, about 25% of the new lieutenants required by the Army each year. Admission to West Point is extremely competitive. Candidates must receive a nomination from a member of Congress or from the Department of the Army. They are then evaluated on their academic, physical, and leadership potential. Specifically, admission to West Point depends heavily on a Whole Candidate Score, a weighted average of SAT scores, class rank, demonstrated leadership ability, and physical aptitude. Even with such a rigorous admissions process, about 1 in 20 cadets drops out during the first summer of training.

In Study 4, we expected grit to predict retention over the first summer and, among those cadets who remained, military and academic GPA 1 year later. Given the especially rugged experience of the summer regimen, we anticipated that grit would predict retention better than would self-control. We expected grit to be unrelated to IQ (as measured by SAT scores) or to physical aptitude.

Method

Participants. Participants were 1,218 of 1,223 freshman cadets who entered the United States Military Academy, West Point, in July

2004. This group was typical of recent West Point classes in terms of gender (16% women, 84% men), ethnicity (77% Caucasian, 8% Asian, 6% Hispanic, 6% Black, 1% American Indian, and 2% other ethnicity), and age ($M = 19.05$ years, $SD = 1.1$).

Procedure. Participants completed questionnaires during a routine institutional group testing activity on the 2nd and 3rd days after arrival to West Point in June 2004. The test administrator informed cadets that participation in this study was voluntary and that the information provided would be kept confidential. Separately, official records were obtained for other data.

Measures

Grit. In the current sample, the Grit Scale had an internal reliability coefficient of $\alpha = .79$.

Self-control. The Brief Self-Control Scale (BSCS; Tangney, Baumeister, & Boone, 2004) contains 13 items endorsed on a 5-point scale, where 1 = *not like me at all* and 5 = *very much like me* (e.g., “I have a hard time breaking bad habits” and “I do certain things that are bad for me, if they are fun”). In the current sample, the BSCS had an internal reliability coefficient of $\alpha = .81$.

Whole Candidate Score. The Whole Candidate Score is used in conjunction with other information to admit applicants to West

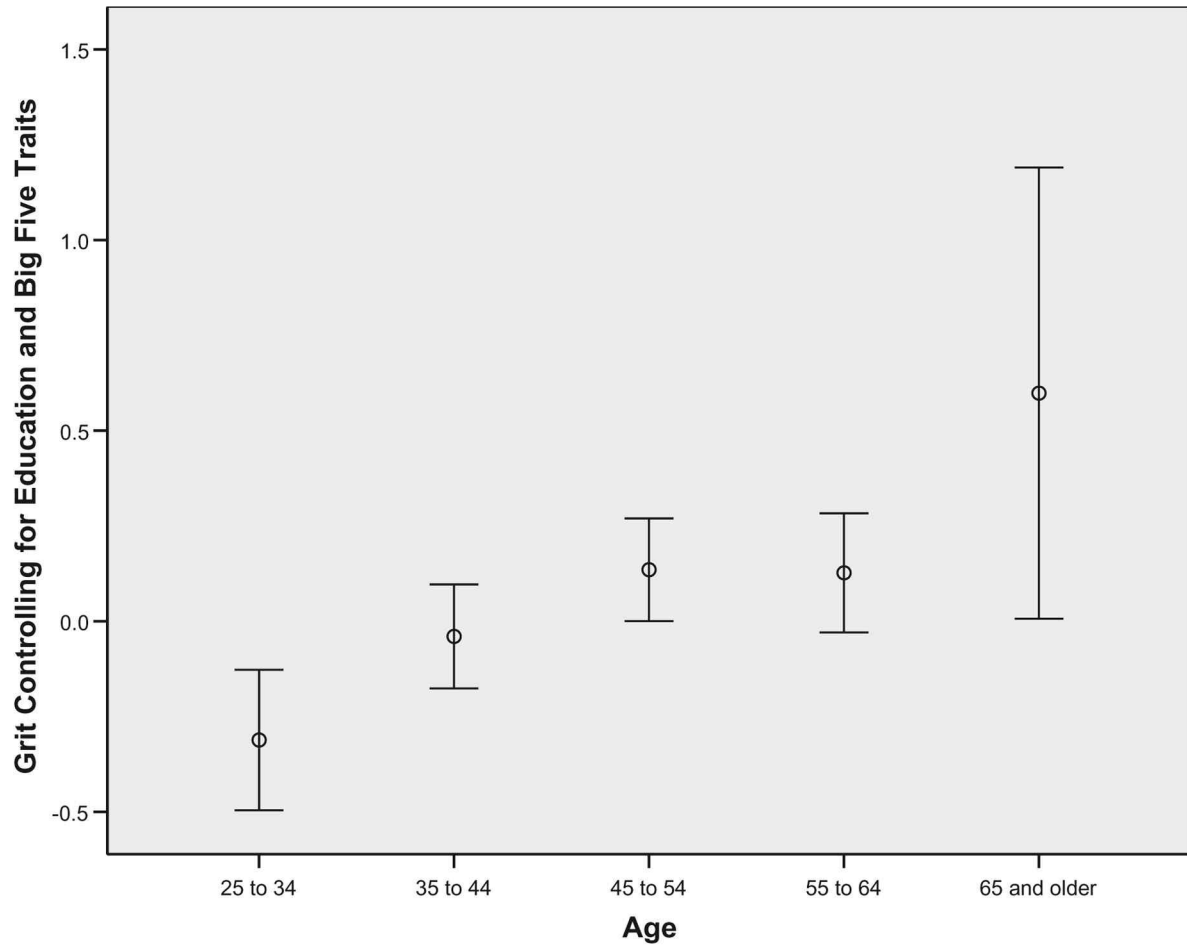


Figure 4. Grit as a function of age (in years), controlling for educational attainment and Big Five traits in Study 2 participants. Error bars represent 95% confidence intervals of the mean.

Point. The Whole Candidate Score is a weighted composite of high school rank; SAT score; Leadership Potential Score, which reflects participation in extracurricular activities; and Physical Aptitude Exam, a standardized physical exercise evaluation.

Summer retention. Summer retention was coded as a dichotomous variable where 1 = *retained* and 0 = *separated as of the first day of the fall semester*. In the current sample, 94.2% of cadets completed the summer training ($n = 1,152$), and 5.8% dropped out ($n = 71$). To examine the individual effects of grit, self-control, and other predictors on retention, we conducted separate binary logistic regressions with retention as the dependent variable. For each predictor, we report beta, which represents the change in the log odds of retention due to a unit change in the predictor, and the OR, which in the case of continuous predictor variables represents the change in the odds of retention associated with a one-unit change in the predictor.

Academic GPA. Academic GPA was calculated in spring 2005 as the cumulative average of grades in academic subjects.

Military Performance Score (MPS). MPS was calculated in spring 2005 from performance ratings from military program activities during the summer and academic year as well as grades

for military science courses. Activities completed at higher levels of responsibility were weighted more heavily.

Results and Discussion

Grit was not related to Whole Candidate Score ($r = .02$, *ns*) nor any of its components: SAT score ($r = -.05$, *ns*), high school class rank ($r = -.04$, *ns*), Leadership Potential Score ($r = .05$, *ns*), and Physical Aptitude Exam ($r = .01$, *ns*). As predicted, grit was related to self-control ($r = .63$, $p < .001$).

Grit predicted completion of the rigorous summer training program better than any other predictor. We conducted separate binary logistic regression analyses predicting summer retention from grit, self-control, and Whole Candidate Score. Predictor variables were standardized before regression analysis to allow for a more intuitive understanding of ORs. Cadets who were a standard deviation higher than average in grit were more than 60% more likely to complete summer training ($\beta = .48$, $OR = 1.62$, $p < .001$), whereas cadets who scored a standard deviation above average in self-control were only 50% more likely to complete the summer course ($\beta = .41$, $OR = 1.50$, $p < .01$). Whole Candidate

Score, the composite score used by West Point to admit candidates, did not predict summer retention ($\beta = .09$, $OR = 1.09$, ns). Further, when all three predictors were entered simultaneously into a binary logistic regression model, grit ($\beta = .44$, $OR = 1.55$, $p < .01$) but neither self-control ($\beta = .12$, $OR = 1.13$, ns) nor Whole Candidate Score ($\beta = .11$, $OR = 1.11$, ns) predicted retention robustly.

However, grit was not the best predictor of cumulative first-year academic GPA and MPS among cadets who remained at West Point. Grit predicted MPS ($r = .19$, $p < .001$) about as well as did self-control ($r = .21$, $p < .001$). However, self-control was a better predictor of GPA ($r = .13$, $p < .001$) than was grit ($r = .06$, $p < .05$); $p < .001$ for the difference in correlation coefficients. Even more striking was the superior prediction by Whole Candidate Score of both MPS ($r = .42$, $p < .001$) and GPA ($r = .64$, $p < .001$). When Whole Candidate Score and self-control were held constant, grit continued to predict MPS (partial $r = .09$, $p < .01$) but not GPA (partial $r = -.01$, ns).

These findings support Galton's (1892) contention that there is a qualitative difference between minor and major accomplishments. Earning good grades during the academic year at West Point requires regulating effort from moment to moment, primarily by resisting "hourly temptations" to procrastinate, daydream, or indulge in unproductive diversions. Self-control may be constantly taxed, but the workload is manageable and there is little temptation to give up altogether. Staying at West Point through the first summer training (sometimes referred to as *Beast Barracks*), in contrast, calls upon a different sort of fortitude. *Beast Barracks* is deliberately engineered to test the very limits of cadets' physical, emotional, and mental capacities. A reasonable response to the unrelenting dawn-to-midnight trials of *Beast Barracks* would be to exchange the goal of graduating from West Point for a more manageable goal such as graduating from a liberal arts college.

Study 5

Study 4 showed that grittier cadets were more likely to complete their first summer of training at West Point. Study 5 was a replication and extension of Study 4 in which we tested whether grit had incremental predictive validity for summer attrition over and beyond Big Five Conscientiousness.

Method

On the day after their arrival at West Point in June 2006, 1,308 of 1,310 cadets in the Class of 2010 completed questionnaires. Participants completed the Grit Scale (observed $\alpha = .79$) and the 9-item Conscientiousness subscale of the Big Five Inventory (John & Srivastava, 1999; observed $\alpha = .82$). Official records including Whole Candidate Scores and retention data were obtained in September 2006. Summer retention for the Class of 2010 (95.3%) was higher than for the Class of 2008 (94.2%).

Results and Discussion

Whole Candidate Score was related to conscientiousness ($r = .12$, $p < .001$) but not to grit ($r = .03$, ns). As in Study 2, grit and conscientiousness were highly related ($r = .64$, $p < .001$). Nevertheless, summer retention was predicted better by grit ($\beta = .31$,

$OR = 1.36$, $p < .02$) than by either conscientiousness ($\beta = .09$, $OR = 1.09$, ns) or Whole Candidate Score ($\beta = .02$, $OR = 1.02$, ns). When all three predictors were entered simultaneously into a binary logistic regression model, grit predicted summer retention ($\beta = .39$, $OR = 1.47$, $p < .03$), but Conscientiousness ($\beta = -.17$, $OR = 0.85$, ns) and Whole Candidate Score ($\beta = .04$, $OR = 1.04$, ns) did not.

Study 6

Study 6 was a prospective, longitudinal investigation involving finalists in the 2005 Scripps National Spelling Bee. This annual competition involves thousands of children in the United States, Europe, Canada, New Zealand, Guam, Jamaica, Puerto Rico, the U.S. Virgin Islands, The Bahamas, and American Samoa. In 2005, 273 newspapers sponsored spelling bee programs in their communities; the champion of each sponsor's spelling bee advanced to the national competition in Washington, DC. The two outcomes of interest were final round reached in the national competition and number of prior competitions in which children participated.

We were interested in this competition for two reasons. First, we were curious about the importance of grit to exceptional extracurricular accomplishment—to avocational rather than vocational pursuits. Second, Study 6 enabled us to test a hypothesis about the mechanism of grit. We expected the effect of grit on final round to be mediated by time on task, in this context operationally defined as the number of hours spent studying for the current spelling bee final competition and, in addition, the number of prior final competitions entered.

Method

Participants. Of 273 finalists in the 2005 Scripps National Spelling Bee, 175 (64%) elected to participate by returning signed child and parent consent forms and self-report questionnaires in April and May 2005, prior to the June final competition. Participants ranged in age from 7 to 15 years old ($M = 13.20$, $SD = 1.23$); 48% were girls, and 52% were boys. Of these 175 participants, 79 volunteered to take a verbal IQ measure over the telephone. We were able to administer the verbal IQ test to 66 participants before the competition; the remaining 13 verbal IQ tests were administered during the 2 weeks following the competition. Participants did not differ from nonparticipants on age, gender, final round reached, or number of prior competitions. Similarly, there were no systematic differences on these variables between participants who completed the verbal IQ measure and those who did not, nor between participants who completed the verbal IQ measure before the final competition and those who completed it afterward.

Measures

Grit. The Grit Scale had an internal reliability coefficient of $\alpha = .80$ in this study.

Self-control. The BSCS had an internal reliability of $\alpha = .88$ in the current sample.

Verbal IQ. The Similarities subtest of the Wechsler Intelligence Scale for Children-III (Wechsler, 1991) was delivered over the telephone to a subgroup of participants who indicated a will-

ingness to be called for this purpose. The Wechsler Intelligence Scale for Children—III is a widely used measure of general intelligence for children aged 6 to 16 years. The subtest comprises 19 word pairs that participants are asked to compare and bring under a single concept (e.g., “Red and blue. How are they similar? How are they the same?”) We chose the Similarities subtest in part because it correlates highly with verbal IQ ($r = .85$) and full scale IQ ($r = .78$). In addition, we considered that most participants would be memorizing words in preparation for the spelling bee competition and that this verbal subtest would be least confounded with vocabulary learned explicitly for the competition. Wechsler (1958) pointed out that

while a certain degree of verbal comprehension is necessary for even minimal performance, sheer word knowledge need only be a minor factor. More important is the individual’s ability to perceive the common elements of the terms he is asked to compare and, at higher levels, his ability to bring them under a single concept. (p. 73)

The Similarities subtest has a published average split-half reliability coefficient of .81 and an average test–retest stability coefficient of .81. The current sample scored more than a standard deviation above average (mean scaled score = 13.83, $SD = 2.38$).

Study time. Participants reported how many hours per day they studied for the spelling bee finals on weekdays and, separately, how many hours per day they studied on weekends. Participants studied for the spelling bee an average of 2.25 hr per day ($SD = 2.04$) on weekends and 1.34 hr per day ($SD = 1.50$) on weekdays. We interpret the higher mean and standard deviation for weekend studying as indicating that on Saturdays and Sundays finalists had fewer school-related and extracurricular obligations and, therefore, more discretionary time for studying. Because weekend and weekday studying hours were highly correlated ($r = .62, p < .001$), and because of the greater variance in weekend studying hours, in subsequent analyses we used weekend studying hours only.

Final round. The final competition of the Scripps National Spelling Bee is an oral competition conducted in rounds until only one speller remains. Rounds end after all spellers among those remaining in competition have spelled for the judges one new word. Beginning in Round 3, if a speller misspells a word, he or she is eliminated. During the 2005 competition, the winner correctly spelled words during all 19 rounds, two children tied for second place by correctly spelling words during the first 18 rounds, and so on. For all participants in our study, we recorded the number of rounds completed by a finalist prior to elimination.

Prior competitions. We recorded from records provided by the Scripps National Spelling Bee the total number of times a child has participated in the final competition. Of the 175 participants in our study, 133 (76%) were first-time finalists, 34 (19%) had competed once before, 4 had competed twice before (2%), and 4 had competed in three prior competitions (2%).

Results and Discussion

The two dependent variables of interest in Study 6—final round and prior competitions—were ordinal. We therefore used ordinal regression models (Scott, Goldberg, & Mayo, 1997) to test the effect of each predictor. We report the statistical significance and OR for each covariate, where the OR represents the likelihood of being in the next category per unit increase in the covariate. To

facilitate interpretation of ORs, we standardized grit, self-control, and verbal IQ scores before fitting ordinal regression models. Not surprisingly, older children were more likely to have participated in prior competitions ($p < .02$), and there was a trend toward older children advancing farther in competition ($p < .08$). We therefore include age as a covariate in all subsequent analyses.

As shown in Figure 5, grit predicted advancement to higher rounds in competition. In an ordinal regression model with final round as the dependent variable, grit ($\beta = .34, OR = 1.41, p < .04$) and age ($\beta = .28, OR = 1.32, p < .05$) were significant predictors, indicating that finalists with grit scores a standard deviation above the mean for same-aged finalists were 41% more likely to advance to further rounds.

Despite the sizable correlation between grit and self-control ($r = .66, p < .001$), self-control ($\beta = .04, OR = 1.04, ns$) failed to predict performance when age was controlled for ($\beta = .27, OR = 1.31, p < .06$). When grit, self-control, and age were entered as predictors of final round, grit ($\beta = .62, OR = 1.86, p < .01$) and age ($\beta = .29, OR = 1.33, p < .05$) were the only significant positive predictors.

Verbal IQ also predicted final round. In an ordinal regression model with final round as the dependent variable, verbal IQ ($\beta = .80, OR = 2.22, p < .003$) but not age ($\beta = .20, OR = 1.22, ns$) was a significant predictor. Grit and verbal IQ were not strongly related ($r = .02, ns$). Thus, we were surprised that in an ordinal regression model predicting final round from grit, verbal IQ, and age, grit was not a statistically significant predictor of final round. Specifically, the regression coefficient for grit in this model was $\beta = .19$ and its OR was 1.21, suggesting that finalists who were a standard deviation above the mean for finalists of the same age and verbal IQ might be 21% more likely to advance to further rounds. Because listwise deletion of participants who did not complete the verbal IQ measure reduced the model’s degrees of freedom by more than half, we speculate that grit would have been a significant predictor had we obtained verbal IQ data on more children and thus preserved statistical power. However, we cannot rule out other explanations.

Gritty finalists outperformed their less gritty peers at least in part because they studied longer. Specifically, weekend hours of practice mediated the relationship between grit and final round.

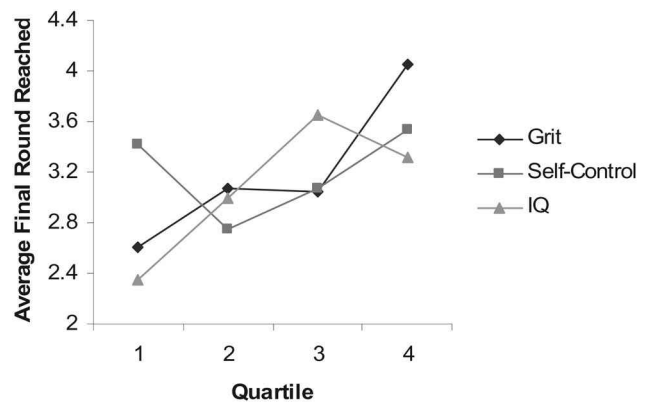


Figure 5. Final round reached as a function of ranked quartiles of grit, self-control, and IQ among National Spelling Bee finalists in Study 6. All predictors are controlled for age.

Several criteria must be met for a variable to be considered a mediator: The independent variable must predict the mediator, the mediator must predict the dependent variable when controlling for the independent variable, and the independent variable must predict the dependent variable. In addition, mediation implies that association of the independent variable and the dependent variable is reduced in the presence of the mediator (see Figure 6).

We showed in the above ordinal regression model that grit indeed predicted final round when holding age constant. Second, in a simultaneous multiple regression with study time as the dependent variable and age as a covariate, we found grit was a significant predictor ($\beta = .28, p < .001$). Finally, in a simultaneous ordinal regression model predicting final round, study time ($\beta = .30, OR = 1.35, p < .001$) and age ($\beta = .32, OR = 1.38, p < .03$) were both significant predictors, but grit ($\beta = .16, OR = 1.17, ns$) was not. Thus, although we do not know of an accepted test for the significance of the decrement in the grit regression coefficient, this set of regression analyses is consistent with weekend hours of practice at least partially mediating the relationship between trait-level grit and performance.

We followed a similar procedure to show that experience in prior final competitions was also a partial mediator between grit and final round. In contrast to self-control and verbal IQ, grit robustly postdicted participation in prior national spelling bee final competitions. In an ordinal regression model with prior competitions as the dependent variable, grit ($\beta = .48, OR = 1.62, p < .02$) was a significant predictor when age was controlled for ($\beta = .30, OR = 1.35, p < .07$). The OR for grit was 1.62, indicating that finalists who were a standard deviation above same-aged peers in grit score were 62% more likely to have competed in an incremental prior competition. In contrast, self-control only approached significance as a postdiction variable ($p = .11$), and verbal IQ seemed entirely unrelated ($p = .82$). In a simultaneous ordinal regression predicting 2005 final round, number of prior competitions ($\beta = 1.21, OR = 3.36, p < .001$) remained a significant covariate when age was controlled for ($\beta = .20, OR = 1.22, ns$), but grit ($\beta = .20, OR = 1.22, ns$) did not.

Study 6 suggests that gritty children work harder and longer than their less gritty peers and, as a consequence, perform better. The prospective, longitudinal design of this study gives us some confidence that, indeed, an enduring personality characteristic we call grit is driving the observed correlations with success outcomes rather than the other way around. However, in all of the current studies, it remains possible that a third variable drove both success outcomes and responses to the Grit Scale. We discuss this limitation in detail in the General Discussion.

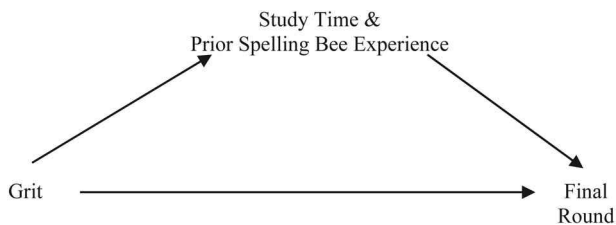


Figure 6. Model of study time and prior spelling bee experience as mediators between Grit and final round in Study 6.

General Discussion

Across six studies, individual differences in grit accounted for significant incremental variance in success outcomes over and beyond that explained by IQ, to which it was not positively related. As summarized in Table 3, grit accounted for more variance in outcomes than commonly observed for Big Five Conscientiousness. In Studies 1 and 2, we found that grittier individuals had attained higher levels of education than less gritty individuals of the same age. Older individuals tended to be higher in grit than younger individuals, suggesting that the quality of grit, although a stable individual difference, may nevertheless increase over the life span. As we expected, grittier individuals made fewer career changes than less gritty peers of the same age. In Study 3, undergraduates at an elite university who scored higher in grit also earned higher GPAs than their peers, despite having lower SAT scores. In Studies 4 and 5, grit was a better predictor of first summer retention at West Point than was either self-control or a summary measure of cadet quality used by the West Point admissions committee. However, among the cadets who persisted to the fall semester, self-control was a better predictor of academic performance. In our final study, grittier competitors in the Scripps National Spelling Bee outranked less gritty competitors of the same age, at least in part because of more accumulated practice.

In our view, achievement is the product of talent and effort, the latter a function of the intensity, direction, and duration of one's exertions toward a goal. We speculate that individual differences in the intensity dimension of effort are salient and, therefore, described by many adjectives in the English language (e.g., energetic, conscientious, dutiful, responsible, lazy). Whereas the amount of energy one invests in a particular task at a given moment in time is readily apparent both to oneself and to others, the consistency of one's long-term goals and the stamina with which one pursues those goals over years may be less obvious. Similarly, whereas the importance of working harder is easily apprehended, the importance of working longer without switching objectives may be less perceptible. Hence, it is possible that fewer adjectives describe individual differences in the dimensions of direction and duration of effort, both molar rather than molecular concepts. This disparity in lexical representation may have resulted in the omission of the grit construct from measures of Big Five Conscientiousness.

As an example, consider two children learning to play the piano. Assume that both children are equally talented in music and, therefore, improve in skill at the same rate per unit effort. Assume further that these children are matched in the intensity of effort they expend toward musical training. Intensity in this case is described by the extent to which attention is fully engaged during practice time. Duration and direction of effort, on the other hand, are described by the number of accumulated hours devoted to musical study and, crucially, the decision to deepen expertise in piano rather than to explore alternative instruments. Our findings suggest that children matched on talent and capacity for hard work may nevertheless differ in grit. Thus, a prodigy who practices intensively yet moves from piano to the saxophone to voice will likely be surpassed by an equally gifted but grittier child.

Twenty years prior to our research, the Personal Qualities Project examined the effect on success in college of over 100 preadmissions variables, including expert ratings of community

Table 3
Summary of Major Findings

Sample	Study design	Success measure	% variance in success explained by grit	<i>r</i> between grit and IQ
Study 1: Adults aged 25 and older	Cross-sectional	Educational attainment	4.8 ^{a***}	
Study 2: Adults aged 25 and older	Cross-sectional	Educational attainment	4.8 ^{a***}	
Study 3: Ivy League undergraduates	Cross-sectional	Grade point average	6.3 ^{**}	-.20 ^{b*}
Study 4: West Point cadets Class of 2008	Longitudinal (3 months)	Retention	3.9 ^{c***}	-.05 ^{b*}
Study 5: West Point cadets Class of 2010	Longitudinal (3 months)	Retention	1.4 ^{c*}	-.08 ^{b**}
Study 6: National Spelling Bee finalists	Longitudinal (1 month)	Final round	3.8 ^{a,c*}	.02

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

^a Controlling for age. ^b IQ measured by SAT score. ^c Percentage of variance estimated using Nagelkerke R^2 .

activities, athletic achievement, creative talent, personal statement quality, talent in music, and leadership experience (Willingham, 1985). One quality, follow-through, captured the essence of grit: "The follow-through rating involved evidence of purposeful, continuous commitment to certain types of activities versus sporadic efforts in diverse areas" (p. 213). High school students who received a 5-point rating for follow-through were involved for several years in at least two different activities and, in each of these domains, demonstrated significant advancement and achievement (e.g., editor of the yearbook and captain of the varsity softball team). Students who received a 1-point rating had no evidence of a multiple-year involvement in any activity.

Among more than 3,500 participants attending nine different colleges, follow-through was a better predictor than all other variables, including SAT scores and high school rank, of whether a student would achieve a leadership position in college. Follow-through was also the single best predictor of significant accomplishment in science, art, sports, communications, organization, or some other endeavor (Willingham, 1985, p. 213). Follow-through was the third best predictor, after SAT scores and high school rank, of who would graduate with academic honors. It is important to note that ratings of follow-through were better than ratings of overall high school extracurricular involvement in predicting success outcomes. Consistent with our finding that grit was not positively associated with IQ, follow-through was orthogonal to SAT scores ($\varphi = .01$). Given that college grades are only modestly correlated with adult success (Hoyt, 1966), we wonder whether follow-through or, as we prefer to call it, grit, may in fact matter more than IQ to eventual success in life.

Limitations

We see four major limitations to the current research. First, we relied exclusively on a self-report questionnaire to measure grit. The limitations of self-report instruments are well-known (e.g., Lucas & Baird, 2006; Paulhus, 1991). The Grit Scale is relatively transparent and, therefore, particularly vulnerable to social desirability bias. Although confidentiality was assured in all six studies, some participants may have been more motivated than others by the desire to look good. Studies 1 and 2 involved self-reported educational attainment and GPA, respectively, and it could be argued that in these studies, social desirability bias drove observed positive correlations between outcomes and the Grit Scale. Against this is the fact that grit was associated with educational attainment

when controlling for conscientiousness and other Big Five factors, the scores of which would also reflect social desirability bias. Further, how do we account for the sizable correlations between grit and objective measures of success in Studies 4, 5, and 6? In fact, if significant, social desirability bias suggests that the true correlations between grit and achievement are higher than we observed, strengthening our conclusions rather than weakening them. Still, we believe that a multimethod, multisource approach to measurement is preferable, and we plan to develop informant report, content analysis, and biodata measures of grit in future studies.

The second major limitation of the current work is that the Grit Scale asks respondents to reflect on their characteristic approach to goals, setbacks, and challenges (e.g., "Setbacks don't discourage me"). Such items, even when worded in the present tense, necessitate retrospective reflection. A case could be made that the sum total of our research is to show that past behavior predicts future behavior. The strong version of this complaint would suggest there is no stable individual difference called grit. Rather, there is consistency of behavior across time, possibly reflecting consistency of situation (Mischel, 1968). Of course, this claim questions whether such a thing as personality exists at all. A discussion of this debate is beyond the scope of this article, but we point out that in Studies 3, 4, 5, and 6, we examined how individuals in a similar situation respond differently.

An additional concern is that Studies 3, 4, 5, and 6 involved select populations in which there was restriction of range on IQ, resulting in attenuation of correlations between IQ and both grit and achievement. Our findings suggest that among high achievers, there is likely some degree of restriction of range on grit as well. Thus, we may have underestimated the correlations among grit, IQ, and achievement. Further, by focusing our attention on individual differences among relatively high-IQ individuals, we have necessarily limited the external validity of our investigation. We are hesitant to extrapolate from the conclusions made here to less talented populations, but our suspicion is that grit, like IQ, is of ubiquitous importance in all endeavors in which success requires months or even years of sustained effort and interest. To the extent that the temptation to give up is greater for individuals of modest ability, grit may matter more, not less. We found no significant interactions between IQ and grit in Studies 3, 4, 5, and 6, but recognize that more heterogeneous samples are needed to test

whether IQ moderates the relationship between grit and achievement.

Finally, the current findings do not shed light on how grit relates to other variables known to predict achievement, such as self-efficacy (Bandura, 1977), optimistic explanatory style (Seligman & Schulman, 1986), and locus of control (Rotter, 1966). Future research is necessary to test whether these other variables are distal factors that have an effect on achievement via grit. One possibility is that the propensity to pursue long-term goals with perseverance and passion may be determined in part by beliefs about one's capabilities, attributions of positive and negative events, and beliefs about the relative influence of external causes. However, it is also possible that the effects of these other variables on performance are mediated by some other mechanism and that grit is a mere epiphenomenon. More generally, further research is needed to elucidate the specific processes or behaviors set in motion by grit and other variables associated with achievement.

Implications

In a qualitative study of the development of world-class pianists, neurologists, swimmers, chess players, mathematicians, and sculptors, Bloom (1985) noted that "only a few of [the 120 talented individuals in the sample] were regarded as prodigies by teachers, parents, or experts" (p. 533). Rather, accomplished individuals worked day after day, for at least 10 or 15 years, to reach the top of their fields. Bloom observed that in every studied field, the general qualities possessed by high achievers included a strong interest in the particular field, a desire to reach "a high level of attainment" in that field, and a "willingness to put in great amounts of time and effort" (p. 544). Similarly, in her study of prodigies who later made significant contributions to their field, Winner (1996) concluded, "Creators must be able to persist in the face of difficulty and overcome the many obstacles in the way of creative discovery. . . . Drive and energy in childhood are more predictive of success, if not creativity, than is IQ or some other more domain-specific ability" (p. 293).

The qualitative insights of Winner (1996), Bloom (1985), and Galton (1892), coupled with evidence gathered by the current investigation and its forerunners, suggest that, in every field, grit may be as essential as talent to high accomplishment. If substantiated, this conclusion has several practical implications: First, children who demonstrate exceptional commitment to a particular goal should be supported with as many resources as those identified as "gifted and talented." Second, as educators and parents, we should encourage children to work not only with intensity but also with stamina. In particular, we should prepare youth to anticipate failures and misfortunes and point out that excellence in any discipline requires years and years of time on task. Finally, liberal arts universities that encourage undergraduates to sample broadly should recognize the ineluctable trade-off between breadth and depth. To paraphrase Benjamin Franklin, the goal of an education is not just to learn a little about a lot but also a lot about a little.

References

- Ackerman, P. L., & Heggestad, E. D. (1997). Intelligence, personality, and interests: Evidence for overlapping traits. *Psychological Bulletin, 121*, 219–245.

- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*, 191–215.
- Barrick, M. R., & Mount, M. K. (1991). The Big Five personality dimensions and job performance: A meta-analysis. *Personnel Psychology, 44*, 1–26.
- Baum, J. R., & Locke, E. A. (2004). The relationship of entrepreneurial traits, skill, and motivation to subsequent venture growth. *Journal of Applied Psychology, 89*, 587–598.
- Bloom, B. (1985). *Developing talent in young people*. New York: Ballantine Books.
- Bridgeman, B., McCamley-Jenkins, L., & Ervin, N. (2000). *Predictions of freshman grade-point average from the revised and recentered SAT I: Reasoning Test* (College Board Report 2000–2001). New York: College Entrance Examination Board.
- Cassidy, T., & Lynn, R. (1989). A multifactorial approach to achievement motivation: The development of a comprehensive measure. *Journal of Occupational Psychology, 62*, 301–312.
- Cattell, J. M. (1903). A statistical study of eminent men. *Popular Science Monthly, 359–377*.
- Cattell, R. B., & Butcher, H. J. (1968). *The prediction of achievement and creativity*. Oxford, England: Bobbs-Merrill.
- Chamorro-Premuzic, T., & Furnham, A. (2005). *Personality and intellectual competence*. Mahwah, NJ: Erlbaum.
- Chown, S. M. (1959). Personality factors in the formation of occupational choice. *British Journal of Educational Psychology, 29*, 23–33.
- Costa, P. T., & McCrae, R. R. (1992). *Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI) professional manual*. Odessa, FL: Psychological Assessment Resources.
- Cox, C. M. (1926). *Genetic studies of genius: Vol. 2. The early mental traits of three hundred geniuses*. Stanford, CA: Stanford University Press.
- Desrochers, S., & Dahir, V. (2000). Ambition as a motivational basis of organizational and professional commitment: Preliminary analysis of a proposed career advancement ambition scale. *Perceptual and Motor Skills, 91*(2), 563–570.
- Ericsson, K. A., & Charness, N. (1994). Expert performance: Its structure and acquisition. *American Psychologist, 49*, 725–747.
- Fergusson, D. M., Horwood, L. J., & Ridder, E. M. (2005). Show me the child at seven II: Childhood intelligence and later outcomes in adolescence and young adulthood. *Journal of Child Psychology & Psychiatry, 46*(8), 850–858.
- Frey, M. C., & Detterman, D. K. (2004). Scholastic assessment or g? The relationship between the scholastic assessment test and general cognitive ability. *Psychological Science, 15*(6), 373–378.
- Galton, F. (1892). *Hereditary Genius: An inquiry into its laws and consequences*. London: Macmillan.
- Gartner, W. B., Gatewood, E., & Shaver, K. G. (1991). Reasons for starting a business: Not-so-simple answers to simple questions. In G. E. Hills & R. W. LaForge (Eds.), *Research at the marketing/entrepreneurship interface* (pp. 90–101). Chicago: University of Illinois at Chicago.
- Goldberg, L. R. (1990). An alternative "description of personality": The Big-Five factor structure. *Journal Of Personality And Social Psychology, 59*, 1216–1229.
- Goldberg, L. R. (1992). The development of markers for the Big-Five factor structure. *Psychological Assessment, 4*, 26–42.
- Gottfredson, L. S. (1997). Why g matters: The complexity of everyday life. *Intelligence, 24*, 79–132.
- Hartigan, J., & Wigdor, A. (1989). *Fairness in employment testing: Validity generalization, minority issues, and the general aptitude test battery*. Washington, DC: National Academy Press.
- Hollenbeck, J. R., Williams, C. L., & Klein, H. J. (1989). An empirical examination of the antecedents of commitment to difficult goals. *Journal of Applied Psychology, 74*, 18–23.
- Hough, L. M. (1992). The "Big Five" personality variables—construct

- confusion: Description versus prediction. *Human Performance*, 5(1–2), 139–155.
- Howe, M. J. A. (1999). *Genius explained*. New York: Cambridge University Press.
- Hoyt, D. P. (1966). College grades & adult accomplishment: A review of research. *Educational Record*, 47, 70–75.
- James, W. (1907, March 1). The energies of men. *Science*, 25, 321–332.
- John, O., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (pp. 102–138). New York: Guilford Press.
- Kuncel, N. R., Hezlett, S. A., & Ones, D. S. (2001). A comprehensive meta-analysis of the predictive validity of the graduate record examinations: Implications for graduate student selection and performance. *Psychological Bulletin*, 127, 162–181.
- Kuncel, N. R., Hezlett, S. A., & Ones, D. S. (2004). Academic performance, career potential, creativity, and job performance: Can one construct predict them all? *Journal of Personality and Social Psychology*, 86, 148–161.
- Langlie, T. A. (1938). Intelligence-test scores and scholarship. *Journal of Higher Education*, 9, 449–450.
- Latham, G. P., & Pinder, C. C. (2005). Work motivation theory and research at the dawn of the twenty-first century. *Annual Review of Psychology*, 56, 485–516.
- Lucas, R. E., & Baird, B. M. (2006). Global self-assessment. In M. Eid & E. Diener (Eds.), *Handbook of multimethod measurement in psychology* (pp. 29–42). Washington, DC: American Psychological Association.
- Lufi, D., & Cohen, A. (1987). A scale for measuring persistence in children. *Journal of Personality Assessment*, 51(2), 178–185.
- McClelland, D. C. (1961). *The achieving society*. Oxford, England: Van Nostrand.
- McClelland, D. C., Koestner, R., & Weinberger, J. (1992). *How do self-attributed and implicit motives differ?* New York: Cambridge University Press.
- McCrae, R. R., & Costa, P. T., Jr. (1987). Validation of the five-factor model of personality across instruments and observers. *Journal of Personality and Social Psychology*, 52, 81–90.
- McCrae, R. R., Costa, P. T., Jr., de Lima, M. P., Simões, A., Ostendorf, F., & Angleitner, A., et al. (1999). Age differences in personality across the adult life span: Parallels in five cultures. *Developmental Psychology*, 35, 466–477.
- Mischel, W. (1968). *Personality and assessment*. New York: Wiley.
- Moutafi, J., Furnham, A., & Paltiel, L. (2005). Can personality factors predict intelligence? *Personality and Individual Differences*, 38(5), 1021–1033.
- Neisser, U., Boodoo, G., Bouchard, T. J. J., Boykin, A. W., Brody, N., & Ceci, S. J., et al. (1996). Intelligence: Knowns and unknowns. *American Psychologist*, 51, 77–101.
- Paulhus, D. L. (1991). Measurement and control of response bias. In J. P. Robinson, & P. R. Shaver (Eds.), *Measures of personality and social psychological attitudes* (Vol. 1; pp. 17–59). San Diego, CA: Academic Press.
- Paunonen, S. V., & Ashton, M. C. (2001). Big five predictors of academic achievement. *Journal of Research in Personality*, 35(1), 78–90.
- Paunonen, S. V., & Jackson, D. N. (2000). What is beyond the big five? *Plenty! Journal of Personality*, 68(5), 821–835.
- Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General & Applied*, 80(1), 1–28.
- Scott, S. C., Goldberg, M. S., & Mayo, N. E. (1997). Statistical assessment of ordinal outcomes in comparative studies. *Journal of Clinical Epidemiology*, 50, 45–55.
- Seligman, M. E., & Schulman, P. (1986). Explanatory style as a predictor of productivity and quitting among life insurance sales agents. *Journal of Personality and Social Psychology*, 50, 832–838.
- Simonton, D. K. (1994). *Greatness: Who makes history and why*. New York: Guilford Press.
- Srivastava, S., John, O. P., Gosling, S. D., & Potter, J. (2003). Development of personality in early and middle adulthood: Set like plaster or persistent change? *Journal of Personality and Social Psychology*, 84, 1041–1053.
- Swanson, J. L. (1999). *Stability and change in vocational interests*. In M. L. Savickas & A. R. Spokane (Eds.), *Vocational interests* (pp. 135–158). Palo Alto, CA: Davies-Black Publishing.
- Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality*, 72(2), 271–322.
- Terman, L. M., & Oden, M. H. (1947). *The gifted child grows up: Twenty-five years' follow-up of a superior group*. Oxford, England: Stanford University Press.
- Tett, R. P., Jackson, D. N., & Rothstein, M. (1991). Personality measures as predictors of job performance: A meta-analytic review. *Personnel Psychology*, 44(4), 703–742.
- Tupes, E. C., & Christal, R. E. (1992). Recurrent personality factors based on trait ratings. *Journal of Personality*, 60(2), 225–251.
- Twenge, J. M., Zhang, L., & Im, C. (2004). It's beyond my control: A cross-temporal meta-analysis of increasing externality in locus of control, 1960–2002. *Personality and Social Psychology Review*, 8(3), 308–319.
- Vallerand, R. J., Blanchard, C., Mageau, G. A., Koestner, R., Ratelle, C., & Léonard, M., et al. (2003). Les passions de l'Âme: On obsessive and harmonious passion. *Journal of Personality and Social Psychology*, 85, 756–767.
- Webb, E. (1915). Character and intelligence. *British Journal of Psychology*, 1(3), 99.
- Wechsler, D. (1940). Nonintellective factors in general intelligence. *Psychological Bulletin*, 37, 444–445.
- Wechsler, D. (1958). *The measurement and appraisal of adult intelligence* (4th ed.). Baltimore: Williams & Wilkins.
- Wechsler, D. (1991). *Wechsler Intelligence Scale for Children—Third Edition*. San Antonio, TX: The Psychological Corporation.
- Willingham, W. W. (1985). *Success in college: The role of personal qualities and academic ability*. New York: College Entrance Examination Board.
- Winner, E. (1996). *Gifted children: Myths and realities*. New York: Basic Books.

Received October 31, 2005

Revision received December 27, 2006

Accepted January 10, 2007 ■