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Issue: *Beyond the IQ Test***Beyond perceived ability: the contribution of psychosocial factors to academic performance**Dante D. Dixon,¹ Frank C. Worrell,² Paula Olszewski-Kubilius,³ and Rena F. Subotnik⁴¹Educational Psychology, College of Education, Wayne State University, Detroit, Michigan. ²Graduate School of Education, University of California, Berkeley, Berkeley, California. ³School of Education and Social Policy, Northwestern University, Chicago, Illinois. ⁴Education Directorate, American Psychological Association, Washington, DC

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In this study, we examined the contributions of grit, hope, and academic self-efficacy to academic achievement in a sample of 609 academically talented students ranging in age from 10 to 18 years. Our hypothesis was that these variables would predict academic achievement above and beyond the contributions of demographic variables and perceived ability. After establishing the reliability and structural validity of scores for the three constructs in this sample, regression analyses indicated that hope and academic self-efficacy were predictors of perceived ability and that academic self-efficacy was the most robust predictor of academic achievement. Grit was not a meaningful predictor of either perceived ability or academic achievement. We concluded that psychosocial variables can contribute to performance in talented students, but research is needed to establish which psychosocial variables are the most useful.

Keywords: academic self-efficacy; gifted; grit; hope; psychosocial variables

The predictive validity of general ability to academic performance has been well established,^{1–5} and scores on cognitive tests are frequently used to identify students for gifted and talented education programs.⁶ In 2011, Subotnik *et al.* reviewed the psychological literature on giftedness and gifted education. These authors acknowledged the importance of both general and domain-specific abilities, but also contended that “psychosocial variables play an essential role in the manifestation of giftedness” (p. 7).⁷ The goal of this study is to examine the contributions of psychosocial factors to perceived ability and to academic achievement in a sample of academically talented students after controlling for perceived ability.

Psychosocial factors

Psychosocial factors refer to motivational constructs that are affected by both psychological and social contexts (e.g., mindsets, future orientation, self-efficacy), and there is a growing literature suggesting that psychosocial variables are related to

academic outcomes (e.g., see Refs. 8–10). Nisbett *et al.*⁵ pointed out that there is also consensus among researchers who study cognitive variables that noncognitive variables—what we call psychosocial factors in this study—are important contributors to intellectual functioning, and researchers who study domain-specific ability have also called for studies “examining the personality and motivational characteristics of students at the time of participation in educational acceleration and enrichment activities” (e.g., see Ref. 11, p. 870).

It seems as if many researchers are convinced that psychosocial variables play a role in performance outcomes, as well as in distinguishing more outstanding from less outstanding performers. This study is a first step in examining the associations between academic achievement and several psychosocial constructs. The three psychosocial variables examined in this study were academic self-efficacy, hope, and grit. There are many possible psychosocial variables in the literature, so why were these three constructs chosen? As detailed below,

each of these variables comprises a unique constellation of psychosocial variables that have been implicated in education.

Academic self-efficacy

Academic self-efficacy was chosen as it has been shown to be an important self-perception construct in the school context.^{12,13} Bandura¹² defined perceived self-efficacy as “what you believe you can do with what you have under a variety of circumstances” and noted that perceived self-efficacy has a direct impact on performance (p. 37). Thus, people with similar levels of academic skills may perform differently if they differ in academic self-efficacy in a domain. A more competent individual may perform poorly if his or her academic self-efficacy is low, and a less-competent individual may perform well if his or her academic self-efficacy is high.^{14,15} As self-efficacy differs across individuals, it is likely that, even in academically talented youth, there will be varying levels of academic self-efficacy that will contribute to differences in academic outcomes, particularly in challenging academic contexts. However, this hypothesis has yet to be tested. Most research that has been conducted on self-efficacy in talented students focuses on increasing self-efficacy to reverse underachievement (e.g., see Refs. 16 and 17) or establishing that students labeled as gifted have higher levels of academic self-efficacy than those who are not so labeled (e.g., see Ref. 18).

Academic self-efficacy has been found to predict academic achievement, high school rank, and performance on standardized academic tests,^{19–22} to influence career decision making,²³ and to promote academic persistence and high academic aspirations.^{22,24} In addition, academic self-efficacy had the strongest relationship with academic achievement in a meta-analysis examining motivational constructs.²⁵ Finally, academic self-efficacy is inversely related to test anxiety²⁶ and is associated with increased self-regulation,²⁶ mastery or goal orientation,²⁷ and increased interest in academics.^{28,29}

Hope

Hope was chosen to represent the plethora of future-oriented constructs (e.g., future orientation, perceived life chances, optimism, time attitudes) that have also been associated with academic achievement and general well-being in the past two decades (e.g., see Refs. 8, 30, and 31).³² Snyder³³ defined

hope as the belief in one’s ability to envision and obtain future goals. He argued that hope consists of two interrelated constructs: pathways and agency. Pathways are the different options that an individual can formulate in pursuit of a desired goal, and individuals labeled as high in pathways typically have several plausible pathways to achieving their goals. The second component of hope, agency, is similar to self-efficacy, in that it refers to an individual’s belief that he has the capacity to follow through on the pathway to goal attainment. Individuals need to be high in both agency and pathways to be most successful.

Hope has been found to predict academic achievement at all levels of schooling, even when previous achievement and intelligence are taken into account,^{32,34–36} as well as problem-solving ability,³⁷ health,^{34,38} coping ability,³⁷ self-esteem,³⁸ and psychological adjustment.³⁹ Gallagher *et al.*⁴⁰ found that hope predicted the number of semesters enrolled in college, whether students returned for a second semester, if they graduated in 4 years, and their grade point average (GPA) across all years, after controlling for academic self-efficacy and engagement. Despite the aforementioned research, very few studies have examined hope in academically talented students. The studies that have been conducted on hope in gifted and talented students focus on factors that separate the gifted from the nongifted (e.g., see Ref. 41) or on the meaning of hope in these students’ lives (e.g., see Ref. 42).

Grit

Grit was selected because it has been implicated as important in a variety of contexts where outstanding performance is required (e.g., the National Spelling Bee; see Ref. 9).^{43,44} Indeed, grit has become the new poster child for psychosocial variables and has been discussed recently on public television⁴⁵ and in *The New York Times*.⁴⁶ Since being introduced to the literature in 2007, grit has become one of the most popular psychosocial variables, resulting in the development of grit-focused schools.⁴⁷

Duckworth *et al.*⁴³ defined grit as “perseverance and passion for long-term goals” that “entails working strenuously toward challenges, maintaining effort and interest over years despite failure, adversity, and plateaus in progress.” (pp. 1087–1088). Studies in the extant literature indicate that grit has modest relationships with academic achievement

(after controlling for college entrance exam scores; see Refs. 43 and 48), educational attainment,⁴³ success,^{9,48} teacher effectiveness,⁴⁹ and retention throughout military training.⁴³

There have been a few studies of grit in the gifted literature. First, Duckworth *et al.*⁴³ and Duckworth and Quinn⁴⁴ found that grit predicted performance among participants in the National Spelling Bee.⁴⁴ Second, Duckworth *et al.*⁴³ found that grit predicted retention among 1218 freshman cadets within the U.S. Military Academy, West Point. Given grit's prominence in the educational arena, we thought that it was an important variable to include in a study on the benefits of psychosocial variables.

Relationships among the psychosocial constructs

In sum, there is research evidence suggesting that grit, hope, and self-efficacy are related to academic performance, although self-efficacy has the most extensive research base. As motivational constructs related to higher performance, one would expect hope, grit, and academic self-efficacy to be inter-correlated, and studies suggest that they are associated. For example, Feldman and Kubota⁵⁰ found that general hope and academic self-efficacy had a correlation of 0.55 and that hope explained significantly more variance of GPA than academic self-efficacy. Academic self-efficacy is one's perceived ability to do academic tasks, whereas hope consists of one's perceived capacity to accomplish one's goals (a self-efficacy component) as well as one's ability to envision a path to accomplish those goals,^{33,50} so hope is broader. Grit and hope are also correlated. Erickson-Dockter and Randall⁵¹ found that hope and grit had a correlation of 0.45, and Credé *et al.*⁴⁸ reported a correlation of 0.36 between grit and generalized self-efficacy. To the extent that these constructs share variance, an important question is which psychosocial constructs have the greatest utility in performance outcomes.

The present study

Our primary goal in the current study was to examine the contributions of the three psychosocial variables—academic self-efficacy, hope, and grit—to perceived ability and to academic achievement controlling for perceived ability. Perceived ability was used for both pragmatic and theoretical reasons. First, from a practical standpoint, collecting

cognitive test data alongside measures of psychosocial functioning on a large sample could not be accomplished in time to respond to this call. Second, using perceived ability allowed us to control for students' general self-perception of their academic ability, resulting in a more robust assessment of the additional contributions of the psychosocial variables. Third, Spinath *et al.* found that perceived ability had modest positive correlations with intelligence test scores and contributed to the prediction of achievement after controlling for intelligence (also see Ref. 52).⁵³ Finally, research has shown that academically talented students' perceived ability relative to peers at their home schools and to peers in gifted programs is responsive to context.⁵⁴

As reliability and validity are of scores in a specific sample, in keeping with best practice, we began with an examination of the internal consistency and structural validity of scores on the three constructs in this sample. We hypothesized that scores on the three psychosocial constructs would be reliable and valid in the sample. Second, we examined the contribution of academic self-efficacy, hope, and grit to perceived ability, controlling for demographic variables. We hypothesized that these variables would contribute positively and meaningfully to this construct. We know that self-efficacy is determined to some extent by mastery experiences, and we suspect that hope and grit are also related to experiences in the past. Thus, these three constructs should predict students' ability for self-perception.

Finally, we examined the contribution of academic self-efficacy, hope, and grit to academic achievement, controlling for the demographic variables and for perceived ability. This final analysis was the most stringent test of the contributions of the psychosocial variables, as we controlled for the variance already accounted in their self-perception of ability. Thus, we hypothesized that the variables would add less variance than in the previous analyses, but would still contribute meaningfully on the basis of the extant literature.^{9,25,40}

Methods

Participants

The sample consisted of 609 (42.3% male) academically talented adolescents aged 10–18 ($M_{\text{age}} = 14.34$, $SD = 1.44$; $M_{\text{grade}} = 9.61$, $SD = 1.35$) from a summer program for the academically talented at a major research university in an urban

Table 1. Descriptive statistics

Variable	1	2	3	4	5	6	<i>M</i>	<i>SD</i>
1. Self-reported GPA	1.00						3.90	0.79
2. Grit-S effort (1–5)	0.20*	1.00					3.65	0.65
3. Grit-S interest (1–5)	0.05	0.41*	1.00				3.17	0.72
4. Academic SE (1–6)	0.34*	0.40*	0.19*	1.00			4.96	1.16
5. Hope (1–6)	0.26*	0.48*	0.21*	0.45*	1.00		4.34	1.19
6. Perceived ability (1–5)	0.09*	0.16*	0.13*	0.26*	0.24*	1.00	3.46	0.86

**P* < 0.003.

GPA, grade point average; Grit-S effort, Short Grit Scale Perseverance of Effort; Grit-S interest, Short Grit Scale Consistency of Interests; SE, self-efficacy.

area of a Western state. Students are admitted to the program on the basis of grades, teacher recommendations, standardized test scores, and stated interests. The ethnic breakdown of the sample consisted of 380 Asian Americans (62.3%), 90 European Americans (14.8%), 25 Hispanic Americans (4.1%), 11 African Americans (1.8%), and 103 multiethnic/other (16.9%). The socioeconomic classification of the sample was 1.3% poor, 4.6% working class, 7.2% lower-middle class, 34.8% middle class, 37.1% upper-middle class, 6.4% lower-upper class, and 3% wealthy. The mean GPA of the group was close to 4.0 (Table 1).

Measures

Perceived ability. Perceived ability was measured with the following question: “Rate yourself in academic ability compared with others in [your summer program class].” Response options were “Among the poorest,” “Below average,” “Average,” “Above average,” and “Among the best.” Similar items have been used effectively to measure overall perceived ability in school⁵⁵ and in a summer program for academically gifted youth.⁵⁴ Worrell⁵⁴ provided validity evidence in support of this construct by showing that academically talented students’ perceived ability relative to peers at their home schools predicted GPA at their home schools but not in a program for academically talented youth, whereas perceived ability relative to their peers in the academically talented program predicted achievement in the program but not in school, indicating that the construct is context specific. Moreover, although Worrell did not report this, a comparison of his participants’ perceived ability in the home school and summer program yielded lower scores for summer program across all ethnic groups, with medium-to-

large effect sizes ranging from -0.60 to -0.91 across four ethnic groups, suggesting that the variable is responsive to context.

Grit. Grit was measured using the Short Grit scale, an eight-item scale that measures trait perseverance and passion for long term goals (Grit-S).⁴⁴ The Grit-S is made up of two subscales, consistency of interests over time (four items, e.g., “I have difficulty maintaining my focus on projects that take more than a few months to complete”) and perseverance of effort over time (four items, e.g., “I have achieved a goal that took years of work”). Responses consisted of 5-point Likert scale ranging from 1 (“Not like me at all”) to 5 (“Very much like me”). For the consistency of interests over time subscale, lower scores indicate more grit; thus, responses are reverse coded. For the perseverance of effort subscale, higher scores indicate more grit. Duckworth and Quinn⁴⁴ reported that Grit-S scores were reliable in samples of undergraduates and adolescents, with α estimates ranging from 0.73 to 0.83.

Hope. Hope was measured using the Children’s Hope Scale (CHS).³² The CHS is a six-item instrument made up of two subscales, pathways and agency. Pathways measures one’s ability to envision paths and alternative paths to one’s future goals (three items, e.g., “I can think of many ways to get the things in life that are most important to me”). Agency measures one’s belief, and corresponding motivation, in one’s own ability to accomplish their goals via envisioned paths (three items, e.g., “I think I am doing pretty well”). Responses are recorded via 6-point Likert scale options ranging from 1 (“None of the time”) to 6 (“All of the time”). Scores on the CHS have been found to be structurally valid

and reliable in similar populations, with α estimates ranging from 0.72 to 0.86.^{32,56}

Academic self-efficacy. Academic self-efficacy was measured using the Self-Efficacy for Academic Achievement Scale (SEAA).⁵⁷ The SEAA scale is a nine-item instrument that measures how well students thought they could learn various academic subjects. Questions on the SEAA scale require adolescents to respond to “How well can you learn” academic subjects, including general mathematics, algebra, science, biology, reading/writing/language skills, computers, foreign language, social studies, and English grammar. Response options were a 6-point Likert scale ranging from 1 (“Not well at all”) to 6 (“Very well”). Although the SEAA has been used in several studies,⁵⁸ no researchers have examined the psychometric properties of SEAA scores.

Academic achievement. Academic achievement was based on students’ self-reported GPA on a 4.0 scale. They answered the question, “What is your current GPA?” Studies have shown that adolescent self-reported grades are reliable and accurate with correlations between actual GPA and reported GPA being as high as 0.90.^{59,60}

Procedure

The data in this study were collected in the form of an online questionnaire administered at the end of the summer program, and the psychosocial instruments were included alongside measures of teacher effectiveness and other program-evaluation questions. The study was approved by the Institutional Review Board at the first author’s institution. Missing data were handled using maximum likelihood estimation (25 iterations). Percentage of values imputed for variables ranged from 2.5% to 20.2%.

Results

Preliminary analyses

Means, standard deviations, and intercorrelations among the variables are reported in Table 1. Skew coefficients were less than 1 for perceived ability, hope, and the two Grit-S subscales. Academic self-efficacy had elevated kurtosis levels, and GPA had elevated skew and kurtosis levels. Given the sample size, tests of normality for all the variables yielded statistically significant results. However, an inspection of the histograms indicated that the primary issue for academic self-efficacy (1.0–6.0) and academic achievement (2.0–4.8) was leptokurtosis, with 38% of the participants having mean academic self-efficacy scores of 5 and 42% having mean GPAs of 4.0. Outside of these values, which were near the center of the distribution, the distributions generally fell within the normal curve outline. As the ratio of the mean to the standard deviation was >4.0 for both variables, no transformation was performed.⁶¹ As can be seen, most of the variables were statistically and meaningfully correlated with each other, as expected. Moreover, the variables generally had similar levels of association with perceived ability and academic achievement.

As grit and hope scores are well established in the literature, the structural validity of these scores was examined using confirmatory factor analyses (CFAs), all of which are reported in Table 2. CFAs were conducted using Mplus 7.3 with the robust weighted least squares means and variance adjusted (WLSMV).⁶² Following the recommendation of Hu and Bentler,⁶³ several different types of fit indices were reported: χ^2 , the comparative fit index (CFI), the Tucker–Lewis index (TLI), and the root mean square error of approximation (RMSEA) and its 95% confidence interval. CFI and TLI values ≥ 0.90 are considered acceptable and ≥ 0.95 are

Table 2. Fit indices from confirmatory factor analyses (WLSMV)

Model	α	ω	χ^2	d.f.	CFI	TLI	RMSEA	(90% CI)
1. GRIT-S (1F)	0.79	0.84	650.548*	20	0.814	0.740	0.228	0.213, 0.243
2. GRIT-S (2F)	0.74/0.77	0.80/0.80	193.36*	19	0.949	0.924	0.123	0.107, 0.139
3. Hope	0.85	0.88	90.361*	4	0.977	0.943	0.188	0.156, 0.223

NOTE: $N = 609$.

* $P < 0.001$.

CFI, comparative fit index; TLI, Tucker–Lewis index; RMSEA, robust root mean square error of approximation; CI, confidence interval (for RMSEA); 1F, one-factor model; 2F, two-factor model.

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considered excellent. RMSEA values ≤ 0.05 are considered acceptable.

These results are presented in Table 2. We began with a one-factor model for both Grit-S and CHS scores, as this is how the two variables are typically used in the literature. As can be seen in Table 2, none of the fit indices for the one-factor Grit-S model were acceptable. A two-factor model based on the two Grit-S factors yielded acceptable CFI and TLI values and lower RMSEA values than the one-factor model (albeit still high). As two of the three indices were in the acceptable range and several studies found that the RMSEA will be artificially high for models with small degrees of freedom,^{64,65} the two-factor model was accepted and used in subsequent analyses. The one-factor analysis of CHS scores yielded excellent CFI and TLI values. The RMSEA for hope was high, but that was to be expected because the degrees of freedom were low. As a result, we accepted the one-factor model for use in subsequent analyses.

Given the lack of psychometric information on SEAA scores, an exploratory factor analysis (principal axis extraction) was run for the SEAA. Two items, computer and foreign language, were dropped from the scale because communalities were low (0.19 and 0.28, respectively). A subsequent analysis indicated that communality estimates for the other seven items ranged from 0.35 to 0.66. Parallel analysis suggested a two-factor structure, but an analysis of the two-factor structure indicated that only five items had nonsubstantial cross-loadings, resulting in a duplet mathematics factor (algebra and general math) and a language arts/social studies factor. A one-factor structure was run, and this analysis yielded factor coefficients ranging from 0.53 to 0.80. The α estimate for scores based on the seven items was 0.81, and the factor explained 38.7% of the variance in SEAA scores. Thus, the one-factor structure was accepted and used in subsequent analyses.

Regression analyses

Table 3 displays the results of the hierarchical regression with academic self-efficacy, hope, and grit predicting perceived ability. As can be seen, sex, socioeconomic status, and age accounted for less than 1% of the variance in perceived ability, but the three psychosocial variables explained more than 7% of the variance in perceived ability. However, only academic self-efficacy and hope were statistically sig-

Table 3. Hierarchical regressions predicting perceived ability

Variable	B	β	Adjusted R ²	ΔR^2
Block 1				
Sex	−0.090	−0.052		
Socioeconomic status	0.073	0.092		
Age	0.028	0.047	0.009	0.009
Block 2				
Grit-S effort	−0.017	−0.013		
Grit-S interest	0.089	0.076		
Hope	0.151*	0.148		
Academic self-efficacy	0.221*	0.172	0.087	0.078

* $P < 0.01$.
Grit-S effort, Short Grit Scale Perseverance of Effort; Grit-S interest, Short Grit Scale Consistency of Interests.

nificant contributors. We examined the interactions of the two grit facets with hope and academic self-efficacy, but these did not contribute significantly or meaningfully to the equation.

In the next analysis (Table 4), we predicted academic achievement with the demographic variables in block 1, perceived ability in block 2, and the psychosocial variables in block 3. The final equation accounted for almost 14% of the variance in academic achievement, with demographic variables contributing 2% of the variance, perceived ability contributing $< 1\%$, and the psychosocial variables contributing 11% of the variance, with only academic self-efficacy making a statistically significant contribution. Although not statistically significant, hope had a standardized coefficient around 0.10. We included the interactions between grit facets and the other two psychosocial variables in a fourth block, but they did not contribute to the equation.

Discussion

In this study, we examined the contributions of three psychosocial variables—academic self-efficacy, hope, and grit—to both perceived ability and to academic achievement (controlling for perceived ability) in an academically talented sample. As hypothesized, two of the three variables, hope and academic self-efficacy, were significant predictors of perceived ability, although grit did not contribute. Additionally, academic self-efficacy was a significant predictor of achievement after controlling for perceived ability. These findings indicate that

Table 4. Hierarchical regression predicting self-reported GPA

Variable	<i>B</i>	β	Adjusted R^2	ΔR^2
Block 1				
Sex	0.055	0.088		
Socioeconomic status	0.039*	0.139		
Age	0.006	0.027	0.022	0.022
Block 2				
Perceived ability	0.030	0.085	0.027	0.005
Block 3				
Grit-S effort	0.020	0.042		
Grit-S interest	−0.017	−0.041		
Hope	0.037	0.104		
Academic self-efficacy	0.128*	0.282	0.137	0.11

* $P < 0.01$.

Grit-S effort, Short Grit Scale Perseverance of Effort; Grit-S interest, Short Grit Scale Consistency of Interests.

some psychosocial variables play meaningful roles in predicting performance in a talented sample of students beyond perceived ability.

Integrity and utility of the psychosocial variables

The reliability and structural validity evidence for self-efficacy scores was generally supportive, and self-efficacy's relationship with academic achievement is consistent with the extant literature.²⁵ Hope scores were also reliable, structurally valid, and had meaningful associations with Grit-S Effort and academic self-concept. Hope contributed significantly to the prediction of perceived ability but not to academic achievement. Thus, unlike the study of Gallagher *et al.*,⁴⁰ who found that hope was a stronger predictor of achievement than academic self-efficacy, the results of this study supported the preeminence of academic self-efficacy.²⁵

Grit-S scores were internally consistent and structurally valid, but contributed the least amount of variance to both perceived ability and academic achievement. Given the popularity of the construct and the claims made in the literature,^{1,62} this finding was surprising. In the regression analyses, Grit-S effort scores had a near-zero negative correlation with perceived ability, with the valence in keeping with the negative correlation found between conscientiousness and IQ.⁶⁶ On the other hand, Grit-S effort scores had a positive, albeit still modest, association with academic achievement, with Grit-S interest scores manifesting a similar

association, but negative. As Grit-S effort scores had moderate relationships (0.40–0.48) with Grit-S interest, hope, and self-efficacy scores, it is probable that much of the variance of Grit-S effort was contributed by those other constructs.

Indeed, the construct of grit received a considerable amount of attention and critical scrutiny in 2016. In the first half of the year, Duckworth⁶⁷ published a book—*Grit: The Power of Passion and Perseverance*—in which she claimed that grit was the variable that distinguished those who succeeded as a West Point cadet or a Green Beret from those who did not: “what we accomplish in the marathon of life depends tremendously on our grit” (p. 269). At the same time, several researchers have stated that grit is overblown. Rimfeld *et al.*⁶⁸ examined Grit-S scores in a sample of over 4000 16 year olds in the United Kingdom and concluded that grit did not contribute to the prediction of academic achievement beyond the contribution of the personality trait of conscientiousness. In another study, Credé *et al.*⁴⁸ conducted a meta-analysis—584 effect sizes culled from over 66,000 individuals in 88 independent studies—and found correlations of 0.20 for Grit-S effort scores with achievement and 0.08–0.11 for Grit-S interest scores, in keeping with the correlations reported for these constructs in this study. These researchers concluded that there are construct validity problems with Grit-S scores and that grit interventions have minimal effects on performance. All of these findings, including those in the current study, remind us of the importance of assessing constructs in a broad range of samples before assuming that they will work more generally, a concern that is even more important in the context of grit, given the decision to base schools on this construct or assess this construct as part of student evaluations.⁴⁶

The correlations among the variables in the study provide support for the hypothesis that some psychosocial variables are related, at least modestly, to perceived ability and to academic achievement. In examining these relationships, researchers often fail to acknowledge that psychosocial variables have bidirectional correlations with academic self-perceptions—in this case, perceived ability—as well as associations with academic achievement. In other words, the same variables that contribute directly to academic outcomes also contribute to academic outcomes via a student's academic history. Thus, it is not surprising that there were associations with

perceived ability. Moreover, given that the mean GPA of the sample was 3.9, the associations of the psychosocial variables with GPA are probably attenuated owing to ceiling effects, suggesting that the contributions are greater than the coefficients found in this study. Moreover, although we did not test the relationship with outstanding performance directly, the fact that psychosocial variables contribute some variance when the range is so restricted suggests that these variables may help to distinguish outstanding performers from high performers.

The findings also raise an important caveat for researchers and educators to consider—all psychosocial variables are not created equal. For example, the results of this study suggest that self-efficacy contributes more to academic achievement than hope and grit, and hope contributes more than grit. Thus, it will be important for individuals arguing for the importance of the contribution of psychosocial variables to educational outcomes to demonstrate that the newer variables explain variance beyond the already well-established constructs before we begin to engage in intervention studies using the newer variables.

Broader implications of the study

The study's findings indicate that some psychosocial factors contribute to academic achievement beyond perceived ability. Although many conceptions of giftedness have recognized the role of variables such as motivation and self-efficacy, most models do not discuss psychosocial variables within a developmental framework whereby some psychosocial skills play greater roles at particular stages of talent development than others (cf. Ref. 7). For example, after first encountering highly talented peers, an adolescent may lose confidence, yet with coaching and practice, confidence can either be regained or worked around so that it does not interfere with performance. Future research should examine if the contributions of psychosocial variables differ from childhood to adolescence and as individuals move from less selective to more selective peer groups.

The current study found an association between psychosocial skills and achievement, and we hypothesize that this effect will increase as individuals progress in their careers. First, as individuals move up in a domain, they will be competing against others who are more similar in abilities; thus, ability will become less of a distinguishing characteristic.

Concomitantly, psychosocial factors, rather than competence, may distinguish one individual from others of similar training and ability. For example, an adolescent who is more skilled at engaging teachers by way of enthusiasm and effort may be more successful at garnering talent development opportunities, leading to an accumulation of advantage. For individuals at higher stages of talent development, possessing skills that attract patrons and mentors is important for career advancement.

Similarly, models of talent development have generally not acknowledged that the profile of psychosocial skills that support achievement may vary by the domain of talent. For example, social skills are probably more critical in performance fields where the most important venues for demonstrating one's work involve engaging in in-person interactions, such as in the performing arts or diplomacy. However, even in more traditional academic fields, work ethic, self-efficacy, a hopeful approach, and the ability to get along with others may lead to additional opportunities when individuals are equally skilled. Most promising is research showing that psychosocial skills are malleable and can be modeled, taught, and deliberately cultivated by teachers, mentors, coaches, and even parents. We recommend that researchers of academic outcomes look to performance areas, such as sport and music performance, for ideas on transferring psychosocial strength training to academic domains.

Limitations and conclusions

As with all studies, this one had several limitations. First, the variables were all self-reported, including achievement. Although the pattern of relationships and the results reported provided support for the hypotheses, it will be important to examine these relationships using some variables that are not reported by participants (e.g., GPA from the program and actual rather than perceived measures of ability). Second, the sample reflects the lack of diversity in gifted and talented education programs, with small numbers of underrepresented minorities. Third, more rigorous analyses of the relative roles of psychosocial variables and ability will require longitudinal studies of students in gifted and talented programs, with appropriate measurements of the psychosocial and ability constructs over multiple years. The few longitudinal studies in the extant literature have not assessed the contributions of

psychosocial variables to performance. Limitations notwithstanding, the current study makes a contribution in that it is a test of the claim made by Subotnik *et al.* that psychosocial variables contribute to the performance outcomes of talented students (see Ref. 7), and the findings provide a basis for future studies to work from. In sum, the current study promotes the need for further study to disentangle the relative roles of ability, social skills, psychological strength, and demographic variables as they interact with focused instruction and deliberate practice in accounting for achievement at different stages of talent development.

Conflicts of interest

The authors declare no conflicts of interest.

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