



# Test of three conceptual models of influence of the big five personality traits and self-efficacy on academic performance: A meta-analytic path-analysis



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## ABSTRACT

The Big Five personality traits and self-efficacy independently relate to a multitude of outcomes across domains of functioning. Yet, only a small number of studies examined these variables together as part of the same conceptual model, and findings are mixed. We revisit their joint relationships, and test three conceptual models of influence on academic performance of college students over a semester. Because of the key role college graduates will play in society, many have a stake in better understanding their performance. The *trait model* specifies that the Big Five traits influence performance directly and indirectly through partial mediation of self-efficacy. In the *independent model*, the Big Five traits influence self-efficacy and performance independently, without mediation of self-efficacy. In the *intrapersonal model*, the effects of the Big Five traits on performance are fully mediated by self-efficacy. We collected data in five samples, three Universities, and two countries,  $N = 875$ , and conducted a meta-analytic path-analysis. Self-efficacy positively related to academic performance across the models, conscientiousness and emotional stability were predictive of self-efficacy and performance in some analyses, and the significance of the other three traits was fleeting.

## 1. Introduction

Personality and social cognition each have an influential role in human behavior. Two theories that conceptualize their influences are Big Five trait theory (Barrick & Mount, 1991; John & Srivastava, 1999) and social cognitive theory (Bandura, 1986, 1999). The former theory characterizes personality as five clusters of habitual behaviors: conscientiousness, agreeableness, extroversion/introversion, openness to experience, and emotional stability. The traits are defined as innate dispositions; behaviors they predispose one to can vary across activities, social milieus, and time, but behaviors are uniformly coherent with the trait. The assessments of the five traits are often decontextualized, as items remain mostly context-invariant (Costa & McCrae, 1992a).

Social cognitive theory is founded on an agentic perspective (Bandura, 2001). To be an agent is to exert self-regulative influence over one's functioning. Unlike Big Five theory that ascribes personality to inherent traits, social cognitive theory conceptualizes personality as a set of dynamic, intrapersonal factors that motivate and regulate behavior (Bandura, 1999). Self-efficacy is the focal determinant of functional adaptation in this theory for it affects outcomes both directly and by influencing other intrapersonal factors such as goals, outcome

expectations, and self-evaluative reactions to one's behavior and resulting outcomes (Bandura, 1997).

Although predictive powers of the Big Five traits and self-efficacy are well-documented (Bandura, 2001; Barrick & Mount, 2005), their joint influences have received scant attention, leaving these relationships incompletely understood. Juxtaposing Big Five traits and self-efficacy theories, we posit that in undertakings strewn with daunting obstacles, such as academic performance, students need both the staying power of their dispositions and efficacy beliefs in their capabilities to succeed. Being a pursuit that affects life paths, academic performance sets the course of occupational and lifestyle trajectories (Bandura, 1995). Because of the key role college graduates will play in society, many have a stake in their academic performance (Bok, 2013).

## 2. Literature review and theory development

### 2.1. The Big Five traits influence on academic performance

Research shows that the Big Five traits relate to academic performance (Laidra, Pullmann, & Allik, 2007; Poropat, 2009). Conscientiousness, i.e., self-discipline, facilitates schoolwork by imparting

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preparedness (Steel, Brothen, & Wambach, 2001). Openness, i.e., imagination, helps with new modes of studying (Zeidner & Matthews, 2000). Agreeableness, i.e., compliance, increases consistency of class attendance (Lounsbury, Sundstrom, Loveland, & Gibson, 2003). Extraversion, i.e., sociability, hampers students' focus (Bidjerano & Dai, 2007), and neuroticism, i.e., emotional instability, is associated with test anxiety, where both traits hinder performance (Poropat, 2009). Empirical support for the predictiveness of some traits is stronger than for others. For instance, "Conscientiousness is the most robust predictor of academic performance with an average correlation of .20" (Rimfeld, Dale, Kovas, & Plomin, 2016, p. 718).

## 2.2. The Big Five traits influence on self-efficacy

Studies have linked the Big Five traits and self-efficacy (Judge & Ilies, 2002; Judge, Jackson, Shaw, Scott, & Rich, 2007). Conscientiousness facilitates task engagement and effort, fostering higher self-efficacy beliefs (Brown, Lent, Telander, & Tramayne, 2011; Chen, Casper, & Cortina, 2001). Openness shifts perceptions of demands into challenges to be tackled, broadening task engagement and self-efficacy (Sanchez-Cardona et al., 2012). Agreeableness facilitates entry into new activities, mastery of which can lead to increased self-efficacy (Caprara, Alessandri, Di Giunta, Panerai, & Eisenberg, 2009). Extraversion heightens positive reactions from others, which can increase self-efficacy (Judge & Ilies, 2002). Conversely, neuroticism increases anxiety, which suppresses or reduces self-efficacy (Schmitt, 2008). Beyond these findings, influences of the Big Five traits on self-efficacy are inconclusive, but the most consistent predictors tend to be conscientiousness and neuroticism (Judge et al., 2007).

## 2.3. Self-efficacy influence on academic performance

Self-efficacy is correlated with academic performance (Bandura, 1995; Chamorro-Premuzic, Harlaar, Greven, & Plomin, 2010; Multon, Brown, & Lent, 1991; Robbins, Lauver, Le, Davis, & Langley, 2004; Zimmerman, Bandura, & Martinez-Pons, 1992). A recent meta-analysis examined 50 antecedents of academic performance and found that self-efficacy had the strongest correlation ( $r = 0.59$ ) (Richardson, Abraham, & Bond, 2012). In the same study, of the Big Five traits, only conscientiousness significantly correlated with performance ( $r = 0.19$ ). In another synthesis, which examined 105 predictors, self-efficacy was the second (after peer assessment) strongest predictor of academic achievement (Schneider & Preckel, 2017).

## 2.4. Joint influences of the Big Five traits and self-efficacy

Only a few studies examined the joint influences of the Big Five traits and self-efficacy (e.g., Lent & Brown, 2006). Of these, several assessed only their inter-correlations (Hartman & Betz, 2007; Thoms, Moore, & Scott, 1996) and others measured self-efficacy (e.g., DeFeyter, Caers, Vigna, & Berings, 2012) inconsistently with theory recommendations (see Bandura, 2006).

Some studies tested joint influences, but results are inconclusive. Caprara, Barbaranelli, Pastorelli, and Cervone (2004) reported that self-efficacy related to academic achievement but the Big Five traits did not. Vecchione and Capara (2009) found that self-efficacy fully mediated the effects of the Big Five traits. Nauta (2004) showed that self-efficacy fully mediated the relationships between the Big Five traits and career interests, except for agreeableness where the mediation was partial. Sheu, Liu, and Li (2017) evidenced that self-efficacy partially mediated the effects of extraversion and emotional stability on academic satisfaction among Chinese students. Yet, Judge et al. (2007) found that the Big Five traits correlated with work-related performance and self-efficacy, but self-efficacy did not predict performance, a finding at odds with prior research (Bandura, 1997; Brown & Lent, 2017; Sheu et al., 2010; Stajkovic & Luthans, 1998).

## 2.5. Three conceptual models of joint influences

We propose three conceptual models of influence that specify both the individual and joint contributions of the Big Five traits and self-efficacy to academic performance (henceforth performance). The Big Five traits predispose one to behaviors coherent with the trait, which can also result in increased self-efficacy for those same activities due to repeated practice, i.e., enacted mastery. Moreover, self-efficacy is not bound by traits. Because self-efficacy depends on experience with any given challenge, it is adaptable and can be enhanced through enacted mastery, vicarious learning, verbal persuasion, and physiological/psychological sensations. That is, how students perceive the characteristics of their social environment - the impediments it erects and the opportunities it provides - influence their courses of action beyond dispositions. Those with low self-efficacy easily convince themselves of the futility of effort when they come up against academic obstacles, whereas those with high self-efficacy figure out ways to surmount them.

We control for general mental ability (GMA) and experience in the models we examine, because they covary with performance (Brown et al., 2008; Judge et al., 2007; Richardson et al., 2012; Schneider & Preckel, 2017), and more capable students develop stronger self-efficacy beliefs (Brown et al., 2011; Chen et al., 2001; Robbins et al., 2004). We include all predictor and control variables in the three models examined, but the relationships in each are differentially specified.

### 2.5.1. The trait model

In this model, the effects of the Big Five traits on performance are partially mediated by self-efficacy (Fig. 1a). This conceptual framework integrates literature reviewed above into one fully-specified, or saturated, model. The partial mediating role of self-efficacy is grounded in the notion that "self-efficacy represents the mechanism through which generalized tendencies ... manifest themselves" (Martocchio & Judge, 1997, p. 766). A recent study tested this model and reported that self-efficacy loses predictiveness when the Big Five traits are in it (Judge et al., 2007). However, some methodological and analytical deficiencies (c.f., Viswesvaran & Ones, 1995) in that study could account for some of the equivocal results. Thus, we re-examine this conceptual model, but postulate that self-efficacy directly affects academic performance, for the theoretical reasons articulated earlier.

### 2.5.2. The independent model

In this model, (Fig. 1b), the Big-Five traits influence performance and self-efficacy independently, without an indirect effect through self-efficacy. This model is grounded in the findings of Judge et al. (2007), and others who have raised questions about the effects of self-efficacy on performance (Heggstad & Kanfer, 2005; Vancouver, Thompson, & Williams, 2001). We examine the validity of these conclusions by comparing model fits between the *trait model* and the *independent model*, providing evidence, or not, of self-efficacy's pertinence to academic performance.

### 2.5.3. The intrapersonal model

Given that self-efficacy calls for functional adaptations, and related debate about the Big Five traits (see Costa & McCrae, 1992b; Eysenck, 1992), in this model (Fig. 1c) the effects of the Big Five traits are fully mediated by self-efficacy. Given that academic performance occurs dynamically in different spheres of content and under diverse circumstances, it is unclear if the Big Five traits are effective (Eysenck, 1992), as non-conditional generalities, to predict variance in performance above that of self-efficacy (Lent, Brown, & Hackett, 1994). Moreover, those beset with self-doubt about learning may shun many activities despite their dispositions.

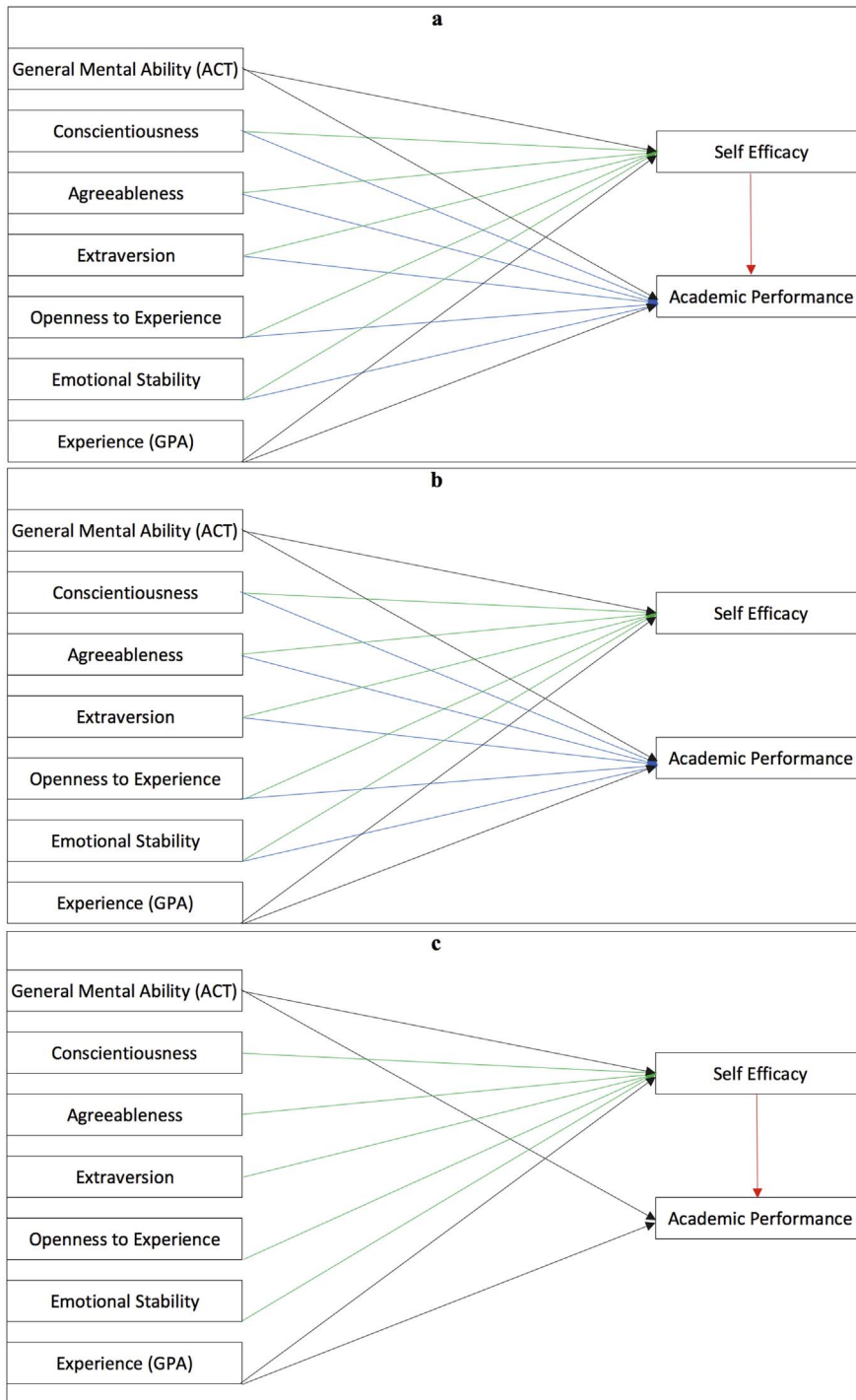


Fig. 1. a The trait model.  
b The independent model.  
c The intrapersonal model.

### 3. Method and results

#### 3.1. Participants

We collected data from 5 independent samples, across 3 universities and 2 countries (see Sheu & Bordon's (2017) recommendation for inclusion of cross-national samples), totaling 875 participants. Most participants were undergraduates. Table 1 reports the demographics.

To assess systematic variation attributable to socio-demographic differences across the five samples we performed analysis of variance; gender was not significant and age was significant. Southwestern sample participants were older than those in the other U.S. samples because some were graduate students, and South Korean participants

Table 1  
Socio-demographic characteristics across five data samples.

Sample	n	$\bar{x}$ age	% of female	Site/university
1	279	21	48.70%	Midwestern USA, public
2	148	20.8	49.70%	Midwestern USA, public
3	175	21.1	48.60%	Midwestern USA, public
4	142	24.4	43.70%	Southwestern USA, private
5	131	23	59.50%	South Korea, private

were older than those in the U.S. because they perform military service before or during college. As a bivariate difference, percentage of

**Table 2**  
Weighted-average correlations and meta-analytic correlation matrix based on five data samples.

Variable	1	2	3	4	5	6	7	8	9
1. Conscientiousness	–								
2. Agreeableness	0.35**	–							
3. Extraversion/introversion	0.41**	0.35**	–						
4. Openness to experience	0.24**	0.24**	0.26**	–					
5. Emotional stability	0.35**	0.39**	0.38**	0.15**	–				
6. GPA	0.23**	0.01	–0.05	–0.01	–0.02	–			
7. GMA	–0.05	–0.05	–0.10**	0.12**	–0.02	0.39**	–		
8. Self-efficacy (SE)	0.25**	0.07	0.14**	0.09**	0.22**	0.21**	0.14**	–	
9. Academic performance	0.21**	0.05	–0.02	–0.01	0.00	0.48**	0.26**	0.33**	–

Note: the number of individual correlations and the sample size for all five studies is 875 except for GMA = 744.

\*\*  $p < 0.01$ .

females in the South Korean sample was greater than in the four U.S. samples averaged out.

### 3.2. Study design

Participants were given the same measures of the Big-Five traits and self-efficacy, and performance was assessed by final exam scores. All path coefficients in the models were estimated simultaneously, and within-group homogeneity of individual correlations was estimated for the 15 relationships specified in the *trait model*. Because the other two models are nested within the *trait model*, homogeneity results are consistent among them.

### 3.3. Measures

The assessments of the Big Five traits, GMA, and experience were conducted mid-semester, self-efficacy was assessed two weeks before the final exam, and performance at the end of the semester. The Big Five traits were measured with the *International Personality Item Pool* (Goldberg, 1992), which contained 100 items, with 5-point scale response anchors from 1 “very inaccurate” to 5 “very accurate.” Mean internal consistencies across samples were: conscientiousness ( $\alpha = 0.91$ ), agreeableness ( $\alpha = 0.87$ ), extroversion ( $\alpha = 0.94$ ), openness to experience ( $\alpha = 0.90$ ), and emotional stability (reverse-scored neuroticism) ( $\alpha = 0.92$ ). To assess self-efficacy, a scale was developed according to Bandura's (2006) guidelines. Participants were presented with 15 levels of performance (I believe I can get 65% on the final exam, with 2.5% level increments, e.g., 67.5%, 70%, 72.5%, until 100%). For each level of performance, participants rated strength of their belief that they can achieve it on a scale from 0 to 100. Self-efficacy was the sum of the strength scores across levels of performance (Bandura, 2006).

In terms of covariates, GMA was measured with ACT and SAT scores, and for students who took only the SAT, their scores were converted to ACT scores according to conversion charts. Because of changes in the admissions procedures, some South Korean students took different GMA tests, and some did not take them, reducing the overall sample size for analyses involving GMA to  $N = 744$ . Experience is knowledge that results from direct participation in or vicarious observation of an activity (Bandura, 1986, 1997). For students, grade point average (GPA) captures academic experience because studying, participating in class, and performing on exams are related academic experiential activities encompassed in GPA.

### 3.4. Analytic procedures

As reported above, some differences in the distributions of age and gender were present across samples, as well as some differences with regard to GMA tests. Also, though performance was measured with final exam scores in each sample, each class final exam was different. Given

these differences, analyses were performed for each of the five samples individually first. Meta-analytic path analysis was then conducted to provide one set of results. The results from each sample were consistent with each other and correspond to those reported at the synthesis level.

#### 3.4.1. Meta-analysis and results

**3.4.1.1. Weighted average correlations.** All meta-analytic procedures and reporting in this study follow those by Stajkovic and Luthans (1998). Briefly, we used the correlation coefficient  $r$  to estimate the population correlation  $\rho$ . Because  $r$  underestimates  $\rho$ , we calculated an unbiased estimate of  $r$ ,  $G(r)$ . Because the variance of  $r$  and  $G(r)$  is dependent on the unknown value of  $\rho$ , we converted  $G(r)$  to the standard normal deviate  $z$  (Hedges & Olkin, 1985). We used  $z$ -transformations to calculate the weighted average correlations ( $Z_+$ ), and then tested significance of  $Z_+$ . We calculated 95% confidence limits for population parameters  $\zeta$  and  $\rho$ . The weighted average correlations are presented in Table 2. The Big Five traits correlated with each other, and except for agreeableness, they correlated at low levels with self-efficacy. Except for conscientiousness, the Big Five traits were not correlated with performance. GPA, GMA, and self-efficacy were correlated with performance.

**3.4.1.2. Homogeneity testing and results.** We used the  $Q_t$  homogeneity test (Hedges & Olkin, 1985), based on the  $\chi^2$  distribution for  $df = (k - 1)$ , as well as Hunter and Schmidt's (1995) 75% rule as another validation of the  $Q_t$  test. Table 3 presents results of the  $Q_t$  and sampling error tests for each of the 15 relationships, and 14/15 were homogeneous. To obtain estimates for 15 relationships among 9 variables, 36 meta-analyses are needed:  $1/2(n(n - 1)) = 36$ , where  $n$  is the number of variables in the model.

#### 3.4.2. Meta-analytic path-analysis and results

The meta-analytic correlation matrix obtained from the five samples was the input matrix to the path analysis (performed by LISREL 8). Each of the three conceptual models was tested in two ways. Given the meta-analytic part of this procedure, calculation of sample size can be based on the average sample size from the five studies and on the harmonic mean.

**3.4.2.1. Tests of the conceptual models.** Fig. 2a shows results of meta-analytic path analysis of the *trait model* using the harmonic mean. GMA, GPA, conscientiousness, and emotional stability were related to performance both directly and indirectly through self-efficacy, which also significantly predicted performance. The other three traits were neither related to self-efficacy nor performance. Fig. 2b shows results of this analysis with average sample size. GPA and self-efficacy were related to performance, and emotional stability was significantly related to self-efficacy. Other variables in the model demonstrated no significant relationships. Results for the *independent model* are reported in Fig. 3a and b, and for the *intrapersonal model* in Fig. 4a and b. Support

**Table 3**  
Multiple meta-analytic estimates, sampling error, and homogeneity tests for the 15 structural relationships in the trait model.

Relationships	Z <sub>+</sub>	z <sup>a</sup>	G(r <sub>+</sub> )	ρ <sub>l</sub>	ρ <sub>u</sub>	σ <sub>G(r<sub>+</sub>)</sub> <sup>2</sup>	σ <sub>e</sub> <sup>2</sup>	σ <sub>p</sub> <sup>2</sup>	%SE <sup>b</sup>	σ <sub>p</sub>	G(r <sub>+</sub> )/σ <sub>p</sub> <sup>c</sup>	Q <sub>t</sub>
1. GMA-SE	0.14	3.70	0.14	0.07	0.21	0.00	0.00	0.00	100%	0.00	n/a	1.08
2. Conscientiousness-SE	0.26	7.74	0.25	0.18	0.32	0.01	0.01	0.00	78%	0.04	6.64	6.14
3. Agreeableness-SE	0.07	1.92	0.07	0.00	0.14	0.01	0.01	0.00	63%	0.06	1.2	7.90
4. Extraversion-SE	0.14	4.19	0.14	0.07	0.21	0.00	0.00	0.00	100%	0.00	n/a	1.11
5. Openness-SE	0.09	2.69	0.09	0.02	0.16	0.00	0.00	0.00	100%	0.00	n/a	3.52
6. Emotional stability-SE	0.22	6.42	0.22	0.15	0.29	0.01	0.01	0.00	64%	0.05	4.08	7.74
7. GPA-SE	0.21	6.10	0.21	0.14	0.28	0.00	0.00	0.00	100%	0.00	n/a	2.39
8. GMA-performance	0.27	7.32	0.26	0.19	0.33	0.01	0.00	0.00	85%	0.03	8.91	4.88
9. Conscientiousness-performance	0.21	6.08	0.21	0.14	0.28	0.00	0.00	0.00	100%	0.00	n/a	4.03
10. Agreeableness-performance	0.05	1.52	0.05	-0.02	0.12	0.00	0.00	0.00	100%	0.00	n/a	3.03
11. Extraversion-performance	-0.02	-0.70	-0.02	-0.09	0.05	0.01	0.01	0.01	49%	0.08	-0.30	10.22 <sup>†</sup>
12. Openness-performance	-0.01	-0.34	-0.01	-0.08	0.06	0.00	0.00	0.00	100%	0.00	n/a	0.07
13. Emotional stab.-performance	-0.00	-0.07	0.00	-0.07	0.07	0.00	0.00	0.00	100%	0.00	n/a	3.03
14. GPA-performance	0.52	15.27	0.48	0.41	0.55	0.00	0.00	0.00	97%	0.01	44.6	5.21
15. SE-performance	0.34	10.08	0.33	0.26	0.40	0.00	0.00	0.00	100%	0.00	n/a	2.34

Notes: in estimate columns four and five, confidence limits (l = lower, u = upper) are calculated at 95% certainty level. Values in the last column (Q<sub>t</sub>) are based on the χ<sup>2</sup> distribution where the null hypothesis is: model fits = model is homogeneous. Thus, a statistically not significant Q<sub>t</sub> value indicates relationship homogeneity, which 14/15 were, except for one (#11) where <sup>†</sup>p > 0.01 and < 0.05.

<sup>a</sup> Value of the z test statistic, based on standard normal deviate z distribution.  
<sup>b</sup> %SE = percentage of total residual variance attributable to sampling error variance.  
<sup>c</sup> Distance from 0 value of population correlation expressed in standard deviations.

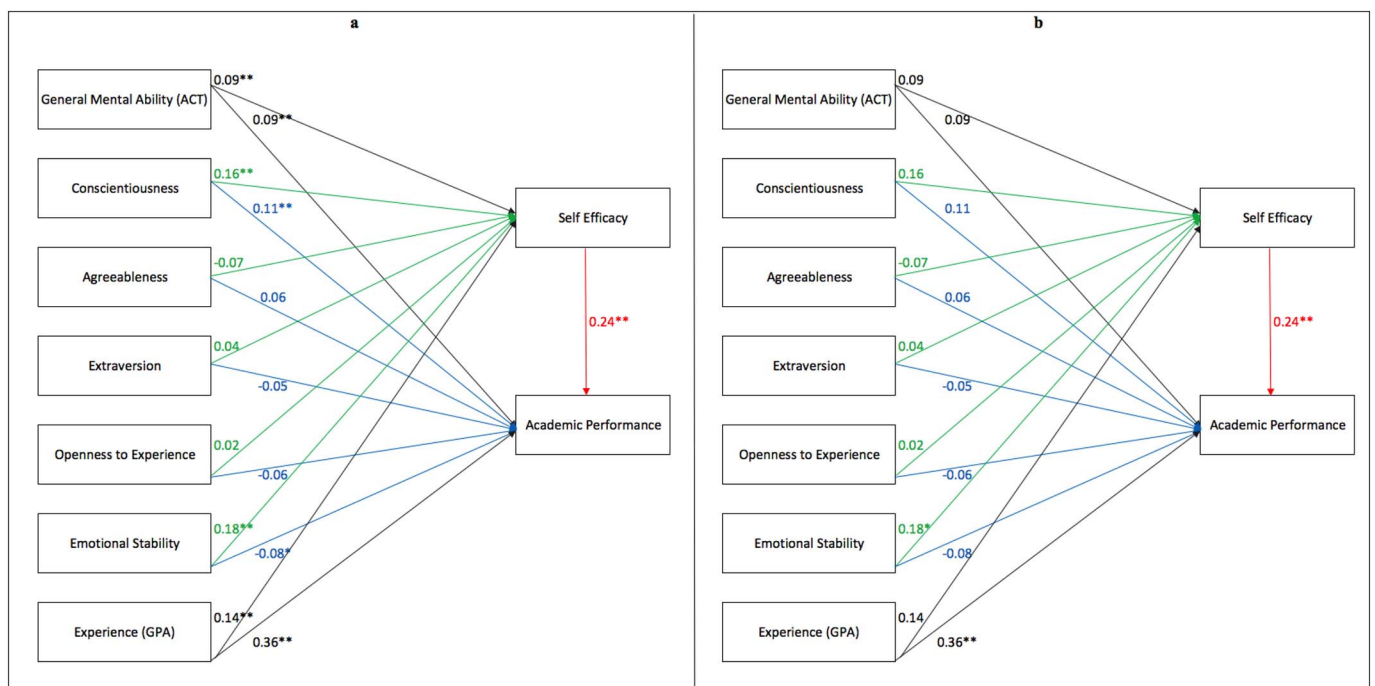
for the role of self-efficacy across the three models may be underestimated from controlling for GPA, which is based on grades, which are affected by prior self-efficacy for educational attainments.

Although models tested by path analysis are sometimes called causal models, the technique per se does not evaluate causality (Pedhazur, 1982). Relatedly, the three conceptual models of influence we proposed, examined, and compared are not the only three possible models, but are theory-driven conceptualizations of these relationships based on our review of the literature and building upon it. Other models may be justified by the literature.

**3.4.2.2. Model fit and direct model fit comparisons.** The *trait model* is saturated, all endogenous relationships are specified, and thus has a

perfect model fit by design. The *independent* and the *intrapersonal models* are not saturated; they are conceptually more parsimonious than the *trait model*. Because not all relationships are specified in these two models, their fits can be estimated. In addition, because the *independent* and the *intrapersonal models* are nested within the *trait model*, direct model fit statistical comparisons using the χ<sup>2</sup> difference test are possible (see Stajkovic, Lee, & Nyberg, 2009).

Complete results are reported in Table 4. Briefly, comparison of the *trait model* to the *independent model* indicated that the *trait model* provides a better fit to the data, based on both harmonic mean (Δχ<sup>2</sup> = 55.67, Δdf = 1, p < 0.01) and on average sample size (Δχ<sup>2</sup> = 11.52, Δdf = 1, p < 0.01), adding further evidence in support of the relationship between self-efficacy and performance. Comparison



**Fig. 2. a** The *trait model*: meta-analytic path analysis based on harmonic mean sample size (N = 842).

**b** The *trait model*: meta-analytic path analysis based on average sample size (N = 175).

\*\*p < 0.01; \*p < 0.05.

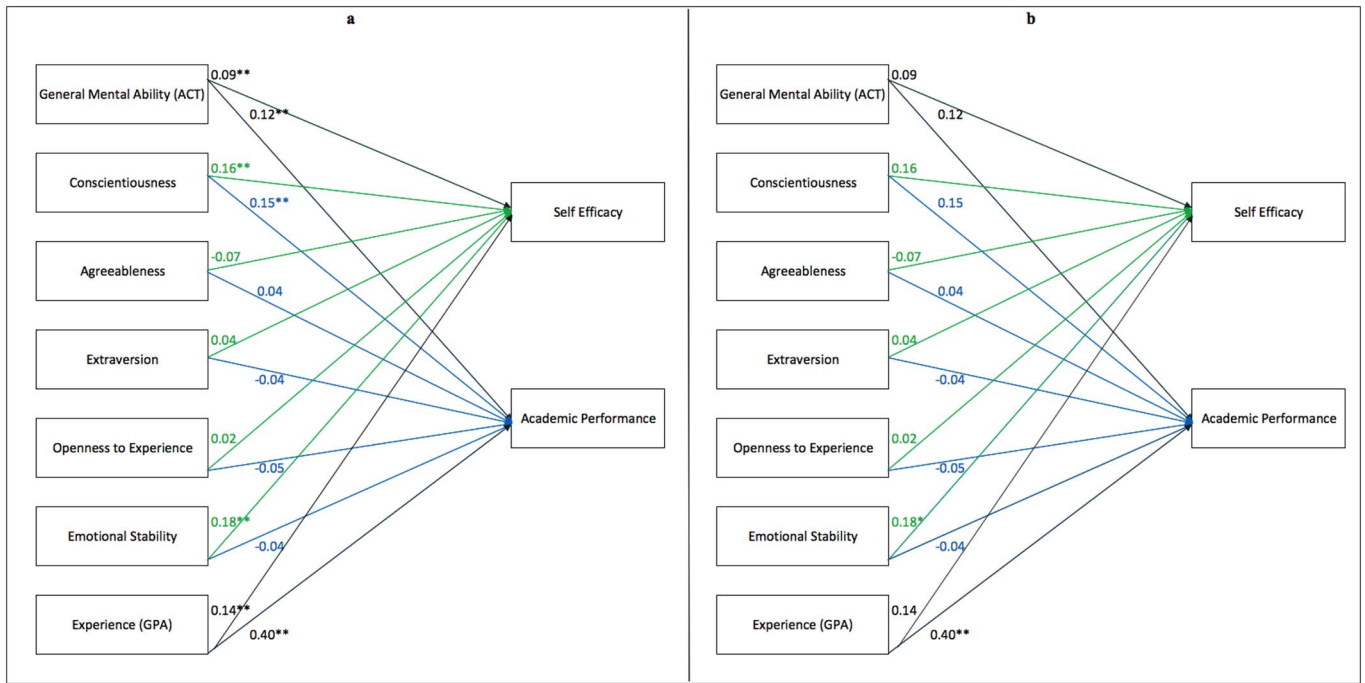


Fig. 3. a The independent model: meta-analytic path analysis based on harmonic mean sample size (N = 842).  
 b The independent model: meta-analytic path analysis based on average sample size (N = 175).  
 \*\*p < 0.01; \*p < 0.05.

of the trait model to the intrapersonal model indicated that the former fits the data better using harmonic mean ( $\Delta\chi^2 = 18.06$ ,  $\Delta df = 5$ ,  $p < 0.01$ ). Because the difference between these models is the absence of directs paths from the Big Five traits to performance, conscientiousness and emotional stability contributed significantly to model fit, as the only traits directly related to performance. Using average sample size, the model fit comparison was not significant ( $\Delta\chi^2 = 3.74$ ,  $\Delta df = 5$ ,  $p > 0.50$ ), indicating that the intrapersonal

model fits the data equally well as the trait model, but it is more parsimonious because it has five less links.

#### 4. Discussion

Assertions have been made that “once the individual differences are taken into account, the predictive validity of self-efficacy shrinks dramatically” (Judge et al., 2007, p. 114–115). To verify causal

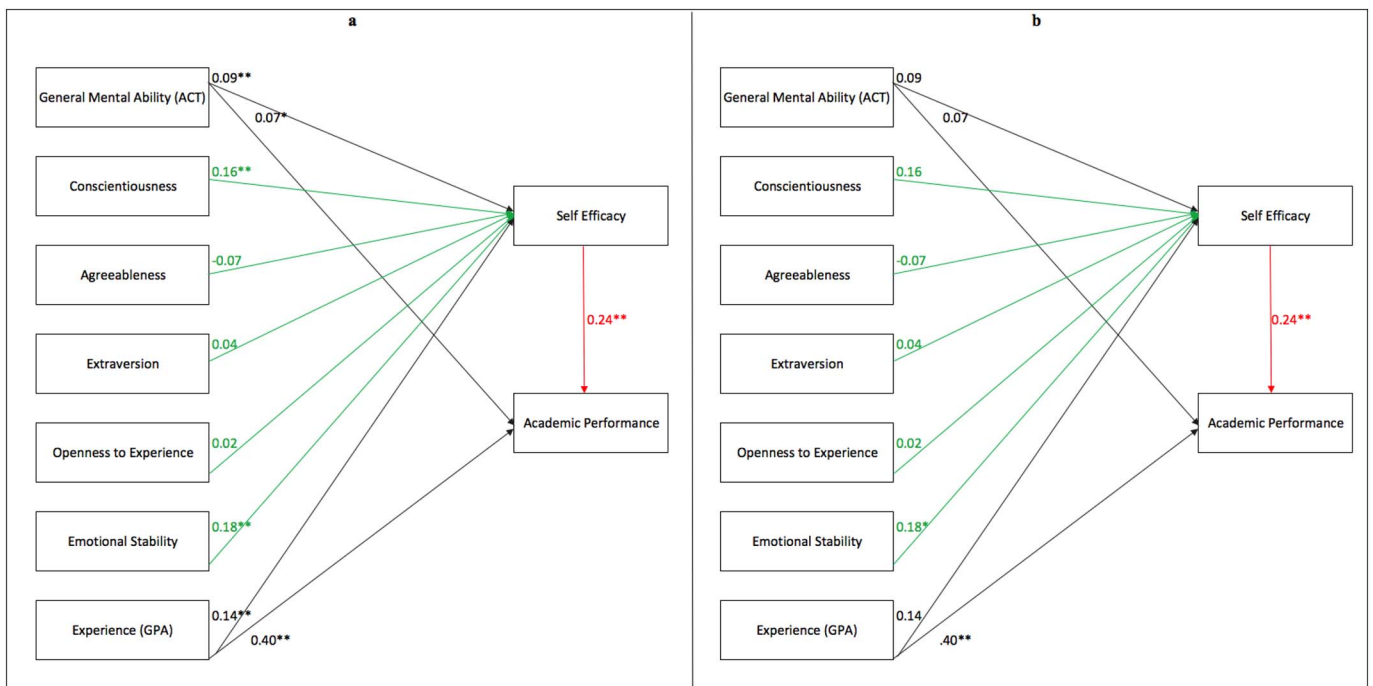


Fig. 4. a The intrapersonal model: meta-analytic path analysis based on harmonic mean sample size (N = 842).  
 b The intrapersonal model: meta-analytic path analysis based on average sample size (N = 175).  
 \*\*p < 0.01; \*p < 0.05.

**Table 4**  
Model comparisons: path coefficients and fit indexes based on average sample size and harmonic mean.

Relationships and model fit indices	Harmonic mean sample size			Average sample size		
	N = 842			N = 175		
	Trait model	Independent model	Intrapersonal model	Trait model	Independent model	Intrapersonal model
ACT – self-efficacy	0.09**	0.09**	0.09**	0.09	0.09	0.09
Conscientiousness – self-efficacy	0.16**	0.16**	0.16**	0.16 <sup>†</sup>	0.16 <sup>†</sup>	0.16 <sup>†</sup>
Agreeableness – self-efficacy	– 0.07	– 0.07	– 0.07	– 0.07	– 0.07	– 0.07
Extraversion – self-efficacy	0.04	0.04	0.04	0.04	0.04	0.04
Openness – self-efficacy	0.02	0.02	0.02	0.02	0.02	0.02
Emotional stability-self-efficacy	0.18**	0.18**	0.18**	0.18*	0.18*	0.18*
GPA – self-efficacy	0.14**	0.14**	0.14**	0.14 <sup>†</sup>	0.14 <sup>†</sup>	0.14 <sup>†</sup>
ACT – performance	0.09**	0.12**	0.07*	0.09	0.12	0.07
Conscientiousness-performance	0.11**	0.15**		0.11	0.15 <sup>†</sup>	
Agreeableness – performance	0.06	0.04		0.06	0.04	
Extraversion – performance	– 0.05	– 0.04		– 0.05	– 0.04	
Openness – performance	– 0.06	– 0.05		– 0.06	– 0.05	
Emotional stability - performance	– 0.08*	– 0.04		– 0.08	– 0.04	
GPA – performance	0.36**	0.40**	0.40**	0.36**	0.40**	0.40**
Self-efficacy – performance	0.24**		0.24**	0.24**		0.24**
R <sup>2</sup> in self-efficacy	0.13	0.13	0.13	0.13	0.13	0.13
R <sup>2</sup> in performance	0.30	0.26	0.29	0.30	0.26	0.29
χ <sup>2</sup> model fit index	n/a	55.67**	18.06**	n/a <sup>a</sup>	11.52**	3.74
Degrees of freedom (d.f.)	n/a	1	5	n/a	1	5
CFI model fit index	n/a	0.96	0.99	n/a	0.96	1
NNFI model fit index	n/a	0.28	0.94	n/a	0.31	1
RMSEA model fit index	n/a	0.26	0.056	n/a	0.25	0
SRMR model fit index	n/a	0.03	0.01	n/a	0.03	0.01

<sup>a</sup> N/A because saturated model has a perfect fit – all possible links are specified in the model.

\*\*  $p < 0.01$ .

\*  $p < 0.05$ .

<sup>†</sup>  $p < 0.10$ .

dependence, converging evidence is needed. With regard to academic performance, findings from the present research are at variance with this claim. Though our findings are based only on five samples, they are in accord with the body of evidence on the positive functional role of self-efficacy across activities. Three of the Big Five traits (agreeableness, extroversion, and openness) flected in significance across the six empirical models tested. Conscientiousness and emotional stability were predictive of self-efficacy and performance only when harmonic mean was used.

The *trait model* explained the most variance in performance ( $R^2 = 0.30$ ). Importantly, though, the merits of this model suffer empirically without the self-efficacy-performance link, adding both theory nuance and circumspection to inveterate assertions that individual differences can do the job without much assistance by social cognition. Our findings point to more permeable inferences, namely, that the effects of individual differences are likely mediated by self-efficacy, as suggested by previous research (e.g., Martocchio & Judge, 1997). In particular, though the *trait model* explained the most variance, it was only by a razor-thin margin over the *intrapersonal model* ( $R^2 = 0.29$ ), and this difference was not statistically significant when average sample size was used. Thus, the *intrapersonal model* provided an equally-fitting, yet more parsimonious explanation of the relationships among variables.

This finding has practical implications for students, parents, and educators looking for ways to effectively use limited resources. If one buys the empirics from prior research that “distal” traits predict performance in a way that makes self-efficacy that is proximally and conditionally related to it putatively inconsequential (Judge et al., 2007), or that self-efficacy is “little more than past performance” (Heggstad & Kanfer, 2005, p. 84), then student selection becomes the only important aspect of education. In this view, performance is mostly unaffected by teachers, mentoring, modeling, and verbal persuasion. Yet, our findings indicate the opposite.

This is good news for students trying to cultivate skills to garner a

better future, parents laboriously shepherding their children through transitional phases of development, teachers striving to promote learning in students who are disengaged from the educational system, or social reformers battling under tough odds to affect change in the educational system. These are some examples of the types of formidable educational endeavors in which students can use the power of their self-efficacy beliefs to aid their functioning (see also Brown & Lent, 2016, 2017).

## 5. Conclusion

We contribute to the understanding of the joint influences of the Big Five traits and self-efficacy on academic performance by adding gradation to theory connections and new evidence. Building cumulative knowledge at the juxtaposition of these theories is critical going forward; to advocate for one in the lieu of the other is to essentially ascribe to an incomplete conception of the self-regulation of human behavior. Theory focusing on commonalities and integration versus conceptual segregation is more likely to earn a place in the pantheon of socially useful theories.

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