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

Alexander D. Stajkovic[a],[*], Albert Bandura[b], Edwin A. Locke[c], Dongseop Lee[d], Kayla Sergent[a]

[a] University of Wisconsin-Madison, United States
[b] Stanford University, United States
[c] University of Maryland, United States
[d] Korea University, Republic of Korea

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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

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 (Heggestad & 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.