



Conscientiousness and self-motivation as mutually compensatory predictors of university-level GPA

Wen Cheng, William Ickes*

Department of Psychology, The University of Texas at Arlington, Box 19528, Arlington, Texas 76019-0528, United States

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ABSTRACT

To help account for variability across studies in the predictive utility of conscientiousness, we proposed that conscientiousness and self-motivation mutually compensate for each other in predicting university-level academic performance. Consistent with this expectation, we found evidence of such mutual moderation in a sample of 377 college undergraduates. First, we found that conscientiousness and self-motivation compensated for each other in predicting university GPA: Students who were either high in conscientiousness or high in self-motivation had better academic performance (GPA) than those who were low in both conscientiousness and self-motivation. Second, these findings were still evident after we controlled for the students' previous academic performance (high school rank) and academic ability (SAT/ACT). The study of mutually compensatory predictors not only offers the potential of developing better predictive models; it also helps to account for why some "main effect" predictors of university GPA are variable across studies in their degree of predictive utility.

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1. Introduction

Since 1903, when Alfred Binet initiated his research on psychometrics and intellectual ability in France, many studies have revealed that "intelligence" is the most important factor accounting for individuals' academic performance. Intelligence is only part of the story, however. There are many factors apart from academic intelligence that can potentially influence an individual's overall academic performance by influencing behaviors such as attending classes, doing homework, participating in class discussions, coping with stress during exams, and so on.

Many studies have investigated personality variables in relation to academic performance. A number of these studies have examined correlations between the Big Five trait dimensions and academic performance. In general, the results of these studies have shown that conscientiousness is a fairly consistent predictor of academic performance, but that extraversion, agreeableness, neuroticism, and openness have inconsistent effects (Busato, Prins, Elshout, & Hamaker, 2000; Chamorro-Premuzic & Furnham, 2003; Gray & Watson, 2002).

Conscientiousness, which refers to "socially prescribed impulse control" (Hogan & Ones, 1997), includes six facets in its conceptual structure: industriousness (hard working, ambitious, confident,

and resourceful), order (planning and organized), self-control (cautious, levelheaded, and patient), traditionalism (willing to comply with current rules, customs, norms, and expectations), responsibility (cooperative and dependable), and virtue (follows rules of good or moral behaviors to act as a moral exemplar) (Roberts, Chernyshenko, Stark, & Goldberg, 2005). Accordingly, students with high conscientiousness should achieve good academic performance because they are able to develop an organized study plan, acquire the resources needed to make it work, and carry it out in a responsible way.

However, even in the case of conscientiousness as a predictor, there have been some notable "failures to replicate." For example, both Paunonen (1998) and Farsides and Woodfield (2003) found that conscientiousness did not correlate with students' GPA in their study samples. And though most studies have shown that conscientiousness makes a unique contribution to the prediction of university GPA after first controlling for previous academic performance, (e.g., Conard, 2006; Nofle & Robins, 2007; Wolfe & Johnson, 1995), some exceptions to this finding also exist (Farsides & Woodfield, 2003; Nofle & Robins, 2007).

Although there are only a few of these exceptions, they raise the important question of why conscientiousness is not always a significant unique predictor in large-sample studies of university GPA. We propose a possible answer to that question: that if conscientiousness interacts with other variables in the prediction model in a mutually compensatory way, conscientiousness may fail to emerge as a significant "main effect" predictor, but still contribute as one of the variables in a significant "interaction term" instead.

* Corresponding author. Tel.: +1 817 272 3229; fax: +1 817 272 2364.

E-mail addresses: wen.cheng@mavs.uta.edu (W. Cheng), ickes@uta.edu (W. Ickes).

For example, not all students who achieve high grades in class are conscientious (i.e., well-organized and detail-oriented). Sometimes, low conscientious students can also achieve good grades if they have other compensatory characteristics, such as a high level of motivation to persist in achieving their goals. Thus, some students with high motivation may work exceptionally hard and achieve academic success despite a lack of organizational skills and a focus on details. It is therefore reasonable to hypothesize that some of the variability in the effect sizes of conscientiousness may be attributable to the effects of a mutually compensatory predictor with which conscientiousness interacts.¹

In the present study, we tested for mutual compensation of the type just proposed. Specifically, we tested for a significant interaction between conscientiousness and self-motivation, with the expectation that self-motivation might interact with conscientiousness in a mutually compensatory way to predict university-level academic performance. If this relationship can be documented, it may help to explain why conscientiousness does not always significantly predict students' academic performance, and why (and how) other personality traits may play compensatory roles.

Self-motivation concerns the strength of one's tendency to set goals and to persist in working to attain them (Dishman & Ickes, 1981; Dishman, Ickes, & Morgan, 1980). Hosen (1997) stated that self-motivation is relevant to the capacity for self-reinforcement and the ability to delay gratification. Therefore, individuals with high self-motivation should set goals for themselves and consistently strive to achieve them. As a personality construct, self-motivation helps to answer the question of why some people work so hard and persistently to achieve personal goals whereas other people do not. Dishman et al. (1980) developed a reliable self-report measure of self-motivation that has been validated in several applied contexts in which sustained effort, self-discipline, and perseverance are important. For example, the self-motivation measure has successfully predicted participation in adult exercise programs and endurance sport training (Dishman et al., 1980). It has also been associated with successful treatment outcomes in a smoking cessation program (Joseph, Grimshaw, Amjad, & Stanton, 2005), and with the degree of physical activity in youth (Biddle et al., 1996).

Thus, we predicted that because students with higher self-motivation scores would work harder and persist in the face of obstacles to achieve their educational goals, they would achieve higher university GPAs than students with lower self-motivation scores, even when their level of conscientiousness (organization and attention to detail) is low. That is, we expected that a high level of self-motivation could compensate for a low level of conscientiousness. On the other hand, we expected that a high level of conscientiousness would compensate for a low level of self-motivation, because students who organize their activities well and pay a lot of attention to detail should succeed in their studies even when a high level of self-motivation is lacking.

Hypotheses

We may state these predictions more formally as follows:

Hypothesis 1: Self-motivation should interact with conscientiousness to predict university GPA: for people who are high in conscientiousness, self-motivation should be, at best, only slightly correlated with actual academic performance; similarly, for people who are high in self-motivation, conscientiousness should be, at best, only slightly correlated with actual academic performance.

Hypothesis 2: After controlling for students' previous academic performance (high school rank and SAT/ACT score), conscientiousness and self-motivation should still interact with each other to predict students' university GPAs.

2. Method

2.1. Participants

The initial sample included 391 undergraduate respondents; however, after applying the criteria of influential data points to identify outliers (Stevens, 1984), 14 influential outliers were detected and their data points were excluded. The remaining respondents were 377 undergraduates who were enrolled during the Fall, 2007 and Spring, 2008 semesters at the University of Texas at Arlington. They included 107 men (71 freshmen and 36 sophomores) and 270 women (187 freshmen and 83 sophomores). Proportions based on ethnic backgrounds were 50.7% White/Anglo-American, 13.8% Black/African-American, 15.6% Asian, 0.3% Native American or Alaskan Native, 0.3% Pacific Islander, and 19.4% other/multiracial. Proportions based on ages were 47.2% 16–18 years old, 49.8% 19–21 years old, 1.6% 22–24 years old, 0.8% 25–27 years old, and 0.6% 28–30 years old.

The participants were recruited by means of the SONA experiment tracking software system via the Internet (students can choose from a list of available studies the ones they would like to participate in). Each respondent received experimental participation credit for completing the survey online. All students were given the alternative option of fulfilling this requirement by reading a short, research-focused article and writing a summary reaction to it.

2.2. Materials

The respondents to the online survey were asked to provide answers to items that assessed: (1) personal background information, (2) conscientiousness, (3) self-motivation, and (4) their consent to release from their official university records various outcome measures that are relevant to different aspects of their university experience. The various measures that were included on the survey are described below.²

Personal background information: The participants were asked to report their sex and to complete items relevant to their ethnicity, their reasons for attending UT-Arlington, and the goals they seek while attending the university.

Conscientiousness: The participants were asked to complete the conscientiousness subscale of the Big Five Inventory (BFI) BFI that was developed by John, Donahue, and Kentle (1991) (sample $M = 32.54$, $SD = 5.29$). They used a 5-point Likert scale to respond to items such as "I see myself as someone who is a reliable worker" and "I see myself as someone who does things efficiently." The reliability (measured as Cronbach's alpha) of conscientiousness in the present sample was .80.

Self-motivation: Self-motivation was measured by means of the Self-motivation Inventory (SMI) (Dishman & Ickes, 1981; Dishman et al., 1980) (sample $M = 142.27$, $SD = 21.04$). The participants used a 5-point Likert scale to respond to items such as "Whenever I get bored with projects I start, I drop them to do something else" and "I can persevere at stressful tasks, even when they are physically tiring or painful." In the present sample, the scale's reliability coefficient was .93.

¹ Interactions indicative of mutually compensatory predictors are ones in which a high score on one predictor compensates for a low score on the other predictor, and this compensatory effect "works both ways."

² A few other measures were included in the online survey that are not relevant to the goals of the present investigation, and these additional measures will not be discussed here.

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