



# Able, ready, and willing: Examining the additive and interactive effects of intelligence, conscientiousness, and autonomous motivation on undergraduate academic performance<sup>☆</sup>



Stefano I. Di Domenico<sup>\*</sup>, Marc A. Fournier<sup>\*</sup>

University of Toronto Scarborough, Canada

## ARTICLE INFO

### Article history:

Received 10 January 2014

Received in revised form 22 January 2015

Accepted 29 March 2015

### Keywords:

Intelligence

Conscientiousness

Autonomous motivation

Self-determination theory

Academic performance

## ABSTRACT

Intelligence, conscientiousness, and autonomous motivation are well-established predictors of academic performance. However, research has yet to examine how these variables combine and interact in the prediction of academic success. We therefore examined intelligence, conscientiousness, and autonomous motivation in the concurrent prediction of students' grade point average (GPA) among university undergraduates. Conscientiousness was a stronger predictor of GPA at higher levels of intelligence, suggesting that an industrious disposition serves a catalytic function among those students who are the most intellectually able. Conscientiousness was a stronger predictor of GPA at lower levels of autonomous motivation, suggesting that an industrious disposition also serves a compensatory function among those students who are the least intrinsically interested. These findings call for further research on Intelligence  $\times$  Conscientiousness and Conscientiousness  $\times$  Autonomous Motivation interactions in the prediction of academic performance.

© 2015 Elsevier Inc. All rights reserved.

## 1. Introduction

Academic success can play a dramatic role in shaping the life course of university students. Apart from being an important admission requirement for graduate and professional schools, excellent performance in undergraduate courses also promises better job opportunities after university (Plant, Ericsson, Hill, & Asberg, 2005; Strenze, 2007). A natural turn of interest for education researchers is thus to identify what individual difference characteristics, either alone or in combination, are most predictive of academic success.

Findings from three separate and largely independent lines of research have identified three sources of individual differences that contribute to the prediction of academic performance. Undergraduate students differ in terms of (a) their *ability* to do academic work (i.e., intelligence), (b) their *readiness* to do academic work (i.e., conscientiousness), and (c) their *willingness* to do academic work (i.e., autonomous motivation). Meta-analytic effect sizes for these predictors have been estimated to be  $\rho = .21$  for intelligence,

$\rho = .23$  for conscientiousness, and  $\rho = .16$  for autonomous motivation (corrected for measurement error; Richardson, Abraham, & Bond, 2012). However, as these individual difference characteristics have been studied in relative isolation, very little is still known about how these variables combine and interact in the prediction of academic performance in university settings. The purpose of the present research was thus to examine the additive and potentially interactive (i.e., synergistic or compensatory) effects of intelligence, conscientiousness, and autonomous motivation on grade point average (GPA) among a sample of university undergraduates.

### 1.1. A closer look at intelligence: the ability to do academic work

Intelligence refers to the general mental capability that subsumes a broad range of more specific cognitive abilities, including abstract reasoning, planning, problem-solving, and learning from experience (Gottfredson, 1997). Spearman (1904, 1927) was the first to posit that a single common factor could be responsible for producing the positive manifold of correlations among tests of specific mental abilities, a position that has garnered continued support in subsequent investigations (Carroll, 1993; Jensen, 1998). The heritability of general intelligence increases with age, from about 30% in childhood to about 80% in adulthood (Deary, Penke, & Johnson, 2010). Individual differences in general intelligence are very stable over time; for example, Deary, Whalley, Lemmon, Crawford, and Starr (2000) tested participants at age 11 and then again at age 79 and found that general intelligence had a rank-order stability coefficient of .63.

<sup>☆</sup> Author Note: As both authors contributed equally to the preparation of this article, names are listed in alphabetical order. Portions of these findings were presented at the 2013 biennial meeting of the Association for Research in Personality (ARP) in Charlotte, North Carolina. We express our appreciation to Zhouran (Crystal) Li, Aubrey Gibson, and Mesaaba Correia for their contributions to the collection of these data.

<sup>\*</sup> Corresponding author at: Department of Psychology, University of Toronto Scarborough, 1265 Military Trail, Toronto, Ontario M1C 1A4, Canada.

E-mail addresses: [s.didomenico@utoronto.ca](mailto:s.didomenico@utoronto.ca) (S.I. Di Domenico), [marc.fournier@utoronto.ca](mailto:marc.fournier@utoronto.ca) (M.A. Fournier).

Although intelligence is thought to reflect a capability for learning and comprehension that is broader and deeper than mere book-learning or test-taking abilities (Gottfredson, 1997), academic performance has traditionally been used an important criterion to validate psychometric tests of intelligence. Indeed, Simon and Binet developed the first intelligence tests over 100 years ago specifically to help identify children that would have difficulties learning in a regular classroom environment. The distinct cognitive abilities subsumed under the general intelligence factor may each account for additional variance on tests restricted to specific academic subjects (e.g., processing speed and spatial ability in the domain of mathematics; Lubinski, Webb, Morelock, & Benbow, 2001; Rohde & Thompson, 2007). However, researchers have mostly focused on the role of general intelligence in the prediction of academic performance as broadly defined by course grades or GPA, a convention followed in the present investigation.

### 1.2. A closer look at conscientiousness: the readiness to do academic work

Conscientiousness is an individual difference construct in the five-factor model of personality, a taxonomy of personality traits that also includes neuroticism, extraversion, openness to experience, and agreeableness (Goldberg, 1993; John, Naumann, & Soto, 2008; McCrae & Costa, 2008). Roberts, Jackson, Fayard, Edmonds, and Meints (2009, p. 369) described conscientiousness as “the propensity to follow socially prescribed norms for impulse control, to be goal directed, to plan, and to be able to delay gratification and follow norms and rules.” Conscientiousness was discovered in factor-analytic studies of personality-descriptive terms in natural languages. Like the other five-factor traits, conscientiousness has a strong genetic basis; a number of studies estimate its heritability to be about 50% in adulthood (e.g., Jang, Livesley, & Vemon, 1996; Jang, McCrae, Angleitner, Riemann, & Livesley, 1998; Loehlin, McCrae, Costa, & John, 1998). Although people’s levels of conscientiousness tend to increase throughout the lifespan (Roberts, Walton, & Viechtbauer, 2006), individual differences in conscientiousness are stable during the typical university years; for example, Roberts, Caspi, and Moffit (2001) tested participants at age 18 and then again at age 26 and found that conscientiousness had a rank-order stability coefficient of .67.

Much like intelligence, conscientiousness represents a broad construct that accounts for the variance shared by more narrow or specific personality facets. Recently, researchers have identified five principal facets to the trait domain of conscientiousness (Roberts, Bogg, Walton, Chernyshenko, & Stark, 2004; Roberts, Chernyshenko, Stark, & Goldberg, 2005): *industriousness* (achievement vs. laziness), *orderliness* (organization vs. sloppiness), *impulse control* (cautiousness vs. carelessness), *reliability* (dependability vs. unreliability), and *formality* (traditionalism vs. nonconformity). Although researchers have mostly focused on the broad trait domain defined by conscientiousness, emerging studies suggest that the facets of conscientiousness are differentially associated with academic performance, with the “achievement-oriented” facets (i.e., industriousness and reliability) being the strongest predictors in university settings (e.g., Nofle & Robins, 2007; Paunonen & Ashton, 2013). In the present study, we examined both conscientiousness and its constituent facets alongside general intelligence and autonomous motivation in the prediction of academic performance.

### 1.3. A closer look at autonomous motivation: the willingness to do academic work

Autonomous motivation is a key construct in a macro-theoretical framework for the study of motivation and personality development called self-determination theory (SDT; Deci & Ryan, 2000, 2012; Ryan & Deci, 2008). Autonomous motivation refers to the extent to which people experience their goal-relevant behaviors as being choicefully initiated, volitionally enacted, and personally endorsed. Autonomously motivated behaviors are thus experienced as emanating from one’s

abiding sense of self or, stated in attributional terms, as having an internal perceived locus of causality (Ryan & Connell, 1989). SDT differentiates behavioral regulations along a continuum of relative autonomy. The most basic differentiation in this regard concerns the difference between *intrinsic motivation* and *extrinsic motivation*. Intrinsic motivation refers to the impetus for behavior performed for the inherent satisfaction associated with its enactment (i.e., for interest’s sake). In contrast, extrinsic motivation refers to the impetus for behavior aimed at the attainment of instrumentally separable outcomes (i.e., for the attainment of rewards or the avoidance of punishments). SDT further distinguishes between three empirically distinct forms of extrinsic motivation. *Identified regulation* is a relatively autonomous type of extrinsic motivation that is evidenced when one performs an activity because one recognizes or accepts the activity’s importance or underlying value. *Introjected regulation* is a less autonomous type of extrinsic motivation that is evidenced when one performs an activity to avoid feelings of shame and guilt or to defensively maintain feelings of self-worth. *External regulation* is the least autonomous type of extrinsic motivation that is evidenced when one performs an activity to obtain rewards or avoid punishments.

Unlike intelligence and conscientiousness, which are highly decontextualized and heritable attributes, autonomous motivation is a context-specific characteristic that is believed to have its primary basis in those environments in which the relevant goal-directed behaviors are socialized and enacted (Deci & Ryan, 2000, 2012; Ryan & Deci, 2008). In the language of the five-factor theory of personality (McCrae & Costa, 2008), autonomous motivation is considered a “characteristic adaptation,” an individual difference characteristic that is jointly determined by one’s foundational personality traits and by one’s environmental context, although the latter set of influences is believed to predominate in the case of autonomous motivation. This makes autonomous motivation a malleable characteristic. Indeed, a very large body of applied work in SDT shows that socializing agents (e.g., parents, educators, workplace supervisors, etc.) play a critical role in fostering the development of autonomous motivation by encouraging people’s initiation, by providing them with meaningful choices, by offering them structured and task-relevant feedback, and by making them feel valued. The benefits of such *autonomy supportive* practices have been documented across a wide variety of life domains, including educational settings (Deci & Ryan, 2000, 2012; Ryan & Deci, 2008).

The earliest applications of SDT in the educational domain focused on primary and secondary school settings. These studies found that the more autonomously motivated students tended to exhibit a variety of positive outcomes, including better maintenance and transference of academic activities, greater conceptual understanding, less procrastination, lower drop-out rates, and higher levels of achievement (see Deci & Ryan, 2000). Although fewer studies have applied SDT to university settings, researchers have found that more autonomous forms of motivation are similarly beneficial at higher levels of education (e.g., Black & Deci, 2000; Komarraju, Karau, & Schmeck, 2009; Kusurkar, Ten Cate, Vos, Westers, & Croiset, 2012; Miquelon, Vallerand, Grouzet, & Cardinal, 2005; Ning & Downing, 2012; Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009). However, researchers have yet to examine whether autonomous motivation has meaningful incremental utility over intelligence and conscientiousness in the prediction of undergraduate academic performance.

### 1.4. Overview of the present research

In the present research, we examined the additive and potentially interactive effects of intelligence, conscientiousness, and autonomous motivation to the prediction of undergraduate academic performance. Given that these constructs each represent a qualitatively distinct class of individual differences, we expected the correlations among their measures to range from minimal (intelligence and conscientiousness) to moderate (conscientiousness and autonomous motivation).

Download English Version:

<https://daneshyari.com/en/article/364729>

Download Persian Version:

<https://daneshyari.com/article/364729>

[Daneshyari.com](https://daneshyari.com)