



The Big Five and tertiary academic performance: A systematic review and meta-analysis



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ABSTRACT

This article reports a systematic review and meta-analysis of the relationships between the Big Five personality traits and tertiary academic performance. Five frequently used personality measures formed a restricted inclusion criteria pertaining to predictor variables: *NEO Personality Inventory – Revised* (NEO-PI-R; Costa & McCrae, 1992), *NEO Five-Factor Inventory* (NEO-FFI; Costa & McCrae, 1992), *Big Five Inventory* (BFI; John, Naumann, & Soto, 2008), *Big Five Markers* (Goldberg, 1992; Saucier, 1994; Thompson, 2008), and *Big Five International Personality Item Pool* (IPIP, www.ipip.ori.org/). Grade point average (GPA) was the criterion variable. 20 studies (21 independent samples) published between 1996 and 2013 were included with a total of 105 correlations and an aggregated sample size of 17,717. A random-effects model was used for meta-analysis. GPA was found to correlate significantly with Agreeableness, Conscientiousness, and Openness. Conscientiousness was the strongest predictor of GPA by far with a weighted summary effect of .26. Subgroup analyses tested a potential moderator variable not explored hitherto: academic major of study participants. Academic major was indeed found to moderate the relationship between Conscientiousness and GPA. Problems with the widespread use of psychology students only in samples and other methodological issues are discussed, and suggestions are provided for future research.

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1. Introduction

In the philosophical writings of Plato the concept *reason* is what distinguishes the academically capable from others (Taylor, Reeves, & Jeffords, 2008), and historically the search for predictors of superior academic performance has primarily focused on cognitive abilities (Sternberg, 1990). A milestone in this search was the workings of Alfred Binet from the beginning of the 20th century. Binet studied school children's differential academic performance and constructed intelligence tests and scales in order to identify pupils with academic potential (Binet & Simon, 1916). In the same historical time period Charles Spearman published work pointing towards a general intelligence factor (Spearman, 1904), a factor that has since become widely known as the *g* factor. Binet and Spearman's workings had an enormous impact, and cognitive abilities have consistently been shown to predict academic performance well (Ackerman & Heggstad, 1997). But there always were researchers doubting the adequacy of solely focusing on cognitive abilities. Edward Webb studied individual differences and

academic performance of British college students and schoolboys and concluded that “character” was just as important as intelligence in predicting academic success (Webb, 1915). Webb even proposed a general will-factor, *w*, corresponding to Spearman's *g* to emphasize the role of personality in academic performance. However, the *w* factor never gained currency, and cognitive factors remained the focus of research in prediction of academic performance throughout the century. With the growing consensus on the Big Five personality traits, *Agreeableness*, *Conscientiousness*, *Extraversion*, *Neuroticism*, and *Openness* (McCrae & Costa, 2008), however, research into the personality-academic performance interface has become more frequent.

1.1. Variability in Big Five measures in previous research

Three meta-analyses have reviewed the broad literature on the predictive validity of the Big Five for academic performance (Poropat, 2009; Richardson, Abraham, & Bond, 2012; Trapmann, Hell, Hirn, & Schuler, 2007) and found substantial, positive correlations between Conscientiousness and academic performance (grades and GPA) in the range of .19–.27. When partialling out intelligence whenever possible, the correlation between Conscien-

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tiousness and academic performance increases (e.g. Poropat, 2009); establishing Conscientiousness as an independent predictor not confounded with psychometric intelligence. Only small correlations were found for the other four personality traits. These meta-analyses had very broad inclusion criteria; studies using any measure of the Big Five personality traits were included. However, it is plausible that the various measures of the Big Five are not equally good at predicting academic success. Though statistical corrections were applied regarding sampling error (Richardson et al., 2012) and reliability (Poropat, 2009) whenever possible, the results still are based on collapsing diverse measures leading to a somewhat blurred picture.

1.2. Variability in criterion in previous research

This potential problem in criterion-related validity was recently addressed by McAbee and Oswald (2013) who performed a meta-analysis on the criterion-related validity of five frequently used personality measures for predicting tertiary level academic performance (grades and GPA): the *NEO Personality Inventory – Revised* (NEO-PI-R, Costa & McCrae, 1992), the *NEO Five-Factor Inventory* (NEO-FFI, Costa & McCrae, 1992), the *Big Five Inventory* (BFI, John et al., 2008), *Big Five Markers* (Goldberg, 1992; Saucier, 1994; Thompson, 2008), and the *Big Five International Personality Item Pool* (IPIP, www.ipip.ori.org/). Conscientiousness was found to be a robust predictor of academic performance across these particular five personality measures adding to the validity of future meta-analyses collapsing any of these particular five personality measures. But the criterion variable in the meta-analysis by McAbee and Oswald was very broad and covered both registry GPA, self-reported GPA, and individual course grades. Studies have generally found very high correlations between self-reported GPA and registry GPA in the range .84–.89 (Gray & Watson, 2002; Nofle & Robins, 2007), which makes self-reported GPA a suitable criterion variable comparable to registry GPA. Individual course grades on the other hand is much more problematic. Courses vary greatly in content and kinds of academic assessment (Furnham & Chamorro-Premuzic, 2005), and course grades are not comparable with GPA due to their specificity.

1.3. Aims of the current meta-analysis

The first objective of the current meta-analysis was to find out to which extend more restricted selection criteria of Big Five personality measures as well as criterion variable yield higher predictive validity of the Big Five, Conscientiousness especially, for academic performance in college and university populations, compared to the four meta-analyses previously undertaken with more variability in personality measures and criterion variable.

The second objective was to assess a new, potential moderator of these relationships: the academic major of the subjects participating in the studies. Previous research (Poropat, 2009) has assessed the impact of moderators such as age and educational level but never explored whether there are differences in the strength of association between the Big Five personality traits and academic performance depending on the academic major of study participants. Most studies in this field of research use samples consisting of psychology students only. It is relevant to investigate whether these studies yield results similar to or different from studies performed with students from other academic fields since discrepancies would have implications for the generalizability of previous findings on the predictive validity of the Big Five personality traits, Conscientiousness especially, for academic per-

formance. The current meta-analysis is the first to test this potential moderator.

2. Method

2.1. Literature search

A systematic search by thematically relevant electronic databases was conducted to identify studies on the relationship between the Big Five personality traits and academic performance at university. Using ProQuest the following electronic databases were searched simultaneously with the last search run on April 14, 2014: Australian Education Index (1977 – present), British Education Index (1975 – present), ERIC (1966 – present), PsycINFO (1806 – present) and Sociological Abstracts (1952 – present). Search terms and Boolean operators were ab(personality) AND ab(academic success OR academic performance) AND peer(yes). No publication date limits were applied. Abstracts of the located studies were reviewed, and potential relevant studies were identified. Copies of the potential relevant studies were obtained and examined applying the inclusion criteria outlined in the section below. References of included studies were searched manually to identify additional relevant studies. Finally, this author's personal collection of electronic articles in the personality research field was searched identifying a relevant, recent study (Furnham, 2012) not cited in the included studies or in any of the previous meta-analyses.

2.2. Inclusion criteria

The current meta-analysis included only studies available in English for further examination. The most basic requirement for inclusion of studies was that one of the personality measures shown to have equally good criterion-related validity (McAbee & Oswald, 2013) had been correlated with GPA.¹ Studies using other personality measures than the NEO-PI-R, NEO-FFI, BFI, Markers, or IPIP were therefore excluded (e.g. Busato, Prins, Elshout, & Hamaker, 2000; Cela-Ranilla, Gisbert, & de Oliveira, 2011; Paunonen & Ashton, 2013; Ridgell & Lounsbury, 2004). In one study (Gray & Watson, 2002) Conscientiousness, was measured by the NEO-PI-R whereas the remaining four factors were measured by the NEO-FFI. Given that both of these personality measures honour the inclusion criteria this study was included. Studies employing only a subset of one of the personality measures were not included (e.g. Ahmad, 2011; Furnham, Nuygards, & Chamorro-Premuzic, 2013; Wagerman & Funder, 2007), and studies using single course or examination grade as criterion variable were also excluded (e.g. Ziegler, Danay, Schölmerich, & Bühner, 2010). In the study conducted by Ferguson, Sanders, O'Hehir, and James (2000) the criterion variable was a so-called "general medical training factor" extracted with exploratory factor analysis from 21 assessment variables and yielding a coefficient alpha of .87. The generality yet cohesion – as shown by factor analysis – of this factor makes it comparable with GPA; therefore this study was included. Studies using samples drawn from the non-tertiary level of education were excluded (e.g. Bratko, Chamorro-Premuzic, & Saks, 2006; Di Fabio & Busoni, 2007).

The identified relevant studies were included in the meta-analysis only if they contained zero-order correlations (or data that could be converted to this) between the Big Five personality traits and GPA. The reason for this inclusion criterion is the diversity in

¹ In Europe the academic performance criterion typically used is overall exam marks not encompassing coursework as the American GPA. For the sake of simplicity GPA will be used in the current meta-analysis to denote both.

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