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Big Five personality predictors of post-secondary academic performance

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Abstract

We reviewed the recent empirical literature on the relations between the Big Five personality dimensions and post-secondary academic achievement, and found some consistent results. A meta-analysis showed Conscientiousness, in particular, to be most strongly and consistently associated with academic success. In addition, Openness to Experience was sometimes positively associated with scholastic achievement, whereas Extraversion was sometimes negatively related to the same criterion, although the empirical evidence regarding these latter two dimensions was somewhat mixed. Importantly, the literature indicates that the narrow personality traits or facets presumed to underlie the broad Big Five personality factors are generally stronger predictors of academic performance than are the Big Five personality factors themselves. Furthermore, personality predictors can account for variance in academic performance beyond that accounted for by measures of cognitive ability. A template for future research on this topic is proposed, which aims to improve the prediction of scholastic achievement by overcoming identifiable and easily correctable limitations of past studies.

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1. Introduction

Understanding the reasons for individual differences in levels of scholastic achievement has always been a concern of educational psychologists. Knowledge of the factors that influence academic success has important implications for learning and education. Many educators, for example, are interested in knowing beforehand who will perform well, and who will perform poorly, in academic programs. Other researchers are concerned with identifying the determinants of academic success in an effort to develop curricula aimed at improving levels of academic performance.

Research has established that cognitive ability is one important determinant of academic achievement (e.g., Ackerman & Heggestad, 1997). Ability factors alone, however, are not sufficient to account fully for individual differences in academic success (Chamorro-Premuzic & Furnham, 2006). Thus, researchers have sought to identify non-cognitive predictors of academic performance, including variables related to personality dispositions. One group of predictor variables that has generated a considerable amount of interest is the Big Five personality dimensions. The purpose of this article is to review the recent empirical literature on the Big Five as predictors of, in particular, post-secondary academic achievement.

Our review is organized into several major sections. The rationale for predicting post-secondary academic performance on the basis of personality traits is first discussed. Next, two approaches to the study of Big Five personality predictors of academic performance are presented, and the relevant empirical literature is reviewed. This is followed by a discussion of two substantive issues that have arisen from the study of personality traits and scholastic achievement: the relative predictive utility of the two aforementioned empirical approaches, and the extent to which personality variables can increment the prediction of academic performance over that achieved by ability variables. Finally, an evaluation of the current status of the literature is provided, and a template for future research is proposed.

2. Rationale

Three broad justifications have been offered for the evaluation of personality traits as predictors of academic performance. First, it has been suggested that behavioral tendencies reflected in personality traits affect certain habits that can have an influence on academic success. Rothstein, Paunonen, Rush, and King (1994) have argued that, “to the extent that evaluations of performance in [an academic] program are influenced by characteristic modes of behavior such as perseverance, conscientiousness, talkativeness, dominance, and so forth, individual differences in specific personality traits justifiably can be hypothesized to be related to scholastic success” (p. 517).

A second argument for personality traits as predictors of academic performance is that, whereas cognitive ability reflects what an individual *can* do, personality traits reflect what an individual *will* do (Furnham & Chamorro-Premuzic, 2004). Stated otherwise, it is thought that long-term academic performance may be more accurately predicted by a measure of typical performance, such as a personality scale, rather than a measure of maximal performance, such as a cognitive ability scale (Goff & Ackerman, 1992).

A third reason for an increasing focus on personality traits as predictors of academic achievement relates to the trend towards studying the performance of university age students. Personality

traits may be especially relevant for the prediction of post-secondary academic performance, the focus of our study, because measures of cognitive ability might lose their predictive power at this higher level of education (Ackerman, Bowen, Beier, & Kanfer, 2001; Furnham, Chamorro-Premuzic, & McDougall, 2003). Research has found that the relation between cognitive ability and academic success is often weaker than expected in samples of university students, in comparison to samples of elementary and secondary school students. One explanation for this loss in predictive power is restriction of range in the intelligence scores of students enrolled in post-secondary programs (Furnham et al., 2003). Another reason (Ackerman et al., 2001) is that the criterion of academic achievement tends to shift over time, from factors that favor cognitive abilities (e.g., critical thinking) to factors that favor personality or motivational variables (e.g., domain knowledge). In addition, universities seem to be placing a greater emphasis on continuous assessment methods (e.g., attendance, class participation), and personality traits might be especially relevant for predicting such criteria. Taken together, the three broad justifications outlined above provide a strong impetus for our examination of personality variables as predictors of post-secondary academic performance.

3. Theoretical perspectives

Interest in the relation between personality traits and academic performance has persisted throughout the 20th century. During this period, investigators have adopted several theoretical approaches to the topic, involving distinct conceptualizations of the relevant personality dimensions. Early research efforts focused on the relation between academic performance and a broad personality trait termed persistence of motives (Webb, 1915). More recently, research has examined the relations between academic achievement and the personality dimensions proposed in Cattell's (1973) and Eysenck's (1970) models of personality structure.

The past empirical research stemming from the historical approaches mentioned above has been reviewed elsewhere (see Chamorro-Premuzic & Furnham, 2005; De Raad & Schouwenburg, 1996; Eysenck, 1970) and, therefore, will not receive any further attention in this article. Rather, our concern is with the most recent theoretical approach to the study of personality traits and academic achievement; namely, that based on the Five-Factor Model of personality structure. A comprehensive review of the empirical literature examining the relations between the personality dimensions of the Five-Factor Model and post-secondary academic performance has yet to be provided in the literature (but see Chamorro-Premuzic & Furnham, 2005, for a partial review).

The Five-Factor Model of personality (McCrae & Costa, 1997) represents the dominant conceptualization of personality structure in the current literature. This model posits that the Big Five personality factors of Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness reside at the highest level of the personality hierarchy. These factors are thought to encompass the entire domain of more narrow personality traits that fall at lower-levels of the hierarchy.

Recent investigations of the relations between personality traits and academic performance tend generally to operate under the framework provided by the Five-Factor Model of personality structure. Under this framework, however, contemporary researchers have adopted two broad

approaches to the study of Big Five personality dimensions and academic performance. In the first method, investigators have examined how well the broad Big Five personality factors (i.e., those factors residing at the highest level of the personality hierarchy) predict academic performance. In the second method, researchers have evaluated more narrow personality traits, at lower levels of the personality hierarchy, in terms of predicting academic success. The following sections review the empirical literature stemming from each of these perspectives.

4. Big Five personality factors and achievement

Many empirical studies have investigated the relations between post-secondary academic performance and the Big Five personality factors. Different measures of the Big Five have been employed in this research. The most common measures are the Revised NEO Personality Inventory (NEO-PI-R: Costa & McCrae, 1992) and the NEO Five-Factor Inventory (NEO-FFI: Costa & McCrae, 1992). Other measures include the Big Five Inventory (BFI: Benet-Martinez & John, 1998; John, Donahue, & Kentle, 1991), the Personal Style Inventory (PSI: Lounsbury & Gibson, 1998), and the 5 PFT (Elshout & Akkerman, 1975).

The following sections review the empirical literature on the relations between the Big Five personality factors and academic achievement. We begin by summarizing the correlations between the Big Five factors and post-secondary academic performance that have been reported in the major papers available on this topic. These correlations are presented in Table 1. The correlations are discussed both individually and in terms of meta-analyses we did to evaluate general trends in the data (Hunter & Schmidt, 1990). The results of the meta-analyses are summarized in Table 2.¹

4.1. Conscientiousness

Of the Big Five factors, Conscientiousness has been the most consistently linked to post-secondary academic success. Numerous empirical studies have identified positive relations between the factor and diverse indicators of academic performance. At the broadest level, Conscientiousness has been found to be positively associated with GPA, indicating that conscientious students tend to perform better academically than do less conscientiousness students (Bauer & Liang, 2003; Chamorro-Premuzic & Furnham, 2003a; Chamorro-Premuzic & Furnham, 2003b; Conard, 2006;

¹ Three comments about our meta-analytic procedure are relevant. (a) Box plots were constructed to identify potential outliers in the correlations of Table 1. Three negative correlations (one for Neuroticism, two for Agreeableness) were identified as outliers, and were thus excluded from the meta-analyses. (b) Some studies reported several correlations, but between a Big Five factor and multiple indicators of academic achievement from the same students. Meta-analysis, however, requires an independent set of observations. Thus, in such cases, we included only the correlation based on overall academic performance (e.g., course grade, GPA). In one case (Hair & Hampson, 2006), where such an overall measure was not available, we used the mean correlation computed across two dependent measures of academic performance (see Table 1). (c) Individual correlations were corrected for attenuation due to measurement error in the Big Five personality factor measure. Indices of reliability were obtained from the tests' manuals. In cases where these indices were not available, the reliabilities reported for the sample were used. In two cases where no reliability information was available, the mean value of the reliability estimates obtained from the other studies was used.

Table 1

Summary of studies reporting correlations between Big Five personality factors and post-secondary academic performance

Study	Measure		Correlation				
	Big Five	Academic performance	N	E	O	A	C
Dollinger and Orf (1991)	NEO-PI	Exam grade	.10	.01	.30	.10	.21
	NEO-PI	Essay grade	-.12	-.04	.06	.18	.17
	NEO-PI	Course grade	-.01	.11	.20	.05	.25^a
Goff and Ackerman (1992)	NEO-PI	GPA	-.09	-.17	-.00	.03	.17^a
Rothstein et al. (1994)	PRF	Written performance	-.02	-.09	-.00	-.07	.09
	PRF	Classroom performance	-.09	.19	.17	-.20	.05
	PRF	GPA	-.08	.07	.12	-.19	.10 ^a
Wolfe and Johnson (1995)	BFI	GPA	-.02	-.08	.10	.08	.34^a
De Fruyt and Mervielde (1996)	NEO-PI-R	GPA	-.09	.02	-.09	.05	.28^a
Paunonen (1998) (Study 1)	NEO-FFI	GPA	.18	-.15	.08	-.24	.06 ^a
Paunonen (1998) (Study 2)	NEO-FFI	GPA	.03	-.02	.19	.03	.20 ^a
Busato et al. (2000)	5 PFT	Exam grade	.06	-.13	.03	-.00	.16^a
Paunonen and Ashton (2001a)	PRF	Course grade			-.04		.21^a
Gray and Watson (2002)	NEO-FFI	GPA	.00	-.09	.19	.15	^a
	NEO-PI-R						.36^a
Lievens et al. (2002)	NEO-PI-R	GPA	.03	-.04	.15	-.10	.19^a
Bauer and Liang (2003)	NEO-FFI	GPA	.00	-.18	-.02	.06	.22^a
Chamorro-Premuzic and Furnham (2003a)	NEO-PI-R	GPA	-.16	-.11	.02	.07	.36^a
Chamorro-Premuzic and Furnham (2003b)	NEO-FFI	GPA	-.35	.07	.00	.22	.39^a
	NEO-FFI	Thesis research	-.25	-.01	-.03	.13	.36
Diseth (2003)	NEO-PI-R	Exam grade	-.03	-.10	.03	.12	.06 ^a
Farsides and Woodfield (2003)	NEO-FFI	GPA	.03	.00	.26	.14	.09 ^a
Furnham et al. (2003)	NEO-PI-R	GPA	.14	-.29	-.16	.06	.40^a
Lounsbury et al., 2003	PSI	Course grade	-.11	.01	.16	-.01	.18^a
Phillips et al. (2003)	NEO-FFI	GPA	.04	-.04	.19		.26^a
Duff et al. (2004)	16 PF	GPA	-.14	.06	.07	.12	.21 ^a
Furnham and Chamorro-Premuzic (2004)	NEO-FFI	Average exam grade in course	.04	-.24	-.06	-.04	.25^a
Hair and Hampson, 2006	BFI	Average essay grade in course	.00	-.12	.00	.06	.13^a
	BFI	Average exam grade in course	-.11	-.15	.00	.01	.18^a
Conard (2006)	NEO-FFI	Course grade	-.11	-.06	.11	.17	.31
	NEO-FFI	GPA	-.06	.00	-.02	.11	.35^a

Note. Significant correlations ($p < .05$) are bolded; blanks = correlation not evaluated. N = Neuroticism; E = Extraversion; O = Openness to Experience; A = Agreeableness; C = Conscientiousness; NEO-PI = NEO Personality Inventory; PRF = Personality Research Form; BFI = Big Five Inventory; NEO-PI-R = Revised NEO Personality Inventory, NEO-FFI = NEO Five-Factor Inventory, 5 PFT = Vijf Persoonlijkheids-factoren test; PSI = Personal Style Inventory, 16 PF = Sixteen Personality Factor Questionnaire.

^a Row of correlations included in meta-analyses.

De Fruyt & Mervielde, 1996; Furnham et al., 2003; Goff & Ackerman, 1992; Gray & Watson, 2002; Lievens, Coetsier, De Fruyt, & De Maeseneer, 2002; Phillips, Abraham, & Bond, 2003; Wolfe & Johnson, 1995). The Big Five Conscientiousness factor has also been found to predict

Table 2
Results of meta-analyses for five factors

Big Five factor	<i>K</i>	<i>N</i>	ρ_{uncorr}	ρ_{corr}	$SD_{\rho_{\text{corr}}}$	90% CI
Neuroticism	21	5091	-.03	-.03	.04	$-.10 < \rho < .04$
Extraversion	22	5161	-.05	-.05	.06	$-.15 < \rho < .05$
Openness to Experience	23	5878	.05	.06	.10	$-.10 < \rho < .22$
Agreeableness	19	4490	.06	.06	.03	$.01 < \rho < .11$
Conscientiousness	23	5878	.22	.24	.07	$.12 < \rho < .36$

Note. *K* = number of correlations; *N* = total sample size; ρ_{uncorr} = mean uncorrected correlation; ρ_{corr} = mean population correlation corrected for attenuation due to measurement error in the Big Five measure; $SD_{\rho_{\text{corr}}}$ = estimated standard deviation of population correlations; 90% CI = 90% confidence interval around ρ_{corr} .

more narrow indicators of academic performance such as final grades in an undergraduate course (Conard, 2006; Dollinger & Orf, 1991; Lounsbury, Sundstrom, Loveland, & Gibson, 2003; Paunonen & Ashton, 2001a), mid-term exam grades in introductory psychology (Busato, Prins, Elshout, & Hamaker, 2000; Hair & Hampson, 2006) and in undergraduate statistics classes (Furnham & Chamorro-Premuzic, 2004), written essay grades (Hair & Hampson, 2006), and thesis research grades (Chamorro-Premuzic & Furnham, 2003b).

The results of our meta-analysis, as summarized in Table 2, indicated that the mean population correlation between Conscientiousness and academic performance was $r = .24$, and that the 90% confidence interval around this value ranged from $r = .12$ to $r = .36$. Thus, Conscientiousness is clearly an important determinant of academic success when considered across a substantial body of research. However, the magnitude of the association between Conscientiousness and achievement can vary from small to quite substantial. The reason for this variation in the literature is not yet clear.

The relation between Conscientiousness and academic performance has often been interpreted in terms of motivation; conscientious students are thought to be more motivated to perform well academically than are less conscientiousness students (Chamorro-Premuzic & Furnham, 2005). Additionally, it is often assumed that there is a logical relation between behaviors underlying some facets of Conscientiousness and academic performance. For example, it seems likely that students who are organized, hard-working, and achievement-oriented will perform better at typical academic tasks than those who are not.

Despite the empirical support for a positive association between Conscientiousness and academic success, some research suggests that extremely high levels of Conscientiousness may have a detrimental effect on grades. Cucina and Vasilopoulos (2005) found an inverted-U relation between Conscientiousness and GPA, indicating that extremely conscientious students had lower GPAs than did students scoring in the moderate to moderate-high range of that factor.

4.2. Openness to Experience

Investigations of the Openness to Experience factor of personality as a predictor of academic performance have produced mixed results. On one hand, a number of studies have identified a positive association between Openness and post-secondary academic performance. Measures of

the factor have been found to predict GPA (Farsides & Woodfield, 2003; Gray & Watson, 2002; Lievens et al., 2002; Phillips et al., 2003; Rothstein et al., 1994), final course grades (Lounsbury et al., 2003), grades on a psychology exam (Dollinger & Orf, 1991), and class participation grades (Rothstein et al., 1994). This generally positive relation has often been interpreted in terms of ability, as Openness measures have often been found to be positively correlated with measures of intelligence (Chamorro-Premuzic & Furnham, 2005). On the other hand, many studies have failed to find a significant association between Openness and academic performance (Table 1).

The results of our meta-analysis (Table 2) indicated that the average population correlation between Openness to Experience and achievement was only $r = .06$, providing little evidence of an overall association between that personality dimension and academic performance. However, substantial variation was found to exist in the magnitude of the effect sizes, with the 90% confidence interval for the population correlations ranging from $r = -.10$ to $r = .22$. It is possible that one or more unknown moderator variables are responsible for determining whether Openness to Experience exerts a positive or null influence on academic performance.

4.3. Extraversion

Research examining Extraversion as a predictor of post-secondary academic performance has, like Openness to Experience, produced mixed results. Several studies have identified negative associations. Extraversion has been negatively correlated with GPA (Bauer & Liang, 2003; Furnham et al., 2003; Goff & Ackerman, 1992), and grades on introductory psychology exams (Busato et al., 2000; Hair & Hampson, 2006) and statistics exams (Furnham & Chamorro-Premuzic, 2004). This negative association has been interpreted as suggesting that introverts spend more time studying, whereas extraverts spend more time socializing (Chamorro-Premuzic & Furnham, 2005).

The validity of a negative relation between Extraversion and academic performance has yet to be firmly established as a general rule, numerous studies having failed to find any such association (Table 1). Moreover, some research has even identified a positive association between Extraversion and academic achievement. Rothstein et al. (1994), for example, reported that Extraversion was positively associated with classroom participation grades in an MBA program.

Our meta-analysis found that the mean population correlation between Extraversion and academic performance was $r = -.05$, with the 90% confidence interval ranging from $r = -.15$ to $r = .05$ (Table 2). The small average correlation provides little evidence of an overall relation between Extraversion and academic performance in the literature. However, the confidence interval does suggest that there is a tendency for Extraversion to be negatively associated with scholastic achievement in some situations.

4.4. Neuroticism

A few studies have found negative associations between Neuroticism and post-secondary academic performance. For example, Neuroticism has been negatively correlated with GPA (Chamorro-Premuzic & Furnham, 2003a; Chamorro-Premuzic & Furnham, 2003b; De Fruyt & Mervielde, 1996) and performance on thesis research (Chamorro-Premuzic & Furnham, 2003b), suggesting that emotionally stable students perform better academically than do more

neurotic students. This relation has been most often interpreted in terms of the debilitating effects of anxiety – under academic evaluation conditions, neurotic individuals are thought to experience anxiety and stress, impairing their performance (Chamorro-Premuzic & Furnham, 2005).

Despite some specific correlational results, Neuroticism is mostly unassociated with post-secondary academic performance in the empirical literature overall (Table 1). The mean population correlation between Neuroticism and academic performance, estimated by our meta-analysis, was $r = -.03$ (Table 2). The 90% confidence interval for this value was found to range from $r = -.10$ to $r = .04$. This small mean correlation and narrow confidence interval suggest that Neuroticism may not be a strong determinant of individual differences in scholastic achievement in general.

4.5. Agreeableness

Agreeableness has been mostly unassociated with post-secondary academic performance. The small body of empirical research that has uncovered significant relations between that factor and academic achievement has produced mixed results; some research finding a positive relation, and other research finding a negative relation. For example, Agreeableness has been positively associated with GPA (Farsides & Woodfield, 2003; Gray & Watson, 2002) and final course grades (Conard, 2006) in some studies, but negatively associated with GPA (Paunonen, 1998; Rothstein et al., 1994) and class participation grades (Rothstein et al., 1994) in other studies.

Our meta-analysis of the correlations between Agreeableness and academic performance indicated that the mean population correlation was $r = .06$ (Table 2). The 90% confidence interval estimated that the population correlations ranged from $r = .01$ to $r = .11$. Thus, the overall body of literature suggests that Agreeableness is not an important determinant of academic performance.

5. Narrow personality traits and achievement

A second approach to the study of personality and academic performance involves the investigation of narrow personality traits as predictors, traits that reside at a lower level of the personality hierarchy than do the broad Big Five factors. The specific personality traits that have been examined have been drawn from several personality inventories. One such questionnaire is the NEO-PI-R (Costa & McCrae, 1992). The NEO-PI-R assesses 30 narrow personality traits or facets, six for each of the broad Big Five factors. Other sources of narrow personality traits have included the Personality Research Form (PRF; Jackson, 1984) and the Jackson Personality Inventory (JPI; Jackson, 1976), having 20 and 15 trait scales respectively. Although these latter two questionnaires were not explicitly designed to assess facets of the Big Five factors, there is both empirical and theoretical evidence supporting those scales' relations to the Five-Factor Model (e.g., Jackson, Paunonen, Fraboni, & Goffin, 1996; Paunonen & Jackson, 1996).

The empirical research examining the relations between narrow personality traits and academic performance is reviewed below for the NEO-PI-R and other personality measures. Because the numbers of correlations we found in the literature for the specific personality predictors were so small, we could not do meta-analyses on the results of our search.

5.1. NEO-PI-R personality facets

The NEO-PI-R personality facets of Big Five Conscientiousness include achievement-striving, competence, deliberation, dutifulness, order, and self-discipline. Positive associations have been, at one time or another, found between all six facets and academic success (De Fruyt & Mervielde, 1996; Gray & Watson, 2002). The strength of the relations, however, tend to vary substantially across facets, suggesting that some of these traits may be more relevant for predicting academic performance than others.

The Conscientiousness facets of achievement-striving and self-discipline, in particular, have been the strongest and most consistent predictors of academic performance. Achievement-striving involves being ambitious, diligent, and persistent; self-discipline involves being motivated to finish tasks and resistant to distractions. Several studies have uncovered positive associations between these two facets and academic success, with the magnitude of the correlations ranging from $r = .15$ to $r = .39$ for achievement-striving, and from $r = .18$ to $r = .46$ for self-discipline (Chamorro-Premuzic & Furnham, 2003a; De Fruyt & Mervielde, 1996; Gray & Watson, 2002; Lievens et al., 2002). Dutifulness, which involves an emphasis on fulfilling moral obligations, has also emerged as a predictor of academic achievement in some research, with the magnitude of the correlations ranging from $r = .25$ to $r = .38$ (Chamorro-Premuzic & Furnham, 2003a; De Fruyt & Mervielde, 1996; Gray & Watson, 2002). Other facets of Conscientiousness have been found to play a smaller role in the prediction of academic performance.

Empirical evidence concerning the relations between the NEO-PI-R Openness to Experience facets and academic performance is mixed. Dollinger and Orf (1991) reported a positive correlation between the openness to ideas facet and academic success ($r = .22$), suggesting that individuals who are more curious and open to unconventional ideas receive higher final course grades than do individuals who are not. However, later research has failed to replicate this finding (Chamorro-Premuzic & Furnham, 2003a; De Fruyt & Mervielde, 1996). Furthermore, De Fruyt and Mervielde (1996) found a negative association between GPA and the openness to fantasy facet (i.e., being dreamy and not task-oriented) for males ($r = -.22$), and between GPA and the openness to aesthetics facet (i.e., appreciating art and beauty) for females ($r = -.19$). These relations, however, have also yet to be replicated (Chamorro-Premuzic & Furnham, 2003a; Dollinger & Orf, 1991).

Some research has identified activity, a NEO-PI-R facet of Extraversion that involves being energetic, hurried, and enthusiastic, as a predictor of academic performance, but disagreement exists concerning the nature of the relation. De Fruyt and Mervielde (1996) found a positive association between activity and GPA for males ($r = .26$) and females ($r = .21$), but Chamorro-Premuzic and Furnham (2003a) found a negative association ($r = -.24$). The narrow personality trait of gregariousness, another NEO-PI-R facet of Extraversion, has been reported to be negatively associated ($r = -.20$) with academic performance (Chamorro-Premuzic & Furnham, 2003a).

Two of the NEO-PI-R facets of Neuroticism, impulsivity and anxiety, have been associated with academic achievement. Chamorro-Premuzic and Furnham (2003a) found a negative association between impulsiveness and GPA ($r = -.26$), and De Fruyt and Mervielde (1996) found a negative association between that facet and GPA for both males ($r = -.22$) and females ($r = -.14$). These findings suggest that not being able to control one's appetitive urges has

negative consequences for academic performance. Chamorro-Premuzic and Furnham (2003a) also provided some evidence that the Neuroticism facet of anxiety is negatively associated with scholastic achievement ($r = -.29$), indicating that being anxious, tense, and nervous may be a detriment to academic performance.

The present review of the literature failed to uncover any reports of significant relations between the NEO-PI-R facets of Agreeableness and academic performance. The lack of such relations is perhaps not surprising, given that the broad Big Five Agreeableness factor has been largely unassociated with academic performance (Table 1).

5.2. Other trait measures

The PRF (Jackson, 1984) assesses 20 narrow personality traits that may be considered lower-level facets of the Big Five factors of personality (Jackson et al., 1996). Several of these personality traits have been found to predict post-secondary academic performance. The PRF measure of achievement, in particular, has been consistently associated with academic success. Paunonen (1998) reported a positive association between the PRF Achievement scale and undergraduate GPA ($r = .27$), and Paunonen and Ashton (2001a) reported a positive association between that measure and final grades in an undergraduate psychology course ($r = .26$). In addition, Rothstein et al. (1994) found that PRF Achievement predicted both GPA ($r = .21$) and class participation grades ($r = .21$) in an MBA program.

Other PRF personality trait measures have been less consistently linked with academic performance. Rothstein et al. (1994) reported that the PRF Dominance scale predicted GPA in an MBA program ($r = .22$), and that both PRF Dominance ($r = .23$) and Exhibition ($r = .33$) predicted class participation grades. Paunonen (1998) reported that undergraduate GPA was related to the PRF scales of Defence ($r = .21$), Abasement ($r = -.21$), Nurturance ($r = -.25$), and Play ($r = -.27$). Paunonen and Ashton (2001a) found that grades in an undergraduate psychology course were associated with the PRF scale of Understanding ($r = .23$). Replication of these findings is necessary before firm conclusions about their reliability can be made.

Another source of personality trait predictors of academic performance has been the JPI (Jackson, 1976). This questionnaire assesses 15 narrow personality traits that are arguably related to the Big Five (Paunonen & Jackson, 1996). Wolfe and Johnson (1995) found that GPA was predicted by the JPI measures of Organization ($r = .28$) and Risk-Taking ($r = -.31$), and to a lesser degree, Interpersonal Warmth ($r = .20$), Conformity ($r = .21$), and Anxiety ($r = .15$). Paunonen (1998), however, found GPA to be predicted by the JPI measure of Responsibility only ($r = .23$). As such, the reliability of the relations between the JPI traits and academic performance has not been fully established in the literature.

6. Relative predictive utility of the Big Five factors and traits

One important issue arising from the study of Big Five personality dimensions and academic performance concerns whether achievement is best predicted by the broad Big Five personality factors or by the factors' more narrow constituent personality traits. Some investigators have addressed this issue by comparing the magnitude of the zero-order correlations between the Big Five

factors and academic performance on the one hand, and more narrow personality traits and academic performance on the other. The results of empirical studies adopting this method are reviewed below.

Rothstein et al. (1994) examined whether the Big Five personality factors or their constituent narrow personality traits, both assessed with the PRF, were better predictors of academic performance in an MBA program. None of the Big Five factors was correlated with overall GPA. However, two of the narrow personality traits, namely achievement from the Conscientiousness factor and dominance from the Agreeableness factor, were able to predict GPA ($r = .21$ and $r = .22$, respectively).

Rothstein et al. (1994) also examined the relative predictive utility of the Big Five factors and their narrow traits in relation to two distinct components of MBA students' GPA: written performance and classroom performance. Although neither the Big Five factors nor the narrow personality traits were able to predict written performance, the pattern of findings for classroom performance provided further evidence that narrow personality traits may be better able to predict academic achievement than can the broad Big Five personality factors of which they are part. Specifically, whereas Big Five Extraversion was positively correlated with classroom participation grades ($r = .19$), one of its lower-level personality traits, exhibition, was an even stronger predictor of that criterion variable ($r = .33$). Similarly, although Big Five Agreeableness was negatively associated with classroom participation grades ($r = -.20$), its lower-level personality trait of dominance was a slightly stronger predictor of that criterion variable ($r = -.23$). In addition, achievement, a lower-level personality trait of Big Five Conscientiousness, was positively associated with classroom performance ($r = .21$), despite the fact that Conscientiousness itself was not a significant predictor.

Chamorro-Premuzic and Furnham (2003a) used a similar approach to Rothstein et al. (1994) to investigate whether undergraduate GPA was more accurately predicted by the Big Five personality factors or the 30 narrow personality traits defined by the NEO-PI-R. With regards to the Conscientiousness dimension, they found that GPA was predicted by the Big Five factor measure ($r = .36$), as well as by several of its lower-level personality trait measures: Dutifulness ($r = .38$), Achievement-Striving ($r = .35$), and Self-Discipline ($r = .22$). Although the magnitude of the correlation for Dutifulness was slightly larger than that of the Conscientiousness factor, those particular findings do not suggest any substantial predictive advantage to using either the Big Five factor measure or its constituent narrow trait measures. However, a different pattern of results emerged with regards to the personality dimensions of Neuroticism and Extraversion. Whereas Chamorro-Premuzic and Furnham found that Big Five Neuroticism was not related to GPA, NEO-PI-R Anxiety and Impulsiveness, two lower-level facet scales of Neuroticism, were significantly negatively correlated with GPA. Similarly, although Big Five Extraversion was unrelated to GPA, its facet scales of Gregariousness and Activity were both negatively correlated with that criterion.

The results of the research conducted by Rothstein et al. (1994) and Chamorro-Premuzic and Furnham (2003a) suggest that, at least in some situations, narrow personality traits can have predictive advantages over the broad Big Five personality factors in the prediction of academic performance. A limitation of that research must be noted, however. In both of those studies, a larger number of narrow traits were compared to a smaller number of broad factors. Thus, there was a greater probability of finding significant but spurious relations between the narrow personality

traits and academic performance, on the basis of chance alone, than between the Big Five personality factors and academic performance.

Paunonen and Ashton (2001a) examined the relative predictive utility of the Big Five factors and more narrow personality traits taking into account the potential problems associated with comparing a smaller number of broad factors to a larger number of narrow traits. They compared one Big Five personality factor with only one of the narrow personality traits presumed to lie below that factor. Specifically, they examined whether the Big Five factors of Conscientiousness and Openness or the more narrow personality traits of need for achievement (a facet of Conscientiousness) and need for understanding (a facet of Openness) were better predictors of final course grade. The two narrow traits were selected from the larger pool of narrow traits based on theoretical considerations.

Paunonen and Ashton (2001a) found that Big Five Conscientiousness was positively correlated with final course grade ($r = .21$). The narrow personality trait of achievement, however, was an even stronger predictor ($r = .26$) of that criterion. Big Five Openness was not associated with academic performance, but the narrow personality trait of understanding, a lower-level facet of Openness, was a significant predictor of that criterion ($r = .23$). These findings provide further support that narrow personality traits can be more accurate predictors of academic achievement in some situations than are the broad Big Five personality factors.

One limitation of exclusively examining simple correlations in establishing the relative predictive utility of the Big Five factors versus narrow personality traits is that the independent contribution of the two categories of variables cannot be determined. It is of interest to know the degree to which narrow personality traits can increase criterion prediction above and beyond that accounted for by the broad Big Five factors.

Paunonen (1998) conducted two empirical studies to investigate the incremental predictive validity of narrow personality traits over the broad Big Five factors for the criterion of academic performance. Narrow personality traits were assessed using the PRF (Study 1) and the JPI (Study 2), and the Big Five factors were assessed using the NEO-FFI. To address the Type I error problems associated with having a larger number of personality traits than Big Five factors, the personality traits were evaluated at a more conservative alpha level than the Big Five factors. In the first stage of a stepwise hierarchical regression analysis, the Big Five personality factors were searched to identify significant predictors of GPA. In the second stage of the analysis, the lower-level personality traits were searched to identify personality traits that could significantly increase the prediction of GPA above and beyond that achieved by the factors at stage one.

In Study 1, Paunonen (1998) found that the Big Five personality factors were able to account for 6% of the variance in GPA, with low Agreeableness being the best predictor overall. The lower-level personality variables of the PRF, however, were able to increase this prediction substantially. Specifically, the PRF scale of Achievement was able to account for an additional 7.2% of the variance in GPA. In Study 2, Paunonen found that the Big Five personality factors were unable to predict GPA. The JPI Responsibility scale, however, was able to account for 5.8% of the variance in academic performance. These two studies suggest that narrow personality traits can increase the prediction of academic performance over the broad Big Five personality factors significantly, accounting for perhaps 5–7% in additional criterion variance.

Paunonen and Ashton (2001b) also investigated the degree to which personality traits can increase the prediction of academic performance over the Big Five personality factors. They com-

pared five narrow personality traits with the Big Five factors. Graduate student judges were used to determine which lower-level personality traits were, in their estimation, the most relevant for predicting academic performance. Two sets of lower-level personality traits were identified. The first set was drawn from the trait scales of the PRF and JPI, and included Achievement, Complexity, Endurance, Organization, and Understanding. The second set was drawn from the facet scales of the NEO-PI-R and included Achievement-Striving, Competence, Dutifulness, Openness to Ideas, and Self-Discipline.

Hierarchical regression analyses were performed to determine the degree to which each of these sets of narrow personality traits was able to predict undergraduate GPA, over and above that predicted by the Big Five factors. Paunonen and Ashton (2001b) found that the five chosen PRF-JPI narrow personality traits were unable to account for any significant variance in GPA over the Big Five personality factors (as assessed by the NEO-PI-R). However, the five chosen NEO-PI-R facet scales were able to account for an additional 6.3% of the variance in GPA beyond that accounted for by the Big Five factors (as assessed by the PRF and JPI). Although the results of this study were somewhat mixed, the findings provide some partial support for the predictive utility of narrow personality traits over broad personality factors in the prediction of academic performance.

In summary, the research we have cited appears to support the conclusion that individual differences in academic performance can be more accurately predicted by narrow personality traits than by broad personality factors. Research comparing the magnitude of the relations has found that the correlations between narrow personality traits and academic performance tend to be stronger overall than are the correlations between the Big Five personality factors and academic performance. Further, studies of incremental validity have demonstrated that narrow traits can often account for statistically significant amounts of variance in academic performance above and beyond that predicted by the Big Five factors.

7. Personality and cognitive ability as predictors of academic performance

One criterion for evaluating the practical utility of research on the relations between personality variables and academic performance is the degree to which that research can improve existing predictor batteries. In particular, given that a large body of research has established measures of cognitive ability as important predictors of academic success (e.g., Ackerman & Heggestad, 1997), it is of interest to determine whether personality variables are able to increase the prediction of academic performance above that predicted by cognitive variables.

Farsides and Woodfield (2003) examined whether Big Five personality factor measures were able to add to general intelligence measures in the prediction of GPA. Undergraduate students completed the NEO-FFI measure of the Big Five personality factors and a measure of general cognitive ability. Hierarchical regression analysis was performed to evaluate how these two measures, along with other potential predictors of academic performance, were able to predict GPA. The measure of general cognitive ability was entered in the first stage of the regression analysis, and was found to account for 4% of the variance in GPA. A measure of class attendance was entered in the second stage of the analysis, and was able to account for an additional 7% of the variance in GPA. The Big Five personality factors were then entered in the third stage of the

regression analysis and were able to account for an additional 5% of the variance in GPA, above and beyond that predicted by general cognitive ability and attendance.

Lounsbury et al. (2003) conducted a test of the incremental predictive utility of personality over cognitive ability, using final course grade as the criterion measure of academic performance. Predictors were the Big Five personality factors, as assessed by the PSI (Lounsbury & Gibson, 1998), and a measure of general intelligence. General intelligence was entered in the first stage of a hierarchical regression analysis and was able to account for 16% of the variance in final course grade. The Big Five personality factors were entered in the second stage of the analysis, and were able to explain an additional 7% of the variance in the criterion. Furnham and Chamorro-Premuzic (2004) used a similar methodology to examine the predictive utility of personality and cognitive ability with regards to the prediction of statistics exam grades. Consistent with the above research, they found that personality traits were able to account for an additional 12% of the variance in statistics exam grades over the 3% explained by general cognitive ability. That research speaks directly and clearly to the practical utility of using personality variables to predict post-secondary students' academic performance, even if measures of cognitive ability are available.

An alternative method of considering personality predictors in comparison to cognitive ability predictors is to evaluate whether they differentially predict distinct components of academic performance. Rothstein et al. (1994) examined the role of personality and cognitive ability in predicting different aspects of academic performance in an MBA program. Personality was assessed using the narrow personality traits of the PRF, and the GMAT subscales were used as indicators of verbal and quantitative ability. Rothstein et al. examined two distinct components of academic performance: performance on exams and other written evaluations, and classroom participation performance. The results suggested that personality and cognitive ability were differentially related to these two aspects of academic performance. Written work was predicted by cognitive ability, but not by personality. On the other hand, personality (specifically, the traits of achievement, dominance, and exhibitionism) was a stronger predictor of classroom performance than was cognitive ability.

8. Current status of the literature

In the preceding sections of this article, we have reviewed the recent empirical literature on the prediction of individual differences in post-secondary academic achievement with Big Five personality dimensions. Two broad approaches to this topic were discussed: one examining the predictive utility of the broad Big Five personality factors that reside at the top of the personality hierarchy, the other examining the predictive utility of more narrow personality traits that reside at lower levels of the personality hierarchy. In the sections that follow, we summarize consistencies in the empirical results. We then note some general limitations of the published research, and make some recommendations for future studies in this area.

8.1. Consistent effects

The Big Five personality factor of Conscientiousness and its constituent narrow personality traits have been found to be especially relevant for the prediction of scholastic achievement.

A meta-analysis of the available correlations found that Conscientiousness is, on the whole, moderately related to academic performance. As such, it appears that being achievement-oriented, self-disciplined, and diligent (among other facets of Conscientiousness), is beneficial for academic success in post-secondary programs.

Academic performance has also been found to be positively associated with Big Five Openness to Experience and some of its narrow personality traits, as well as negatively associated with Big Five Extraversion and some of its constituent personality traits. However, the empirical evidence regarding these two dimensions has been somewhat mixed. Our meta-analyses of the available correlations found only weak overall relations in the literature, suggesting that these relations may only hold in some situations. Few strong relations have been found between academic performance and personality dimensions related to Agreeableness and Neuroticism, suggesting that these dimensions may not be highly relevant as determinants of scholastic achievement.

The patterns of relations between the Big Five personality factors and post-secondary academic performance are similar to those reported in the literature for students in primary and secondary school. One exception, however, concerns the association between Extraversion and scholastic achievement. Although Extraversion has been negatively associated with post-secondary academic performance in some research, it is most often positively associated with academic performance at earlier stages of education (e.g., Entwistle, 1972). It has been suggested that this relation changes from positive to negative as the relaxed social atmosphere of primary school is replaced by the more formal atmosphere of later stages of secondary school and university.

The empirical literature that has examined the relative predictive utility of broad personality factors and narrow personality traits suggests that the narrow traits may be more accurate predictors of academic performance, at least in some situations, than are the broad Big Five personality factors. This conclusion is drawn from data indicating that narrow personality traits are often more strongly correlated with indicators of academic success than are the Big Five factors, as well as data demonstrating that narrow personality traits can often account for additional variance in criterion measures of academic performance beyond that predicted by broad personality factors.

There are logical reasons for the predictive advantage of narrow traits over broad personality factors as reported in the empirical literature. Some theorists have argued that the Big Five personality factors are too broad and general to accurately predict specific behaviors in particular situations (e.g., McAdams, 1992). Each Big Five factor reflects variance that is common to all of its lower-level constituent personality traits. Although this common variance may be useful for understanding general patterns in behavior, it may not contain the specificity required to predict highly circumscribed instances of behavior. Narrow personality traits, on the other hand, contain trait-specific variance, variance that is statistically removed in creating the broad Big Five factors of which they are a part. This trait-specific variance may be predictive of particular instances of behaviors, such as those involved in academic performance.

Several broad theoretical frameworks have been proposed for understanding relations between personality variables and performance. Ackerman's (1996) PPIK theory details how personality traits and interests interact with cognitive ability to influence the development of knowledge (see also Matthews, 1999, cognitive-adaptive theory for a similar model). Recently, Chamorro-Premuzic and Furnham (2006) have proposed a framework for understanding individual differences in both scholastic and occupational achievement. Their model argues that the acquisition of knowledge depends on cognitive ability, self-assessed ability, and personality.

8.2. *Some limitations*

Despite the empirical evidence that narrow personality traits may be more accurate predictors of academic performance than are the Big Five personality factors, many investigators continue to predict scholastic achievement solely on the basis of these five broad factors. That research may therefore underestimate the importance of personality for understanding individual differences in academic performance. Future investigators are strongly encouraged to assess narrow personality traits, in addition to broad personality factors, in order to maximize the prediction of academic achievement.

A more general problem of the recent literature, in our view, concerns its reliance on the Five-Factor Model of personality structure. This strategy excludes other potentially relevant personality trait predictors of academic performance from being examined. Although the Five-Factor Model putatively accounts for the entire domain of personality, some empirical research has identified personality dimensions that do not fall within this five-factor space (e.g., Ashton, Lee, & Son, 2000; Paunonen & Jackson, 2000). In particular, Goff and Ackerman (1992) have proposed that a personality construct called Typical Intellectual Engagement falls beyond the domain of the Big Five. Typical Intellectual Engagement seems especially pertinent in the present context because it refers to individuals' "typical expression of a desire to engage and understand their world, their interest in a wide variety of things, and their preference for a complete understanding of a complex topic or problem" (Goff & Ackerman, 1992, p. 539). Research is needed that examines the extent to which these personality variables that purportedly do not fall within the Five-Factor Model of personality are related to academic performance.

In addition to issues regarding the personality predictors of academic performance, we also see issues with the criterion. Most studies have employed a single overall indicator of scholastic achievement as a criterion measure of academic performance, grade point average being the favorite. However, academic performance is not a unitary construct. Rather, overall indicators of scholastic achievement, such as GPA, typically reflect distinct and arithmetically averaged sub-components of performance, including, but not limited to, multiple-choice exams, essay exams, written papers, oral presentations, class participation, and attendance. The factors influencing levels of achievement across these diverse components of performance might vary as a function of the specific component in question. For example, Rothstein et al. (1994) found that personality traits related to dominance and exhibitionism predicted class participation grades, but not grades on essay examinations. Thus, investigators are strongly encouraged to examine the specific components of academic performance, as well as overall indicators of academic success, in future investigations.

Another problem with the present literature is that conclusions regarding the relations between personality variables and academic performance are often drawn exclusively on the basis of zero-order predictor-criterion correlations. Although such correlations are useful for establishing an initial link between personality and scholastic achievement, they have limited utility. More attention should be given to multiple regression analyses designed to determine the unique predictive ability of each personality variable, in relation to the other personality variables under consideration, in the prediction of academic performance. Further, the predictive utility of personality variables should be routinely examined in relation to non-personality predictors of academic performance, such as measures of motivation and cognitive ability. Path analysis and structural equation modeling could be used to test models regarding these diverse variables and academic achievement.

One more shortcoming we see in the empirical research investigating the relation between personality and post-secondary academic performance is the lack of empirical attention devoted to understanding the processes that might account for the relations. Researchers have speculated on how personality traits can influence academic performance (Chamorro-Premuzic & Furnham, 2005). For example, the positive relation between Conscientiousness and academic performance is commonly interpreted in terms of motivation, and a positive association between Openness to Experience and academic achievement is often thought to be due to intelligence. However, there is very little empirical research examining the viability of these, and other, propositions regarding the processes underlying personality influences on university- and college-level academic performance. Mediational analyses or structural equation modeling are methods that are well suited to address this issue.

9. A template for future studies

Consideration of the existing research on the prediction of post-secondary academic achievement, in terms of both the studies' data and limitations, leads us to propose a template for future research in this area. The proposed research strategy borrows heavily from a technique used by industrial and organizational psychologists before attempting to predict job performance, known as job analysis (Casio & Aguinis, 2005). The template applies not only to the study of personality predictors of scholastic achievement, but more generally to any prediction paradigm.

Step 1. Specify the criterion of interest and its facets. If one is exclusively interested in predicting overall levels of scholastic achievement, then a suitable criterion might be GPA. However, as argued earlier, there may be important predictive advantages associated with examining the facets of academic performance. Thus, one could decompose a broad criterion variable of academic performance into its specific components. Those components might include grades on multiple-choice exams, written essays, oral presentations, and class participation. One might choose to further decompose these indices of academic performance according to academic discipline (e.g., mathematics, history).

Step 2. Identify the variables that are, on rational, theoretical, or empirical grounds, most likely to predict the individual criteria. In the present context, these predictor variables could include measures of personality, cognitive ability, motivation, study habits, and so on. As with the criterion, consideration should be given to facets or subcomponents of the predictors. For example, the personality factor of Conscientiousness can be broken down into more narrow personality trait measures, such as Self-Discipline and Orderliness. Similarly, cognitive ability can be decomposed into distinct components of verbal ability and quantitative ability.

Step 3. Formulate hypotheses concerning the relations between the specific predictor components and the specific criterion components, consulting the empirical literature when possible. By decomposing both the predictor and criterion variables, as described in the first two steps, researchers can assemble a series of very circumscribed predictions regarding the unique set of predictor-criterion relations. With regard to the domain of academic achievement, for example, one might expect that the talkativeness facet of Extraversion is positively correlated with class

participation grades in a course, but that the gregariousness facet of the same factor is negatively correlated with exam grades.

Step 4. Evaluate the predictor-criterion associations using multivariate techniques. Initial analyses will first involve an examination of the zero-order correlations between the predictor variables and the components of the criterion. This should then be followed by regression analyses examining the unique predictive utility of specific predictor variables, as well as the incremental predictive validity of specific predictor variables, or groups of variables, over other predictors. Structural equation modeling can be used to test process models regarding predictor-criterion relations and the influence of possible mediators, moderators, or suppressor variables.

10. Conclusions

Interest in predictors of academic performance is evident in over a century of research in psychology. The accurate prediction of individual differences in academic performance has important implications for education, and not just at the post-secondary level. First, knowledge of the factors influencing academic achievement allows one to predict those who will, and those who will not, do well in an academic program. Second, understanding the relations among ability, motivation, and personality in the prediction of distinct components of academic performance can be used to direct students towards disciplines and programs in which they are most likely to succeed. Third, knowledge of the factors influencing academic achievement enables educators to develop fair academic curricula, those that can compensate for known weaknesses that a student might carry into the classroom, and those that can nurture a student's strengths. Although ability or intelligence has been a natural choice for the prediction of academic achievement, recent research has shown that personality variables have much to offer. As shown in this review, personality variables, specifically the Big Five factors and facets, have been strongly implicated in scholastic success.

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