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Brief report

Aptitude is not enough: How personality and behavior predict academic performance [☆]

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Abstract

The study investigated the incremental validity of Big Five personality traits for predicting academic criteria (college GPA, course performance) while controlling for academic ability (SAT). Results showed that conscientiousness incrementally predicted each criterion over SAT. Results also showed that behavior (attendance) incrementally predicted GPA and course performance and it mediated the relationship between conscientiousness and both academic criteria. Personality measures are promising predictors of academic outcomes and they may have usefulness in admissions and student development.

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1. Introduction

There is a history of research regarding various personality constructs as they related to academic performance (Lavin, 1965). Some recent studies reflect an increasing interest in the validity of measures of normal personality, particularly the Big Five traits, (i.e., openness to experience, conscientiousness, extraversion, agree-

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28 ableness, and neuroticism). Recent results consistently showed positive bivariate
29 correlations between conscientiousness and academic criteria; with a few exceptions,
30 correlations with openness, neuroticism, agreeableness and extraversion have been
31 generally nonsignificant (Busato, Prins, Elshout, & Hamaker, 2000; Chamorro-Prem-
32 uzic & Furnham, 2003a, 2003b; Gray & Watson, 2002; Oswald, Schmitt, Kim,
33 Ramsay, & Gillespie, 2004; Wolfe & Johnson, 1995).

34 To be most useful, it is important to assess the incremental validity of personality
35 traits over existing predictors such as the Scholastic Aptitude Test (SAT) and/or high
36 school grade point average (HSGPA). It is also important to include all Big Five
37 traits because they occur together in individuals, they are intercorrelated, and have
38 shown different patterns of validity when assessed together than when correlated
39 individually (Chamorro-Premuzic & Furnham, 2003a, 2003b; Farsides & Woodfield,
40 2003; Oswald et al., 2004). Results varied across the few studies that assessed all five
41 traits and controlled for academic ability. In a British university, openness predicted
42 academic performance after controlling for IQ (Farsides & Woodfield). In two US
43 universities, conscientiousness predicted college GPA positively after controlling for
44 HSGPA and SAT (Wolfe & Johnson, 1995), and both conscientiousness (positively)
45 and extraversion (negatively) predicted GPA over a composite of SAT/ACT score
46 (Oswald et al.).

47 Drawing conclusions about validity of the Big Five is complicated not only by
48 variations in results, but also by varied methods of operationalizing academic perfor-
49 mance (i.e., GPA, performance in single courses or tests), international differences in
50 defining academic performance (e.g., year end grades, study points, and yearly essay
51 exams) and widely varying intervals between measuring personality and academic
52 performance (from concurrently to three years apart). Therefore, it is important to
53 continue to accrue evidence in a variety of situations.

54 Improving the prediction of academic performance with standardized, noncogni-
55 tive measures such as personality is desirable because such measures can complement
56 commonly used predictors without sharing their limitations such as a lack of compa-
57 rability (HSGPA), adverse impact for gender and race (SAT) and variability in how
58 information is used (letters of recommendation, personal essays) (Oswald et al.,
59 2004). However, personality must manifest itself through behavior (a mediator) to
60 affect performance. To build adequate theories and to aid applications, it is impor-
61 tant to understand those behavioral mechanisms. Class attendance is one of those
62 behaviors. In previous studies, attendance was treated as a criterion and a predictor.
63 Oswald et al. found that extraversion correlated positively and conscientiousness cor-
64 related negatively with self-reported absence. In the Farsides and Woodfield (2003)
65 study, both conscientiousness and agreeableness were significantly negatively corre-
66 lated with tutor-recorded absence, and as a predictor, absence contributed to predic-
67 tion of final grades over IQ and Big Five traits. Mediation effects were not examined
68 and excused absences were not controlled in either case.

69 The following goals guided the present study. First, I investigated the incremental
70 validity of Big Five traits for three academic outcomes, one self-reported (college
71 GPA) and two objectively measured (course performance and class attendance) over
72 academic ability (SAT). Second, I tested a behavioral mediator (attendance) between

73 personality characteristics and academic performance. The present study adds to the
74 evidence of the validity of Big Five traits, and advances understanding by assessing a
75 behavioral mediator between personality and performance.
76

77 2. Method

78 2.1. Participants and procedure

79
80 Participants were 300 full-time undergraduates recruited from the author's
81 General Psychology classes and other courses during the spring semesters over three
82 years (233 women, 67 men, age $M = 19.48$, $SD = 2.13$, 140 freshmen, 77 sophomores,
83 50 juniors, 33 seniors, 271 whites, 4 African-Americans, 12 Hispanics, 1 Asian, 1
84 Native American, and 11 "other"). Participants received course credit and could opt
85 to do an alternate assignment.
86
87

88 2.2. Measures

89
90 The 60-item NEO Five-Factor Inventory, Form S (Costa & McCrae, 1992)
91 measured Big Five traits. They reported Cronbach's alphas of .86, .77, .73, .68, and .81
92 for neuroticism, extraversion, openness, agreeableness, and conscientiousness, respec-
93 tively. Total SAT score measured academic ability because it was available for most
94 participants, it is an established predictor of college GPA, it is highly correlated with
95 IQ (Frey & Determan, 2004), and the current SAT overlaps considerably with, and
96 predicts about as well as HSGPA (Bridgeman, McCamley-Jenkins, & Ervin, 2000).
97

98 College GPA and SAT scores were self-reported. Respondents were given code
99 numbers on questionnaires to insure anonymity, were encouraged to be as accurate
100 as possible in recalling scores, and were asked to grant permission for researchers to
101 check university records to verify accuracy, to reduce motivation toward socially
102 desirable responding (Sheppherd, 1993).

103 Attendance was taken at each class. Absences with documented reasons (e.g., a
104 doctor's note) were not counted, thereby creating a measure that was relatively free
105 of involuntary absence (Hackett & Guion, 1985) and providing a more powerful test
106 of the influence of personality rather than situational factors. Attendance was highly
107 skewed and varied somewhat between the three cohorts, therefore, the log(10) trans-
108 formation was used in analyses. Attendance was measured directly for course perfor-
109 mance, and serves as an indicator of attendance when GPA is the criterion, with the
110 rationale that attendance in one course is likely to be correlated with attendance in
111 courses generally.

112 Course performance was operationalized as the percentage of points earned (75%
113 from three objective exams, the remainder from several written assignments and
114 exercises). Data were collected near the beginning of the semester; therefore, course
115 performance was not confounded with GPA. Freshmen had only one semester to
116 acquire their GPAs. However, a comparison between freshmen and upperclassmen
117 showed no significant differences in GPA ($t(287) = -1.12$, $p > .05$), therefore the

118 groups were pooled for subsequent analyses. To avoid experimenter bias data were
 119 tracked by code numbers, personality measures were scored by research assistants,
 120 and were not merged with course data until the course ended.

121

122

123 3. Results

124

125 Table 1 presents descriptive statistics and bivariate correlations. Patterns of
 126 correlations are similar to those found in other studies (Busato et al., 2000; Costa &
 127 McCrae, 1992; Farsides & Woodfield, 2003; Gray & Watson, 2002; Wolfe & John-
 128 son, 1995), and indicate acceptable levels of discriminant validity among the
 129 predictors.

130 Two multivariate analysis strategies were employed. First, hierarchical regression
 131 analyses were conducted to identify significant predictors and to assess mediation
 132 effects for attendance. Second, path models suggested by the multiple regression
 133 results were estimated. Hierarchical regression analyses including attendance and
 134 course performance were based on a subset of participants ($N = 186$). In each analy-
 135 sis, power exceeded .95.

136 Following Baron and Kenny's (1986) systematic mediation assessment, atten-
 137 dance was regressed on SAT and the Big Five. Second, GPA was regressed on the
 138 same six predictors. Third, attendance was added to the predictor set. Examination of
 139 significance levels and confidence intervals indicated that conscientiousness predicted
 140 attendance, and that SAT, conscientiousness, and attendance predicted GPA. Other
 141 traits were not predictive. A comparison of the change in beta weights in the second
 142 and third steps indicated that attendance mediated the conscientiousness-GPA rela-
 143 tionship, and it did not mediate relationships between SAT or other traits and GPA.
 144 The same process was used with course performance as the criterion, with similar
 145 results.

146 Trimmed path models suggested by the regression results were estimated using
 147 AMOS 4.0 (Arbuckle, 1999). The Sobel test (MacKinnon, Warsi, & Dwyer, 1995) was
 148 used to test indirect effects. Fig. 1 presents the standardized regression coefficients for
 149

150

Table 1

151 Descriptive statistics and correlations of personality and academic performance variables

152 Variable (N)	M	SD	SAT	Attend	Course	N	E	O	A	C
153 GPA (289)	3.14	.42	28*	37*	53*	-.06	00	-.02	11	35*
154 SAT (271)	1068	119	—	-.01	25*	-.02	02	15*	-.06	-.05
155 Attendance (log) (186)	-.0048	-.0047	—	—	54*	-.16*	01	05	22*	34*
156 Course performance (186)	80.13	9.86	—	—	—	-.11	-.06	11	17*	31*
157 Neuroticism (N) (299)	21.8	8.20	—	—	—	—	-.35*	-.02	-.22*	-.29*
158 Extroversion (E) (299)	32.27	5.88	—	—	—	—	—	01	21*	22*
159 Openness (O) (298)	26.68	5.55	—	—	—	—	—	—	07	-.06
159 Agreeableness (A) (298)	32.49	5.69	—	—	—	—	—	—	—	30*
160 Conscientiousness (C) (299)	32.88	6.65	—	—	—	—	—	—	—	—

161 Note. Decimals have been omitted from correlations.

162 * $p < .05$.

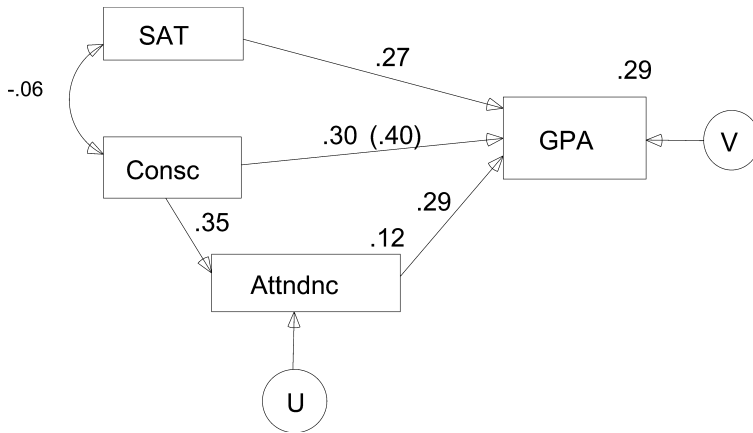


Fig. 1. Standardized parameter estimates for the trimmed model of the relationship between SAT, Conscientiousness, attendance, and GPA. The unmediated effect is shown in parentheses. Consc, conscientiousness; attndnc, course attendance.

the trimmed model with GPA as the criterion. Conscientiousness and SAT had direct effects on GPA, and attendance partly mediated the relationship between conscientiousness and GPA. The standardized indirect effect of conscientiousness on GPA through attendance was 0.09 ($t = 2.15, p < .05$). The model fit the data well, $\chi^2(1, N = 186) = .02, ns$ and $RMSEA = .00$.

A trimmed model with course performance as the criterion was also estimated. The results were similar to those found with GPA. SAT ($\beta = .27, p < .05$) and conscientiousness ($\beta = .17, p < .05$) had direct effects on course performance, and attendance partly mediated the relationship between conscientiousness and course performance. The path from conscientiousness to attendance was significant ($\beta = .35, p < .05$) as was the path from attendance to course performance ($\beta = .54, p < .05$). The standardized indirect effect of conscientiousness on course performance was 0.17 ($t = 4.18, p < .05$). The model fit the data well $\chi^2(1, N = 168) = .02, ns$ and $RMSEA = .00$.

4. Discussion

The present study adds to the limited domain of research that assessed the incremental validity of Big Five traits over academic ability. Conscientiousness predicted three academic outcomes (GPA, course performance, and attendance), incrementally over academic ability and other traits. In practical terms, a one standard deviation increase in conscientiousness translated into a 0.11 increase in GPA (on a 0–4.0 scale) and a 2% increase in course performance, even after controlling for SAT. The results contribute new knowledge which can aid theory development and practice by showing how conscientiousness operates through a theoretically relevant behavior, attendance. In future work it would be useful to assess additional potential behavioral mediators such as study habits and completing assignments.

208 The present study found that traits other than conscientiousness did not provide
209 incremental validity for academic outcomes. Because colleges and universities are
210 interested in recruiting and selecting students who will be involved in campus life
211 beyond academics, such as participation in student organizations, community ser-
212 vice, leadership, and athletics (e.g., Conard, 2004; Oswald et al., 2004) it is important
213 to broaden the types of criteria studied before drawing conclusions about the efficacy
214 of other traits. In future work, meta-analysis and/or large scale predictive validity
215 studies across colleges and universities would help to parse differences that may
216 account for variation in results across studies (e.g., different definitions of academic
217 performance and variables controlled, college selectivity).

218 GPA and SAT were self-reported and their accuracy is not known for the present
219 data. However, several studies have shown high reliability (from .84 to .97) between
220 self-reported GPA and SAT and university records (Cassady, 2001; Gray & Watson,
221 2002; Kirk & Sereda, 1969). Although steps were taken to encourage accurate report-
222 ing, discrepancies, particularly nonlinear discrepancies, could mitigate the obtained
223 validities.

224 HSGPA is also a known predictor of college GPA, although its validity has
225 considerable overlap with SAT. Given that similar traits and behaviors may also
226 underlie HSGPA, future research could assess incremental validity with HSGPA
227 included. HSGPA was not available in the present study.

228

229 *4.1. Implications*

230

231 Conscientiousness provided incremental validity in predicting academic
232 performance and manifested itself through behavior, which suggests that personality
233 measurement may have practical applications in college admissions, and perhaps for
234 student development. However, important issues must be addressed. One issue is
235 whether the validities would change with applicants as respondents, whose motiva-
236 tions may tend toward socially desirable responding rather than accuracy, and who
237 may even be professionally coached. Encouragingly, studies with job performance as
238 the criterion indicate that although applicants did tend to inflate their scores, such
239 inflation did not reduce the validity of personality to any great degree (Barrick &
240 Mount, 1996; Ones, Viswesvaran, & Reiss, 1996). Further, Schmitt et al. (2003)
241 designed procedures that discouraged such socially desirable responding. It may also
242 be desirable to develop personality measures that are resistant to it.

243 A second issue is that conscientiousness was only moderately consistent over time
244 in 18–22 year olds, (Roberts & DelVecchio, 2000) and is higher in older adults
245 (McCrae & Costa, 1994; McCrae et al., 1999). It is not yet clear whether these differ-
246 ences are due to maturation or in response to environmental circumstances, or both.
247 It would be undesirable to screen out individuals who might become more conscien-
248 tious (and perhaps better performers), with time. It could be less problematic to use
249 personality as a compensatory measure (e.g., high scores on conscientiousness might
250 compensate for lower SAT scores, with which they are not correlated).

251 Another potential application could be for student development (e.g., low scores
252 on conscientiousness might serve to identify students who are likely to need

253 interventions to succeed). The finding that conscientiousness operates through
 254 behavior is valuable here. At present there is doubt about the possibility of changing
 255 one's personality traits (McCrae & Costa, 1994; Roberts & DelVecchio, 2000), but
 256 there is ample evidence that behaviors can be changed. The present study identified
 257 one behavior that mediated the relationship between conscientiousness and academic
 258 performance, and there are likely to be others. Identifying that set of behaviors would
 259 establish an empirical foundation for the development and evaluation of interven-
 260 tions designed to improve academic performance.

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