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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.

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

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

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

Improving the prediction of academic performance with standardized, noncognitive measures such as personality is desirable because such measures can complement commonly used predictors without sharing their limitations such as a lack of comparability (HSGPA), adverse impact for gender and race (SAT) and variability in how information is used (letters of recommendation, personal essays) (Oswald et al., 2004). However, personality must manifest itself through behavior (a mediator) to affect performance. To build adequate theories and to aid applications, it is important to understand those behavioral mechanisms. Class attendance is one of those behaviors. In previous studies, attendance was treated as a criterion and a predictor. Oswald et al. found that extraversion correlated positively and conscientiousness correlated negatively with self-reported absence. In the Farsides and Woodfield (2003) study, both conscientiousness and agreeableness were significantly negatively correlated with tutor-recorded absence, and as a predictor, absence contributed to prediction of final grades over IQ and Big Five traits. Mediation effects were not examined and excused absences were not controlled in either case.

The following goals guided the present study. First, I investigated the incremental validity of Big Five traits for three academic outcomes, one self-reported (college GPA) and two objectively measured (course performance and class attendance) over academic ability (SAT). Second, I tested a behavioral mediator (attendance) between
personality characteristics and academic performance. The present study adds to the evidence of the validity of Big Five traits, and advances understanding by assessing a behavioral mediator between personality and performance.

2. Method

2.1. Participants and procedure

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

2.2. Measures

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

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

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

Course performance was operationalized as the percentage of points earned (75% from three objective exams, the remainder from several written assignments and exercises). Data were collected near the beginning of the semester; therefore, course performance was not confounded with GPA. Freshmen had only one semester to acquire their GPAs. However, a comparison between freshmen and upperclassmen showed no significant differences in GPA ($t(287) = -1.12$, $p > .05$), therefore the
groups were pooled for subsequent analyses. To avoid experimenter bias data were tracked by code numbers, personality measures were scored by research assistants, and were not merged with course data until the course ended.

3. Results

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

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

Following Baron and Kenny’s (1986) systematic mediation assessment, attendance was regressed on SAT and the Big Five. Second, GPA was regressed on the same six predictors. Third, attendance was added to the predictor set. Examination of significance levels and confidence intervals indicated that conscientiousness predicted attendance, and that SAT, conscientiousness, and attendance predicted GPA. Other traits were not predictive. A comparison of the change in beta weights in the second and third steps indicated that attendance mediated the conscientiousness–GPA relationship, and it did not mediate relationships between SAT or other traits and GPA. The same process was used with course performance as the criterion, with similar results.

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

Table 1

<table>
<thead>
<tr>
<th>Variable (N)</th>
<th>M</th>
<th>SD</th>
<th>SAT</th>
<th>Attend</th>
<th>Course</th>
<th>N</th>
<th>E</th>
<th>O</th>
<th>A</th>
<th>C</th>
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</thead>
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<tr>
<td>GPA (289)</td>
<td>3.14</td>
<td>.42</td>
<td>28*</td>
<td>37*</td>
<td>53*</td>
<td>-06</td>
<td>00</td>
<td>-02</td>
<td>11</td>
<td>35*</td>
</tr>
<tr>
<td>SAT (271)</td>
<td>1068</td>
<td>119</td>
<td>—</td>
<td>—</td>
<td>25*</td>
<td>-02</td>
<td>02</td>
<td>15*</td>
<td>-06</td>
<td>-05</td>
</tr>
<tr>
<td>Attendance (log) (186)</td>
<td>-.0048</td>
<td>-.0047</td>
<td>—</td>
<td>—</td>
<td>54*</td>
<td>-16*</td>
<td>01</td>
<td>05</td>
<td>22*</td>
<td>34*</td>
</tr>
<tr>
<td>Course performance (186)</td>
<td>80.13</td>
<td>9.86</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>-11</td>
<td>06</td>
<td>11</td>
<td>17*</td>
<td>31*</td>
</tr>
<tr>
<td>Neuroticism (N) (299)</td>
<td>21.8</td>
<td>8.20</td>
<td>—</td>
<td>—</td>
<td>-35*</td>
<td>-02</td>
<td>-22*</td>
<td>-29*</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Extroversion (E) (299)</td>
<td>32.27</td>
<td>5.88</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>01</td>
<td>21*</td>
<td>22*</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Openness (O) (298)</td>
<td>26.68</td>
<td>5.55</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>07</td>
<td>-06</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Agreeableness (A) (298)</td>
<td>32.49</td>
<td>5.69</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>30*</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Conscientiousness (C) (299)</td>
<td>32.88</td>
<td>6.65</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

* p < .05.

Note. Decimals have been omitted from correlations.
the trimmed model with GPA as the criterion. Conscientiousness and SAT had direct
effects on GPA, and attendance partly mediated the relationship between conscien-
tiousness 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 conscien-
tiousness ($\beta = .17, p < .05$) had direct effects on course performance, and attend-
ance 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 incre-
mental 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 show-
ing how conscientiousness operates through a theoretically relevant behavior, atten-
dance. In future work it would be useful to assess additional potential behavioral
mediators such as study habits and completing assignments.
The present study found that traits other than conscientiousness did not provide incremental validity for academic outcomes. Because colleges and universities are interested in recruiting and selecting students who will be involved in campus life beyond academics, such as participation in student organizations, community service, leadership, and athletics (e.g., Conard, 2004; Oswald et al., 2004) it is important to broaden the types of criteria studied before drawing conclusions about the efficacy of other traits. In future work, meta-analysis and/or large scale predictive validity studies across colleges and universities would help to parse differences that may account for variation in results across studies (e.g., different definitions of academic performance and variables controlled, college selectivity).

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

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

4.1. Implications

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

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

Another potential application could be for student development (e.g., low scores on conscientiousness might serve to identify students who are likely to need
interventions to succeed). The finding that conscientiousness operates through behavior is valuable here. At present there is doubt about the possibility of changing one’s personality traits (McCrae & Costa, 1994; Roberts & DelVecchio, 2000), but there is ample evidence that behaviors can be changed. The present study identified one behavior that mediated the relationship between conscientiousness and academic performance, and there are likely to be others. Identifying that set of behaviors would establish an empirical foundation for the development and evaluation of interventions designed to improve academic performance.

References


