



Beyond Cognitive Ability: Using Personality to Predict Study Retention

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Abstract

This study examined the relationship between personality and student retention. We found that conscientiousness predicted student retention across three years and eventual graduation rates. Researchers and practitioners can use these findings to develop personality-based interventions to increase student retention and reduce costs for colleges and universities.

Introduction

Personality is an important predictor of academic outcomes (Dilchert, 2007; Dilchert & Ones, 2009; Kuncel et al., 2005; Poropat, 2009), yet researchers continue to ignore the role of personality in university admissions testing compared to other ability- and achievement-related measures (Kuncel, Ones, & Sackett, 2010). Although common admission standards such as SAT scores tell a university what a student “can do,” personality helps the university understand what a student “will do” in most situations and across time. Specifically, personality is defined as predispositions to behave in certain ways and how others would describe that behavior (R. Hogan & J. Hogan, 2007; Montgomery, 2006).

Most personality and academic outcome research focuses on personality’s ability to predict student performance, such as grades or GPA (Kuncel et al., 2005; Lievens, Ones, & Dilchert, 2009; Poropat, 2009). Kuncel and colleagues (2005) reviewed the literature on self-report personality measures and college grades and found correlations in the $r = .30$ range for conscientiousness and socialization. Connelly and Ones (2010) also found strong relationships between conscientiousness and academic performance. Additionally, Poropat (2009) conducted a meta-analysis on the relationships between the Five-Factor Model (FFM) of personality and academic performance. Poropat found that agreeableness, conscientiousness, and openness had significant relationships with academic performance. Results also revealed that conscientiousness predicted academic performance even when controlling for cognitive ability. Thus, the relationship of conscientiousness with academic performance was independent of intelligence. Lievens et al. (2009) collected longitudinal data from medical students including FFM personality scores and GPA across several years. They found that personality was significantly related to academic performance and became more predictive during the later years of medical school when performance was more application-based rather than knowledge acquisition-based.

Beyond academic performance, personality has been shown to be related to other academic outcomes, such as student retention (Alarcon & Edwards, 2013; Chen, 1996; Lievens, Coetsier, De Fruyt, & De Maeseneer, 2002; Tross, Harper, Osher, & Kneidinger, 2000; Welter, 2002). As with any organization, it is critical for colleges and universities to identify and understand predictors of retention because (a) retention is a key institutional performance indicator and (b) turnover is costly. Overall, only 60% of first-time, full time undergraduate students complete their degrees (U.S. Department of Education, 2016). From an organizational perspective, this amount of student turnover leads to a large loss in revenue for the college or university. In 2004, it was estimated that freshman attrition cost \$10.9 million in lost revenue for a single university (Montgomery, 2006). Just as it is costlier

for organizations to recruit and train new employees than retain current employees, it is more expensive for a university to recruit and admit new students than to retain existing students (Braunstein, Lesser, & Pescatrice, 2006).

By predicting student retention, colleges and universities can select students who will likely complete their degree and develop programs to help students remain in school, reducing organizational costs. Given personality's relationship with academic outcomes and the importance of student retention, this paper examines how universities and colleges can retain students using personality assessments.

Personality and Student Retention

In 1975, Tinto put forth a model of student retention that described retention as a function of the student and social system. Although Tinto included personality in his model, many researchers focused on characteristics of the social and academic systems to explain student retention (Welter, 2002). Interest in personality's relationship with student retention increased in the 1990's (Chen, 1996; Schurr, Ruble, Palomba, & Pickerill, 1997). Chen (1996) demonstrated that personality characteristics influenced students' intentions to leave college more than other traditional variables, such as academic performance, precollege experience, and family encouragement. Specifically, when examining freshman attrition, she found that those who persisted were more perfectionistic and rule-conscious (FFM conscientiousness) compared to students who dropped out. Conversely, students who dropped out were described as flexible and experimenting (FFM openness).

Tross et al.'s (2000) study examined conscientiousness, high school GPA, and SAT scores as predictors of academic retention. They found a direct relationship between conscientiousness and student retention. Further, Lievens et al. (2002) studied the influence of personality on academic performance and retention using a large sample of freshman medical students. They showed that students high on extraversion and low on conscientiousness were more likely to drop out of medical school. Furthermore, Hawkins (2005) also studied medical student retention and found that low anxiety, high independence, and high extraversion were related to higher graduation rates.

Hogan Personality Inventory (HPI) and Student Retention

Montgomery (2006) collected HPI data from 1170 freshmen across three years at a science and technology-based university. He found significant relationships between student retention and HPI scores. Specifically, Prudence (i.e., conscientiousness) was positively related to retention and Sociability (i.e., extraversion) was negatively related to retention (Montgomery, 2006). These findings suggest that students who are organized, detail-oriented, and conscientious were more likely to remain in college and graduate. Further, those students who are highly sociable, impulsive and desire constant interaction with others were less likely to remain in college and graduate. For example, highly sociable students may spend less time studying and completing tasks and more time at social events.

Hypotheses

The two goals of the current study were to (a) determine if certain personality characteristics predict student retention and (b) replicate the previous research using the HPI to predict student retention. Although some variation exists, certain personality characteristics, such as conscientiousness, have been consistently linked with student retention (Chen, 1996; Lievens et al., 2002; Tross et al., 2000). Thus, we hypothesized that Prudence (HPI's conscientiousness scale) would predict student retention across each of the four years (Hypothesis 1). In particular, students high in Prudence would be more likely to remain at the university and graduate compared to students low in Prudence.

To replicate previous findings using the HPI, we hypothesized Sociability (Hypothesis 2a) and Prudence (Hypothesis 2b) would predict retention for students enrolled in the college of Engineering and Natural Sciences (ENS). Because previous research examined the HPI and student retention at a science and technology university, we believed narrowing the current sample to the ENS college would ensure the comparability of the two samples. Specifically, we hypothesized that students low in Sociability and high in Prudence would be more likely to remain at the university and graduate compared to students high in Sociability and low in Prudence.

Method

Participants

A sample of 788 freshmen students at a small, private Midwestern university completed the personality measure during the beginning of their freshman year. We collected data from three freshman cohorts over a three-year period. The sample was 52% female and 70% Caucasian. We obtained archival data from the university for each student regarding the academic terms they completed, whether or not they earned a degree from the university, and the college in which they were enrolled. The archival data provided approximately four years of data for each student.

Measures

The Hogan Personality Inventory (HPI) was the first measure of normal personality based on the FFM and designed to predict occupational performance (R. Hogan & J. Hogan, 2007). The HPI contains 206 true/false items and reads at a 4th grade level. The HPI consists of seven primary scales: Adjustment (FFM Emotional Stability), Ambition (FFM Extraversion [in part]), Sociability (FFM Extraversion [in part]), Interpersonal Sensitivity (FFM Agreeableness), Prudence (FFM Conscientiousness), Inquisitive (FFM Openness [in part]), and Learning Approach (FFM Openness [in part]).

We calculated a retention variable based on the number of terms each student completed. For example, if they completed the fall and spring semester of their first year, the Year 1 Retention variable was coded as 1. In total, four retention variables were created indicating completion of the freshmen, sophomore, junior and senior years. Completion of the fourth year (senior year) was additionally restricted to only those students who graduated from the university earning a bachelor's degree.

Results

Hypothesis Testing

Hypothesis 1 stated that Prudence would predict student retention across each of the four years (completion of students' freshman, sophomore, junior, and senior years). To test this hypothesis, we conducted linear regressions, one for each year of retention. Consistent with previous research, the results indicated that the HPI Prudence scale significantly predicted sophomore retention, $F(1, 773) = 3.98, p = .046$, junior retention, $F(1, 773) = 11.03, p = .001$, and senior retention, $F(1, 773) = 18.06, p < .001$ (see Table 1). Overall, Hypothesis 1 is moderately supported, as students with higher Prudence were more likely to complete their sophomore, junior and senior years.

In addition, we found that students who remained at the university during their senior year and graduated ($M = 36.45$) had significantly higher Prudence scores compared to students who left the university during their senior year and did not graduate ($M = 28.34$), $t(523.70) = 4.18, p < .001$ (Figure 1). Furthermore, we categorized students as being high or low Prudence according to their HPI Prudence scores. Specifically, we classified students with percentile scores less than or equal to 35 as being low Prudence and those with percentile scores above 35 as high Prudence (R. Hogan & J. Hogan, 2007). Students high on the Prudence scale were nearly twice as likely to remain at the university and ultimately graduate compared to those low on the Prudence scale, odds ratio = 1.85 (see Table 2).

Next, we investigated the relationship between personality and retention for the ENS college to examine if Montgomery's (2006) results could be replicated. A majority of students at the university Montgomery studied earn a degree in engineering or science; thus, to examine these hypotheses, we restricted the current sample to include only those students enrolled in the ENS college. Additionally, we determined that both studies defined student retention using the same variables.

To test Hypothesis 2a, we conducted separate linear regressions for each year of retention. Contrary to Montgomery's (2006) findings, we found that the HPI Sociability scale did not predict freshman, $F(1, 222) = .004, p = .95, n.s.$, sophomore, $F(1, 222) = .43, p = .51, n.s.$, junior, $F(1, 222) = .01, p = .92, n.s.$, nor senior retention, $F(1, 222) = .03, p = .87, n.s.$ Thus, Hypothesis 2a was not supported. However, although non-significant, Sociability was negatively related to sophomore, junior, and senior year retention (r 's ranging from $-.01$ to $-.04$), which is consistent with the trends found in the previous study's findings (see Table 3).

Hypothesis 2b stated that Prudence would predict retention for students in the ENS college. Again, contrary to previous findings, the HPI Prudence scale did not predict freshman, $F(1, 220) = 3.50, p = .06, n.s.$, sophomore, $F(1, 220) = 3.70, p = .06, n.s.$, junior, $F(1, 220) = 1.68, p = .20, n.s.$, or senior retention, $F(1, 220) = 2.96, p = .09, n.s.$ Thus, Hypothesis 2b was not supported.

Exploratory Analyses

In addition to testing our hypotheses, we explored overall trends for the relationships between all HPI scales and student retention. We present these correlations in Table 3. Across the three cohorts, Prudence (r 's ranging from $.07$ to $.15$) and Adjustment (r 's ranging from $.07$ to $.10$) were significantly related to second, third and fourth year retention.

Further, Ambition was significantly related to third and fourth year retention (r 's = .09). Lastly, Learning Approach was significantly related to fourth year retention (r = .07).

Discussion

Consistent with previous research, the current study's findings suggest that personality affects student retention (Chen, 1996; Hawkins, 2005; Lievens et al., 2002; Tross et al., 2000; Welter, 2002). Specifically, we found that students high in Prudence were more likely to remain at the university and ultimately graduate compared to students low in Prudence. This finding supports previous personality and retention research, which found conscientiousness to predict academic persistence (Chen, 1996; Lievens et al., 2002; Tross et al., 2000).

These results suggest that students who remained at the university and earned a degree were organized, detail-oriented, and responsible. These students likely used time management skills to help complete assignments and study for tests on time. Individuals high on Prudence tend to hold high standards for their own performance and set priorities to meet these standards. As such, it seems intuitive that individuals who possess these characteristics would be more likely to remain in college and graduate.

A secondary goal of this study was to replicate previous research examining retention and the HPI. To compare Montgomery's (2006) findings to the current study, we limited the current sample to only those students in the ENS college (i.e., engineering and science majors). Montgomery found that students high in Prudence and low in Sociability were more likely to persist and graduate. However, this study did not replicate those findings. For our sample, neither Sociability nor Prudence predicted retention for any year. Although we restricted our sample for these analyses to more closely align with Montgomery's sample, there may still be marked differences between the science and technology university and the university from which our sample was obtained.

Exploratory Analyses

Past researchers examined Sociability and Prudence as predictors of retention (i.e., extraversion, conscientiousness; Chen, 1996; Lievens et al., 2002; Montgomery, 2006; Tross et al., 2000). Given that other scales, such as Adjustment (FFM Emotional Stability), may be important for student retention, we conducted exploratory analyses examining all of the HPI scales in relation to student retention (see Table 3). Results indicated that Adjustment was significantly positively related to three years of retention and graduation. These results suggest that students who remained enrolled at the university and graduated tend to be balanced and calm under stress and pressure. Given the stress a student experiences during college to balance a social life with school demands, it makes sense that highly adjusted students are more likely to graduate.

Furthermore, results indicated that Ambition (FFM Extraversion [in part]) was significantly positively related to junior and senior year retention. This finding suggests that students who completed their junior and senior year were likely driven, energetic, goal-oriented, and focused on achieving results and success. Within the university context, greater drive may be important for completing the last two years when classes are more difficult and students

have greater demands (e.g., applying for jobs or graduate school). Given these results, future studies should examine the predictive relationships between a greater number of personality dimensions and student retention. Many studies have demonstrated the importance of conscientiousness. However, research examining other scales would be valuable and address a gap in the literature.

Practical Implications: Personality-Based Interventions

Certain personality characteristics (i.e., conscientiousness; Chen, 1996; Lievens et al., 2002; Montgomery, 2006; Tross et al., 2000) consistently predict whether students remain enrolled in college. As a result, researchers suggest using personality assessment results to design advising and support programs for students at risk of dropping out (Lievens et al., 2002). Personality-based retention efforts may offer many benefits including cost reduction due to decreased student turnover. Furthermore, assessment feedback can help students leverage their strengths.

For example, given the high rate of freshman turnover, many colleges and universities have implemented first-year experience programs designed to increase freshman retention (Braunstein et al., 2006; Cox, Schmitt, Bobrowski, & Graham, 2005). Many of these programs focus on introducing students to the university, providing a sense of community, and discussing college-level work expectations. The current study's results may provide ways to further structure these programs given the personality of the freshman class. For example, if the incoming class is low on Prudence, the program should focus on time management skills, study strategies, and organization skills. Again, it would be useful to examine the predictive validity of personality at more specific levels (within colleges, departments, etc.) to increase the effectiveness of the personality-based interventions.

As a result of the Montgomery (2006) study, the respective university created various intervention programs to help those students low in Prudence and high in Sociability graduate from college by capitalizing on their strengths. Specifically, researchers created support messages based on students' personality strengths and regularly sent them to pre-selected freshman groups. For example, students identified as "at risk" due to their low Prudence received emails about upcoming study skills seminars. These support messages kept freshmen informed about available resources and attempted to spark constructive conversations about their college experience with advisors and student support staff (Montgomery, 2006).

After implementing the various programs, the researchers re-examined retention and found that first-to-second year retention grew by 5%; they were able to sustain this growth over four years. The university had a 10% increase in graduation rates over this same time period (Montgomery, 2006). This increase in retention could potentially lead to significant cost savings for the university which is especially beneficial given the current economic situation.

This study had several strengths that should be highlighted. First, we used the HPI, which is a well known measure of normal personality and is used in several settings including education and business (R. Hogan & J. Hogan, 2007). The use of this instrument allows our study's results to be compared to other studies that use personality measures based on the

FFM. Second, colleges and universities can draw many practical applications from these results. We hope that the current study's findings will not only describe the relationship between personality and academic retention, but also prescribe action that can improve student retention by leveraging personality. However, the current study was limited in that it would have been beneficial to include other measures, such as ACT scores, SAT scores and GPA, in addition to personality scales as universities use these tools in admissions testing to predict retention and to create intervention programs.

Conclusion

The current study addressed a gap in the personality and individual differences literature (Kunzelet al. 2010); it examined personality's ability to predict academic outcomes, specifically student retention. Our results suggest that personality significantly relates to student retention and that personality-based interventions targeted at low Prudence students could help improve retention at universities. More studies are needed to examine the relationships between additional personality characteristics and academic retention. Further, future research should investigate the benefits of personality-based interventions, and specifically, their return on investment for universities.

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Table 1

Summary of Regression Analysis for HPI Prudence Scale Predicting Retention Variables for University Sample

Criterion Variable	<i>B</i>	<i>SE B</i>	β	R ²
Year1 (Freshman)	0.001	0.002	0.024	0.001
Year 2 (Sophomore)	0.006	0.003	0.072	0.005*
Year 3 (Junior)	0.011	0.003	0.119	0.014**
Year 4 (Senior)	0.015	0.004	0.151	0.023**

Note. * $p < .05$; ** $p < .01$. Year 4 retention includes completion of fourth year and graduation from the university.

Table 2

HPI Prudence Score and Student Retention Frequencies

Retention	Prudence			Odds Ratio
	Low	High	Total	
Not Retained	179	70	249	
Retained	305	221	526	1.85
Total	484	291	775	

Note. Retention = enrolled senior year and graduated; Prudence = percentile score on HPI Prudence Scale.

Table 3

Correlations between HPI Scales and Yearly Retention Variables

	Retention			
	Year 1	Year 2	Year 3	Year 4
Adjustment	.06	.07*	.10**	.10**
Ambition	.02	.06	.09*	.09*
Sociability	.00	-.01	-.02	-.04
Interpersonal Sensitivity	.06	.03	.04	.03
Prudence	.02	.07*	.12**	.15**
Inquisitive	-.05	-.02	.00	-.01
Learning Approach	-.05	.03	.04	.07*

Note. N = 788; * p < .05; ** p < .01. Year 4 retention includes completion of fourth year and graduation from the university.

Figure 1. HPI Prudence Scores for Retained vs. Not Retained Students.

