Big Five Factor Personality Differences by Academic Major and Gender in a Faith-Based University Sample

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Abstract

Big Five personality research has been criticized for lack of generalizability due to the overuse of undergraduate psychology student samples. We address this criticism by including undergraduate religion students. This study explores student personality traits and gender differences in an underrepresented sample. Results indicated that religion students scored significantly higher in agreeableness than business students, and lower in neuroticism compared to education students. Gender comparisons revealed significant differences in terms of agreeableness, conscientiousness, neuroticism, and openness. Findings underscore the importance of tailored school counseling interventions based on the personality traits and gender to achieve an optimal fit between personality, gender, and career choice.

Keywords: Big Five personality, academic performance, undergraduate students, personality differences, gender, generalizability, religion students

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Big Five factors of personality (conscientiousness, extraversion, openness, agreeableness, and neuroticism) are among the most widely used constructs to measure personality in academic performance (Briley et al., 2014). Conscientiousness has been the strongest predictor for academic performance (Komarraju et al., 2009; Lounsbury et al., 2003; Nguyen et al., 2005; Poropat, 2009; Richardson et al., 2012); however, this may be contingent upon academic major. Vedel et al. (2015) found that conscientiousness was a good predictor of GPA in some majors, yet not in others.

Additional Big Five factor differences have been discovered among students pursuing varied academic majors. Business students have consistently scored lower in agreeableness when compared to psychology students, whereas psychology students have scored higher in neuroticism when compared to engineering, economics, and medical students (Vedel, 2016). Beyond academic major, gender group differences have also been found with females generally scoring higher in neuroticism, agreeableness, and conscientiousness, compared to that of males, even when gender is a covariate (Clariana, 2013; Vedel, 2016).

Research has been conducted to explore the relationship between personality characteristics and academic performance, but some researchers (e.g., Vedel et al., 2015) have criticized sample profiles of extant studies as heavily influenced by psychology majors sampling, limiting generalizability. This is problematic in that psychology students may differ from other students and the findings may not be

generalizable. This overreliance on psychology student samples has prompted a call to replicate and expand upon the type of academic majors sampled (Vedel et al., 2015).

Vedel (2016) conducted a systematic review that examined Big Five personality group differences by academic major. Review of Vedel's systematic analysis sample (n = 12) revealed that no studies included students with religion majors nor were any conducted using a faith-based university sample. Given that there are over 1,000 private, faith-based colleges and universities in the United States (College Foundation of North Carolina [CFNC], 2019), and the number of students enrolled in said colleges and universities have consistently increased over the past decade (with some of faith-based universities now enrolling 100,000 students or more), it is arguably important to include this understudied population of students in personality differences research, which could then increase generalizability. Thus, the primary aim of the present study was to address this gap in published literature. To reach this aim, the investigators used a faith-based university sample to gain access to unique academic majors that have not yet been well-studied, such as religion-based majors, in addition to the previously studied academic majors.

The second aim of the study was to explore various personality traits of students based on selected academic majors as well as gender differences. Given that some academic majors have a higher percentage of females (e.g., psychology, education), yet other areas have a higher concentration of males (e.g., STEM, business) (National Center for Education Statistics [NCES], 2017), it is important to examine the gender differences in personality characteristics, along with the personality traits that may vary across academic majors. Group differences may be due to the gender makeup of a

certain major rather than the personality structure, or *fit*, of students who pursued said major. This concept of fit has also been examined in association with academic performance and personality group differences (Holland, 1997). It has been hypothesized that the student's personality, as well as the self-selection process, may engender group differences in academic performance due to the fit between student personality and success within an academic major (Vedel et al., 2015). Additionally, when examining gender, group differences may be associated with fit due to personality factors, yet also due to social influences such as role expectations and social gender norms. Therefore, when examining personality traits of students in various majors, it is imperative to account for the gender makeup of each major, as well as gender personality differences. As such, research questions examined in this study included:

1. Do differences exist in the Big Five personality traits (neuroticism, extraversion, openness, conscientiousness, and agreeableness; the dependent variables) of undergraduate students based on major (independent variable, 4 levels: psychology, education, business, and religion) within the studied sample?
2. Do differences exist in the Big Five personality traits of undergraduate students based on gender (independent variable, 2 levels: male and female) within the studied sample?
3. Do differences exist in the Big Five personality traits of undergraduate students based on the interaction of major (4 levels) and gender (2 levels) within the studied sample?

Method

The sample consisted of 260 undergraduate students enrolled full-time or part-time in a midwestern faith-based university in the United States**.** The participants' ages ranged between 18 and 45 years (M = 20.61; SD = 2.25). There were 112 (43.1%)

female and 148 (56.9%) male participants. The participants reported one of the following majors: business, 75 (28.9%), education, 45 (17.3%), religion, 83, (31.9%), and psychology, 57 (21.9%). When examining males by major, 53 (35.8%) were in business, 7 (4.7%) were in education, 28 (18.9%) were in psychology, and 83 (56.1%) in religion. Two hundred and eight participants (80.0%) were White, 40 (15.4%) were Black or African American, 5 (1.9%) Asian, and 7 participants did not report a race (2.7%). Two hundred and thirty-eight (91.5%) participants identified as non-Hispanic, 17 (6.5%) as Hispanic, and 5 (1.9%) unreported for ethnicity. The participants' class rank was 29 (11.2%) freshman, 96 (36.9%) sophomores, 47 (18.1%) juniors, and 87 (33.5%) seniors.

Procedure

In the fall and spring semesters of 2016-2017, undergraduate students were invited to complete a questionnaire that measured the Big Five personality traits. Additional items on the questionnaire included date, student identification number, gender, and current academic major. Participating undergraduate students either completed the questionnaire in class or via a secure online program hosted by the university.

The participants were informed, via the consent form, that involvement was optional and that their university student identification number would be used to link with their academic Integrated Postsecondary Education Data System (IPEDS) data for research purposes only; a release was given via the informed consents to access participants' university registrar data for demographics. After collection of questionnaire data, the investigators linked the university IPEDS data with the questionnaire data via

the university student identification number. When screening the IPEDS data, 673 records were discovered. After linking, 277 records were kept.

Upon reviewing the participants by major, there were a number of low responses in certain academic majors. These majors consisted of integrated language arts (*n* = 3), communication arts (*n* = 3), English (*n* = 8), and professional childcare and development (*n* = 2). These participants were excluded from the final analysis due to small cell count, in addition to reliability concerns. The total number of participants was 261. Furthermore, a number of respondents provided various religious majors and concentrations (biblical studies, Christian ministry, music and worship; urban and intercultural studies). The investigators chose to collapse these degrees into one group (religion) for the purpose of the analysis. Participants were offered the results of their Big Five personality assessment upon request and each participant was entered into a raffle, at the end of data collection, to win a $100 gift card.

Measures

The investigators used the International Personality Item Pool (IPIP) instrument to collect data on the Big Five personality factors for this study (Goldberg et al., 2007). Research has demonstrated its structural validity across cultures (Mlacic & Goldberg, 2007), gender, and ethnic groups (Ehrhart et al., 2008). The IPIP instrument has a total of 50 items with 10 items per personality factor. The personality factors measured in the IPIP are neuroticism, extraversion, openness, conscientiousness, and agreeableness. The IPIP uses a 5-point Likert scale with a range from 1, very inaccurate, to 5, very accurate, (Goldberg, 1992). Coefficient alpha for IPIP scales compared to the Revised NEO Personality Inventory were 0.80 and 0.75, respectively (Goldberg, 1992).

Cronbach's alpha was used to test reliability. The investigators discovered the following alphas: extraversion subscale ($\alpha = 0.91$), agreeableness subscale ($\alpha = 0.83$), conscientiousness subscale ($\alpha = 0.83$), neuroticism subscale ($\alpha = 0.84$), and openness subscale ($\alpha = 0.75$).

Assumptions

Prior to analyses, investigators completed examination of univariate and multivariate assumptions, such as normality, missing data, outliers, skewness, kurtosis, frequency, multicollinearity, equality of error variances, and homogeneity of variance-covariance matrices. Those assumptions violated are explained next. Missing items ($n = 15$) were discovered in the IPIP items and were inspected through the Little's MCAR test for missing completely at random in *R* software. The test was not significant, $X^2 = 680.12$, df = 680, $p = 0.5$ using cut off less than 0.05 indicating MCAR. Therefore, due to MCAR, the investigators calculated the mean score for an entire trait by using the total number of items that had non-missing answers. Examination of multivariate outliers was performed using Mahalanobis distance statistic. One multivariate outlier exceeded the critical value, $\chi^2(5) = 20.515$ at $p < .001$, and was removed from the data set, leaving 260 valid cases for analysis. Our questionnaire response rate was 39% when compared to the undergraduate student body, 260 out of 672.

All database management was in SAS 9.3. The analyses were conducted using SPSS v. 25.0 and R studio 1.1.3 software. The study was approved by the university's institutional review board.

Results

Detailed descriptive statistics for participants, based on gender and academic major, are outlined in Appendix Table A1. First, an exploratory chi-square analysis revealed significant gender differences among academic majors, χ^2 (3) = 46.59 at $p < .001$ (Table A2). Specifically, females were significantly more likely to select an education major, while males were significantly more likely to select religion and business majors. Next, a 4 x 2 multivariate analysis of variance (MANOVA) was used to test the differences in participants' scores on the Big Five personality factors (openness, conscientiousness, extraversion, agreeableness, and neuroticism) based on academic major (business, education, psychology, and religion) and gender (female, male). When examining the omnibus MANOVA test results, the main effects were significant for academic major (Pillai's Trace $V = 0.18$, F (15, 735) = 3.12, $p < .001$, $\eta_p^2 = 0.06$) and gender (Pillai's Trace $V = 0.13$, F(5, 243) = 7.35, $p < .001$, $\eta_p^2 = 0.13$). The interaction of academic major and gender was not statistically significant on the combined dependent variable (Pillai's Trace $V = 0.57$, F (15, 735) = 0.96, $p = 0.50$).

Results of the follow-up univariate ANOVAs indicated that significant main effects were found for both gender and academic major on several dependent variables individually. Specifically, participants of various academic majors differed significantly in terms of agreeableness, F (3, 252) = 10.84, $p < .001$, $\eta_p^2 = 0.11$ and neuroticism, F (3, 252) = 2.80, $p = .04$, $\eta_p^2 = 0.03$. The main effect of gender suggested statistically significant differences between males and females in terms of agreeableness, conscientiousness, neuroticism, and openness with small to medium effect sizes (Table

A3). Gender by major interactions, for each dependent variable, individually were not significant.

Pairwise comparisons (Table A4), indicated that students with religion majors were similar to all other majors on most Big Five personality traits, with notable exceptions. First, comparison of religion students with business students revealed that religion majors scored significantly higher in agreeableness (Cohen's *d* = 0.72). When religion students were compared to education students, their profiles were quite similar except for neuroticism, in which education students outscored religion students (Cohen's *d* = 0.49). In fact, education students also significantly outscored psychology (Cohen's *d* = 0.51) and business (Cohen's *d* = 0.54) students in terms of neuroticism. Profile comparison of religion and psychology students revealed no significant differences between these student groups on any of the Big Five traits. Finally, business students scored significantly lower in agreeableness as compared to all other majors, including psychology (Cohen's *d* = 0.86) and education (Cohen's *d* = 0.67).

Discussion

The primary aim of the present investigation was to address the criticism leveled by Vedel et al. (2015) who noted that extant studies examining Big Five personality differences often have restricted samples of undergraduate students. The present study aimed to fill this gap in published research by including students with additional academic majors (e.g., religion) that have not yet been widely investigated. The investigators were able to not only expand but also to replicate previous findings by including business, psychology, and education majors. Further, as gender differences in academic majors have been reported in previously published studies, gender was

included as a variable of interest and interactions between gender and major were examined for all Big Five personality traits. Overall, study results suggest there are significant personality differences among students of various academic majors, as well as differences between genders.

Academic Major

Overall, our results align with previously published findings (Clariana, 2013; Kaufman et al., 2013; Pritchard et al., 2018; Vedel, 2016) in that personality differences exist by academic major. In the present sample, differences in agreeableness and neuroticism were discovered between different academic majors. Historically, business students tend to score lower in agreeableness when compared to students with other academic majors (Vedel, 2016). This was confirmed in our sample as business students scored lower in agreeableness when compared to all other academic majors, along with medium to large effect sizes (Cohen, 1988). Pertaining to education students, a trend of higher scores in neuroticism has been found, which is in line with previously published research (e.g., Clariana, 2013; De Fruyt and Mervielde, 1996). No significant differences were observed for psychology students in addition to aforementioned differences. New insights were found by the inclusion of religion students into the sample. Religion students scored higher in agreeableness when compared to business students, while also being comparable to psychology students on all Big Five traits. It was also found that religion students scored lower in neuroticism than education students.

Overall, these findings align and support previous studies that education students score higher in neuroticism (Clariana, 2013), but our results did not reveal similar

findings for psychology students. Our psychology students scored lower in neuroticism, whereas previous researchers have discovered higher levels of neuroticism (De Fruyt & Mervielde, 1996; Lievens et al., 2002; Vedel et al., 2015). Other studies did not find statistical differences for psychology students when compared to other academic majors (Kaufman et al., 2013; Marrs et al., 2007), which is in line with our results. However, given the personality differences observed across academic majors, it is important to include a variety of undergraduate student majors to increase generalizability.

Gender

To date, only four other studies have included gender as an additional independent variable in factorial designs when examining personality differences among different academic majors (Larson et al., 2007; Marrs et al., 2007; Rubinstein, 2005; Vedel et al., 2015). One additional study involved a *t*-test comparison of males and females in terms of Big Five personality traits (Clariana, 2013). Those study results indicated that females score significantly higher than males in agreeableness, which was supported by our findings as well. In addition, we found that females scored significantly higher than males in conscientiousness, supported by Clariana (2013), Rubinstein (2005) and Vedel et al. (2015). No differences between genders were observed in extraversion (Clariana, 2013; Vedel et al., 2015). It is of notable interest that in our sample, females were significantly lower than males in neuroticism, which contradicts previous findings of higher scores in neuroticism among females (Clariana, 2013; Vedel et al., 2015). Finally, previous research findings are contradictory regarding openness (Vedel, 2016); in our study females scored lower in the openness compared to males. Inconsistent findings in previous studies regarding personality differences

between genders, in addition to new findings of the present study that contradict some of the previously published results, warrant further examination of gender differences in terms of personality traits.

Implications

It is important to understand how a student's personality may influence the choice of an academic major, as well as how personality is an aspect of fit in their current and future work environments (Milsom & Coughlin, 2017). According to John Holland's Typology, students pursue an academic major, in part, due to their personality structures and projection towards a future career (Holland, 1997; Zunker, 2016). Holding to Holland's model, fit or congruence may be important to academic performance in that students align with a particular major in the hopes that it will fit their personal needs, values, and beliefs providing a life of satisfaction with their chosen major (Holland, 1997). This is relevant to school counselors because they "need to be comprehensive in scope, results-oriented in design, and developmental in nature [and to do this, school counselors] need to be collaborative with other schools [trade schools, colleges, universities], staff, parents, community resources, and students" (ASCA, 2019, p. 10) by attending to personality characteristics of each student in a holistic approach across K-12 grades.

If school counselors uphold the value of fit, based on Holland's model, then it may be important to find the best fit based on the student's personality and career choice (academic major) as an aspect of academic performance across K-12. Regarding career-readiness, lack of optimal alignment between academic major and personality traits may be associated with potentially negative academic outcomes, such

as a change in major, increased time to degree completion, drop out, increased debt load, increased risk of anxiety, depression, and isolation (Logue et al., 2007; Pritchard et al., 2018). Others have found this same effect associated with student personality, choice of major, and satisfaction with major. Just as well, they have discovered that academic performance is not only based on GPA, but also on satisfaction and retention (Pritchard et al., 2018; Smidt, 2015).

To assist a student in finding an optimal fit, a variety of school counseling avenues and interventions exist. Before a student attends college, school counselors may assist the student in the development and understanding of their personality and its association with their career goals. The school counselor may implement personality assessments (e.g., IPIP) at the individual and group level, along with brief counseling to develop a student's knowledge and insight into career readiness based on their personality. These counseling and instructional interventions could build a bridge towards increased academic performance in higher education through a student's enhanced understanding of self, interests, and choice of major. Additionally, school counselors, in collaboration with staff, parents, and community, could instill further insight by applying these types of interventions in elementary, middle, and high school, thus conceivably increasing fit towards career trajectories. Finally, through the use of assessment data on students' personality traits, school counselors can provide tailored guidance and psychoeducation regarding fit, career opportunities, and avenues to achieve career goals.

Once a student arrives at a college or university, advising, career counseling, and professional counseling are avenues for increased awareness of personality and

choice of major. Through these modalities, students may increase their understanding of self in context, while simultaneously increasing the likelihood of congruence in their careers. For example, if a student scores higher in agreeableness, how would that translate to a fit in the workplace where extraversion (e.g., Seibert & Kraimer, 2001) may be a better predictor of performance? In coordination with career counseling and advising, the student could further explore fit for the business degree or change to a different major that may be more congruent with their personality traits, such as education, religion, or psychology. Additionally, a college student could also engage in individual counseling to identify barriers and conflicts that may impede academic performance, while gaining insight to personality and fit. Potentially, these efforts could lead to increased retention and degree completion rates among college students (Vedel et al., 2015). At the university level, increasing student fit may increase alumni satisfaction rates. This, in turn, may improve relations between the university and alumni. At the national level, by increasing fit, default on student loans may be reduced and quality of professional career may be increased.

When examining gender variation of personality by major, some of the differences may be attributed to social norms and values that are instilled over the life course. Moreover, enrollment and completion of a degree has social determinants attached; there is a bias, by gender, regarding which majors or degrees are socially acceptable. In our sample a potential bias existed in religion degree-seeking students which were predominantly male. For females, several resources could be employed by faculty and staff depending on the contextual factors. Advisors, faculty, staff, career counselors, and other helping professionals could play a role in the decision-making

process for female students when identifying a major. This could combat the social norms that restrict the academic freedom of choice for females and potentially increase fit between major by gender.

School counselors may offer interventions at the group and individual level across K-12. At the individual level, counselors may assist the student in expanding their career interests (Turner et al., 2008). The school counselor may provide career exploration that is outside of the gender norms and aligns with personality. At the group level, the school counselor may provide instruction on the relationship between gender, personality traits, and career choice. The school counselor may also recruit community role models that may defy conventional gender-norms and share their work experiences. Finally, the school counselor may work with a variety of community resources by having students “shadow” individuals with careers that are gender neutral and cross-gender to expand their career options.

Limitations and Future Directions

Several limitations may be found within this study. The study sample may not be culturally representative of some universities and communities. The study design was cross-sectional and did not employ a predictive model such as a regression or SEM. The reason for this was to utilize similar research design and statistical approaches that had been used in prior research, to compare our results to previously published studies. A follow-up study could attend to this limitation by using an approach, such as a structural equation model, which may elucidate a further understanding of the Big Five dimensions and academic performance. Future studies may also include other factors into the SEM, such as motivation, race, ethnicity, and faith to further understand how

these factors fit into the interplay between personality and academic performance. Additionally, it is currently unknown if a selection bias exists between students who chose a faith-based institution and those who chose to attend to a non-faith-based institution, which may account for personality differences by academic major.

Another limitation is that Big Five factors were used but not the corresponding facets (facets are specific traits that make up a factor). Prior research has linked several specific facets (such as anxiety and impulsivity) with worse academic performance, and facets have been found to be a stronger predictor of academic performance than Big Five factors (O'Connor & Paunonen, 2006). In the future, the second phase of the study could be accomplished by gathering data on the facets along with the use of SEM or a regression analysis to understand the predictive power of the facets.

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Appendix

Table A1

Means and Standard Deviations for Big Five Scores by Gender and Major (on 5-Point Scale)

	Gender				Major							
	Male		Female		Business		Education		Religion		Psychology	
	M	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***
Agreeableness	4.06	0.79	4.28	0.58	3.81	0.62	4.28	0.78	4.26	0.63	4.32	0.56
Conscientious	3.51	0.89	3.71	0.65	3.57	0.70	3.69	0.88	3.60	0.71	3.59	0.64
Extraversion	3.35	1.30	3.22	0.94	3.32	1.01	3.47	1.27	3.22	1.03	3.11	0.92
Neuroticism	3.40	1.01	3.02	0.74	3.06	0.79	3.54	0.99	3.10	0.80	3.10	0.72
Openness	3.86	0.75	3.69	0.55	3.68	0.59	3.82	0.74	3.79	0.60	3.80	0.53

Table A2

Major Selection by Gender

	Male		Female		Total	
	n	***%***	***n***	***%***	***n***	***%***
Religion	60	72.3	23	27.7	83	31.9
Psychology	28	49.1	29	50.9	57	22.0
Education	7	15.6	38	84.4	45	17.3
Business	53	70.7	22	29.3	75	28.8

Table A3

Results of the 2 (gender) x 4 (major) Follow-up Analyses of Variance (ANOVA)

	Gender		Major		Gender x Major	
	***F*(df)**	**η_p^2**	***F*(df)**	**η_p^2**	***F*(df)**	**η_p^2**
Agreeableness	6.90(1, 252)**	0.03	10.84(3, 252)**	0.11	0.26(3, 252)	0.00
Conscientious	4.23(1, 252)*	0.02	0.19(3, 252)	0.00	1.40(3, 252)	0.02
Extraversion	0.90(1, 252)	0.00	1.02(3, 252)	0.01	1.11(3, 252)	0.01
Neuroticism	12.4(1, 252)**	0.05	2.80(3, 252)*	0.03	1.40(3, 252)	0.02
Openness	4.66(1, 252)*	0.02	0.77(3, 252)	0.01	0.50(3, 252)	0.01

*$p < 0.05$
**$p < 0.01$

Table A4

Post-Hoc Multiple Comparisons for Big Five Personality Scores (Mean Difference)

	Big Five Personality Traits				
Comparisons	**A**	**E**	**C**	**N**	**O**
By Major					
R-B	0.46**	-0.09	0.02	0.04	0.12
R-E	-0.02	-0.25	-0.09	-0.44*	-0.03
R-P	-0.06	0.11	0.00	0.00	-0.01
P-B	0.52**	-0.21	0.02	0.04	0.12
P-E	0.04	-0.36	-0.09	-0.44*	-0.02
B-E	-0.48**	-0.16	-0.11	-0.48*	-0.14
By Gender					
F-M	0.22**	-0.13	0.20*	-0.38**	-0.17*

Note. B = business; E = education; R = religion; P = psychology; A = agreeableness; E = extraversion; C = conscientiousness; N = neuroticism; O = openness; F = female; M = male
*$p < 0.05$
**$p < 0.01$

Biographical Statements

David E. Jones - Assistant Professor, Liberty University, School of Behavioral Sciences, Department of Counselor Education and Family Studies, School Counseling Program in Lynchburg, VA. Dr. Jones' research interest is around prevention that takes many forms such as improvement of student academic success as a route to reduce health inequities.

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Dr. Anna Ord's primary research is quantitative methodologies and associated statistical analysis. Kate Duskey was a counseling student during this research project. She currently is a clinical mental health counselor. Kate Jones' research emphasis is program evaluation. Dr. Neil Duchac's research interests involve counseling military. Mariah Dern was a doctoral student in counselor education during this research project. Her research interest is focused on career counseling. Lydia Montiel was a doctoral student in clinical psychology during this research project. Her research focus is on multicultural counseling.