Research notes

# A predictive psychometric model to identify personality and gender differences of college majors

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## ARTICLE INFO

## ABSTRACT

This research applies Cattell's 16 Personality Factor Questionnaire (16PF) (Cattell & Schuerger, 2003) to compare and contrast personality traits among undergraduate men and women enrolled in business and liberal arts colleges. Specific attention is given to what personality differences exist between accounting as the most popular business major, and that of psychology as the most popular liberal arts major. For added comparison, we further juxtaposed marketing, which contains a combination of consumer psychology and analytical business skills. Analysis of variance among the three majors found the differences in 10 personality factors to be significant and a multivariate analysis of variance determined gender a significant covariate. While this research provides a detailed personality profile unique for each major, stepwise discriminant analysis isolated one personality factor providing a predictive model of 42.8% while gender contributed 5.1% for a predictive psychometric model of 47.9%. This research is unique as it compares personality differences among business majors with a popular nonbusiness major, isolates the impact of gender, and provides a parsimonious predictive model that can be used to identify a compatible fit between personality and gender by college major.

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## 1. Introduction and background

Previous studies, typically based on demographic survey data, have uncovered many reasons why students select a business major. Relationships with such variables as salary (Cebula & Lopes, 1982), prestige of a specific career (Lowe & Simons, 1997) and gender (Malgwi, Howe, & Burnaby, 2005; Worthington & Higgs, 2003) have been cited as influencing factors. More recent studies have focused on the role of personality as a possible underlying reason why students select a business major (Lounsbury, Fisher, Levy, & Welsh, 2009; Noël, Michaels, & Levas, 2003; Pringle, DuBose, & Yankey, 2010). Much of this current research is based on Holland's (1985, 1996) theory of vocational choice that proposes that people will enter professions where they believe the work environment will match their personalities.

Various measures have been used to define personality characteristics in business education. The Myers-Briggs Type Indicator (MBTI) was used by Filbeck and Smith (1996), who observed finance majors to have high scores on extroversion, sensing, thinking, and judging. Nourayi and Cherry (1993) found accounting majors to be overwhelmingly (94%) categorized

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as 'judgers' using the MBTI. Noël et al. (2003) applied Cattell's 16 Personality Factor (16PF) (Cattell & Schuerger, 2003) questionnaire to accounting, management information systems and marketing majors and found significant differences on outgoingness, abstract thinking, emotional stability, enthusiasm, venturesomeness, imaginativeness, and tension, along with self-monitoring behavior. They concluded that the personality traits for each major reflect conventional stereotypes of their selected business vocations. Subsequently, Cattell's 16PF has been successfully applied in business management to investigate personality similarities and differences between Mexican and American business leaders (Ojeda, James Ree, & Carretta, 2010) and to help outplacement firms to understand and contend with the personality characteristics and profiles of recently terminated executives (Austin & Murray, 1993).

De Raad and Schouwenburg (1996) reviewed over a century of research and theory of personality in education. They summarize a growing consensus that personality-related constructs are central to the research in this field. Personality was found to play an important role in the selection of a business major compared to other academic majors (Lounsbury et al., 2009). One commonly used measure is the Big Five personality inventory which consists of five factors: neuroticism, extraversion, openness to experience, agreeableness and conscientiousness (De Raad, 2000; Goldberg, 1993). Lounsbury et al. (2009) applied the Big Five to reveal that business students were more emotionally stable, extraverted, and conscientious while less agreeable and less open to sharing experiences than other majors. One limitation of this study is that the 'other' nonbusiness majors were not clearly identified. The Big Five personality inventory was also applied by Lakhal, Frenette, Sevigne, and Khechine (2012) which showed that personality played an important role in the selection of a business major. They found that personality (neuroticism, openness to experience, agreeableness, and conscientiousness) and gender account for 42.2% of the variance in the choice of a business major using multiple hierarchical logistic regression analysis.

Extensive descriptions for each of these Big Five factors have been studied and validated in the scientific literature (Costa & McCrae, 1992; De Raad, 2000). However, criticism of the Big Five factors approach exists. McAdams (1995) has called the Big Five a 'psychology of the stranger' (p. 365) as they refer to traits that are easy to observe in a stranger as opposed to other aspects of personality that are more privately held. Van der Linden, Nijenhuis, and Bakker (2010) have found that the five factors are not fully orthogonal to one another; that is, they are not independent and therefore increase the chances of redundancy between the broadly defined dimensions.

Significant gender differences have been found in a number of studies including that of personality. The pedagogical literature is replete with research reporting gender differences in business education from first year accounting and auditing modules (Gammie, Paver, Gammie, & Duncan, 2003), assessment of computer skills (Caputo, 2010; Yau & Cheng, 2012), financial literacy (Chen & Volpe, 2002), responses to ethical business dilemmas (McInerney, Mader, & Mader, 2010), group learning experiences (Kaenzig, Anderson, Hyatt, & Griffin, 2006; Korte, Lavin, & Davies, 2013) and application of business statistical software in the classroom (Gober, Freeman, Wyatt, & Adams, 1999). Results from these studies indicated that women outperformed men in certain accounting courses, rated faculty members more favorably and reported a lower willingness to engage in potentially unethical behaviors. On the other hand, women assigned lower levels of importance to technology-based educational tools, the value of specific IT skills, and personal finance topics than did men. These are just a sample of the many outcome results reported in the literature on gender differences that exist between business students.

Moreover, significant personality differences have been found based on gender. Costa, Terracciano, and McCrae (2001) found women consistently report higher 'nurturing' aspects of neuroticism, agreeableness, warmth and openness to feelings, and men often report higher facets of 'extraversion', such as, assertiveness, dominance and openness to ideas as assessed by the Big Five. Del Giudice, Booth, and Irwing (2012) set out to measure personality at a 'higher resolution than that afforded by the Big Five and to assess global differences' (p.1). They applied Cattell's 16PF survey to a large multivariate sample of 10,261 USA adult respondents. They reported a significant 10% overlap in the distribution of personality traits between men and women, which they cite as extremely large by psychological standards. Their results support the classic gender differences in dominance traits by men and nurturance traits of women. In a review of 15 studies of university students (Woodcock et al., 2013), people-orientation and thing-orientation personality traits uniquely predict choice of major and retention. Men preferred 'thing-oriented' fields of study such as science and engineering, and women favored vocational and nurturance interests (e.g. 'people-oriented' traits).

Since 1970, the proportion of undergraduates in the USA who are women has increased from 42% of college undergraduates to 57% today. By 2021, 5.2 million more women than men are expected to be enrolled in universities with 3.5 million more women than men forecasted to be enrolled as undergraduates (Hussar & Bailey, 2013). It is projected that by 2025, "in some countries (Austria, Canada, Iceland, Norway, and the United Kingdom) there could be almost twice as many female students as male" (Vincent-Lancrin, 2008 p.266). Despite the growing numbers of women in higher education, there is a continuing gender imbalance in the majority of undergraduate college majors. Women still choose female-dominated ('people-oriented') majors like education, nursing, liberal arts and psychology, while men typically select ('thing-oriented') majors in engineering, physics and computer sciences (Lakhal et al., 2012). In the USA, women make up about 50% of college business graduates nationally (Aud, Hussar, Keane, Bianco, Frohlich, Kemp, & Tahan, 2011) which now comprise 18% of all undergraduate degrees awarded to women. The psychology undergraduate degree is the most popular degree in the liberal arts with 109,000° conferred in 2011–2012 versus 367,000 in business (U.S. Department of Education, 2015; Knapp, Kelly-Reid, & Ginder, 2010). Koc, Koncz, Tsang, and Longerberger (2014) reported on the salaries of college majors in The National Association for Colleges and Employers (NACE), a nonprofit professional association used by college career counselors and corporate recruiters. They report in its 2014 Salary Survey that for the USA the starting salary for accounting in 2013 was $51,600; marketing; $49,400 (including market research) and psychology; $35,900. While the student gender ratio is roughly

even in accounting and marketing, there are nearly three female students to every male student in psychology (Lott & Rogers, 2011). This suggests an attraction by women to the study of psychology for reasons other than monetary rewards.

Based on a Big Five interpretation of personality traits, Marrs, Barb, and Ruggierro (2007) discussed the impact of the changing gender composition among undergraduate psychology majors, as this major moved over time from enrolling predominantly men to enrolling primarily women. They cite that psychology is increasingly being thought of as a human service career (nurturing and 'people-oriented') rather than a male-dominated scientific and research ('thing-oriented') career as it once was. The statistics, research, and writing requirements for a psychology degree are largely similar to that of marketing except for the entry-level business courses required of the marketing major.

## 2. Cattell's 16PF

The 16PF was selected for this study because of its known psychometric properties, with average-scale reliabilities ranging from 0.69 to 0.89 and evidence of construct validity in a wide variety of applications (Cattell & Schuerger, 2003). The 16PF is a forced choice seven-point bipolar scale. As such, it attempts to avoid any negative connotations as to whether one trait is any better or worse than another as may be inferred on a five-point Likert scale. While most other personality measures have been designed for use within a specific clinical population, the 16PF was developed for use with a broad 'normal' population. Cattell's 16PF was the result of factor-analyzing hundreds of everyday behaviors to find the fundamental sixteen primary traits behind them. He found these traits to be independent and orthogonal. Cattell then established the second order global traits known as the Big Five which has become a popular global measure in personality research (Costa & McCrae, 1992; De Raad, 2000). The Big Five allows for easy multiple regression analysis and interpretation based on five comprehensive traits (Goldberg, 1993), whereas Cattell's bipolar scale of 16PF leads to more rigorous analysis and in-depth interpretation of 32 traits (Cattell & Schuerger, 2003).

The difference between the two personality tests is analogous to the Big Five being a map of a large city while the 16PF presents a more detailed map of a neighborhood. The 16PF has been translated and validated in over thirty languages and found compliant with the American Disabilities Act, and for gender, cultural and racial biases (Cattell & Schuerger, 2003, p. 13). These factors have not been overlooked by previous studies measuring personality in a business related environment (De Raad & Schouwenburg, 1996; Noël et al., 2003).

In this study, we seek to compare personality traits between the most popular major in business, accounting, with the most popular major in liberal arts, psychology. For added comparison, we include the marketing major, which shares consumer psychology and analytical business elements with the aforementioned majors.

## 3. Research questions

While standard hypothesis testing would deductively assign empirically derived traits and gender differences to specific college majors, the following research questions present an inductive inquiry into whether a standardized psychometric model can predict one or more influential characteristics among a larger group of significant personality and gender differences. The application of discriminant analysis attempts to isolate and predict dominant traits or characteristics among a larger set of significant traits. This helps to focus on those traits that are most influential, guide in the initial interpretation of the more detailed set of lesser traits, and evaluate the impact of gender on personality and a selection of college major. In light of the general finding on personality and gender, the following research questions are proposed:

RQ1: Will significant personality trait differences be found between accounting, marketing and psychology majors using Cattell's 16PF personality factor questionnaire?

RQ2: Can a parsimonious predictive model based on any personality trait and gender differences between the three majors be established?

## 4. Method

Student volunteers were recruited from undergraduate business and liberal arts courses at two separate college campuses within a larger urban southeast United States regional state university serving both commuter and residential students. The two separately accredited campuses serve different cities and regions with differing demographics, business environments, and elected political parties. Respondents were given minimal extra course credit for their participation in the online survey, providing only their names and majors. Respondents were informed of the confidentiality and anonymity of their responses. All undergraduate students had officially declared college majors and were selected from large course sections in their senior year.

A sample of 293 students provided nearly equal distributions for each major with accounting ($n = 98$), marketing ($n = 95$) and psychology ($n = 100$). Students were asked to complete an online survey which included Cattell's 16PF questionnaire (answered on a bipolar seven-point scale) and demographic variables (e.g., gender, age and major).

Significant gender differences $\chi^2$ (2, $N = 293$) = 12.78, $p < 0.002$ exist (see Table 1) between the three majors as can be expected from both national trends (Hussar & Bailey, 2013) and existing university demographic information. As such, more men in the sample were accounting majors and more women were marketing and psychology majors.

**Table 1**
Gender by major.

|  | Accounting | Marketing | Psychology | Total |
|---|---|---|---|---|
| Male | 55 | 36 | 32 | 123 |
| Female | 43 | 59 | 68 | 170 |
| Total | 98 | 95 | 100 | 293 |

Using a fixed-model response ANOVA, no significant differences between the two regional campuses were found on either Cattell's 16PF, age, or hours worked. The average age for all students was 25.24 ($SD = 7.60$) within the 95% confidence interval compared to existing university student data (26.11).

## 5. Results

### 5.1. Research question 1

A MANCOVA was conducted with the 16PFs as the dependent variables with college major as the independent variable. Gender was used as a covariate. Table 2 shows the results of the multivariate tests. We chose to conduct the test using Wilks's lambda, as all of the other methods gave identical results. RQ1 is confirmed. Gender and the three college majors had significant multivariate effects at $p < 0.001$ with the 16PF.

Next a series of ANOVAs were conducted to examine the differences in the 16PF scores. Table 3 presents the results of each of the 16PF dependent variables by the three college majors, the F value, eta-squared, and the observed power for significant statistical tests. Analysis of variance (ANOVA) revealed ten PF scale items as significantly different between at least two of the three majors.

Table 4 presents the significant differences between each of the paired majors after adjusting the means for the effect of the gender covariate. PF I (Tough-minded/Sensitive) and PF O (Self-assured/Apprehensive) were determined not significant based on the adjusted pairwise comparisons. A more insightful interpretation of each of the remaining eight significant PFs is fully described in detail based on Cattell and Schuerger (2003).

Factor A found differences between all three majors. This factor measures the degree to which contact with others is sought and found rewarding as an end in itself rather than a means to another goal. Students with a high score on Factor A indicate a more 'people-' versus a 'thing-orientation' in their major field of study. Marketing students scored significantly higher than both accounting and psychology majors, preferring to work and associate with other people and emphasizing personal contact. No significant differences were found between accounting and psychology students as they both focus their interests on ideas or objects, often reducing contact with others for any number of reasons.

Factor B is a measure of an individual's conceptualization of himself as a concrete, rather than an abstruse and transcendent thinker. Accounting students scored as more focused thinkers, while marketing and psychology students considered themselves to be more creative and abstract thought processors.

Factor E measures the distinction between compliant and passive personalities versus more assertive, recalcitrant, and competitive ones. Marketing majors scored high on assertive and competitive traits while the accounting and psychology majors rated themselves as more submissive and amiable.

Factor F compares individuals who consider themselves restrained and self-controlled, as they are calm and collected in their work and relationships with others, versus those who feel they are enthusiastic, passionate and highly energetic. Marketing students scored significantly higher on enthusiasm, while no significant differences were found between accounting and psychology students, who scored themselves as more restrained.

Factor H measures conceptions of 'reservation and timidity' versus 'venturesome and uninhibitedness.' Marketing students view themselves as venturesome, while accounting and psychology students rate themselves as more reserved and timid.

Factor M indicates accounting majors rate themselves as practical. Marketing and psychology majors rated themselves more highly in terms of being imaginative.

The factors $Q_1$ to $Q_4$ are more defined factors that comprise a total score for the introverted-extroverted factor. Factor $Q_1$ indicates accounting students to be significantly more conservative in orientation and marketing students more experimenting. Factor $Q_3$ indicates accounting students to be significantly more self-controlled, while marketing and psychology students follow their own urges. Accounting and psychology students lean toward introversion, while marketing students scored high on the traits of experimenting and 'follows own urges' indicating a tendency toward extroversion.

**Table 2**
Results of MANCOVA multivariate tests.

| Variable | Wilks's lambda | F | df | Sig. | Partial eta[2] | Observed power |
|---|---|---|---|---|---|---|
| Major | 0.748 | 2.59 | 32 | 0.000 | 0.135 | 1.000 |
| Gender | 0.831 | 3.36 | 16 | 0.000 | 0.169 | 0.999 |

**Table 3**
ANOVA differences in personality type.

| PF | 16 personality factor | Accounting (n = 98) | | Marketing (n = 95) | | Psychology (n = 100) | | F | p | Partial eta$^2$ | Obs. power |
|----|-----------------------|-----|-----|-----|-----|-----|-----|------|----|------|------|
| | | M | SD | M | SD | M | SD | | | | |
| A | Reserved-detached/Outgoing-easygoing | 4.70 | 1.6 | 5.43 | 1.5 | 4.79 | 1.7 | 5.73* | ** | 0.039 | 0.864 |
| B | Focused thinking/Creative thinking | 3.49 | 1.7 | 4.69 | 1.6 | 4.76 | 1.5 | 18.58* | ** | 0.128 | 1.000 |
| C | Affected by feelings/Emotionally stable | | | | | | | | NS | | |
| E | Submissive/Assertive-competitive | 4.69 | 1.7 | 5.24 | 1.5 | 4.66 | 1.6 | 4.37* | ** | 0.029 | 0.733 |
| F | Restrained/Enthusiastic | 4.67 | 1.5 | 5.41 | 1.4 | 4.75 | 1.8 | 8.20* | ** | 0.064 | 0.981 |
| G | Expedient/Persistent-competitive | | | | | | | | NS | | |
| H | Reserved-timid/Venturesome | 4.01 | 1.5 | 4.91 | 1.5 | 4.29 | 1.8 | 7.32* | ** | 0.048 | 0.932 |
| I | Tough-minded/Sensitive | 3.90 | 1.7 | 4.02 | 1.7 | 4.47 | 1.6 | 3.29* | ** | 0.025 | 0.665 |
| L | Trusting/Suspicious | | | | | | | | NS | | |
| M | Practical/Imaginative | 3.35 | 1.5 | 4.29 | 1.8 | 4.47 | 1.6 | 12.93* | ** | 0.091 | 0.999 |
| N | Forthright/Shrewd | | | | | | | | NS | | |
| O | Self-assured/Apprehensive | 3.64 | 1.6 | 3.24 | 1.6 | 3.82 | 1.8 | 0.31* | ** | 0.019 | 0.546 |
| Q1[a] | Conservative/Experimenting | 3.85 | 1.5 | 4.65 | 1.6 | 4.22 | 1.8 | 5.39* | ** | 0.036 | 0.836 |
| Q2[a] | Group-oriented/Self-sufficient | | | | | | | | NS | | |
| Q3[a] | Follows own urges/self-controlled | 4.98 | 1.3 | 4.28 | 1.7 | 4.50 | 1.6 | 4.70* | ** | 0.009 | 0.790 |
| Q4[a] | Relaxed-low drive/Tense-high drive | | | | | | | | NS | | |

Note. Q1[a] through Q4[a] are sub-factors of the Introversion/Extroversion factor. *df = 2. **p < 0.05. NS means not significant at the >.05 level. Cohen's benchmark for effect size using eta$^2$ are .02 (small), .13 (medium) and .26 (large) (Pierce, Block, & Aguinis, 2004).

In summary, accounting majors were found to be significantly different from either psychology and marketing majors on all eight of the 16 PFs. Accounting majors are significantly more reserved-detached and more focused and concrete thinking. They are more submissive, restrained, reserved, practical, conservative and self-controlled. Marketing majors are significantly more outgoing and creative thinking. They are more assertive, enthusiastic, venturesome, imaginative, experimenting and follow their own urges. Psychology majors are significant different from the other majors on six of the eight pairwise comparisons. This major is seen as reserved-detached and creative-abstract thinking. They are more submissive, restrained, reserved, and imaginative.

### 5.2. Research question 2

The goal of RQ2 was to find the most parsimonious solution using the fewest predictors among the set of eight significant PFs and gender established in RQ1. Stepwise discriminant analysis was used to determine a predictive model of a few independent variables that would significantly account for the differences found between the criterion variables of accounting, marketing and psychology majors. A stepwise correlation analysis was performed to determine which had the highest or optimal combination of variables, the subsequent next optimal, and so on. Based on this analysis, two functions emerged: Function 1 was interpreted, based on the bipolar scale of PF B, as 'focused concrete thinking' and male-dominant, while Function 2 was determined to be 'creative thinking' and female-dominant. These functions are independent and orthogonal between groups and do not overlap (Hair, Anderson, & Tatham, 1990; Tatsuoka, 1988).

Table 5 presents the outcome results for the stepwise discriminant analysis and resulting canonical correlations. The $\chi^2$ test for PF B was significant and accounts for 42.8% of the eight PF factors found significant in this study. The PF B scale isolated 'focused and concrete thinking' for the accounting majors (M = 3.49) and 'creative and abstract thinking' for the marketing (M = 4.69) and psychology majors (M = 4.76).

The discriminant analysis also identified PF F bipolar scale as significant. Accounting (M = 4.67) and psychology (M = 4.75) majors are described as 'restrained' and marketing (M = 5.41) majors as 'enthusiastic.' Summarily, both PF B and PF F describe accounting majors as more focused and concrete thinkers and perhaps are restrained due to the nature of their occupation. Marketing majors are creative and abstract thinkers who are enthusiastic and exhibit a high 'people' orientation. Psychology majors are creative and abstract, but are restrained perhaps based on the dominant scientific and research orientation versus the people focus in their field of study. These two personality factors alone describe more than 40% of the variance of the personality traits characteristics between accounting, marketing and psychology students. PF F was significant, however, given the small contribution to the percent of variance it failed to provide a significant predictive contribution as presented in Table 6.

Gender provides a significant impact of 5.1% of the interactive variance with the PF model. Although gender is a significant factor, it plays a lesser role than that of personality traits in the overall psychometric model described here. This is at odds with the ten percent variance reported by Del Giudice et al. (2012) but may be due to the younger age and developing personalities of college students.

Table 7 presents the standardized discriminant function coefficients; Table 8 shows the means, or group centroids, of the discriminant function scores by group for each of the three majors varied based on the two functions in Table 7.

**Table 4**
Pairwise comparison summary of corrected between-group differences.

| 16 personality factor | Acct. vs. Mktg. | Acct. vs. Psych. | Mktg. vs. Psych. |
|---|---|---|---|
| PF A: Reserved-detatched/Outgoing-easygoing | * | | * |
| PF B: Focused thinking/Creative thinking | * | * | |
| PF E: Submissive/Assertive-competitive | * | | * |
| PF F: Restrained/Enthusiastic | * | | * |
| PF H: Reserved-timid/Venturesome | * | | * |
| PF M: Practical/Imaginative | * | * | |
| Q1[a]: Conservative/Experimenting | * | | |
| Q3[a]: Follows own urges/self-controlled | * | | |

*Note.* *Difference in mean score significant at $p < 0.05$.

Reclassification of cases based on the two canonical variables indicates 79.4% of the cases were correctly classified into their original categories. PF B and gender account for an overall predictive psychometric model of 47.9%.

## 6. Conclusion and discussion

This research is unique as it compares the personality differences of several popular college majors. It isolates the impact of gender differences in personality, and uses multivariate stepwise discriminant analysis to provide a parsimonious predictive model of dominant personality characteristics from a set of significant multiple traits. This model can be easily applied to identify key personality traits that significantly differentiate students of one major from other majors. It provides faculty and administration with a model to better market and position college majors to help students differentiate between programs of study based on their own personal characteristics. Highlighting unique personality traits provides direction to recruit, select and develop focused business and nonbusiness programs.

Personality is comprised of traits that form a consistent response to one's environment. Marketing and management professionals consider 'brand personality' as a set of human characteristics that are attributed to a brand name and is something to which the individual can relate. An effective brand will increase its equity by having a consistent and relevant set of traits (Kotler & Keller, 2012). This study provides a predictive model to help determine which traits are most characteristic of certain college brands, namely the accounting, marketing and psychology majors. This model could be extended to other college majors.

While the course materials educators produce are written in an accessible and objective manner, they are not imbued with the personality traits perceived by the student. We stereotypically expect marketers to be outgoing and creative, psychologists to aid individuals dealing with personal and emotional issues, and accountants to prepare spreadsheets. It is likely that effective faculty exhibit personality traits that dovetail with their professional interests. Students majoring in that field should share a common set of personality traits with their professors. Faculty can best collaborate with their students using these shared personality traits through their lectures, electronic presentation materials, use of social media, applied assignments and overall course design. The downside is that personality-based pedagogy, such as assigning 'outgoing' marketing majors multiple in-class presentations to exploit this trait, may not mesh with all marketing students. This approach also does not take into account whether a student's personality changes over the course of his education.

The results presented provide guidance for both business and liberal arts professors to create a more productive interface between men and women in the classroom. Communication, the key to this process, is dependent on the two parties' ability to freely interact by understanding personality differences between and among the majors. Colleges of business should be aware of the changing environment fostering more enrollments of women than in the past. Enrollment of women in MBA programs, once dominated by men, now exceeds 40 percent for many top schools (Smith-Barrow, 2015). Changing enrollments by gender will likely modify personality characteristics of a college major as well as the character of the selected vocation. 'Aggressiveness' and related traits may diminish as more women enter specific male-dominated occupations. However, it should be noted that, even while psychology majors in this study were predominantly women, they shared several traits with more male-dominated accounting majors. For example, both psychology and accounting majors identified themselves as more reserved and detached, while marketing students were more likely to identify themselves as outgoing. Regardless, the consequence of gender shifts in majors and subsequent professional activity may have economic repercussions for business and society.

It should be noted that global implications of personality traits and gender differences in higher education are not well documented. However, the study of the similarities and differences of Mexican and American business leaders indicates important differences in personality traits across nationality and cultural divides as reported by Ojeda et al. (2010). Because cross-cultural data was not collected in this study, it remains to be seen whether these results reflect a more global perspective.

Managers should consider the compatibility of personality traits of their job applicants and existing employees when designing job descriptions and constructing work assignments. Certain personality traits may fit better with job assignments based on a set of characteristics that are 'people-oriented' versus 'thing-oriented.' The personality of an accounting major, for instance, may be compatible with routine in-house bookkeeping, but stressful to those assigned to account management, customer relationships, and new business ventures. Similarly, administrators of psychology programs may consider a 'human

**Table 5**
Stepwise statistics and canonical R: Percent of variance explained by personality PFs and gender.

| Characteristic | Wilks's lambda | P value | Exact F | df1 | df2 | $\chi^2$ | Rc |
|---|---|---|---|---|---|---|---|
| PF B: Focused-concrete thinking/Creative-abstract thinking | 0.872 | 0.000 | 18.58 | 2 | 290 | 66.27 | 0.428 |
| PF F: Restrained/Enthusiastic | 0.791 | 0.000 | 8.21 | 6 | 576 | 5.21 | 0.033 |
| Gender | 0.827 | 0.000 | 14.00 | 4 | 578 | 9.22 | 0.051 |

*Note.* Exact F significant at $p < .001$.

**Table 6**
Eigenvalues by function.

| Function | Eigenvalue | % Of variance | Cumulative % | Canonical correlation |
|---|---|---|---|---|
| 1 | 2.24 | 87.1 | 87.1 | 0.428 |
| 2 | 0.033 | 12.9 | 100 | 0.051 |

**Table 7**
Standardized canonical discriminant function coefficients.

| | Function | |
|---|---|---|
| | 1 | 2 |
| PF B: Focused-concrete thinking/Creative-abstract thinking | 0.822 | −0.256 |
| PF F: Restrained/Enthusiastic | 0.309 | 0.928 |
| Gender | 0.424 | −0.453 |

**Table 8**
Functions at group centroids by major.[a]

| Major | Function | |
|---|---|---|
| | 1 | 2 |
| Accounting | −0.664 | 0.001 |
| Marketing | 0.353 | 0.189 |
| Psychology | 0.347 | −0.245 |

Note.
[a] Unstandardized canonical discriminant functions evaluated at group means.

service' track or special major more compatible with a 'nurturing' personality profile. In summary, students may excel with a college major designed around their personality profile and compatible to their chosen occupation.

The psychometric methodology guidelines presented in this paper can and should be applied to individual differences and characteristics other than personality and gender. Other interactive measures may include vocational interests, cognitive abilities, emotional intelligence, work environment, and the like. An especially critical investigation would be to compare self-reported personality with observer ratings to other more objective evaluation methods. Matchmaking websites such as eHarmony base their algorithms on behaviors and personality traits, which claim success in matching potential partners by the number of successful marriages. Perhaps colleges can also extend the use of personality surveys and psychometric profiles to a specific college program's own personality profile. While STEM (science, technology, engineering and mathematics) programs are traditionally male-dominated, might we be unwittingly losing male applicants by redesigning these programs to attract more women? Further research by grouping students by their personality profiles into selected courses may provide more insight into students' overall satisfaction for the course and college program, as well as their success in their vocations.

According to the NACE report (Koc et al., 2014) young adults ages 25–34 with a bachelor's degree earn 50% more than young adults with a high school diploma. While the increasing enrollment by women should be celebrated, the fact that enrollment by men lags behind women should be of concern to educators and to society. Researchers may wish to investigate this trend by examining the compatibility of gender-oriented personality variables with certain majors and careers.

A major limitation of this study was that the survey was restricted to only undergraduate seniors across the three majors. It does not indicate whether changes in personality occurred over the educational experience unique to each major. It therefore does not answer whether an accounting student, who is outgoing in their junior year, may change this personality trait and become more reserved as they matriculate through their major. However, personality is comprised of traits that are a consistent response to a person's environment and would take considerable time to develop and change. This research was in keeping with Holland's (1985, 1996) theory of vocational choice in which he argues that people enter professions that best match their personalities. Nonetheless, future research should test the possibility that students studying particular subjects would bring about changes in their personalities.

Another limitation of this study is that the research was conducted in one country, the United States. Further investigation is needed to determine the extent to which results can be replicated internationally. Samples may be selected using countries

that differ from one another on a number of key cultural attributes influencing personality. A framework such as Hofstede's cultural dimensions (Hofstede, 2001) may prove useful in selecting schools from various global regions.

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