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## Research notes

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

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## 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 Lakhali, 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 (Lakhali 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

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