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Differences in Personality Factors and College Major Choice

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CHAPTER 1

Overview of the Study

Research Problem

Transitional practices for secondary students moving on to post-secondary education are currently not universal in practice (Young, 2007). While schools are required to provide transition services to students classified with a disability under the Individual with Disabilities Education Improvement Act of 2004 (IDEIA 2004), the breadth and depth of these services are not defined in the law. Transition services may be only minimally supporting students with disabilities and do not usually support regular education students who could also benefit from a transition plan when graduating to post-secondary education. With an increasing demand placed on students to earn a bachelor's degree, secondary students moving on to post-secondary education can only expect to rise in the future.

When students apply to post-secondary university or college, one of the first tasks to complete is choosing an academic major. This can be a life-changing and stressful decision for many people. When students have more knowledge of themselves, their interests, and their tendencies, choosing a major may be less stressful. Career assessments and transition services should encourage career exploration which requires students to have knowledge about oneself

and the world of work. When career assessments provide students with this information, they may be more informed on what major to choose.

Purpose of the Study

The purpose of this study was to look at group differences among college majors and their personality factors as measured by the Sixteen Personality Questionnaire, 5th Edition (16PF-5). It is hypothesized that there will be statistically significant mean differences.

Significance of the Study

If college major groups are significantly different on the 16PF-5 primary factor and global scales, then the implications for practice in transition services and career assessments is vast. If students with certain majors also seem to have significantly different personality types compared to students with different majors, then students in secondary education that take a personality test, such as the 16PF-5 which measures normal personality, can be better informed about which major they best fit. Secondary students often have to apply to schools knowing what they want to major in which can be a very difficult and daunting task. Knowledge about oneself can help inform this major decision. With significant evidence that students in these majors have significantly different personality factors, school psychologists and counselors can help guide students as to what majors will best fit their personality type.

Delimitations of the Study

This study looked at undergraduate students from a Western New York technical university. The students were assessed through archival data from a convenience sample. Part of the sample was taken from a college restoration program at the university and another part of the sample came from general education class volunteers. The study only evaluated mean group differences between college majors and personality factors from the archival data.

Definitions of Terms

The following terms are defined below and will be used throughout the study.

Measures of Normal Personality- Personality assessments, like the 16PF-5 which measures normal-range of personality. In contrast with measures that look at psychopathology, these measures focus on motivating factors, interpersonal skills, and their behavioral tendencies.

Post-secondary Education- This is any education that follows the completion of secondary school. It can include vocational training, undergraduate education, graduate education, and doctoral education.

Transition Services and Planning- A service planning process that is completed by school counselors which guides the student's transition from high school to post-secondary education. This includes, but is not limited to, assessments, training, and a planning process geared at getting students ready for life post-high school.

College Restoration Program- A program implemented at the University that was implemented for students who had failed and when they registered for the university again, they were placed in this program in order to help them be more successful.

CHAPTER 2

Literature Review

The transition planning process has been widely unsuccessful and inconsistent for students transitioning to post-secondary education (Baer, Flexor, & Dennis, 2007). While transition plans are mandated for secondary students with disabilities, the transition plans currently in place require students to blindly direct their future without adequate preparation for the realistic consequences of their decisions. It is not required that secondary schools provide transition services to all students, despite the benefits they could gain. Transition plans should encourage career exploration which requires students to have knowledge about oneself and the world of work. Since the need for individuals to have a college degree increases, adequate preparation for this process for all students transitioning from secondary to post-secondary education is needed. One of the first tasks to complete when applying to or entering a post-secondary institution is choosing a college major. Because career exploration requires increased knowledge about oneself, personality assessment as part of a larger career assessment battery during the transition period could provide the information students need to be successful.

Approximately 68% of the young adult populations are enrolled in a post-secondary school between three to five years after high school graduation while only 27% of youths with disabilities were enrolled at some point in those three to five years (Wagner & Blackorby, 1996).

The college attendance disparity between the typical young adult population and young adults with disabilities has several hypothesized explanations in the research literature. First, the nature of some disabilities has a large impact on a student's success rate in post-secondary school. For example, the majority of the students with disabilities, who did not succeed according to research, had a learning disability, mental retardation or emotional disturbance (Wagner & Blackorby, 1996). These disabilities require a great deal of resources and accommodations at the post-secondary level which are not as easily accessible as they were in high school. Colleges and universities are not required by law to provide services the way that secondary schools are. Resources and accommodations at the post-secondary level are often only accessed through students' self advocacy. They need to identify themselves as someone with a disability and in need of support which is often something they have never experienced or been taught to do before.

Second, a confounding factor for students with disabilities enrolling in post-secondary education, is that there is a relationship between students with disabilities (learning disability, mental retardation and emotional disturbance) and school attendance, in that these students also exhibited the highest dropout rates in high school (Wagner & Blackorby, 1996). This factor greatly impacts the student's ability to pursue post-secondary school at all since the absence of a high school degree makes post-secondary school a near impossible outcome. Wagner and Blackorby (1996) state that only 4% of adolescents with disabilities attended four year colleges. This is a staggeringly small number compared to the majority of students in the general population who attend four-year colleges. Wagner and Blackorby also state that only 12% of youths with disabilities attended two-year colleges. Students with disabilities require additional supports during the transition process to post-secondary education in order to succeed in this

transition. Fortunately, it is required by law that students with disabilities receive additional support. The Individuals with Disabilities Education Improvement Act (IDEIA) of 2004 mandates that transition services are provided for students who are classified with a disability and receive special education.

IDEIA of 2004 defines transition services as a coordinated set of activities for an adolescent with a disability that are designed to be within a results-oriented process, focused on improving the academic and functional achievement of the child with a disability to facilitate the child's movement from school to post-school activities, including post-secondary education, vocational education, integrated employment (including supported employment), continuing and adult education, adult services, independent living, or community participation. IDEIA (2004) further describes that the transition service is based on the individual child's needs, taking into account the child's strengths, preferences, and interests; and includes instruction, related services, community experiences, the development of employment and other post-school adult living objectives, and, when appropriate, acquisition of daily living skills and functional vocational evaluation. Specific transition planning for students with disabilities are mandated to be included in the individualized education plan (IEP) no later than age 16 which was raised from age 14 during the recent reauthorization of this act in 2004 (Madaus & Shaw, 2006). Therefore, timely and effective transition planning is greatly important for the success of students with disabilities moving on to post-secondary education.

Unfortunately, specific regulations on uniform transition services and planning for students in the nation is not specifically explained under IDEIA (2004). Under the law, a "statement of transition needs" is mandated in the student's IEP which should include appropriate and measurable post-secondary goals based upon age appropriate transition

assessments related to training, education, employment, and, where appropriate, independent

living skills as well as the transition services (including courses of study) needed to assist the

child in reaching those goals. There are no regulations about which specific assessments should

be used or any specific standards to how these goals and independent living skills will be

measured. It is questionable whether the effectiveness of transition plans are assessed critically

and may only be done to complete the student's requirements and not to really benefit them.

The actual practice of transition planning in secondary schools is variable. Young (2007)

studied transition practices in secondary schools and looked at whether education preparation

programming was promoting self-determination skills in their students and whether secondary

schools were embracing self-determination skills as a means for successful transition. Self-

determination skills during transition, particularly self-regulation and self-realization within

students were the most important contributors to transition planning knowledge and skills

(Wehmeyer, Palmer, Soukup, Garner, & Lawrence, 2007). Wehmeyer et al. suggest that

involving students in their own transition process and providing them with self-determination

skills to be active members in this process is greatly important. Self-determination is defined by

Algozzine, Browder, Karvonen, Test, and Wood (2001) as "the combination of skills,

knowledge, and beliefs that enable a person to engage in goal-directed, self-regulated,

autonomous behavior". The very nature of the ways in which students will need to access special

support and be independent warrant the need for self-determination skills training. The question

arises though, if students are given interventions for self-determination, are these interventions

effective and widely used? Algozzine et al. (2001) found in their study that interventions of self-

determination are sparse and most interventions are not comprehensive enough to teach the

students a broad range of skills for decision-making, problem solving and self-advocacy that will be needed when they face significant challenges in their future.

Other studies looked at the effectiveness of transition plans in secondary schools. Young (2007) implemented a secondary school survey of ten school districts in southeastern Texas to study the transition practices for students receiving special education services. Specifically, Young (2007) looked at how best practices for transitions were being implemented, including whether a person centered approach is used, whether the students are active decision makers in their individual transition plan (ITP), whether they receive training before their ITP meeting, whether student's preferences and interests reflected in the ITP goals and objectives, and whether the students received instruction in self-determination. Young (2007) found that these best practices associated with self-determination related transition activities were not typically implemented in the school districts surveyed, furthermore, ten out of ten districts did not provide any formal instruction in self-determination.

Two models of transition practices developed by Siegel (1998) and Greene (2003) were looked at in a recent study which researched career paths and transition services of students with disabilities using an interview of 742 students with disabilities in their final year of college and what practices were actually occurring in schools in Ohio (Baer et al., 2007). Both models are evidence based and described as follows: Seigel's (1998) model of transition considered both the intensity of transition supports and the curricular needs of students with disabilities while Greene's (2003) model of transition services emphasizes choices of students with disabilities and the types of services within the school that are needed to support these choices (Baer et al., 2007). Evidently, there is not any one practice or transition model followed by secondary schools nationally. Baer et al. (2007) found that for lower academic achieving students who were

planning to attend college, practices from either Greene or Seigel's models were being used in these schools. Under Seigel's model, transition services should increase and under Greene's model self-determination improvement techniques should be implemented. Therefore, it is evident that although there are evidence based models for best practices in transitions, these models are not universally used or implemented effectively. And in return, many students with disabilities are not provided with the support they need.

While teaching self-determination skills and providing opportunities for students to be active decision makers in their transition opportunities is great for students to become more active in their own process, plans which primarily rely on students to provide direction of their future is problematic as well. In a study on the gender differences experienced for students with disabilities transitioning to post-secondary school and work, the most important limitation in this study is that on many survey items, the participants' responses indicated that transition needs, expectations, and experiences transcend gender (Hogansen, Greenen, Powers, & Gil-Kashiwabara, 2008). Therefore, all of the students with disabilities studied experienced difficulty becoming active members in their transition to participate effectively in the process and thus, their transition needs were unable to be met. One possible reason for unsuccessful transition plans is that when they are student-directed and when they are asked what they want out of life and their future, these students are not always provided with adequate knowledge about themselves and the world of work to answer these questions realistically.

Janiga and Constenbader (2005) studied the perception of transition services that students with disabilities received by surveying coordinators of special education of colleges and universities in New York State. They found that while secondary schools provided updated evaluation information, the coordinators overall perception of transition services was negative

and they defined the plan's biggest weakness as not providing adequate self-advocacy training in students moving on to post-secondary education (Janiga & Constebader, 2005). Students who need accommodations and special services at post-secondary institutions must be self-advocates for themselves since these schools are not legally required to provide the same services as high schools are since IDEIA 2004 does not apply to young adults after they graduate high school. Appropriate assessment provides students with knowledge about themselves and education of how to be self-advocates and realistic decision-makers of their future.

When an ITP is developed, specific assessment of the student's goals and objectives are required by IDEIA 2004. Stillington and Clark (2007) recommended selected areas of transition planning which are basic for minimal compliance of appropriate assessment and these areas include: interests, preferences, cognitive development and academic achievement performance, adaptive behavior, interpersonal relationship skills, emotional development and mental health, employability and vocational skills and preparation skills for community living. Appropriate assessments of these areas are vital for appropriate transition planning. As research shows, the student's involvement in the process and the degree to which they are active members in the process is greatly important for student success. One study outlines recommendations of transition assessments. Stillington and Clark (2007) stress the importance of transition assessment be seen as an ongoing process that is closely related to the IEP for success of the individual's educational preparation.

The particular assessment measures to be used in this process are not uniformly used in research or secondary school practice. IDEIA 2004 suggests that the assessments used for transition practice should include tests (standardized and non-standardized), interviews, direct observations, and curriculum based measurement (Clark, 1996). However, they do not include

what specific measurements to use or how to assess certain aspects of an individual's interests, preferences, interpersonal skills or emotional development. Increasing a student's awareness of their own tendencies may also increase their participation, self-determination and active membership in their ITP. When the transition process engages the student with real life questions about their future and how they can realistically approach life's growing demands, it provides a wake-up call that typical psycho-educational assessment cannot do (Clark, 1996). Therefore, the more knowledge students have about their realistic career goals and the active participating role they play in this process makes them more able to make the many life-changing decisions they will need to make as they pursue their post-secondary goals.

Clark (1996) recommends that transition assessment include questions that require students to answer key questions about their ITP including; who they are, what they want in life now and in the future, and what barriers will they face? Clark also recommends that the transition assessment should be an ongoing process, that schools use multiple types and levels of assessment, use efficient and effective assessment procedures, organize assessment data for easy access in the IEP, have someone in the school responsible for the transition assessment and lastly, that the assessment process is appropriate regarding the student's culture and language. These recommendations provide well developed guidelines of assessment practices but still do not make specific recommendations of the best assessment battery to use. Suggestions for future research in the article state that finding an assessment battery that has better outcomes for students will be the next step. Therefore, research confirms that if assessment helps students who are deciding their future, to be more educated about themselves and the world of work, then they can make better self-directed decisions throughout their transition planning.

Powers, Gil-Kashawabara, Grennen, Powers, Balandran, and Palmer (2005) studied two large urban school districts in western United States and they randomly selected 322 IEP's of students in these districts. Powers et al. found that students were expected to carry out their own action steps for transition goals when the student had never actually signed the IEP, had little to no training in self-determination or access to resources in order to do so effectively. Powers et al. defines that one important implication of their study is that secondary schools cannot expect students to carry out transition preparation activities without adequate training and supports to do so. Thus, relying on students to say what they want from their future, and to expect them to carry out steps toward their future with little support or access to resources does not seem to provide them with adequate assistance to succeed. Suitable assessments could provide students with information about themselves and realistic expectations of their future.

Career assessment batteries that provide opportunities for the student to learn more about themselves and their normal personality traits may be beneficial for the student to make realistic and educated decisions about their future. The Sixteen Personality Factors Questionnaire, 5th Edition (Cattell, Cattell, & Cattell, 1993) (16PF-5) is a personality assessment that provides a comprehensive measure of normal personality which has found to be effective in settings where an in-depth assessment of the whole person is needed (Cattell & Mead, 2008). This tool could be an important addition to a career assessment battery within a transition plan that specifically gives the student knowledge about their personality and what environments they will fit best. Similarly, the concept of person and environmental fit requires an individual to gain a better perspective and pick an environment that best suits them. Porter and Umbuch (2006) describe person-environment fit as the result of an interaction between individuals and their environment in which individuals choose academic environments that are compatible with their personality

types and they suggest that congruence between person and environment are related to higher levels of educational stability. Therefore, increased knowledge about oneself and the environment that best fits their tendencies can help inform student's decisions during transition.

It is very possible that all students can benefit from this process of learning about themselves and the environments that will be most appropriate for them to thrive for career exploration. Halpern (1994) explains that the transition from high school to post-secondary life is a turbulent time for all adolescents, with or without disabilities, and also implies that high schools need to provide appropriate transition practices for all students and the importance of creating an environment for them to work together to address transition issues and common concerns. With an effective transition plan, students with disabilities and students in regular education would benefit when they are educated and informed of how to make data based decisions about their future. Since IDEIA 2004 only requires transition plans for students with disabilities, minimal research (Baer et al., 2007; Young, 2007; Blackorby & Wagner, 1996) looks at transition best practices for all students.

With the changing economy and young adults' increased need for a post-secondary education for their vocational future, the need for secondary students to move on to colleges and universities, with or without disabilities, continues to increase. When students in high school move on to post-secondary education, choosing a major is one of the first, and most life-changing tasks to complete. Porter and Umbach (2006) discuss that the impact of college major choice lasts beyond just what the student learns and their satisfaction in college but that carries opportunities and rewards such as job salaries, job stability and job satisfaction that are greatly impacted by this choice. While some schools insist that the student must apply to schools with a major already chosen, other schools accept students who are "undecided." Choosing a major

before even attending a college or university puts the student on a trajectory to graduation that is sometimes difficult to change from without extending undergraduate school beyond the typical four years to complete a degree. Therefore, once on this trajectory, it can be difficult to come off and start a whole new one.

College major choice is a significant decision for any young adult to make. There are many factors to consider when figuring out which school is best and what major will best suit a young adult's interest. Arcidiacono (2003) reveals that college major choice follows a dynamic model and the factors students are most concerned about include monetary returns, workplace preferences, and subjects they prefer to study. These factors all combine in a dynamic way which can be stressful and difficult for adolescents to truly understand. One study looked at the decision-making practices of 120 Israeli high school seniors in Tel Aviv choosing a major for their last two years in school and they were given five choices: geography, literature, Arabic, natural sciences, and social sciences (Shiloh, Koren, & Zakay, 2000). While these practices of a "high school major" do not exist in the United States, the researchers found interesting information that relates to the similar experiences of students in the U.S. choosing a college major.

The researchers found through questionnaires of the students that they would weigh the positives and negatives of each major or sometimes rationalized why to choose each major but in the end, the decision-making process of choosing a major is complex, stressful, and a significant life-changing event that was personally different for each student (Shiloh, Koren, & Zakay, 2000). Shiloh et al. (2000) found that the decision making process in the adolescent's studied were largely variable and each student approached the process in different ways. Interestingly, Shiloh et al. also found that there is a critical period in the process of the decision making where

social and interpersonal factors interfere with the individual's natural decision making process.

Early in the process, decisions are based mainly from individual differences but soon after, the

decision making process is influenced by people who perceive and construct it. Therefore,

increased knowledge about oneself and one's tendencies could help improve this dynamic and

life-changing decision

Additional studies have looked at the influences on undergraduate students' choice of

majors. One study surveyed business students, at a large northeastern university, to find out

general factors that influence major choice and the researchers found that interest was the most

important factor contributing to major choice for incoming freshmen regardless of gender

(Malgwi, Howe, & Burnaby, 2005). Transition plans which provide students with knowledge

about their career interests could be beneficial. Malgwi, Howe and Burnaby (2005) also found

that some gender differences did occur when choosing a major. Women were most influenced in

choosing a major based on their level of aptitude in the subject, and men were influenced to

choose a major based on career advancement, job opportunities, and level of compensation.

These gender differences are interesting and influential in the decision making process of

choosing a major during transition. Although these findings are interesting and significant, they

only apply to business majors rather than widespread university students since only business

students were surveyed in this study.

Another study which looked at major choice in early undergraduate school surveyed 111

college students, from two Minnesota liberal arts colleges, in their 1st year and again one year

later about their academic major-decision. They were required to list criteria and alternatives

under consideration during their major-decision, rate the importance of each, and give overall

impressions of each alternative (Galotti, 1998). The researcher found that making this decision is

life-changing, complex, and difficult one for college students to make. Specifically, the researcher describes that confidence and comfort with the decision-making process were not correlated with measures of rational decision making, suggesting that students may have maladaptive expectations about what effective real-life decision making should be (Galotti, 1998). This was the most significant finding because it indicates that many post-secondary students are not ready to make such a life-changing and complex decision which puts them on a fast trajectory towards their future. Galotti's findings are significant because it suggests to educators and counselors supporting students in transition to recognize the stress and difficulty that students experience, assure students that it is "normal" to change one's thinking and lastly, reassure students who do take the time to consider many options or to weigh many criteria that the processes in which they are engaging reflects effective decision-making. Since the choice of major is a significant decision making process, the results of this study and the researcher's recommendations are helpful to those supporting students in transition.

There is some literature suggesting that personality type can influence college major choice. Norman and Redlo (1952), in the mid-twentieth century, looked at how the individuals with certain personality patterns gravitate towards certain majors and also whether there are certain "personality" demands among some occupations. The researchers studied 149 male seniors from the University of New Mexico who were given the Minnesota Multiphasic Personality Inventory (MMPI) and completed a seven point questionnaire rating their satisfaction with their major. The researchers found that the MMPI was a valid measure for distinguishing trends among majors and when individuals were more satisfied with their majors (Norman & Redlo, 1952). Interestingly, students who were most strongly exhibiting personality trends common for their major were also most satisfied and students who were less satisfied or changed

majors were less strongly exhibiting the personality trends common of others in their major (Norman & Redlo, 1952). These findings are significant and provide promising results of personality trends within academic majors, yet it's generalizability to career assessments was unsubstantiated.

Norman and Redlo's (1952) results suggest that personality tests may predict which majors students will be most satisfied in as well but there are some limitations and problems with the generalizability of these findings. First of all, the participants are all male and the study was conducted in the 1950's which makes the findings difficult to apply to women and undergraduates in the twenty-first century. Also, the researchers used the MMPI which measures adult psychopathology. Currently it is widely used to diagnose adult psychopathology and appropriate treatment options but is not a measure or normal personality traits as it may have been used in the 1950's. In a similar study by Goldschmid (1967), the researcher looked at college major choice and the predictive nature of personality tests. The researcher gave five personality tests to undergraduate freshmen in universities on the west coast of the USA. The tests used in the study included the California Psychological Inventory (CPI), the MMPI, the Myers-Briggs Type Indicator (MBTI), the Omnibus Personality Inventory (OPI), and the Strong Vocational Interest Bank (SVIB). The researchers found that again, particular personality patterns are associated with educational choice. While the personality inventories used were more widespread measures of personality than the previous study, the results may be significantly outdated to the experiences of undergraduates in the twenty-first century.

Kipnis, Lane and Berger (1967) researched character structure, vocational interest, and achievement in predicting college major choice. The researchers found that impulsive and restless persons are less attracted to occupations that require day-to-day persistence and study

which are related to mathematic and physical science majors. They also found that low-impulsive students sought out majors that allowed them to express their personalities through an intellectual or scientific environment and high impulsive students were more attracted to business majors (Kipnis, Lane & Berger). While these findings are interesting, it is difficult to relate the major choices of college students in 1967 to the major choices of students in 2010. Similarly, Morrow (1971) studied the effectiveness of Holland's theory of vocational choice (1964) for predicting satisfaction with college students' major choice. They looked at students who were majoring in mathematics and sociology at a university in the sounthern region of the USA. They found that satisfaction with a major was highly correlated with personality type for mathematics majors but not for sociology majors and they concluded that this meant that sociology majors may possess varying personality types and still be satisfied with their major choice (Morrow, 1971). Again, the major choice and satisfaction for 1971 vary greatly from 2010. Also, the concept of personality and what makes up an individual has greatly changed since the early 1970's.

Porter and Umbach (2006) used Holland's theory of careers, to analyze college major choice using the Cooperative Institutional Research Program (CIRP) Student Information Form and institutional data for first-year students at a selective liberal arts college to study the factors that affect college major choice, both at entry and at graduation. The researchers looked at demographics, parental influence, academic preparation, future views of the academic career, political views and personality as measured by Holland's theory (Porter & Umbach, 2006). The researchers found that more than any other factor, political views and Holland personality scales are very strong predictors of student major choice (Porter & Umbach, 2006). Holland's personality types of Realistic, Investigative, Enterprising, Social, Artistic and Conventional are

measured through a questionnaire of the student's preferred activities, interests, and competencies.

Holland's personality questionnaire however, does not give the individual an overall measure of their personality but rather a personality measure based on preferred activities, interests and competencies. It makes intuitive sense that Holland's personality types would provide strong predictors of major choice since they are already used to be predictors of occupations. The 16PF-5 profiles are generally consistent with Holland's theory of personality types. However, Cattell and Schuerger (2003) explain that when interpreting a student's 16PF-5 scores to the Holland occupational types and within specific occupations, people will differ from one another in personality depending on job functions and settings. Therefore the 16PF-5 gives the individual a comprehensive view of their entire personality through sixteen personality factors which correlate to the Big Five ideas of personality including openness (toughmindedness), conscientiousness (self control), extroversion (extroversion), agreeableness (independence) and neuroticism (anxiety). Therefore the multitude of information that the 16PF gives is much larger and much more complex than Holland's theory.

One study did look at the interrelationships of college major choice between, the American College Testing (ACT) and the 16PF-5. The researchers, specifically, wanted to investigate the relationship between academic potential and personality factors to the choice of major in college by analyzing the usefulness of the ACT and the 16PF as tools for discriminating between students who had decided or undecided majors (Wikoff & Kafka, 1978). Although the study used the 16PF which is a measure of normal personality, the study did not find significant results. They did find that the ACT and the 16PF were indicative of academic potential but the results do not imply that the ACT and 16PF are indicative of success (Wikoff & Kafka, 1978).

Therefore although they used a normal personality test in relation to college major choice, they did not look at differences among majors or prediction of the 16PF on major choices.

   The research shows that transition plans and career assessments are currently ineffective, not universally used and not as helpful for students moving on to post-secondary education as they could me (Baer et al., 2007). When entering undergraduate post-secondary school, one of the first tasks to complete is choosing an academic major, and this decision can be a significant, life-changing decision. In order to relieve stress and provide students with adequate preparation for the decisions students will make in post-secondary school, adequate transition plans could provide this support. Since choosing a major is one of the most important decisions to make in post-secondary education, career assessments which help undergraduates make this decision and understand more about themselves would be greatly beneficial.

   Presently, research does not indicate any one effective way to prepare secondary students for this significant decision during transition. Although there is some research indicating that personality traits relate to particular majors, the research is outdated and has limited applicability to the present population of undergraduates. Therefore, more research is needed to look at the differences in normal personality factors among students with different college majors. This investigation could provide evidence for the usefulness of personality tests during transition planning to help students learn more about themselves and choose an academic major in the future.

CHAPTER 3

Method

Participants

The current study analyzed archival data that was collected as part of a previous study. Two groups of college undergraduate students from a western New York technical university participated in the study. One group was enrolled in a college restoration program (CRP) and a second group consisted of undergraduate volunteers (n=212, both groups combined). The demographic information collected on the students in the study included gender and major. There were many more male (n=177) than female (n=35) participants, which approximates the male to female ratio at the university (68% male). Approximately 64 different majors are represented by participants in the study. Anonymity was maintained as data was previously coded without linking it to original names. The university's Institutional Review Board (IRB) approved collection of this data for study.

Measures

The 16PF-5 (Cattell, Cattell & Cattell, 1993) is a 185 item multiple choice personality test that measures normal personality. The 16PF-5 has sixteen primary factor scales and five global factor scales. The sixteen primary scales and global scales produce standard-ten (Sten) scores. Sten scores range from 1 to 10 with a mean of 5.5 and a standard deviation of 2. Scores of 1-4 are considered low on the factor scales and scores of 7-10 are high on the factor scales. The 16PF-5 has a fifth grade reading level and can only be administered to people 16 years of age and older. Internal consistency and test-retest reliability ranged from .68 to .91. Construct

validity has also been established through factor analysis. The 16PF-5 is an appropriate tool for measuring normal personality and can be used in clinical and counseling settings, employment and career settings, as well as research and education settings (Cattell & Schuerger, 2003).

Procedures

When the archival data was collected students in both the college restoration program (CRP) and the student volunteers were given the 16PF-5 in group format. The participants were also required to provide their gender and major. Data was collected during the 2007-2008 school year. Student volunteer data was also collected during summer of 2008. The participants in the CRP completed the test as a requirement for the restoration program. The volunteers were offered an incentive of extra credit points in their general education psychology class and a Ben and Jerry's gift certificate. The tests were scored by a school psychology faculty member and trained graduate assistants. The student's majors were collapsed into seven groups because they belonged to specific schools within the technical university where the research was conducted (see Appendix 1). The seven groups included College of Information Sciences (n=67), College of Imaging Arts and Sciences (n=16), College of Applied Science and Technology (n=35), College of Science (n=12), College of Engineering (n=49), College of Business (n=17), and College of Liberal Arts (n=16).

Data Collection and Analysis

The archival data was analyzed based on the results of the participants' primary and global sten scores on the 16PF-5 and their major choice. Multivaritate analyses of variance were conducted for both the primary factors and global factors. Univariate analyses of variance were conducted for each factor along with additional post hoc analyses.

CHAPTER 4

Results

A multivariate analysis of variance (MANOVA) was conducted to compare mean differences for major groups on both the primary and global factors of the 16PF-5. Descriptive statistics for the 16PF-5 primary factors are shown in Table 1. A significant one-way MANOVA resulted for the primary factors ($\lambda = .445$, $F(6,211) = 1.735$, $p = .000$). One way analyses of variances (ANOVA) were conducted for each of the 16 primary factors. Across group means, eight primary factors showed significant differences: Warmth ($F(6,211) = 3.411$, $p = .003$), Reasoning ($F(6,211) = 4.588$, $p = .000$), Dominance ($F(6,211) = 2.491$, $p = .024$), Rule Consciousness ($F(6,211) = 2.881$, $p = .010$,), Social Boldness ($F(6,211) = 3.070$, $p = .007$), Sensitivity ($F(6,211) = 5.342$, $p = .000$), Abstractedness ($F(6,211) = 2.884$, $p = .010$) and Perfectionism ($F(6,211) = 3.246$, $p = .005$).

Post-Hoc tests were conducted using the Student-Newman-Keuls (SNK) procedure to determine which major groups had significant differences among the primary factors as shown in Table 2. Results of the post hoc test indicated that students from the College of Engineering scored statistically significantly lower on Warmth compared to students from the College of Imaging Arts and Sciences and the College of Business. With regards to Reasoning, Students from the College of Science, College of Information Sciences and the College of Engineering scored statistically higher than students in the College of Liberal Arts. Lastly, post hoc tests indicated that students from the College of Imaging Arts and Sciences scored higher in Sensitivity than students from the College of Engineering, the College of Applied Science and Technology, and the College of Science. Additionally, the students from the College of Liberal Arts scored statistically higher in Sensitivity than the College of Engineering.

A second one-way MANOVA was conducted to compare the major group means among the global factors on the 16PF-5. Descriptive statistics for the 16PF-5 global factors are shown in Table 3. A significant difference was found ($\lambda = .445$, $F_{(6,211)} = 2.314$, $p = .000$). One way analyses of variances (ANOVA) were conducted for each of the five global factors. There were significant mean differences for four of the five global factors including Extroversion ($F_{(6,211)} = 2.469$, $p = .025$), Tough Mindedness ($F_{(6,211)} = 3.410$, $p = .003$), Independence ($F_{(6,211)} = 2.707$, $p = .015$), and Self Control ($F_{(6,211)} = 3.272$, $p = .004$).

Post-Hoc tests were conducted using the SNK procedure to determine which major groups had significant differences among the global factors as shown in Table 4. Results of the post hoc tests indicate that students from the College of Imaging Arts and Sciences and the College of Liberal Arts scored significantly lower than students from the College of Science on the global factor of Tough-Mindedness. For Independence, students from the College of Liberal Arts score statistically higher than students from the College of Science. Lastly, students from the School of Business scored exceedingly higher than students from the College of Imaging Arts and Sciences on Self-Control.

CHAPTER 5

Discussion

Statistically significant differences were found among the different schools within the technical university studied between group means on the primary and global factors of the 16PF-5. Tendencies can be inferred from the results of this study. Primary factors of Warmth, Reasoning, Dominance, Social Boldness, Sensitivity, Abstractedness, and Perfectionism tend to stand out as factors which are related to students choosing an academic major. Unfortunately due to the differing sample sizes and the groupings of the majors into their respective colleges, power was lost in determining where each factor has significance within major groups. Some interesting findings were found that can implicate which majors students may be interested in pursuing based on their personality profile.

In terms of Warmth, students who score high on this factor tend to be caring, sympathetic, and generous while students who score low on this factor tend to be reserved, aloof and impersonal (Cattell & Schuerger, 2003). According to the results of the current study students who score higher on Warmth may be more attracted to majors within the College of Business or the College of Information Sciences while students who score lower on Warmth may be more interested in majors within the College of Engineering.

For students who score high on Reasoning, which includes abstract reasoning ability, good problem solving skills, and performs well in academic settings (Cattell & Schuerger, 2003), these young adults may be more attracted to majors within the College of Science, Engineering or Information Sciences. Students who score low on Reasoning may tend to have low abstract reasoning and may be more inclined to majors within the College of Liberal Arts. The primary factor of Sensitivity describes that students who score high on this factor may be emotionally

sensitive, aesthetic, empathic, artistic, and sentimental (Cattell & Schuerger, 2003); results of the

current study indicate that these students may be attracted to majors within the College of

Imaging Arts and Sciences and the College of Liberal Arts. Students low in Sensitivity tends to

be unsentimental, objective, realistic, and acting on facts and logic (Cattell & Schuerger, 2003).

These students may be interested in pursuing majors within the College of Engineering, the

College of Applied Science and Technology and the College of Science.

The global factors resulted in some interesting and inferential findings as well.

Extroversion, Tough Mindedness, Independence and Self Control were all considered

statistically significant factors in differentiating between the seven major groups. Results of the

current study indicate that students high in Tough Mindedness score lower in the primary factors

of Warmth, Sensitivity, Abstractedness and Openness to Change. In other words, these students

tend to be reserved, impersonal, utilitarian, practical, solution oriented and traditional. Students

high on this global factor may be attracted to majors within the College of Science. Students low

in Tough-Mindedness in contrast are warm, outgoing, sensitive, aesthetic, abstracted,

imaginative, and open to change and as a result score high on the above primary factors. These

students may be interested in pursuing a major within the College of Imaging Arts and Sciences

and the College of Liberal Arts. Similarly, Rottinghaus, Lindley, Green and Borgen (2002) found

that the Big Five personality measure correlated to Openness to Experience, were related to

Artistic types on the Holland Personality measure. Therefore an ability to be open to new

experiences and change is related to artistic interests, as shown in the current study.

Students who score high on the global factor of Independence tend to also score high on

the primary factors of Dominance, Social Boldness, Vigilance and Openness to Change. In other

words they tend to be forceful, assertive, bold, venturesome, suspicious, skeptical, and

experimenting and these students may be interested in pursuing majors within the College of Liberal Arts. Students who score low on this factor tend to be accommodating, cooperative, avoid conflict, shy, trusting, unsuspecting, and traditional, as well as score low on the above primary factors. These students may be attracted to majors within the College of Science.

The global factor of Self Control is categorized with primary factors that are low on liveliness, high on rule consciousness, low on abstractedness and high in perfectionism. These students tend to be contentious, serious, dutiful, practical, solution-oriented, organized and self-disciplined. According to the current research, these students may be attracted to majors within the College of Business. Students who score low on self control in contrast are high on liveliness, low on rule consciousness, high on abstractedness and low in perfectionism. They tend to lack restraint, they are animated, spontaneous, nonconforming, imaginative, idea-oriented and flexible. They may be attracted to majors within the College of Imaging Arts and Sciences. In contrast, Kipnis and Lane (1967) found that high impulsive students pursued business majors which would relate to low self control. The researcher can explain this difference with the changing demands and expectations of business students in the past forty years. High risk business has been shown historically to be less successful today and thus more practical, perfectionist and low impulsive emerging adults may be more likely to pursue business.

The current study has implications for school psychologists and school counselors working with students transitioning from high school to post secondary education. Considering the 16PF-5 as a vital addition to transition planning, assessment procedures could be beneficial in helping students figure out which college to apply to within a university. The current thesis offers a possibility in breaking down differences between majors. According to the results of the current study, individuals in certain schools within a university tend to be high or low on primary

and global factors on the 16PF-5 which indicates that students with similar personality traits may also be attracted to these majors. In other words, certain schools within universities may provide an appropriate personality-environment fit.

In addition, the 16PF-5 as an assessment procedure in the transition planning process could fit the requirements of the IDEIA. According to IDEIA, transition planning is to be a coordinated set of activities in a results-oriented process, including assessment data collected in high school, particularly for expectations for disability documentation in post secondary institutions (Madaus & Shaw, 2006). Therefore, school psychologists in secondary education, could administer the 16PF-5, or a similar normal personality test to be used as a specific transition goal and activity to meet the "necessary transition assessment" component of the law.

The limitations of the current study are that the sample data was taken from a previously collected convenience sample. Additionally, the data analyzed was from archival data and consistency of administration cannot be determined. Although the sample approximates the current ratio of the institution of which the data was collected, the gender of the participants is largely male. Another possible limitation of the study is that the data was collected from a technical university and therefore the majors that were included in the study were highly populated by computer science, software engineering, electrical and mechanical engineering and other technical majors that are common within the university. This resulted in uneven sample sizes within each college at the university. Also, by grouping the majors into their respective colleges, some power was lost.

Future research could look at more a more widespread and even sample which would break down particular majors and not just particular colleges within a university. With a more diverse and evenly divided sample, conclusions about individual majors could be made.

Additionally, coordinating the 16PF-5 and student's Holland code between college majors could provide even more beneficial information among student's differences. Lastly, since self-determination traits and practices are helpful during the transition practice, especially for students with disabilities, correlating these factors with the 16PF-5 could give counselors and educators working with secondary students a greater breadth of information to help students with this life changing decision. Using the 16PF-5 in a research study, as a piece of the transition practice and studying the effectiveness, long-term success and individual benefits could give educators a greater perception of its usefulness and application in transition assessment batteries.

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Table 1.

Means and Standard Deviations of Primary Factors on the 16PF-5 Questionnaire

	School Colleges												
	COIS n= 67		COIAS n=16		COAST n=36		COS n=12		COE n=49		COB n=17		COLA n=16	
16PF-5 Primary Factors	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
A	4.6	1.9	5.8	1.7	4.9	1.9	5.2	2.0	4.1	1.3	5.8	1.8	5.2	1.4
B	6.7	1.6	6.1	1.5	5.6	1.5	5.7	1.6	6.8	1.6	5.5	1.9	5.1	2.2
C	4.2	1.9	3.8	1.2	4.8	1.8	4.2	1.9	4.4	1.8	4.8	1.7	3.8	1.5
E	4.6	1.8	5.4	1.5	5.0	1.4	4.5	1.0	5.5	1.6	5.3	1.5	5.8	1.3
F	5.8	1.9	6.9	2.0	6.5	1.5	6.5	2.2	6.2	1.8	6.8	1.8	6.6	1.6
G	3.5	1.4	3.4	1.6	4.3	1.5	4.3	1.7	4.2	1.6	4.8	1.9	3.5	1.3
H	4.6	2.1	6.3	2.0	5.1	2.0	5.0	2.1	5.5	2.2	6.2	1.3	6.2	1.9
I	6.0	1.3	6.6	2.1	5.1	1.8	5.2	1.5	4.8	1.5	5.4	1.3	6.3	1.5
L	6.8	2.0	6.6	1.5	7.0	1.3	6.8	1.3	6.7	1.5	6.2	1.2	7.1	1.4
M	7.3	1.4	7.4	0.7	6.4	1.3	6.5	1.2	7.2	1.3	6.2	1.8	7.1	1.4
N	6.2	1.6	5.6	2.3	6.1	1.5	5.7	1.8	6.1	1.9	5.1	1.6	5.4	1.7
O	6.1	2.0	6.3	1.6	6.2	1.5	6.1	1.4	6.1	1.4	5.9	1.4	5.8	0.9
Q1	6.1	1.6	6.0	1.1	5.9	1.6	5.3	1.6	6.1	1.9	5.9	1.7	6.3	1.3
Q2	5.9	1.7	5.6	1.6	5.4	1.5	5.9	0.9	5.5	1.6	5.1	2.2	5.8	1.3
Q3	3.7	1.7	3.9	1.9	4.9	1.9	4.7	1.4	4.5	1.9	5.3	1.5	4.1	1.6
Q4	5.3	1.4	5.8	1.1	5.9	1.4	5.3	0.6	5.6	1.3	5.0	1.2	5.7	1.5

Note. Mean based on Sten Scores 1-10. M = Mean, SD = Standard Deviation, 16PF = Sixteen Personality Factors Questionnaire, M = Mean, SD = Standard Deviation, COIS: College of

Information Sciences, COIAS: College of Imaging Arts and Sciences, COAST: College of Applied Science and Technology, COS: College of Science, COE: College of Engineering, COB: College of Business, COLA: College of Liberal Arts, A = Warmth, B = Reasoning, C = Emotional Stability, E = Dominance, F = Liveliness, G = Rule Consciousness, H = Social Boldness, I = Sensitivity, L = Vigilance, M = Abstractedness, N = Privateness, O = Apprehension, Q1= Openness to Change, Q2 = Self Reliance, Q3 = Perfectionism, Q4 = Tension.

Table 2.

Post Hoc Analyses on the 16PF-5 Primary Factors that had Significant Differences.

16PF-5 Primary Factors	School Colleges						
	COIS n= 67 M	COIAS n=16 M	COAST n=36 M	COS n=36 M	COE n=49 M	COB n=17 M	COLA n=17 M
A: Warmth	4.6_{ab}	5.8_b	4.9_{ab}	5.2_{ab}	4.1_a	5.8_b	5.2_{ab}
B: Reasoning	6.7_b	6.1_{ab}	5.6_{ab}	6.7_b	6.8_b	5.5_{ab}	5.1_a
E: Dominance	4.6	5.4	5.0	4.5	5.5	5.3	5.8
G: Rule Consciousness	3.5	3.4	4.3	4.3	4.2	4.8	3.5
H: Social Boldness	4.6	6.3	5.1	5.0	5.5	6.2	6.2
I: Sensitivity	5.9_{abc}	6.6_c	5.1_{ab}	5.2_{ab}	4.8_a	5.4_{abc}	6.3_{bc}
M: Abstractness	7.3	7.4	6.4	6.5	7.2	6.2	7.1
Q3: Perfectionism	3.7	3.9	4.9	4.7	4.5	5.3	4.1

Note: The subscripts above mean that they are not sharing the same means and there is a statistically significant difference. Mean is based on sten scores. M = Mean, COIS: College of Information Sciences, COIAS: College of Imaging Arts and Sciences, COAST: College of Applied Science and Technology, COS: College of Science, COE: College of Engineering, COB: College of Business, COLA: College of Liberal Arts

Table 3.

Means and Standard Deviations of Global Factors on the 16PF-5 Questionnaire

16PF-5 Global Factors	School Colleges												
	COIS n= 67		COIAS n= 16		COAST n= 36		COS n= 12		COE n= 49		COB n= 17		COLA n= 16	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
EX	4.2	1.9	6.0	2.3	5.4	1.6	5.4	1.8	5.2	1.8	6.5	1.9	5.8	1.8
AX	6.5	2.0	6.8	1.2	6.7	1.6	6.5	1.6	5.8	1.5	6.8	1.5	5.1	2.2
TM	4.7	1.5	4.2	1.6	5.4	1.6	5.7	1.4	5.4	1.5	5.2	1.4	4.3	1.2
IN	5.2	1.9	6.2	1.6	5.4	1.5	5.0	1.4	5.9	1.5	5.9	1.5	6.4	1.6
SC	3.5	1.3	3.3	1.8	4.4	1.4	4.2	1.3	3.9	1.6	4.7	1.7	3.5	1.2

Note. Mean based on Sten Scores 1-10. M = Mean, SD = Standard Deviation, 16PF = Sixteen Personality Factors Questionnaire, M = Mean, SD = Standard Deviation, COIS: College of Information Sciences, COIAS: College of Imaging Arts and Sciences, COAST: College of Applied Science and Technology, COS: College of Science, COE: College of Engineering, COB: College of Business, COLA: College of Liberal Arts, EX = Extroversion, AX = Anxiety, TM = Tough Mindedness, IN = Independence, SC = Self Control

Table 4.

Post Hoc Analyses on the 16PF-5 Global Factors that had Significant Differences.

16PF-5 Global Factors	School Colleges						
	COIS	COIAS	COAST	COS	COE	COB	COLA
	n= 67	n=16	n=36	n=36	n=49	n=17	n=17
	M	M	M	M	M	M	M
EX: Extroversion	4.2	6.0	5.4	5.4	5.2	6.5	5.8
TM: Tough Mindedness	4.7_{ab}	4.2_a	5.4_{ab}	5.7_b	5.4_{ab}	5.2_{ab}	4.3_a
IN: Independence	5.2_{ab}	6.2_{ab}	5.4_{ab}	5.0_a	5.9_{ab}	5.9_{ab}	6.4_b
SC: Self Control	3.5_{ab}	3.3_a	4.4_{ab}	4.2_{ab}	3.9_{ab}	4.7_b	3.5_{ab}

Note: The subscripts above mean that they are not sharing the same means and there is a statistically significant difference. Mean is based on sten scores. M = Mean, COIS: College of Information Sciences, COIAS: College of Imaging Arts and Sciences, COAST: College of Applied Science and Technology, COS: College of Science, COE: College of Engineering, COB: College of Business, COLA: College of Liberal Arts.

Appendix

College Major Groups	Majors	*n*
College of Information Sciences (COIS)	Applied Network & Systems Information Technology New Media Information Technology Computer Science Software Engineering	67
College of Imaging Arts and Sciences (COIAS)	Film and Video Photography Professional Photography Illustration New Media Design and Imaging New Media Publishing Animation Industrial Design Metal Crafts and Jewelry Graphic Media Graphic Design	16
College of Applied Science and Technology (COAST)	Applied Arts and Sciences Packaging Science Multidisciplinary Pre-Med Creative Writing Literature Manufacturing Engineering Technology Civil Engineering Technology Electrical Engineering Technology Mechanical Engineering Technology Computer Engineering Technology	35
College of Science (COS)	Applied Mathematics Science Exploration Polymer Chemistry Bioinformatics Chemistry Biotechnology Physician Assistant Biochemistry	12
College of Engineering (COE)	Industrial Engineering Computer Engineering Mechanical Engineering Electrical Engineering Undeclared Engineering	49

College of Business (COB)	Management Information Sciences Business Management Accounting Finance Marketing Graphic Media Marketing International Business	17
College of Liberal Arts (COLA)	RIT Exploration Psychology Professional and Technical Communication Criminal Justice Economics Advertising and Public Relations	16