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Personality Measures

and

Academic Specialization

in Cegep Students

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A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfilment of the requirements of the degree of Master of Arts in Educational Psychology.

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Abstract

The main purpose of the present investigation was to compare the personality traits of cegep students enrolled in arts, sciences, and social sciences. In addition, the influence of gender on personality was examined, as well as its interaction with academic specialization. Finally, exploratory research was conducted to study the influence of selected socio-demographic variables on personality configuration.

Participants were asked to complete a socio-demographic questionnaire as well as the French research translation of the NEO-Five Factor Inventory (NEO-FFI), which measures the five basic dimensions of personality. Thus, another purpose of this study was to provide validational information for the latter instrument.

Results indicated that arts students score significantly lower on Extraversion than science and social science students. Furthermore, females were shown to score significantly higher than males on measures of Neuroticism, Extraversion, and Conscientiouness. In addition, the interaction of program specialization and gender was shown to be significant on the Openness to experience scale. Exploratory research

indicated that students whose parents have a higher occupational level scored significantly higher than other students on measures of Openness to experience. Finally, the internal consistency of each scale and correlations between the scales of the instrument were calculated. The implications of our results were subsequently discussed, as well as potential issues for future research.

Résumé

L'objectif principal de la présente enquête consistait à comparer les traits de personnalité d'étudiants de niveau cégep en arts, en sciences, et en sciences sociales. De plus, l'influence du sexe sur la personnalité a été examinée, ainsi que son interaction avec le domaine de spécialisation académique. Enfin, une enquête exploratoire a permis d'étudier l'influence de certaines variables socio-démographiques sur la configuration de la personnalité.

Les participants ont complété un questionnaire socio-démographique ainsi que la traduction française provisoire du « NEO-Five Factor Inventory » (NEO-FFI), mesurant les cinq grandes dimensions de la personnalité. Ainsi, un autre objectif de ce projet était de fournir des données de validation pour cet instrument.

Les résultats ont indiqué que les étudiants en arts ont un score significativement plus bas sur l'échelle d'extraversion que les étudiants en sciences et en sciences sociales. De plus, des scores significativement plus hauts chez les femmes que chez les hommes ont été observées pour les échelles de neuroticisme, d'extraversion et d'esprit consciencieux.

Aussi, l'interaction du domaine de spécialisation académique et du sexe s'est démontrée significative sur l'échelle d'ouverture aux expériences. La recherche exploratoire a indiqué que les étudiants pour lesquels le score correspondant à l'occupation des parents est plus élevé, ont des résultats significativement supérieurs aux autres étudiants sur l'échelle d'ouverture aux expériences. Finalement, la consistance interne de chaque échelle ainsi que les corrélations entre les échelles de l'instrument ont été calculées. Les implications de nos résultats ont ensuite été discutées, ainsi que les avenues potentielles pour de futures recherches.

Introduction

One of the most important developments in personality psychology in the past decade has been the wide recognition, by researchers from many different traditions, that the Five-Factor Model, also refered to as the Big Five, adequately represents the fundamental dimensions of personality. Because of its comprehensiveness, this model of personality was shown to be appropriate for use in many different applications, namely in counselling, clinical psychology, and psychiatry; in behavioral medicine and health psychology; as well as in vocational counselling, industrial / organizational psychology, and educational research. Given the wide recognition and applicability of this model, one purpose of the present study is to introduce and evaluate an instrument in its developmental stages – the French version of the NEO-Five Factor Inventory (NEO-FFI) – which measures the five basic dimensions of personality, so that it can eventually be used adequately on a common basis with the Quebec Francophone population for many different applications.

Researchers and educators generally agree that university students enrolled in different academic programs do differ on the basis of

their personality configuration. Nevertheless, some questions still remain unanswered: Can students specializing in different academic programs at the cegep level be distinguished on the basis of their personality profile? And if so, which personality traits characterize each group of students? The following chapters will explore these questions further and discuss the usefulness of such information for students' benefit.

The project is an important extension of the current research in the field. Interestingly, it will extend to Francophone populations studies that have been restricted to Anglophone populations, and will examine effects that are particularly pertinent to the Quebec educational system. In addition, it picks up on very recent research concerning gender on the relationship between personality and academic specialization. Thus, this project has the potential to make a significant contribution to the field.

Chapter 1: Theoretical considerations

1.1 Theoretical background: Personality traits

This first section consists of a general overview of the current literature on personality traits, as well as the influence of selected variables on the development of these traits dimensions.

1.1.1 The Nature of Personality Traits

Personality variables called traits are generally conceptualized as " relatively enduring dispositions (tendencies to act, feel, or think in a certain manner in any given circumstance) that distinguish one individual from another " (Kaplan & Saccuzzo, 1993, p.19). These traits are internal dispositions which were shown to be relatively stable over time and across situations (Costa & McCrae, 1988; Digman 1990; McAdams, 1994; McCrae & Costa; 1989,1990). Since personality traits represent only a single aspect of the individual, they are usually inferred from cross-situational consistencies in individual functioning. They are also typically formulated in bipolar terms and are seen as additive and independent. In addition, these traits refer to very generalized individual differences in

socioemotional functioning (Conley, 1985a). Thus, personality traits may be distinguished from variables such as values, attitudes, world views, and schemas which are less socioemotional and more cognitive in nature (Conley, 1985a).

Individuals vary in the degree to which they can be characterized by specific traits. Most individuals obtain intermediate scores on continuously distributed trait measures, but a minority score at low or high extremes. High and intermediate scorers are more likely than low scorers to possess the pattern of thoughts, feelings, and actions associated with traits (Costa & McCrae, 1988; Digman, 1990; McCrae & Costa, 1989,1990).

1.1.2 The Five-Factor Model of Personality

Generally, personality psychologists agree that there are five robust factors that can meaningfully classify personality constructs (e.g., Digman, 1990;Golberg, 1990; McCrae & Costa, 1985; Rolland, 1993). Indeed, these five factors were shown to have convergent and discriminant validity across instruments and observers, and to remain stable throughout adulthood (McCrae & Costa, 1990). The structure of personality in five factors have been identified in different semantic and

cultural contexts: Anglo-american, Chinese, Dutch, Finnish, Polish, French (France), Japanese, Tagalog (Philipino), modern Hebrew, German, and Russian (Angleitner & al., 1990; Rolland, 1993).

All in all, the value of the five-factor model was supported by McCrae and John (1992), as they wrote:

> "...the appeal of the model is threefold: It integrates a wide array of personality constructs, thus facilitating communication among researchers of many different orientations; it is comprehensive, giving a basis for systematic exploration of the relations between personality and other phenomena; and it is efficient, providing at least a global description of personality with as few as five scores " (p.206).

One main goal of the present study is to explore the possible relations between personality and academic specialization in cegep students. Consequently, because of its comprehensiveness, the five-factor model of personality was selected as the underlying framework of the present investigation.

1.1.2.1 Describing the Five Factors

While there is general agreement among researchers concerning the number of personality factors, there is still some disagreement as to their precise labeling. Yet, the most broadly accepted configuration was described by McCrae and Costa (1987). According to them, each of the five factors defines a domain of related traits and they are labeled as follows: Extraversion (sociable – retiring, fun-loving – sober, affectionate – reserved), Neuroticism (worrying – calm, insecure – secure, self-pitying – self-satisfied), Openness to Experience (imaginative – down to earth, preference for variety – preference for routine, independent – conforming), Agreeableness (soft-hearted – ruthless, trusting – suspicious, helpful – uncooperative), and Conscientiousness (reliable – undependable, well-organized – disorganized, persevering – quitting).

Longitudinal evidence has shown stability for each of these five galaxies, leading to the conclusion that personality traits are enduring dispositions (McCrae & Costa, 1990). Indeed, an important characteristic common to both vocational interests and personality dispositions is their high stability throughout adulthood. Cross-sectional and longitudinal analyses of the personality scores of males and females aged 21 to 96 indicated that older adults may obtain slightly lower scores than younger

adults in Extraversion, Positive Emotions, and Openness to Experience (though the difference is fairly small), which changes might be attributed to maturation (Costa & McCrae, 1988). Indeed, studies that trace individuals from college age into adulthood almost invariably report some changes in the average levels of personality traits and more fluctuations for younger individuals than are found in studies of individuals who are initially older (e.g., Finn, 1986; Helson & Moane, 1987). Note that the changes in personality traits observed in these studies were in the average levels of the traits, which are much less important than changes in patterns. In other words, although slight changes were observed in the traits average levels, the relative importance of each trait dimension compared to one another remained highly stable. All in all, these observed changes are very small, and most studies support the position that personality generally reaches stability between age 20 and 30.

Based on this evidence, one can assume that personality dispositions in cegep students will be relatively stable across time. However, one has to keep in mind that, in most Canadian and American institutions, students enter college after graduating from high school. Indeed, "college students" usually refers to students enrolled in an undergraduate university program. In contrast, after graduating from high school, students in the Quebec educational system have to go through a

two-year cegep program before entering university. Thus, cegep students are younger on the average than college students.

Neuroticism (N)

Neuroticism is undoubtedly the best known personality factor. This domain is generally described as a continuum ranging from emotional instability or neuroticism to emotional stability. This personality dimension is mainly concerned with individual differences in the experience of negative emotions and distress such as fear, sadness, guilt, anxiety, and the like. High scorers on this scale tend to be distressed in many aspects of their lives and can be described as worrying, nervous, high-strung, insecure, self-pitying, and vulnerable, and tend to have a very low opinion of themselves. In addition, because disruptive emotions interfere with adaptation, individuals high in N tend to be less able to control their impulses and cope with stress. In contrast, people who score low on the Neuroticism scale are generally calm, at ease, relaxed, secure, self-satisfied, and hardy (Costa & McCrae, 1992).

Extraversion (E)

Extraversion is a superordinate trait primarily composed of the lower-order traits of sociability, impulsivity, and assertiveness. Extraverts are characterized by their sociability which is associated with gregariousness, warmth, talkativeness, energy, cheerfulness, and stimulation from others. These people are also adventurous, action-oriented individuals who take chances, crave excitement, lose their temper easily, and who tend to manifest dominance and boldness. Individuals who score low in the extraversion domain are, by definition, introverted. They may be described as withdrawn, quiet, shy, inhibited, reserved, unaggressive, passive, and pessimistic (e.g., McCrae & Costa, 1990).

Openness to experience (O)

The domain of Openness to Experience has been recently conceptualized by McCrae & Costa (1980). High scorers on this dimension can be described as original, creative, curious, independent, artistic, and having broad interests. In addition, people high in O seem to welcome new and unusual experiences without anxiety, which makes their lives richer in experiences. In contrast, low scorers tend to be

conventional, simple, conforming, nonanalytical, traditional, conservative, and having narrow interests.

Agreeableness (A)

The fourth trait domain is generally labeled Agreeableness (A) and encompasses descriptors such as altruism, affection, and other humane aspects of human personality (Digman, 1990; Goldberg, 1990; McCrae & Costa, 1991). Hence, individuals at the high end of the continuum can be described as interpersonally warm, generous, loving, helpful, patient, empathic, understanding, and sincere. In contrast, people at the low end of the continuum are described as being harsh, manipulative, untrustworthy, malicious, and tend to disregard other people's feelings. Agreeableness is a highly valued dimension which has shown to promote psychological well-being (McCrae & Costa, 1991). Indeed, scores on this scale have often been used to describe good versus evil individuals (McCrae & Costa, 1987).

Conscientiousness (C)

The trait labeled Conscientiousness (C) is mainly concerned with descriptors related to the areas of work, achievement, accomplishment,

and so forth. People who score high on C may be described as being well-organized, efficient, dependable, persistent, steady, predictable, conventional, and thrifty (Goldberg, 1990; McCrae & Costa, 1990). Indeed, these individuals approach tasks and problems in a systematic and logical fashion, and their lives are planned carefully according to principles and goals. They are also highly disciplined, reliable, and responsible in their work as well as in their dealings with other people. After reviewing many studies suggesting the importance of this trait in determining school achievement, Digman (1990) has renamed conscientiousness " the will to achieve ". Hence, at the low end of the C continuum, people tend to be disorganized, inefficient, undependable, unpredictable, lazy, and undecisive. In addition, unconscientious people were shown to have little respect for serious standards of work and morality (McAdams, 1994).

1.2 Measuring Personality

Personality inventories consist of self-report questionnaires containing a large number of items for which respondants must indicate their level of agreement or adhesion (true or false). The different items are then grouped in a number of trait factors, which scores are calculated by summing up the scores obtained for each item in a specific subgroup.

Note that all trait factors are independent and determined by the author of the instrument. Once the personality scores are calculated for each trait dimension, the personality profile of the respondant can be established.

Several instruments have been developed over the years to measure these personality characteristics. The most widely used personality questionnaires are the Minnesota Multiphasic Personality Inventory (MMPI), the 16 Personality Factors (16 PF), the Myers-Briggs Type Indicator (MBTI), and the Personality Research Form (PFR). In addition, a recent instrument has received increasing attention in the past decade: the NEO-Personality Inventory (NEO-PI), as well as its revised version, the NEO-Personality Inventory-Revised (NEO-PI-R), and its abrreviated version, the NEO-Five Factor Inventory (NEO-FFI). These instruments were developed by McCrae and Costa to provide accurate measures of the Big Five personality traits. Given the wide recognition and usefulness of these instruments, the NEO-FFI was recently adapted to the Quebec French semantic and cultural context by researchers at the Montreal Jewish Hospital. Although their version is not available for public use, the researchers gave me permission to use their instrument to conduct the present study. Indeed, my results will provide data to evaluate their findings.

1.3 Personality and Academic Specialization

Several studies have examined the personality of students pursuing different academic programs and they all confirmed the hypothesis that students enrolled in different programs can be differentiated on the basis of their personality profile (e.g., Kline and Lapham, 1992; Corulla & Coghill, 1991; Clark, 1986; Harris, 1993; Wankowski, 1968: see Kline & Lapham, 1992). Despite this general concensus, researchers do not agree as to how these students differ. A major cause of their divergence stems from the fact that researchers from different traditions of psychology hardly understand and/or communicate with each other. Consequently, the personality measures collected in different studies are organized according to diverse personality theories and constructs, thus complicating their comparison. The next paragraphs will describe several studies on the topic in order to set a clear global picture of the current scene.

Many researchers assume that student populations can be reliably differentiated on the variables of neuroticism and extraversion. For example, Kline & Lapham (1992) referred to this assumption in their discussion of personality and academic success as they indicated that science students are usually found to be more introverted than arts

students (Wankowski, 1968: see Kline & Lapham, 1992), while social studies students score higher on Neuroticism (Cattell *et al.*, 1970: see Kline & Lapham, 1992). However, as shown below, the results obtained from other studies do not always support this hypothesis.

For example, in an investigation on the predictors of scientific majors, Clark (1986) examined the personality measures of 200 college students using the 16 Personality Factor Inventory (16 PF). His sample was made up of 73 males and 127 females, ranging from 17 to 24 of age. The findings of his study indicated that college major groups significantly differed on 3 personality variables, with natural science majors being more reserved (introverted), sober (as opposed to happy-go-lucky), and practical than social and nonscience majors.

In contrast, Corulla and Coghill (1991) obtained different results in their recent work on personality and educational streaming. In their first study involving 17 female science students, 16 arts students (13 females, 3 males), and 13 male technical students from a Technical College, personality information was collected using the Eysenck Personality Questionnaire-Revised (EPQ-R) and the Impulsiveness Questionnaire (I.7). Their findings indicated that the science group scored significantly lower than arts and technical students on the Psychoticism scale. In

addition, a positive correlation between Neuroticism and arts students was found, although not significant. When interpreting these findings, however, one has to pay close attention to the confound between gender and program in their sample. Indeed, while their science sample was composed entirely of females, technical students were all males.

In their second study, they examined the personality correlates of 300 university students (100 arts students, 100 engineering science students, and 100 social science students) using the same instrumentation (Corulla & Coghill, 1991). The sample consisted of 215 males with a mean age of 21.6, and 85 females with a mean age of 20.3. While Psychoticism and Impulsivity were shown to correlate significantly and positively with technical science studies, the results indicated a significant positive correlation between Neuroticism and arts studies, and a significant negative correlation between Psychoticism and engineering students. These findings provide support for their first study in suggesting that enrollment in hard sciences is negatively related to Psychoticism. In addition these findings suggest that social conformers, as translated by a low score on the Impulsiveness scale, are more likely to specialize in sciences than individuals who score high on Psychoticism.

Finally, the conclusion of their third study indicated that science students tend to score lower on measures of Psychoticism than psychology students, providing support for the two previous studies. However, a close examination of their sample again revealed a gender confound as their sample consisted mainly of males.

Along the same line of research, Kline and Lapham (1992) investigated the personality scores of students from different faculties in different British universities. This sample of 1472 subjects with a mean age of 19.2 years old was administered the Professional Personality Questionnaire (PPQ), a measure of the "Big Five" personality variables. Their results indicated that science and engineering students were significantly more conscientious, higher in conformity (lower on Openness to experience), and more tough-minded (lower on Agreeableness) than arts, social science, and mixed major students. However, in contrast to their original assumptions, scores on Neuroticism and Extraversion failed to discriminate among students in these faculties.

More recently, Harris (1993) examined self ratings as well as peer ratings on the Personality Research Form (PRF), noting that students' personalities differed by faculty. Her results indicated similar personality profiles for arts and social science students, both characterized by being

significantly more affiliative, sociable, and sentient, whereas science students were described as being more precise.

These studies mentioned above all suggest that students enrolled in different academic programs at the college level differ on the basis of their personality profile. However, because of the wide variety of the instrumentation available to measure personality characteristics, no consensus has been reached as to which traits distinguish students enrolled in the different programs. In addition, these studies have focused on college students, where the findings can hardly be generalized to the cegep population. Not only are cegep students younger than college students, but their scope of academic programs differs greatly. Indeed, universities offer a much wider variety of programs than cegep institutions do, because cegeps provide students with a general preparation background to pursue university education. As a result, cegep students enrolled in sciences include students in both pure and applied sciences, while these students groups are segregated in different academic specializations at the university or college level.

Thus, in contrast to the research that has been done in the past, the present investigation will examine personality differences in cegep students in terms of the five-facor personality model. In the light of the

studies mentioned above, personality differences are expected to be found between arts, science, and social science students. Exploratory analyses will then be performed in order to investigate the explicit nature of these personality differences between these three student groups.

1.4 The relationship between Gender and Personality

The issue of personality differences between genders has been studied extensively in the past. However, no concensus has been reached on the topic. For example, a study investigating the predictors of scientific majors in 200 college students indicated gender differences on five personality variables as measured by the 16 Personality Factor Inventory (16 PF) (Clark, 1986). Indeed, women were shown to be more conscientious, toughminded, astute, and experimenting, with more tough-poise than men. Nevertheless, these gender differences were not present when the interaction between gender and college major was examined.

Along the same lines of research, Baker (1983) studied the personality characteristics of 180 college students (30 male and 30 female physical science majors, 30 male and 30 female biological science majors, 30 male and 30 female nonscience majors) using the Myers-Briggs Type Indicator (MBTI). According to his results, significant

personality differences between genders were observed on the Thinking-Feeling scale. That is, gender differences were primarily reflected in terms of decision making, with males prefering an analytical approach to problem solving and females basing their decisions on personal values. In addition, his analyses suggested that personality differences among college majors were due to differences between males and females rather than between majors.

Most relevant to the present investigation are the studies which have looked at gender differences in terms of the NEO-Personality Inventory. Indeed, recent studies using the NEO-PI-R scales with college students agree that women tend to score higher than men on measures of Agreeableness (e.g., Costa & McCrae, 1992; Jung, 1995). However, Costa and McCrae (1992) also reported that females were significantly more neurotic than males, while Jung (1995) observed that females were significantly more extraverted. Furthermore, McCrae and Costa (1992) indicated that their findings were supported by diverse studies, which noted similar patterns using other personality inventories (e.g., Eysenck & Eysenck, 1975: see McCrae & Costa, 1992).

The present study will examine gender differences among cegep students in terms of the NEO-Five Factor Inventory, the abbreviated

version of the NEO-Personality Inventory. The short version of the instrument was selected because of its availability and convenience. Consequently, my hypotheses will be based on the literature looking at gender differences in terms of the NEO-PI scales. Therefore, as a cumulation of the studies mentioned above, gender differences are expected to be found on Agreeableness, Neuroticism, and Extraversion, with females scoring higher than males on each dimension. In contrast, I predict that gender differences will not be observed on measures of Openness to experience and Conscientiousness. Furthermore, exploratory analyses will be performed in order to examine the interaction between gender and academic specialization, since other studies looking at the gender-program interaction didn't use the Big Five, while studies with the Big Five didn't look at the interaction.

1.5 Hypotheses of the Present Study

The main purpose of this research project is to examine the relationship between cegep students' personality profiles and their area of academic specialization in terms of the five-factor model of personality. In addition, personality measures of males and females will be compared within each academic program. The provisory French version of the NEO-FFI will be used for data collection as I assume that the tool will be

useful to the Canadian francophone communities for assessment in different applied settings.

In the light of the literature reviewed earlier, my first hypothesis is that personality differences will be present between cegep students enrolled in the arts, science, and social science programs. In addition, on the basis of earlier reasearch with the five-factor model, I expect females to score higher than males on measures of Agreeableness, Neuroticism, and Extraversion. In contrast, I predict that gender differences will not be observed on measures of Openness to experience and Conscientiousness. Furthermore, exploratory analyses will be performed in order to examine the interaction of gender and academic program on personality differences, as well as the relationship between native language, parental education and occupation, and the region where subjects were raised and the five major personality categories. Another issue of this research is the relative usefulness of the French translation of the NEO-FFI in personality assessment, which will be examined in the present study.

Chapter 2 : Method

2.1 Participants

The sample was entirely drawn from two French cegeps located in the Montreal area, namely Cégep du Vieux-Montréal and Cégep de Maisonneuve. The participants were recruited through classes on a voluntary basis in the science, the social science, and the arts programs. Prior to recruitement, all instructors agreed to allow students to fill in the questionnaires during class time. A total number of 227 students agreed to participate in this study. However, 7 were dropped from the study because they submitted incomplete questionnaires. Thus, the sample was made up of 220 participants (128 females and 92 males), with a mean age of 18.72 ranging from 16 to 39. More specifically, complete questionnaires were returned by 75 students in the arts program (43 females, 32 males), 64 students in the science program (34 females, 30 males), and 81 students in the social science program (51 females, 30 males).

Note that cegep students enrolled in the arts program clearly do specialize in fine arts such as photography, interior design, presentation

design, graphism, jewellery, cabinet work, textile impression, textile construction, as well as general manual arts leading to university. In contrast, social sciences students are mainly enrolled in the general program leading to university programs such as psychology, history, and administration, although some of them do specialize in administration at the technical level. And finally, the science program embraces all students who are planning to pursue their studies in sciences at the university level, as well as students completing a technical science prgram at the cegep level, such as engineering, nursing, biochemistry, and so on.

2.2 Measures

2.2.1 Personality Measures

Personality measures were obtained using the French research translation of the NEO-Five Factor Inventory (French translation: Kirmayer & Robbins, 1993). Although the instrument is not commercially available yet, the bibliography of the NEO-PI-R professional manual indicated that a French research translation had been developed by Montreal researchers, for which validational research was currently in progress. Consequently, these researchers gave me permission to use

their instrument under the condition that I share my results with them for validational purposes. I gladly accepted their proposition as I was determined to give an innovative flavor to my research project.

The instrument is a direct translation of the original American English version of the NEO-Five Factor Inventory (Form S) (NEO-FFI: Costa & McCrae, 1992). The latter was developed through factor-analytic methods as the abbreviated form of the NEO-Personality Inventory (NEO-PI), which includes 240 items. The NEO-FFI is a 60 items self-report questionnaire rated on a five-point Likert-type scale ranging from strongly disagree to strongly agree. Items were balanced to reduce acquiescent responding. Like the NEO-PI, the NEO-FFI is intended to measure the five major dimensions of normal personality: Neuroticism (N), Extraversion (E), Openness to Experience (O), Agreeableness (A), and Conscientiousness (C). While there is no time limit to fill in the questionnaire, most respondents require 10 to 15 minutes to complete it, depending on their reading skills level.

The use of the NEO-FFI was selected for several reasons. First, a study comparing the different instruments to operationalize the five-factor model of personality revealed that the NEO-FFI (English version) was the most appropriate and comprehensive instrument to measure the "Big

Five" personality dimensions (Briggs, 1992; Ostendorf; 1994). In addition, the basic structure in five dimensions was shown to encounter several major personality inventory available today (McCrae & John, 1992). Second, this instrument was designed for use with individuals who are 17 years of age or older (Costa & McCrae, 1992). Indeed, it appears to work equally as well for college students as for adults. Consequently, the tool seems to be potentially valuable to cegep students, as it is one of the few tools that has been designed with the inclusion of this specific age range. Based on the wide recognition of this instrument, it is my contention that a French version adapted to the Quebec cultural and semantic context could be a highly valuable tool for diverse applications, such as counselling, personnel selection, and educational psychology, in our province. Hence, this study will provide reliability data which will allow improvement of the instrument which is presently in its developmental stages.

Validity and reliability information

Costa and McCrae (1992) reported correlations between the NEO-FFI (Form S) and the revised NEO-PI (NEO-PI-R; Costa & McCrae, 1992), which were .92, .90, .91, .77, and .87 for the N, E, O, A, and C domains respectively. In addition, for a separate sample of 1539 adults,

the Cronbach's α internal consistency reliability coefficients for the domain scales were .86, .77, .73, .68, and .81 for N, E, O, A, and C respectively with respect to the English version of the NEO-FFI. Evidence of construct validity for the NEO-FFI (Form S) was obtained from self-report adjective factors of the five-factor model. Costa and McCrae (1992) reported convergent validity correlations ranging from .56 to .82 , and absolute discriminant validity coefficients ranging from .00 to .20. Further indications of construct validity was obtained by the pattern of correlations between the NEO-FFI scores and spouse ratings of the NEO-PI-R scales (Costa & McCrae, 1992). Such information on reliability and validity is presently unavailable for the French version as it is in its developmental stages. The present study will provide information that will be of value for future research.

2.2.2 Sociodemographic Questionnaire

In addition to the NEO-FFI, subjects were asked to complete a socio-demographic information sheet designed for this study which requested the subjects to indicate their educational institution, gender, age, academic program, native language, parents' educational level, and parents' occupation.

One-way analyses of variance (ANOVAs) were performed to test the effects of subjects' program (pure and applied sciences, humanities, arts and literature), gender (male, female), as well as their interaction on each of the five personality dimensions. In addition, several other statistical procedures were performed to explore the relationship between selected sociodemographic variables and the Big Five personality domains.

Chapter 3: Results

The following section will present the results obtained from this investigation. Note that preliminary analyses have revealed no significant differences in the subjects' scores on each personality dimension as a function of native language, parents' education, and the region where subjects were raised (rural versus urban). For this reason, these variables were not included in the subsequent analyses.

3.1 Program differences

The purpose of the first statistical analysis was to test the first hypothesis, which stipulates that arts, science, and social science students can be distinguished on the basis of their personality profile. In addition, further exploratory analysis allowed us to examine the specific nature of these differences in terms of personality traits.

Thus, one-way analyses of variance were performed to examine the effects of *program* on each personality dimension, followed by a Tukey's Studentized Range (HSD) test to see which mean differences were significant (Table 1 shows means). The analyses yielded a

significant value for Extraversion, $F(2,217) = 3.58$, $p=0.0296$ (Table 2), indicating that the student groups are characterized by a different level of Extraversion. On subsequent analysis of the means of the three program groups, the Tukey HSD revealed that social science students scored significantly higher (at $p<0.05$) than arts students on the Extraversion scale. However, no significant differences were found between science students and the two other groups on this dimension.

Table 1. Means for each program on the 5 NEO-FFI scales.

Program	n	N	E	O	A	C
Arts	75	33.36	42.71	44.16	43.28	43.37
Science	64	34.28	43.05	41.78	41.86	42.83
Social science	81	33.47	45.01	42.62	43.68	42.78

Table 2. Analyses of variance for *program* differences on the 5 NEO-FFI scales.

Personality scale	df	SS	MS	F	P
N	2	34.387	17.193	0.22	0.8050
E	2	240.352	120.176	3.58	0.0296*
O	2	205.647	102.823	2.32	0.1010
A	2	126.450	63.225	1.83	0.1626
C	2	16.339	8.17	0.15	0.8641

Overall, the results obtained in this analysis weakly support the hypothesis that personality differences exist between the student groups, since these differences were present only in terms of Extraversion.

3.2 Gender differences

The literature on the issue of personality differences between genders using the NEO-PI-R suggests that personality differences do exist between genders. More specifically, studies have indicated that women tend to score higher than men on measures of Neuroticism, Agreeableness, and Extraversion. Consequently, my second hypothesis predicts that personality differences will be found between genders, with females scoring significantly higher than males on measures of a) Neuroticism, b) Agreeableness, and c) Extraversion. In contrast, no sex differences are expected to be found on the dimensions of d) Openness to experience and e) Conscientiousness.

Thus, one-way analyses of variance were performed on the *gender* means for each personality dimension (Table 3). These analyses yielded significant F values for three of the five personality dimensions, namely Neuroticism; $F(1,218) = 14.08$, $p=0.0002$, Extraversion; $F(1,218) = 6.90$,

p=0.0092, and Conscientiousness; F(1,218) = 5.78, p=0.0171 (Table 4), with females scoring significantly higher than males on each dimension.

Table 3. Means for each gender on the 5 NEO-FFI scales.

Gender	n	N	E	O	A	C
Female	128	35.52	44.52	42.99	43.59	44.01
Male	92	31.10	42.45	42.77	42.22	41.59

Table 4. Analyses of variance for sex differences on the 5 NEO-FFI scales.

Personality scale	df	SS	MS	F	P
N	1	1044.689	1044.689	14.08	0.0002 *
E	1	231.088	231.088	6.90	0.0092 *
O	1	2.601	2.601	0.06	0.8104
A	1	100.252	100.252	2.91	0.0896
C	1	313.699	313.699	5.78	0.0171 *

The results obtained in this second set of analyses provide partial support to my hypotheses. As was expected, personality differences were found between males and females on measures of Neuroticism and Extraversion, with females scoring significantly higher than males. In

contrast, the hypotheses formulated for the other dimensions were not supported by the results. Surprisingly, not only were no group differences observed on Agreeableness, but unexpected gender differences also turned out to be significant on the Conscientiouness scale.

3.3 The interaction between program and gender

Studies investigating the personality profiles of college students consistently indicated significant gender differences (e.g., Clark, 1983, 1986). Nevertheless, these gender differences were not present when the interaction between gender and college major was examined. Indeed, some analyses suggested that personality differences among college majors were due to differences between males and females rather than between majors. Thus, one purpose of the present study was to explore gender differences among cegep students within the different academic programs.

One-way analyses of variance were performed to test the effects of the *gender* by *program* interaction on each of the five personality variables. Interestingly, the results indicated the presence of a significant *gender* by *program* interaction ($p<0.05$) only on the Openness to experience scale, with a trend on Agreeableness. Table 5 below shows

the means on which the analyses of variance were performed to explore this issue.

Table 5. Means for *program by gender* groups on the 5 NEO-FFI scales.

Program	G	n	N		E		O		A		C	
			M	SD	M	SD	M	SD	M	SD	M	SD
Arts	F	43	34.98	7.55	43.70	4.52	44.14	5.34	43.09	5.92	44.35	5.77
	M	32	31.19	7.03	41.38	7.33	44.19	5.87	43.53	5.42	42.06	7.46
Science	F	34	35.88	7.62	44.18	6.65	43.56	6.12	43.74	5.76	43.94	7.09
	M	30	32.47	12.27	41.77	5.18	39.77	8.47	39.73	6.91	41.57	8.33
Soc. sci.	F	51	35.73	8.83	45.45	5.65	41.65	6.69	43.90	5.29	43.77	7.89
	M	30	29.63	8.14	44.27	4.95	44.27	7.07	43.30	5.75	41.10	8.10

Firstly, the ANOVA with Neuroticism as the dependent variable yielded a significant value for the model; $F(5,214) = 3.16$, $p=0.0089$. In addition, the partitioning of the sum of squares (type III SS) revealed the independent significant contribution of the variable *gender* ($p=0.0003$) to explain group differences on Neuroticism (Table 6), which finding is consistent with the previous analyses (Table 4).

Table 6. Analysis of variance with **Neuroticism** as the dependent variable.

Source	df	Type III SS	MS	F	P
Model	5	1184.806	236.961	3.16	0.0089*
Program	2	81.097	40.549	0.54	0.5828
Gender	1	1038.900	1038.900	13.87	0.0003*
Program by gender	2	75.888	37.944	0.51	0.6033

Secondly, the ANOVA with Extraversion as the dependent variable yielded a significant value for the model; $F(5,214) = 2.77$, $p=0.0189$. In addition, the partitioning of the sum of squares (type III SS) revealed the independent significant contribution of both *gender* ($p=0.0134$) and *program* ($p=0.0348$) to explain group differences on Extraversion (Table 7), whcih finding is consistent with the two previous sets of analyses (Tables 2 and 4).

Table 7. Analysis of variance with **Extraversion** as the dependent variable.

Source	df	Type III SS	MS	F	P
Model	5	458.374	91.675	2.77	0.0189*
Program	2	225.443	112.722	3.41	0.0348*
Gender	1	205.700	205.700	6.23	0.0134*
Program by gender	2	16.990	8.495	0.26	0.7735

Thirdly, the ANOVA with Openness to Experience as the dependent variable yielded a significant value for the model; $F(5,214)=2.61$, $p=0.0259$. In addition, the partitioning of the sum of squares (type III SS) revealed the independent significant contribution of the interaction between *gender and program* ($p=0.0175$) to explain group differences on Openness to experience (Table 8). As depicted in Table 5, the low male score in the science group seems to account for this effect, as male scores varied most on this dimension – from least open in science, a traditionally male dominated field ($M= 39.97$), to most open in social science, a traditionally female dominated area ($M= 44.27$).

Table 8. Analysis of variance with **Openness to Experience** as the dependent variable.

Source	df	Type III SS	MS	F	P
Model	5	564.499	112.900	2.61	0.0259*
Program	2	213.445	106.722	2.46	0.0875
Gender	1	7.431	7.431	0.17	0.6791
Program by gender	2	356.943	178.472	4.12	0.0175*

Fourthly, the ANOVA with Agreeableness as the dependent variable yielded a significant value for the model; $F(5,214)=2.32$,

p=0.0442. The partitioning of the sum of squares (type III SS) for this variable didn't show any independent significant contributions to the model, although a trend towards significance was present for both, gender and program (Table 9). Again, Table 5 shows science males as the discrepant score.

Table 9. Analysis of variance with **Agreeableness** as the dependent variable.

Source	df	Type III SS	MS	F	P
Model	5	392.068	78.414	2.32	0.0442*
Program	2	135.844	67.922	2.01	0.1363
Gender	1	101.961	101.961	3.02	0.0837
Program by gender	2	180.914	90.457	2.68	0.0709

Finally, the ANOVA with Conscientiousness as the dependent variable did not yield a significant value for the model. However, the partitioning of the sum of squares (type III SS) revealed the independent significant contribution of the variable *gender* (p=0.0177) to explain group differences on Conscientiousness (Table 10), which finding is consistent with the previous analyses (Table 4).

Table 10. Analysis of variance with **Conscientiousness** as the dependent variable.

Source	df	Type III SS	MS	F	P
Model	5	336.228	67.246	1.22	0.3015
Program	2	22.421	11.210	0.20	0.8163
Gender	1	315.313	315.313	5.71	0.0177*
Program by gender	2	1.453	0.726	0.01	0.9869

The results obtained in this exploratory analysis revealed a significant program by gender interaction only on Openness to experience, with a trend towards significance on Agreeableness. The low male science scores on these two dimensions seem to account for both of these effects.

3.4 Personality differences based on parental occupation

On the sociodemographic questionnaire, subjects were asked the occupation of both parental figures. The information was then translated or coded into numbers, and then averaged, in such a way as to get a single parental occupation score for each subject. Accordingly, a

systematic coding system based on occupations' skill level was developed as follows:

a) low unskilled occupations, as well as unemployment were coded as 1;
b) office work and middle skilled occupations (e.g., carpenters, plumbers) were coded as 3; and
c) high professionals (e.g., doctors, dentists) and top management positions were coded as 5.

The occupational information was coded along a continuum ranging from low to high socioeconomic status. Thus, some occupations were also coded as 4 or 2, although no label were given to these categories. For example, occupations coded as 2 included welder,fireman, policeman, sewers, etc..., while occupations coded as a 4 included educators, accountants, and so on. Then, the average code for both parents was computed as to get one code representing the occupation of both parents. Because observations with missing values were not included in this analysis, only 201 observations were used in this analysis.

Diverse statistical procedures were performed to explore possible relationships. These analyses indicated significance when a one-way analysis of variance was performed with parental occupation as the

classifying variable and Openness to experience as the dependant variable; F(4,196) = 2.63, p=0.0355 (Table 11). Furthermore, a Tukey's Studentized Range (HSD) test indicated that subjects for whom parental occupation was coded as 5 (high professional and top managers) scored significantly higher (p<0.05) on measures of Openness to experience than students whose parental occupation catergory was coded as 1, 2, or 3.

Table 11. Analysis of variance with **Openness to Experience** as the dependent variable.

Source	df	SS	MS	F	P
parental occupation	4	452.081	113.020	2.63	0.0355*

3.5 Reliability of the instrument

As mentioned in the previous section, the French translation of the instrument used in this study is currently under development. Thus, one of the purposes of this investigation was to provide reliability information for the test. Hence, the split-half procedure was selected as a means to approximately determine the internal consistency of the scales using the Pearson correlation coefficients. The results obtained from this analysis

are compared to the reliability measures calculated using coefficient alpha for the English version of the instrument (Table 12).

Table 12. Internal consistencies of the NEO-FFI scales as calculated in this study compared to the English version.

Personality scale	French translation (r)	English version (α)[1]
N	0.74	0.86
E	0.50	0.77
O	0.54	0.73
A	0.56	0.68
C	0.73	0.81

1. Source: Costa, P. T., Jr., & McCrae, R., R. (1992). *NEO-PI-R Professional Manual.* Odessa, Florida: Psychological Assessment Resources. p.53

3.6 Correlations between the scales

Table 13 presents the correlations between the scales of the French translation of the NEO-FFI given the data from this study. Weak to moderate correlations among the five trait dimensions can be observed.

Table 13. Pearson correlation coefficients between the scales of the French translation of the NEO-FFI given the data from this study.

	N	E	O	A
E	-0.144 p=0.0327			
O	0.037 p=0.5803	0.137 p=0.0419		
A	-0.283 p=0.0001	0.256 p=0.0001	0.114 p=0.0924	
C	-0.298 p=0.0001	0.251 p=0.0002	-0.073 p=0.2797	0.274 p=0.0001

Summary of the results

All in all, the results of this investigation point to limited personality differences between students enrolled in arts, science, and social science at the cegep level. Indeed, these student groups were shown to differ on measures of Extraversion, with social sciences scoring significantly higher than science students. In addition, personality differences were found between genders on measures of Neuroticism and Extraversion, with females scoring significantly higher than males. Furthermore, a significant program by gender interaction was found on Openness to experience, with a trend towards significance on Agreeableness. Finally,

students whose parents' occupations require high skills showed significantly higher scores on Openness to experience than students whose parents' occupations require only limited skills.

The internal consistencies calculated for the five scales of the instrument are .74, .50, .54, .56, .73 for Neuroticism, Extraversion, Openness to experience, Agreeableness, and Conscientiousness respectively. Furthermore, weak to moderate correlations between the domain scales of the instrument were found, ranging from -0.298 to 0.037.

Chapter 4: Discussion

4.1 The French version of the NEO-FFI

Weak to moderate correlations between the five domain scales of the French research translation were found in this study, ranging from -0.298 to 0.037. These numbers are comparable to those of the English version which range from 0.00 to 0.41, as obtained by Tokar and Swanson (1995). Furthermore, in accord with previous studies (Jung, 1995; Costa & McCrae, 1985: see Jung, 1995), the findings indicated that Neuroticism and Extraversion are inversely related (r =-0.144), so are Neuroticism and Agreeableness (r =-0.283), and Extraversion and Agreeableness are positively related (r =0.256). These numbers suggest that there is either a slight overlap in the items or in the factors themselves. Nevertheless, the associations between the factors in the French and English versions seem to be of the same nature.

As seen in Table 12, internal consistencies obtained for the NEO-FFI scales were .74, .50, .54, .56, and, .73 in this study employing the French translation, compared to .86, .77, .73, .68, and .81 for the English version, for N, E, O, A, and C, respectively (Costa & McCrae, 1992). The

fact that the coefficients are substantially lower than those calculated for the English version point to the low reliability of three of the five scales, namely Extraversion, Openness, and Agreeableness. However, an important element to take into consideration when examining these differences is the relatively small sample size of the present study (N=220) compared to Costa and McCrae's (N =1539), which might have negatively affected the results.

The lack of internal scale consistencies suggest potential limitations in the adaptation of the inventory to the Quebec semantic and cultural context. Thus, in order to get some insights into the possible causes of this limitation, the developmental procedures of the French and the English versions of the NEO-FFI will be both briefly described.

On the one hand, the English version of the NEO-FFI was developed as an abbreviated version of the NEO-PI. Indeed, the items selected for the NEO-FFI were the validimax factors from the NEO-PI. That is, the validimax method was used to maximize convergent and discriminant validity between the validimax factors of the NEO-PI. Then, for each trait dimension, the 12 items with the most negative or positive correlation on the corresponding scale were selected as preliminary NEO-FFI items. After examination of these items, substitutions were made to

vary item content, cancel items with similar loading, and make sure that no more than two-thirds of the items on any scale were keyed in the same direction, as a control for acquiescent responding.

In contrast, the approach used to adapt the NEO-FFI for the French Quebec population was not based on the validimax method. In fact, the French version of the instrument was a direct translation of its corresponding English version. Indeed, the English version (Form S) was first translated in French by a researcher in the field. Then, a professional translator performed a backtranslation of the document. And finally, the researcher and the translator examined together the differences between the backtranslation and the original English version, and discussed the choice of words for the French version. That is, instead of translating the English version into French word by word, Kirmayer and Robbins (1993) tried to keep the essence or the meaning of each item by putting them in current Quebec French language.

In the light of these considerations, a number of weaknesses are important to mention when examining the latter approach. First, the 60 items selected using the validimax method from the NEO-PI in the English version were simply translated to get a French version. However, there is a major conceptual problem since the 60 items, as selected by the

validimax method do not necessarily correspond to the ones that would have been obtained for the French version. Two ways to remediate to the situation could be explored further in future research. First, the translation process could be started over and initiated by a translation of the NEO-PI-R, from which the validimax method could be used in selecting the 60 items. Or else, the present translation could be modified so that the items with low correlations with their corresponding domain scale be replaced by new items with higher factor loadings.

4.2 Discussion of the findings

4.2.1 The program main effect

The first set of analyses provided weak support to the hypothesis that arts, science, and social science students at the cegep level differ on the basis of their personality profile. Indeed, exploratory analyses indicated that group differences were found only on the Extraversion dimension, which effect was mainly due to differences between social science and arts students.

This finding is supported by the literature on occupational choice suggesting that extraverts tend to prefer and to excel in occupations that

involve frequent interaction or cooperation with other people (e.g., Barrick & Mount, 1991; Costa *et al.*, 1984; Wilson, 1978), which occupations usually require studies in social science at the cegep level. In contrast, artists tend to have more solitary interests and are consequently more introverted (Bendig, 1963), which occupations correspond to studies in arts at the cegep level.

In contrast to the present findings, however, Bendig (1963) also indicated that artists are not the only category of people who tend to be more introverted in nature, but so are research scientists, engineers, and mathematicians. Although the findings didn't reveal that science and social science students significantly differ on Extraversion, a reexamination of the analyses allowed us to notice a trend towards significance. The means presented in Table 5 suggest that this trend might be true of male students. We could therefore suppose that a balanced ratio of males and females in the sample might have resulted in a significant difference on Extraversion between science and social science students.

An alternative interpretation could be that students considering a career in pure and applied sciences, such as chemist, engineer, or physician, may follow the stereotype of being introverted. In contrast,

students more inclined toward health sciences may be more extraverted, given their distinct future career lines, such as medical doctors, pharmacist, or dieticians, which occupations often involve frequent interactions with other people. If this is the case, then personality measures may be more useful in differentiating career paths within fields rather than by their academic precursors. In the present investigation, the sample included both pure/applied and health sciences in the same student group because these programs are highly similar at the cegep level (with the exception of 1 or 2 courses). The fact that the term "program" used in the literature doesn't apply here points to the usefulness of the present investigation. In addition, future research involving cegep students is needed to provide replicative data to validate the findings.

Comparison of the findings to Kline and Lapham's

As mentioned earlier, Kline and Lapham (1992) recently conducted a study similar to the present one. Indeed, they examined the personality profiles of students in the same age range using the Professional Personality Questionnaire (PPQ), a different instrument to measure the Big Five personality traits. Interestingly, although both studies involved students' personality scores in terms of the five-factor model, the two sets

of findings are highly inconsistent with one another. Indeed, Kline and Lapham (1992) found that science and engineering students were significantly higher on Conscientiousness, Conformity, and Tough-mindedness than arts, social science, and mixed major students. In contrast, the findings revealed that arts, science, and social science students could only be differentiated on the basis of their Extraversion level, with social science students scoring significantly higher on Extraversion than arts students.

The discrepancy between these two sets of findings can be explained by several factors. Firstly, although both studies provided personality measures in terms of the five-factor model, different instruments were used to collect the data. Thus, each set of results might have been affected by the weaknesses of their respective instrumentation. Indeed, in a recent study, Angleitner and Ostendorf (1994) showed that the Professional Personality Questionnaire (PPQ), as used by Kline and Lapham, was totally inappropriate to measure the Big Five personality traits. Indeed, only one of the assumed relationships among the instrument's scales and the five factors was supported, namely the convergence between the Conventionality scale and the Openness to experience factor. Similarly, the limitations of the instrument, as described earlier, may also have affected the results. Furthermore, the

language differences between both instruments may also constitute a possible source of explanation.

Secondly, program differences due to distinct educational systems were translated into different student populations, which may also contribute to the discrepancy between both sets of findings. In addition, not only were both samples recruited through volunteering, thus not randomly chosen from their respective population, but the relatively small sample size might also have affected the results. All in all, the limitations in both studies point to the idea that although Kline and Lapham may be totally wrong, so may we. In addition, this comparison illustrates well why no concensus has been reached on this topic, and why more research is needed in order to demistify this issue.

4.2.2 The gender main effect

The second set of hypotheses was formulated on the basis of earlier reasearch with the NEO-PI scales. Thus, we predicted that females would score higher than males on measures of Agreeableness, Neuroticism, and Extraversion, while no gender differences would be present on measures of Openness to experience and Conscientiousness. The analyses provided support for only two of the five hypotheses,

namely for Neuroticism and Openness to experience. Indeed, while females scored higher than males on the Neuroticism scale, no gender differences were observed on measures of Openness. It is also noteworthy to mention that although males and females did not significantly differ on Agreeableness at $p<0.05$, the difference was close to significance ($p=0.0896$).

In contrast to what was expected, however, groups differences were found on Extraversion and Conscientiousness, with females scoring significantly higher than males on both dimensions. The gender differences on Conscientiousness as observed in the sample coincide with Clark's (1986) findings as measured by the 16 PF. In addition, the significance on Extraversion is supported by Jung (1995), who found slightly higher scores for females on this dimension, which he explained by the interpersonal orientation of females. As mentioned earlier, previous research investigating gender differences in personality do not allow to settle the question, and nor do these findings. Thus, further research is needed in order to explore this issue, with particular emphasis on the effects of societal gender role changes on personality.

4.2.3 The interaction between program and gender

Personality differences between genders within each program were found on Openness to experience. The male scores seem to account for this effect, as they varied most on this dimension – from least open in science, a traditionally male dominated field, to most open in social science, a traditionally female dominated area. This observation suggests for males a relationship between gender stereotypes and Openness to experience, which might be examined further in future research. In addition, as opposed to what has been hypothesized in the past, our results suggest that women do not appear to avoid science because their personality doesn't match the requirements of the field since the gender by program interaction was not significant for Extraversion. Thus, future research is needed in order to move toward a better understanding of personality differences between genders within academic programs in terms of the five-factor model of personality.

4.2.4 The influence of parental occupation on personality

Exploratory research was carried out to investigate the influence of selected sociodemographic variables on the five major personality variables. Results indicated that parents' education is positively

associated with the Openness trait in the cegep population. Similarly, Eysenck and Allsopp (1986) found the same relationship between students' socioeconomic status and measures of Unconventionality. Indeed, previous studies have indicated that Openness to experience and years of education are moderately correlated (r = .19) (Costa & McCrae, in press-c and Costa *et al.*, 1991: see McCrae & Costa, 1992). Thus, future research might attempt to determine whether the level of Openness itself can be increased by education.

4.3 Implications of the findings

4.3.1 Implications for vocational counselling

As McCrae & Costa (1991) pointed out, the five-factor model may be particularly appropriate for use in vocational counselling because it is concise, designed for nonpathological individuals, and sensitive to people's strengths and weaknesses. Indeed, it was shown that personality assessment using the five-factor model may provide a useful complement to vocational interests information, as it might reinforce or modify the information yielded by vocational interests scores. For example, it was shown that people who score high on Openness to experience tend to be interested in a wide variety of occupations,

including those that low scorers on this dimension prefer (McCrae & Costa, 1992). Thus, this information should be taken into consideration when interpreting vocational interests scores, as very open individuals might indicate an initial interest in occupations that are unlikely to sustain their interest. Similarly, someone who scores high on measures of sales interest but low on Extraversion may indicate carelessness in completing the vocational interest inventory or else a poor understanding of the nature of the work. Indeed, Super (1957, p.193) stated that "... the best way to promote vocational adjustment is to give people information about themselves..." Accordingly, the NEO-FFI gives information on emotional, interpersonal, experiential, attitudinal, and motivational styles, which should also be taken into account in evaluating the fit between individuals and vocations (McCrae & Costa, 1991).

The findings seem to suggest that personality, particularly Extraversion, may be one of the factors contributing to the selection of academic program at the cegep level. However, the general lack of personality differences suggests that it may be more fruitful to use personality to guide students to particular career paths within their respective fields of study.

4.3.2 Implications for education

Two of the five factor domains, namely Openness and Conscientiousness, are of particular interest to the field of educational psychology. Indeed, Openness to experience was shown to be moderately related to measures of intelligence and more strongly related to measures of divergent thinking, which ability is thought to contribute to creativity (McCrae, 1987). As a result, educators might investigate whether education can promote the development of Openness in their students, or whether Openness lead students to pursue more education.

As McCrae and Costa (1992) noted, another application of this dimension in an educational setting could be to investigate whether unconventionality, as translated by a high level of Openness, is a source of misunderstanding or frustration in traditional classrooms. If that is the case, educators might attempt to adopt teaching strategies that would promote students' autonomy, such as independent learning in open schools. Indeed, McPartland and Epstein (1975) observed that students from the higher social classes showed a more positive relationship between school openness and academic achievement than did students from the lower social classes. Consequently, future research may

investigate whether the use of these strategies promotes the development of Openness in their students.

The measure of Conscientiousness was also shown to be positively associated with college-level academic performance (e.g., Wolfe & Johnson, 1995; Dollinger & Orf, 1991). Conscientious students tend to be well-organized, purposeful, and persistent. Indeed, some studies have suggested that these traits lead to higher academic achievement (Digman & Takemoto-Chock, 1981: see McCrae & Costa, 1992). In addition, conscientious people consider themselves, and are rated by others, to be more intelligent (McCrae & Costa, 1987: see McCrae & Costa, 1992). Thus, personality assessment on this domain scale may be a useful supplement to ability and intelligence measures as predictors of academic and later-life success.

The assumption that college students enrolled in different academic programs do differ in terms of personality implies that distinct insructional strategies may have greater benefit than others for the different student populations. For example, based on the findings indicating that social science students are more extroverted than arts students, we could suppose that while a social science group would enjoy class discussions and team work, an arts group would prefer traditional

lectures and individual work. One question needs to be explored further, namely, do teaching methods characteristic of different fields attract and retain different people, or are people shaped by the program they choose?

Chapter 5: Summary and Conclusions

The present investigation provides weak support for the hypothesis that cegep students enrolled in arts, sciences, and social sciences can be distinguished on the basis of their personality. Indeed, individuals in social sciences were shown to be more extraverted than arts students, and a trend, more particularly for males, also suggested that social sciences tend to be more extraverted than science students. This finding has implications in the selection of teaching strategies that will allow students to learn more effectively the course material. In addition, this information can be useful in vocational counselling, as a supplement to vocational interests.

In addition, gender differences were found on Neuroticism, Extraversion, and Conscientiousness, with females scoring higher than males on each dimension. Yet, more research is needed to explore this point further and is beyond the scope of this study.

Furthermore, exploratory analyses have indicated that gender differences were also present within each program concentration on measures of Openness to experience. The low male scores on this

dimension seem to account for this effect, as they varied from least open in science, a traditionally male dominated field, to most open in social science, a traditionally female dominated area. This observation suggests for males a relationship between gender stereotypes and Openness to experience, which might be examined further in future research. In addition, more research is needed to move toward a better understanding of personality differences between genders within academic programs in terms of the five-factor model of personality, and to study how this information could be used in applied settings.

Finally, the skill level of parents' occupations was shown to be associated with high scores on the measure of Openness, a relationship that was supported by previous research. However, future investigations need to address the question of whether the level of Openness can be increased as a result of education, or whether Openness leads students to pursue more education.

Despite our positive findings, some limitations of the present study have to be considered when interpreting our results, namely the weaknesses of our instrumentation, our volunteer sampling methodology, and our relatively small, unbalanced sample.

All in all, this study suggests that more research is needed to determine the educational correlates of personality traits, and how the information could be used in an educational setting. Furthermore, future research is needed to improve the French version of the NEO-FFI, so that it may eventually be used reliably for many different applications involving the francophone population in Quebec and the rest of Canada.

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Appendix 1: Sociodemographic Questionnaire

Information socio-démographique

Établissement scolaire: _____

Sexe: masculin ___ féminin ____

Âge: _____

Programme: _____ Est-ce votre 1ère, 2ème ou 3ème année dans ce programme? ____

Considérez-vous votre ville d'origine une région rurale, semi-rurale, ou urbaine? _____

Quelle est votre ville d'origine? _____

Langue maternelle: _____

Quel est le niveau scolarité de vos parents? Mère: _____
Père: _____

Quelle est l'occupation de vos parents? Mère: _____
Père: _____

Appendix 2: Informed Consent

Consentement éclairé

Cher étudiant,

Chère étudiante,

Dans le cadre de mes études de maîtrise, je conduis un projet de recherche visant à étudier la personnalité des étudiants et étudiantes de niveau cégep inscrits dans les programmes de sciences pures, sciences humaines et arts afin de déterminer s'il existe des différences entre les individus poursuivant des programmes différents. De plus, je tiens à examiner les différences de personnalité entre les deux sexes, ainsi que l'influence de certaines variables socio-démographiques. Le but de cette étude est de déterminer si l'information révélée par les mesures de personnalité pourraient éclairer les étudiants effectuant leur choix de programme collégial.

Si vous êtes intéressé(e) à participer à ce projet, vous aurez à remplir le questionnaire intitulé NEO-FFI (traduction française du « NEO Five Factor Inventory »), lequel devrait vous prendre de 10 à 15 minutes à compléter. Les réponses que vous indiquerez seront analysées et traitées en toute confidentialité. En aucune façon sera-t-il possible de vous identifier personnellement. Vos résultats individuels seront cumulés à ceux des autres participants de manière à ce que les données soient analysées en groupe. Votre participation est entièrement volontaire et vous pouvez vous retirer du projet en tout temps. Je vous remercie à l'avance de bien vouloir participer à cette recherche.

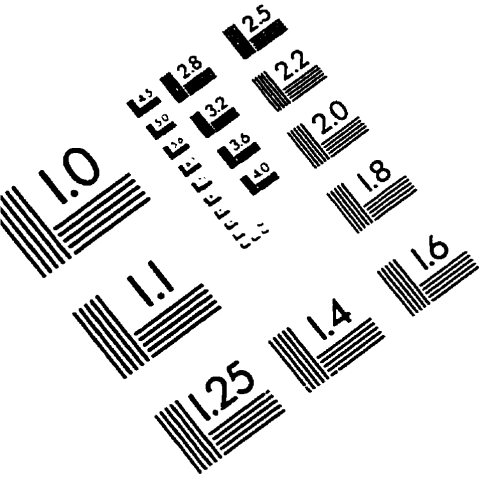
Anabel Paquet-Gagnon

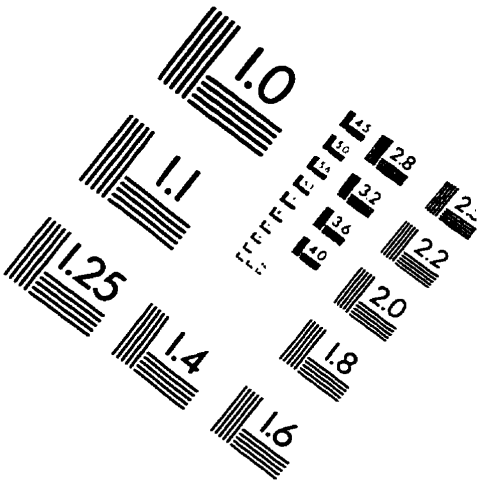
Nom: _____

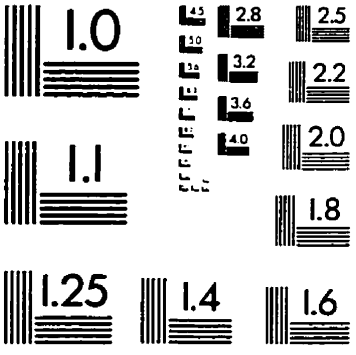
Signature: _____

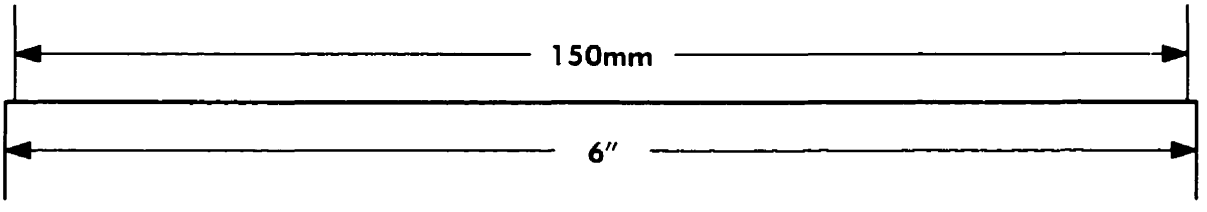
Date: _____

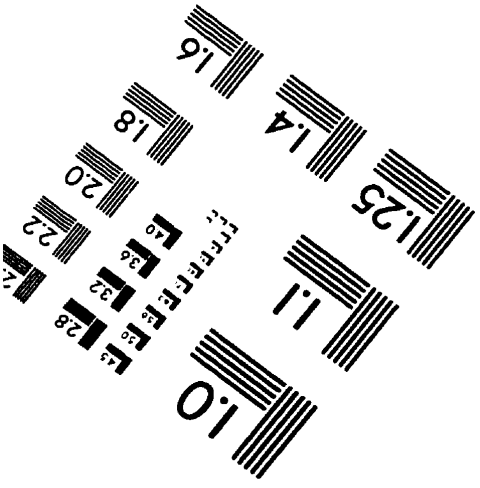
IMAGE EVALUATION
TEST TARGET (QA-3)

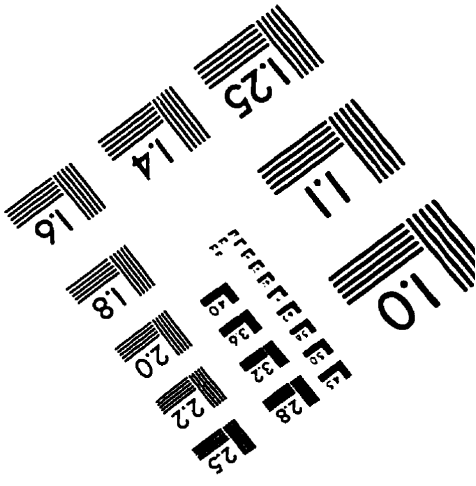












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