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Objective and subjective personality characteristics of medical students

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**OBJECTIVE AND SUBJECTIVE PERSONALITY CHARACTERISTICS
OF MEDICAL STUDENTS**

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A dissertation submitted to
the College of Human Resources and Education at
West Virginia University
in partial fulfillment of the Requirements
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Doctor of Philosophy
in
Counseling Psychology

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Abstract

Objective and Subjective Personality Characteristics of Medical Students

Heather Anderson Meit

The present study viewed personality characteristics of medical students using both objective (i.e., a valid and reliable psychological instrument) and subjective methods (i.e., medical students' self-ratings of how they viewed themselves and how they believed others viewed them). The 16 Personality Factor Questionnaire (16PF, 5th Edition) and a researcher developed instrument, the Subjective Rating Form (SRF), were utilized in this study. Significant differences were found in 16PF scores from entry to medical school (Time 1) to exit from medical school (Time 2). Significant differences were also observed when SRF scores were compared between Self at Time 1 (retrospectively), Self at Time 2, and self-ratings made from the perspective of Other. Most striking were differences between 16PF and SRF scores when compared with each other, at both Time 1 and Time 2. This last group of findings translated into differences between the actual and perceived self (i.e., real vs. ideal). The implications of such differences are discussed.

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CHAPTER I

INTRODUCTION

There has been little change in the past 60 years in the educational programs of medical students in the United States (Jones & Brownell Anderson, 1994). It is the primary mission of any program of medical education to prepare students to function effectively in the prevailing health care delivery system (McGuire, 1994). Medical school curricula, although quite varied, have as their goal the preparation of students to enter a period of graduate medical education (Jones & Brownell Anderson, 1994), also termed “residency.”

Rogoff (1957) noted that there is wide variation in the time at which the process of deciding to study medicine begins. Admission into medical school is an intensely competitive process and it is clear that successful applicants represent a distinct and venerable subset of our society (Meit, Meit, & Yasek, 1999). Doctors generally enjoy high prestige relative to other occupations (Coombs, Fawzy, & Daniels, 1993). Gough and Hall (1977) estimated that 16% of medical students come from families in which one parent is a physician.

While admission to medical school may be prestigious, the process of medical education has been described as stressful (Carmel & Bernstein, 1987; Stern, Norman, & Komm, 1993; Strayhorn, 1989; Wolf, Elston, & Kissling, 1989). Major categories of stressors include academic stressors, anticipated medical career stressors, and social stressors (Carmel & Bernstein, 1987). McKegney (1989) viewed the process of medical education from a family systems approach, and found it comparable to "a neglectful and abusive family system."

Coombs (1978) stated that the impact of medical training depends in large measure upon the personality characteristics and basic values brought to medical school by participants. Green, Peters, and Webster (1991) concur, stating that in addition to intellectual ability, personality and

motivation also play a part in success in medical school performance. Nearly all medical schools conduct personal interviews to assess personal qualities, values and attitudes of applicants, a practice that is rarely followed in business, law, and other professional schools (Jones & Brownell Anderson, 1994). According to Taylor, Clark, and Sinclair (1990), personality factors play a key role in the process of choosing one's life work. Despite the importance of personality factors in medical education, little formal assessment is conducted as part of the medical school admissions process.

In addition to the academic component of medical training, students choose a specific specialty area, their clinical practice, or area of expertise. One area of expertise is primary care medicine. The medical specialty of family practice is considered to be a subspecialty of primary care, as are internal medicine and pediatrics (Schwartz et al., 1994). Family practice used to be referred to as general practice and was what physicians did when they did not select a medical specialty area (Rucker & Keller, 1990). Family practice physicians must have a wide knowledge of a variety of clinical issues, as they are often the first to come in contact with the patient with general medical problems (Borges, 1998). Some less favorable qualities have been attributed to family physicians prior to 1969, since they were not required to complete residencies during that time period (Coombs, 1978). Since 1969, family practice physicians have been required to complete a three-year residency (Borges, 1998). There is a growing consensus that there is a shortage of primary care physicians in the United States (Douglass, 1995). This issue is a major concern in the current medical climate, when patients are often mandated to see a primary care physician for approval before seeking specialty care. Determining what types of individuals choose primary care, and attracting such individuals to the field, has become an area of focus for researchers.

One of the most common questions in the literature regarding personality and medical specialization is whether individuals with certain “personality types” are drawn to specific clinical practice areas (e.g., surgery, psychiatry, primary care, etc.). According to Deckert, Beckham, Hall, and Holmes (1991), students choosing primary care clearly have a somewhat different value system than those moving toward nonprimary care specialties. Coombs (1978) described a “missionary type” of personality, which included attributes such as outgoing, warmhearted, genuine, companionable, generous, good-natured, happy, friendly, and able to get along with others. Bland, Meurer, and Maldonado (1995) synthesized the literature on primary care specialty choice from 1987 to 1993, and found that student characteristics associated with primary care choice included: 1) being female, older, and married; 2) having a broad undergraduate background; 3) having non-physician parents; 4) having relatively low income expectations; 5) being interested in diverse patients and health problems; and, 6) having less interest in prestige, high technology, and surgery.

Although personality factors contribute in part to how one views oneself in terms of one's vocational choice, other factors, such as self-concept, may also play a role. According to Holland (1973), a comparison of self with the perception of an occupation and subsequent acceptance or rejection is a major determinant in career choice. Demo (1992) viewed self-concept as a function of interacting biological, developmental, and social processes across the life span. Further, Demo (1992) described self-concept as “a set of structured self-attitudes that is relatively stable and ‘characteristic’ of an individual.” Pate and Dumas (1970) stated that an improved self-concept is a known function of perceiving oneself as successful in any enterprise. Stephenson (1961) found that the self-concept of the premedical student was crystallized prior to making application to medical school.

Related to self-concept is the notion of self-esteem. Carmel (1997) defined professional self-esteem as “an individual’s attitude about personal professional competence, performance, and worth along a positive-negative dimension.” She further stated that professional self-esteem is expected to change over time with one’s professional advancement and with objective changes in one’s professional status. She also suggested that high professional self-esteem helps a physician cope more efficiently with work stressors, reducing the harmful effects of stress (e.g., burnout), and increasing the positive outcomes of work (i.e., work satisfaction).

In summary, existing research has shown that personality characteristics, self-concept, and the self-esteem of medical students play a role in one’s entry into, and success in, medical school. Whether medical education impacts (i.e., creates changes) personality, self-concept or self-esteem, either during or following the completion of medical school, merits investigation. In addition, if students with certain personality characteristics are drawn to a specific area of clinical practice and certain areas of clinical practice (e.g., family practice) are high in demand and low in supply, it would behoove researchers to determine what personality characteristics are present among individuals currently choosing this specialty area, and to use this information to attract future specialists to this area of clinical practice.

Statement of the Problem

The purpose of the present study was to determine whether there was a measurable change in personality from the time one enters to the time one exits medical school. Potential changes were viewed from an objective perspective through the use of a reliable and valid psychological instrument already in widespread use. Additionally, such changes were examined from a subjective perspective. That is, the participants’ perception of how they viewed

themselves at entrance to and exit from medical school, including their perception of how others would view them at exit from medical school, were examined.

Null Hypotheses

The null hypotheses for the present study are as follows:

1. There is no change in personality as measured by the objective personality instrument (the 16 Personality Factor Questionnaire, Fifth Edition [16PF]) from Time One (entry to medical school) to Time Two (exit from medical school);
2. There is no difference between objective personality characteristics (measured by the 16PF at Time Two) and subjective personality characteristics (measured by a researcher-designed instrument at Time Two);
3. There is no difference in subjective personality characteristics between self-ratings made on the researcher-designed instrument as viewed by "self" (measured at Time Two, from the perspectives of Time One and Time Two) and self-ratings as viewed by "others" (measured at Time Two); and,
4. There is no difference in personality characteristics at entry to medical school, when measured objectively at Time One or subjectively at Time Two (i.e., retrospectively).

Definition of Terms

For the purposes of this study, the following terms are defined to aid the reader:

- A. Medical students: individuals enrolled in a 4-year post-baccalaureate course of study at the school of medicine at a mid-atlantic university.
- B. Entry into medical school: the week of orientation for new medical students, which immediately precedes medical school coursework (in this study, August, 1995).

- C. Exit from medical school: the completion of the fourth year of medical education, specifically, the day before students are notified of their residency assignments (in this study, March, 1999).
- D. Objective personality instrument: in this study, the 16 Personality Factor Questionnaire (16PF), 5th edition. The 16 personality factors are:
1. Warmth (Factor A): the continuum representing reserved, impersonal, distant vs. warm, outgoing, attentive to others.
 2. Reasoning (Factor B): the continuum representing concrete vs. abstract.
 3. Emotional Stability (Factor C): the continuum representing reactive, emotionally changeable vs. emotionally stable, adaptive, mature.
 4. Dominance (Factor E): the continuum representing deferential, cooperative, avoidance of conflict vs. dominant, forceful, assertive.
 5. Liveliness (Factor F): the continuum representing serious, restrained, careful vs. lively, animated, spontaneous.
 6. Rule-Consciousness (Factor G): the continuum representing expedient, nonconforming vs. rule-conscious, dutiful.
 7. Social Boldness (Factor H): the continuum representing shy, threat-sensitive, timid vs. socially bold, venturesome, thick-skinned.
 8. Sensitivity (Factor I): the continuum representing utilitarian, objective, unsentimental vs. sensitive, aesthetic, sentimental.
 9. Vigilance (Factor L): the continuum representing trusting, unsuspecting, accepting vs. vigilant, suspicious, skeptical, wary.

10. Abstractedness (Factor M): the continuum representing grounded, practical, solution-oriented vs. abstracted, imaginative, idea-oriented.
 11. Privateness (Factor N): the continuum representing forthright, genuine, artless vs. private, discreet, non-disclosing.
 12. Apprehension (Factor O): the continuum representing self-assured, unworried, complacent vs. apprehensive, self-doubting, worried.
 13. Openness to Change (Factor Q1): the continuum representing traditional, attached to the familiar vs. open to change, experimenting.
 14. Self-Reliance (Factor Q2): the continuum representing group-oriented, affiliative vs. self-reliant, solitary, individualistic.
 15. Perfectionism (Factor Q3): the continuum representing tolerance for disorder, unexacting, flexible vs. perfectionistic, organized, self-disciplined.
 16. Tension (Factor Q4): the continuum representing relaxed, placid, patient vs. tense, high energy, impatient, driven.
- E. Subjective personality instrument: a researcher-modified (with the test publisher's permission) score sheet from the 16PF in which the numbers have been removed but the verbal descriptors of the items remain (see Figure 1).

Limitations

The findings from this study were limited, for the following reasons:

1. This was a longitudinal sample, and due to attrition, the current sample (N = 38) was smaller than the original sample (N = 94). However, only 81 of the original 94 participants were available to participate in the study by Time Two; 13 of the

participants were either no longer enrolled or had delayed their graduation date.

This rate of attrition may affect the generalizability of the findings.

2. The participants in this study were from a rural geographic area, and as such, are not likely representative of medical students from other areas of the United States or from other countries. Thus, the results may not be generalizable.
3. Participants were volunteers in the study, and were notified in advance of their participation that random prizes would be awarded to participants. This structure could have resulted in a selection bias among the participants.

Summary

In summary, the present study sought to determine whether there was a measurable change in personality from the time one enters to the time one exits medical school. Potential changes were viewed from an objective perspective using a reliable and valid psychological instrument. Changes were also examined from a subjective perspective, using a researcher developed instrument. Subjectively, the participants' perception of how they viewed themselves at entrance to and exit from medical school, including their perception of how others would view them at exit from medical school, were examined.

CHAPTER II

RELEVANT RESEARCH

This chapter begins with an overview of existing research on personality issues as they apply to the medical field, especially pertaining to medical education. Next, specific studies will be highlighted and critiqued. Longitudinal studies will be reviewed first, followed by a review of time-limited studies. Lastly, a summary will provide a rationale for the decision to include or exclude certain psychometric instruments in the present study.

The issue of personality in the medical field has been viewed from a variety of perspectives by researchers. Some descriptive studies merely describe a “personality profile” of medical students (Schofield, 1953a) or medical residents (Coombs et al., 1993; Harris & Ebbert, 1985; Taylor, et al., 1990). Investigative research has paired personality with other variables. The impact of personality on choice of medical specialty has been examined in the literature (Fadem, Nicolich, Simring, Dauber, & Bullock, 1984; Mowbray & Davies, 1971; Schumacher, 1963, 1964; Zeldow & Daugherty, 1991), as well as personality factors as they relate to academic performance or achievement (Davies & Mowbray, 1968; Gough, Bradley, & McDonald, 1991; Green et al., 1991; Pollock, Byrne, & Shanley, 1982; Schofield, 1953c; Shen & Comrey, 1997) and the impact of personality on mental health during medical training (Boyle & Coombs, 1971; Brewin & Firth-Cozens, 1997; Chowdhury, Channabasavanna, Prabhu, & Sarmukaddam, 1987).

Does medical education, or any other educational program, effect a change in personality from the time one starts to the time one finishes such an educational program? This question has been addressed in non-medical education, specifically, in seminary training (Vaughan, 1970) and teacher education (Dollar, 1983, 1989). Other studies have sought to ascertain whether medical education in particular produces changes in personality, either during medical school (Schofield,

1953b; Zeldow, Daugherty, & Leksas, 1987), residency (Taylor et al., 1990) or beyond (Cartwright & Wink, 1994). One study compared the personalities of medical students with those of dental students (Bass, King, & Hollway, 1987). Several different psychometric instruments have been utilized by researchers, in both the longitudinal and time-limited studies. A review of longitudinal studies and their corresponding instruments will be highlighted and critiqued in the following section.

Longitudinal Studies

One of the earliest longitudinal studies investigating personality profiles of medical students utilized the Minnesota Multiphasic Personality Inventory (MMPI). The MMPI is currently the most widely used and researched objective personality inventory (Greene, 1991). It was initially developed in the 1940's by Hathaway and McKinley. The final version of the instrument consisted of 566 items (550 items and 16 repeated items), and included ten clinical scales and four validity scales. It was normed on clinical populations and was frequently used in psychiatric settings. Despite its use in psychiatric settings, the MMPI was the instrument of choice for Schofield's (1953a) study of medical students. The purpose of Schofield's (1953a) Phase I study was to determine the frequency of "deviant" scores per clinical scale and to examine specific MMPI profile patterns. In this phase, the MMPI was administered to two groups of male medical students--pre-med students from the University of Wisconsin (N = 68), and freshmen medical students (entering class of 1946) from the University of Minnesota (N = 83). The MMPI scores from these two groups were compared with those of males in the general population (N = 256), as well as college student males from the University of Wisconsin (N = 2805). The results indicated that the general male population and the college student male group differed from each other, and that the two medical student groups were more similar to each

other than to either the general male group or the college student male group. Specifically, the mean profiles for the two medical groups revealed primary elevations on Scale 5, the *Mf* scale (in the feminine direction) and secondary elevations on Scale 3 (the *Hy* scale). Additionally, there was a smaller frequency of high points on Scale 2 (the *D* scale) for the entering medical students than the pre-med students, and the entering medical students showed a greater frequency of high points on Scale 9 (the *Ma* scale). The author suggested that these findings indicated that morale level (and energy level) was higher for the admitted medical students than for those who were not yet admitted. What the author did not explain was why the general student population showed less pathology (i.e., less "no high point" codes) than either of the medical student groups.

In the second phase of Schofield's longitudinal study of medical students using the MMPI (1953b), he examined changes in profile scores after two years of medical training. The 83 freshmen medical students in the initial study from the University of Minnesota were readministered the MMPI during their junior year of medical school. In their junior year, Scale 4 (*Pd* scale) scores showed an increase of more than 14% in the frequency with which it was the high point, whereas Scale 5 (the *Mf* scale) and Scale 9 (the *Ma* scale) showed marked decreases in their frequency as high point elevations (in comparison with the freshman year scores). The author also reported "statistically reliable" changes in the mean scores for the three validity scales (*L*, *F*, and *K*). The author suggested that the students became more sophisticated in their ability to admit minor, relatively "acceptable" shortcomings (lower *L* scores) and that they developed an increasing reserve (higher *K* scores) concerning more intimate aspects of their personal lives. The author did not give an explanation for the lower *F* scores. Perhaps the greatest flaw in the author's finding that there were indeed "changes" in personality from freshman to junior years of medical school was that, after the administration of the MMPI in the freshman

year, these students were given feedback (i.e., several lectures) about the instrument itself and their individual profiles. Such firsthand knowledge about the instrument not only affects how one approaches the test taking task and scores on the instrument during future administrations, but more importantly, compromises the internal validity of the instrument itself.

Many years later, a longitudinal study was undertaken by Zeldow et al. (1987) which also attempted to determine how medical school affected personality. The researchers studied an entire class of medical students from the Medical College at Rush University in Chicago. Participation in the study was voluntary. Seventy-two students (60%) participated at all six data collection points (orientation and late in year one, early and late in year two, and midway through years three and four). There were several instruments that were utilized in the study. One instrument that was administered to the medical students was the Personality Attributes Questionnaire (PAQ). The authors of the present study stated that the PAQ provides 8-item measures of dominance (masculinity), warmth (femininity), and a combination of aggressiveness and emotional toughness (masculinity-femininity). The authors found "slight but significant" changes in the dominance and emotional-toughness scales of the PAQ (i.e., students appeared slightly less dominant and more vulnerable by the middle of their third year). However, this instrument was not administered in year four, thus there was no way to determine whether this finding continued. Another instrument that was administered to the medical students was the 12-item version of the Eysenck Personality Inventory (EPI). According to Tellegen (1978), the EPI remains the "best known" self-report instrument measuring the personality dimensions of Extraversion and Neuroticism (anxiety-proneness). In the present study, Extraversion and Neuroticism scores (as measured by the EPI) reportedly changed at certain points in the measurement process, but reverted back to previous levels by the last point of measurement. The

authors attributed these changes to the impact of the waxing and waning stressors within the medical school program on the students, but did not consider that the low number of items (i.e., 12) on the modified version of the EPI or other mediating variables (e.g., gender, age) may have accounted for the disparate findings.

Another longitudinal study examined the influence of medical school on surgeons' personalities, specifically, whether surgeons' personalities differed from those of other (non-surgical) physicians. Coombs et al. (1993) retrospectively analyzed scores from a battery of 55 standardized personality scales which were administered to 17 surgical and 44 non-surgical specialists who were in the same graduation class at a U. S. medical school. All 55 personality scales were administered to the participants twice, at entry to medical school (Time One) and at exit from medical school (Time Two). Complete data were obtained from 93% of the participants at Time One (14 surgical and 43 non-surgical specialists) and 64% of the participants at Time Two (12 surgical and 27 non-surgical specialists). Although an entire battery of personality scales was administered, the only statistically significant differences found between the surgical and non-surgical group occurred on the California Psychological Inventory (CPI). The CPI is a 462 item self-report questionnaire that measures 20 features of normal personality (Bolton, 1992). The goal of the instrument is to enable clinicians to accurately describe individuals and to predict their behavior (Bolton, 1992). At Time One, the surgical group was found to be more flexible than the non-surgical group. At Time Two, the surgical group was found to be more adaptable to change than the non-surgical group. However, neither of these findings held up over both test periods (i.e., Time One and Time Two). One piece of key information that was missing from the study was the composition of the non-surgical group (i.e., what specialties were represented). In addition, the authors failed to account for a testing

effect on the participants. That is, fatigue or other factors (e.g., multiple instruments testing the same construct) may have had a significant impact on the findings from this study.

Brown and Pepler (1994) utilized a different instrument, the Myers-Briggs Type Indicator (MBTI), in their longitudinal study. The MBTI is one of the most common personality inventories used in the study of personality types within the field of medicine (Sliwa & Shade-Zeldow, 1994). The MBTI grew out of Jung's type theory as interpreted primarily by Isabel Briggs Myers (Devito, 1985). According to Close Conoley and Kramer (1989), the purpose of the MBTI is "to identify, from self-report of easily recognized reactions, the basic preferences of people in regard to perception and judgement, so that the effects of each preference, singly and in combination, can be established by research and put to practical use." It is a forced-choice instrument, with examinees receiving ratings on four dichotomies: Extraversion/Introversion, Sensing/Intuiting, Thinking/Feeling, and Judging/Perceiving. Examinees are then categorized into one of 16 "types" based on their ratings in the four dichotomous areas. Brown and Pepler (1994) administered the MBTI to 145 incoming medical students at the University of Tennessee, Memphis in 1989. The purpose of the study was to determine if there was a change in students' MBTI preferences between the first and fourth years of medical school. In 1992-1993, they randomly selected 40 students (ten from each quartile based on GPA) for a re-administration of the instrument. Thirty-five of the 40 students (11 females and 24 males) completed it. At the re-administration, the authors found that 20 of the 35 students had changed their preferences on one or more dimensions, and that 16 of the 20 showed changes in either how they perceived and gathered information (the Sensing-Intuiting dimension) or how they made decisions (the Thinking-Feeling dimension) or both. In addition, the changes occurred most frequently in males, and in those in the second and fourth quartiles of the class. The authors concluded that the

preferences of some medical students changed over the course of time spent in medical school. It is possible, though not noted by the authors, that this subset of the original sample was not representative due to its small size. To the authors' credit, they did indicate that the change was in "preferences" and not "personality type." However, they failed to mention the difficulties inherent in the MBTI itself. Carlson (1989) and Healy (1989) debated the merits of the instrument from a psychometric perspective, with Carlson taking the "pro" stance, and Healy taking the "con" stance. Even though they reviewed the instrument from different perspectives, both authors agreed that the norms for the MBTI were incomplete, and that substantial validation of the instrument was lacking.

Eicke, Blake, and Replogle (1993) evaluated family practice residents from the University of Mississippi (N = 44) during three consecutive years, using both the MBTI and the Sixteen Personality Factor Questionnaire (16PF). The purpose of the study was to validate the MBTI (a theoretically based instrument) with the use of the 16PF (an empirically based instrument). The 16PF, which measures personality characteristics, was normed on nonclinical populations, developed through factor analysis, and has item content that is essentially nonpathological (Grossman & Craig, 1995). Family practice residents were administered both instruments. Most residents completed the instruments during their first year of residency (N = 29), but others completed them during their second year (N = 4) or their third year (N = 11). The authors found the highest correlations between the two instruments on the Extraversion/Introversion aspect of personality ($r = -.71$). Other correlations were identified between the 16PF second-order factors of Tough Poise and Independence and the MBTI dimension of Extraversion/Introversion, and between the 16PF second-order factor of Superego/Control and the MBTI dimension of Judgement/Perception. The manner in which the

data was collected (i.e., the instruments were initially administered to the participants at different points in time) could have resulted in what Campbell and Stanley (1963) referred to as the confounding effect of history, which is a threat to the internal validity of this study.

A longitudinal study which utilized the 16PF with non U. S. medical students (N = 202) was conducted in Japan by Sakai, Takeichi, and Sato (1984). The researchers reported that they utilized the 16PF to assess the mental health of incoming freshman medical students. Beginning in 1978 (coinciding with the opening of a new medical school), the researchers administered a "modified version" of the 16PF to first year medical students. When the 1978 incoming medical students reached their fifth year of medical school, the modified 16PF was readministered to these medical students. In the abstract of this study, the researchers reported "high" test-retest correlations on the modified 16PF and stated that no significant differences were found in the personality traits for these medical students between the first and fifth years of medical school. The researchers did not, however, report the test-retest correlations numerically, nor did they specify the percentage of medical students who participated in each test administration.

A study by Meit et al. (1999) highlighted preliminary findings from a longitudinal study which utilized the 16PF (Fifth Edition) with U. S. medical students. The purpose of the study was to identify personality trait patterns associated with this population, and to determine if any of these personality traits demonstrated associations with later residency choice. Two groups of incoming medical students at West Virginia University (1995 and 1996 entering classes, N = 181) were administered the 16PF during their respective week of new student orientation. These medical students were found to have higher reasoning (Factor B), emotional stability (Factor C) and liveliness (Factor F) than the general population on which the 16PF was normed. These findings were significant at the $p < .001$ level. In addition, female and male medical students

scored differently on 7 of the 16 personality factors. For example, female medical students showed greater social boldness (Factor H), more openness to change (Factor Q1), more perfectionistic traits (Factor Q3), and greater apprehension/self-doubt (Factor O) than their male medical student peers. What was not reported by the authors, due to the "preliminary findings" status of the study, was the association between the personality traits of this group and their eventual residency selections.

An unrelated longitudinal study which utilized the 16PF is worthy of mention here. Bolton (1979) administered the 16PF, Form E, to 32 persons with disabilities, at the time of acceptance to rehabilitation services, and again six years later. Six of the primary scales and four of the secondary scales were shown to have substantial stability over the 6-year time frame, as evidenced by correlations greater than .50 and statistical significance at the $p < .001$ level. The six stable primary scales (i.e., outgoing, assertive, enthusiastic, uninhibited, sensitive, and suspicious) were the major contributors to the four stable secondary scales (i.e., Exvia, Cortertia, Independence, and Prodigious Subjectivity). The author concluded that these findings provide additional support for Cattell's conceptualization of normal personality functioning. While these findings are noteworthy, the small sample size and lack of a control group may compromise the findings' generalizability to other populations.

In summary, longitudinal studies to date have utilized the MMPI, the EPI, the CPI, the MBTI and the 16PF to examine the impact of medical education on personality characteristics. These instruments will be reviewed for their inclusion or exclusion in the present study following the subsequent section on time-limited studies.

Time-Limited Studies

In addition to longitudinal studies, there are numerous time-limited studies which have examined the impact of medical education on personality characteristics, particularly within the specialty of family practice, at a single point in time. Many of these studies have utilized the MBTI. Quenk and Heffron (1975) compared the MBTI profiles of family practice residents (N = 85) with those of family practice teachers (N = 91). The purpose of their study was to determine whether the field of family practice was attracting individuals of a certain "personality type." According to the authors, the combined sample showed an over-representation of Sensing-Judging types and an under-representation of Intuiting-Perceiving types. The most frequent type observed among the family practice residents was Introverted/Sensing/Thinking/Judging (ISTJ), and for the family practice teachers, Extraverted/Sensing/Feeling/Judging (ESFJ) was most prevalent. The authors concluded that the same personality types were attracted to family practice that had been attracted to the original field of general practice. The biggest limitation of this study was the manner in which the samples were derived. Family practice teachers were those individuals who volunteered to fill out the MBTI at a national medical conference. Some of these teachers, in turn, "volunteered" their residents to fill out the instrument as well. In spite of the authors' claims to the contrary, this method of selection is subject to sampling bias, as neither of these samples may be representative of the populations from which they were drawn (e.g., not all teachers may attend conferences, the residents may have had mild coercion to fill out the instrument, etc.).

Ten years later, a study which also utilized the MBTI with a group of family practice residents was conducted by Harris and Ebbert (1985). Similar to Quenk and Heffron (1975), Harris and Ebbert (1985) sought to determine whether the personality types of individuals

choosing family practice residencies at a given point in time were likely to be different from those individuals previously choosing the area of general practice medicine. The authors compared MBTI scores from incoming University of Utah family practice residents from 1977-1980 (N = 55) with those of primary care physicians in private practice in a rural area (N = 20, a 50% response rate for the 40 physicians initially requested to participate). The Intuiting/Feeling type (NF) was more prevalent among the residents, whereas the Sensing type (S) was more prominent among the rural primary care physicians. What is interesting to note is that the authors admitted that the NF type is also prevalent among their faculty, and may indeed have led similar-type applicants to choose that residency, or the faculty to choose similar-type applicants for admission (a possible selection bias). This may have skewed the results of the research, in that the sample was homogeneous at the outset of the study.

Taylor et al. (1990) also utilized the MBTI to examine family practice residents during the mid-1980s. The purpose of their study was to determine the most common personality types occurring among family practice residents during that time period. The researchers contacted 387 family practice residencies, 35 of which were utilizing the MBTI in their programs. Of these 35, 19 residency directors supplied data for use in this study. The authors personally administered the MBTI to residents from 11 other programs, bringing the total number of profile reports collected to 778. These residents' scores were then compared with those of general practitioners' scores from existing research (compiled by another author in the 1950s) and studies of family practice residents (by other authors from the 1970s). The biggest change noted by the authors of the present study was that family practice residents in the 1980s were primarily Intuiting (N), Feeling (F) and Judging (J) types, as opposed to the Sensing (S), Thinking (T) and Perceiving (P) types that had been prominent among general practitioners before the 1970s. The NF

temperament type was predominant in the 1980s group, whereas family practice residents in the 1970s showed a preponderance of SJ types. However, the SJ type was still prominent in 1980s family practice residents who were completing military as opposed to civilian-based training programs. The authors admit that the biggest limitation of their study was that their sample was not random, and that a selection bias may have occurred (i.e., the sample was not representative geographically or demographically).

Family practice is not the only medical specialty which has examined MBTI data. Sliwa and Shade-Zeldow (1994) investigated personality types of residents and graduates of their training program in Physical Medicine and Rehabilitation using the MBTI. The authors stated that the purpose of their study was to determine the personality types prevalent within their residency program, to identify the academic potential of residents and graduates based on type theory, and to determine if personality type changes over time. Thirty of 39 residents (76%) and 48 of 110 graduates (44%) participated in the study. Twelve personality types were represented among the graduate group, and 13 in the group of residents. The graduate group had the largest number of any specific code type (N = 13), for the INTJ type. The authors found a statistically significant difference between residents and graduates on two of the four MBTI scales, with graduates scoring as more Introverted (I) and Judging (J) than the residents. The results also indicated that Intuiting (N) was the dominant process for the majority of both residents and graduates, and the authors used this finding to "conclude" that both the residents and graduates had academic potential according to type theory. Lastly, the authors stated that, "the comparison of residents and graduates on individual indexes of the MBTI supports a change in the personality of those entering our rehabilitation program." This last finding is clearly flawed, in that a pre-post test design was not utilized, and comparing one group with another at a single

point in time and reaching a longitudinal conclusion compromises the internal validity of the study.

The MBTI has also been used in the field of dentistry. Bass et al. (1987) undertook a study with the MBTI to determine how similar dental students were to medical students (i.e., were dental students aspiring physicians who just could not get admitted to medical school). They administered the MBTI to 263 first year dental students from the University of Florida and 675 first year medical students from the same institution. All of the 16 MBTI code types were represented in both the dental and medical student groups. However, the two most prevalent personality types identified by the authors among the dental students were ESFJ and ESTJ, and among the medical students, the INFP and the ISTJ types. The authors used these findings to conclude that the two groups were indeed different from one another. What was noticeably absent from their study, however, was any demographic information for either of the two groups of students (e.g., age, ethnicity, gender). As such, it is unclear whether the groups may have been different in ways other than student status (i.e., dental or medical) alone.

The MBTI is not the only instrument which has been used in time-limited studies examining the impact of medical education on personality characteristics. Mowbray and Davies (1971) examined personality factors using both the EPI and two scales (Complexity of Thinking and Thinking-Introversion) from the Omnibus Personality Inventory (OPI) to determine if these factors played a role in choice of medical specialty for non U.S. postgraduate medical students. The OPI is comprised of 14 scales designed to assess attitudes, values, and interests (Dollar, 1989; Howarth, 1978). This was a follow-up to an earlier study by Davies and Mowbray (1968) in which undergraduates were administered the same two scales from the OPI. In the earlier study, it was found that students who expressed interest in psychiatry as a specialty had high

scores on these two scales. Those scoring low on the two scales were more likely to indicate that surgery would be their specialty choice. In the Mowbray and Davies (1971) study, the EPI and OPI were mailed to postgraduate medical students from the University of Melbourne, with an 86% return rate. The total number of participants was 207, and included surgery residents (aka, "surgeons") (N = 60), psychiatry residents (aka, "psychiatrists") (N = 30), and medicine residents (aka, "physicians") (N = 64) along with those declaring themselves "undecided" (N = 39) and "nonspecializing" (N = 14). The authors reported that the highest Extraversion and Neuroticism scores on the EPI were evident in the nonspecializing group as well as the lowest scores on the Thinking-Introversion scale of the OPI. Surgeons and psychiatrists were significantly more extraverted than physicians according to the EPI scores, and physicians showed significantly higher Neurotic scores when compared with surgeons (the least neurotic group). On the Thinking-Introversion scale of the OPI, the psychiatrists and physicians were most introverted, significantly more than surgeons (the least introverted group). The biggest threat to the findings of this study was the manner in which the data was gathered. That is, the researchers cannot be assured that, when the instruments were mailed to the participants, that the intended participants were indeed the ones who completed them.

Lastly, a cross-sectional study utilizing the 16PF was undertaken by Chowdhury et al. (1987). They investigated the personality profiles and other characteristics of non U. S. psychiatry residents during two consecutive years. The personality instrument used in the study was the 16PF (Form C). After discarding incomplete protocols (N = 7), complete 16PF profiles were obtained from a total of 34 first year psychiatry residents and 12 third year psychiatry residents. Internal medicine residents (N = 27) were used as a control group. The authors found that, in comparison with the first year psychiatry residents, the internal medicine residents had

significantly higher scores on second order Factors III (perfection) and IV (tension), and significantly lower scores on primary factors A (warmth), B (reasoning), C (emotional stability), and I (sensitivity). The only significant difference found between the first and third year psychiatry residents was that the third year residents scored higher on Factor IV (tension). The researchers erroneously concluded that the lack of significant differences on the 16PF between the first and third year psychiatry residents was attributable to "three years (being) too short a period to bring about measurable changes in personality." Such a statement cannot be made when a within-subjects, pre-test/post-test design was not utilized by the researchers.

Summary

In summary, there are a variety of instruments that have been utilized by researchers to investigate the level of impact of medical education on personality characteristics. However, several of these instruments are not suitable for this purpose. For example, the MMPI's use with medical students is limited because of the availability of newer instruments which are more appropriate for use with non-clinical populations. Using an instrument that was developed for clinical populations with relatively normal populations (i.e., medical students) seems inappropriate at best, and pathologizing at worst. The same holds true for the CPI, because of the fact that the instrument includes 194 test items (42% of the total test items) which are MMPI test items (Bolton, 1992). Why is it necessary to employ items that suggest psychiatric disturbance to assess variations in normal personality functioning (Bolton, 1992)? The EPI does not provide the needed information that is available from other self-report inventories such as the CPI and MMPI (Tellegen, 1978), and those instruments have already been excluded for use in the present study for the reasons noted herein. The OPI "semi-deceptively" includes the term "personality" in its title, but was actually designed to measure attitudinal and interest aspects of college performance

(Howarth, 1978). Further, the OPI scales are less psychometrically acceptable than those of the 16PF and would be considerably less satisfactory than the EPI scales (Howarth, 1978). While there is a large body of research utilizing the MBTI within the field of medicine, the findings from such research cannot, due to the nature of the instrument, be considered reliable and/or valid (Carlson, 1989; Healy, 1989). As such, all of the above instruments were disregarded for use in the present study.

In support of its use in the present study, the 16PF was constructed by systematically sampling the entire realm of personality descriptors and then reducing them to a number of primary traits (Schuerger, 1992). The 16PF Fifth Edition was created with a combination of traditional factor-analytic and contemporary item analysis methods (Conn & Rieke, 1994a). The instrument provides a sample of the test taker's verbal self-presentation that is broad based and structured (Schuerger, 1992). It has been utilized in longitudinal studies, with test-retest stability over a 6-year time period (Bolton, 1979). What is most relevant to the present study, however, is that the 16PF is a measure of the normal, rather than a clinical population, making its use more relevant in universities than many other tests (Stern, Harris, & Buckley-Sharp, 1972). Given that medical students are presumably members of the normal population who are also located in a university setting, the 16PF appears to be the most appropriate instrument for use in the present study. Chapter III provides a detailed description of this psychometric instrument.

CHAPTER III

METHOD

This chapter provides detailed information about how the present study was conducted. First, a description of the study's participants is provided. Information is then provided about the instruments that were used for the collection of data. Following that is the section on the procedures used in the study. Lastly, the methods that were used for the analysis of data are described.

Participants

Participants consisted of female (N = 17) and male (N = 21) medical students who were concluding their fourth year of medical school at a mid-Atlantic university in March, 1999. The participants were located at two campuses (i.e., for the purposes of this study, the northern campus and the southern campus). There were 27 participants from the northern campus (11 females and 16 males) and 11 participants from the southern campus (6 females and 5 males). There was one additional male on the southern campus who filled out only one of the two instruments, so his data could not be included in the final analyses.

At the time that the data for the current study were being collected, the students were also completing their participation in a longitudinal study by another researcher. The longitudinal study involved the participants completing the 16PF during the orientation week prior to year one of medical school (August, 1995), and then again at year four, near the completion of medical school (March, 1999). Although there were originally 94 participants in the longitudinal study by the other researcher, only 81 of these were available for use in the present study (13 of the 94 were either no longer enrolled in medical school or had delayed their graduation). Thus, the 38 participants in the present study represented a 47% participation rate. Approval for the

present study was obtained via an addendum to the Institutional Review Board's approval of the original study by that researcher (see Appendixes A and B).

Instruments

There were two instruments that were utilized for the collection of data. The first instrument was the 16PF, Fifth Edition. According to the 16PF Fifth Edition Technical Manual (Conn & Rieke, 1994a), the 16PF is comprised of 16 primary factor scales and 5 global (formerly second order) factor scales developed via factor analysis of the primary scales. The 16 primary personality factors are: Factor A (Warmth), Factor B (Reasoning), Factor C (Emotional Stability), Factor E (Dominance), Factor F (Liveliness), Factor G (Rule Consciousness), Factor H (Social Boldness), Factor I (Sensitivity), Factor L (Vigilance), Factor M (Abstractedness), Factor N (Privateness), Factor O (Apprehension), Q1 (Openness to Change), Q2 (Self-Reliance), Q3 (Perfectionism), and Q4 (Tension). The five global factors are: Extraversion (EX), Anxiety (AX), Tough-Mindedness (TM), Independence (IM), and Self-Control (SC).

The 16PF Fifth Edition contains 185 multiple choice items (16 primary factor scales of 10 to 15 items each and an Impression Management [IM] scale of 12 items) (H. Cattell, 1994). On the test form, the Reasoning (Factor B) items are separated from the personality items because they measure ability and therefore have right and wrong answers (H. Cattell, 1994). Raw scores for each of the scales are then converted to scores on a standard continuum from 1 to 10, better known as a STEN (mean of 5.5 and standard deviation of 2.0). Readability is estimated at a fifth-grade level, and the average time for paper-and-pencil administration ranges from 35 to 50 minutes (H. Cattell, 1994).

According to the 16PF Fifth Edition Technical Manual (Conn & Rieke, 1994b), the instrument was normed on a sample of 2,500 individuals (1,245 males and 1,255 females). Four

demographic variables were used to stratify the sample: gender, race, age, and education. The variables of gender and race nearly matched 1990 U. S. Census data, but adults over age 55 and those individuals with lower education were underrepresented in the normative sample (in comparison with the 1990 U. S. Census). The mean age of the individuals in the normative sample was 33.3 years, and the mean education level was 13.6 years.

Validity and reliability information on the 16PF Fifth Edition was also highlighted in the technical manual (Conn, 1994). The average internal consistency values for the 16 primary scales ranged from .66 to .86, with .75 being the median; the manual did not specify the method(s) used to arrive at these values. Two month test-retest estimates for the 16 primary scales ranged from .56 to .79, with .69 the median. Bolton (1979) found that six of the primary scales and four of the secondary scales were shown to have substantial stability over a 6-year time frame, as evidenced by correlations greater than .50 and statistical significance at the $p < .001$ level. The test's original author, R. Cattell (1994), found that global (second-order) factors were stable over a 20 year time frame, but stated that "predictions from these factors are poorer than the 16 primary factors." Thus, only the 16 primary factors were utilized in the present study. Correlations between the 16PF primary factor scales and four other personality instruments (including the MBTI and the CPI) were "substantial" according to the manual's authors, and served as evidence of validity for these scales (Conn & Rieke, 1994c).

The second instrument utilized in the study was generated by the present researcher. This instrument, hereinafter referred to as the "Subjective Rating Form" (SRF), was modeled after the 16PF Fifth Edition score sheet, and was modified with permission of the test publishers (see Appendix C). The top of the instrument included directions for the participants. This instrument/form was used for participants to record their self-ratings. That is, participants were

asked to use specific markings to rate themselves on continua for 16 (non-numbered) factors. Indeed, these were designed to be the same 16 factors included in the 16PF instrument.

The design of the instrument required the participants to change cognitive perspectives when completing the form. One rating was recorded by the participant from three different perspectives for each of the 16 factors presented on the form. These perspectives were: (1) self-perception at entrance to medical school, (2) self-perception at exit from medical school, and (3) other-perception at exit from medical school. An overhead projection of the answer sheet was utilized to show participants examples of how markings (i.e., a square, an “X,” and a circle) were to be recorded on the continua, particularly if the student chose the same “dot” to represent all three perspectives (see Figure 1).

Procedure

At Time One (August, 1995), the 16PF Fifth Edition was administered to participants at the northern and southern campuses of a mid-Atlantic university who were participating in a study conducted by another researcher. Time One data were accessed archivally for use in the present study. At Time Two (March, 1999), the 16PF Fifth Edition and the researcher designed Subjective Rating Form were administered simultaneously at these same campuses (by the researcher at the southern campus, and by a member of the researcher’s doctoral committee at the northern campus) to the same participants from Time One. Data were collected on the same date, at the same time of day.

The participants met in a large lecture hall at their respective campuses. The administration began with the researcher (or designee, at the northern campus) reading standardized instructions to research participants (see Appendix D). Instructions were read aloud to the participants and projected for viewing by an overhead projector.

DIRECTIONS

On this form, you will be making 3 ratings on each continuum listed below. You may use the same dot for all 3 ratings.

First, place a square (□) around the dot on each continuum that best represents where you believe you WERE when you first entered medical school.

Second, place an "X" through the dot on each continuum that best represents where you believe you are NOW.

Third, circle the dot on each continuum that best represents where you believe OTHERS would rate you now.

*** Left Meaning	*** Right Meaning
Reserved, Impersonal, Distant	Warm, Outgoing, Attentive to Others
Concrete	Abstract
Reactive, Emotionally Changeable	Emotionally Stable, Adaptive, Mature
Deferential, Cooperative, Avoids Conflict	Dominant, Forceful, Assertive
Serious, Restrained, Careful	Lively, Animated, Spontaneous
Expedient, Nonconforming	Rule-Conscious, Dutiful
Shy, Threat-Sensitive, Timid	Socially Bold, Venturesome, Thick-Skinned
Utilitarian, Objective, Unsentimental	Sensitive, Aesthetic, Sentimental
Trusting, Unsuspecting, Accepting	Vigilant, Suspicious, Skeptical, Wary
Grounded, Practical, Solution-Oriented	Abstracted, Imaginative, Idea-Oriented
Forthright, Genuine, Artless	Private, Discreet, Non-Disclosing
Self-Assured, Unworried, Complacent	Apprehensive, Self-Doubting, Worried
Traditional, Attached to Familiar	Open to Change, Experimenting
Group-Oriented, Affiliative	Self-Reliant, Solitary, Individualistic
Tolerates Disorder, Unexacting, Flexible	Perfectionistic, Organized, Self-Disciplined
Relaxed, Placid, Patient	Tense, High Energy, Impatient, Driven

All participants received a code number which was assigned to them by the researcher and used for identification purposes. This code number was used consistently, across time (i.e., Time One and Time Two) and across instrument (i.e., the 16PF answer sheet and the Subjective Rating Form). The only identifying data that were filled in on either of these forms by the participant was their gender.

The participants completed the aforementioned instruments voluntarily. However, several prizes were donated by pharmaceutical companies (at Time Two) to encourage maximum attendance by participants for the scheduled collection of data. These prizes included textbooks, gift certificates, sports equipment, and food items. Participants (all of those at the southern campus, due to the small number of participants at that site, and some at the northern campus) received prizes in a random drawing following administration of the instruments (i.e., data collection) at Time Two only. In addition, the university provided meal tickets for dinner from the hospital cafeteria for the students who participated in the data collection.

Data Analysis

The present study utilized a within-subjects (pre-test/post-test) design. There were additional comparisons at Time Two that were not pre-test/post-test. The original 16PF scores for each of the 38 participants from Time One were available archivally, and were compared with the scores from the re-administration of this instrument (Time Two) in the present study. However, the Subjective Rating Form was utilized as a post-test only instrument (Time Two). This research design is illustrated in Table 1.

A series of multivariate analyses of variance (MANOVA) was utilized. Lomax (1992) defines MANOVA as the simultaneous analysis of multiple dependent variables. Each of the

personality factors from the 16PF is a dependent variable, as are the 16 personality characteristics on the Subjective Rating Form.

A MANOVA (for Testing Occasion) was utilized to determine if there was a change in personality as measured by the 16PF from Time One (entry to medical school) to Time Two (exit from medical school). The null hypothesis stated that there was no change in personality from Time One to Time Two. To test this hypothesis, an initial MANOVA was computed in which the independent variable (within subjects) was Testing Occasion (Time One versus Time Two). The dependent variables were the 16PF sten scores for each factor (e.g., Warmth, Reasoning, Emotional Stability, Dominance). If this MANOVA yielded a significant ($p < .05$) F value, follow-up analyses of variance were computed to determine which dependent variables showed statistically significant differences between participants' scores at Time One versus Time Two.

Similarly, a MANOVA (for Instrument) was needed to compare each participant's sten scores on the 16PF (the objective personality instrument) with their scores on the Subjective Rating Form (the subjective personality instrument), both measured at Time Two. The null hypothesis stated that there was no difference between objective personality characteristics (results on the 16PF) and subjective personality characteristics (results on the SRF). To test this hypothesis, an initial MANOVA was computed in which the independent variable (within subjects) was Instrument (16PF versus SRF). The dependent variables were the 16PF sten scores and the SRF scores. If this MANOVA yielded a significant ($p < .05$) F value, follow-up analyses of variance were computed to determine which dependent variables showed statistically significant differences between participants' scores on the 16PF versus the SRF.

Table 1

Research Design

Instrument	Time One (August, 1995)	Time Two (March, 1999)
MANOVA (testing occasion) 16 PF	X	X
MANOVA (instrument) 16 PF SRF		X X
MANOVA (perspective) SRF (self 1) SRF (self 2) SRF (other)		X X X
MANOVA (comparison) 16PF SRF (self 1)	X	X

Research Question One: Does medical school change personality? There is one independent variable (testing occasion) at two levels (Time One and Time Two), and 16 dependent variables (16PF sten scores) for each testing occasion.

Research Question Two: Are there differences between "objective" personality characteristics and "subjective" personality characteristics? There is one independent variable (instrument) at two levels (16PF and SRF), and 16 dependent variables for each instrument.

Research Question Three: Are there differences between "subjective" personality characteristics when rated from different perspectives? There is one independent variable (perspective), at three levels (Self-One, Self-Two, and Other), and 16 dependent variables for each perspective.

Research Question Four: Are there differences between "objective" personality characteristics measured at Time One and "subjective" personality characteristics measured at Time Two but rated from the perspective of Time One? There was one independent variable (instrument), and 16 dependent variables for each instrument.

Additionally, a MANOVA was utilized (for Perspective) to assess whether participants' ratings varied when they rated themselves subjectively from different perspectives. The null hypothesis stated that there was no difference in subjective personality characteristics on self-ratings as viewed by "self" (measured at Time Two, from the perspectives of Time One and Time Two) and self-ratings as viewed by "others" (measured at Time Two). To test this hypothesis, an initial MANOVA was computed in which the independent variable (within subjects) was Perspective (Self-One, Self-Two, and Other). The dependent variables were the SRF scores from all three perspectives. If this MANOVA yielded a significant ($p < .05$) F value, follow-up analyses of variance were computed to determine which dependent variables showed statistically significant differences between participants' scores from the SRF for Self-One, Self-Two, and Other.

Lastly, a MANOVA (for Comparison) was needed to compare each participant's sten scores on the 16PF at Time One with their scores on the SRF, measured at Time Two from a retrospective point of view of Time One (Self-One). The null hypothesis stated that there was no difference in personality characteristics at entry to medical school, when measured objectively at Time One by the 16PF or subjectively at Time Two (retrospectively) by the SRF. To test this hypothesis, an initial MANOVA was computed in which the independent variable (within subjects) was Comparison (16PF at Time One versus SRF Self-One). The dependent variables were the 16PF sten scores and the SRF scores. If this MANOVA yielded a significant ($p < .05$) F value, follow-up analyses of variance were computed to determine which dependent variables showed statistically significant differences between participants' scores on the 16PF versus the SRF.

Summary

The participants in the present study were medical students at a mid-Atlantic university. There were two instruments that were used in the present study for the collection of data. The objective instrument was the 16 Personality Factor Questionnaire, Fifth Edition (16PF) and the subjective instrument was the researcher-developed Subjective Rating Form (SRF). The data for this longitudinal study were collected at two points in time. Time One (entry to medical school) data (16PF only) were originally collected in August, 1995 and were accessed archivally for use in the present study. Time Two (exit from medical school) data (16PF and SRF) were collected in March, 1999. Data were analyzed using MANOVAs. When MANOVAs were significant, follow-up ANOVAs were computed. Chapter IV provides a detailed description of the findings from this study.

CHAPTER IV

RESULTS

The purpose of the present study was to determine whether there was a measurable change in personality from the time one enters to the time one exits medical school. Not only were potential changes viewed from an objective perspective (i.e., using the 16PF) but also from a subjective perspective (i.e., using the SRF).

Research Question 1

Is there a change in personality as measured by the objective personality instrument (the 16 PF) from Time One (entry to medical school) to Time Two (exit from medical school)? To address this question, an overall multivariate analysis of variance (MANOVA) was computed in which the independent variable (IV) was testing occasion (Time One or Time Two). The dependent variables (DVs) for this MANOVA were the participants' STEN scores on the 16PF. This analysis yielded an overall significant finding ($F = 2.22, p < .05$).

As such, component analyses of variance (ANOVAs) were computed. In each of these component analyses, the IV was testing occasion (within subjects), and the DV was the STEN score (range of 1 to 10) for each specific personality characteristic. The means and standard deviations, as well as the results of these ANOVAs, are reported in Table 2. As may be noted in the table, significant results occurred for the personality characteristics of Dominance and Openness to Change. The 16PF scores were higher at Time One than at Time Two for both of these characteristics (i.e., participants' scores decreased on these characteristics at Time Two). To determine if gender had any effect on these findings, two additional MANOVAs were computed. Neither the overall analysis computed for female nor male participants yielded a significant F-value. However, subsequent ANOVAs computed did yield significant findings,

Table 2

Means, SDs and ANOVA Results for Testing Occasion (IV) and 16PF Scores (DVs) for

Research Question 1

Characteristic	16PF					
	Time One		Time Two		F	Significance
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>		
1. Warmth	4.90	1.92	4.77	1.87	0.28	NS
2. Reasoning	7.92	1.44	8.15	1.25	1.15	NS
3. Emotional Stability	6.33	1.77	6.08	1.77	1.40	NS
4. Dominance	5.67	1.91	5.08	2.06	4.32	*
5. Liveliness	6.13	1.58	6.33	1.94	0.97	NS
6. Rule-Consciousness	5.61	1.68	5.44	2.05	0.57	NS
7. Social Boldness	5.61	1.84	5.31	1.88	1.89	NS
8. Sensitivity	4.56	1.85	4.69	1.95	0.26	NS
9. Vigilance	5.92	1.63	5.92	1.91	0.00	NS
10. Abstractedness	5.31	1.84	4.90	2.29	2.92	NS
11. Privatness	5.26	2.02	5.64	2.01	2.63	NS
12. Apprehension	5.59	2.02	5.85	2.16	0.82	NS
13. Open to Change	6.56	1.53	5.54	2.06	14.57	**
14. Self-Reliance	5.00	1.92	5.44	2.09	2.89	NS
15. Perfectionism	5.67	2.23	5.18	2.47	2.84	NS
16. Tension	5.38	1.84	5.44	1.89	0.03	NS

* $p < .05$. ** $p < .001$.

which varied by gender. For females, the personality characteristics of Emotional Stability, Dominance, and Openness to Change decreased from Time One to Time Two, and the characteristics of Sensitivity and Self-Reliance increased from Time One to Time Two (see Appendix F). The only significant finding for males occurred on the personality characteristic of Openness to Change, which decreased from Time One to Time Two (see Appendix G), as was also noted in the females.

Research Question 2

Are there differences between objective personality characteristics (measured by the 16PF at Time Two) and subjective personality characteristics (measured by the SRF at Time Two)? To address this question, an overall MANOVA was computed in which the IV was instrument (16PF or SRF) at Time Two. Thus, the IV was a within-subjects variable in which each participant responded to both instruments. The DVs for this MANOVA were the participants' scores on the 16PF and SRF. This analysis yielded an overall significant finding ($F = 63.44, p < .0001$).

Accordingly, component ANOVAs were computed. In each of these component analyses, the IV was instrument (within subjects), and the DV was the STEN score for each specific personality characteristic. The means and standard deviations, as well as the results of these analyses of variance, are reported in Table 3. As may be noted in the table, significant results occurred for the personality characteristics of Warmth, Reasoning, Emotional Stability, Liveliness, Rule-Consciousness, Social Boldness, Sensitivity, Privatness, and Perfectionism. The 16PF score was higher than the SRF score on Reasoning, Liveliness, and Privatness. The SRF score was higher than the 16PF score for Warmth, Emotional Stability, Rule-Consciousness, Social Boldness, Sensitivity, and Perfectionism.

Table 3

Means, SDs and ANOVA Results for Instrument (IV) and Scores (DVs) for

Research Question 2

Characteristic	Instrument				F	Significance
	16PF (Time Two)		SRF (Self-Two)			
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>		
1. Warmth	4.78	1.87	7.51	1.64	47.88	****
2. Reasoning	8.15	1.25	6.24	2.27	25.94	****
3. Emotional Stability	6.08	1.77	7.65	2.12	11.97	**
4. Dominance	5.08	2.06	5.49	2.51	0.83	NS
5. Liveliness	6.33	1.94	5.54	2.18	5.33	*
6. Rule-Consciousness	5.44	2.05	6.97	2.45	15.29	***
7. Social Boldness	5.31	1.88	6.43	2.32	5.16	*
8. Sensitivity	4.69	1.95	6.35	2.30	15.27	***
9. Vigilance	5.92	1.91	5.54	2.46	0.92	NS
10. Abstractedness	4.90	2.29	4.43	1.99	1.26	NS
11. Privatness	5.64	2.01	4.76	2.16	6.59	*
12. Apprehension	5.85	2.16	5.08	2.36	2.84	NS
13. Open to Change	5.54	2.06	5.22	2.21	0.66	NS
14. Self-Reliance	5.44	2.09	5.97	2.42	2.23	NS
15. Perfectionism	5.18	2.47	6.32	2.40	10.91	**
16. Tension	5.44	1.89	5.51	2.46	0.04	NS

* p < .05. ** p < .01. *** p < .001. **** p < .0001.

Research Question 3

Are there differences in subjective personality characteristics between self-ratings made on the SRF as viewed by "self" measured at Time Two, from the perspectives of (a) Time One and (b) Time Two, and (c) self-ratings as viewed by "others," measured at Time Two? To address this question, an overall MANOVA was computed in which the IV was perspective (Self-One, Self-Two, or Other). The DVs for this MANOVA were the participants' scores on the SRF. This analysis yielded an overall significant finding ($F = 3.19, p < .0001$).

Accordingly, component ANOVAs were computed. In each of these component analyses, the within subjects IV was perspective (Self-One, Self-Two, and Other), and the DVs were the scores for each of the 16 personality characteristics. The means and standard deviations, as well as the results of these ANOVAs, are reported in Table 4. As may be noted in the table, significant results occurred for the personality characteristics of Emotional Stability, Dominance, Social Boldness, Vigilance, Privatness, and Apprehension.

To determine which perspectives were statistically significant, post-hoc tests were computed using Duncan's Multiple Range Test. For the personality characteristic of Emotional Stability, Self-One was lower than Other ($p < .05$), and Self-One was lower than Self-Two ($p < .05$). Self-Two and Other did not differ significantly. For the personality characteristic of Dominance, Self-One was lower than Other ($p < .01$), and Self-One was lower than Self-Two ($p < .01$). Self-Two and Other did not differ significantly. For the characteristic of Social Boldness, Self-One was lower than Other ($p < .001$), and Self-One was also lower than Self-Two ($p < .001$). Self-Two and Other did not differ significantly. On the characteristic of Vigilance, Self-One was lower than Self-Two ($p < .01$), and Other was lower than Self-Two ($p < .01$). Self-

Table 4

Means, SDs and ANOVA Results for Perspective (IV) and Scores (DVs) for

Research Question 3

Characteristic	Self-One		Self-Two		Other		F	Signif
	<u>M</u>	SD	<u>M</u>	SD	<u>M</u>	SD		
1. Warmth	6.72	2.08	7.51	1.64	7.06	2.08	3.02	NS
2. Reasoning	5.87	2.44	6.24	2.27	6.09	2.28	1.00	NS
3. Emotional Stability	6.74	2.29	7.65	2.12	7.39	1.94	4.06	*
4. Dominance	4.38	2.33	5.49	2.51	5.21	2.34	5.05	**
5. Liveliness	5.03	2.37	5.54	2.18	5.61	2.19	1.72	NS
6. Rule-Consciousness	7.33	2.25	6.97	2.45	6.85	2.45	1.72	NS
7. Social Boldness	5.03	2.25	6.43	2.32	6.03	2.31	9.87	***
8. Sensitivity	6.10	2.44	6.35	2.30	6.61	2.51	1.38	NS
9. Vigilance	4.44	2.40	5.54	2.46	4.58	2.18	7.54	**
10. Abstractedness	4.79	2.31	4.43	1.99	4.39	1.97	1.78	NS
11. Privateness	4.97	2.36	4.76	2.16	4.33	2.07	3.53	*
12. Apprehension	5.72	2.25	5.08	2.36	4.58	2.22	3.89	*
13. Open to Change	4.61	2.27	5.22	2.21	4.67	2.26	1.99	NS
14. Self-Reliance	6.49	2.17	5.97	2.42	5.91	2.40	1.74	NS
15. Perfectionism	6.72	2.45	6.32	2.40	6.18	2.49	2.16	NS
16. Tension	5.28	2.26	5.51	2.46	4.82	2.43	1.69	NS

* $p < .05$. ** $p < .01$. *** $p < .001$.

One and Other did not differ significantly. On the personality characteristic of Privatness, Other was lower than Self-One ($p < .05$). Neither Self-One and Self-Two nor Self-Two and Other differed from each other significantly. Lastly, for the characteristic of Apprehension, Other was lower than Self-One ($p < .05$). Neither Self-One and Self-Two nor Self-Two and Other differed significantly from each other.

Research Question 4

Are there differences in personality characteristics at entry to medical school, when measured objectively at Time One (using the 16PF) or subjectively at Time Two (using the SRF, from a retrospective point of view)? To address this question, an overall MANOVA was computed in which the IV was comparison (16PF at Time One vs. SRF, Self-One perspective). The DVs for this MANOVA were the participants' scores on the 16PF and SRF. This analysis yielded an overall significant finding ($F = 10.49, p < .0001$).

As such, component ANOVAs were computed. In each of these component analyses, the IV was comparison (within subjects), and the DV was the score for each specific personality characteristic on both the 16PF and the SRF. The means and standard deviations, as well as the results of these analyses of variance, are reported in Table 5. As may be noted in the table, significant results occurred for the personality characteristics of Warmth, Reasoning, Dominance, Liveliness, Rule-Consciousness, Sensitivity, Vigilance, Openness to Change, Self-Reliance, and Perfectionism. The 16PF score was higher than the SRF score on Reasoning, Dominance, Liveliness, Vigilance, and Openness to Change. The SRF score was higher than the 16PF score for Warmth, Rule-Consciousness, Sensitivity, Self-Reliance, and Perfectionism.

Table 5
Means, SDs and ANOVA Results for Comparison (IV) and Scores (DVs) for

Research Question 4

Characteristic	Instrument				F	Significance
	16PF (Time One)		SRF (Self-One)			
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>		
1. Warmth	4.90	1.92	6.72	2.08	21.19	****
2. Reasoning	7.92	1.44	5.87	2.44	30.00	****
3. Emotional Stability	6.33	1.77	6.74	2.29	0.86	NS
4. Dominance	5.67	1.91	4.38	2.33	8.83	**
5. Liveliness	6.13	1.58	5.03	2.37	6.44	*
6. Rule-Consciousness	5.61	1.68	7.33	2.25	25.74	****
7. Social Boldness	5.61	1.84	5.03	2.25	2.13	NS
8. Sensitivity	4.56	1.85	6.10	2.44	12.67	**
9. Vigilance	5.92	1.63	4.44	2.40	10.72	**
10. Abstractedness	5.31	1.84	4.79	2.31	1.68	NS
11. Privatness	5.26	2.02	4.97	2.36	0.50	NS
12. Apprehension	5.59	2.02	5.72	2.25	0.11	NS
13. Open to Change	6.56	1.53	4.61	2.27	30.94	****
14. Self-Reliance	5.00	1.92	6.49	2.17	17.84	***
15. Perfectionism	5.67	2.23	6.72	2.45	7.45	**
16. Tension	5.38	1.84	5.28	2.26	0.07	NS

* $p < .05$. ** $p < .01$. *** $p < .001$. **** $p < .0001$.

Summary of Findings

Across Research Questions 1, 2, 3 and 4, significant differences were demonstrated for a total of 14 of the 16 personality characteristics, on either the 16PF, the SRF, or both instruments. These differences are summarized by instrument in Table 6. As can be seen in the table, the two personality characteristics which failed to yield significant differences on either the 16PF or the SRF were the characteristics of Abstractedness and Tension.

Table 6
 Summary Table of Means and Significant Differences by Instrument

Characteristic	A 16PF Time One	B SRF Self- One	C 16PF Time Two	D SRF Self- Two	E SRF Other	Significant Differences*
1. Warmth	4.90	6.72	4.77	7.51	7.06	D>C B>A
2. Reasoning	7.92	5.87	8.15	6.24	6.09	C>D A>B
3. Emotional Stability	6.33	6.74	6.08	7.65	7.39	D>C E>B D>B
4 Dominance	5.67	4.38	5.08	5.49	5.21	A>C A>B D>B E>B
5. Liveliness	6.13	5.03	6.33	5.54	5.61	C>D A>B
6. Rule-Consciousness	5.61	7.33	5.44	6.97	6.85	D>C B>A
7. Social Boldness	5.61	5.03	5.31	6.43	6.03	D>C E>B D>B
8. Sensitivity	4.56	6.10	4.69	6.35	6.61	D>C B>A
9. Vigilance	5.92	4.44	5.92	5.54	4.58	D>B D>E A>B
10. Abstractedness	5.31	4.79	4.90	4.43	4.39	
11. Privatness	5.26	4.97	5.64	4.76	4.33	C>D B>E
12. Apprehension	5.59	5.72	5.85	5.08	4.58	B>E
13. Open to Change	6.56	4.61	5.54	5.22	4.67	A>C A>B
14. Self-Reliance	5.00	6.49	5.44	5.97	5.91	B>A
15. Perfectionism	5.67	6.72	5.18	6.32	6.18	D>C B>A
16. Tension	5.38	5.28	5.44	5.51	4.82	

Note. Differences shown are for the entire group and do not reflect gender differences.

CHAPTER V

DISCUSSION

The purpose of the present study was to determine whether there was a measurable change in personality from the time one enters to the time once exits medical school. Changes were measured using both an objective personality instrument (the 16PF, Fifth Edition) and a subjective personality instrument (a researcher-modified version of the 16PF score sheet, subsequently referred to as the Subjective Rating Form).

The null hypothesis for Research Question 1 stated that there would be no change in personality as measured by the 16PF from Time One (entry to medical school) to Time Two (exit from medical school). The null hypothesis was rejected when the MANOVA computed for this research question was statistically significant. Follow-up ANOVAs determined that two personality characteristics, Dominance and Openness to Change, did change from Time One to Time Two. As a group, the medical students' scores decreased on both of these characteristics from Time One to Time Two. A lower level of Dominance would manifest itself as students becoming less assertive and forceful and more cooperative and deferential in their interactions with others, most likely with their medical colleagues (particularly medical specialists). A decrease in Openness to Change would be exhibited by students as less experimentation and more traditional, or attached to the familiar. In practice, this decrease may be observed as students relying more on their "book learning" when treating patients rather than trusting their "clinical gut."

There are three existing longitudinal studies that are relevant to the discussion of the findings of Research Question 1. In support of the present finding, a longitudinal study of medical students which utilized the Personality Attributes Questionnaire (Zeldow et al., 1987)

also found medical students to be slightly less dominant from the first year to the third year of medical school. However, in contrast to the present finding is a study by Coombs et al. (1993). In that longitudinal study of medical students, personality characteristics remained stable (i.e., there were no changes in personality that continued from entry to exit from medical school). However, that study utilized the California Psychological Inventory (CPI), and as mentioned in Chapter II, that particular instrument contains a large number of items that test clinical pathology. The third longitudinal study did utilize an earlier, "modified" edition of the 16PF (Sakai et al., 1984) with non-U.S. medical students, and that study also found no significant differences in personality characteristics from entry to exit from medical school. To the author's knowledge, no study to date has utilized the 16PF with U.S. medical students longitudinally. Thus, comparisons cannot be made with 16PF data from such studies.

A second MANOVA was computed for Research Question 1 to determine if changes in personality characteristics from Time One to Time Two were gender dependent. This MANOVA was not statistically significant. However, follow-up ANOVAs did demonstrate slightly different findings than those observed in the group of medical students as a whole (see Appendixes E and F for profiles of 16PF scores for females and males, respectively). The female medical students also decreased in Emotional Stability from Time One to Time Two (in addition to decreases in Dominance and Openness to Change). In contrast, their scores increased on the personality characteristics of Sensitivity and Self-Reliance from Time One to Time Two. The only finding which continued for males from Time One to Time Two was the decrease in Openness to Change; the decrease in Dominance did not continue when the females were separated from the group.

Preliminary findings of a longitudinal study of U.S. medical students which utilized the 16PF Fifth Edition (Meit et al.,1995) found significant gender differences in their sample. In that study, first year female medical students showed greater Social Boldness, more perfectionistic traits (Perfectionism) and greater Apprehension/self-doubt than the first year male medical students. None of these findings were evident in the present longitudinal study. One additional finding in that study was that first year female medical students showed more Openness to Change than the first year male medical students. In the present study, both females and males demonstrated lesser amounts of this personality characteristic over the course of their medical education. In the Meit et al. (1995) study, gender differences were hypothesized as being attributable to females entering what has traditionally been a "male dominated occupation." Perhaps undergoing the same academic and clinical rigors over the four years of medical school neutralized the genders in this respect.

The null hypothesis for Research Question 2 stated that there would be no difference between objective personality characteristics (measured by the 16PF) and subjective personality characteristics (measured by the SRF) at Time Two. This null hypothesis was soundly rejected when the MANOVA for instrument was statistically significant. Follow-up ANOVAs revealed that there were significant differences on 9 of the 16 personality characteristics. The 16PF scores were higher than the SRF scores on Reasoning, Liveliness, and Privatness, and the SRF scores were higher than the 16PF scores on Warmth, Emotional Stability, Rule-Consciousness, Social Boldness, Sensitivity and Perfectionism. This finding was quite unexpected, given that both instruments were measuring the same characteristics, and were administered to the participants within minutes of each other. What is likely is that the SRF may have had more "face validity" than did the 16PF. The only real difference between the two instruments was in the Reasoning

characteristic; on the 16PF, there were correct and incorrect answers for the reasoning questions which yielded a true score, whereas the SRF had only a self-rating and did not test actual reasoning ability.

The most plausible explanation for the discrepancies between the 16PF scores and SRF scores noted above is the discrepancy between the "real self" and the "ideal self." Bischoff (1970) provides a synopsis of Horney's (1945) work in this area. For Horney, the "real self" is the actual self; the "ideal self" is the perfect person. If one seeks the ideal self (an unobtainable goal) at the expense of self-realization (i.e., achievement of one's actual full potential), neuroticism can result. This concept was later espoused by Rogers in 1959 (cited in Bischof, 1970), who stated that incongruence between the "perceived self" and the "actual organism" makes an individual feel threatened and anxious. In turn, such individuals behave defensively, and exhibit rigidity and constriction in their thinking. Lastly, Bischof (1970) highlights the work of Cattell (1953), the author of the 16PF, on this topic. For Cattell, the "real self" is the "actual personality," whereas the "ideal self" is "what one would like to be, granted all things and all power." Thus, these three theorists believe that there is a difference in how one "really is" versus how one "would like to be."

The results of Research Question 2 exemplify the "real" versus "ideal" self noted by the theorists above. On the 16PF, the medical students are actually abstract thinkers, lively, and private at exit from medical school. However, they wanted to APPEAR attentive to others, mature, dutiful, assertive, socially bold, sensitive, and self-disciplined, as evidenced by their ratings on the SRF. In essence, they wanted to project themselves in the image of a "perfect" doctor. As Horney and Rogers both stated, however, this discrepancy can have a negative impact

on the self. For example, Okun and George (1984) found neuroticism to be significantly and negatively correlated with subjective well-being in adults.

The null hypothesis for Research Question 3 stated that there would be no difference in subjective personality characteristics (measured by the SRF) at Time Two when the participants made the ratings from three different perspectives: (1) Self-One (rated retrospectively at Time Two); (2) Self-Two; and (3) Other (a self-rating of how participants' believed that others would rate them at Time Two). The null hypothesis for this research question was also rejected when the MANOVA for perspective was statistically significant. Subsequent ANOVAs revealed that the results were significant for Emotional Stability, Dominance, Social Boldness, Vigilance, Privatness, and Apprehension. Duncan's Multiple Range post-hoc test was used to determine which perspectives changed in which direction. As was noted in Table 4 in the Results section, Emotional Stability, Dominance, Social Boldness, and Vigilance were rated lower for Self-One than for Self-Two. Privatness and Apprehension were statistically significant only in relationship to Other.

The findings for Research Question 3 indicated that the medical students rated themselves as being more mature, assertive, socially bold, and accepting/trusting at exit from medical school than they were at entry to medical school. Some of the findings for this question are in agreement with those found by Coombs (1978). In that study, the Adjective Check List was administered to a group of medical students at the beginning of freshman year of medical school and at the end of senior year of medical school. There was a change in self-perception among students, who saw themselves as being more outgoing, stubborn, optimistic, sensitive, and far-sighted, and less quiet, nervous, trusting, and moderate by the end of medical school.

For Research Question 3, participants were also asked to rate themselves from the perspective of how "others" would see them at exit from medical school. The only difference between the "other" perspective and the "self" perspective was that the students rated themselves as more non-disclosing and self-doubting at entry to medical school than others would see them at exit from medical school. This is the only research question in which self-doubt (Apprehension) is statistically significant. It is interesting to note that Apprehension does not decrease significantly from entry to exit from medical school, but this could have been due to a historical effect; that is, students completed the instruments the night before they were to receive their residency selections. When students took the perspective of "other," however, they may have been anticipating their upcoming graduation, and their opportunity to share in this milestone with family members and friends, the majority of whom have not experienced the stressors of medical education firsthand.

Lastly, the null hypothesis for Research Question 4 stated that there would be no difference between personality characteristics at entry to medical school, when measured objectively at Time One (using the 16PF) or subjectively at Time Two (using the SRF, from a retrospective point of view). This null hypothesis was also rejected when the MANOVA for comparison yielded a significant finding. Follow-up ANOVAs revealed significant differences for 10 of the 16 personality characteristics. For the personality characteristics of Reasoning, Dominance, Liveliness, Vigilance, and Openness to Change, the 16PF scores were higher than the SRF scores. For the characteristics of Warmth, Rule-Consciousness, Sensitivity, Self-Reliance, and Perfectionism, the SRF scores were higher than the 16PF scores.

This large number of significant differences is not unlike those found in Research Question 2, which compared 16PF scores with SRF scores at Time Two. Apparently, the

participants had no difficulty in rating themselves from a retrospective point of view for Time One on the SRF in Research Question 4. As noted above, Reasoning and Liveliness scores were higher on the 16PF than the SRF for Research Question 4 (Time One perspective). These same personality characteristics also showed higher scores on the 16PF than the SRF in Research Question Two (Time Two perspective). This is not surprising, given that abstract thinking and high energy would be a requirement throughout the course of medical school. Other personality characteristics that remained consistent from Time One to Time Two occurred on the SRF (Warmth, Rule-Consciousness, Sensitivity, and Perfectionism). The limitation of this finding, of course, is that SRF scores were not administered at Time One, but at Time Two, from a retrospective point of view by the participants for Time One.

As in Research Question 2, there is a significant discrepancy between the "real" self (as demonstrated by 16PF scores) and the "ideal" self (as demonstrated by SRF scores). In actuality at entry to medical school, the medical students were abstract thinkers, assertive, lively, and open to change, but also skeptical/vigilant (according to 16PF scores). However, they wanted to APPEAR at entry to medical school (from a retrospective point of view on the SRF) as being attentive to others, dutiful, sensitive, self-reliant and self-disciplined. There is perhaps an aspiration at Time One to be viewed as the "ideal student" in addition to the "ideal doctor."

Summary

In the present study, there were significant differences found between the 16PF scores from Time One to Time Two. Significant differences were also observed when the SRF scores were compared between Self at Time One (retrospectively), Self at Time Two, and Self at Time One and Time Two compared with Other at Time Two. Most striking, however, were the significant differences found between the 16PF and the SRF scores when compared with each

other, at both Time One and Time Two. This last group of findings translated into differences between the actual and perceived self (i.e., real vs. ideal). That is, regardless of objective reality (measured by the 16PF), the subjective reality (measured by the SRF) was more representative of how the participants viewed themselves. It was hypothesized prior to the study that none of these findings would occur.

Limitations of Findings

As mentioned in Chapter I, this was a longitudinal sample, and due to attrition, the current sample ($N = 38$) is smaller than the original sample ($N = 94$). However, only 81 of the original 94 participants were available to participate in the study by Time Two; 13 of the participants were either no longer enrolled or had delayed their graduation date. Additionally, the participants in this study are from a rural geographic area, and as such, are not likely representative of medical students from other areas of the United States or from other countries. Thus, the findings from this study may not be generalizable. Similarly, participants were volunteers in the study and were notified in advance of their participation that random prizes would be awarded to participants. This structure could have resulted in a selection bias among the participants. Lastly, there may be other confounding factors, such as the maturation of the participants over the course of four years' time, which could in part account for the results of this study.

The most salient confounding factor may be the timing of the data collection at Time Two. Data were collected from participants the night before they were scheduled to be notified of their residency selections, which may have affected the manner in which they responded to items on either or both instruments. This historical event could be a threat to the internal validity of this study (Campbell & Stanley, 1963). Although residency selection is an important

milestone in the progression of medical education, fourth year medical students have certainly faced other significant stressors (Carmel & Bernstein, 1987) during the course of their undergraduate medical education. Thus, residency selection alone should not have impacted the manner in which the participants responded on the instruments.

Implications and Recommendations

The medical students in this study came from an Appalachian region and received a great deal of exposure to primary care medicine. Family practice is one clinical area of primary care. Coombs (1978) stated that family practice physicians have a "missionary type" personality, which he characterized as outgoing, warm hearted, genuine, companionable, generous, good-natured, happy, friendly, and able to get along with other people. If students wanted to be admitted to a family practice residency (which their medical school offers), would they not need to "look like" a family practitioner? The personality characteristics endorsed by the medical students on the SRF came closer to the "missionary type" of personality described by Coombs (1978). However, the 16PF characteristics endorsed by the medical students did not. It may be that these discrepancies more reflective of individuals who feel threatened and anxious, behave defensively and exhibit rigidity and constriction in their thinking, as theorized by Rogers (1959, cited in Bischof, 1970). If medical students are feeling the incongruence suggested by Rogers, what responsibility do medical schools have to "debrief" them upon exit from medical school, given the ongoing stressor of medical education? Other occupational fields (e.g., the military, law enforcement) routinely use debriefing after stressful assignments or events.

Perhaps it would behoove medical educators to consider prevention (which can be more time consuming for staff but less emotionally costly for students) over intervention, especially methods which promote self-awareness and well-being, as advocated by Novack, Epstein, and

Paulsen, 1999. Coombs & Virshup (1994) proposed that medical schools offer student "well-being committees" to provide this function. They stated that the benefits of such committees include the enhancement of student morale and well-being, the avoidance of serious emotional problems, and improved relationships between students and teachers.

In addition to the need for prevention or intervention with medical students, there may be longer term implications for these findings. What if the graduating medical students who are admitted into primary care residencies appear to be primary care physicians, but in actuality may not be? As mentioned in Chapter I, there is a growing consensus that primary care physicians are short in supply (Douglass, 1995). The need to attract and retain primary care residents and practicing physicians becomes paramount. Counseling psychologists may be called upon to determine the appropriateness of personality measures and to conduct assessments (Borges, 1998) for such purposes. The 16PF certainly appears to be an appropriate measure to determine whether an individual's personality characteristics are congruent with the role of a primary care practitioner.

In summary, the findings in the present study point to the need for prevention and/or intervention with medical students during or following completion of medical school. Also, primary care residencies may wish to consider the 16PF as an admission tool to assist in the selection of residents whose personalities are congruent with primary care practice. However, given that the data for Time Two were collected the night before the participants received their residency selections, it is recommended that follow-up research be conducted to determine whether this historic event could have accounted for the findings in this study.

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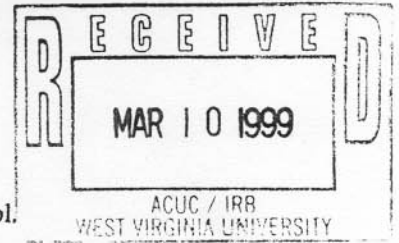
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IRB PROTOCOL AMENDMENT FORM

Use this form to request approval for changes to an approved protocol.
Send this form and all attachments to the IRB, PO Box 6845.

Principal Investigator Scott Meit, Psy.D. Date 3-8-99
HS # 13364 Am. 63

Protocol Title

Personality characteristics and traits of medical students that may be associated with later residency choice and identifying personality characteristics and traits common and/or unique to primary care physicians

Describe changes. Explain in detail your reasons for requesting these changes and which part(s) of the approved protocol will be amended. If adding a new site, attach the appropriate letter(s); if adding new investigators, the principal investigator and all new co-investigators must sign this form. Attach a copy of the revised drug protocol (when appropriate) with revised sections bracketed.

SEE ATTACHED SHEET

WEST VIRGINIA UNIVERSITY
Institution Review Board for the
Protection of Human Research Subjects

MAR 26 1999
APPROVED
X [Signature]
EXPIRES 03/2/1999
H.S. # 13364

Describe changes to the consent form. Explain which sections of the consent are being changed. Attach a copy of the latest approved consent; a revised and bracketed copy showing changes; and a new, clean copy for approval and stamping.

[Signature]
Principal Investigator
Heather J. Meit, MA

3-5-99
Date
3/5/99
Date

New Co-Investigator(s): (additional signatures below)

Amendment to H.S.#13364:

Heather Meit, MA, wishes to conduct dissertation research using the graduating medical students as subjects. The purpose of her research is to obtain supplemental information for H.S.#13364 (S. Meit, V. Yasek). The proposed study, "Personality Factors of Medical Students: Does Perception Match Reality?," will enhance the findings of the on-going study by adding subjective data on: 1) how medical students viewed themselves on 16 personality factors prior to commencing medical school; 2) how medical students view themselves on 1 personality factors upon completion of medical school; and, 3) how medical students believe others view them on these same 16 personality factors upon the completion of medical school.

The goals of the proposed study, are to determine: 1) how medical students view the longitudinal impact of medical school on 16 personality factors; 2) whether discrepancies exist between self-ratings and obtained values on the 16PF Questionnaire; and, 3) whether discrepancies exist between self-ratings and perceived ratings of others.

Ms. Meit will obtain this information through the administration of the 16PF scoring sheet, which she has modified for study purposes (see Attached).

Procedure to be followed: the graduating students will be given the opportunity to complete the 16PF on March 17, 1999, at both the Morgantown and Charleston campuses. We will place the dissertation instrument into the 16PF Questionnaire booklets next to the 16PF Questionnaire answer sheet. The code number used on the Questionnaire answer sheet will also be affixed to Ms. Meit's instrument (in the upper right corner). Students will be informed of the purpose of her study, that it is being conducted as part of the requirement for Ms. Meit's doctorate, and that completing the instrument is voluntary. Ms. Meit will assist Jerry Spiegler in administering the 16PF and her own instrument in Charleston; Van Yasek, PhD, will administer both instruments in Morgantown.

WEST VIRGINIA UNIVERSITY
Institution Review Board for the
Protection of Human Research Subjects

MAR 26 1999

APPROVED
X M. J. Munn
EXPIRES Oct 2, 1999
H.S. # 13364



MEMORANDUM

TO: Van Yasek, Ph.D.
Heather Meit, M.A.

FROM: Scott S. Meit, Psy.D. *SSM*

DATE: February 19, 1999

RE: Special permission from IPAT (16PF publisher) to use modifications of Individual Record Form as Assessment instruments

At 2:30 p.m. EST, I spoke with James Slaughter (president of IPAT) regarding our written request (which his office received and signed for on 2/08/99). He indicated that he had the request in front of him and that he was ready to respond to it.

Specifically, Mr. Slaughter indicated that he would authorize 100 copies to be made of Appendix A (in support of Ms. Meit's dissertation) and 500 copies of Appendix B for ongoing WVU and/or MMAP research. Regarding the latter, he explained that a number (for copies) had to be assigned, but that we would need only to make a simple request to extend that number should the need arise in the future. Mr. Slaughter indicated that he will follow this verbal authorization in writing directly.

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Clark K. Sleeth Family Medicine Center

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PO Box 9152
Morgantown, WV 26506-9152

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Overhead directing students not to mark the answer sheets at this time

As students enter, take their name, look them up in the master list, place their code number on the 16PF answer sheet and the Dissertation instrument. Hand them the booklet with answer sheet, Diss instrument and exit survey paperclipped to the front. Hand them a pencil, and ask them to take a seat.

Show the first overhead, explanatory text

My name is _____, of the Department of _____. My assistants are _____. We are administering the 16PF questionnaire for Dr. Scott Meit, psychologist in the Dept of Family Medicine. You were administered the 16PF as incoming medical students in 1995. At that time we told you that we would re-administer the instrument upon your graduation. The time has come.

You have been given a questionnaire booklet. Paperclipped to the front of the booklet you'll find three sheets of paper:(the 16PF answer sheet, a second instrument, and the exit survey). **Show them.**

In addition to completing the 16PF(which should take about 30-35 minutes), we would like to ask you to take an additional 5 minutes to complete the second instrument (the second sheet). This instrument has been adapted by Heather Meit, who will use the results for her dissertation. Her study will add subjective data to the objective data we are already collecting with the 16PF (if you're interested in a fuller description, I have her study abstract here, and you can look it over when you're finished). Finally, we'd like you to complete the one question survey, which simply asks if you would have shown up for this re-test if we weren't offering a raffle.

Instructions overhead

The authors of the 16PF instrument suggest that you respond, whenever possible, with an "a" or a "c". These are stronger responses than "b", and gives us more to work with. Of course, if "b" is the most appropriate response for you, give us a "b."

Last page of questionnaire

The last 15 questions, starting on page 14, are problem solving questions (with only one right answer), unlike the previous questions which are preference questions and obviously have no right answers.

Heather's instrument

Explain.

I'd like you to complete the one-question survey first, then do the 16PF, and finally the dissertation instrument. When you are finished, please place the answer sheets, booklets, dissertation instrument, one-question survey, paperclips and pencils on this table. We will then give you your meal ticket and raffle ticket. You can use the meal ticket whenever you want. Once everyone has completed the questionnaire we will begin the raffle.

Overhead with list of raffle contributors (leave this on till raffle is completed)

Figure 1. Mean STEN scores for female medical students at Times 1 and 2.

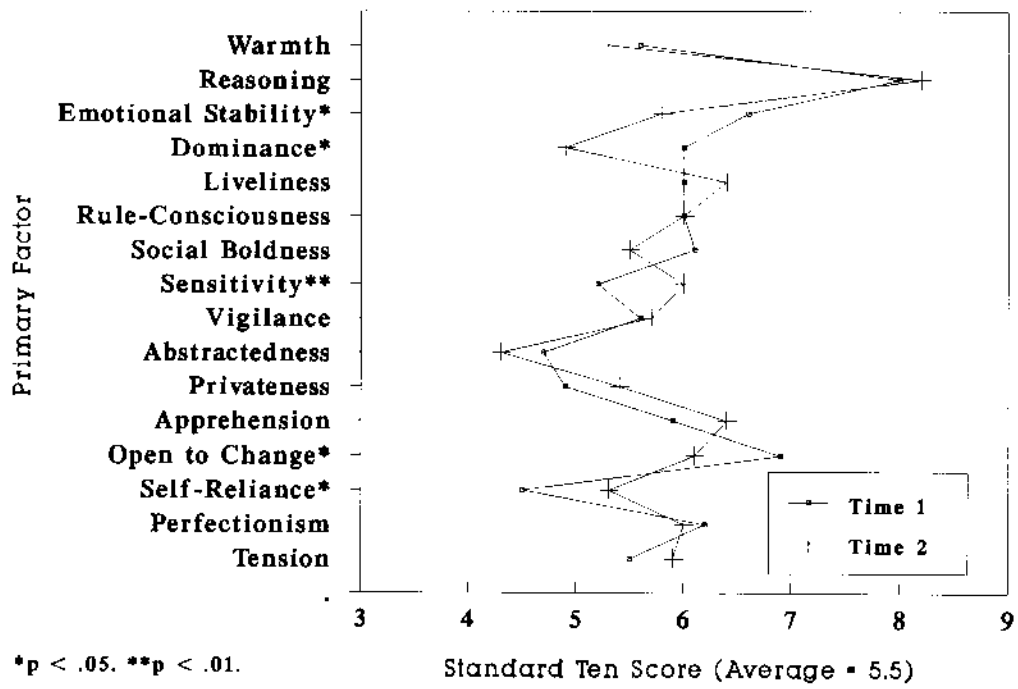


Figure 2. Mean STEN scores for male medical students at Times 1 and 2.

