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1978

A Study of the Relationship of Perceptual and Judgmental Preferences with Academic Predictors in Medical School Success

Madhavi Mehta
Loyola University Chicago

Recommended Citation

A STUDY OF THE RELATIONSHIP OF PERCEPTUAL

AND JUDGMENTAL PREFERENCES WITH ACADEMIC

PREDICTORS IN MEDICAL SCHOOL SUCCESS

by

Madhavi Mehta

A Dissertation Submitted to the Faculty of the Graduate School

of Loyola University of Chicago in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

May

1978

ACKNOWLEDGEMENTS

I wish to acknowledge the help received from the members of my committee, Dr. Samuel T. Mayo, the Director of the committee, Dr. Jack Kavanagh, the chairman of the department, Dr. Steven Miller, and Dr. Pedro Saavadra for their help and guidance throughout the period of this study. Dr. Saavadra especially, was very helpful in guiding me with the appropriate methodology and statistical procedures.

I also wish to acknowledge my gratitude to Dr. Donald Pochyly of the Chicago Medical School who made it possible for me to obtain all the necessary data from the office of records.

I am also indebted to Dr. Rosemary Donatelli who provided me always with the much needed moral support to complete this dissertation.

Lastly, I am ever grateful to my husband, Subhash, and my brother, Bhaskar, whose constant support and encouragement enabled me to achieve whatever I have achieved.

VITA

The author, Madhavi Mehta, was born in the state of Kerala, India, in July 1930.

In 1945 she graduated from high school, and in 1949, she earned the degree of Bachelor of Science, with a major in physics, from Maharaja's College, Madras University, India. In 1952, she obtained the degree of Master in Science with a major in nuclear physics and radioactivity from Wilson College, Bombay University, India.

While attending Wilson College, she was granted an assistant-ship in physics. In 1953 she received a scholarship for higher studies in the Institute of Nuclear Physics at Calcutta, and in 1954 obtained the diploma of Associate of Institute of Nuclear Physics, from Calcutta University.

From 1954 to 1969 she taught physics and mathematics in Savitri College and Demonstration High School at Ajmer, in India. In 1967 she received the Bachelor's Degree in education from Rajasthan University.

In August 1969 she came to the United States and entered Loyola University for graduate studies. In June 1971 she earned the degree of Master in Education from Loyola University. From February 1971 to June 1976 she worked as part-time instructor in the department of Foundations at Loyola University.

From February 1974 to June 1976 she was employed as a research assistant in the Chicago Medical School. Since September 1976 she has been working as a high school mathematics teacher in Chicago public schools.

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INTRODUCTION

Each year, in all medical schools, the admissions committees,
or other groups charged with similar responsibility, are faced with the
problem of selecting a limited number of the finest applicants avail-
able from an exceedingly large pool. To make a fair, wise, and rational
selection is an extremely complex and multifaceted problem.

The purpose of admission procedures in medical schools is, in
short, to identify talented and healthy candidates for medical training
who will (a) complete the training and go into professional careers;
(b) do well in and profit by the training programs; (c) perform credit-
ably in professional practice; and (d) possess the traits of character
and ethical values desirable in a professional person.

The value of a selection program may be appraised by the degree
to which it can fulfill each of these objectives. As far back as 1910,
Flexner,[1] probably the best known pioneer in medical education, had
stressed that the method of selection should help make it possible to
identify candidates possessing those abilities and attributes required
of the future physician, such as a combination of perseverence, self-

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[1]Flexner, A., Medical Education in the United States and Cana-
da: A Report to the Carnegie Foundation for the Advancement of Teach-
ing. Bulletin No. 4, Boston: Updyke, 1910.

discipline, preparation and academic aptitude needed to see an individual through the period of undergraduate medical education. In other words, in determining the attributes associated with academic success and professional competence, he urged that one should go beyond the cognitive abilities of the candidates and delve into their personality characteristics.

At present, medical educators are duly concerned that the usual criterion for selection, viz, high scholastic aptitude test scores, eliminates candidates whose interests, values, and temperaments would make them especially desirable practitioners in a world of changing health needs and patterns of medical care, but who have to withdraw due to low science grades and other aptitude scores.

The need for developing reliable and valid measures of factors other than aptitude and achievement has been acknowledged by educators in the medical field since 1950. Yet, only a few schools employ interest and personality inventories in their admission procedures.

Presently, the scholastic aptitude test used in the selection process by American medical colleges is the Medical College Aptitude Test (MCAT) originated in 1946, and sponsored by the American Association of Medical Colleges (AAMC). During the entire period of its existence, from 1946 to the present, the MCAT has been under the supervision of a standing committee of the AAMC, charged with the responsibility for developing and improving the test in conjunction with professional resources of the Educational Testing Service, and more recently, the Psychological Corporation.

The basic purpose of the test is to help the admissions committee identify and select those students of appropriate scholastic aptitude and those who have adequate preparation for the study of medicine. The selection of students who have the intellectual capacity to complete the medical curriculum is the primary purpose and this, therefore, constitutes the major criterion for validating the MCAT. In this connection, Stalnaker[2], a former Director of Studies for the AAMC, explicitly deals with the role of the MCAT in appraising the intellectual characteristics of the applicants:

> The MCAT does not reflect interest in the study of medicine (presumably an important factor in attaining success in medical school), adjustment to the medical school's methods of education, financial resources, ambition, drive or the ability and desire to apply oneself to the task at hand. . . . In diagnosing the illnesses of the sick, logic would dictate that physicians of high intellectual competence would be right more frequently than less talented physicians. Most of us in selecting our own physician will prefer a bright one rather than a dull one. Thus it is understandable that admissions committees, when there is a choice will select a bright applicant over a less bright one. The MCAT scores help tremendously in supplying the basic data on which a selection decision can be made.

In 1963, Gough and Harris[3] questioned the usefulness of MCAT in prediction of medical college performance. Sanzaro and Hutchins[4] in

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[2]Stalnaker, J. M., "The Medical College Admission Test." J. Med. Educ., 29: 43-46, 1954.

[3]Gough, H. D., Hall, W. B., and Harris, E. R., "Admission Procedures as Forecasters of Performance in Medical Training." J. Med. Educ., 38: 938-998, 1963.

[4]Sanzaro, P. J., and Hutchins, E. B., "The Origin and Rationale of the Medical College Admission Test." J. Med. Educ., 38: 1044-1050, 1963.

reply, pointed out that the prediction issue of the MCAT should be sep-
arated from the selection issue. Besides, correlation studies could
offer special problems when the performance criteria, the medical col-
lege tests and the faculty judgments are of undetermined reliability or
if the variability of the preselected group of medical students is low.

The admission procedure is only partly responsible for attain-
ing the objectives of the program. A larger portion of the responsi-
bility rests on the students. Regarding academic success, John B. Car-
roll[5] states that the degree of achievement in any subject is highly in-
fluenced by not only the cognitive abilities of the students, such as
the aptitude for particular kinds of learning, but also by his person-
ality characteristics, such as his perseverance, his ability to under-
stand and follow instruction and the effort and time devoted by him for
learning.

Gough and others[6] in their study, give evidence bearing on non-
intellectual factors predictive of differential performance in medical
school. Gough characterizes the psychological prototype of the success-
ful medical student and physician as, ". . . unselfish, considerate, in-
formal, forgiving, reasonable, and selfconfident."

In another project, Howell[7] studied the personal files of 312

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[5]Carroll, J. B., "A Model of School Learning." Teachers' Col-
lege Record, 64: 723-733, 1963.

[6]Ibid., p. 3.

[7]Howell, M. A., "Personal Effectiveness of Physicians in a Fed-
eral Health Organization." J. Appl. Psychol., 50: 451-459, 1966.

career officers in the U. S. Public Health Service, 156 of whom received

highly favorable ratings by their superiors, and 156 of whom received

unfavorable ratings. He found that intellectual variables did not yield

strong differentiations between the higher rated and lower rated samples.

Moreover, he found that certain nonintellectual factors, on the contrary,

did discriminate between the two groups.

Rationale for the Present Study. On the basis of the findings

of the analysis of data on the 40,506 applicants for the 1973-1974 en-

tering class from eighty-six medical schools across the nation, the ap-

plicants' study committee of the AAMC made the following recommendation,

which was approved by the administrative board of the AAMC Council of

Deans on April 3, 1975[8]:

> Given the continuing demands made on the admission staff by the
> processing of the applications and of the efforts currently made
> with the American Medical College Application Study and Medical
> College Admission Programs to alleviate problems related to ad-
> mission, all medical schools continue to monitor and refine ad-
> mission policies and procedures internally and in cooperation with
> one another and with the existing programs of AAMC.

In connection with this recommendation of the Council of Deans,

this study is an effort to refine the admission policy of Chicago Medi-

cal School. The study is exploratory in nature and attempts to include

a predictor of the noncognitive type along with the cognitive predictors.

The criteria used for selection at the Chicago Medical School

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[8]Dube, W. F. and Johnson, D. G., "Medical School Applicants,
1973-74." J. Med. Educ., 50: 1026-1032, November 1975.

are mainly of the cognitive type, such as the MCAT scores, premedical grade point average (GP) and the nature of the undergraduate subjects. The selection from the applicants is made by the admissions committee members, taking into account the cognitive variables and the impressions the students make during the interview. There appears to be no statistical model to help the committee members make decisions.

Many of the personal characteristics of the students cannot be reflected in the credentials, and hence are not included in consideration for selection. The committee appears not to have a uniform frame of reference to handle the relationship and the interaction of the various academic and nonacademic factors. Hence, it is possible that the committee may attach a different significance to the same factor from meeting to meeting and, subsequently, inconsistent decisions may be made. It is also possible that the committee may consider, in reality, only MCAT scores and premedical GPA.

Each of the two methodologies, viz, the use of cognitive predictors as well as personality measures can lead to valid findings. There is no reason why they cannot be used together so as to complement one another. The use of a multivariate formula as a frame of reference for committee action emerges as an important device for fairness, uniformity, and economy of time. When combined with personality measures these formulations should be helpful in predicting medical school performance reasonably well. This study is an effort directed towards the above objective.

The personality measure used in the present study is the Myers-

Briggs-Type-Indicator[9] (MBTI). It is based on the famous Jungian typology. Besides having a sound theoretical basis, numerous research reports[10] indicate that the instrument has adequate reliability and validity. In the Mental Measurement Yearbook, Mendelsohn[11] reports that the instrument relates meaningfully to a large number of variables including personality, interest, ability, aptitude, and performance.

Most medical educators will probably agree that efforts to teach clinical competence meet with only partial success. The facts and principles presented in the classroom, and the demonstrations in the laboratories, operating rooms, and the wards are necessary, but not sufficient to gain competence in clinical performance. The knowledge so gained must be applied and proper application takes both perception and judgment. Perception and judgment are precisely what the Type Indicator deals with.

The Principle and Purpose of the Indicator. The instrument is specially constructed to identify different personality types by choosing one from each of four dichotomous preferences. They are EI (Extraversion or Introversion), SN (Sensing or Intuition, the two kinds of perception), TF (Thinking or Feeling, the two kinds of judgment), and

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[9]Myers, I. B. and Briggs, K. C. Myers-Briggs-Type-Indicator, Form F., Consulting Psychologists Press, Inc., California, 1957.

[10]Carlyn, M. "An Assessment of the Myers-Briggs Type Indicator." Journal of Personality Assessment, 1977, 41: 461-473.

[11]Mendelsohn, G. A. "Review of the Myers-Briggs Type Indicator." In O. K. Buros (Ed.), Sixth Mental Measurements Yearbook (3rd ed.). Highland Park, N. J.: Gryphon Press, 1965.

JP (the Judging or Perceptive attitude for dealing with the environment. The scales were expressly developed by the authors to classify people into type categories. The four scales combine to generate sixteen types.

The instrument provides a series of forced-choice items tapping a wide range of situations in which these preferences appear. The paired statements are approximately matched in desirability and do not possess a positive or negative value connotation. Thus, the person classifies his type by what he himself likes and chooses.

Table 1 in the appendix shows the four preferences and the placement of the sixteen combinations (types) formed out of the four dichotomous preferences on a type table. The theory postulates specific uses and interactions of the four preferences in each type. Table 2 in the appendix outlines these.

If people differ systematically in what they perceive and the conclusions they come to, they may, as a result, show corresponding differences in their reactions; in their needs, interests, values, motivations; and in what they do best, and like to do best. The theory assumes that these differences are valuable and any complex field, such as medicine, will benefit from the skills of different types of people.

In type theory, the intrinsic appeal of any kind of work (as distinguished from external advantages such as money or status) lies in the chance to use the mental processes one likes best in the way one likes to use them. The appeal of medicine is at least twofold. A physician may be a scientist or a humanitarian, or both. The humanitarian side of medicine gives full play to the warmth of feeling. The scien-

tific side offers full scope to the intuitive's zest for problem-solving
and the introvert's gift for concentration. Perception is logical for a
person where the first necessity is to find out what is wrong before
treatment can be undertaken. By the above reasoning, the types who are
likely to be attracted to the medical field are the introverts, intui-
tives, feeling and perceptive types. The research of Myers[12] on type-
selection policies of various schools indicate that certain types are
attracted to certain fields. Her findings further point out that the
combination (type) that is found most among the medical students is the
INFP combination (introverted intuitive feeling perceptive types).

Medicine offers diverse specialities within a single professional
field. Some specialities demand certain competencies and attitudes found
only in certain psychological types. Complex subjects like psychiatry,
research, etc., need an intellectual approach and are found to be at-
tractive to the introverts and intuitives, whereas, surgery, obstetrics,
etc.--the fields dealing with facts and realities--are attractive to the
sensing type.

Medical college admission committees are traditionally inter-
ested in a student's reasons for coming to college. In judging whether
an applicant will make rewarding use of his opportunities if admitted,
it may be relevant to know whether his personality is such that he is
more influenced by intellectual values or by economic values. A know-
ledge of the student's personality type as shown by the Indicator will

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[12]Myers, I. B. The Myers-Briggs Type Indicator Manual, p. 44.
Princeton, N. J.: Educational Testing Service, 1962.

be helpful in this respect.

Purpose of the Study. The primary purpose of this study is to investigate the relationship of personality measures, as indicated by Myers-Briggs Type Indicator (MBTI), and cognitive predictors and academic achievement in Chicago Medical School (CMS).

The study is conducted in two parts. First, the writer has explored the possible relationship between the academic predictor variables, indices of performance in the medical school and 'type' of students based on the Type Indicator. The writer, then, has tried to obtain a single predictor index for the performance of the CMS students at different phases of their curriculum, based on the academic data available at the time of their admission.

In the latter part of the study, the writer has formulated a secondary set of hypotheses—partly in an attempt to verify certain findings of Myers and partly as an extension of her findings.

CHAPTER II

REVIEW OF LITERATURE

Prediction of success in medical school has been a favorite
topic in medical education for more than two decades. The prediction
has been attempted mainly on two lines: one by using reliable cogni-
tive measures, interview impressions, types of college, difficulty of
and number of courses; the other by emphasizing the use of personality
measures along with cognitive variables. The personality measures
used most frequently have been the Minnesota Multiphasic Personality
Inventory, Strong Vocational Interest Blank, the California Psycholog-
ical Inventory, and lately, the Myers-Briggs Type Indicator (MBTI).

Problems in Prediction. In many schools where objective per-
sonality measures are not considered for selection, premedical grades
and MCAT scores are given heavy weights for selection. Research
studies in the medical field have repeatedly shown negligible to low
correlations of MCAT scores and premedical gradepoint averages with
criteria scores in the medical school--whether the criteria be aca-
demic ranks or clinical performance. A selection process based on
premedical grades or MCAT scores is primarily directed at finding
individuals who merely are likely to survive the first year of the
medical school, where virtually all the attrition occurs, but where
few of the characteristics of the effective physician are required

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for success.

Previous research at other institutions on the predictive validity of MCAT and pre-med GP show both positive and negative evidence for predicting performance in medical school. Schwartzman and others[13] showed moderate relationships between MCAT subscales and grades in medical school. Low correlations between MCAT and GPA of freshmen in medical school, as well as GPA of the graduating classes, were obtained by Crowder[14], Kneher and Kohl[15], Hammond and Kern[16], and Gough and others[17].

The general picture that emerges from these studies is that MCAT or premedical GPA have low validity in predicting medical school performance as indicated by GPA. A multivariate approach was not used in any of the above studies; instead, prediction was based on a single predictor at a time. Recently, Best and others[18] have attempted to

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[13]Schwartzman, A. E., et al. "Factors Related to Medical School Achievement," J. Med. Educ., 37: 749-759, 1962.

[14]Crowder, D. G. "Prediction of First Year Grades in Medical College," Educ. Psychol. Measmt., 91: 637-639, 1959.

[15]Kneher, C. A., and Kohl, R. N. "MMPI Screening of Entering Medical Students," J. Psychol., 47: 297-304, 1959.

[16]Hammond, K. R., and Kern, F., Jr. Teaching Comprehensive Medical Care, Cambridge: Harvard University Press, 1959.

[17]Gough, G. Harrison, et al. "Admission Procedures as Forecasters of Performance in Medical Training," J. Med. Educ., 38: 938-998, 1963.

[18]Best, R. W., et al. "Multivariate Predictors in Selecting Medical Students," J. Med. Educ., 42: 42-50, 1971.

predict medical school performance by deriving prediction equations
through stepwise multiple regression using fourteen predictor variables
and ten criteria variables; however, their findings, too, have not dif-
fered substantially from other researchers. For example, premedical
criteria became progressively less precise in the prediction of academ-
ic performance as the students advanced through the medical school. The
premedical gradepoint average (often adjusted for type of college) and
MCAT science were robust predictors for the first year of the medical
college whereas they, as well as other predictors, were found to be poor
in predicting clerkship ratings and scores on patient management prob-
lems. Their findings, however, did not include the results of any per-
sonality measure.

Fredericks and Mundy[19] did a ten-year follow-up study of medi-
cal students at Loyola University of Chicago. This study is unique in
terms of the scientific quality of the research and the participation
of all the cases in the sample throughout the period of ten years. Hence,
the findings of this study can be considered as reliable. Their find-
ings are:

a. A student's premedical grades appear to have no relationship
   to either the scores obtained on the National Board Examina-
   tions Part I or Part II[20], or academic achievement in the four
   years of medical school[21], or MCAT scores of the subtests[22].

[19]Fredericks, A. M., and Mundy, P. The Making of a Physician,
Chicago: The Loyola University Press, 1976.

[20]Ibid., p. 94.   [21]Ibid., p. 82   [22]Ibid., p. 85.

b. MCAT scores are not related to academic achievement in medical school. The National Board of Medical Examinations are found to be highly correlated with academic achievement in medical school.[23]

The implication is that neither MCAT nor premedical grades are effective predictors of medical school achievement as reflected in academic grades or in National Board scores.

Restricted Range. Validity coefficients are largest in a group with a wide range of ability, and tend to be small in a restricted, pre-selected group. It was observed in a study[24] that the validity coefficient of the battery for the pilot selection was in the neighborhood of 0.37 for men who met standards for flight training. When, for experimental purposes, a completely unscreened group was sent into pilot training, the validity coefficient rose to 0.66. Thus, it is possible that a selection program like MCAT can succeed in selecting candidates who, on the whole, do well and yet be unable to predict differential attainment among those who are selected.

Rhoads and others[25] did a follow-up study on medical school admissions for the years 1962 to 1970 at Duke University. The grades of 728 medical students in Basic Science during the first year were

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[23]Fredericks, A. M., and Mundy, P. The Making of a Physician, Chicago: The Loyola University Press, 1976, p. 52.

[24]Dubois, P. H. The Classification Program, Washington, D.C.: Government Printing Office, 1947, p. 103 and 193.

[25]Rhoads, M. J., et al. "Motivation Medical School Admission and Student Performance," J. Med. Educ., 49: 1119-1127, 1974.

compared with those from clinical ratings during the second and third years. It was observed that only half of the students who excelled in the Basic Science portion of the curriculum did so in the Clinical portion, while roughly seventy percent of the students who excelled in the Clinical Sciences had not done well in the Basic Science area.

Comparison of students in terms of admission data revealed minimal differences. Usually, only those who excel in physical and biological sciences are selected in the medical school. And yet, only half of those who excelled in basic sciences could do well in the clinical sciences. This indicates that some mediating personality variable may be responsible for differential achievement in clinical competence.

Similar conclusions were reached in an earlier study done in 1963 by Conger and Fitz.[26] In their attempt to predict success in medical school they reached the conclusion that, "as a student moves from preclinical to the clinical years, academic ability per se (as evidenced by undergraduate grades and MCAT scores) becomes relatively less crucial for success while personality qualities as judged by interviews tend to maintain their importance."

Yet another study of an exploratory nature was conducted by Lief[27] and his colleagues at Tulane University School of Medicine.

[26]Conger, J. J., and Fitz, R. H. "Prediction of Success in Medical Students," J. Med. Educ., 38: 943-948, 1963.

[27]Lief, F. V., Lief, I. H., and Young, M. K. "Academic Success: Intelligence and Personality," J. Med. Educ., 49: 114-124, 1965.

This study also indicated trends of a nature similar to those obtained in other studies—namely, that personality attributes contribute significantly to the scholastic performance of the undergraduates.

The inability to delineate clearly those factors or personal qualities which determine excellence in medical performance has been reported by a few investigators such as Korman[28], and, as mentioned earlier, by Lief.

On the other hand, few studies have attempted to combine the results of personality measures and cognitive variables for predicting medical school performance. Gough and Hall[29] reported evidence bearing on nonintellectual factors predictive of differential performance in medical school. They developed a regression equation for the California Psychological Inventory (CPI) which correlated moderately with cumulative GPA ($r=+.46$). College males scoring high on the abovementioned equation were described as unselfish, considerate, informal, forgiving, reasonable, and self-confident.

Findings of Follow-up Studies with MBTI. In view of these findings, it is worthwhile to explore further the possibility of some effective predictors from areas other than purely cognitive ones. The present study attempts this.

It was mentioned in the previous chapter that a personality

[28]Korman, M., Stubblefield, L. R., and Martin, W. L. "Patterns of Success in Medical School and Their Correlates," J. Med. Educ., 43: 405-407, 1968.

[29]Gough, H. G., and Hall, W. B. "Prediction of Performance in Medical School from the CPI," J. Appl. Psychol., 48: 218-226, 1964.

instrument known as the Myers-Briggs Type Indicator is administered to Chicago Medical School students. In the early 1950's this test was administered to more than five thousand medical students from forty-two medical schools across the nation. After twelve years a follow-up study of 4,272 doctors was conducted by Myers and Davis[30]. They found that medical students more often chose specialities whose tasks, in theory, should call on the interests and skills of their types. Medical specialities attracted relatively more introverts and intuitives, while surgical specialities attracted relatively more extraverts and sensing types. Those who go into general practice are found to be generally the sensing types. The problem-solving ability of the intuitives attracts them to the fields of teaching and research in medicine. Extraverts are attracted to obstetrics and gynecology, orthopedic surgery and pediatrics. Introverts are attracted to the areas of internal medicine, pathology, neurology, or psychiatry.

The researchers Myers and Davis came to another important conclusion in their follow-up study: in choosing a speciality, the difference associated with type is greater than the difference associated with intelligence. For example, more intuitives than the sensing types of the same ability (above mean MCAT score or below mean MCAT score) choose complex specialities like pathology, psychiatry, research, etc., which demand an intellectual approach and a tolerance for the complicated. The implications of the foregoing discoveries are clear. They

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[30]Myers, I. B., and Davis, A. J. "Relation of Medical Students' Psychological Type to Their Specialities Twelve Years Later." Paper presented at the annual meeting of APA, Los Angeles, California, 1964.

strongly suggest that MBTI can offer a new dimension for counseling, quite independent of intelligence. An understanding of the type helps a student find his place in medicine, where his own preferred kind of perception and/or judgment will be increasingly useful.

In a more recent study of 223 interns, Myers and McCaulley[31] cross-validated the findings of their previous research. In 1959 MBTI was administered to 163 interns at New Mexico School of Medicine, and in 1969 MBTI was administered to sixty interns at Howard University College of Medicine. The New Mexico sample was predominantly white, while the Howard sample was predominantly black; the samples were separated by ten years and 1,700 miles. Finally, the Howard sample was sixty-one percent sensing, as compared to twenty-three percent of the New Mexico sample. The researchers obtained similar patterns of significant relationship between clinical competence ratings and indicator patterns in both the samples[32]. The correlations of competence ratings and MCAT scores were a mere .01 with the Howard sample and -.12 with the New Mexico sample.

At various medical centers several investigators have done work similar to the earlier part of my proposed study; but, no study has been attempted which includes a prediction equation for the personality variable 'types' of students in a medical school. Moreover, the need for such studies has been emphasized in the proceedings of the American

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[31]Myers, B. I., and McCaulley, H. M. "Relevance of Type to Medical Education," The Myers Briggs Type Indicator in Medical Education: A Status Report, 1974.

[32]Ibid.

Association of Medical Colleges (AAMC) in 1974[33].

Since medical schools have been known to vary with respect to student selection policy, curriculum structure, and teaching methods, it is the responsibility of each school to determine its own admission policy in the context of all the variables unique to that school. This study is an attempt to predict medical college performance of CMS students by including personality variables along with academic variables in the prediction equation.

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[33]Dube, W. F., and Johnson, D. G. "Study of U. S. Medical Applicants, 1973-1974," J. Med. Educ., 50: 1016-1032.

CHAPTER III

THEORY OF MYERS-BRIGGS TYPE INDICATOR

The Myers-Briggs Type Indicator (MBTI) is a self-report instrument based on the personality theory of Carl G. Jung. The indicator was developed more than thirty years ago and has undergone several revisions since then. The instrument is designed to measure four dichotomous preferences of a person which seem to structure an individual's personality. The four scales are: extraversion-introversion (E-I), sensation-intuition (S-N), thinking-feeling (T-F), and judging-perceiving (J-P). These scales are expressly developed to classify people into 'type' categories (e.g., classification as an extravert or introvert, sensing type or intuitive type, etc.).

Jung, himself, was not interested in building up a typology with definite qualities assigned to each type. He merely sought some clues with which to approach the psychic processes of the individual, thereby, presenting a model that can be helpful in understanding a person. His typology was the result of many years of practical experience gained in the hard course of the professional work.

Jung was, in his own words, first and foremost a physician and a practising therapist, and all his psychological formulations were based on the experiences gained during his professional work, that is, treatment of psychic complications. He was one of the first to use typology

as a therapeutic tool. Since his experiences were not easily accessible to the academic psychologists, his writings were often misunderstood and considered irrelevant to psychological science. To the layman, even today, his theory may look strange, involved and complex.

Elements of Jung's Typology. Jung's basic unit of study is the 'psyche' by which he means the totality of the psychologic structure of the human being. Jung conceives of it as a nonphysical space within the personality, filled with psychic energy or libido as Jung calls it[34]. Jung does not accept the Freudian concept of libido being basically sexual in nature and exclusively pleasure-oriented. Instead, to Jung, libido signifies "the energy of the process of life."[35] In the book "Theories of Personality," authored by Hall and Lindzey[36], an excellent summary of Jung's ideas is given. The basic elements of the structure of personality as described by them are:

> The total personality or 'psyche' as it is called by Jung, consists of a number of differentiated but interacting systems. The principal ones are the ego, the personal unconscious, and its complexes, the collective unconscious, and its archetypes, the persona, the anima, the animus, and the shadow. In addition to these, there are the attitudes of introversion and extraversion and the functions of thinking, feeling, sensing and intuiting. Finally, there is the self which is the centre of the whole personality.[37]

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[34]Progoff, I., Jung's Psychology and Its Social Meaning. Anchor Press, New York, 1973, p. 48-50.

[35]Jung, C. G., Psychological Types. Trans. by Baynes, H. G., Harcourt, Brace, New York, 1923, p. 262.

[36]Hall, S. C., and Lindzey, G., Theories of Personality. John, Wiley & Sons, Inc., 1970.

[37]Ibid., p. 82.

Psychic energy is a hypothetical construct; it is not a concrete substance or phenomenon. Consequently, it cannot be measured or sensed. Psychic energy finds concrete expressions in the form of actual forces like wishing, willing, striving, etc., or potential forces like attitudes, dispositions, tendencies and the like. More important, it is the psychic energy which is finally responsible in helping an individual achieve his goal of self-realization.

Though unique and complex in nature, the covert and hypothetical constructs of Jung's analytical psychology have not stimulated much empirical investigation in the field of psychology. But, his concepts of the two attitudes (extraversion-introversion) and the four psychological functions (sensing, intuiting, thinking, feeling), which constitute the elements of Jung's personality typology have been widely influential. Its main impact on personality measurement has been to promote an abiding interest in typology as evidenced by the abundance of psychological literature written on the subject and the number of tests constructed on the dimensions of extraversion-introversion. Eysenck[38], in 1947 (by means of factor analysis), identified extraversion-introversion as one of the primary dimensions of personality. Yet another study of Jung's typology is by Ball (1967)[39]. His factor analytic study indicated results in confirmation of Jung's ideas.

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[38]Eysenck, J. J., _Dimensions of Personality_. London: Routlege and Kegan Paul, 1947.

[39]Ball, E. D., _A Factor Analytic Investigation of the Personality of Typology of C. G. Jung_. Diss. Abst., 1968, 28 (10-B), 4277-4278.

Tests which assess the four functions of thinking, feeling, sensing, and intuiting, in conjunction with attitudes of introversion-extraversion, have been constructed by Gray and Wheelwright[40], and Myers and Briggs[41]. The Type Indicator is concerned with valuable differences in people that result from the way they like to perceive and the way they like to judge. Succeeding at anything takes both perception and judgment. First, a person has to find out what the problem or situation is and what are the various ways of tackling the situation. Then he has to decide about the method he is going to opt. Finding out is an exercise in perception. Deciding is an exercise in judgment.

Explanation of the Terms. The conceptual definitions of the four dimensions that the indicator's scales are presumed to represent and the definition of the word 'type' as it is used here are given below:

'Type,' as the word used here, is simply the result of peoples' preferences for the use of perception and judgment--the mental process by which people see what they look at and become aware of it (perception), and decide what they do about it, or come to a conclusion about the situation (judgment).

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[40]Gray, H., and Wheelwright, J. B., _Jungian Type Survey_. San Francisco, Society of Jungian Analysts of Northern Carolina, 1946.

[41]Myers, I. B., and Briggs, K. C., _Myers-Briggs-Type Indicator_, _Form F_. Consulting Psychologists' Press, Inc., California, 1957.

Sensation and Intuition. Sensation and intuition are two distinct and opposite ways of perceiving. Sensation is the direct form of perception by which we become aware of things through our five senses. It is the reality function. It yields concrete facts or representations of the world. Intuition is perception by way of unconscious processes and subliminal contents. The intuitive man goes beyond facts, feelings, and ideas in his search for the essence or reality.

The intuitive person sees meanings, relationships and possibilities that are beyond the reach of one's senses. Intuition is especially useful for seeing what we might do about a situation. A person uses both sensing and intuition, but not both at once and not with equal liking.

Thinking and Feeling. Thinking and feeling are two contrasting means of evaluating or judging a phenomenon. Thinking is ideational and intellectual. It is a logical process capable of being formalized, resulting in impersonal judgment of right or wrong. Feeling is a more subjective process. It is the evaluative function and it gives man his subjective experiences of pleasure and pain or joy and love, resulting in the acceptance or rejection of a phenomenon.

Thinking people analyze the situation, decide impersonally and logically on the basis of cause and effect, whereas feeling people decide on the basis of personal values. Thinking people make decisions by analyzing and weighing facts, including the unpleasant ones. The feeling people are more skillful in dealing with people; they are appreciative and sympathetic, give great weight to personal values that

are involved, including those of others.

Jung[42] explains the meaning of these four functions as related to the introvert-extravert dichotomy:

> . . . a state of completeness is attained by these four. Sensation establishes what is actually given, thinking enables us to recognize its meaning, feeling tells us its value, intuition points to the possibilities of the whence and whither that lie within the immediate facts. In this way we can orient ourselves with respect to the immediate world . . .

Thinking and feeling are called the rational functions because they are purposive functions from the individual's point of view. They make use of reason, judgment abstraction and generalization. They enable man to look for lawfulness in the universe. Sensation and intuition are considered to be irrational functions because they are based upon the perception of the concrete, particular, and accidental.

The Indicator classifies the respondents on each of the four preferences, assigning him one of the sixteen possible 'type' formulas such as ESTJ, ENFP, ISTP, and so on. The sixteen 'types' with their dominant and auxiliary functions are given in Table 2 in the Appendix. ISTP, for example, means an introvert who prefers sensing (to intuition) as the perceptual process, and prefers thinking (to feeling) as the judging process, and who has mainly perceptive attitudes toward the outer world. A detailed discussion of the preferences and the way they interlock in creating the Jungian 'type' is explained in the following pages.

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[42]Jung, C. G., Modern Man in Search of a Soul. Translated by H. G. Baynes, New York: Harcourt Brace and World, 1933b, p. 107.

Dominant and Auxiliary Processes. Although a person uses all the above four functions, all of them are not necessarily well developed. Usually, one of the four functions is more highly differentiated (developed) than the other three, and plays a predominant role in consciousness. It is the function with which he is best equipped by nature or which will secure him greatest social success. This is called the superior function or the dominant process. This phenomenon of the dominant process overshadowing the other process and shaping the personality accordingly was empirically noted by Jung in the course of his work and became, along with the extravertion-introvertion preference, the basis of his "Psychological Types."[43] One of the other three functions usually acts in an auxiliary capacity. If his dominant process is a judging one, his auxiliary process will be perceptive. An adequate development of the auxiliary process also is needed to provide balance between extravertion and introvertion and to make one's personality balanced and effective.

The auxiliary function is possible and useful only insofar as it serves the dominant function without making any claim to the autonomy of its own principle.

For instance, if an ENT--an extravert with intuition and thinking--chooses the perceptive attitude which makes him an ENTP, then perception, and not judgment, is his dominant process. Thinking is his auxiliary process. He will enjoy his intuition most, trust it most,

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[43]Jung, C. G., Psychological Types. Translated by H. G. Baynes, p. 419, 1971.

use it and shape his life so as to have maximum opportunity to pursue his intuitive goals. He will consult his judgment (thinking) only when there is no conflict with intuition. He will use thinking only to pursue something wanted by intuition.

Similarly, an ESF with judging attitude, will put his feeling in charge and sensing in second place. His life will be shaped to serve his feeling values. He will not permit his sensing to point out disturbing facts about something valued by his feeling.

With an extravert, the dominant process is concerned with the outer world of people and things, and his auxiliary process has to look after his inner life. For him, the JP preference is the product of the dominant process.

But, for an introvert, the JP preference (regarding the attitude he takes towards the surrounding world) is a product of the auxiliary process. Since the introvert's dominant process is introverted, his JP preference does not point directly to it, as is the case with the extraverts. The JP preference always reflects the attitude taken towards the outer life (the attitude in which the person's outer life is lived). In the extravert, the attitude towards the outer world is set by the dominant process. In the introvert, it is set by the auxiliary process.

Thus, for an ENTP, his intuition is in command and his thinking is in second place, but for an INTP, intuition is his second in command. It is indeed conducting his outer life in the service of his dominant process, his introverted thinking.

If the four functions are placed equidistant from each other on the circumference of a circle, the centre of the circle represents the fully differentiated functions. In such synthesis there are no super-ior or inferior functions and no auxiliaries. They are all of equal strength in the personality. Such a synthesis can only occur when the self has become fully actualized. Since complete actualization of the self is impossible, the synthesis of the four functions represents an ideal goal towards which the personality strives.

Perception and Judgment (P-J).[44] These are the attitudes toward, or the ways one deals with his immediate surroundings. Togeth-er they constitute a large part of the individual's mental activity. They must also govern a large portion of his overt behavior since, by definition, his perception determines what he sees in the situation and his judgment determines what he decides to do about it.

Extraversion and Introversion. Extraversion and introversion describe the direction of a person's interest--whether his interest is oriented towards the external objective world of people and things or the inner subjective world of concepts and ideas. Both the opposing attitudes are present in the personality, but ordinarily one of them is dominant and conscious while the other is subordinate and uncon-scious.

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[44]No separate and explicit variable reflecting individual dif-ferences of this kind is found in Jung's typology, but Jung does clas-sify each of the four functions as either rational and judging, or ir-rational and perceiving.

The gist of the theory of the Indicator is that much apparently random variation in human behavior is actually quite orderly and consistent, being due to certain basic differences in mental functions in the way people prefer to use perception and judgment. Even though different types of people use the same perceptive processes (sensing and intuition) and the same judgmental processes (thinking and feeling), each type has different priorities of interest in the four functions and, hence, tend to show a rather consistent preference for and greater pleasure in one or the other modes of perception and judgment. For example:

> . . . when people prefer sensing, they find too much interest in the actuality of concrete facts around them to spend much energy listening for ideas from nowhere. When people prefer intuition, they are too much interested in all the possibilities that occur to them to give a whole lot of notice to the actualities around them.[45]

A similar basic difference in the use of the judgmental processes also results in different types of persons.

The T-F preference for thinking and feeling is entirely independent of the preference for the function for perception, i.e., the S-N function[46]. Hence, either kind of judgment can team up with either kind of perception, creating four different combinations:

S-T   Sensing plus thinking

S-F   Sensing plus feeling

[45]Myers, I. B., The Myers-Briggs Type Indicator Manual. Princeton, J. J. Educational Testing Service, 1962, p. 51-52.

[46]Ibid., p. 53.

N-F   Intuition plus feeling

N-T   Intuition plus thinking

Each of the four combinations produces a different kind of personality. The interests, values, needs, habits and other characteristics of a person will be a result of the preferences of the particular combination.

Two persons with the same combination will have many qualities in common; they will get along easily since they tend to find the same things interesting because of the similarity of perception, and will consider the same things important because of the similarity of judgment.

Many a destructive conflict of personalities is due, according to this theory, simply to the fact that two people are using opposite kinds of perception and opposite kinds of judgment. When the origin of such a conflict is recognized, it is found easier to take and easier to cope with.

Thus, the four possible combinations of perception and judgment produce four different kinds of people. The differences in their personality characteristics seem to express important differences among real people. Thus, ST people tend to be hardheaded and practical; SF people, social gregarious; NF people, enthusiastic and insightful; NT people, intellectually ingenious.

The E-I preference for extraversion or introversion is completely independent of the S-N and T-F preference[47]. Thus, extraverts

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[47]Myers, I. B., The Myers-Briggs Type Indicator Manual, p. 57.

and introverts occur for all the combinations creating eight different types of personality. For instance, let us consider the N-F combination with the perceptive process of intuition and the judgmental process of feeling. The introverts among them work out their insights slowly and carefully. The extraverts would have an urge for immediate communication, putting their inspirations into instant force and practice. Thus, the extraverts' results are more copious and the introverts' results are more profound. The introverts are harder to understand than the extraverts for two reasons. They are not merely less communicative, but they are also a good deal more complicated.

The three basic preferences mentioned with regard to the use of perception and judgment have been: (a) the choice between two rival ways of perceiving--S-N; (b) the choice between two rival ways of judging--T-F; and (c) the choice between two rival ways of their use--E-I.

The final basic difference which completes the structure of personality under the theory presented concerns the preference between the attitudes toward perception and judgment or an attitude towards the surrounding world. A person may possess both attitudes, but will prefer one attitude to the other, find it more comfortable, feel more at home with it and spend much of their lives in it as possible. Myers elaborates on this point:

> There is a fundamental difference between the two attitudes. In the judging attitude, in order to come to a conclusion, perception must be shut off for the time being. The evidence is all in. Anything more is irrelevant and immaterial. One now arrives at a verdict and gets things settled. Conversely, in the perceptive attitude one shuts off the judgment for the time being. The evidence

is not all in. There is much more to it than this. New develop-
ments will occur. It is much too soon to do anything irrevocable.

Both attitudes have their merits. Either can make a satisfying way
of life, if one is able to switch over temporarily to the opposite
attitude when he really needs it.

What determines an individual's choice between the two attitudes is
probably not a preference for judgment in the abstract or percep-
tion in the abstract. Actually, the choice is between the two spe-
cific processes. People who may be classified as S-T choose again
between sensing and thinking. N-F people choose again between in-
tuition and feeling. One will be the dominant process, the other--
auxiliary process. In practice, the JP preference is a by-product
of the choice as to which process, of the two liked best, shall
govern one's life.[48]

Very few fall into the distinct categories the author has out-

lined. Most rely primarily upon a main function and to lesser extent

on a secondary function, but the two work well together. Thus, an ex-

traverted intuitive thinking type would be an extravert, whose intui-

tive/thinking is primary and is modified by his thinking/intuition.

In conclusion, each type has its own road to excellence and

each develops his own preferred functions. The result of these dif-

ferences in interest and developed skill is that each type has greater

attractions to those aspects of life which give greatest play to his

best developed processes.

According to this working hypothesis, the Indicator aims to

ascertain from self-report of easily reported reactions, people's

basic preferences in regard to perception and judgment so that the ef-

fects of these preferences in regard to perception and judgment and

their combinations may be established by research and put to practical

use.

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[48]Myers, I. B., The Myers-Briggs Type Indicator Manual, p. 58-59.

CHAPTER IV

PROCEDURE

This chapter describes the sample studied, the nature of the academic variables, the personality variable, and the psychometric properties of the personality measure used in the study. Then, a set of ten research hypotheses concerning the relationship of personality variables and academic achievement in medical school has been formulated.

For the latter part of this study, a second set of research hypotheses has been formulated in an attempt to confirm certain findings of Myers and partly as an extension of her findings.

Sample. The sample consists of 365 Chicago Medical School (CMS) students. These students represented all areas of the nation. At the time of the administration of the test, 173 of them had just finished their internship (third year), while ninety-five of them had finished their second year, and the remaining ninety-seven completed their freshman year.

The majority of the students had undergraduate majors in either physical or biological sciences, and a small number in mathematics or psychology. About one-third of the student population in CMS had majored in humanities (such as literature, philosophy, political science or history). All the students had obtained a bachelor's degree. A few had earned a master's degree, too. All, with the exception of a few

minority students, had a gradepoint average of at least 3.00.

Two types of variables are used in this study--academic variables and personality variables. The academic variables are: premedical gradepoint average (GP), the four subscores of the Medical College Admission Test (MCAT), the grade for the freshman year in the medical school measured as rank (RANK), the total of the National Board of Medical Examinations in basic sciences (NBME Scores total), and the average of the clinical ratings at the conclusion of the clerkships during the sophomore year and the internship year (third year).

Academic Variables.

GP: The premedical gradepoint average--the average of the gradepoints earned by the student in the college before he applied for admission in the medical school.

MCAT scores: The four subscores of the Medical College Admission Test. They are the standardized measures of--

MV, the verbal aptitude

MQ, the quantitative aptitude

MG, achievement in general information category

MS, achievement in premedical sciences.

RANK: The relative standing of the medical student in the freshman year by the grades earned in the classroom tests and lab work.

NBME scores total: The total of scores on the National Board of Medical Examinations--they test knowledge of behavioral science and six basic sciences at the end of the freshman year in medical school.

Clinical Ratings: The average of the clinical performance of the student during his internship year (third year), and of the clerkships during the sophomore year; the student is evaluated on his professional knowledge by theoretical examinations—written and oral, on his performance in the hospital during his clerkships, and on his personal qualities and attitudes required and observed in treating patients. A sample of the evaluation form is given in the Appendix (p.3).

Personality Variables. The personality variables are the scores from the instrument "Myers-Briggs Type Indicator" (MBTI). The instrument yields four dichotomous scores called the preference scores. The four preference scores are: E-I (Extraversion/Introversion), S-N (Sensing/Intuition, the two kinds of perception), T-F (Thinking/Feeling, the two kinds of judgment), and J-P (Judging/Perceptive attitude for dealing with the environment). The definitions and meanings of the four dichotomous preferences are discussed in detail in Chapter III.

The scores for the academic variables are continuous in nature. GP and the four MCAT subscores are used as predictors and Rank, NBME scores total, and Clinical Ratings are used as criteria in the multiple regression analyses.

The scores obtained from the Myers-Briggs Type Indicator (MBTI) can be treated in one of the three ways:

a) Continuous scales: The MBTI yields four scales; Extraversion/Introversion, Sensing/Intuition, Thinking/Feeling and Perception/Judgment. The scores for each scale are all odd numbers and range from thirty-three to 161, with 100 serving as the division point

which separates the two opposing preferences. For example, scores
from thirty-three to ninety-nine are E, and 101 to 161 are I.

b) Dichotomous variables: Each of the above four scales can be
converted to a dichotomous letter score. Thus, each subject is
described by the four letters (known as the type formula) such as
ESTP, INTJ, ISFP, and so on. A respondent is classified as one of
the sixteen possible types formed out of the four dichotomous pre-
ferences.

c) Categorical variable: The sixteen types mentioned above may
again be reclassified in four categories based on the four percep-
tual and judgmental processes—also known as 'dominant' processes—
sensing, intuition, thinking and feeling. The essentials of 'type'
classification are based on these four dominant processes. Each
category consists of four of the sixteen types.

A list of the types belonging to the four dominant processes is
given below.

TABLE 1

TYPES BELONGING TO THE FOUR DOMINANT PROCESSES

Sensing	Intuition	Thinking	Feeling
ESTP	ENTP	ESTJ	ESFJ
ESFP	ENFP	ENTJ	ENFJ
ISTJ	INTJ	ISTP	ISFP
ISFJ	INFJ	INTP	INFP

At different points in this study, each of the three scaling methods of the personality variable is utilized.

The statistical procedures used in the study for the first set of hypotheses are discriminant function analysis, one-way analysis of variance, analysis of covariance, and multiple regression analysis.

Personality variable 'type' based on the four dominant process- es is treated as the independent variable; GP and the four subscores of MCAT as the predictors/covariates; and Rank, NBME scores total, and Clinical Ratings as the criteria.

For the second set of hypotheses, the statistical procedures to be used are t tests and chi square tests.

Psychometric Properties of the Indicator. Besides having a sound theoretical basis, the Indicator meets all the necessary require- ments a measuring instrument should possess.

The instrument is based on a sound theory--the Jungian typol- ogy. It consists of 166 forced choice items. The Indicator provides each respondent with four scores which indicate the strength of pre- ference of the four dichotomies. In addition, the four scores also indicate the type of the respondent with the four letters such as ESFJ, INTP, and so on.

As mentioned in the previous pages, the scores obtained from the MBTI may be treated either as a continuous variable or as a di- chotomous variable. When the Indicator scores are treated as dichot- omous variables, a respondent is classified as one of the sixteen

possible types. These sixteen types can again be reclassified into four categories based on the four dominant processes. The distribution of personality types in a particular sample is usually displayed in a standard type-table format (p. 76).

Since the MBTI scores can be treated as dichotomous type categories as well as continuous scores, investigations on intercorrelations, reliability, and validity of the four scales of the instrument have been conducted on both dimensions.

The relative independence of the scales has been reported by Stricker and Ross[49], Webb[50], and a number of other researchers[51]. Stricker and Ross, and Webb obtained intercorrelations of the scales treating them as dichotomous scores in one study and continuous scores in another study, the E-I, S-N, and T-F scales have been found to be relatively independent of each other and the S-N scale is found to correlate consistently with the J-P scale.

Reliability. Both internal consistency reliability and test-retest reliability have been examined by several investigators. Estimates of internal consistency of continuous scores ranged from .70 to

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[49]Stricker, J. J. and Ross, J. "Intercorrelations and Reliability of the Myers-Briggs Type Indicator Scales," Psychological Reports, 1963, 12, 287-293.

[50]Webb, S. C. "An Analysis of the Scoring System of the Myers-Briggs Type Indicator," Educational & Psychological Measurements, 1964, 24, 765-781.

[51]Carlyn, M. "An Assessment of the Myers-Briggs Type Indicator," Journal of Personality Assessment, 1977, 41, 461-473.

.90[52]. It appears to be adequate for a self-report instrument.

Estimating the internal consistency of the type categories has been more difficult because existing statistical procedures can provide only low and high estimates. Nevertheless, the type categories appear to be quite reliable for adult samples[53].

In all the reported studies--whether the data used was categorical or continuous--the proportion of agreement between the original and retest type classification has been significantly greater than that which would be expected by chance. The college populations have been found to maintain reasonably stable scores over a period of time[54]. A clear majority of the subjects showed complete stability or a shift only in one of the four basic scales. The reliability coefficient showed a range of .70 to .87 for the E-I, S-N, and J-P scales, whereas for the T-F scale, the range was from .48 to .82[55].

Validity. The validity of the Myers-Briggs-Type-Indicator is dependent on how well it measures what it is intended to measure: the theoretical constructs of Jung's typology.

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[52]Ibid.

[53]Myers, I. B. The MBTI Manual, p. 20b.

[54]Carlyn, M. "An Assessment of the Myers-Briggs-Type-Indicator," Journal of Personality Assessment, 1977, 41, 461-473.

[55]Ibid.

Myers[56] gives an extensive account of the criteria used for choosing and scoring items for the Indicator in the manual. She also has provided considerable evidence for the instrument's content validity, such as correlations between the MBTI scores and the scores on Gray-Wheelwright questionnaire[57]. This questionnaire is another instrument designed to identify Jungian types.

Construct validity is the validity at issue when an instrument purports to measure abstract variables referred to as "constructs." In order to evaluate construct validity of an instrument, observable behaviors which are related to the construct should be specified. Studies are then conducted to determine how well the test correlates with the related behaviors.

Saunders[58] used factor analysis to compare the continuous MBTI scores of 1,132 subjects with their scores on the Allport-Vernon-Lindzey Study of Values. Factor analysis revealed that the four Jungian type dimensions formed a good simple structure and both instruments appeared to measure-related constructs.

Evidence of construct validity was obtained by numerous correlational studies[59], comparing the Indicator scores with scores on other

[56]Myers, I. B. Manual, p. 83-87.

[57] Gray, H. and Wheelwright, J. B. "Jung's Psychological Types, Their Frequency of Occurrence," Journal of General Psychology, 1946, 34, 3-17.

[58]Saunders, D. R. Evidence Bearing on Existence of a Rational Correspondence Between the Personality Typologies of Spranger and Jung (ETS RB 60-6). Princeton, N. J.: Educational Testing Service, 1960.

[59]Myers, I. B. Manual, p. 21-32.

instruments such as Strong Vocational Interest Blank, Edwards Personal Preference Schedule, Scales of Personality Research Inventory and creativity tests.

All the above mentioned findings indicate that the scales of the Indicator measure important dimensions similar to those postulated by Jung. Mendelsohn[60] observes that the MBTI scores "relate meaningfully to a large number of variables, including personality, ability, interest, value, aptitude, performance measures, academic choice, and behavior ratings."

The subsequent discussion in this chapter, written in two parts, deals with two sets of hypotheses. In the first part a set of ten major hypotheses will be formulated, followed by the respective statistical procedures to be used in testing the hypotheses.

In the latter part of the chapter, a secondary set of hypotheses will be formulated and discussed in the light of certain findings of Myers.

For the first set of ten hypotheses, the personality variable 'type' is treated as a categorical variable and the independent variable. The predictors/covariates are the academic variables GP and the four MCAT subscores. Rank, NBME scores total, and Clinical Ratings are the criteria.

Following is the summary of the research hypotheses formulated

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[60]Mendelsohn, G. A. "Review of Myers-Briggs Type Indicator," in O. K. Buros (Ed) Sixth Mental Measurement Yearbook (3rd ed). Highland Park, N. J.: Gryphon Press, 1965.

for the first part of this chapter.

1. Different 'types' of students in medical school do not achieve differently in the five predictor variables--GP and the four scores of MCAT (MV, MQ, MG, and MS).

2. The relationship between the Rank in the freshman class and the five predictor variables is not statistically different for the different 'types.'

3. The relationship between NBME scores total on basic sciences and the five predictor variables is not significantly different for the different 'types.'

4. The relationship between Clinical Ratings and the five predictor variables is not significantly different for different 'types.'

5. When the predictor variables GP and MCAT scores are controlled, no significant difference is found in Rank between the different 'types' in the medical school.

6. When predictor variables GP and MCAT scores are controlled, no significant difference in NBME scores total is obtained among the different 'types.'

7. When predictor variables GP and MCAT scores are controlled, no significant difference in Clinical Ratings is found among the different 'types.'

8. In the medical school, there is no significant relationship between the Rank and the five predictor variables--GP, and the four scores of MCAT--MV, MQ, MG, and MS.

9.   In the medical school, there is no significant relationship between the NBME scores total in basic sciences and the five predictor variables--GP and the four scores of MCAT--MV, MQ, MG, and MS.

10.   In the medical school, there is no significant relationship between Clinical Ratings and the five predictor variables--GP and the four scores of MCAT--MV, MQ, MG, and MS.

For the second part of the chapter the following seven hypotheses are formulated.

11.   Generally, the students with the 'type' combination INJ, that is, INTJ and INFJ, are not significantly better than the students with the other type combinations in scholastic performance, as measured by GP, the four MCAT subscores, Rank, and the NBME scores total.

12.   Scholastic performance of the introverted intuitives (IN), as measured by GP, the four MCAT scores, Rank, and NBME scores total is not significantly better than the performance of the extraverted sensing types (ES).

13.   The sensing types do not score significantly lower than the intuitives on MCAT scales.

14.   Academic achievement of the intuitives, as measured by Rank in the freshman class, is not significantly better than the achievement of the sensing types.

15.   The ratings of the intuitives in Clinical Performance are not significantly better than the ratings of the sensing types.

16. Compared to a typical high school population, the number
of introverted intuitive feeling types (INFs) is not significantly
larger than the number of extraverted sensing thinking types (ESTs),
in Chicago Medical School.

17. Compared to a high school population, the number of in-
tuitives is not significantly larger than the number of sensing
types in Chicago Medical School.

Research Hypotheses. The general purpose of the present study
is to investigate the relationship of personality variables to the aca-
demic variables in medical school performance. The specific purpose of
the first set of hypotheses is to investigate the relationship of per-
ceptual and judgmental preferences to the academic variables. A set of
ten (10) research hypotheses has been formulated for this purpose.

Below, each one of the research hypotheses has been stated,
followed by the statistical procedure necessary to list the hypothesis.

1. Different 'types' of students in medical school do not
achieve differently in the five predictor variables--GP, and the
four scores of MCAT--MV, MQ, MG, and MS.

Statistical Procedure: A multiple discriminant analysis will
be performed between the four dominant 'types' using GP and the
four MCAT scores as predictors in the discriminant equation. Dis-
criminant functions will be tested for significance. Results will
indicate whether the groups can be discriminated in terms of the
predictor variables.

The performance of the students in the medical school are likely to be affected by (a) their previous achievement indicated by the predictor variables, and/or (b) the membership in the categorical variable 'type.' If, in fact, the personality variable 'type' contributes to the student variance in the criterion variables, above and beyond the variance that is contributed by the academic predictor variables, an analysis of covariance using academic predictors as covariates and 'type' as independent variable should reveal this fact. However, there is also the possibility that each 'type' might require a separate prediction equation. In other words, the relationship between predictors and criteria might be different for different 'types.' This would be so if 'type' were to act as a mediating variable. Hence, it is hypothesized that:

2. The relationship between Rank in the freshman class and the five predictor variables--GP, MV, MQ, MG, and MS-- is not significantly different for the different 'types.'

3. The relationship between NBME scores total and the five predictor variables--GP, MV, MQ, MG, and MS--is not significantly different for different 'types.'

4. The relationship between Clinical Ratings and the five predictor variables--GP, MV, MQ, MG, and MS--is not significantly different for different 'types.'

In other words, these hypotheses state that there is no significant interaction between the independent variable 'type' and the predictors--GP and the four MCAT scores--for each of the dependent

variables taken separately.

Statistical Procedure: The test for the absence of interaction is a test for the equality of regression coefficients (slopes). Hence, all the three hypotheses will be tested through a test of equality of slopes in an analysis of covariance for each criterion variable separately. In each case 'type' will be used as an independent variable and GP and the four MCAT scores as the covariates.

If the null hypothesis $H_0 = (B_1=B_2=B_3=B_4)$ is not rejected, only then, will the corresponding hypothesis among the next three be considered. All three are concerned with the test for the main effects ('type' effects) for the respective criterion variable, and similar statistical procedures will be used for all the three hypotheses.

5. When the predictor variables are controlled, no significant difference is found in Rank between the different 'types' in medical school.

6. When predictor variables are controlled, no significant difference is found in NBME scores total in basic sciences among the different 'types' in medical school.

7. When predictor variables are controlled, no significant differences in Clinical Ratings are obtained among the different 'types.'

Statistical Procedure: Analysis of covariance will be performed to determine if there is any statistically significant difference between the means of the groups for each dependent variable

separately.

Hypotheses 8, 9, and 10 are concerned with the relationship be-
tween the predictors GP and the four MCAT scores, and the criterion
Rank/NBME scores total/Clinical Ratings.

8. There is no significant relationship between Rank in the
freshman class and the five predictor variables--GP and the four
scores of MCAT.

9. There is no significant relationship between the NBME scores
total in basic sciences and the five predictor variables--GP and the
four scores of MCAT.

10. There is no significant relationship between the Clinical
Ratings and the five predictor variables--GP and the four MCAT
scores.

Statistical Procedure: The same analyses of covariance used to
test hypotheses 2 through 7, will be used to test hypotheses 8
through 10. A significant effect due to covariates is hypothesized.
In addition, a regression equation using only those variables which
make a significant contribution to each criterion will be obtained.
It may be noted that the last regression analyses contain a few
additional subjects for which type data were not available.

This part of the chapter deals with a set of seven (7) hypothe-
ses concerning the distribution of personality type and the relation-
ship of 'type' to academic aptitude and achievement in a medical col-
lege. These hypotheses are formulated in an attempt to confirm certain
findings of Myers.

Statistical Procedure: To test the hypotheses 11 through 17, t-tests and chi square tests will be used.

Below is given a summary of the hypotheses.

11. Generally, the students with the type combination INJ, that is, INTJ and INFJ, are not significantly better than the rest of the group in scholastic performance as measured by GP, the four MCAT scores, Rank, and NBME scores total.

12. Scholastic performance of the INs (introverted intuitives) as measured by GP, MCAT scores, Rank, and NBME scores total is not significantly better than the performance of ESs (extraverted sensing types).

13. The sensing types do not score significantly lower than the intuitives in GP, and the four MCAT scores.

14. Academic achievement of the intuitives as measured by Rank or NBME scores total is not significantly better than the achievement of the sensing types.

15. The clinical performance of the intuitives as measured by the Clinical Ratings is not significantly better than the clinical performance of the sensing types.

16. Compared to a typical high school population, the number of introverted intuitive feeling types (INFs) is not significantly larger than the number of extraverted sensing thinking types (ESTs) in Chicago Medical School.

17. Compared to a typical high school population, or to a liberal arts college population, the number of intuitives is not sig-

nificantly larger than the number of sensing types in Chicago Medical School.

Statistical Procedure: Hypotheses 11, 12, 13, 14, and 15 will be tested by t-tests. Hypotheses 16 and 17 will be tested by chi square.

In type terms, academic aptitude requires the skills of introversion and intuition. Findings from Myers' research done on various academic populations indicate that the three preferences that appear to make the main contributions to scholastic success are introversion, intuition, and judging. In the present study, the above findings of Myers are examined. The relevant hypothesis is stated below:

11. Generally, the students with the type combination INJ, that is INTJ and INFJ, are not significantly better than the students with the other type combinations in scholastic performance as measured by GP, MCAT scores, Rank, and NBME scores total.

Statistical Procedure: A t-test will be used to test the hypothesis.

Myers' research further indicated that the scholastic performance of the INs--introverted intuitives--is significantly superior to the performance of the ESs--extraverted sensing types. This marked difference in their achievements appears to stem from the INs' high level of scholastic interest and the ESs' neglibibly low concern for the same. Accordingly, INs' performance in the medical school is expected to be superior to that of ESs'. This hypothesis is as follows:

12. Scholastic performance of the INs (introverted intuitives)

as measured by GP, the four MCAT scores, Rank and NBME scores total is not significantly better than the performance of the ESs (extraverted sensing types).

Statistical Procedure: A t-test will be used to test the hypothesis 12.

Hypotheses 13, 14, and 15 are concerned with the achievement of the sensing and intuitive types in premedical school and medical school. They are stated below:

13. The sensing types do not score significantly lower than the intuitives in GP, and the four MCAT scales.

14. Academic achievement of the intuitives, as measured by Rank and NBME scores total, is not significantly better than the achievement of the sensing types.

15. The clinical performance of the intuitives, as measured by the Clinical Ratings, is not significantly better than the clinical performance of the sensing types.

Statistical Procedure: All the three hypotheses will be tested by t-tests.

Hypotheses 16 and 17 deal with the distributions of the different type combinations—INFs and ESTs, and Ss and Ns -- in the medical school.

16. Compared to a typical high school population, the number of introverted intuitive feeling types (INFs) is not significantly larger than the number of extraverted sensing thinking types (ESTs) in Chicago Medical School.

17. Compared to a typical high school population, or a liberal arts college population, the intuitives are not significantly larger in number than the sensing types in Chicago Medical School.

Statistical Procedure: Chi square tests will be performed to test hypotheses 16 and 17.

CHAPTER V

ANALYSIS OF DATA AND RESULTS

Part I. In the preceding chapter it was stated that, hypothe-
sis 1 would be tested by discriminant analysis; hypotheses 2, 3, and
4 would be tested by equality of regression coefficients in analysis
of covariance procedures; hypotheses 5 through 10 would be tested by
analyses of covariance procedures with 'type' as independent variable
and predictors GP and the four MCAT scores as covariates. In addition,
regression equations would be obtained for each of the three criterion
variables.

Hypothesis 1: Different 'types' of students in medical school
do not achieve differently in the five predictor variables--GP and the
four MCAT scores (MV, MQ, MG, and MS).

A discriminant analysis was conducted between the four dominant
'types' using GP and the four MCAT scores as predictors. In other
words, the discriminating power of the predictor variables was deter-
mined by Wilk's lambda (not shown in table), which is then converted
into an F ratio. The F test indicated significance for the verbal
scale (MV), general information scale (MG), and the science scale (MS),
of MCAT (Table 2A).

Then, chi square tests were computed for each of the three dis-
criminant functions to determine the significance of discrimination

along each dimension (Table 2B). The first discriminant function was found to be significant (χ^2 = 27.51, p $\leq$.025) but, the significance of the second vector failed to reach the necessary level (p = .210). The first vector accounted for sixty-one percent of the predictable group variation.

TABLE 2A

TABLE FOR DISCRIMINANT ANALYSIS

Predic-tor Var-iables	Means for Criteria Groups				MS	Unvar-iate F	SDFC[1]
	S(n=32)	N(n=55)	F(n=50)	T(n=37)			
GP	344.31	337.27	330.66	328.16	1905.8	2.35	-0.174
MV	517.50	550.27	510.60	570.41	32664.4	5.09	0.675
MQ	603.75	615.00	584.40	600.68	8267.5	1.74	0.099
MG	515.00	541.80	524.40	562.03	15717.6	3.13	0.069
MS	585.63	600.27	558.00	599.32	18957.8	3.79	0.365

[1]SDFC=Standardized Discriminant Function Coefficient.

TABLE 2B

TEST OF THE DISCRIMINANT FUNCTION

Discriminant Function	Eigen Value	Relative Percentage	F	Chi square	DF	Sig
1.	0.104	61.03	1.861	27.51	15	0.025
2.	0.064	37.39	1.360	10.85	8	0.210
3.	0.002	1.58	0.149	0.45	3	0.930

The standardized discriminant function coefficients (SDFC) presented in the last column of Table 2A also indicate which of the five variables are contributing most to type discrimination. It is observed that verbal and scientific scales of MCAT contribute most to the significance of the discriminant function.

In addition to the discriminant analysis, univariate analyses of variance were also conducted to test hypothesis 1. The overall F ratio (Table 3) indicated a significant difference in the MCAT scales MV and MS among the four 'types.' Thus, the results of univariate analysis of variance confirm the results obtained by the discriminant analysis.

To know which of the group means are significantly different from others, the Scheffé test--a multiple comparison procedure, was conducted. The test indicated two homogeneous subsets within the whole sample for each of the predictor variables MV and MS. In other words, the feeling and the sensing types were found to be significantly different from the intuitive and thinking types in terms of MV and MS. Thus, the discriminant analysis as well as the Scheffé test indicated that the groups can be discriminated in terms of the predictor variables among the different 'types' in medical school.

Hypotheses 2, 3, and 4: There is no significant difference in the relationship between Rank/NBME scores total/Clinical Ratings and the five predictor variables among the different 'types' in the medical school.

These hypotheses were tested through a test of equality of

TABLE 3

RESULTS OF UNIVARIATE ANALYSIS: GROUPS MEANS AND SD FOR THE FOUR

TYPES CATEGORIZED BY THE DOMINANT PROCESS AND F RATIO

| Academic Variables | Whole Group | Groups by Dominant Process | | | | F |
		Sensing	Intuition	Feeling	Thinking	
	N=177	N=32	N=56	N=52	N=37	
GP	335.0 28.4	344.3 25.9	337.3 26.3	330.7 31.6	329.7 28.7	2.13 p=0.09
MV	539.0 80.1	517.5 90.6	550.3 68.9	510.6 87.6	576.0 75.5	6.08 p=0.006
MQ	601.7 69.0	603.8 72.2	615.0 50.8	584.4 81.3	603.5 71.2	1.75 p=0.160
MS	586.9 71.1	585.6 57.5	600.3 60.9	558.0 83.8	605.5 76.3	4.32 p=0.006
MG	536.5 72.3	515.0 69.3	541.2 68.5	524.6 75.9	562.0 69.1	3.253 p=0.023
RANK	50.5 27.9	46.5 22.8	53.1 29.7	51.5 30.3	48.9 25.6	0.451 p=0.72
NBME	485.0 87.0	466.5 79.9	491.4 92.0	479.2 99.1	498.5 67.1	0.930 p=0.428
CLINRATE	376.3 32.8	386.6 35.1	378.0 29.9	372.1 32.8	373.4 33.5	0.861 p=0.469

·A lower rank is indicated by a larger number. Before the students were admitted to the medical school the 'types' were significantly different as shown by their scores in MV and MS and MG, the sensing types and feeling types achieving much lower than the intuitives and thinkers. But once they were admitted to the school, this difference disappeared. These grounds were not significantly different in any of the performance variables in the medical school.

regression coefficients (slopes) in an analysis of covariance for each criterion variable separately. In each case 'type' was used as the independent variable, and the five predictors as the covariates. Table 4 gives the results of the analysis. F ratios for all the three criteria variables were found to be not significant; thus, no evidence of inequality of regression coefficients in all the four cells was found. In other words, 'type' did not appear to be a mediator in the relationship between predictors of performance in medical school and measures of actual performance.

Thus, the hypotheses that there is no significant difference in the realtionships between the predictor variables and each of the criterion variables, among the different 'types' in the medical school, are supported.

TABLE 4

TEST OF EQUALITY OF REGRESSION IN THE FOUR CELLS FOR THE INDEPENDENT FACTOR TYPE AND THE FIVE COVARIATES BY ANALYSIS OF COVARIANCE

Criterion Variable	Source of Variance	SS	DF	MS	F	p less than
Rank	Within cells	103983.88	149	697.88		
	Regression	9410.38	15	627.36	0.90	0.567
NBME scores total	Within cells	1083873.00	138	7854.15		
	Regression	106383.56	15	7092.23	0.903	0.562
Clinical Ratings	Within cells	92828.63	77	1205.57		
	Regression	6909.26	15	460.62	0.382	0.980

Results of the data in the table show that F ratios for all the three criterion variables are not significant. Thus, the null hypothesis of equality of regression coefficients of the covariates in all the four cells is supported.

In the absence of the interaction, the next step is to see
whether there is a significant difference in the medical school per-
formance among the different 'types.' When categorical variables are
of more concern, effects of predictor variables on the dependent var-
iable are removed by using them as covariates. Regression procedures
are used to remove variation in the dependent variable due to covar-
iates and a conventional analysis of variance is then performed on the
corrected scores.

Hypotheses 5, 6, and 7: When the predictor variables are con-
trolled, no significant difference is found in Rank or NBME scores to-
tal, or Clinical Ratings among the different types in the medical
school.

An analysis of covariance was used to compare the performance
of the four groups on the dependent variables (Rank, NBME scores to-
tal, and Clinical Ratings), with scores on GP and the four MCAT scores
as concomitant variables. The assumption of homogeneity of regression
was tested through hypotheses 3, 4, and 5. The tests indicated par-
allel regression slopes, thus permitting the use of conventional ana-
lysis of covariance.

The analysis of covariance (Tables 5A, 5B, and 5C) indicates
that the main effects due to 'type' were not significant for any of
the criterion variables. Hence, the hypotheses that when predictor
variables are controlled, no significant difference is found in Rank,
or NBME scores total, or Clinical Ratings among the different 'types'
in the medical school are supported.

TABLE 5A

ANALYSIS OF COVARIANCE TABLE SHOWING

THE SOURCES OF VARIATION AND F RATIO

FOR THE DEPENDENT VARIABLE RANK

Source of Variation	SS	DF	MS	F	Signi of F
Covariates	13958.8	5	2791.7	4.030	.002
GP	2529.3	1	2529.3	3.652	.058
MV	264.3	1	264.3	0.382	.538
MQ	1854.3	1	1854.3	2.677	.104
MG	1068.3	1	1068.3	1.542	.216
MS	1866.1	1	1866.1	2.694	.103
Main Effects	1178.9	3	392.9	0.567	.637
Type	1178.9	3	392.9	0.567	.637
Explained	15137.3	8	1892.2	2.732	.008
Residual	94200.2	136	692.7		
Total	109337.5	144	759.3		

Multiple R = .372 R^2 = .138

The analysis of the data in the table indicates that the F Ratio obtained for the main effect 'type' on the dependent variable Rank is not significant.

TABLE 5B

ANALYSIS OF COVARIANCE FOR THE

DEPENDENT VARIABLE NBME TOTAL

Source of Variation	SS	DF	MS	F	Signi of F
Covariates	232793.4	5	46558.7	7.323	.000
GP	354.5	1	354.5	0.056	.814
MV	832.6	1	832.6	0.131	.718
MQ	9846.4	1	9836.4	1.549	.215
MG	1741.8	1	1741.8	0.274	.601
MS	85122.6	1	85122.6	13.388	.000
Main Effects	10811.6	3	3603.9	0.567	.638
Type	10811.6	3	3603.9	0.567	.638
Explained	243605.1	8	30450.6	4.789	.000
Residual	985504.9	155	6358.1		
Total	1229110.0	163	7540.5		

Multiple R = 0.445 R^2 = 0.198

    The analysis of the data in the table indicates that the F Ratio obtained for the main effect 'type' on the dependent variable NBME is not significant.

    Only 19.8 percent of the total variance is explained by the personality variable 'type' and the covariates together.

TABLE 5C

ANALYSIS OF COVARIANCE TABLE FOR THE

DEPENDENT VARIABLE CLINRATE .

Source of Variation	SS	DF	MS	F	Signi of F
Covariates	3562.4	5	712.5	0.657	.657
GP	972.5	1	972.5	0.897	.346
MV	617.3	1	617.3	0.569	.452
MQ	186.9	1	186.9	0.172	.679
MG	809.0	1	809.0	0.746	.390
MS	801.4	1	801.4	0.739	.392
Main Effects	3921.2	3	1307.0	1.206	.312
Type	3921.2	3	1307.0	1.206	.312
Explained	7483.6	8	935.4	0.863	.551
Residual	97569.0	90	1084.1		
Total	105052.6	98	1072.2		

Multiple R = .264 R^2 = .070

The analysis of the data in the table indicates that the F Ratio obtained for the main effect 'type' on the dependent variable Clinrate is not significant. Only seven percent of the total variance in the Clinrate is explained by the covariates and the personality variable together.

Hypotheses 8, 9, and 10: There is no significant relationship between the criterion Rank (or NBME scores total or Clinical Ratings) and the five predictor variables--GP and the four MCAT scores, MV, MQ, MG, and MS.

The results of the analyses of covariance in Tables 5A, 5B, and 5C indicate that hypotheses 8 and 9 are not supported; whereas, hypothesis 10 is accepted. F ratios for the predictors (covariates) were found to be significant in the case of the criteria variables Rank and NBME scores total. The results indicate that the source of variance in the achievements among the 'types' was due to the covariates. Among the predictors, GP contributed to the variance of Rank, while MS contributed most to the variance of the NBME scores total. However, F ratio for the Clinical Ratings did not even reach the significance level of .05 for the predictors covariates.

In view of all the above findings that 'type,' per se, did not contribute to the differential achievements of the students in the medical school, the whole sample was treated as one composite group. The next objective of this study was to obtain a set of regression equations for the various criteria. Only those variables which made a significant contribution to the criterion were used in the equations. It will be noted that regression analysis contains a few additional subjects for whom type data were not available.

An examination of the correlation matrix (Table 7) for the academic variables indicates that the four scores of the MCAT are all significantly correlated to each other and also to the criteria Rank

and NBME scores total.

It is also observed that NBME scores total shows significant correlation with Rank, thereby indicating the validity of the grades in the medical school.

The analyses of the data and F ratio given in Tables 8A, 8B, and 8C indicate that not more than the first two variables contribute significantly to the variance of each criterion.

The prediction equations are given below.

For the criterion Rank, the prediction equation is:

$$Y' = 222.9 - 0.126(MQ) - 0.712(MS)$$

For the criterion NBME scores total, the prediction equation is:

$$Y' = 117.1 + 0.203(MS) + 0.388(GP)$$

For the criterion Clinical Ratings, the prediction equation is:

$$Y' = 412.9 - 0.192(GP) + 0.637(MS)$$

The other predictors were not retained in the equations since they contributed negligible variance to the criteria.

MS is found to be the only common predictor for all three criteria. GP and MQ are the other two.

The negligible to low correlation of Clinical Ratings with the other variables are not unexpected. But, the significant and negative correlation of Clinical Ratings with the premedical gradepoint average (GP) needs further investigation.

The findings from this study are from one school only. Additional research is required to explore whether these results can be extrapolated further for medical schools in general.

TABLE 6

CORRELATIONS AMONG ALL ACADEMIC VARIABLES

	GP N=358	MV N=363	MQ N=363	MG N=363	MS N=363	RANK N=361	NBME N=337	CLINRATE N=252	
1. GP	1.00	0.04	0.12^1	0.01	0.03	-0.10^1	0.17^2	-0.21^2	GP
2. MV		1.00	0.24^2	0.64^2	0.40^2	-0.10^1	0.18^2	-0.05	MV
3. MQ			1.00	0.18^2	0.44^2	-0.20^2	0.22^2	0.07	MQ
4. MG				1.00	0.29^2	-0.12^1	0.14^1	-0.02	MG
5. MS					1.00	-0.20^2	0.25^2	0.16^1	MS
6. RANK						1.00	-0.39^2	-0.10	RANK
7. NBME							1.00	0.13^1	NBME
8. CLINRATE								1.00	CLINRATE

[1]p ≤ .01   [2]p ≤ .001

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TABLE 7A

MULTIPLE REGRESSION ANALYSIS

Dependent Variable: Rank

Variable	Multiple R	R^2	R sq Change	B	Beta	F
MQ	0.241	.058	0.058	− 0.126	−0.182	21.75[1]
MS	0.260	.067	0.009	− 0.712	−0.101	2.59
GP	0.268	.072	0.005	− 0.113	−0.070	1.81
MG	0.274	.075	0.003	− 0.563	−0.071	1.19
MV	0.275	.075	0.000	0.165	0.022	1.00
Constant				222.900		

[1] $p \leq .01$

Note: (1) The negative sign of the rank is the result of lower ranks having a higher standing in the group.
    (2) The values of the F ratio refer to the significance of variance accounted for in the dependent variable by the predictor variable. The test is known as the hierarchical F test.

TABLE 7B

MULTIPLE REGRESSION SUMMARY TABLE

Dependent Variable: NBME

Variable	Multiple R	R^2	R sq Change	B	Beta	F
MS	0.254	0.065	0.065	0.203	0.175	23.140[1]
GP	0.303	0.092	0.027	0.388	0.150	9.986[1]
MQ	0.316	0.100	0.008	0.112	0.055	3.055
MV	0.325	0.106	0.006	0.658	0.055	2.183
MG	0.327	0.107	0.001	0.593	0.044	1.000
Constant				117.130		

[1] $p \leqslant .01$

Note: The values of the F ratio refer to the significance of variance accounted for in the dependent variable by the respective predictor variable.

TABLE 7C

MULTIPLE REGRESSION SUMMARY TABLE

Dependent Variable: Clinrate

Variable	Multiple R	R^2	R sq Change	B	Beta	F
GP	0.209	0.044	0.044	− 0.192	−0.193	11.640^1
MS	0.244	0.060	0.016	0.637	0.140	4.240^1
MV	0.262	0.068	0.008	− 0.555	−0.113	2.540
MQ	0.265	0.070	0.002	0.205	0.045	0.495
MG	0.266	0.070	0.000	− 0.117	−0.022	0.080
Constant				412.900		

[1]$p \leq .01$

Note: Only GP and MS are found to contribute to the prediction of Clinrate. The variance contributed by each of the other predictors is less than one percent.

The values of the F ratio refer to the significance of variance accounted for in the dependent variable by the respective predictor variable.

Part II. It was mentioned in the last chapter that 't' tests would be performed for testing hypotheses 11 through 15, and chi square tests would be performed to test the hypotheses 16 and 17.

The reader is reminded that 'type' is treated here (hypotheses 11 through 17) as a dichotomous variable.

Hypothesis 11: Generally, the students with the type combination INJ--that is, INTJ and INFJ--are not significantly better than the rest of the group in scholastic performance, as measured by GP, the four MCAT scores, Rank and NBME scores total.

The results of the data in Table 8 indicate that the above hypothesis is partially substantiated. The 't' test results indicate that the INJ combination is superior to the rest of the sample only in the variable GP (premedical gradepoint average). For the other variables indicating scholastic performance, 't' test results do not indicate a significant difference in the achievements of the concerned groups.

The data in the table do indicate a definite trend for better achievement for the INJ combination, indicated by higher group means in the variables GP and the four MCAT scores. However, these differences between the means of the groups do not approach the statistical significance of .05 level.

It is also observed that in medical school, the difference between the groups means for the three variables--Rank, NBME scores total, and Clinical Ratings--is negligibly low.

TABLE 8

COMPARISON OF TWO GROUPS—INJ COMBINATION (GROUP 1)

AND THE REST OF THE SAMPLE (GROUP 2)—IN TERMS OF

THE ACADEMIC VARIABLES BY MEANS OF t-TEST

Academic Variables	n	Mean	sd	F	t	DF	p
GP							
Group 1	24	348.9	22.1				
Group 2	153	332.8	28.9	1.72	2.62	175	.010
MV							
Group 1	24	555.0	77.2				
Group 2	153	536.4	84.4	1.19	1.01	175	.312
MQ							
Group 1	24	611.7	63.2				
Group 2	153	600.2	70.4	1.24	0.75	175	.452
MG							
Group 1	24	549.6	73.8				
Group 2	153	534.4	72.0	1.05	0.96	175	.340
MS							
Group 1	24	609.2	57.9				
Group 2	153	583.4	74.7	1.67	1.62	175	.108
RANK							
Group 1	24	51.3	31.6				
Group 2	152	50.4	27.2	1.35	0.16	174	.876
NBME TOT							
Group 1	22	490.7	100.1				
Group 2	142	484.2	85.0	1.39	0.33	162	.744
CLINRATE							
Group 1	10	373.6	29.6				
Group 2	91	376.6	33.2	1.26	-0.27	99	.785

Hypothesis 12: Scholastic performance of the INs (introverted intuitives) as measured by GP, the four MCAT scores, Rank and NBME scores total is not significantly better than the performance of the ESs (extraverted sensing types).

The results of the 't' test, as given in Table 9, show a significant difference between the two group means only in the variable GP (t = -2.00, p. = 05). For all the other academic variables, no significant difference is found between the two groups--ESs and INs.

The negative sign of 't' indicates that group mean of the premedical gradepoint average of group 2, that is, of the INs, is significantly larger than the group mean of the ESs.

The 't' test assumes that the scores in one group have about the same degree of variability as the scores in the second group. This assumption is tested by the F ratios shown in the Table. The F ratios are found to be not significant for all the variables.

The IN combination consists of the types INTJ, INTP, INFJ, and INFP. The ES combination consists of the types ESTJ, ESTP, ESFJ, and ESFP.

Hypotheses 13, 14, and 15:

13. The sensing types do not score significantly lower than the intuitives in GP and the four MCAT scores MV, MQ, MG, and MS.

14. Academic achievement of the intuitives as measured by Rank or NBME scores total is not significantly better than the achievement of the sensing types.

TABLE 9

COMPARISON OF TWO GROUPS--EXTRAVERTED SENSING TYPES (1)

AND INTROVERTED INTUITIVE TYPES (2)--IN TERMS OF THE

ACADEMIC VARIABLES BY MEANS OF t-TEST

Academic Variables	n	Mean	sd	F	t	DF	p
GP							
Group 1	29	322.5	36.8				
Group 2	63	336.0	26.5	1.93	-2.00	90	.048
MV							
Group 1	29	557.1	80.5				
Group 2	63	554.1	81.3	1.02	0.17	90	.868
MQ							
Group 1	29	610.8	56.7				
Group 2	63	610.2	66.9	1.39	0.04	90	.965
MG							
Group 1	29	537.1	21.1				
Group 2	63	554.0	70.1	1.03	-1.07	90	.286
MS							
Group 1	29	582.9	85.7				
Group 2	63	604.8	63.4	1.82	-1.37	90	.173
RANK							
Group 1	29	55.8	24.6				
Group 2	63	46.5	29.2	1.41	1.49	90	.139
NBME							
Group 1	27	479.3	72.2				
Group 2	57	502.5	87.9	1.48	-1.19	82	.237
CLINRATE							
Group 1	21	384.8	27.3				
Group 2	38	374.2	33.4	1.49	1.24	57	.222

15. The clinical performance of the intuitives, as measured by Clinical Ratings, is not significantly better than the clinical performance of the sensing types.

The 't' test results (Table 10) indicate that in none of the academic variables except in the general information scale of MCAT (MG), the difference between the means of the sensing and the intuitive types reached a significance level of .05.

Thus, hypothesis 13, that the sensing types do not score significantly lower than the intuitives, is supported.

Hypothesis 14, that academic achievement of the intuitives as measured by Rank in the freshman class or NBME scores total is not significantly better than the achievement of the sensing types, is supported.

Similarly, hypothesis 15, that the clinical performance of the intuitives as measured by Clinical Ratings is not significantly better than the clinical performance of the sensing types, is found tenable.

Hypothesis 16: Compared to a typical high school population, the number of introverted intuitive feeling types (INFs) is not significantly larger than the number of extraverted sensing thinking types (ESTs), in Chicago Medical School.

Referring to the distribution of types given in the Standard Type Table (Table 11), it is evident that the number of INFs in CMS is forty (22.6%) and the number of ESTs is ten (5.65%).

The frequence distribution in percentage of the sixteen types in a typical high school population (N=3,503) is given in Table 12.

TABLE 10

COMPARISON OF TWO GROUPS--SENSING AND INTUITIVE TYPES--

IN TERMS OF THE ACADEMIC VARIABLES BY MEANS OF t-TEST

Academic Variables	n	Mean	sd	F	t	DF	p
GP							
Sensing	61	335.3	32.3				
Intuitive	116	334.8	26.7	1.46	0.11	175	0.909
MV							
Sensing	61	531.7	88.1				
Intuitive	116	542.8	81.0	1.18	-0.84	175	0.405
MQ							
Sensing	61	604.3	66.2				
Intuitive	116	600.3	71.2	1.16	0.36	175	0.717
MG							
Sensing	61	521.1	72.8				
Intuitive	116	544.6	71.0	1.05	-2.08	175	0.039
MS							
Sensing	61	578.0	73.1				
Intuitive	116	591.6	72.9	1.00	-1.18	175	0.240
RANK							
Sensing	61	51.4	25.1				
Intuitive	115	50.0	29.1	1.35	0.32	174	0.749
NBME TOT							
Sensing	58	471.2	80.6				
Intuitive	106	492.6	89.5	1.23	-1.51	162	0.132
CLINRATE							
Sensing	38	378.7	35.2				
Intuitive	63	374.8	31.3	1.27	0.58	99	0.565

TABLE 11

COMPARISON OF THE FREQUENCIES OF THE INFs AND

ESTs IN A HIGH SCHOOL POPULATION AND

CHICAGO MEDICAL SCHOOL

BY CHI SQUARE TESTS

School	Percent of INF	Percent of EST	School	INF fo fe	EST fo fe	chi sq
High	6.28	23.41	CMS N=177	40 11	10 41.4	76.45 +23.84 100.29

From this Table the percentage of the INF group is found to be 6.28 and
the percentage of the ESTs is found to be 23.41. Proportionately, the
expected number of INFs in Chicago Medical School (N=177) is eleven and
the expected number of ESTs is forty-one persons.

The difference in the type distributions of the two populations
is obvious. In the high school, EST combination is largest in number
and INF is the smallest. In the medical school, the reverse is true—
INF is the largest and EST is the smallest.

The data in Table 11 indicate a chi square value of 76.45 for
the INFs and a chi square value of 23.84 for the ESTs separately. Both
values are significant beyond .001 level.

Hypothesis 17: Compared to a high school population or to a lib-
eral arts college population, the intuitives are not significantly larger

in number than the sensing types in Chicago Medical School.

The high school population (Table 12) shows a ratio of forty-two to fifty-eight for intuitives to sensing types. According to this distribution, the expected ratio of the intuitives to the sensing types in Chicago Medical School (N=177) is seventy-four to 103. The actual numbers are 119 and fifty-eight (Table 13). This gives a chi square value of 47.02 (Table 14) which is significant beyond .001 level.

In the liberal arts college, the ratio of the intuitives to sensing types is found to be sixty to forty (Table 12). In Chicago Medical School, the expected distribution would be 106 intuitives and seventy-one sensing types. The observed frequencies are 119 and fifty-eight. Calculation gives a chi square value of 3.84 which is significant at .05 level (Table 14).

Myers[61] observes that different colleges use different assortment of types and the frequence of the intuitives rises steeply as one proceeds from a fifteen percent for the vocational group in high schools to a forty-two percent in the college preparatory classes, and to an eighty-three percent for the National Merit Finalists.

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[61]Myers, I. B. _Manual_, p. 14.

TABLE 12

PERCENTAGE FREQUENCIES OF THE 16 TYPES IN HIGH SCHOOL
POPULATION AND LIBERAL ARTS COLLEGE STUDENTS

High School Students[1] (College Prep Group) (N=3,503)				Liberal Arts College Students[2] (N=3,676)			
ISTJ 8.08	ISFJ 3.97	INFP 2.11	INTJ 4.68	ISTJ 7.32	ISFJ 4.19	INFP 5.03	INTJ 7.26
ISTP 5.14	ISFP 4.37	INFP 4.17	INTP 5.97	ISTP 3.26	ISFP 2.80	INFP 8.00	INTP 7.81
ESTP 7.74	ESFP 6.42	ENFP 7.14	ENTP 7.88	ESTP 3.75	ESFP 4.27	ENFP 9.60	ENTP 8.11
ESTJ 15.67	ESFJ 6.48	ENFP 3.54	ENTJ 6.65	ESTJ 9.33	ESFJ 5.93	ENFP 5.83	ENTJ 7.51
S=57.90% N=42.14%				S=40.85% N=59.15%			

[1] Penn. High School students mainly from 11th and 12th grades, with a large proportion of college prep students, tested in spring '57.

[2] Liberal Arts students from Amherst, Brown, Dartmouth, Stanford Wesleyan Universities, tested in '62 and '63.

TABLE 13

MYERS-BRIGGS TYPE INDICATOR TYPE TABLE FOR
177 CHICAGO MEDICAL SCHOOL STUDENTS

SENSING TYPES with		INTUITIVE TYPES with				N	%	I
thinking	feeling	feeling	thinking		E	80	45.20	0.95
					I	97	54.80	1.05
					S	58	32.77	0.94
					N	119	67.23	1.06
ISTJ	ISFJ	INFJ	INTJ		T	69	38.98	0.80
n=12	n=12	n=17	n= 7		F	108	61.02	1.20
%= 6.78	%= 6.78	%= 9.60	%= 3.95		J	88	49.72	0.87
I= 0.88	I= 1.08	I- 1.43	I= 0.50		P	89	50.28	1.13
					IJ	48	27.12	0.95
					IP	49	27.68	1.17
					EP	40	22.60	1.17
ISTP	ISFP	INFP	INTP		EJ	40	22.60	0.80
n= 2	n= 6	n=23	n=18		SJ	42	23.73	0.88
%= 1.13	%= 3.95	%=12.99	%=10.17		SP	16	9.04	1.11
I= 0.42	I= 1.46	I= 1.21	I= 1.36		NP	73	41.24	1.22
					NJ	46	25.99	0.87
					TJ	38	20.34	0.65
					TP	33	18.64	1.06
ESTP	ESFP	ENFP	ENTP		FP	56	31.64	1.24
n= 2	n= 6	n=21	n=11		FJ	52	29.38	1.14
%= 1.13	%= 3.95	%=11.86	%= 6.21		IN	65	36.72	1.12
I= 0.81	I= 1.72	I= 1.21	I= 1.07		EN	54	30.51	0.98
					IS	32	18.08	0.93
					ES	26	14.69	0.88
					ST	24	13.56	0.50
ESTJ	ESFJ	ENFJ	ENTJ		SF	34	19.21	2.11
n= 8	n=10	n=13	n= 9		NF	74	41.81	1.21
%= 4.52	%= 5.65	%= 7.34	%= 5.08		NT	45	25.42	0.87
I= 0.60	I= 1.03	I= 1.02	I= 0.63					

Introverts

Extraverts

NOTE: I=Index=ratio of percentage at CMS to percentage in composite sample of 3,704 present-day medical students from nine medical schools from different parts of the nation (data base). Index above 1.0 means CMS has more than expected from the 3,704 base.

TABLE 14

COMPARISON OF THE FREQUENCIES OF THE INTUITIVES AND THE SENSING TYPES IN
A HIGH SCHOOL POPULATION, IN LIBERAL ARTS COLLEGE
AND THE CHICAGO MEDICAL SCHOOL
BY CHI SQUARE

School	Percent of Intuitives	Percent of Sensing Types	School	Intuitives f_o	f_e	Sensing Types f_o	f_e	Chi sq
High School (N=3,503)	42	58	CMS (N=177)	119	74	58	103	47.02[1]
Liberal Arts College (N=3,676)	60	40	CMS (N=177)	119	106	58	71	3.97[2]

[1] $p \leq .001$ [2] $p \leq .05$

CHAPTER VI

SUMMARY, DISCUSSION, AND CONCLUSION

The primary purpose of this study was to investigate the re-
lationships among personality variables and academic variables in the
medical school performance of the students of Chicago Medical School.
In addition, it was also proposed to obtain a set of prediction equa-
tions with academic variables as predictors which would be helpful in
predicting medical performance reasonably well. These prediction
equations could also serve as an initial screening device of the ap-
plicants for admission, thereby helping the admissions committee to
expedite the process of admissions. The above procedure is also
likely to reduce the cost of admission to the applicants. Only those
candidates who are likely to be successful in the medical school need
be asked to come to the school for further tests and interviews.

At present, the initial screening of the applicants is done
by using cut-off scores in the premedical gradepoint average (GP) and
the science scale of the MCAT. The use of a set of prediction equa-
tions appears to be a better device in assuring fairness and uni-
formity of weightings in selection by different members of the ad-
missions committee.

If the personality variables should be found to affect medi-
cal school performance, a second set of equations involving person-
ality variables could be obtained, and it would be possible to

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identify the most successful subgroup from the main group of medical

students. The inclusion of personality variables in the set of pre-

diction equations would take into account many personality character-

istics which, otherwise, are not being considered for selection.

Sample: The subjects were 365 Chicago Medical School students.

All subjects, with the exception of a few minority students, had a

gradepoint average of 3.00 or more.

Variables: Two types of variables were used in the present

study--academic variables and personality variable. The academic var-

iables were premedical gradepoint average (GP), the four scores of

MCAT, the Rank in the freshman class, the NBME scores total in basic

sciences, and the Clinical Ratings. The scores for the personality

variable 'type' were obtained with the instrument Myers-Briggs Type

Indicator (MBTI). Academic variables were continuous in nature, and

personality variable 'type' was categorical.

The Instrument: The instrument is based on Jungian Typology.

On the basis of numerous studies conducted by the instrument since its

appearance thirty years ago, it could be concluded that the reliability

and validity of the instrument have been adequately established.

The MBTI data were available for only 177 students. These

were categorized into four groups on the basis of the four dominant

processes (p. 26), sensing, intuition, thinking, and feeling. Hypoth-

eses concerning the personality variable 'type' involved this sample

of 177 students only. However, hypotheses concerning only the aca-

demic variables involved the whole sample of 365 students.

Statistical Procedures: Discriminant analysis, analysis of variance, analysis of covariance, regression analysis, 't' tests and chi square tests were used as statistical procedures in this study. 'Type' was used as the independent variable in analysis of covariance; GP and the four MCAT scores were predictors; and Rank, NBME scores, and Clinical Ratings as criteria.

Results: The major research question was whether an individual's 'type' category is a determinant of medical school performance; and that the differential achievement in the medical school represented an effect that could not be attributed to the covariates.

The major hypotheses of this study concerned the extent to which the personality variable 'type' measured by the instrument Myers-Briggs Type Indicator, predictor variables--GP, the four MCAT scores, and the interactions of the two (if any) relate to the three sets of achievement measures--Rank, NBME scores, and Clinical Ratings. A few other related hypotheses also were formulated and tested.

Results of analysis of variance and analysis of covariance indicate that differential achievement in the criterion variables (Rank, and NBME scores total) among the students of medical school could not be attributed to the personality variable 'type.' Also, this differential achievement (in the criterion variables) among the groups could be attributed to the covariates--premedical gradepoint average (GP), and the verbal, quantitative, general information, and scientific scales of the MCAT.

From the results of discriminant analysis, it was observed

that the groups could be discriminated in terms of the verbal and scientific scale of the MCAT (MV and MS). In addition, multiple comparison procedures--Scheffé test--showed that sensing and feeling types were significantly different from the intuitive and thinking types in terms of MV as well as MS. Further, the group means of the sensing and feeling types were found to be significantly lower than the group means of intuitive and thinking types in the verbal and scientific scales of the MCAT. However, pairwise comparisons of the group means showed that in premedical gradepoint average the sensing types scored significantly higher than the thinking and the feeling types.

But, once the students were admitted to the medical school, these significant differences between the 'types' disappeared. An inspection of the group means of the four 'types' (Tables 15 and 16) on the z score table for the academic variables shows that the group means of each 'type' does not differ much from the grand mean of the whole group.

In Rank and Clinical Ratings--where time (speed) and verbal reasoning are not contributing factors of achievement--the sensing type is found to do better than the intuitives. (In timed paper and pencil tests, such as MCAT and NBME, the intuitives are found to have an advantage over the sensing types.) In other words, the sensing type is found to overachieve in medical school and make up for their low MCAT scores.

Since 'type' per se as measured by the dominant process was found to be unrelated to medical school performance, the four groups

could now be treated as one composite group, and prediction equations were obtained for the composite group. The predictors were GP and the four MCAT scores.

The criterion variables Rank and NBME scores total were found to be significantly related to all the predictors. However, the predictor variables—the four MCAT scores—themselves were interrelated (Table 6) and, consequently, all except two of the five variables contributed negligible variance to the criterion variable. These two variables were retained in each of the regression equations.

The predictive efficiency of each of the three equations (p.64-66) as reflected by R^2, is not very high. For a good regression equation, correlations among the predictors should be low and correlations between each criterion and the predictors should be high. It was mentioned earlier that correlations among the predictor variables are high.

It is observed that there is no significant correlation between the clinical competence and the MCAT scales, except for the MS scale.

Clinical Ratings is a composite measure of professional knowledge and personal attitudes and qualities required of a physician. The ratings are the results of written, oral, and practical examinations combined with evaluations on performance of the student observed in real life situations in the hospital. But, the clinical competence appears to be unrelated to the MCAT scales except for the MS scale. It was also observed that the intuitives who usually score high on

TABLE 15

z SCORES FOR ACADEMIC AND CLINICAL

PERFORMANCE BY DOMINANT PROCESS

	N	GPz	MSz	RANKz	NBMEz	CLINRATEz
SENSING						
ESTP	(2)	-0.72	-0.51	+0.76	-0.32	NA
ESFP	(6)	-0.58	+0.16	+0.19	-0.16	+0.57
ISTJ	(12)	+0.53	-0.20	-0.22	-0.27	+0.17
ISFJ	(12)	+0.73	+0.19	-0.41	-0.08	-0.12
INTUITIVE						
ENTP	(11)	-0.33	+0.57	+0.14	-0.11	+0.28
ENFP	(21)	-0.21	-0.12	+0.15	+0.22	+0.09
INTJ	(7)	+0.32	-0.08	-0.36	+0.48	+0.68
INFJ	(17)	+0.62	+0.37	+0.07	-0.08	-0.39
THINKING						
ESTJ	(8)	-0.12	-0.22	+0.27	-0.23	+0.18
ENTJ	(9)	+0.31	+0.19	-0.25	+0.12	-0.28
ISTP	(2)	-0.02	-0.44	-0.18	+0.84	-1.70
INTP	(18)	-0.59	+0.40	+0.03	+0.10	0.00
FEELING						
ESFJ	(10)	-0.82	-0.37	+0.31	-0.17	-0.33
ENFJ	(13)	+0.11	-0.97	+0.41	-0.57	-0.13
ISFP	(6)	-0.34	-0.76	+0.69	-0.68	-1.18
INFP	(23)	+0.09	+0.23	-0.44	+0.43	-0.14

It appears that the sensing type--whether sensing is the dominant or auxiliary process--always scores below the mean except in the combinations of ISTJ and ISFJ. A negative z in rank indicates a higher standing than a positive z.

TABLE 16

ACADEMIC AND CLINICAL PERFORMANCE OF THE
DIFFERENT TYPES IN TERMS OF GROUP MEANS

Dominant Process

Type	n	GP	MV	MQ	MS	RK	NBMETOT	CLINRATE	
S=32									n=20
ESTP	2	314.5	450.0	580.0	550.0	71.5	457.5	Not Avail.	
ESFP	6	318.5	596.7	586.7	598.3	55.8	470.8	395.6	(6)
ISTJ	12	350.2	503.3	600.0	572.5	44.3	461.7	381.9	(9)
ISFJ	12	356.0	508.1	619.6	601.2	39.2	478.3	372.6	(5)
Group Mean		344.3	517.5	603.8	585.6	46.5	466.5	386.6	
N=56									n=21
ENTP	11	325.5	573.2	616.8	628.6	54.4	475.5	386.0	(4)
ENFP	21	328.9	537.4	621.7	578.3	54.6	504.0	379.5	(8)
INTJ	7	344.1	558.8	607.5	581.3	40.5	526.3	399.3	(4)
INFJ	17	352.6	543.8	608.8	613.8	52.4	478.2	363.8	(5)
Group Mean		337.3	550.3	615.0	600.3	53.1	491.4	378.0	
T=37									n=24
ESTJ	8	331.5	533.8	633.8	571.3	57.7	465.0	382.5	(4)
ENTJ	9	343.9	542.8	560.6	600.6	43.6	495.6	367.4	(5)
ISTP	2	335.5	535.0	585.0	555.0	45.5	557.5	320.0	(1)
INTP	18	318.0	604.4	607.8	616.1	51.2	493.8	376.9	(14)
Group Mean		329.7	576.0	603.5	605.5	48.9	498.5	373.4	
F=52									n=33
ESFJ	10	311.7	547.0	605.0	560.0	59.0	470.0	387.6	(8)
ENFJ	13	338.1	478.8	538.3	516.5	61.8	435.5	372.3	(8)
ISFP	6	325.2	521.7	556.7	531.7	69.7	425.8	337.3	(3)
INFP	23	337.7	526.4	614.1	604.1	38.4	522.0	372.0	(14)
Group Mean		330.7	510.6	584.4	558.2	51.5	479.2	372.1	
GRAND MEAN		334.9	539.0	601.7	586.9	50.5	485.0	376.7	

MCAT scales do not score high on Clinical Ratings. Thus, a high score

on MCAT does not assure a high score on clinical competence.

In attempting to obtain a predictor index for the various predictors and academic criteria, the qualities of the criteria should be considered. Criteria should be standards of excellence against which predictors are evaluated. To be predictable, a criterion should be fairly reliable, too. Even highly reliable and relevant tests cannot predict a criterion that lacks reliability. This is probably a principal reason why the many attempts to predict clinical performance as measured by Clinical Ratings have been fruitless. The Clinical Ratings of the interns is a composite measure of their professional knowledge and personal effectiveness, rated by not less than six different departments and at least ten faculty members. Interrater reliability plays a major role in contributing to the low reliability of the Clinical Ratings.

Often, there are great discrepancies between grade-getting abilities (decided primarily by cognitive abilities) and capacity to excel in clinical performance--decided not merely by intellectual abilities, but also by interpersonal relationship, independent thinking abilities, interest, motivation, emotional maturity, and other personality characteristics. This is, no doubt, an important reason why logically relevant factors, such as MCAT scores or NBME scores total, yield such low correlation with Clinical Ratings.

When multiple criteria for the same occupation are collected, the correlations between the criteria are frequently low. Sometimes,

this is simply because one criterion or the other is a bad measurement.

At other times, the different criteria reflect psychologically differ-

ent distinct aspects of performance. Kelly[62] found that grades on a

State Board Examination to license physicians correlate less than .20

with a National Board Examination in the same subject, or with the

grades earned in that subject the previous year. Further, the aptitude

tests and premedical grades correlated low with faculty ratings during

the internship in diagnostic competence, sensitivity to patients'

needs and overall promise. Cronbach[63] points out that the closer the

criteria to bookwork, the better the paper/pencil work tests predict

them; closer to the duties of the job, the more chancy the prediction.

The results obtained from the second set of hypotheses of the

present study contribute to the following conclusions.

Contrary to the expectations and predictions by the theory, no

significant difference in achievement in any of the academic variables

(except GP) was found between the INJ combination and the remaining

combinations.

Again, even though 'type' theory predicts that INs are academ-

ically superior to the ESs, no significant difference in achievement be-

tween the two groups was obtained for any of the academic variables.

Concerning the distribution of 'type' in medical school, the

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[62]Kelley, E. L. "Alternative Criteria in Medical Education and
Their Correlates," Proceedings, Invitational Conference on Testing Prob-
lems, 1963. Princeton, N.J.: Educational Testing Service 1964, p. 64-65.

[63]Cronbach, L. J. Essentials of Psychological Testing, 3rd Ed.
New York: Harper and Row, Publishers.

results are in the expected direction—a preponderance of INFs over ESTs and intuitives over sensing types. The INFs (n=40) were four times as many as the ESTs (n=10), and the intuitives (n=119) were twice as many as sensing types (n=58).

It was observed that the sensing types, on the average, make lower MCAT scores; but,

    sensing students in medical school overachieve on the whole,
 which makes up to a great extent for their lower MCAT scores, and

    sensing interns are rated at least as high on clinical com-
 petence as intuitives.

The findings from the present study confirm the conclusions reached by Myers in her follow-up studies (p. 17) done on the students twelve years after she gave the Indicator to them. The implications of the above findings are that by accepting more sensing types, the level of the clinical competence will not be lowered.

Discussion. Though the results of the major hypotheses indicate that personality variable 'type' as measured by the four dominant processes is not a determinant of the performance in the medical school, an examination of the group means for z score table (Table 15) shows that certain combinations perform much better than certain other combinations in most of the academic variables. For example, the combinations ISFJ, INTJ, INFP, INTP, INFJ and ENTJ are found to be academically superior to the remaining combinations as shown by their posi-

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Note: When relative positions in a class are indicated by Rank, a positive z indicates positions below the mean.

tive z scores. Similarly, the combinations ESTP, ESTJ, ESFJ, ENFJ, ISFP and ESFP are found to be academically poor as indicated by their negative z scores in the academic variables.

It appears that individual indices of the Indicator taken in combinatons, tend to modify each other and produce unique effects. It may be observed from the z score table that all the eight combinations of the sensing type (dichotomized sample)--except the combinations ISFJ and ISTJ--score below the mean. Similarly, the intuitives (dichotomized sample) are considered to be academically superior (to the sensing types) according to 'type' theory. However, certain EN combinations are found to perform below the mean.

Large samples are needed to have enough cases in all the sixteen cells to place confidence in results. In the present sample, the combinations ISTP and ESTP have only two cases each.

With reference to the type distribution in Chicago Medical School, two important observations are noticed: an overrepresentation of INFs and underrepresentation of ESTs. INFs (n=40) are found to be four times as many as ESTs (n=10). In a typical high school population the reverse is found to be true--the ESTs are nearly four times as many as the INFs.

In this study, high school and college students are used as reference groups, since these are the pools from which medical students' samples are drawn. The 'type' distribution in Chicago Medical School is strikingly different from the distributions in a typical high school or college (Tables 11-14). If type made no difference in

career selection, every career should have the same proportion of types
as found in the original sample. The results of the present study show
that it is not true. Type theory assumes that occupational choices are
related to psychological types. Certain types exhibit special interest
towards certain fields. Obviously, the EST combination is not very
much attracted towards the medical field. The preponderance of INFs in
the medical school is not unexpected. Similar findings have been re-
ported by Myers in her follow-up study.

The appeal of medicine for the INFs can be explained in terms
of the type theory. A physician may be a scientist or a humanitarian
or both. The humanitarian side of medicine gives full play to the
warmth of feeling. The scientific side offers full scope to the intui-
tive's zest for problem-solving and the introvert's gift for concentra-
tion. The disproportionately high frequencies of the introverts, in-
tuitives, and feeling types, or their combinations, are thus not unex-
pected.

During the course of the study, several subempirical questions
were posed in order to explore the empirical questions and hypotheses
stated in Chapter IV. For example, the correlation matrix for the
personality variable 'type' (when 'type' was treated as a continuous
variable) revealed that the extraversion/introversion (E-I), sensing/
intuition (S-N), and thinking/feeling (T-F) indices were relatively in-
dependent. But a significant relationship between the sensing/intui-
tion, and judging/perception categories was found, indicating that
sensing types were likely to be judging types and intuitives tend to be

perceptive types (Table 4, Appendix).

These findings lend support to Jung's theory that there are ac-
tually only three typological dimensions--extraversion/introversion,
sensing/intuition, and thinking/feeling.

The correlation between the SN and JP categories (0.49, Table
4, Appendix) implies that SJ combinations are natural combinations and,
hence, should occur more frequently than the SP and NJ combinations.
An example of the type table (Table 13) confirms this hypothesis.

Limitations. Caution should be exercised in generalizing the
conclusions drawn from this study to other medical schools.

The most serious drawback is the lack of a large number of sub-
jects--particularly for the variable measuring medical school perform-
ance by clinical competence (n=98). Type data were available for only
177 subjects, and these subjects were to be grouped in four categories
(of unequal sizes). The number in each category ranged from a low of
thirty-two to a high of fifty-seven. Admittedly, these numbers are
not large enough to place confidence in the conclusions drawn from the
results of this study.

Another weak factor in this study was the lack of a highly re-
liable measure for clinical competence. The criteria for the medical
school performance ought to be indicators of achievement in each year
of the medical school. For the freshman year, Rank and NBME scores
were chosen as the criteria. Given that both Rank and NBME scores
were reliable and valid measures of medical school performance, they

were indicators of achievement for the freshman year only, when few of

the characteristics of the effective physician were required for suc-

cess. The only other measure of medical school performance available

to the writer was the clinical and clerkship ratings obtained during

the internship year, which--being ratings--lacked the objectivity and

reliability of the standardized measures. Since each subject is eval-

uated by the faculty members from a minimum of six different disciplines,

the interrater unreliability probably might be the main contributor to

the unreliability of the measure.

The results of the correlations among the predictor variables

were found to be significant; as a result, the predictive efficiency of

the prediction equations would probably be low.

Yet another weakness of this study is that it was not possible

to cross-validate the results of this study, since cross-validation re-

quires two comparable samples or a sufficiently large sample (say 500)

split randomly into two. Neither method was feasible at the time of

the study.

Implications for Medical Education and Education in General.

Academically superior 'type' combination: Categorization of the

personality variable 'type' by the four dominant processes did not show

any significant result in differential achievement of the 'types.'

However, certain combinations of the indices, such as INTJ, were found

to be academically superior to the rest, and certain other combinations,

like ESTP, were found to be academically poor. The difference in a-

chievement of the groups, though not significant, was found to be in a

direction predicted by theory. Probably, categorization along the dimension of the sixteen 'type' combinations may yield better results, and with a large sample, the differentiation of academically superior or inferior groups could be possible.

Results of such a project could be immensely useful to the admissions committee and counselors in all fields of education.

Drop-out rate: Studies could be initiated to observe the rate of graduation and drop-out for each 'type' in an institution. If the drop-out rate follows a pattern for any particular combination, the information could be very valuable to the counselors and admissions committee.

Development of perception and judgment: Most medical educators will probably agree that efforts to teach clinical competence meet with only partial success. The facts and principles presented in the classrooms and the demonstrations in the laboratories, operating rooms and wards are necessary, but not sufficient to gain clinical competence. The knowledge so gained has to be applied, and proper application takes both perception and judgment. Appropriate use of perception and judgment is a skill that can be learned like any other skill--by understanding what one needs to do and practicing the doing of it. Type theory offers a way of thinking about it and the Indicator suggests what needs to be done.

Clinical competence: An understanding of 'type' theory, and one's own 'type,' renders a double service in the development of clinical competence. It helps a student find his place in medicine,

where his own preferred kind of perception and/or judgment will be fully

used and increasingly useful. It also makes him aware that he does have

two kinds of perception and two kinds of judgment and needs to use

each, separately in the right place at the right time.

Choice of specialty: Medical students often feel that they

have too little to go on in choosing a specialty. A student who knows

his combination of preferences, such as sensing and feeling or intui-

tion and thinking, can consider how much scope each specialty offers

for the combination he likes to use. The first follow-up study of

graduates reported by Myers and Davis[64] shows the relative attractive-

ness of fields for each of the types (Table, Appendix).

Admission and selection: The findings from the follow-up stud-

ies by Myers[65] show that sensing physicians are more likely than intui-

tives to provide primary patient care as shown by the proportion in

general practice (Table 3, Appendix).

At present, there is a crying need for more physicians available

to give primary patient care, short of the specialist level--especially

in small communities. A simple way to increase the output of sensing

physicians is to admit more sensing types to the medical schools. This

can be made possible if the speed factor in the admission tests (MCAT)

to the medical schools is eliminated.

---

[64]Myers, I. B., and Davis, J. A. "Relation of Medical Students'
Psychological Types to Their Specialities Twelve Years Later" A paper
presented at the annual meeting of the APA, Los Angeles, California,
1964.

[65]Ibid.

Conclusion. In the main, type differences were in the directions expected from C. G. Jung's theory of psychological types, except for the results relating the differential achievement to types. A larger sample probably will give more reliable results. The findings of the study are important because a good theory can give a valuable insight into the meanings of unrelated facts.

A knowledge of a person's basic preferences could be useful in almost any decision that affects his future. Opposite types can supplement each other in any joint undertaking. When two people approach a problem from opposite sides, each sees things which are not visible to the other.

A knowledge of the type in general, and one's own type in particular, can help a person choose his career. It can also help him deal with the problems and the people in his life. The Indicator reports a person's type by four letters that show how he came out on each of the four preferences. The effects of the combinations of perception and judgment are given in Table 2 of the Appendix.

A knowledge of 'type' theory, its relationship to aptitude and intelligence, and the possibility of its application in career choices, opens up an entirely new dimension for guidance and counseling--quite independent of intelligence.

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APPENDIX

TABLE 1

MYERS-BRIGGS TYPE INDICATOR

UNDERSTANDING THE TYPE TABLE

FOUR PREFERENCES ARE SCORED TO ARRIVE AT A PERSON'S TYPE

+ + + +   DOES THE PERSON'S INTEREST FLOW MAINLY TO + + + + + + +

(E)

THE OUTER WORLD OF ACTIONS, OBJECTS AND PERSONS?	THE INNER WORLD OF CONCEPTS AND IDEAS?
EXTRAVERSION	INTROVERSION

(I)

+ + + + + +   DOES THE PERSON PREFER TO PERCEIVE + + + + + + + +

(S)

THE IMMEDIATE, REAL, PRACTICAL FACTS OF EXPERIENCE AND LIFE?	THE POSSIBILITIES, RELATIONSHIPS AND MEANINGS OF EXPERIENCES?
SENSING	INTUITION

(N)

+ + + DOES THE PERSON PREFER TO MAKE JUDGMENTS OR DECISIONS + + +

(T)

OBJECTIVELY, IMPERSONALLY, CONSIDERING CAUSES OF EVENTS & WHERE DECISIONS MAY LEAD?	SUBJECTIVELY AND PERSONALLY, WEIGHING VALUES OF CHOICES & HOW THEY MATTER TO OTHERS?
THINKING	FEELING

(F)

+ + + + + + DOES THE PERSON PREFER MOSTLY TO LIVE + + + + + + + +

(J)

IN A DECISIVE, PLANNED AND ORDERLY WAY, AIMING TO REGULATE & CONTROL EVENTS?	IN A SPONTANEOUS, FLEXIBLE WAY, AIMING TO UNDERSTAND LIFE AND ADAPT TO IT?
JUDGMENT	PERCEPTION

(P)

THE LOCATION OF THE 16 PREFERENCE TYPES ON THE TYPE TABLE

ISTJ	ISFJ	INFJ	INTJ
ISTP	ISFP	INFP	INTP
ESTP	ESFP	ENFP	ENTP
ESTJ	ESFJ	ENFJ	ENTJ

EXTRAVERSION-INTROVERSION

I
E

SENSING-INTUITION

S	N

THINKING-FEELING

T	F	T

JUDGMENT-PERCEPTION

J
P
J

TABLE 2

THE THEORY: DOMINANT AND AUXILIARY FUNCTIONS FOR EACH TYPE

According to Jung's theory of psychological types, everyone uses all four *functions* (S, N, T, F), and adopts all four *attitudes* (E, I, J, P). The types are called *preference types* because people in each type *prefer* one of the two *perceptive functions* (S or N), and one of the two *judgment functions* (T or F). These preferences appear in the 2 middle letters of the type formula. Types also differ in the functions they prefer to use when in the introverted or extraverted attitudes.

The most preferred, or favorite, or *dominant function*, is extraverted in E types and introverted in I types. The second favorite or *auxiliary function* is introverted in E types and extraverted in I types. The type table below shows these relationships for each of the 16 MBTI types.

ISTJ	ISFJ	INFJ	INTJ
INTROVERTED SENSING with Thinking	INTROVERTED SENSING with Feeling	INTROVERTED INTUITION with Feeling	INTROVERTED INTUITION with Thinking
Sensing is dominant and introverted	Sensing is dominant and introverted	Intuition is dominant and introverted	Intuition is dominant and introverted
Thinking is auxiliary and extraverted	Feeling is auxiliary and extraverted	Feeling is auxiliary and extraverted	Thinking is auxiliary and extraverted
ISTP	**ISFP**	**INFP**	**INTP**
INTROVERTED THINKING with Sensing	INTROVERTED FEELING with Sensing	INTROVERTED FEELING with Intuition	INTROVERTED THINKING with Intuition
Thinking is dominant and introverted	Feeling is dominant and introverted	Feeling is dominant and introverted	Thinking is dominant and introverted
Sensing is auxiliary and extraverted	Sensing is auxiliary and extraverted	Intuition is auxiliary and extraverted	Intuition is auxiliary and extraverted
ESTP	**ESFP**	**ENFP**	**ENTP**
EXTRAVERTED SENSING with Thinking	EXTRAVERTED SENSING with Feeling	EXTRAVERTED INTUITION with Feeling	EXTRAVERTED INTUITION with Thinking
Sensing is dominant and extraverted	Sensing is dominant and extraverted	Intuition is dominant and extraverted	Intuition is dominant and extraverted
Thinking is auxiliary and introverted	Feeling is auxiliary and introverted	Feeling is auxiliary and introverted	Thinking is auxiliary and introverted
ESTJ	**ESFJ**	**ENFJ**	**ENTJ**
EXTRAVERTED THINKING with Sensing	EXTRAVERTED FEELING with Sensing	EXTRAVERTED FEELING with Intuition	EXTRAVERTED THINKING with Intuition
Thinking is dominant and extraverted	Feeling is dominant and extraverted	Feeling is dominant and extraverted	Thinking is dominant and extraverted
Sensing is auxiliary and introverted	Sensing is auxiliary and introverted	Intuition is auxiliary and introverted	Intuition is auxiliary and introverted

THE 4 COLUMNS: COMBINATIONS OF PERCEPTION AND JUDGMENT

SENSING PLUS THINKING **ST**	SENSING PLUS FEELING **SF**	INTUITION PLUS FEELING **NF**	INTUITION PLUS THINKING **NT**
PRACTICAL AND MATTER-OF-FACT	SYMPATHETIC AND FRIENDLY	ENTHUSIASTIC AND INSIGHTFUL	LOGICAL AND INGENIOUS
Like using abilities in	Like using abilities in	Like using abilities in	Like using abilities in
TECHNICAL SKILLS WITH FACTS AND OBJECTS	PRACTICAL HELP AND SERVICES FOR PEOPLE	UNDERSTANDING & COMMUNICATING WITH PEOPLE	THEORETICAL AND TECHNICAL DEVELOPMENTS
for example in	for example in	for example in	for example in
Applied science Business Production Construction and many more	Patient care Community service Sales Teaching and many more	Behavioral science Research Literature & art Teaching and many more	Physical Science Research Management Forecasts & Analysis and many more

THE 4 QUADRANTS: COMBINATIONS OF ATTITUDE AND PERCEPTION

INTROVERSION AND SENSING **IS**	INTROVERSION AND INTUITION **IN**
KNOWLEDGE IS IMPORTANT TO ESTABLISH TRUTH "THOUGHTFUL REALISTS"	KNOWLEDGE IS IMPORTANT FOR ITS OWN SAKE "THOUGHTFUL INNOVATORS"
EXTRAVERSION AND SENSING **ES**	EXTRAVERSION AND INTUITION **EN**
KNOWLEDGE IS IMPORTANT FOR PRACTICAL USE "ACTION-ORIENTED REALISTS"	KNOWLEDGE IS IMPORTANT FOR CREATING CHANGE "ACTION-ORIENTED INNOVATORS"

Table 3 Relative Attractiveness of the Specialties to Each of the Sixteen Types
(Ratio of actual to expected frequency of each specialty within each type)

	Sensing Types			Intuitives	
	With thinking		With feeling	With feeling	With thinking

ISTJ		ISFJ		INFJ		INTJ	
*Pathology	1.74	*Anesthes.	1.76	Med.Faculty	1.67	**Neurology	2.75
-*Obst., Gyn.	1.46	Pediatrics	1.43	*Intern.Med.	1.42	***Research	2.72
Anesthes.	1.21	Gen.Practice	1.13	Research	1.35	**Pathology	1.99
Gen.Practice	1.07	Obst., Gyn.	.99	Psychiatry	1.26	Psychiatry	1.46
Surgery	1.00	Surgery	.93	Pediatrics	1.07	**Intern.Med.	1.44
Intern.Med.	.99	Med.Faculty	.82	Surgery	.97	Gen.Practice	1.02
Med.Faculty	.98	Intern.Med.	.81	Gen.Practice	.96	Anesthes.	.87
Neurology	.88	Psychiatry	.68	Pathology	.77	Med.Faculty	.78
Pediatrics	.75	Neurology	.53	Neurology	.69	Obst.,Gyn.	.73
*Psychiatry	.44	Pathology	.30	Obst.,Gyn.	.68	Surgery	.71
Research	.00	Research	.26	Anesthes.	.38	Pediatrics	.61

ISTP		ISFP		INFP		INTP	
**Anesthes.	2.05	*Anesthes.	1.84	***Psychiatry	2.04	**Neurology	2.35
Obst., Gyn.	1.16	**Gen.Practice	1.40	Pathology	1.49	**Research	1.98
Gen.Practice	1.09	Obst.,Gyn.	1.17	Med.Faculty	1.31	***Psychiatry	1.84
Surgery	.98	Surgery	1.00	Intern.Med.	1.12	**Pathology	1.78
Intern.Med.	.86	Pediatrics	.94	Neurology	.94	Med.Faculty	1.41
Pediatrics	.72	Med.Faculty	.79	Research	.92	Intern.Med.	1.00
Med.Faculty	.61	Intern.Med.	.73	Gen.Practice	.79	Surgery	.91
**Psychiatry	.39	Research	.66	Surgery	.76	Pediatrics	.90
*Pathology	.33	Pathology	.63	Obst.,Gyn.	.75	Gen.Practice	.85
Research	.19	Psychiatry	.57	Anesthes.	.69	Anesthes.	.84
Neurology	.00	Neurology	.45	Pediatrics	.66	***Obst.,Gyn.	.44

ESTP		ESFP		ENFP		ENTP	
*Surgery	1.38	*Obst.,Gyn.	1.44	**Psychiatry	1.52	Pediatrics	1.24
Obst.,Gyn.	1.27	Surgery	1.21	Research	1.29	Intern.Med.	1.21
Gen.Practice	1.17	Pediatrics	1.09	Obst.,Gyn.	1.28	Psychiatry	1.20
Pathology	1.00	Gen.Practice	1.07	Pediatrics	1.23	Research	1.17
Neurology	.89	Anesthes.	.85	Med.Faculty	1.22	Med.Faculty	1.05
Pediatrics	.88	Neurology	.77	Neurology	1.16	Pathology	1.04
Intern.Med.	.85	Intern.Med.	.76	Intern.Med.	.98	Surgery	1.00
Med.Faculty	.49	Research	.57	Surgery	.95	Anesthes.	.84
Anesthes.	.49	Pathology	.43	Pathology	.73	Obst.,Gyn.	.82
Research	.44	*Med.Faculty	.43	*Gen.Practice	.73	*Gen.Practice	.70
**Psychiatry	.25	**Psychiatry	.33	Anesthes.	.56	Neurology	.34

ESTJ		ESFJ		ENFJ		ENTJ	
***Gen.Practice	1.46	*Pediatrics	1.51	*Med.Faculty	1.69	Neurology	1.85
Obst.,Gyn.	1.37	Anesthes.	1.26	Psychiatry	1.32	Med.Faculty	1.44
Pediatrics	1.19	Gen.Practice	1.16	Pediatrics	1.16	*Intern.Med.	1.35
Surgery	1.16	Research	1.13	Gen.Practice	.99	Pathology	1.30
Anesthes.	1.01	Surgery	1.08	Obst.,Gyn.	.96	Psychiatry	1.18
*Intern.Med.	.68	Obst.,Gyn.	1.05	Surgery	.95	Research	1.14
Med.Faculty	.49	Intern.Med.	1.03	Intern.Med.	.83	Surgery	1.13
Pathology	.41	Med.Faculty	.85	Research	.81	Anesthes.	1.02
**Psychiatry	.36	Neurology	.76	Pathology	.61	Gen.Practice	.72
Research	.36	Pathology	.64	Anesthes.	.60	Pediatrics	.72
Neurology	.00	***Psychiatry	.16	Neurology	.55	Obst.,Gyn.	.66

*Significant at .05 level; **significant at .01 level; ***significant at .001 level.

TABLE 4

Intercorrelations Among the Academic and Continuous Personality Variables
N-177

	GP	MV	MQ	MG	MS	EF	SN	FT	JP	RK	NB	CL (N=98)
GP	1.00	-.07	.13**	-.11**	0.21**	0.13	-.04*	-.02*	-.23**	-.23**	.10**	-.10
MV		1.00	0.22	0.67	0.51**	0.13	0.20	-.20	0.21	-.13**	0.26**	-.05
MQ			1.00	0.10	0.42**	0.12	-.04**	-.05	0.06	-.21	0.25*	-.00
MG				1.00	0.36	0.08	0.24	-.15*	0.15	-.14**	0.19**	0.02
MS					1.00	0.17	0.15	-.19	0.15	-.28*	0.42	-0.11
EI						1.00	0.04	-.05	0.00**	-.19	0.11*	- .07
SN							1.00	0.04	0.49	-.05	0.16	- .07
FT								1.00	0.12	0.00	0.03	- .11
JP									1.00	0.07	0.11**	- .05*
RK										1.00	0.73	- .16
NBME											1.00	0.13
CLINRATE												1.00

** p $\leq$ .01

* p $\leq$ .05

APPENDIX

CLERKSHIP–EVALUATION OF STUDENT

Clerkship __Pediatrics Michael Reese Hospital__   Inclusive Dates __2/2/76 - 3/19/76__

Student (print) __John Davidson__   Faculty Member (print) _____

Professional

- __3__ Interview and history
- __2__ Physical examination
- __3__ Differential diagnosis
- __3__ Tentative diagnosis; additional data
- __3__ Appropriate treatment plan
- __3__ Concise verbal presentation
- __2__ Recordkeeping
- __3__ Emotional status of patient

Personal

- __3+__ Interest and attitude
- __3__ Reliability
- __2__ Rapport; consideration of patients
- __2__ Attendance and punctuality
- __3__ Ethical standards
- __3+__ Maturity
- __2__ Interpersonal relationships

Overall Rating (circle):   1   2   ③   4   5

FACULTY COMMENT – Strengths and Weaknesses (use extra page if necessary)

Unfortunately, John was ill and missed a significant amount of time during the clerkship. His performance was somewhat uneven, possibly related to those absences. For example, evaluations of his data gathering skills ranged from 2 to 5, but in general were judged satisfactory. He performed well on the history and physical exam at the end of the clerkship, but scored poorly on his oral exam with an overall assessment of C (marginal) in factual knowledge and C- in reasoning ability. (Michael Reese Staff)

Examination grades: Written - 24   (Range 24 - 39) Fail
                Oral - Fail (Taken twice)

I discussed John's clerkship performance with him on March 30, 1976. I told him that he had done poorly on the oral examination. I stated that the staff at Michael Reese had felt that he was unable to "put things together" and that this was the feeling of the examiners also. The Michael Reese staff felt that he performed in an average manner, although on the low side of average. I told Mr. Davidson that although he had passed the clerkship, I thought he needed some review, particularly in the area of integrating information and problem solving. I recommended

Faculty Member (signature) _____ Date _____

that he take an additional four week elective in pediatrics.

STUDENT COMMENT (use extra page if necessary)

APPROVAL SHEET

The dissertation submitted by Madhavi Mehta has been read and
approved by the following Committee:

Dr. Samuel T. Mayo, Director
Professor, Foundations of Education
Loyola

Dr. Jack A. Kavanagh
Associate Professor and Chairman
Foundations of Education, Loyola

Dr. Steven I. Miller
Associate Professor, Foundations
of Education, Loyola

Dr. Pedro J. Saavedra
Associate Professor, Foundations
of Education, Loyola

The final copies have been examined by the director of the disserta-
tion and the signature which appears below verifies the fact that
any necessary changes have been incorporated and that the disserta-
tion is now given final approval by the Committee with reference to
content and form.

The dissertation is therefore accepted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy.

June 19, 1978   _Samuel T Mayo_
Date   Director's Signature