

THE RELATIONSHIP BETWEEN CERTAIN FACTORS AND
ACADEMIC SUCCESS IN THE SCHOOL OF PHARMACY
AT SOUTHWESTERN STATE COLLEGE

By

RUBY STRAUGHAN DRINKWATER

Bachelor of Science
Southeastern State College
Durant, Oklahoma
1936

Master of Education
The University of Oklahoma
Norman, Oklahoma
1955

Submitted to the faculty of the Graduate College
of the Oklahoma State University
in partial fulfillment of the requirements
for the degree of
DOCTOR OF EDUCATION
July, 1967

Thesis
1967D
D 3816
copy 2

OKLAHOMA
STATE UNIVERSITY
LIBRARY

JAN 10 1968

THE RELATIONSHIP BETWEEN CERTAIN FACTORS AND
ACADEMIC SUCCESS IN THE SCHOOL OF PHARMACY
AT SOUTHWESTERN STATE COLLEGE

Thesis Approved:

William B. Ewens

Thesis Adviser

Harry K. Brock

B. B. Duff

John F. Fisher

Kenneth E. Wiggins

D. D. Durland

Dean of the Graduate College

358686

ACKNOWLEDGEMENTS

The writer wishes to acknowledge her indebtedness to those persons whose assistance and cooperation made this study possible.

Sincere appreciation is extended to members of the Advisory Committee, Professors Harry K. Brobst, Kenneth Wiggins, Robert Griffith, Sol Sutker, and W. Price Ewens. Particular credit is due Dr. Ewens, Chairman of the Committee, without whose kindness and never-ending assistance, this study could not have been completed.

For services in statistical computation by IBM, the writer is indebted to Dr. Morrison and his assistant, Robert Walls.

Deepest appreciation is extended to the writer's colleagues at Southwestern State College for their unfailing encouragement and assistance:

to Dr. Walter L. Dickison, Dean of the Pharmacy School, for allowing the writer to administer certain time-consuming tests to pharmacy students;

to the head of her division, W. C. Burris, Dean of Students, for his continuous encouragement and cooperation in making available data from student personnel records; and to Miss Mildred Slagle, his secretary;

to Dr. Louis Morris, Dean of Instruction, for his encouragement and assistance in his gift of time, when time was needed;

to Dr. Harold Budde, Professor of Psychology, for his critical reading and comments;

to Jack Shelton, Head of Public Information and Publications, for his assistance in the solution of technical problems in the final production

of the thesis, to his assistant, Mrs. Johnny Faye Thomas, for her painstaking final printing of the study;

to Miss Joe Anna Hibler, Professor of Business Education, for her skillful preparation of copy for the final reproduction.

The writer is grateful to Dr. Edwin Vineyard for his initial guidance and continued interest in the study.

The writer's sincerest appreciation goes to Dr. Dayton Royse, M.D. without whose skillful medical care and wise counsel the doctoral program could not have been completed.

To the writer's family, Nancy, Marilyn and James, David and Lesley, appreciation is due for their understanding and pride, and for their constant encouragement.

TABLE OF CONTENTS

Chapter	Page
I. PROBLEM TO BE INVESTIGATED.	1
Introduction.	1
Background Information About the School of Pharmacy at Southwestern.	2
Accreditation	2
Pharmaceutical Curriculum	3
Statement of the Problem.	4
Procedure	4
Hypotheses to be Tested	5
Purpose of the Study.	6
Need for the Study.	7
Overview of Remainder of Thesis	11
II. SOURCES OF DATA, SCOPE, AND LIMITATIONS	12
Introduction.	12
Selection of Subjects for Study	12
Selection of Factors for Study.	13
Sources of Data	13
Description of Test Instruments	14
Scope and Limitation of the Study	23
III. RELATED STUDIES	26
High School Records	28
College Admissions.	28
Intelligence Tests as Predictors of Academic Success	34
General Achievement and Educational Development Tests	36
Multiple Variables as Predictors of Academic or Professional Success	37
Summary of Related Studies.	45
IV. PRESENTATION OF DATA AND ANALYSIS OF RESULTS.	46
Phase I: Development of Regression Equations	48
Phase II: Validation of Regression Equation.	54
Application of Validation Data.	54

Part III: MMPI Data on Dropouts	60
Analysis of Data Not Included in the Regression Equations	62
Summary of Findings	66
V. SUMMARY AND RECOMMENDATIONS	69
Recommendations	70
BIBLIOGRAPHY	72
APPENDIX	78

LIST OF TABLES

Table	Page
I. Basic Intercorrelation Matrix Derived from Data on Group I: Pharmacy Seniors, 1964-65.	47
II. The Zero Order Correlations of the Selected Tests and Pre-Pharmacy GPA with Pharmacy Grade Point Average for Group I	49
III. Multiple Correlation Coefficients Between the Selected Test and the Over All Grade Point Criterion	52
IV. Actual and Predicted Grade Point Averages for Group II.	55
V. Predicted Grade Point Averages Based on Pre- Pharmacy GPA and the Subtest Score on Social Studies N = 63	56
VI. Comparison of Predicted and Actual Grade Point Averages in Pharmacy School Based on Pre- Pharmacy GPA for Group II	59
VII. Intercorrelation Matrix Based on Data Derived from Dropouts from Pre-Pharmacy During the Years 1959-1960-1961.	61
VIII. Analysis of Variance Between Personal Data from the Combined Groups I and II.	64

CHAPTER I

PROBLEM TO BE INVESTIGATED

Introduction

This study is an investigation of some factors related to academic success in the School of Pharmacy at Southwestern State College, Weatherford, Oklahoma. The primary objective of the study was to select factors that appear to contribute to the successful completion of the pharmacy curriculum and to develop a more effective means of predicting academic success for future pharmacy students. The study was approached from the guidance point of view, with the ultimate aim of aiding in the selection and counseling of pre-pharmacy and pharmacy students at Southwestern State College.

A basic assumption underlying the study was that each student who failed to gain admission to pharmacy school after having entered pre-pharmacy constituted a loss to the individual, the college, and to society, unless the student had transferred to a field more suitable to his abilities and interests. The possibility of loss to the field of pharmacy is a consideration because of the probability of unrecognized potential in many of the candidates for admission to the pharmacy school.

A further assumption is that students in the school of pharmacy at Southwestern are representative of the total pharmacy student population. To justify this assumption, Southwestern's position in

the membership of American Schools of Pharmacy is presented in the following summary.

Background Information About the School of Pharmacy
at Southwestern

The School of Pharmacy was established on the Southwestern campus in 1940, with a dean and faculty of a student body separate from, but affiliated with the college. Each subsequent year the school has grown in enrollment, has added faculty members, and has gained in prestige among colleges of pharmacy. Among the 73 schools of pharmacy in the United States, in 1966 Southwestern State College of Pharmacy ranked number five in enrollment. Among the seventy-three colleges, there is a diversity of college settings. The Administrative structure is similar in nature, but 40 are situated on large campuses of the multiversity, six are very closely affiliated with medical schools or in medical centers of training, 18 are associated with church or other privately governed colleges, and 34 are affiliated with state supported colleges similar to Southwestern.

Accreditation

The Southwestern State College School of Pharmacy is accredited by the American Council on Pharmaceutical Education. The Council is the only academic accrediting agency for the pharmaceutical profession. It is sponsored by the American Pharmaceutical Association, The American Association of Colleges of Pharmacy, the National Association of Boards of Pharmacy, and the American Council on Education.

The purpose of the Council is to advance standards of pharmaceutical education, to describe the characteristics of the educational

institution worthy of public recognition as a School of Pharmacy by prospective students and to provide a list of acceptable schools of pharmacy for use by state boards of pharmaceutical examiners and other interested agencies.

Graduates of the Southwestern State College School of Pharmacy, meeting all other requirements, are permitted to reciprocate their registration in all but four states, and they are eligible to take the licensing examinations in all the States and District of Columbia.

The school of pharmacy is a member of the American Association of Colleges of Pharmacy. This association was organized in 1900, and its purpose is to promote pharmaceutical education and research.

Pharmaceutical Curriculum

In 1952 the American Council on Education directed a Pharmaceutical Survey from which the pharmaceutical curriculum was developed to serve as a guide to colleges in establishing their respective curricula. In all accredited schools this curriculum is still followed quite closely. The curriculum plan recommends 29 technical subjects carrying 145 semester hours of credit, apart from those subjects which deal with the humanities, social studies, and English in the general education of a pharmacist. To maintain its accreditation, Southwestern's School of Pharmacy adheres to the recommended courses of study and offers work leading to a Bachelor of Science degree in five areas of pharmacy. The divisions of pharmacy are: (1) Pharmaceutics (General Pharmacy), (2) Pharmacy Administration (Retail and Hospital Drug Store Management), (3) Pharmaceutical Chemistry, (4) Pharmacognosy (sources of drug material), and (5) Pharmacology (methods of drug administration, study of modifying action and dosage and toxicology).

The majority of Southwestern pharmacy graduates go into retail drug management or hospital pharmacy. Some go to graduate school to pursue a higher degree in their chosen area; while others may go into medical school after obtaining a pharmacy degree. All course work done at Southwestern can be transferred to any other accredited school of pharmacy.

Statement of the Problem

The problem of this study is an investigation of the relationships of certain selected factors to determine which, if any, contribute to the successful completion of the five-year pharmacy curriculum in the school of pharmacy at Southwestern State College.

Procedure

The study has two phases and involves three groups. Group I will involve the 98 male graduates of the classes of 1964 and 1965. Group II will use the 63 male graduates of 1966. Group III includes 100 pre-pharmacy dropouts.

Phase I of the study will use Group I as the criterion group to derive certain statistics. Phase II will use Group II as the validating group to which the derived statistics will be applied. Group III will be compared to Groups I and II, and is a part of Phase I.

In Phase I a study was made of Group I to determine the relationships among selected variables and to determine the relationships between these variables and the criterion, the pharmacy grade point average.

Phase II included preparation of a similar intercorrelation matrix using Group II, with the highest correlation, and the grade point criterion

of success in the professional school of pharmacy. This phase also included the calculation of multiple R's and regression equation. The equation thus derived was submitted to cross-validation by utilizing it to predict the grade point criterion for Group II.

Tables were prepared to show the relationships between each factor and the criterion.

Hypotheses to be Tested

1. There will be no significant relationship between the level of mental ability as determined by a standardized intelligence test and academic success as shown by a grade point average of 2.00 or better on a 4.00 point system in pre-pharmacy curriculum at Southwestern State College.

2. There will be no significant relationship shown between occupation of father of the pre-pharmacy student and the student's academic success in the pre-pharmacy curriculum at Southwestern.

3. There will be no significant relationship of previous work experience in a drug store and the student's academic success as shown by grade point average in pre-pharmacy.

4. There will be no significant relationship between size of high school from which the pre-pharmacy student graduated and the student's pre-pharmacy grade point average.

5. There will be no significant relationship between predictor variables and pre-pharmacy grade point criterion.

6. There will be no significant relationship between predictor variables in Phase I of the study.

7. There will be no significant relationship between the composite score of the Sophomore General Culture Test and academic success as represented by grade point average in pharmacy school.

8. There will be no significant difference in incidence of variant MMPI patterns for those remaining in pre-pharmacy and those dropping out of pre-pharmacy.

9. There will be no significant difference in degree of relationship shown by the following correlation co-efficients:

(a) that based on predictor group (classes of 1964 and 1965) and actual grade point average for the validation group, graduates of the class of 1966.

(b) the multiple R's derived between the predictor and the criterion variable for the study groups.

Purpose of the Study

The purpose of the study was to determine the relationship of the factors mentioned in the hypotheses to academic success in the School of Pharmacy at Southwestern State College, and to report this evidence for possible use in predicting success of future pharmacy students.

Questions inherent in the problem statement and the purpose were:

(1) What was the relationship between each factor and success in pharmacy school? (2) What was the relationship between success in pre-pharmacy and success in the professional school of pharmacy? (3) Did the derived statistics hold for a subsequent validation group? (4) What was the comparison of these relationships?

Need for the Study

Concurrent with the growth of the school of pharmacy at Southwestern, a problem of career counseling has developed with freshmen and sophomores in the pre-pharmacy division. This study was needed to help in the solution of the problems of selection and retention of pre-pharmacy students as well as an aid in the process of counseling with those whose probability of success in pharmacy school appears to be slight. The need for more effective academic advisement and planning is however not necessarily a problem unique to Southwestern, but appears to be a universal need in higher education (17) (32) (47). From much of the research in the past fifty years, the emphasis appears consistently to be placed upon recognizing talents and abilities early in the youth's life and assisting in the utilization of these talents and abilities in appropriate careers (57) (53) (32) (35).

An additional problem of effective guidance at the college level involves among other things, career counseling with freshmen who have entered college with little or no occupational information (35) (32). Losses can accrue to both the student and to the college when the student is on the wrong academic path. Such losses to the student in time, money, and educational growth constitutes one of the major problems to be coped with by college counselors and advisers. Lack of ability for certain types of work as well as a naive attitude toward career choice can account for lack of success for many students. Thus continued educational growth would seem to depend to a great extent upon continued educational and vocational guidance in college. A growing enthusiasm for the professions and especially for pharmacy at

Southwestern makes even more pressing the problem of effective differential guidance and consequent productive student population.

With the social revolution of the 1960's and the accompanying political philosophy of eradicating poverty and caring for the medical needs of the population, pharmacy became a more vital member of the vast medical team. Attractive monetary rewards accompanied by a position of prestige in the nations' communities, are enhancing the study of pharmacy for thousands of college students. With so much to gain for the ones who can succeed in this branch of medical training and education, but so much to lose in terms of a life work it seems an unpardonable waste to allow students to enter the field blindly and without counseling. More adequate data will aid the counseling process.

As Sputnik spurred the educational efforts at all levels in the study of science, mathematics, and technology, so will Medicare and the other congressional acts accelerate advancement in fields of medical education.

At Southwestern State College the school of pharmacy is in a position to advance and to grow with the times. There are students asking for admission from every region of the nation and from a small number of foreign lands. Selection of the ones who seem to have the most potential for successfully completing the course is a serious matter for the pharmacy dean and his faculty selection committee. Counseling with these prospective students at the present time is based on broad general principles and from research done mainly in the field of the medical doctor. Therefore the need for this study is quite real and a practical necessity.

One of the objectives of a study by Black (4) was to determine the relationship between the number of units of high school work and university grades. He found that the relationship between the number of units completed in a particular high school area and successful performance in any given subject matter area was very slight.

The use of entrance examinations alone commonly used for the purpose of determining the ability to do college work have not proved to be satisfactory indicators of success in college. They have proved to be of even less value in helping to determine probability of success in a particular curriculum of a specific college (71).

In 1951, Summers (61) assumed an attitude of defeatism and concluded that a point of no progress in the use of examinations for prognosis had been reached. But at a somewhat later date Morris (43) argued an attitude of defeatism will not solve the problem. If the problem is to be solved, continuous study must be made of all factors, intellectual and others, which are suspected of bearing a relationship to academic success in any curriculum area. If enough studies are done and enough factors are considered, the long-term results will be the discovery of the factors most valuable in helping to determine whether a student has the qualities, both academic and otherwise, which are necessary for success in his chosen college program. It would seem to be just as significant, in the long-term picture, to discover that a certain factor bears no significant relationship to academic success in a program such as mathematics, as it is to discover that a factor bears a significant relationship.

Since the end of World War II college enrollment has increased each year. A good example is the school of pharmacy at Southwestern. In 1945

there were two graduates. In 1966 there were seventy-three. As in other areas of education, federal programs have been initiated by Acts of Congress for education of competent and willing young people in the medical fields. These vastly far-reaching opportunities were innovated without a great deal of research as to particular student characteristics needed for success in specific fields.

Recently Ohvall (45) in his 1962 Wisconsin study found that advances in medical science and changes in the economic and social environment during this century have exerted numerous changes in the practice of the profession of pharmacy:

Inauguration of the five year pharmaceutical curriculum is the most recent significant advance in pharmaceutical education. In some pharmacy schools the format of this extended curriculum requires students to take a sequence of courses which will prepare them for specialized practice in one of the three major fields of the profession; general practice, hospital pharmacy, or industrial pharmacy. Many students in this type curriculum will be unable to make rational choice of a specialized pharmacy field. Faculty counselors have limited means at their disposal to guide these students in their decisions. Consequently many students may study and enter a specialized field of pharmacy by chance or default without prior evaluation of their future compatibility and satisfaction in that particular field of study.

Ohvall (45) indicated further the need for a professional guidance program which would aid the students working with faculty advisers, to select a course of specialized study. A methodological framework was suggested within which certain guidance standards or norms could be developed. These norms would result from quantifications of general mental ability, personality, and vocational interests.

Overview of Remainder of Thesis

The sources of data, the scope and limitations, and a description of test instruments are found in Chapter II. Definition of terms will also be included.

Chapter III will be a review of related literature. There is not an abundance of research reports and studies on pharmacy education. Studies were selected which involved the relationship between the same variables used in this study, or similar ones, and academic success in some areas of the medical field, since pre-pharmacy is quite similar in content to pre-medical degree programs.

Chapter IV will present the data and the analysis of the findings and formulation of a multiple regression equation from which the pharmacy grade point average could be predicted.

Chapter V will summarize the objectives, the findings, and conclusions of this study.

CHAPTER II

SOURCES OF DATA, SCOPE, AND LIMITATIONS

Introduction

The purpose of this chapter is to provide background information about the study, give the sources of data, describe the test instruments used, and define important limitations and the scope of the study.

Selection of Subjects for Study

When the pharmacy curriculum was increased from four to five years this automatically increased the number of students, creating overcrowding in the space available. At about the same time the curriculum was expanded, the demand for pharmacists increased. Each of these problems aggravated the other, pointing a need for a study in the selection and retention. What steps could be taken to select pre-pharmacy students who possessed the greatest potential for completing the five year course was the prevailing question.

To find some answers to this question a study of the men in the first graduating class who had successfully negotiated the five year curriculum seemed a likely place to start. The study was limited to a three year period of time, 1964, 1965, 1966, and was concerned only with the men who graduated during those three years, and those who failed to gain admission to the professional pharmacy school. Women

pharmacy students were excluded from the study because of the insignificant number of women as compared to the men in the pharmacy school.

Selection of Factors for Study

Forty-nine pharmacy seniors graduated in 1964 and sixty-nine finished in 1965. Both classes had completed the five year program. Their pre-pharmacy class groups had numbered approximately 275, thus indicating an attrition rate of approximately 50 per cent.

In choosing factors for study it seemed important to select those which would most likely be related to academic success, since graduation depends upon their attaining at least a 2.00 grade point average in the four point system. The literature furnished many clues as to what factors would most probably bear a significant relationship to success of physicians, chemists or teachers, but no many clues could be found with regard to academic success in pharmacy. (See review of the literature, p. 26.)

The factors chosen for selection criteria in the study were those which appeared to be common to all students who entered the field of medicine or chemistry. The following seemed to be the most promising: mental ability, academic interests and achievement as defined by scores on standardized tests, inventories, and transcripts, achievement in certain academic areas of science, personality characteristics, socio-economic background (father's occupation), size of high school, and job experience in a drug store previous to college entrance.

Sources of Data

To obtain a measure of mental ability, scores on the Otis Mental Abilities Test, Gamma Form A, were used. As was previously mentioned,

all entering freshmen are required to take the Otis test at Southwestern State College, but scores from the freshman year were not used in this study. Rather, seniors were tested at the beginning of their last semester in college since transfer students generally did not have a previous Otis test score on file at Southwestern. The Minnesota Multiphasic Personality Inventory was administered to the seniors to obtain scores on the ten personality traits measured by the inventory. A personal data questionnaire was submitted by each student so that background information such as size of high school, academic interests, father's occupations, and previous work experience could be gathered. A copy of the personal data questionnaire is in the Appendix. Scores on the Sophomore General Culture Test, which is administered to all students completing 45 to 60 college hours at Southwestern, were available in the office of Student Personnel where each student has a cumulative personnel folder. A sample of American College Tests scores was obtained from the personnel files of the Office of the Dean of Students. The ACT scores for all the subjects were not available because at the beginning of the 1964 class in pre-pharmacy, the ACT was not required of all entering freshmen.

Description of Test Instruments

To facilitate understanding of terms used in this study a description of test instruments and norms used seems to be in order at this point. Buros Sixty Mental Measurement Yearbook yielded the following reviews concerning the Otis test:

Lefever (40), in Buros Mental Measurement Yearbook, in 1963 stated

Although several widely used intelligence tests may be regarded as lineal descendants of the Otis Group Intelligence scale, the test in its present form has remained

essentially unchanged since 1920. The Advanced Examination is perhaps the most important pioneer group intelligence test.

Terman (65) had this to say:

The Otis Group Intelligence scale was the first scientifically grounded and satisfactory scale for testing subjects in groups, and it probably comes as near testing raw 'brain power' as any system of tests yet devised. It is a necessity in school, industries, armies, or any other institution in which the mental ability of human beings is a factor for consideration.

In the test manual the Otis Test was described as an instrument devised to measure mental ability--thinking power or the degree of maturity of the mind. The test does not purport to measure mental ability directly, "it is possible only to measure the effect mental ability has had in enabling the pupil to acquire certain knowledge and mental skill (46)." Twenty-five seniors who had taken either the Otis or the MMPI or both five years previously (1961) were selected for a re-test reliability check especially for this study. Results obtained from the second Otis testing correlated .86 with the freshman test scores obtained when the student entered Southwestern. The number is admittedly rather small, but the correlation seems to warrant some measure of safety in using the Otis as a reliable factor in predicting freshmen performance.

In selecting a test instrument from which an assessment of mental ability could be made the Otis was chosen because of (1) its availability and (2) the test scores would be comparable to the freshmen pre-pharmacy advisees who would be entering pharmacy in the future at Southwestern. In this specific situation at Southwestern State College, all students have approximately the same educational opportunities, especially the pre-pharmacy and pharmacy students. It therefore seemed reasonable to assume that a student who could answer test questions on the standardized

Otis test more rapidly and with greater degree of accuracy has greater ability than the one who did not. To this extent the Otis test scores serve as a measure of mental ability of the subjects involved in this study.

The Minnesota Multiphasic Personality Inventory (MMPI) is a psychometric instrument designed ultimately to provide in a single test, scores on most of the more important phases of personality, so viewed by the authors and some researchers (27) (58). The instrument comprises 550 statements covering a wide range of subject matter--from the physical condition to the morale and the social attitudes of the individual being tested.

The subject is asked to sort all the statements into three categories, True, False, and Cannot Say. After the subject has identified all the items he can as (mostly) True or (mostly) False about himself, his responses are counted so as to yield scores on four validity scales somewhat less widely used. Personality characteristics may be assessed on the basis of scores on nine clinical scales originally developed for use with the Inventory. These scales are hypochondrias, depression, hysteria, psychopathic personality, masculinity-femininity, paranoia, psychoasthenia, schizophrenia, and hypomania. The tenth scale developed is designed to measure Social Introversion-Extroversion.

Although the scales have been named according to the abnormal manifestations of the symptomatic complex, they have all been shown to have meaning within the usual normal range (58). In the presentation of results the usual procedure is to translate the raw score into a standard score (the T-score) and plot on a profile chart. This procedure permits

analysis of the relative strengths of the various phases, the pattern which is usually more important than the presence of any one phase to an abnormal degree. The scales were developed by contrasting the normal groups with carefully studied clinical cases of which over 800 were available from the neuropsychiatric division of the University Hospitals when the test was published in 1951.

The data which have been reported on the reliability of the MMPI appear quite satisfactory. Hathaway and McKinley (27) using individual forms with unselected normals reported test-retest coefficients for six of the clinical variables. In the MMPI manual, Cottle, Holzberg, and Alessi (27) reported coefficients which may provide a conservative estimate of the reliability of the MMPI. Additional data on the reliability of the MMPI were obtained by the test-retest method for this study with a five year time lapse between testings. A coefficient correlation for reliability for each scale appeared satisfactory. In the Appendix, Table A of this study, is a report of this additional check on the reliability of the MMPI. Scores on scales appear to vary somewhat, but the basic pattern appears to be quite similar.

As for validity, a high score on a scale has been found to predict positively the corresponding final clinical diagnosis, the presence of the trait to an abnormal degree in the symptomatic picture will nearly always be noted.

The MMPI was selected as one of the testing devices in making comparisons and assessments of students' personalities and potentialities as pharmacy students. Psychometric data may be very useful in counseling. On the other hand such data at times, especially with the MMPI or other personality inventories, may lead to more erroneous than correct

Drake and Oetting (15) make clear their general point of view on the use of psychometric data for counseling purposes: that of the median range between Rogerian and the early Williamson when he felt that counseling came after testing. Super (62) describes the workable practice. Drake and Oetting (15) however, deviate at times from Super's presentation and at other times amplify his position:

We assume that the primary function of counseling is to help the counselee develop a realistic understanding of himself and his relations with the society in which he lives. The counsees dealt with in the educational environment are seldom the extremely disturbed persons found in clinics; for the most part they present the less intense or less crippling problems that are generally characteristic of young people making the transition from late adolescence to adult status. This transition cannot be narrowly defined by age; rather it is that period in the development of the individual when his plans and goals and values are changing from those shaped by transitory interests and fantasies to those determined by more realistic perception of himself and his world.

Some information may be obtained from the person's own statement of feelings and experiences, but other important data cannot be obtained accurately or effectively by this means alone. This is especially true when the data relates to the individual's status within a group. He may feel he is quite competent in certain respects and make plans for a program of action based on these perceptions. However, unless he has some indication of his relative competence, of how he ranks among those with whom he will compete, he will be unable to forecast the outcome of his program with much assurance.

The problem of predicting relatively rare events in a person's life (becoming a pharmacist, an M.D. or a criminal are rare events when considering the total population) is one that must be kept constantly in mind in personality assessment or measurement. A large number of possible interpretations can be made from a profile of the results of a personality inventory. Predictions might be made in regard to criminal tendencies, suicide, psychotic behavior, homosexual behavior, or more common characteristics that can interfere with an effective social or education adjustment such as sibling conflict and anxieties.

Predictions made from personality inventories can be more often incorrect than correct in an individual case, but comparisons of the

accuracy of predictions based on clinical judgments with that of predictions based on psychometric data have found that psychometric data-based predictions are generally more accurate than predictions based on clinical judgment.

The Sophomore General Culture Test is designed to provide a measure of general background in five important areas of the college curriculum: social studies, literature, science, mathematics, fine arts. Emphasis has been placed on the understanding of important basic concepts and the application of this understanding in the solution of specific problems. Knowledge of isolated subject matter has been confined as much as possible to those facts which are recognized as being sufficiently important to warrant such consideration.

The test covers that portion of each area commonly included in the first two years of college. Therefore, it is most appropriately used near the close of the sophomore level.

Use of the test results in identifying unusual strengths and weaknesses provides help in two types of guidance situations. Where the student has an opportunity for choosing elective courses during his last two years the test results may emphasize the desirability of selecting certain electives rather than others in order to achieve a well-rounded college education. To the extent that success in doing advanced work in a given field is related to one's level of achievement, the test results can assist students in selecting a major field of study for their last two or three years of college work.

Since there are certain skills, understandings, and attitudes which do not readily lend themselves to paper and pencil testing, this test

has its limitation. These tests must be regarded as collections of work samples (items) concerned with some of the important testable abilities which the student might be expected to have acquired.

The American College Test (ACT) is best described in the ACT Program's Technical Report of 1961. The ACT is a battery of tests composed of four tests of educational development and academic potential, a set of self-reported high school grades, and a student information blank. The tests and grade reports provide information on the student's potential for academic achievement in various areas: (1) English usage, (2) mathematics usage, (3) social studies reading, (4) natural science reading.

From the Technical Report (1) the tests are described as follows:

English Usage examination is an 80-item, 50-minute test that measures the student's understanding and use of the basic elements in correct and effective writing.

The Mathematics Usage tests is a 40-item, 50-minute examination of the student's mathematical reasoning ability. This test emphasized the solution of practical quantitative problems which are encountered in many college curricula. It samples mathematical techniques covered in high school courses.

The Social Studies Reading examination is a 52-item, 40-minute test that measures the evaluative reasoning and problem-solving skills required in the social studies. It measures the student's comprehension of reading passages taken from typical social studies materials. It also contains a few items that test his understanding of basic concepts, knowledge of special study skills needed in college work in the social studies.

The Natural Science Reading examination is a 52-item, 40-minute test that measures the critical reasoning and problem solving skills required in the natural sciences. Emphasis is placed on the formulation and testing of hypotheses and the evaluation of reports of scientific experiments.

According to the American College Testing Program their primary aim is to transmit information that is especially relevant to the student, high school, and his college during the transition from secondary to higher education.

The principal functions and goals of the ACT student assessment program are:

to provide estimates of a student's academic and non-academic potentials which will be useful in the admissions process.

to provide dependable and comparable information for pre-college counseling in high schools and for on-campus educational guidance.

to help students present themselves as persons with individual patterns of educational potentials and needs.

to help colleges place freshmen in appropriate class sections in the introductory courses such as English and mathematics.

to help colleges identify students who would profit from special programs such as honors, independent study, and remedial programs.

to help colleges estimate whether a student should be considered for advanced placement by means of advanced placement tests.

The fundamental idea underlying development of the four tests is that the best way to predict success in college is to measure as directly as possible the abilities the student will have to apply in

his college work and tasks presented in the tests must be representative of scholastic tasks.

In the Sixty Mental Measurement Yearbook, Buros (7) is in general agreement with the philosophy expressed in the "Rationale of the ACT Tests" reported in the ACT Technical Report of 1961 in which it was argued that "what really matters in determining college success is not so much what specific skills and knowledges the student has mastered independently, but rather how well he can use all of them--in proper combination--in an integrated attack upon complicated problems." The report further emphasized the point, "nearly all of the most widely accepted tests used to predict academic success consist in large part of this kind of exercise: Comprehensive reading passages and functional and practical problems involving complex arithmetic reasoning."

Whether or not the tests should be classified as measures of achievement, aptitude, or developed ability now becomes mainly an academic question. In terms of construction, the tests might best be regarded as simply measures of academic potential which rely partly on a student's innate abilities and partly on his current knowledge, but which emphasize his ability to use both.

The Composite score is an average of the four test scores. David V. Tiedeman (1) reviewing the ACT program, supported the Technical Report's claim for validity of the ACT test battery:

Logically, the claim for the validity of the ACT Examination rests on the correspondence of the tasks it requires and the tasks required for accomplishment in college. There is little doubt in my mind that the ACT Examination requires the exercise of reason in the several media in which the understanding of knowledge is founded. I therefore, think that the Composite score in the ACT Examination provides a good indication of scholastic aptitude for college work as is claimed. It seems fair to say that the ACT Program

provides indices of relevance to the selection of applicants for admission to college which equal, and may even slightly excel, the best.

Personal Data Questionnaire. A one-page set of questions about the student's previous school and home environment. From this set of questions the writer got such information as occupation of father, size of high school, student's age, marital status, academic interest, hobbies, and motivation for entering and completing pharmacy school.

Scope and Limitation of the Study

This study was begun for the purpose of collecting data which might be useful in counseling with pre-pharmacy freshmen at Southwestern State College. However, it was not proposed that research done for this particular study would establish a complete and final answer to questions which needed answers. The study is limited in its scope and coverage and for this reason cannot do more than assist advisers and counselors in their work with the beginning student at Southwestern State College.

The general problem outline, a study of relationships of certain factors which appear to be common to successful students in the Southwestern School of Pharmacy was studied in a specific situation. Success here is defined as graduation from college of pharmacy. The groups of students on which this study was based attended Southwestern School of Pharmacy for three years, but all of them did not do their pre-pharmacy at Southwestern.

Even though the groups studied represent the population of graduating seniors rather than a representative sample, it does not include the total population of the pharmacy school. Furthermore, these students

represent only one pharmacy school; therefore, statistical inference on the basis of the results of this study must be made with caution.

No claim of general application is made for this research, since the problem was not studied universally, although there is some evidence presented in Chapter I to support the theory that Southwestern students are generally representative of pharmacy undergraduates in this country. Through the Southwestern School of Pharmacy, however, this research may contribute to the solution of a college-wide problem of admissions-counseling.

This specific study of a universal problem could lead to further research and follow-up studies of a similar nature in other situations. There is an important limitation inherent in any study which attempts to predict behavior or probably academic achievement of an individual. Probabilities are based on group performance and not on specific scores for particular individuals. Insurance companies base their premium costs on the same basis and do a billion dollar business. The individual is not "lost" in the prediction of educational studies. When applied administratively the probability that a student's grade will fall within a certain range is just as valid as the prediction that a person will live to a specified age-range.

Keeping in mind the fact that there is no way to predict an individual's grade precisely, the proportion of the students who fall into the successful and unsuccessful groups can be predicted with a high degree of accuracy. Whether an individual will fall into the successful or unsuccessful portion of the group cannot be foretold with precision, but the individual student can assess his chances of success and enroll in a certain curriculum when he has some knowledge of himself and the

group to which he aspires. Knowing what the standards are and what his capabilities are, the student can proceed with some confidence toward a realistic academic and professional goal.

CHAPTER III

RELATED STUDIES

In the introductory chapter it was stated that the main concern of this study was with relationships between certain factors and the successful completion of pre-pharmacy and ultimately graduation from the professional school of pharmacy at Southwestern State College. One of the possible outcomes was the formulation of a regression equation for the purpose of predicting academic success in pharmacy.

Prediction studies of junior college success in pre-pharmacy are useful in this study because the curricula is science oriented as compared to other orientation in general junior college areas. In reviewing the literature for studies with similar objectives it was found there were hundreds of studies of prediction of academic success generally, but predictive studies of pharmacy students apparently are not being published. However, factors related to achievement in pharmacy school will necessarily be related to "academic success" of a general nature because the pre-pharmacy curricula includes general college courses in addition to the science areas prescribed. In pre-pharmacy the curriculum content is closely allied to and during some semesters, is identical to the pre-medical curricula; therefore, studies involving predictions of success in medical school, medical practice, pharmacy retailing, and other fields were reported. Many of the studies presented interesting

and valuable information concerning personality factors as measured specifically by the MMPI and the Edwards Personal Preference (EPP) Inventory and their relationship to academic success in college. Studies of this nature will be reported in this chapter.

Vineyard (70) found in research at OSU that almost every type of measurable variable which has the appearance of being at all relevant has been studied for its bearing upon school success. A great many of these variables have been shown to have some relationship to academic success, but very few have been demonstrated to have sufficient relationship to be of predictive value.

In 1949, Garrett (21) reviewed one hundred ninety-four studies related to scholastic success at the college level. He found that measures having the greatest predictive value were, in descending order of correlation, high school scholarship, general achievement tests, general college aptitude tests, and special aptitude tests. Thus certain variables have been found to be more pertinent than others for prediction of academic success in college.

Specific research studies made by the American College Test organization on prediction of academic success and personal involvement in college activities at Southwestern State College were reviewed. Consideration was given studies of areas outside pre-college scholastic achievement involving the relationship of the student's socio-economic status and later success in pharmacy. Studies concerning group intelligence tests, general achievement tests, the high school records, general college admissions requirements and problems, particularly those involving admission to medical school and related medical fields were read.

High School Records

There is some controversy about the validity of high school marks, but many investigators report that high school marks generally provide a more accurate basis for the prediction of college scholarship than do intelligence tests and other measures of ability.

Travers (67) related an opinion as to why high school marks generally are bound to be superior predictors:

High school and college averages are more closely correlated than is either with test scores. For the prediction of second semester grades, the first semester grades are by far the best criterion. The value of high school grades for predictive purposes is undoubtedly a result of the fact that they represent a combination of ability and motivational factors operating in college. The advantage of these circumstances seem to outweigh the factors that tend to reduce the validity of high school grades.

Garrett's (21) review also covers some twenty-six studies relating rank in the high school graduating class to college success. The range of correlation coefficients is from .26 to .72 with a median coefficient of .55. Segal's (56) summary of studies of correlation between colleges scholarship and average high school marks gave a median coefficient of .55 which was .11 higher than the median coefficient between intelligence, test scores, and college scholarship.

College Admissions

At the present time all colleges in Oklahoma require an ACT standard score of 12 or better for Oklahoma and 16 or better for out-of-state students, or evidence of class rank above the base quartile for Oklahomans and rank above the class median for out-of-staters; or a transcript showing a "C" average for Oklahomans and the same for out-of-state students. This admission requirement is of recent origin and for all

previous years state supported colleges in Oklahoma required the presentation of a diploma from an accredited high school as the only entrance requirement. The assumption was that the course of study in high school automatically prepared the student for college. There were and still are "college preparatory courses" in many public high schools in Oklahoma. In speaking of such courses, Seyfort (53) commented, "The courses themselves may be very much worthwhile, but as true and valid preparation for college, they are notorious for shooting rather wide of the mark."

Douglas (13) (14) was quite positive in regard to patterns of prescribed courses for high school students headed for college:

Not only do the results of this study indicate that such entrance requirements contribute practically nothing to the differentiation of good from poor student risks in college, but all other studies of a similar nature agree in this respect. In fact, no record can be found by any thorough-going objective investigation ever conducted which affords any rational support for the practice of conditioning general admission to the university upon the completion of prescribed units of certain favored fields.

Recently Palmer (47) said that during the decades preceding World War II with occasional severe distortions introduced by wars and depressions, the prevailing admissions system served their respective colleges quite well by supplying them with approximately the number of qualified applicants needed to fill their classrooms and dormitories. During the 1920's and the 1930's, even the most selective colleges had a relatively small average of qualified candidates and ordinarily rejected fewer than 20 per cent of those seeking admission.

After the full force of the G. I. Bill had raised the American aspiration and capacity to pay for higher education to a new plateau,

this rough balance between candidates and available places in class was replaced by what seemed to be a permanent shortage of desired educational opportunities.

American commitment to "education for all the children of all the people" is so strong and so deeply fundamental that gradually public support for all phases of education including higher education is increasing and will in time meet the demand of the post war generation.

The Educational Policies Commission (17) summarizes its positive position in this statement:

Unless opportunity for education beyond the high school can be made available to all, while at the same time increases the effectiveness of the elementary and secondary schools, the American promise of individual dignity and freedom cannot be extended to all. Increasingly those persons who establish for themselves a life of independent dignity are those whose minds have been developed by such education. In the future, the important question needs to be not "Who deserves to be admitted?" but "Whom can the society, in conscience and self-interest, exclude?"

Palmer (47) noted the similarity of the current efforts to develop an appropriate technology of guidance for college admissions to the problem of allocating scarce jobs during the depression years by measuring and categorizing human traits so that there could be a matching of men and jobs:

When jobs are scarce, it is exceedingly important that the right man be placed in the right job; when places in college are scarce, it is exceedingly important that the right boy or girl enter the total appropriate school and that merit shall be deserved.

The statistically adjusted blend of secondary school records and test scores of the academic prediction formula embodies this concept of social justice and social efficiency deriving from a process whose controlling principle is merit. The prediction of academic success has a long history. When used carefully

with adequate research and constant adjustment, statistical prediction has proved sufficiently better than random selection or than even the most sensitive clinical or artistic selection, to warrant continued use, but, when it has been employed extensively a plateau of effectiveness is soon reached where no amount of tinkering seems to improve the power of the formula. Recently some studies by Dr. Benjamin Bloom of the University of Chicago seemed to suggest that correlations would rise if all the grades from the secondary schools and the colleges were adjusted to a common standard.

Bloom's (5) technique when applied to field trials failed to replicate his previous success. A most useful by-product of Bloom's exploration of the possibilities in central prediction has been the incorporation of prediction data into the regular materials of pre-college guidance. It will not be long before secondary schools will be provided with the numbers and the statistical technology to forecast for themselves the probable academic success of their candidates at a broad range of colleges and universities.

Palmer again (47) stated further that, ". . . in spite of all the books hostile to testing, the public has more confidence in a selection process that uses both tests and school achievement. The tests introduce an equalizer the public recognizes as related to merit."

Turnbull (68) in this same vein concluded that intelligence test scores are fair to all socio-economic groups as to ability in school as now organized. Any unfairness to lower economic classes is in school and society, not in the tests, he said.

While the college admissions world is marred by cynical exploitation of applicants' natural rights and by the surviving freebooters in some college admissions offices, the most important developments of the past decade are the gradual professionalization of the entire admissions process and the emergence of a code of ethics, formal and informal (63).

There seems to be a consensus (63) (23) that the solution to many of the problems that have bedeviled entrance into college will be found in the incorporation of admissions within the aggregate of the educational practice that we have come to call guidance. They insist that once the college admissions officer and the high school counselor acknowledge a common professional allegiance, emerge from a unified program of graduate work, share membership in the same professional (as well as associational) organizations, legislated codes of behavior will be absorbed into a larger agreement among colleagues.

Harold Taylor's (63) concern with admissions policies generally and their relationship to the National Purpose argues that if in a democracy the educational system should be designed to release the talents of each person born to that society, then the educational system must not be allowed to serve just those national goals currently dominant in the public mind. The goal of education, he says, must be to act as an instrument of social change, not as an instrument of social adaptation. He argues further:

The problems of the 30's never did disappear. They were simply sidetracked while we won the war and were then pushed under the rug during the period of what we call the growth into affluence of American society. They have now emerged again because of the Negro protest movement has pushed them before us.

The protests, he says, are on the way to making America politically and socially honest again. The protests have raised the question not only of the Negroes rights, but of everybody's rights. Certain key issues have become visible which were invisible during the 1950's. . .

Continuing, Taylor (63) said,

We have developed what amounts to a chasm between the students and the faculty by allowing our national goals,

(defense and military security) to intrude themselves on the system of higher education by distracting the scholars from what seemed to be the true function of a scholar--to teach and to develop new knowledge which one then shares with the next generation coming to college. The effect of government and industry contracts for space technology, science, and for military strategy has been to deflect the interests of the administration and the faculty from the students themselves.

Max Wise (75) contends that the major current effort to extend educational opportunity is focused on the Negro . . . for example, Antioch College recently announced with support of major foundation, a program initiated in the fall of 1964 which identified potentially able Negroes for admission to that college.

However much sensitivity has increased, the problem of unequal educational opportunity has also increased. The sheer pressure of numbers of applicants and the urge to upgrade our colleges has complicated the problem. Within the past decade a sizable number of colleges and universities have initiated much more rigorous selection programs for new students. Public colleges have found that they must do this with extreme care in order to avoid adverse public criticism. They have, therefore, increasingly turned to using scholastic aptitude test scores and high school performance data as exclusive indices for selection. One result of the use of such indices is to reduce the chances of admission for youth from deprived social and economic backgrounds (75).

In granting funds for scholarships, loans, and buildings, the federal government is trying to correct the situation abhorred by Taylor and Wise (63) (75). At Southwestern State College money is available for assisting students through the school of pharmacy and

other curricula as well. There can be no discrimination in admissions, housing, or in any other school policy because of ethnic background.

During the past twenty years emphasis on more realistic admissions requirements has been building up. Wolfenden (76) in 1951 said that the first criterion for college entrance must be academic performance and promise.

Intelligence Tests as Predictors of Academic Success

In 1937, Harris (26) reviewed academic predictions to that point and found that although a great variety of interest and personality measures had been applied to the prediction of academic performance, none improved to any useful extent that accuracy yielded by pairing a test of intelligence with a measure of past academic achievement.

From 1929 through the early '50's, hundreds of research studies were made of intelligence tests as predictors of academic success in college. Actually few problems in education or psychology have received as much attention as that of the relation of intelligence or scholastic aptitude to college achievement. Summaries by Segal (56), Garrett (21) and Durflinger (16) found a range of coefficients from .21 to .67 with a median coefficient of .47. Complete citations of tabular references may be found in the bibliography.

In 1951, the Kelly and Fiske (38) study of graduate students in clinical psychology showed unmistakably that the Miller Analogy Test (MAT) was an accurate forecaster of professional performance. In 1959 however, Kelly (38) did a follow-up study when more dependable and long range criteria were made available with the criterion of

"academic achievement" . . . essentially the attainment vs. non-attainment of the Ph.D. degree--the median coefficient for the MAT was $+.16$. Against the combined criterion of academic success plus satisfaction with the choice of clinical psychology the median coefficient for the MAT was only $+.10$.

Gough (23) asked what about the selection for medical training where the Medical College Admissions Test (MCAT) has been used for so many years. From a comprehensive survey of research with the MCAT he learned that this test does a poor job of differentiating between graduates and dropouts, and that its correlations with scholastic achievement in medical school decline from a typical coefficient of $+.18$ with first year grades to a $+.07$ with fourth year grades. Holt and Luborsky in the Holland and Richards study (30) reported similar findings in their study of psychiatric residents; the Wachsler-Bellevue scores correlated $+.27$ with the criterion.

Buros (7) in the sixth edition of the Mental Measurement Year-book commented about the aptitude tests of the Graduate Record Examination:

Validities are not available in the manual. They would, perhaps, be superfluous since the pattern of validities of this test should be highly predictable; at any rate, validity figures should be about the same as those obtained with any similar test commonly used at the graduate school level.

Gough (23) asked the question, "What intrinsically is wrong in the aptitude testing domain? What is wrong with these tests?"

Answering his own question, from his studies on creativity, he suggested three limitations of aptitude tests:

1. Over-emphasis on convergent thinking and under-emphasis on divergent thinking.

2. A second problem is found in methodologism in which compulsive attention to inner order factorial purity, and psychometric "small-d" tends to obscure the operational obligation of the aptitude test, which is to forecast the kind of behavior and achievement that the training program seeks to produce.
3. An over emphasis of problem-solving at the expense of problem-defining. Tests should also call upon the ability to define problems, to appraise and evaluate the "givens" of a particular situation.

Nearly everyone in counseling and guidance or personnel testing will agree that "motivational" or "personality" or "interest" testing can add appreciably to an understanding of the individual.

General Achievement and Educational Development Tests

Findings from several studies made in the early '40's were fairly consistent in placing general achievement tests next to high school scholarship as a satisfactory basis for predicting college scholarship (13) (16) (19).

General achievement tests will test more than student recall of facts or problem-solving abilities. The general opinion (21) (1) (9) (14) of achievement testing seems to be that broad areas of learning are evaluated as well as specific skills and knowledge. Memory, perception, reasoning, and individual personality patterns of response are indirectly tested in a comprehensive battery of achievement tests such as ACT and the Cooperative General Culture Test. Segal (56) grouping the results of many studies, reported a median correlation

of .54 between general achievement test results and college scholarship. Durflinger's summary showed a median correlation of .48. More recently, since the accumulation of new data through the ACT program, studies have provided researchers with wider perspectives and deeper insights into the problems of predicting student behavior.

Multiple Variables as Predictors of Academic or Professional Success

Holland and Richards (29) investigating the relationship between academic and non-academic accomplishment were interested in finding if there was any correlation between the two factors. In the past five years, the study of effective performancy in schools and colleges, extra-curricular activities and vocation has produced many findings which suggest that academic success and measures of academic potential have little relationship to effective performance outside the classroom.

Holland and Richards (29) found that academic potential appears to be only one of several relatively independent dimensions of talent and should be used with discrimination rather than as a panacea. Their study supported the theory that other independent measures of achievement and originality should be developed. Measures of academic potential are among the chief methods used to determine admission of students to college. Thus a most significant implication of Holland and Richards findings is that the emphasis in colleges and universities on academic potential has led to neglect of other equally important talents. Price, et al (50) were much concerned with the limited scope of admissions officers generally:

If academic talent had a substantial relation with vocational and other classroom achievement, then this intense pervasive, concern with academic potential would be less disturbing. Unfortunately college grades are generally poor predictors of real-life success and are at best inefficient predictors.

Put another way, Price et al (50) said that these findings imply a need to examine grading practices, since a college education should be largely a preparation for life, both in the community and in a vocation. He continued his thesis by saying that under current grading practices, a college education is mainly preparation for more education in graduate school.

At Southwestern State College a study was made in 1959 (69) of the need structures of teacher education students and pharmacy students both in their first year of their professional programs. Using the Edwards Personal Preference Inventory which purported to measure fifteen basic needs, only one significant difference was obtained and that was in the need of teachers to be intrceptive. Intrception is defined by the authors as something of a cross between introspectiveness and empathy. It involves behavior of others. Of interest in this study were the several significant differences in variability found between the two groups.

Pharmacy students were significantly more variable than students in teacher education in their need for order. The fact that no significant differences were found in these traits, but significant differences were obtained in variability may be important. It may well have resulted because these needs were present to a high degree in some of the more variable groups and not in

others, which in turn supports the premise that given occupational choices may serve different needs for different individuals.

Many of the studies of factors related to levels of academic achievement have been concerned with emotional factors. Although findings are conflicting, there seems to be considerable evidence that a relationship does exist. Kleinmuntz (39) contended that students with emotional problems had more academic difficulty, but found that their scholarship sometime improved with treatment. Hackett (24) is of the opinion that "academic achievement is one of the by-products of the socialization process." Thus, the level of academic achievement is the result of the way in which the student views his world and interacts with it. Jackson and Getzels (37) conclude that:

Dissatisfaction with school appears to be a part of a larger picture of psychological discontent rather than a direct reflection of inefficient functioning in the classroom.

In other words, the disturbed student concentrates on his problem instead of his studies. Gallagher (20) believes that emotions are related to academic success and that those who fail in spite of ability generally had poor relationships with their parents, and unresolved conflicts, and had poor early school impressions. He also stated that many students of high ability withdraw from school or graduate with low grades because of emotional problems. He characterized the low achieving gifted students as being rebellious and resistant. Contrasting the gifted students who were honor students, he characterized them as tending to "be compulsive, driven people, with few or no satisfactory interpersonal relationships."

Stagner (55) found from his review of the literature in 1933 that only negligible relationships exist between measures of personality and academic achievement although emotionally disturbed students do less well than stable students. Frederikson (19) claims that we have little systematic information of the relationship between personality characteristics and academic success.

Increasingly there is the tendency to study personality traits as contributing factors in scholastic achievement or failure. Miller and Heathers (42) studied the relationship of the MMPI. Those who have accepted either a dominant, strong role or a more conforming, follower role in interpersonal relationships on the EPP shows the relative weight a person gives to various personal needs and the MMPI the degree of response similarity to well defined clinical groups.

College counselors and other personnel workers constantly are facing the problem of the student who does not have the ability to succeed in college. It is difficult to say what part of the student's failure may be attributed to intellectual factors and what part to personality traits. Although much improvement has been made in the area of scholastic aptitude tests and other intellectual measures, perfect predictors of academic success have not been developed. Jensen (36) studying achievers and non-achievers found the most obvious trend was for non-achievers of low scholastic ability consistently to obtain higher scores on the MMPI scales than the achieving students of high scholastic ability. One conclusion of his study supported findings of Terman, Brown, Hinkelman and others (36); all have a tendency to show that scholastic ability favors adjustment while low ability obstructs it.

Terman (65) noted that:

On the average, those of highest IQ accomplish more and are equally well-adjusted, but one cannot anywhere draw an arbitrary IQ line that will set off potential genius from relative mediocrity.

Fisher (18) in his concept of the "twisted pear" and prediction of behavior found as Cronbach and Glesser (10) found that the predictor becomes decreasingly predictive of the criterion as the scores obtained increase from the "poor" to "good" extremes of the predictor. Danskin (12) in his studies of the sociological aspects of specific occupations said contributed this viewpoint:

There is a conflict of loyalties among first year students in pharmacy. On the one hand, they see themselves as part of the medical scientific group; and on the other, they see pharmacy as a business venture. The direction they will go--professional or business--is somewhat related to socio-economic status. Those from families of low income have fewer loyalties to business, but they are also the ones who are more likely to be excluded from additional professional training.

Braucher and Evanson (6) investigating the relationship between physical and social factors as they related to success in retail pharmacy found that the occupational skill level of the fathers of pharmacy graduates used in the study showed a negative correlation of $-.16$ with the tenure (management of pharmacy shop) of the graduates. The negative correlation with the tenure score was significant indicating that the higher the father's skill level, the shorter the job tenure for the pharmacy graduate. In addition, the fathers' skill levels showed negative correlations with nine of the ten management evaluation factors used in the study. The lone positive correlation was with address and manner. The fact that there was one significant negative correlation plus an almost complete set of other negative suggests that if there is not a

relationship, there is at least a trend toward the situation whereby graduates from lower skill level homes have better chances of success in retail pharmacy management than those from higher skill level homes.

The factor of college grades and their relation to success in chosen fields following graduation has been studied by many investigators. Husband in the Dartmouth study (24) on relationships of grades and business success found that trends appeared only at the extremes. The one lowest grade point interval had a median income of \$10,625. The highest grade point average had a median income of more than \$20,000.

A different conclusion was reached by Haverman and West (28) who analyzed a survey of 9,064 college graduates which was made by TIME magazine. They reached the following conclusion:

For all practical purposes, and thinking only of income, the man who plans to enter the business world can well argue that grades mean nothing at all. The college diploma . . . has a great financial value in business as well as in other fields. But a degree summa cum laude is not much more valuable than a degree that was in jeopardy until the last examination grade was in.

In Braucher's study (6) he found that no significant relationship existed between academic achievement in the areas of pharmaceutical chemistry, biological science, psychology, and sociology and success in community pharmacy management. However, Braucher made no attempt to evaluate the academic record in its relationship to the performance of the professional pharmacist as a professional man in the medical field of drugs and medicines.

Philip B. Price, an M. D. in collaboration with Taylor, Richards, and Jacobson, (50), all Ph. D.'s did a two phase investigation of preformancy of physicians in practice and a search for reliable predictors

of post-graduation achievement predictors that could be useful in better selection of students to enter and graduate from medical school. Their study included an over-all pool of about 500 physicians including many types of practice, all age groups, various sorts of social, economic and professional environments, and products of many different medical schools and hospital training backgrounds. Among factors studied was the revalency of scholastic records in college and medical school. From the results of their study it was clearly demonstrated that performancy in formal education, as measured by grade point average, came out as a factor almost completely independent of all the factors having to do with performance as a physician.

Specifically . . . When the 849 intercorrelations were viewed across the three measures of academic performance (grade point average in college, grade point average during the first two years in medical school, and grade point average during the last two years in medical school) and the 77 measures of an on-the-job performancy in practice, it was found that 97% of those intercorrelations were of a zero-order magnitude to indicate any significant relationship between undergraduate grades and physician performance, and more of those were negative than positive (50).

Dr. Price (50) found these results to be somewhat shocking since he has spent his professional life selecting applicants for admission to medical school, and in teaching and grading students after admission.

His strong suspicion that grades have been weighed much too heavily in predicting performance in medical school and after graduation from medical school was what lead to the initiation to his whole study. When his suspicion was so forcefully supported he began to question the adequacy of some of the traditional admissions policies as well as the reliability of conventional grades as a measure of progress of the student during his medical course, or as the sole criterion for promotion, or as a dependable predictor of future success in practice.

In discussion with the authors of the study just reviewed, Dr. George Saslow of the University of Oregon asked Dr. Price (50) the following questions:

Let us suppose that the current agitation in many medical schools, including your own, to improve the grading system, is affected by what you have in mind. I think it would be. Suppose one of us had the power to start off a new medical school with faculty willing to listen to data like this. In what directions would you suggest that we look in order to make predictions about the kind of doctors that we need.

Answering the Oregon educator, Dr. Price (50) replied:

The impression has grown on me more and more that since conventional grades and other measures used have been over-weighed, difficult as it is, we are going to be forced to pay attention to other qualities than those which grades reflect; qualities of character and personality, qualities of behavior, or relationships to people, of matters of dedication and integrity . . . These may be the most important factors and it may well be that they can be determined to some extent in medical students.

Dr. Taylor (50) in the same discussion added that:

Another area in which research has been done is communication abilities. . . Our best single device for predicting on-the-job performancy of 2,000 scientists is a well-constructed biographical inventory.

Dr. John Coughy of Western Reserve University (50) in speaking of the increasing number of applicants for admission to medical schools stated that the general tendency of admissions officers in medical schools will be to put increasing emphasis on test scores and grades and that the cut-off levels of both MCAT scores and college grades will rise progressively.

His concern was whether a dependence on this one type of criterion is going to keep out of medical education a type of student who would become an important member of the medical profession but who would not qualify for admission under these conditions.

Dr. Coughy (50) strongly recommended research on the definition of criteria other than grade averages and test scores which might be used for admission to medical school.

Summary of Related Studies

In this chapter the literature was reviewed and selected studies were specifically reported. Attention was given (1) to various types of studies and the extensiveness of the work done in the area of prediction of academic success in college, (2) to studies of college admission as they related to high school background, entrance examination, achievement and placement tests, (3) to selected studies in the field of medical education and the relationship of undergraduate grades to medical practice (in medicine and pharmacy), (4) to opinions and reactions of certain medical educators and deans to the selected studies, and (5) to studies involving personality factors and their possible relationship to success in college.

CHAPTER IV

PRESENTATION OF DATA AND ANALYSIS OF RESULTS

Introduction

As described in the previous chapter, this study is composed of three parts, grouped into two phases. In the first phase the data for Group I were used to determine the variable of most value in predicting the total grade point average of students at the termination of the professional pharmacy curriculum. The data for this first phase of the study were collected for students graduating during the years of 1964 and 1965.

The objective of the second phase of this study was to apply the multiple regression equations developed in phase one of the study to a validation group to determine the effectiveness of the criteria in predicting the total grade point average of students at the completion of the professional pharmacy curriculum. The students for this phase of the study completed their undergraduate degree in pharmacy in 1966.

The third part of this study was to examine specifically, data from the MMPI for dropouts who entered the pre-pharmacy curriculum during the years 1959, 1960, and 1961, which were the same years students used in this study were in pre-pharmacy. Data obtained from thirty-seven profiles were used to compare scores on the personality inventory of dropouts with those who succeeded in completing their pharmacy degree.

TABLE I
 BASIC INTERCORRELATION MATRIX DERIVED FROM DATA
 ON GROUP I: PHARMACY SENIORS, 1964-1965

Factors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Means	2.40	2.60	16	22	19	21	19	34	17	42	27	25	143	111	13	18	21	22	24	09	26	24	20	24
Sigmas	.49	.44	5.84	4.32	4.36	3.11	3.89	7.51	5.52	7.87	8.50	6.31	21.8	8.24	3.46	4.36	4.31	3.82	3.80	2.74	5.29	5.35	4.26	9.50
1. Pre-Pharmacy GPA		.66	.65	-.18	.56	.30	.48	.28	.00	.42	-.24	-.04	.34	.33	.08	.12	.16	.01	.16	.09	-.04	.12	-.03	.11
2. Pharm. GPA			.37	-.10	.74	.34	.52	.29	-.09	.29	.16	-.06	.26	.29	.01	.12	.01	-.01	.15	.17	-.01	.07	-.06	.22
3. ACT English				.26	.78	.08	.78	.48	.31	.29	.36	.05	.40	.39	.32	.37	.37	.01	.61	.47	.37	.49	.45	.24
4. Mathematics					.34	.65	.64	.74	.37	.53	.62	.19	.60	.42	.26	-.35	-.12	.32	.40	.55	.31	.47	.06	.19
5. Social Studies						.48	.91	.17	.23	-.09	.10	-.10	.12	.64	-.04	.44	.00	.36	.56	.52	.64	.49	.49	.47
6. Natural Science							.64	.12	.04	-.06	.19	-.28	-.01	.29	.15	-.13	-.03	.42	.18	.47	.27	.14	-.12	.20
7. Composite								.46	.34	.24	.40	-.07	.37	.60	.22	.19	.13	.40	.66	.61	.56	.55	.42	.33
8. Soph. Gen. Cult.: SS									.04	.55	.29	.28	.77	.37	-.10	-.17	-.10	-.04	.15	-.03	-.19	-.11	-.23	.01
9. Lit.										.20	.13	.21	.38	.04	-.08	.00	.03	-.03	-.16	.25	-.07	-.02	-.10	-.07
10. Science											.38	.06	.74	.41	-.10	-.09	.02	-.04	.11	.10	-.20	-.21	-.06	-.09
11. Math												-.10	.64	.45	.08	.02	.10	-.10	-.01	-.10	-.16	-.05	.01	.01
12. Fine Arts													.40	-.15	-.17	.04	-.01	.00	.20	.02	-.02	-.03	-.07	-.06
13. Composite														.42	-.08	.08	.03	-.06	.18	-.04	-.20	-.14	-.06	-.03
14. Otis															.01	-.07	-.08	.04	.13	-.10	-.12	.03	.05	-.04
15. MMPI-Hs																.19	.52	.11	.11	.23	.30	.33	.10	.01
16. D																	.22	.08	.32	.21	.33	.17	-.19	.55
17. Hy																		.27	.18	.23	.08	.09	.00	-.14
18. Pd																			.29	.29	.24	.33	.37	-.16
19. Mf																				.27	.35	.38	-.10	.22
20. Pa																					.23	.31	.06	.11
21. Pt																						.72	.18	.38
22. Sc																							.25	.30
23. Ma																								-.31
24. Si																								

In Chapter IV data for each phase of the study will be presented with analysis and discussion.

Phase I: Development of Regression Equations

Basic to all future calculations and comparisons in the study was the intercorrelation matrix obtained from data on Group I. Zero order correlations were computed between all factors involved in the study, and Table I presents these data from which the best predictors for pharmacy success were eventually chosen. The highest correlation occurred between pre-pharmacy and pharmacy grade point averages, with an r of .66. This relationship might be anticipated since many pre-pharmacy courses are direct pre-requisites in a prescribed sequence of courses continued in pharmacy school.

Table II presents correlations of test variables and pharmacy grade point average. The ACT sub-test, social studies, and the pharmacy grade point correlated most highly with an r of .72. The ACT composite score vs pharmacy grade point average held to a respectable r of .52. However, it can be noted that the extremely small sample (nine) would not be considered as valid a correlation as the Sophomore General Culture tests with an n of 86. From this series of tests it can be observed that social studies again has one of the strongest correlations with pharmacy grades. Reading ability could be the strong element involved in these two relationships, since social studies tests on both batteries measure reading skills (9). The science test from the Sophomore Culture tests and pharmacy grade point average have an r of .29 which is significant at the .01 level of confidence. The total score and pharmacy grade point are correlated, but less strongly with an r of .26, which is significant at the .05 level of confidence.

TABLE II
 THE ZERO ORDER CORRELATIONS OF THE SELECTED TESTS AND
 PRE-PHARMACY GPA WITH PHARMACY GRADE POINT AVERAGE
 FOR GROUP I

Test	Pharmacy r	Mean	Sigma
Pre-Pharmacy GPA (N = 98)	.66		
ACT (N = 9)			
English	.37	15	5.84
Mathematics	-.10	22	4.32
Social Studies	.74	19	4.36
Science	.34	21	3.11
Composite	.52	19	3.98
Sophomore General Culture (N = 86)			
Social Studies	.29 ^{oo}	34	7.51
Literature	-.09	17	5.52
Science	.29 ^{oo}	42	7.87
Mathematics	.16	27	8.50
Fine Arts	-.06	25	6.31
Composite	.26*	143	21.80
Otis Mental Abilities (N = 98)	.29 ^{oo}	111	29.00
MMPI (N = 98)			
Scale 1, Hs	.01	13	3.45
Scale 2, D	.12	18	4.36
3, Hy	.01	21	4.31
4, Pd	-.01	22	3.82
5, Mf	.15	24	3.80
6, Pa	.17	09	2.14
7, Pt	-.01	26	5.29
8, Sc	.07	24	5.35
9, Ma	-.06	20	4.26
10, Si	.22	24	9.50

* Significant at .05 level of confidence

oo Significant at .01 level of confidence

Pharmacy r's range from -.10 to .74

The Otis Mental Abilities test relates to the pharmacy grade point average with an r of .29, which is significant at the .01 level. It is a well-known fact that tests of this nature are not as significantly related to more homogeneous senior groups as to freshmen (22).

The Wherry-Doolittle procedure was used to select the best variables for the multiple regression equation. In addition to the correlation of the several variables with pharmacy grade point average, the statistical procedure utilizes the intercorrelation of the several independent variables from Table I. These data show some interesting relationship, although these observations are not significant to the problem of this thesis; the selection of the variables for best predictors of pharmacy grade point averages.

Correlation between the MMPI and other test variables were mostly negative, and in thirteen cases, significantly so. An example is the Natural Science sub-test of the ACT and Scale I (hypochondria) which showed a minus r of .37, which is significant at the .05 level. The same ACT test on Science revealed negative correlations between Scale 3 (hysteria) and Scale 8 (schizophrenia) with r 's of -.40 and -.32 respectively. These negative r 's could possibly be pointing out that a high score on the ACT Science test would indicate stability (low scores) on certain personality characteristics which the MMPI purports to measure. The same pattern appears in the relationship shown between the Sophomore Culture sub-test on Science and variables on the MMPI. Every r is negative except the masculinity-femininity interest scale, and it is exactly .00, no correlation. Between the Sophomore Culture test on Science and the scales measuring the neurotic tendency hysteria and hypochondria there appear significant r 's: Hy $r = -.38$ and Hs $r = -.36$.

The Scales 7 and 8 (psychotenia and schizophrenia) are a bit more positive of their negative relationships, with r 's of $-.40$ between each of them and the Sophomore test on Science.

One of the major tasks in this study was to determine the most promising factors for a regression equation to predict grade point averages in the school of pharmacy. Using the Wherry-Doolittle method of test selection, the best predictors were chosen, the regression equations were formulated, and the standard errors of estimate were calculated by the IBM at the Statistical Center at Oklahoma State University. The Wherry-Doolittle method selects those tests which yield a maximum R with the criterion and discards the rest. The process actually consists of determining the multiple R after the addition of each test and stopping when no appreciable increment is observed. Utilizing this test selection method, for computing the multiple R , results are presented in Table III. The sections of the Sophomore General Culture Tests are listed in order of strength of contribution, and the increment in R may be noted as each test is added.

For the number of cases involved in this study it was not necessary to carry the calculation in the multiple R and Standard Error of Estimate beyond the first two digits after the decimal point, but in order to point out the increment in each R and standard error it was necessary to write all the figures.

From Table III it can be observed that while the increase in the Multiple R is apparent with the addition of each test, the final R is not significantly larger than the R obtained from the relationship between pre-pharmacy and pharmacy grade point averages. It is possible that the Sophomore tests measure the same variable relationships

that the pre-pharmacy grade point average represents, since both cover the two years pharmacy students spend in the general college.

TABLE III

MULTIPLE CORRELATION COEFFICIENTS BETWEEN THE SELECTED TEST
AND THE OVER ALL GRADE POINT CRITERION

Tests	Multiple R	Standard Error of Est.
Pre-Pharmacy GPA (X_1)	.6613	.3178
Sophomore Culture Sub-tests:		
Social Studies (X_2)	.6707	.3163
Literature (X_3)	.67746	.3154
Total Score (X_7)	.6809	.3161
Science (X_4)	.6821	.3176
Mathematics (X_5)	.68295	.3194
Fine Arts (X_6)	.68381	.3211

One of the main reasons for computing the multiple R was to develop a regression equation from which the criterion could be predicted with the highest precision of which the tests are capable. The regression equation in score form for Group I (the Study Group) utilizing the independent variable selected first follows:

$$Y = 1.23986 + 0.55597X_1$$

In this equation Y = Pharmacy Grade Point Average, and X_1 = Pre-pharmacy Grade Point Average.

The standard error of estimate for the score predicted from this equation is .32, meaning that if the pre-pharmacy grade point average were known the pharmacy grade point could be predicted in at least two-thirds of the cases within $\pm .32$ grade points of the actual grade point average received in the school of pharmacy at Southwestern. If one desires a higher degree of accuracy in predicting the pharmacy grade point average the 95% limits may be used. The 95% limits are determined by applying $\pm 1.96 \times .32$ to the predicted score.

The second multiple regression equation was based on a multiple R of .67 as compared with the R of .66 from the equation based on the use of the one predictor, pre-pharmacy grade point average. The second equation used the best predictor from among all remaining variables, the Social Studies sub-test from the Sophomore tests. It was as follows:

$$Y = 1.08706 + 0.05286X_1 + .0054X_2, \text{ with a standard error of estimate } .31.$$

Continuing the same method of test selection in order of importance to the equation, the literature test score was added to the original equation. The total score of all sub-tests, next was added and the resulting multiple R was .68, and the standard error of estimate was .32.

The several regression equations are given below without more comments since the equations are emphasized:

1. $Y = 1.23986 + 0.55597X_1$
standard error of estimate = .3178
2. $Y = 1.08706 + 0.5286X_1 + .0054X_2$
standard error of estimate = .3163
3. $Y = 1.21281 + 0.52716X_1 + 0.00672X_2 + .00751X_3$
standard error of estimate = .3154
4. $Y = 0.87707 + 0.58866X_1 + 0.00548X_2 + 0.00768X_3 + 0.0038X_7$
standard error of estimate = .3161

$$5. Y = 0.36621 + 0.51986X_1 + 0.00674X_2 + 0.00696X_3 + 0.00288X_4 + 0.00424X_7$$

standard error of estimate = .3176

$$6. Y = 0.81734 + 0.52065X_1 + 0.00688X_2 + -0.00671X_3 + -0.0252X_4 + -0.00196X_5 + 0.00492X_7$$

standard error of estimate = .3194

$$7. Y = 0.89798 + 0.5201X_1 + 0.00786X_2 + -0.006X_3 + -0.00270X_4 + -0.00220X_5 + -0.0026X_6 + 0.00447X_7$$

standard error of estimate = .3211

The user of these equations has an option in determining which to use in predicting pharmacy grade point averages. An examination of the multiple correlation coefficients on Table III reveals that only small improvement in prediction is achieved by including more than one predictor.

Phase II: Validation of Regression Equation

Phase II of this study is an attempt to determine the validity of the regression equation using the best single predictor determined from Phase I of the study by applying the equation to a new group of students in the school of pharmacy. This group of students is the population described for Phase II.

To obtain an assessment of the validity of the regression equation for this population the scores for the students are substituted in the equation to determine the predicted pharmacy grade point average. The actual and predicted scores are given in Table IV. The actual and predicted grade point averages give a .53 correlation for Group II. Application of the equation on Group I obtained an r of .66.

Application of Validation Data

In view of the one variable prediction of pharmacy grade it would appear that the regression equation involving the pre-pharmacy grade

TABLE IV
 ACTUAL AND PREDICTED GRADE POINT AVERAGES
 FOR GROUP II

Subject	Predicted GPA	Actual GPA	Subject	Predicted GPA	Actual GPA
1	2.3518	2.8200	33	2.5631	2.5600
2	2.5075	2.1300	34	2.8911	2.9100
3	2.7577	3.7200	35	2.5575	2.2700
4	2.4519	2.5800	36	2.3907	2.2900
5	2.7354	2.1800	37	2.7243	2.1100
6	2.5631	2.4500	38	2.8021	2.6000
7	2.9745	3.2400	39	2.2017	2.4400
8	2.5297	2.9400	40	2.7132	2.7300
9	2.3351	3.1200	41	2.5186	2.8700
10	3.1524	3.5600	42	2.6353	2.8700
11	2.4630	2.4700	43	2.6909	2.9200
12	3.1413	3.6900	44	2.2795	2.0100
13	2.4241	2.2100	45	2.6020	2.1900
14	2.4964	2.4700	46	2.8577	2.6000
15	2.5797	3.0000	47	2.3685	2.0300
16	2.5519	2.4100	48	2.3740	3.5300
17	2.7577	3.0200	49	2.7132	2.1100
18	2.7966	3.4100	50	3.2747	3.2700
19	2.7132	3.0000	51	2.7632	3.0000
20	2.5242	3.1000	52	2.2684	3.3400
21	2.2017	3.0800	53	2.3518	2.0600
22	2.6965	2.4300	54	2.3518	2.4700
23	2.3240	2.1800	55	2.4463	2.8300
24	2.6131	3.0000	56	3.3525	4.0000
25	2.8021	4.0000	57	2.7855	3.1300
26	2.8466	3.1300	58	2.9411	2.9400
27	2.7410	2.8200	59	2.9078	2.4900
28	2.9634	2.8500	60	2.4908	2.5900
29	2.7243	2.7500	61	3.0468	2.5900
30	2.9634	3.5900	62	2.8244	2.3800
31	2.4574	2.4200	63	2.8133	3.7200
32	2.2350	2.1300			

point average is most desirable for predicting the probable grade average that a student will make in pharmacy school. However, Table V, which can be used for predicting grade point averages in pharmacy was based on an equation using the social studies score of the sophomore tests and the pre-pharmacy grade point average. The correlation coefficient between these two sets of grades was .527. The equation used to construct the prediction table was $Y = 1.08706 + .5286X_1 + .0054X_2$ in which Y represents pharmacy grade point average, X_1 pre-pharmacy, and X_2 the social studies on the sophomore tests. The standard error was .31 and $N = 63$.

Using mid-points in the frequency distribution for both variables and applying the equation, the following prediction table was constructed.

TABLE V

PREDICTED GRADE POINT AVERAGES BASED ON PRE-PHARMACY GPA AND THE SUBTEST SCORE ON SOCIAL STUDIES N = 63														
Pre-Pharmacy GPA	Social Studies Score													
	14 16	17 19	20 22	23 25	26 28	29 31	32 34	35 37	38 40	41 43	44 46	47 49	50 52	53 55
3.75-4.00	3.21	3.23	3.25	3.26	3.28	3.30	3.31	3.33	3.34	3.36	3.38	3.39	3.41	3.43
3.50-3.74	3.08	3.10	3.11	3.13	3.15	3.16	3.18	3.20	3.21	3.23	3.25	3.26	3.28	3.29
3.25-3.49	2.95	2.97	2.98	3.00	3.01	3.03	3.05	3.06	3.08	3.10	3.11	3.13	3.14	3.16
3.00-3.24	2.82	2.83	2.85	2.87	2.88	2.90	2.91	2.93	2.95	2.96	2.98	3.00	3.01	3.03
2.75-2.99	2.69	2.70	2.72	2.73	2.75	2.77	2.78	2.80	2.82	2.83	2.85	2.86	2.88	2.89
2.50-2.74	2.55	2.57	2.59	2.60	2.62	2.63	2.65	2.67	2.68	2.70	2.72	2.74	2.75	2.81
2.25-2.49	2.42	2.44	2.45	2.48	2.49	2.50	2.52	2.53	2.55	2.57	2.58	2.60	2.61	2.63
2.00-2.24	2.29	2.30	2.32	2.34	2.35	2.37	2.39	2.40	2.42	2.43	2.45	2.47	2.48	2.50
1.75-1.99	2.15	2.16	2.18	2.20	2.22	2.23	2.24	2.26	2.27	2.29	2.31	2.32	2.34	2.36
1.50-1.74	2.02	2.04	2.05	2.07	2.09	2.13	2.15	2.16	2.18	2.20	2.21	2.23	2.25	2.26
1.25-1.49	1.89	1.91	1.92	1.94	1.96	1.97	1.99	2.01	2.02	2.04	2.06	2.07	2.09	2.10
1.00-1.24	1.76	1.86	1.79	1.81	1.82	1.83	1.84	1.87	1.89	1.90	1.92	1.94	1.95	1.97

To use this table to predict the most probable grade in pharmacy school, locate the point directly below the student's score on the Social Studies test score and directly to the right of his grade point average in pre-pharmacy. These predicted grade point averages will probably be accurate within a .32 of an honor point about two-thirds of the time since the standard error of estimate = .32.

Using Fisher's z function (22) in order to test for significance of difference between r's obtained, the formula used to determine the SE_{D_z} was applied. By converting the coefficients into Fisher's z function, resulted in the following z's: Group I r of .53 = z of .59, Group II r of .66 = z of .79 (Table C, Garrett). The standard error of the difference between the two z's was then determined by applying the proper formula (22). Results showed a difference of .12. Dividing .20 [.79 - .59] by .12 resulted in a CR of 1.66 which is below 1.96 and hence is not significant at the .05 level. Based on this evidence there is no significant difference between the two coefficients.

Using the most practical regression equation (pre-pharmacy grade point average to predict pharmacy grade point average) Table IV will show the predicted grade point averages obtained in pharmacy school. The equation used was $Y = 1.23896 + .55597X_1$, $r = .53$, and $N = 63$.

In general, the accuracy of estimates made by use of the above regression equations appear to be satisfactory for the purpose of long range advisement of students by the admissions council in the pharmacy school from which the present study came. The equations may or may not be useful in other schools of pharmacy. They also may or may not be useful during the next several years in the school of pharmacy at Southwestern State College, because school population

change, tests are revised, and curricula are revised from time to time. Pharmacy studied at a large multiversity might possibly be entirely different in some critical areas from work done in smaller schools, church schools, or schools closely affiliated with medical schools. It would seem though, with the standardized curricula prescribed by the Pharmaceutical Accrediting Associations for the American Schools of Pharmacy, that course work would be more similar than different. Pre-pharmacy work done in the general college however, would be likely to reflect the strengths or weaknesses of the curricula in that particular school.

As a part of the present study, the above equations were applied to the data for a subsequent sample from the same school population as a check upon their validity and usefulness. This same group was the validation group described earlier in Chapter I, consisting of the graduating class of 1966, known in this study as Group II.

To test the effectiveness and accuracy of the multiple regression equation using all the test variables in the Sophomore test battery, the grade point category of each student in Group II in this study was predicted and compared with the actual grade point average made in pharmacy. Table VI below is a contingency table representing the relationship between predicted and actual grade point categories. The equation used was $Y = .81734 + .52065X_1 + .00688X_2 + -0.00671X_3 + -0.0252X_4 + -0.00196X_5 + .00422X_7$. The standard error = .32.

Independence values are represented by figures in parenthesis: they give the number of people whom we should expect to find in the various categories in the absence of any real relationship. For example, if there were no association between predicted and actual grade averages,

we should expect to find by chance 1.82 persons in the 3.50-3.99 grade point category predicted, 3.50-3.99 actual category. There were no persons in the category. In the category immediately below, chance alone would suggest that 14.26 persons should fall into this category. There were eleven. Other entries in the table have similar meaning.

TABLE VI

COMPARISON OF PREDICTED AND ACTUAL GRADE POINT AVERAGES IN PHARMACY SCHOOL BASED ON PRE-PHARMACY GPA FOR GROUP II

Pred. G.P. Category	Actual Grade Point Category					Total	
	1.50 1.99	2.00 2.49	2.50 2.99	3.00 3.49	3.50 3.99		4.00
4.00							
3.50-3.99							
3.00-3.49		(1.82) 0	(1.35) 0	(1.20) 2	(.48) 2	(.20) 1	5
2.50-2.99		(14.26) 11	(10.5) 14	(9.30) 10	(3.70) 3	(1.24) 1	39
2.00-2.49		(6.94) 12	(5.12) 3	(4.52) 3	(1.81) 1	(.60) 0	19
1.50-1.99							
Total		23	17	15	6	2	63

χ^2 (16df) = 58.32

Significant at .01 level

Contingency Coefficient = .48 which is highly significant (22).

To determine the significance of the relationship between predicted and an actual grade categories, the coefficient of contingency was computed and the chi-square test of significance was applied. Appropriate formulas were chosen for these computations (22).

The contingency coefficient was .48 and the chi-square was 58.32. A chi-square value of 58.32 with 16 df is significant at the .01 level of confidence. It may be concluded that not once in one hundred times would a chi-square value or a contingency coefficient as large as those obtained occur if there were no association between predicted and actual grade point average.

Part III: MMPI Data on Dropouts

While there were no important positive relationships shown between personality factors and pharmacy success, a study of Group III, the dropouts, does reveal more deviant personality scores on scales of the MMPI from the dropout group than on the two groups that completed the pharmacy degree. Table VII which shows data obtained on the dropout group follows.

Since these students did not enter pharmacy school, correlations will be confined to pre-pharmacy grade point average. The ACT number was 28 which would add to the validity of any statistic computed for those variables.

This study was not intended to be a study of dropouts, but of those who persisted. However, there were some interesting data comparisons. For example: The ACT test on Social Studies has a negative correlation with the pre-pharmacy grade point average and with the Groups I and II Social Studies r was one of the highest. At the lower educational level the Otis IQ test correlates more positively with an r of .42, as compared to r 's of .33 and .29 for Groups I and II.

There was no significant difference in means of IQ among Groups I, II, and III.

TABLE VII
 INTERCORRELATION MATRIX BASED ON DATA DERIVED FROM
 DROPOUTS FROM PRE-PHARMACY DURING THE YEARS
 1959 - 1960 - 1961

Factors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Pre-Pharmacy GPA		.36	.25	.13	.44	-.22	-.15	.36	.42	.00	.10	.05	.11	.25	.09	-.24	-.06	.10	-.07
2. ACT Composite			-.10	.23	.06	-.33	.14	.05	.66	-.02	.25	.04	.10	.02	.16	.02	.04	.02	.14
3. Soph. Gen. Cult.: SS				.41	.59	.42	.44	.84	.25	-.21	.12	-.41	.15	.59	-.21	.14	.03	-.08	-.08
4. Lit.					.37	.40	.15	.63	.24	-.13	.47	-.28	-.09	.79	-.50	-.12	-.37	-.50	.64
5. Science						.25	.36	.81	.29	-.06	-.29	-.07	-.08	.33	-.16	.00	-.18	-.39	.25
6. Math							.29	.57	-.21	.37	.33	.21	.46	.39	-.38	.40	-.03	-.11	.06
7. Fine Arts								.56	.45	.21	.57	.09	.07	.33	-.79	.01	-.29	-.18	.22
8. Total									.34	-.02	.41	-.12	.07	.61	-.44	.03	-.25	-.42	.43
9. Otis I. Q.										.16	.40	.14	.06	.22	.21	.19	.06	-.15	.18
10. MMPI (1) Hs											.45	.76	.49	.40	.43	.51	.46	.06	-.11
11. (2) D												.53	.44	.32	.36	.54	.40	-.17	.54
12. (3) Hy													.50	.32	.34	.36	.37	.09	-.08
13. (4) Pd														.23	.33	.64	.73	.51	-.06
14. (5) Mf															.11	.27	.22	-.01	.26
15. (6) Pa																.37	.12	.08	.07
16. (7) Pt																	.65	.06	.26
17. (8) Sc																		.44	.08
18. (9) Ma																			.30
19. (10) Si																			

The greatest variation found in data from Groups III and Groups I and II was in the MMPI profile patterns which will be included in the summary of this chapter when the original hypotheses will be discussed and conclusions made.

Analysis of Data Not Included in the Regression Equations

Each subject in this study filled out a personal data questionnaire which resulted in information regarding each subject; individually and subjectively. Information from the questionnaire covered items of general information on the subject's background. These items were father's occupation, size high school from which the student graduated, whether he was a transfer to Southwestern School of Pharmacy or had done his pre-pharmacy course work at Southwestern, if he had previous experience working in a drug store, why he chose pharmacy and why he persisted in pharmacy school, and what were his academic interests (liked least and liked most) in high school and college.

The data were programmed for IBM statistical calculations, but yielded nothing significant when each variable was taken apart from the rest of the personal information. The small sampling size in the wide range of categories yielded only frequency distributions. For example, whether any relationship existed between the father's occupation and the son's academic success in the pharmacy school could not be determined statistically because the number in each job category was too small. Forty-four occupations were listed, with the occupational title "farmer" appearing twenty-two times. The mean grade average for these boys was 2.47. Nine frequencies appeared opposite the "pharmacist"

job title. Grade point average for these students was 2.68. These two categories were the only ones large enough to compute a mean. These two occupations in this particular situation could normally be expected to appear at or near the top of such a list because of the nature of the school and its geographic location. Southwestern sets in the center of farming country. Even though the pharmacy school draws students from all sections of the United States and from a small number of foreign countries, the students are predominately native Oklahomans and the majority are from western Oklahoma. While the percentage of pharmacist fathers is not large, it seems reasonable to expect a number of sons to follow their professional fathers and become pharmacists.

Although the individual items in the personal data did not yield a satisfactory statistical evaluation, the analysis of variance did reveal the importance of the data when used as a combined group of factors. Due to the interaction among the many variables, no one single factor could be selected with any degree of confidence as a contributor to the academic success of pharmacy students. Used collectively, the personal data were significant as Table VIII shows.

In sifting through the personal data, some interesting frequency distributions were obtained. In the area of academic interest, the majority of students in both groups expressed practically identical likes and dislikes. A probable explanation was that a group of professionally trained pharmacy seniors would be expected to be more homogeneous than, say, a class of college freshmen.

In stating reasons why they chose pharmacy as a career, "the influence of the friendly home town pharmacist" appeared most frequently.

TABLE VIII
ANALYSIS OF VARIANCE BETWEEN PERSONAL DATA
FROM THE COMBINED GROUPS I AND II

Source	d.f.	Sum of Squares	Mean Sum of Squares	F
Total	160	367051.0		
GPA Pre-Pharm.	1	42851.5	42851.5	
Group	1	4831.8	4831.8	
Size H. S.	2	5256.5	2628.25	
Transfer	1	147.2	147.2	
Experience	1	1995.3	1995.3	
GS	2	5193.8	2596.9	
GT	1	29.9	29.9	
GE	1	3124.9	3124.9	
ST	2	1465.4	732.7	
TE	1	192.3	192.3	
GST	2	73920679.7	33960339.8	
GSE	2	1693.1	847.0	
GTE	1	19.2	19.2	
STE	2	779.9	779.9	
GSTE	2	11149.5	5674.8	4.3*
Error	136	179523.8	1320.0	

*F is significant at the .05 level for the entire combination of variables as they related to the grade point average in the pharmacy school.

High school counselors apparently had practically no influence. Only one student from the combined groups of 161 students said that he had chosen pharmacy as a result of vocational-educational counseling at the high school level. Monetary rewards, personal satisfaction to be gained by belonging to a part of the prestigious medical profession, personal satisfaction to be gained from "helping people" and one word "pressure" were most frequently stated as reasons why they chose pharmacy as a profession. Other reasons for their choice of pharmacy as a future career were quite honestly stated: "Liked science, but did not want to teach," "Liked to work with people and have regular hours," "Wanted to be a part of the medical field, and plan to go from pharmacy school into medical school," "Read about pharmacy in LIFE magazine," "Owned a drug store."

The greatest number of responses to the question, "Why did you persist in pharmacy school?", 68 students (42%) was "faculty interest in pharmacy students." There were other reasons. Many students listed more than one reason for his finishing pharmacy school. After "faculty interest" the most frequently used terms were "pride" "persistence" "desire" "marriage" "maintained interest" "challenge."

Each of these factors is important to the faculty adviser as an area to explore when counseling with the student. Taken as a whole, the factors appear to be quite significant, especially as counseling aids in the guidance of through pre-pharmacy to the professional school of pharmacy.

Due to the small sampling size in each category in a wide range of categories, and to the interaction among the variables, these data

were not correlated with the criterion. However, these data were found to be significantly related to the criterion (academic success) when considered as a combination of factors.

Summary of Findings

In drawing conclusions from the results obtained from the research in this study, the hypotheses stated in Chapter I will be rejected or affirmed in the concluding statements presented here:

A. The null hypothesis that no relationship existed between the Otis Mental Abilities Test and pharmacy grade point average is rejected. While there is not a high correlation between the Otis test and grade points produced by pharmacy seniors, it is significant at the .01 level. It is generally agreed that the higher the level of education the less marked is the degree of relationship between standardized tests of intelligence such as the Otis and grade averages made. The Otis probably would be a more effective counseling or guidance aid at the pre-college level, or at college entrance. The obtained coefficient of correlation of .33 is acceptable.

B. Hypotheses two, three, and four all deal with the personal data that was not included in the basic correlation tables. These results have been discussed previously in this chapter. The hypotheses cannot be affirmed, nor can each one individually be rejected. Taken as a group, considered as a collective factor, the null hypotheses can be rejected, because of the interaction of all factors as a group, they are significant to success in pharmacy school when their relationships are understood and treated accordingly.

C. The null hypothesis that there would be no relationship between predictor variables and pre-pharmacy grade point average can be rejected. From the basic correlation table it can be observed that the correlation coefficient between test variables and pre-pharmacy grade point average is significant as shown by the following correlations of tests with pre-pharmacy grade point: the ACT composite score, .48; the Sophomore General Culture total score, .34; the Otis Mental Abilities test, .33. The MMPI scores did not correlate significantly with the pre-pharmacy grade point average, but some of the scales showed interesting negative correlations.

D. Hypothesis number six states that there will be no significant relationship between predictor variables in Phase I of the study. The strongest single predictor was the pre-pharmacy grade point average, but the scores of each of the sub-tests on the Sophomore Culture tests and the total score added to the precision of the regression equation. The null hypothesis can be rejected on the basis that there is a significant correlation, stated the C above.

E. Hypothesis number seven stating that no significant relationship exists between the total score of the Sophomore General Culture test and pharmacy grade point average can be rejected. The $R = .53$.

F. Hypothesis eight states that there will be no significant difference of variant MMPI patterns for those remaining in pre-pharmacy and those dropping out of pre-pharmacy. This hypothesis can be rejected. From MMPI profiles of the combined Groups I and II, there were 20.6% which had "peaks" or high points on the profile above two standard deviations above the median line. A study of profiles drawn from the dropout population showed that only 37 students had an MMPI profile on record in their personnel files. Of the number (37) observed, 18 (48.6%) had deviant

scores on one or more scales of the inventory. For this particular study, with the limited number of samples of the personality inventory, no claim is being made that the situation existing here is generally true for pharmacy schools' dropout population.

G. Hypothesis nine states that there will be no significant difference in degree of relationship shown by the correlation coefficients based on the predicted group grade point average and the actual grade point average; or the multiple R's derived between the predictors and the criterion variable for the study group. The null hypothesis can be affirmed. The multiple R is .68 and the coefficient between predicted and actual grade point average was .53. Based on evidence from application of Fisher's z function, there is no significant difference.

CHAPTER V

SUMMARY AND RECOMMENDATIONS

The purpose of this chapter is to review and summarize findings from the data analysis. The problem of the study was to identify the relationships between certain factors and academic success in pharmacy school.

The study was developed from two basic groups: Group I, the study group composed of senior classes 1964-1965, and Group II, the validation group, the graduating class of 1966. One hypothesis dealt with a comparison of personality factors measured by the MMPI, of Group I, II and III, the dropouts.

The study was divided into two phases. In Phase I the most promising predictor variable (s) were chosen from which the most practical regression equations were calculated. The pre-pharmacy grade point average proved to be the best single predictor. The equation was strengthened slightly with addition of the next best predictors which were all the test scores on the Sophomore General Culture test, each one added in succession, making a total of seven trial regression equations. The strongest multiple R was obtained from the equation using each of the test variables. However, this equation appeared to be impractical since it did not add appreciably to the accuracy of prediction.

Using the second best predictor, the score on the Social Studies test, an equation was formulated and used to construct a table which can be used to predict pharmacy grade point averages with reasonable accuracy. The correlation obtained was .67.

In Phase II the best regression equation, using only pre-pharmacy grade point average was applied to both groups and grade point averages were predicted. The correlation coefficient from Group I was .66 and for Group II .52. Based on evidence from application of Fisher's z function, there is no significant difference.

On the basis of the data from the validation study it appears that the regression equation can be used with confidence.

In the disposition of data not included in the regression equation it was found that these data did not lend themselves to statistical treatment because of small sampling size in a wide categorical arrangement.

Conclusions which have been stated above appear to be justified on the basis of the evidence from the present study. These findings are recognized to be valid only within the population from which this study was drawn. Caution must be used in general application or interpretation.

Recommendations

Findings of the present study can be of value only if there is a consistent follow-up. In order to predict success in pharmacy school, variables associated strongly, both positively and negatively, would probably produce a more effective prediction equation than this study has made if subjects in early pre-pharmacy were used.

Establishment of local norms is recommended for all college entrance tests used at Southwestern, so that faculty advisement in the total college could be provided with a more substantial guidance tool.

Certain potential dropout characteristics may be observed in this study of correlations on Group III. Additional research on this group is needed.

The scores on the MMPI were not greatly involved in this study. However, there does appear to be much that could be better understood from a thorough and sophisticated study of relationships between personality characteristics and academic achievement.

The findings from the present study indicate that the Sophomore General Culture Tests are of definite value in long range guidance possibilities. It is further recommended that studies be made at Southwestern of the ACT and Sophomore Culture test relationships. These two tests and grade point averages could serve as an evaluation tool for the general college program, as well as a counseling aid in evaluating an individual student's progress through the general college program.

BIBLIOGRAPHY

1. ACT: The American College Testing Program. Technical Report, 1960-61, 1964-65 Edition. Chicago: SRA, Inc., 1960-65.
2. Bass, Bernard and Irwin Berg, Editors. Objective Approach to Personality Assessment. Princeton: D. Van Nostrand Co., Inc., 1959, 233.
3. Becker, Howard, et al. Boys in White: Student Culture in Medical School. Chicago: The University of Chicago Press, 1961.
4. Black, Donald. "Prediction of Academic Success in the University of Washington." (Unpublished Doctoral Dissertation, Seattle, Washington, 1951).
5. Bloom, Benjamin and Frank R. Peters. "The Use of Academic Scales for Counseling and Selecting College Entrants." New York: Free Press of Glencoe, Inc., 1961.
6. Braucher, Charles and Robert V. Evanson. "Academic Factors Relating to Success in Community Pharmacy Management." American Journal of Pharmaceutical Education, XXVIII, no. 1 (Winter, 1964) 56-66.
7. Buros, Oscar K. The Sixth Mental Measurements Yearbook. Highland Park: The Gryphon Press, 1965.
8. Conkhuff, Robert B. The MMPI: An Outline for General Clinical and Counseling. Lexington, 1961, 60.
9. Cooperative General Culture Test. Form A Manual. Princeton: Cooperative Test Division, Educational Testing Service, 1956.
10. Cronbach and Glesser. Buros Sixth Mental Measurement Yearbook. Highland Park: The Gryphon Press, 1965, 983.
11. Dahlstrom, W. Grant and George S. Welsh. An MMPI Handbook. Minneapolis: The University of Minnesota Press, 1962.
12. Danskin, David. "Studies on the Sociological Aspects of Specific Occupations." Personnel and Guidance Journal, (October, 1957) 114.

13. Douglas, Harl R. "The Relation of High School Preparation and Certain Other Factors to Academic Success at the University of Oregon." University of Oregon Publications, XIX (September, 1931).
14. Douglas, Harl R. "Relation of Pattern of High School Credits to Scholastic Success in College." North Central Association Quarterly, VI (May, 1931) 283-297.
15. Drake, L. E. and E. R. Oetting. An MMPI Codebook for Counselors. Minneapolis: The University of Minnesota Press, 1959, 3-9.
16. Durflinger, G. W. "Prediction of College Success." Journal of American Association of College Registrars, XIX (June, 1943) 68-78.
17. Educational Policies Commission. Universal Opportunity for Education Beyond the High School. Washington: National Education Association, 1964.
18. Fisher, Jerome. "The Twisted Pear: Prediction of Behavior." Journal of Counseling Psychology, XXIII (October, 1959) 400-405.
19. Frederickson, Norman O. "Making Test Scores More Useful for Prediction." Educational and Psychological Measurement, XI (Winter, 1951) 783-787.
20. Gallogher, J. Roswell. "The Role of the Emotions in Academic Success." College Admissions, No. 1, Function: College Entrance Board, 1954, 106-109.
21. Garrett, Harley F. "A Review and Interpretation of Investigations of Factors Related to Scholastic Success in College of Arts and Sciences and Teachers' Colleges." Journal of Experimental Education, XVIII (February, 1949) 91-138.
22. Garrett, Henry E. Statistics in Psychology and Education. New York: Longman, Green and Co., 1959, 201, 241-243, 392-396.
23. Gough, Harrison. "Misplaced Emphasis in Admissions." Journal of College Student Personnel, VI, no. 3 (March, 1965) 130-135.
24. Hackett, Herbert R. "Use of MMPI Items to Predict College Achievement." Journal of Counseling Psychology, (1955) 68-69.
25. Hanson, Dale. "A Study of Business as a Phase of the Preparation of Pharmacists." (Unpublished Doctoral Dissertation, University of Oklahoma, Norman, Oklahoma, 1963).

26. Harris, Daniel. "Factors Affecting College Grades: A Review of the Literature, 1930-1937." Psychological Bulletin, XXXVII, (March, 1940) 125-166.
27. Hathaway, S. R. and J. C. McKinley. Manual for Minnesota Multiphasic Personality Inventory. New York: The Psychological Corporation, 1951.
28. Havemann, E. and P. S. West. They Went To College, First Edition. New York: Harcourt and Brace Co., Inc., 1952, 159.
29. Holland, John L. and James M. Richards, Jr. "Academic and Non-Academic Accomplishments: Correlated or Non-Correlated." Journal of Educational Psychology, LVI, no. 4 (1965) 165-174.
30. Holt and Luborsky from Holland and Richards. "Academic and Non-Academic Accomplishments: Correlated or Non-Correlated." Journal of Educational Psychology, LVI, no. 4 (1965) 165-174.
31. Hoyt, Donald P. "Size of High School and College Grades." The Personnel and Guidance Journal, XXVI (March, 1958) 569-573.
32. Hoppock, Robert. Occupational Information. New York: McGraw Hill Book Company, Inc., 1963, 1-15, 106-107.
33. Humber, W. J. "The Relationship Between Reading Efficiency and Academic Success in Selected University Curricula." Journal of Educational Psychology, XXXV (January, 1944) 17-26.
34. Husband from Havemann and West. They Went To College, First Edition. New York: Harcourt, Brace and Company, Inc., 1952.
35. Isaacson, Lee E. Career Information in Counseling and Teaching. Boston: Allyn and Bacon, Inc., 1966, 1-16.
36. Jackson, Philip W. and J. W. Getzels. "Psychological Health and Classroom Functioning." Journal of Educational Psychology, L, no. 2 (December, 1959) 295-300.
37. Jenson, Vern H. "Influence of Personality Traits on Academic Success." The Personnel and Guidance Journal, XXXVI (March, 1958) 497-500.
38. Kelley, E. L. and D. W. Fiske. "The Prediction of Success in the VA Training Program in Clinical Psychology." American Psychologist, (1950) 395-406.
39. Kleinmuntz, B. "Identification of Maladjusted College Students." Journal of Consulting Psychology, (November, 1960) 209-211.

40. Lafeuer, D. Welty. "Review of Otis Group Intelligence Test." Buros' Sixth Mental Measurement Yearbook. Highland Park: The Gryphon Press, 1965, 482-483.
41. McCormack, T. H. "The Druggist Dilemma Problems of a Marginal Occupation." American Journal of Sociology, (1955-56-61) 308-315.
42. Miller, Reed and Louise B. Heathers. "Relation of the MMPI to the Edwards Personal Preference Inventory." Journal of Consulting Psychology, XX, no. 4 (August, 1956) 310-315.
43. Morris, Louis. "The Relationship Between Certain Factors and Academic Success in College Mathematics." (Unpublished Doctoral Dissertation, Oklahoma State University, Stillwater, Oklahoma, 1954).
44. Mueller, Kate Hevner. Student Personnel Work in Higher Education. Boston: Houghton Mifflin Co., 1961, 56.
45. Ohvall, Richard Arthur. "A Study of the Need and Feasibility of Establishing Differential Guidance Standards for Pharmacy Undergraduates in the Extended Curriculum." (Unpublished Doctoral Dissertation, The University of Wisconsin, Madison, Wisconsin, 1962).
46. Otis, Arthur. Otis Quick-Scoring Mental Ability Test and Manual. New York: Harcourt and Brace and World, Inc., 1954.
47. Palmer, John C. "College Admissions: An Overview." High School to College, Readings for Counselors. College Entrance Examination Board Publication, 1964, 38-44.
48. Palubinskas, A. L. and L. D. Eyde. "JVIB, Patterns of Medical School Applications." Journal of Consulting Psychology, VIII (1961) 159-163.
49. President's Commission on Higher Education. "Higher Education for American Democracy." New York, 1948, 7.
50. Price, Philip B., M.D., Calvin Taylor, Ph.D., James M. Kiehards, Jr., Ph.D., and Tony Jacobsen. "Measurement of Physician Performance." Journal of Medical Education, XXXIX, no. 2 (February, 1964).
51. Ross, C. C. Measurement in Today's Schools. New York: Prentice Hall, Inc., 1947.
52. Sarason, Seymour B. "The Test Situation and the Problem of Prediction." Journal of Clinical Psychology, (June, 1950) 387-392.

53. Seyfort, W. C. "Do You Recommend This Student for College?"
School Review, LX (March, 1952) 129-133.
54. Southwestern State College Catalogue. School of Pharmacy,
1966 Edition.
55. Stagner, Ross. "The Relationship of Personality to Academic
Aptitude and Achievement." Journal of Educational Research,
XXVI (May, 1933) 648-660.
56. Segal, David. "Differential Prediction of College Success."
School and Society, XXXIX (January, 1934) 91-96.
57. Shartle, C. L. Occupational Information, Second Edition.
New York: Prentice-Hall, Inc., 1952.
58. Stone, David R. and George R. Ganing. "A Study of Scholastic
Achievement Related to Personality as Measured by MMPI."
Journal of Educational Research, L (October, 1956) 155-156.
59. Stuit, Dewey R. and G. S. Dickson, et al. "Predicting Success
in the Professional Schools: A Summary of Studies and
Prediction of Law, Medicine, and Teaching." American
Council on Education, Washington, D. C., 1949.
60. Student Personnel Point of View: A Report of a Conference,
Series I, I, no. 3, American Council on Education,
Washington, D. C., 1937 in Mueller's Student Personnel
Work in Higher Education, 56-66.
61. Summers, R. E. "Some Thoughts on Prediction of Academic
Achievement." College and University, XXVI (January,
1951) 229-235.
62. Super, Donald. Appraising Vocational Fitness. New York:
Harper and Brother, 1949, 368.
63. Taylor, Harold. "Higher Education and National Purpose."
High School to College: Readings for Counselors,
(Papers presented at the Work Conference on Guidance
for School-College transition, August 17-28, 1964,
Teachers' College Columbia University, New York,
College Entrance Examination Board Publication,
Princeton, New Jersey.
64. Taylor, Calvin. "Measurement of Physician Performance."
Journal of Medical Education, XXXIX, no. 2 (February,
1964).
65. Terman, Lewis M. "Review and Criticism of Otis Mental
Abilities Test." Buros Sixth Mental Measurement Yearbook.
Highland Park: The Gryphon Press, 1965, 483.

66. Tiedman, David V. "Comments on the Utility of the Discriminant Function in Psychological and Guidance Investigations." Personnel and Guidance Journal, XXXIX (June, 1963) 190-192.
67. Travers, Robert M. "Significant Research on the Prediction of Academic Success." Wilma Z. Donahue, The Measurement of Student Adjustment and Achievement, Michigan, 1949, 153.
68. Turnbull, U. U. "Socio-Economic Status and Predictive Test Scores." Journal of Psychology, V (1951) 145-419.
69. Vineyard, E. E., Ruby Drinkwater, and Walter Dickison. "Teacher Education and Pharmacy Students: A Comparison of Their Need Structures." Journal of Higher Education (March, 1962).
70. Vineyard, E. E. "A Longitudinal Study of the Relationship of Differential Aptitude Test Scores with College Success." (Unpublished Doctoral Dissertation, Oklahoma A. & M. College, Stillwater, Oklahoma, 1955).
71. Wallace, N. L. "Differential Predictive Value of the A. C. E. Psychological Examination." School and Society, LXX, (July, 1949) 23-25.
72. Wedge, Bryant M. Psychological Problems of College Men. New Haven: Yale University Press, 1958, 132-135.
73. Williams, E. G. Adolescence, In Hoppock's Occupational Information, 1963. New York: Holt, Rinehart and Winston, Inc., 1930.
74. Williamson, E. G. Students and Occupations. New York: Holt, Rinehart and Winston, Inc., 1937.
75. Wise, Max. "The American Student and His College." High School to College: Readings for Counselors. College Entrance Examination Board Publication, 1964, 8-14.
76. Wolfenden, J. F. "Selection for University." Universities Quarterly, VI (November, 1951) 16-39.

APPENDIX A
 TEST - RETEST DATA ON OTIS MENTAL
 ABILITIES TEST AND THE MMPI
 THE TESTING DATES:
 1961 AND 1965
 N = 25

Factors	1	2	3	4	5	6	7	8	9	10	11	12
Means	117	119	13	16	19	20	25	10	25	25	19	26
Sigmas	8.18	7.40	3.02	4.87	3.11	3.59	6.49	2.14	5.95	5.00	5.18	10.05
1. Otis Pre		.86*	-.59	-.29	-.03	.34	-.04	.16	.43	-.25	.22	-.40
2. Otis Post			-.30	-.16	.05	.35	.01	.32	-.20	-.04	.34	-.22
3. MMPI-Hs			.03	.48	.21	-.34	.22	-.19	.03	.04	.07	.04
4. D				.69*	.11	-.13	.36	-.14	-.12	-.02	.02	.05
5. Hy					.34	-.11	.16	.14	.13	-.07	.21	.12
6. Pd						.25	-.17	.39	-.03	-.17	-.08	.07
7. Mf							.79*	-.20	.17	.08	.00	-.12
8. Pa								.06	.05	-.17	-.12	-.09
9. Pt									.18	.04	-.02	-.10
10. Sc										.04	-.24	.10
11. Ma											-.19	-.04
12. Si												.02

* Significant at .01 level

APPENDIX B
 BASIC INTERCORRELATION MATRIX DERIVED FROM DATA
 ON GROUP II: PHARMACY SENIORS, 1966

Factors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Means	2.53	2.79	18	21	19	22	19	34	19	40	28	23	144	118	13	18	20	21	25	09	26	23	19	26	
Sigmas	.47	.51	4	5.46	5.55	7.82	4.43	8.86	5.77	8.87	8.22	6.25	.25	8.49	3.96	3.92	3.62	3.5	4.32	2.31	4.92	4.85	3.92	7.83	
1. Pre-Pharmacy GPA		.53	.15	.24	.21	.10	.26	.36	.33	.28	.17	-.07	.36	.16	.07	.07	-.03	.13	.17	.22	.07	-.11	-.10	-.01	
2. Pharm. GPA			.11	.06	.32	.06	.17	.06	.52	.21	-.03	.10	.24	.16	.19	.07	.03	-.26	.15	.22	-.05	-.08	.04	.02	
3. ACT English				.57	.35	.41	.67	.04	.26	.31	.27	.03	.24	.52	-.12	-.04	-.05	.00	.10	-.10	.05	-.04	.12	.12	
4. Mathematics					.43	.59	.76	.40	.29	.52	.24	.24	.49	.61	-.21	.02	-.22	-.08	.26	.15	.00	-.20	-.08	.19	
5. Social Studies						.49	.65	.40	.33	.23	.15	.31	.40	.46	.04	-.02	-.05	.25	.25	.30	-.16	-.28	-.06	.15	
6. Natural Science							.86	.29	.18	.49	.17	.13	.37	.48	-.37	-.01	-.40	-.29	.01	-.12	-.18	-.32	-.13	.29	
7. Composite								.36	.30	.52	.32	.24	.50	.67	-.27	-.11	-.34	-.31	.10	.04	-.19	-.29	-.06	.23	
8. Soph. Gen. Cult. Test: S. S.									.20	.61	.28	.12	.74	.37	-.08	.05	-.15	-.25	.10	.08	.00	-.11	-.09	.00	
9. Literature										.31	.09	.40	.54	.25	.16	.09	-.07	-.03	.07	.20	.10	-.02	.25	.09	
10. Science											.41	.23	.80	.29	-.33	-.02	-.36	-.40	.00	-.03	-.27	-.40	-.18	-.05	
11. Mathematics												.14	.61	.44	-.06	.16	-.10	-.29	.04	.17	-.15	-.25	-.12	.01	
12. Fine Arts													.50	.11	.18	-.05	-.02	-.08	.04	.21	-.07	.07	.16	.02	
13. Composite														.45	-.07	.08	-.21	-.33	.07	.20	-.13	-.24	.06	.01	
14. Otis I. Q.															-.06	.04	-.04	-.13	.32	-.04	.00	-.19	.10	.11	
15. MMPI: Hs																.25	.55	.28	.28	.31	.48	.51	.34	.20	
16. D																	.07	.00	.42	.22	.53	.21	-.10	.50	
17. Hy																		.42	.20	.32	.28	.35	.16	-.33	
18. Pd																			.20	.16	-.10	.18	.36	-.05	
19. Mf																				.17	.50	.15	.07	.31	
20. Pa																					.17	.30	.05	-.04	
21. Pt																						.67	.33	.34	
22. Sc																								.36	.12
23. Ma																									-.08
24. Si																									

APPENDIX C

PERSONAL DATA QUESTIONNAIRE

Name _____ Age _____

Hometown _____

Name of High School _____ Date of Graduation _____

Did you do your pre-pharmacy at SWSC? _____

Father's Occupation _____

Did you work in a drug store before college? _____

Which high school subject did you like most? _____

Liked least? _____

What college subjects did you like most? _____

Liked least? _____

Why did you choose pharmacy? _____

In your opinion, what is the one (or one of the most) important factor (s) contributing to your successfully completing a pharmacy degree at Southwestern State College? _____

What are your future plans? _____

VITA

Ruby Straughan Drinkwater

Candidate for the Degree of

Doctor of Education

Thesis: THE RELATIONSHIP BETWEEN CERTAIN FACTORS AND ACADEMIC SUCCESS
IN THE SCHOOL OF PHARMACY AT SOUTHWESTERN STATE COLLEGE

Major Field: Student Personnel and Guidance

Biographical:

Personal Data: Born in Tecumseh, Oklahoma, June 2, 1914, the
daughter of Robert Allen and Arla Mitchell Straughan.

Education: Attended grade school in Tecumseh, Oklahoma; graduated
from the Tecumseh High School in 1932; received the Bachelor
of Science degree in Education from Southeastern State College,
with majors in English and Business Education, in July, 1935;
received the Master of Science degree in Education from the
University of Oklahoma, with a major in Guidance, in June, 1955;
completed requirements for the Doctor of Education in July, 1967.

Professional Experience: Taught in the public schools in Tecumseh,
Oklahoma for ten years; Dean of Women at Southwestern State
College from September, 1956, to September, 1967; in September,
1967 will transfer to teaching in the division of Teacher
Education at Southwestern State College, Weatherford, Oklahoma.