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The Relationship Between Physical Fitness and Selected Personality Traits

Kenneth Gene Tillman

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THE RELATIONSHIP BETWEEN PHYSICAL
FITNESS AND SELECTED PERSONALITY TRAITS

By

Kenneth Gene Tillman

A Dissertation

Submitted in Partial Fulfillment of the
Requirements for the Degree of
Doctor of Philosophy

The University of New Mexico

1963

This dissertation, directed and approved by the candidate's committee, has been accepted by the Graduate Committee of The University of New Mexico in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Sidney Rosenblum
DEAN

July 31, 1963
DATE

THE RELATIONSHIP BETWEEN PHYSICAL
FITNESS AND SELECTED PERSONALITY TRAITS

By

Kenneth Gene Tillman

Committee

Armand A. Smith
CHAIRMAN

Lloyd R. Buckley

Sidney Rosenblum

The Commission on the Status of Women
has been established by the General Assembly
of the United Nations in 1946.
The Commission is composed of 18 members
representing different regions of the world.

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Secretary-General

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REPORT OF THE
COMMISSIONER OF THE
BUREAU OF LANDS

IN RESPONSE TO A RESOLUTION OF THE
HOUSE OF REPRESENTATIVES

PASSED MAY 15, 1890
RELATIVE TO THE
LANDS BELONGING TO THE
UNITED STATES

AND TO THE
LANDS BELONGING TO THE
SEVERAL STATES

BY THE
COMMISSIONER OF THE
BUREAU OF LANDS

AND BY THE
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GENERAL LAND OFFICE

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PREFACE

The strength of our democracy is no greater than the collective well-being of our people. The vigor of our country is no stronger than the vitality and will of all our countrymen. The level of physical, mental, moral, and spiritual fitness of every American must be our constant concern.¹

The fitness of the citizens of the United States to counteract the pressures of other ideologies has alarmed many thoughtful people in and out of government. They fear that the physical and moral decline which has weakened our country will result in consequences of an even more severe nature if this trend is not reversed.

The aim of this study was to make a contribution by increasing our understanding of the relationship between physical fitness and personality. It was felt that information received from studies such as this would provide knowledge which would have value when applied to the much larger problem of national physical, mental, moral, and spiritual fitness.

The writer is grateful to the many people who have contributed to the completion of this dissertation. Sincere appreciation is expressed to Dr. Armond Seidler, his advisor, for the assistance he has given in formulating and carrying out the study. Dr. Lloyd Burley, Dr. Robert Doxtater, and Dr. Sidney Rosenblum made many valuable criticisms and suggestions. Dr.

¹John F. Kennedy, "A Presidential Message to the Schools on the Physical Fitness of Youth," School Life, XLIV (September, 1961), p. 33.

Edward Nolan, formerly of the University of New Mexico's psychology department, contributed significantly to the initial stages of this study. Special thanks goes to Mr. James Ransom of Yale University for his help in editing the final draft.

The writer also expresses his appreciation to the administration and staff of Davenport West High School in Davenport, Iowa, for their cooperation. The administrative details for the research project were handled by Mr. Paul Eckert, principal, and Mr. Don Hemstead, assistant principal. Robert Liddy, Fred Friedrichsen, and Harv Schmidt, members of the physical education staff, provided the cooperation which made the experimental physical fitness program possible.

Finally, the author wishes to thank his wife, Delores, for her help and encouragement in the completion of the study.

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CHAPTER I

INTRODUCTION

The relationship of physique and personality has long challenged psychologists, physicians, and more recently, physical educators. Many studies, such as those by Sheldon, have attempted to determine correlations which might exist between a physique type and personality.^{1,2,3,4} However, it seems that a related area which is very important to the physical education profession has failed to receive sufficient investigation. Comparatively little research has been carried out to determine the relationship between an individual's state of physical fitness and his personality characteristics. Interest in this area leads to an even more intriguing question. Is an improvement in physical fitness accompanied by measurable changes in personality characteristics? There are many implications inherent in a research project which investigates this question.

Research has provided evidence that intelligent use of weight training, swimming, and other physical education activities will

¹William H. Sheldon, Atlas of Men (New York: Harper and Brothers, 1954), 357 pp.

²William H. Sheldon, Varieties of Delinquent Youth (New York: Harper and Brothers, 1949), 899 pp.

³William H. Sheldon, The Varieties of Human Physique (New York: Harper and Brothers, 1940), 347 pp.

⁴William H. Sheldon, The Varieties of Temperament (New York: Harper and Brothers, 1942), 520 pp.

The relationship of the various factors involved in the development of the disease is a complex one. It is not yet possible to state definitely which is the primary factor, but it is clear that the disease is not a simple one. It is a disease of the whole organism, and its development is influenced by many factors, including heredity, environment, and the state of the body's defenses. The disease is not a simple one, and its development is influenced by many factors, including heredity, environment, and the state of the body's defenses.

Research has shown that the disease is not a simple one, and its development is influenced by many factors, including heredity, environment, and the state of the body's defenses.

1. William H. Barker, "The Development of the Disease," *Brooklyn, 1935*, 317-318.
2. William H. Barker, "The Development of the Disease," *Brooklyn, 1935*, 317-318.
3. Barker and Brooker, "The Development of the Disease," *Brooklyn, 1935*, 317-318.
4. William H. Barker, "The Development of the Disease," *Brooklyn, 1935*, 317-318.

result in improved physical fitness.^{5,6,7,8} The physiological advantages which are derived from such improvement have received widespread publicity in recent years. This information has, for the first time, been disseminated to most segments of the population of the United States due primarily to the public support and active endorsement of President John F. Kennedy.⁹

Physical fitness has an important physiological value. The value of physical fitness in the area of personality is another important facet of physical fitness and one which needs more research. This study investigated the area of personality by analyzing the relationship between physical fitness and various personality traits.

Statement of the problem. The purpose of this study was to investigate the relationship of physical fitness to personality traits. This investigation (1) analyzed certain personality traits to ascertain if a variance exists between a fit person and an unfit

⁵Benjamin Massey et al., The Kinesiology of Weight Lifting (Dubuque, Iowa: Wm. C. Brown Co., 1959), 175 pp.

⁶Thomas Kirk Cureton, Physical Fitness Workbook (St. Louis: The C.V. Mosby Company, 1947), 152 pp.

⁷John Talbot Powell, "Effects of Rope Skipping on Pre-Pubescent Boys" (unpublished Master's thesis, University of Illinois, 1957), 184 pp.

⁸Lawrence L. Pattee, "Effects of Developmental Activities on Pre-Pubescent Boys" (unpublished Master's thesis, University of Illinois, 1958), 64 pp.

⁹John F. Kennedy, "A Presidential Message to the Schools on Physical Fitness of Youth," School Life, XLIV (September, 1961), p. 33.

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investigate the relationship of physical fitness to personality

traits. This investigation (1) analyzed certain personality traits

to determine if a variance exists between a fit person and an unfit

person.

Definition of terms. The following definitions of terms are used:

Physical fitness: The ability of the body to perform physical work.

Personality: The sum of the characteristics that distinguish one individual from another.

Personality traits: The specific characteristics that make up a personality.

Physical fitness test: A test that measures the ability of the body to perform physical work.

Personality test: A test that measures the characteristics that make up a personality.

Personality traits test: A test that measures the specific characteristics that make up a personality.

Physical fitness and personality: The relationship between physical fitness and personality.

Physical fitness and personality traits: The relationship between physical fitness and personality traits.

Physical fitness and personality traits test: A test that measures the relationship between physical fitness and personality traits.

person and (2) studied the effect which improvement in physical fitness has on selected personality traits.

This study of personality was directed toward physical fitness which is a measure of motor efficiency, organic condition, and physique.¹⁰ It is related to previous studies like those by Keogh and Merriman which investigated the relationship of motor ability and personality.^{11,12} It is also related to studies by Keogh, Fulton, and Sperling which delved into the field of personality traits by examining achievement in physical education activities and in athletics.^{13,14,15}

It seems that physical fitness in its totality has failed to receive sufficient investigation. Components of physical fitness, such as physique, and results of superior physical fitness, such as excellence in athletic endeavors, have been analyzed to study their relationship to personality traits. However, the study of

¹⁰T. K. Cureton, Physical Fitness Appraisal and Guidance (St. Louis: C. V. Mosby Co., 1947), p. 18.

¹¹Jack Keogh, "Relationship of Motor Ability and Athletic Participation in Certain Standardized Personality Measures," Research Quarterly, XXX (December, 1959), pp. 438-445.

¹²J. Burton Merriman, "Relationship of Personality Traits to Motor Ability," Research Quarterly, XXXI (May, 1960), part I, pp. 163-173.

¹³Keogh, loc. cit.

¹⁴J. B. Fulton, "The Relationship Between Selected Personality Traits and Participation in Different Forms of Athletics and Gymnastics" (unpublished Master's thesis, University of Iowa, 1948).

¹⁵Abraham Sperling, "The Relationship Between Personality Adjustment and Achievement in Physical Education Activities," Research Quarterly, XIII (October, 1942), pp. 351-363.

the relationship of human physical fitness to personality traits has received scant attention.

It was felt that the relationship between physical fitness and personality traits constituted an area which needed thorough investigation. We are frequently sobered by the realization of the close inter-relationship between mind and body. Psychologists, psychiatrists, physical educators, and medical doctors, who specialize in the treatment of somatic ills, frequently emphasize this relationship.^{16,17,18} They know that many physical ailments have a mental basis and that a physical deterioration can result from a personality disorder.

Hypotheses. One of the hypotheses of this study was that variations in the degree of physical fitness would be accompanied by measurable differences in personality characteristics. This raised a rather obvious question which became the second hypothesis of this study: would an improvement in physical fitness be accompanied by a personality change or changes in the individual who improved his physical fitness through a planned program of physical exercise? The second hypothesis, that an improvement

¹⁶ Wesley M. Staton and John A. Rutledge, "Measurable Traits of Personality and Incidence of Somatic Illness Among College Students," Research Quarterly, XXVI (May, 1955), p. 203.

¹⁷ Francis J. Braceland, Psychiatry and Psychosomatic Medicine (New York: The Blakiston Company, 1953), 301 pp.

¹⁸ Otto Chrentheil, "Some Remarks About Somato-Psychic Compared to Psychosomatic Relationships," Psychosomatic Medicine, XXI (January-February, 1959), p. 7.

the relationship of the two groups of subjects
has received recent attention. It was found that
and personality factors were related to the
investigation. The results of the study showed
the close inter-relationship between the two
variables, personality and the results of the
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25. Journal of Personality and Individual Differences
1970, 11(1), 1-10.
26. Journal of Personality and Individual Differences
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27. Journal of Personality and Individual Differences
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28. Journal of Personality and Individual Differences
1970, 11(1), 1-10.
29. Journal of Personality and Individual Differences
1970, 11(1), 1-10.
30. Journal of Personality and Individual Differences
1970, 11(1), 1-10.

in physical fitness would be accompanied by a change in personality characteristics, was investigated.

Significance of the Study. The physical education profession frequently points out the benefits which result from physical activities. A strong case is made for the physical, mental, emotional, social, and spiritual benefits which result. Steinhaus pointed out that research is seeking to establish facts and discover relationships which exist between experiences in physical activities and the physical, mental, emotional, social, and spiritual outcomes generally ascribed to them.¹⁹

The research with which the present study deals had, as its aim, the investigation of two hypotheses. The first hypothesis was that a fit and an unfit person differ in personality traits, and the second one was that personality improvement would accompany improved physical fitness. The implications which such a finding would have are obvious. First, the therapeutic application of such a finding carries much significance for the psychologist, psychiatrist, medical doctor, and the physical therapist as well as the physical educator. In addition, such a finding would have propaganda value on which the physical education profession would be able to capitalize at a time when the physical condition of our population is being deplored.

Scope of the Study. This study covers the physical fitness

¹⁹Arthur H. Steinhaus, "Introduction," Research Quarterly, XXXI (May, 1960), p. 261.

measurement of 386 junior and senior boys from a Davenport, Iowa, high school. On the basis of a physical fitness test, two groups were obtained for comparison. One group consisted of the upper fifteen per cent on the fitness test, and the second group consisted of the lower fifteen per cent. A battery of three personality tests was administered to these groups and statistically analyzed.

The second phase of the study consisted of dividing the lower group into a control and an experimental group. The experimental group participated in a rigorous physical fitness program for two semesters. At the end of the school year, these groups were again tested on the physical fitness and personality tests and the results were statistically studied.

Definition of the Terms

Personality. The trait approach to personality is used for the purpose of defining personality as it is utilized in this study.²⁰ Personality is defined by Smith as being a "distinguishable individual, definable in terms of a qualitative and quantitative differentiation from other individuals."²¹ Traits are thought to be fairly permanent aspects of a person's behavior or experience which make it possible to distinguish one person

²⁰Ross Stagner, Psychology of Personality (New York: McGraw-Hill Company, Inc., 1961), p. 26.

²¹Henry Clay Smith, Personality Adjustment (New York: McGraw-Hill Company, Inc., 1961), p. 29.

from another. Personality is also considered to be composed of a variety of traits.

Leeper and Madison further suggest the following concerning personality:

Personality is particularly a matter of how the person represents and deals with things of emotional significance to him; personality is in some considerable degree a matter of the development and operation of the emotional potentialities of a person; personality is rather heavily social but is not limited merely to the interpersonal relations of the individual; and personality is not restricted solely to the parts of the person's life which he can include within his self-descriptions.²²

Physical Fitness. Physical fitness of the human body is composed of such components as motor efficiency, organic condition, and physique.²³ Therefore, physical fitness includes anatomical and physiological soundness as well as such elements of motor efficiency as endurance, power, strength, agility, flexibility, and balance.

Limitations of the Study

1) The control of many variables which affect physical fitness such as sleep, diet, and outside activities was impossible.

2) The experimental and control groups were assigned to their classes by the high school principal. Scheduling difficulties made it impossible to assign members to these groups on a

²²Robert Ward Leeper and Peter Madison, Toward Understanding Human Personalities (New York: Appleton-Century Crofts Inc., 1959), p. 30.

²³Cureton, op. cit., pp. 18-22.

from another person, by the use of a variety of tactics.

a variety of tactics.

to be used in the study of the individual.

personality:

Personality is a complex of characteristics and traits which are organized in a relatively stable and enduring pattern. It is the sum of all the qualities which determine the individual's behavior and which are expressed in his actions. The study of personality is the study of the individual as a whole, and of the factors which influence his behavior.

1. The study of personality is the study of the individual.

composed of such elements as the individual's physical, mental, and emotional characteristics.

2. The study of personality is the study of the individual's behavior.

3. The study of personality is the study of the individual's development.

4. The study of personality is the study of the individual's environment.

5. The study of personality is the study of the individual's heredity.

1. The study of personality is the study of the individual.

2. The study of personality is the study of the individual's behavior.

3. The study of personality is the study of the individual's development.

4. The study of personality is the study of the individual's environment.

5. The study of personality is the study of the individual's heredity.

6. The study of personality is the study of the individual's socialization.

7. The study of personality is the study of the individual's self-concept.

8. The study of personality is the study of the individual's motivation.

9. The study of personality is the study of the individual's intelligence.

10. The study of personality is the study of the individual's emotions.

11. The study of personality is the study of the individual's attitudes.

12. The study of personality is the study of the individual's values.

completely random basis. However, all members of both groups came from the lower fifteen percent of the original population.

3) It is possible that test score results might have been influenced by sickness, fatigue, or indisposition on the part of the boys even though attempts were made to do away with variable conditions such as these.

occasionally makes his
name from the fact that he is
20. It is possible that he is
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It is possible that he is
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CHAPTER II

REVIEW OF THE LITERATURE

Physical education textbooks and allied writings in the field of physical education stress the value and effect physical activities have on a person's personality. Such values as the relieving of emotional and mental stress through reasonable circulatory-respiratory fitness are claimed.¹ Many writers emphasize the personality characteristics which are developed due to the social situation in which a participant finds himself during a physical education activity.² Steinhaus presented the hypothesis that personality change takes place due to the "overload principle" being applied to personality. He indicated that perhaps the overloading of the mental-emotional mechanisms during a heated contest results in a personality change.³

The study of the handicapped has been important in developing the idea of the close relationship between physical fitness and personality. The idea has been advanced that general good health and vitality may contribute to characteristics which can

¹Wayne Van Huss et al., Physical Activity in Modern Living (Englewood Cliffs: Prentice Hall, Inc., 1960), p. 66.

²G. Lambertini, "Morphological and Psychological Traits Related to the Activity of the Athlete," Health and Fitness in the Modern World, A Collection of Papers (Chicago: Athletic Institute, 1961), p. 253.

³Arthur Steinhaus, Toward Understanding of Health and Physical Education (Dubuque, Iowa: William C. Brown, 1963), p. 46.

be used to describe a well-adjusted personality.⁴ It is also noted that investigations of psychosomatic medicine provide many indications of the effects of sustained emotional states upon the physical condition of man. Inversely, there are instances where physical conditions, such as cretinism, imply defects in mental functioning.⁵

In order to adequately understand the current status of personality studies in the physical education profession, it is necessary to make a historical survey of the previous studies in this area. The study of human personality has long intrigued mankind. The initial studies of personality in the physical education area were concerned with physique. However, at the present time, the emphasis in research seems to have shifted to the relationship of physical education activities and personality. This chapter will attempt to trace personality theories and studies which have been instrumental in paving the way for the present study of the relationship between personality and physical fitness.

Aristotle is said to have written a treatise on physiognomy. Physiognomy is now accepted only by charlatans; but, as Stagner points out, there is a widespread feeling among psychologists that

⁴George T. Stafford, Sports for the Handicapped (New York: Prentice Hall, Inc., 1947), p. 65.

⁵Beatrice Wright, Physical Disability - A Psychological Approach (New York: Harper and Brothers, 1960), p. 260.

the over-all physical pattern has some ill-defined relationship to personality.⁶

The possibility of a relationship between physical fitness (or some component of physical fitness) and personality has resulted in many theories which have attempted to point out various types of relationships between these areas. The historical contributions which have held a position of eminence or at least have stimulated thought which has led to further development in this area will be discussed.

The field of constitutional psychology is a challenging one. Much use is now made of physical fitness and/or its components both in studies on a controlled scientific level and on an observational level. For example, consider the importance of the physique when initial impressions are formed. These first impressions, which are influenced by a person's physique, can be a determining factor in whether or not a person obtains a job and whether or not he is accepted in a social situation. However, further basic research is needed to show more clearly the implications which physical fitness has for the personality. We need to know with more certainty whether or not a particular physical fitness condition predisposes an individual to a certain type of personality.

Further implications of study in the area of personality relationship to physical fitness will be clarified by presenting

⁶ Ross Stagner, Psychology of Personality (New York: McGraw-Hill Book Company, Inc., 1961), p. 274.

The overall physical pattern is not uniform, but is characterized by a general tendency to be somewhat irregular.

The possibility of a general tendency to be somewhat irregular (or some combination of physical factors) is not a new one, but is a well-known fact. It is a fact which has been noted in many cases, and is a fact which is not to be overlooked. It is a fact which is not to be overlooked, and is a fact which is not to be overlooked.

The field of investigation is not a new one, but is a well-known fact. It is a fact which has been noted in many cases, and is a fact which is not to be overlooked. It is a fact which is not to be overlooked, and is a fact which is not to be overlooked.

It is a fact which is not to be overlooked, and is a fact which is not to be overlooked. It is a fact which is not to be overlooked, and is a fact which is not to be overlooked.

Further exploration of the field is not a new one, but is a well-known fact. It is a fact which has been noted in many cases, and is a fact which is not to be overlooked.

It is a fact which is not to be overlooked, and is a fact which is not to be overlooked. It is a fact which is not to be overlooked, and is a fact which is not to be overlooked.

recent findings and theories. The controversies which have accompanied theories, and the studies which are aimed toward providing proof will illuminate the current thinking about constitutional psychology.

Initial studies about the relationship of physical fitness and personality were concerned only with the physique component of physical fitness. Sheldon's theory has occupied a very important position among the theories which have attempted to explain this relationship. Many additional studies have been conducted to test various aspects of his theory.

The next step was to investigate the relationship of personality to various degrees of motor ability as found in various physical education activities. The athlete (variously defined) compared to the non-athlete is a common technique employed in this type of study. A similar study is one in which the personality characteristics of one athletic group are compared with the personality characteristics of another athletic group that participates in a different sport.

Research which attempts to examine personality in the light of various states of physical fitness has appeared in the literature only in recent years. These studies have formed the foundation for this study which delves into the problem of physical fitness change and its effect, if any, upon personality characteristics.

History of Physique and Personality Studies. Hippocrates is frequently referred to as being one of the first to leave any

recent findings and theories. This is a very important point, and the author has done a very good job of presenting it. The book is well written and easy to read. It is a very good introduction to the field of psychology.

Initial studies about the nature of intelligence and personality were conducted in the early 20th century. These studies were very important in the development of the field of psychology. They showed that intelligence and personality are not fixed traits, but rather are influenced by the environment.

and personality were found to be related to the environment. This was a very important finding, as it showed that the environment can shape the individual. This finding has been supported by many other studies, and it is now a well-established fact in the field of psychology.

The next step was to see if the environment could be manipulated to change the individual. This was done in a series of experiments, and the results were very interesting. It was found that the environment can indeed be manipulated to change the individual, and this has been a major finding in the field of psychology.

of various states of mind. This was a very important finding, as it showed that the mind is not a fixed entity, but rather is a dynamic system that can change. This finding has been supported by many other studies, and it is now a well-established fact in the field of psychology.

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History of Psychology and the Future of the Field. This is a very important point, and the author has done a very good job of presenting it. The book is well written and easy to read. It is a very good introduction to the field of psychology.

records revealing an interest in the importance of different types of physiques. He defined two types of body build. The habitus apoplecticus was a physique which was short and stocky. It was characterized by a thick chest and full abdomen. The habitus phthisicus physique was long and thin with a flat chest, long arms and legs, a long slender neck, and a narrow head and oval face. Hippocrates felt that a particular physique predisposed a person to certain diseases. He felt that the muscular habitus apoplecticus physique was vulnerable to apoplexy, and that the relatively delicate habitus phthisicus physique was susceptible to tuberculosis.^{7,8}

Hippocrates was also instrumental in the development of the doctrine of temperaments which bears his name. Galen is credited with the actual formulation of this doctrine, but it is based on the theories of Hippocrates. Hippocrates believed that a proper balance of different body fluids was necessary for health. Galen stated that individuals differ in their temperaments according to which fluid is more abundant. The choleric person was thought to have an abundance of yellow bile secreted by the liver, and the melancholic person was thought to have relatively more black bile which was supposed to be secreted by the spleen. The sanguine person was characterized by an abundance of blood and the

⁷Clements C. Fry and Howard W. Haggard, The Anatomy of Personality (New York: D. Van Nostrand Company Inc., 1958), p. 38.

⁸Pauline M. Alt, "Relationship of Physique and Temperament," School Review, LXI (May, 1953), p. 267.

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phlegmatic person by phlegm. These ideas of Hippocrates can perhaps be considered the beginning of the study of the relationship between physique and personality which has gained increased emphasis through the years.⁹

Another contribution to the present status of constitutional psychology was made by Rostan, a Frenchman who has given classic descriptions of the digestive, muscular, respiratory, and cerebral types. He is credited with elaborating and sharpening certain rather universal concepts about physique which had been taken for granted by himself and a long line of his predecessors.¹⁰

Sheldon credits the Italians with the first vigorous attempt to make use of anthropometry in defining constitutional differences. Di Giovanni founded a school of clinical anthropology at Padua about 1885. At this school he standardized many of the now common anthropometric techniques. Another Italian, Viola, developed what he called the morphological index. This index measured the linearity of a human body. A person with a high morphological index is microsplanchnic (small bodied with relatively long limbs), and the macrosplanchnic (large bodied with relatively short limbs) has a low morphological index. Viola believed that microsplanchnic people were relatively intelligent and macrosplanchnic

⁹ Solomon Diamond, Personality and Temperament (New York: Harper and Brothers, 1957), pp. 129-130.

¹⁰ J. McVicker Hunt, Personality and the Behavior Disorders (New York: The Ronald Press, 1944), vol. I, p. 527.

people were of relatively low intelligence.¹¹ Sheldon feels that such Italians as di Giovanni, Viola, and Pende were the first to demonstrate a statistically supported relationship between a general morphological variable and a psychological variable.¹² Their work was a stimulus to American research in this field.

Beneke, a German pathologist, recorded precise measurements upon the internal organs of diseased people. Although he changed the terminology, he followed the classification of Rostan in his theoretical conception.¹³ Beneke gave one of the first documented modern contributions to constitutional medicine. However, he made no attempt to establish norms for physical variation, nor did he develop a basic taxonomy aimed at isolating and describing components of physique.

A name which stands out in the area of physique and personality studies is that of Ernst Kretschmer. His thoughts and his writings on this subject have been extremely important in stimulating research in connection with this problem. His findings have also served as an impetus to such theorists as Sheldon. Kretschmer noted three principal recurring types of physique which he said emerged from clinical material.¹⁴ He called these types

¹¹Ibid., p. 528.

¹²Ibid., p. 529.

¹³Ibid., pp. 529-530.

¹⁴Ernst Kretschmer, Physique and Character (2nd ed., London: Kegan, Paul, Trench, Trubner, and Co. L.T.D., 1936), p. 20.

people were of relatively low intelligence. It was found that each individual as a group, first to demonstrate a difference between a general population and a specific group. It was found that there was a significant difference between the two groups. The results of the study are as follows: the first group, the second group, the third group, the fourth group, the fifth group, the sixth group, the seventh group, the eighth group, the ninth group, the tenth group, the eleventh group, the twelfth group, the thirteenth group, the fourteenth group, the fifteenth group, the sixteenth group, the seventeenth group, the eighteenth group, the nineteenth group, the twentieth group, the twenty-first group, the twenty-second group, the twenty-third group, the twenty-fourth group, the twenty-fifth group, the twenty-sixth group, the twenty-seventh group, the twenty-eighth group, the twenty-ninth group, the thirtieth group, the thirty-first group, the thirty-second group, the thirty-third group, the thirty-fourth group, the thirty-fifth group, the thirty-sixth group, the thirty-seventh group, the thirty-eighth group, the thirty-ninth group, the fortieth group, the forty-first group, the forty-second group, the forty-third group, the forty-fourth group, the forty-fifth group, the forty-sixth group, the forty-seventh group, the forty-eighth group, the forty-ninth group, the fiftieth group, the fifty-first group, the fifty-second group, the fifty-third group, the fifty-fourth group, the fifty-fifth group, the fifty-sixth group, the fifty-seventh group, the fifty-eighth group, the fifty-ninth group, the sixtieth group, the sixty-first group, the sixty-second group, the sixty-third group, the sixty-fourth group, the sixty-fifth group, the sixty-sixth group, the sixty-seventh group, the sixty-eighth group, the sixty-ninth group, the seventieth group, the seventy-first group, the seventy-second group, the seventy-third group, the seventy-fourth group, the seventy-fifth group, the seventy-sixth group, the seventy-seventh group, the seventy-eighth group, the seventy-ninth group, the eightieth group, the eighty-first group, the eighty-second group, the eighty-third group, the eighty-fourth group, the eighty-fifth group, the eighty-sixth group, the eighty-seventh group, the eighty-eighth group, the eighty-ninth group, the ninetieth group, the ninety-first group, the ninety-second group, the ninety-third group, the ninety-fourth group, the ninety-fifth group, the ninety-sixth group, the ninety-seventh group, the ninety-eighth group, the ninety-ninth group, the one hundredth group.

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asthenic (later to be called leptosome), athletic, and pyknic. He described the characteristics which distinguish each of these groups.^{15,16} The pyknic has a short and thick neck with roundness of all parts of the body. The pyknic has great volume in the cavities such as the chest, abdomen, and skull. The leptosome is noted for the lack of volume in the cavities of the body. The chest is long and flat and does not widen out toward the lower part. The face is angular and irregular. The legs and arms are long and thin with lean muscles. The athletic physique is characterized by the heavy development of the bones and the muscles which stand out. The shoulders are wide in comparison with the hips and the chest is well developed. The abdomen is small and the trunk is tapered. Kretschmer also distinguished a fourth group which he referred to as being the dysplastic type. The dysplastic type actually consisted of a series of small groups which do not fit into any of the other three groups. Kretschmer felt that these groups differ considerably among themselves and each group contains only a few members.¹⁷

Kretschmer's study began as a study of two extreme mental disorders, schizophrenia and manic depressive psychosis.¹⁸ From

¹⁵Ibid., pp. 17-37.

¹⁶Fry, op. cit., pp. 45-47.

¹⁷Kretschmer, loc. cit., p. 67.

¹⁸Ross Stagner, Psychology of Personality (New York: McGraw-Hill Book Company, Inc., 1961), p. 274.

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his observation of these groups, he developed the idea of two normal temperamental types which he called the schizoid and the cycloid. The schizoid was characterized as being unsociable, quiet, serious, reserved, and prone to dissociation. Kretschmer viewed the cycloid as being sociable, good natured, humorous, impulsive, and prone to marked variations of mood. He further believed that a normal cycloid would develop manic depressive psychosis and a schizoid would develop schizophrenia if he broke down. Kretschmer's idea of the relationship between physique and personality developed when he found that his cycloids and manic depressives were mostly of the pyknic build and his schizoids and schizophrenes were predominantly of the leptosome or athletic build. He also felt that the dysplastics were found mostly in the schizophrenic class.^{19,20}

Stagner states, "At present the preponderance of evidence seems to favor his (Kretschmer) interpretation as regards psychotics. Studies of normal individuals, however, have failed to confirm Kretschmer's predictions."²¹

Sheldon credits Kretschmer with making at least four contributions to the constitutional field in addition to inspiring many others to research and study in this area.²²

¹⁹Stagner, Ibid., p. 274.

²⁰Kretschmer, loc. cit., p. 36.

²¹Stagner, loc. cit., pp. 274-275.

²²Hunt, op. cit., pp. 530-531.

This observation of three types of response, the normal, the hysterical, and the psychotic, was made in a study of the response to a certain type of stimulus. The hysterical response was characterized by a certain type of response, and the psychotic response by a certain type of response. The normal response was characterized by a certain type of response, and the hysterical response by a certain type of response. The psychotic response was characterized by a certain type of response, and the hysterical response by a certain type of response. The normal response was characterized by a certain type of response, and the hysterical response by a certain type of response. The psychotic response was characterized by a certain type of response, and the hysterical response by a certain type of response.

It is also to be noted that the hysterical response was characterized by a certain type of response, and the psychotic response by a certain type of response. The normal response was characterized by a certain type of response, and the hysterical response by a certain type of response. The psychotic response was characterized by a certain type of response, and the hysterical response by a certain type of response. The normal response was characterized by a certain type of response, and the hysterical response by a certain type of response. The psychotic response was characterized by a certain type of response, and the hysterical response by a certain type of response.

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- 1. Stagner, J. B., ibid., p. 274.
 - 2. Stagner, J. B., ibid., p. 274.
 - 3. Stagner, J. B., ibid., p. 274.
 - 4. Stagner, J. B., ibid., p. 274.

1) He revived the typology concept in what had previously been its most highly developed form. He redefined and sharpened typology and for the first time made it widely and popularly available.

2) He added for the first time the idea of dysplasia, or mixture of types. This represents a long stride in constitutional research since it has led to the idea of continuous distributions and measurable elemental components instead of types. However, it should be noted that Kretschmer did not take this latter step.

3) Kretschmer also demonstrated a statistical relationship between physical constitution and two psychiatric entities (schizoid and manic-depressive forms of psychopathology).

4) He has extended the type concept beyond morphology to include temperament.

It is difficult to give a comprehensive list of all those who have contributed to the development of a constitutional concept of man. Medicine has been important in giving an impetus to constitutional thinking by emphasizing the idea that the physiological organism must be considered as an integrated unit which reacts as a whole and not in parts.²³ The psychoanalytic influences have also been important in developing a point of view which postulates the total organism as the primary focus of study.²⁴ However, William H. Sheldon would rank as one of the

²³Hunt, Ibid., pp. 533-534.

²⁴Ibid., p. 536.

1) He reviews the type of...
...the most highly developed...
...the time...
...whole.

2) He adds for the first time...
...This represents a...
...the search...
...and...
...should be noted that...

3) He also discusses...
...between physical...
...and...
...He has extended the type...
...to include...

It is difficult to give a...
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4) However, William H. ... study.

Leading contributors to the field of constitutional psychology. His somatotype studies and numerous books have stimulated much research and thought in this area. Sheldon does not feel that there is a focus or school of constitutional research either in England or America. However, he does think that we have learned to deal with integrated personality patterns rather than with isolated segments of structure and behavior. We have also learned, feels Sheldon, to contrive to measure elemental components at those levels of personality at which we choose to work.²⁵

Sheldon has made an important contribution with his idea of continuous distribution of physiques and personality. The conception that a person is not exclusively of one type but rather is located on a continuum has been a valuable contribution to constitutional psychology.

Sheldon's technique of somatotyping was built up by combining anthroposcopy with a detailed consideration of anthropometric measurements.²⁶ The three components he found in each person are referred to by the terms endomorphy, mesomorphy, and ectomorphy. He defines these three components in the following way:²⁷

Endomorphy. Relative predominance of soft roundness throughout the various regions of the body. When endomorphy is dominant the digestive viscera are massive and tend relatively to dominate the bodily economy. The digestive viscera

²⁵Hunt, ibid., pp. 531-532.

²⁶William H. Sheldon, The Varieties of Human Physique (New York: Harper and Brothers, 1942), p. 58.

²⁷Ibid., pp. 5-6.

leading contributors to the field of constitutional psychology. This somatotype method and numerous books have appeared and much research has been done in this area. Studies have not been made in a large or small of constitutional research either in England or America. However, we have found that we have learned to deal with the various personality patterns rather than with isolated segments of structure and behavior. We have also learned to be sensitive to certain elemental components in these levels of personality at which we appear to work. Studies have made an important contribution with this line of research. The concept of structure and personality. The concept is that a person is not exclusively of one type but rather is located on a continuum. There has been a valuable contribution to constitutional psychology.

Kretschmer's technique of somatotyping was built up by correlation and anthropometry with a detailed consideration of anthropometric measurements. The three components he found in each person are referred to by the terms endomorphy, mesomorphy, and ectomorphy. He defines these three components in the following way:

Endomorphy. Relative predominance of soft rounded features in the various regions of the body. When endomorphy is dominant the digestive viscera are sensitive and the body is relatively to dominate the bodily economy. The digestive viscera

 

26. William F. Floyd, The Varieties of Human Physique (New York: Harper and Brothers, 1942), p. 35.

 

are derived principally from the endodermal embryonic layer.

Mesomorphy. Relative predominance of muscle, bone and connective tissue. The mesomorphic physique is normally heavy, hard and rectangular in outline. Bone and muscle are prominent and the skin is made thick by a heavy underlying connective tissue. The entire bodily economy is dominated, relatively, by tissues derived from the mesodermal embryonic layer.

Ectomorphy. Relative predominance of linearity and fragility. In proportion to his mass, the ectomorph has the greatest surface area and hence relatively the greatest surface exposure to the outside world. Relative to his mass he also has the largest brain and central nervous system. In a sense, therefore, his bodily economy is derived from the ectodermal embryonic layer.

Sheldon determined an individual's somatotype by rating him on each component (endomorph, mesomorph, and ectomorph) on a seven point scale. His system of rating is based on measurements of seventeen anthropometric characteristics, in addition to the ponderal index, or ratio of height to the cube root of weight which is the best single indicator of somatotype.²⁸ Components are regarded as continuous variables of which different physiques can exhibit different amounts. The numeral 1 is used to designate the least degree of any one component and the numeral 7 is used for the maximum degree of any component. A person can vary from 1 to 7 on each of these components. Seventy-six different combinations (somatypes) have been found.²⁹ The sum of the index numbers is never less than 9 or more than 12 and the first number

²⁸Diamond, op. cit., pp. 139-140.

²⁹Sheldon, loc. cit., pp. 6, 60-66.

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and derived chemical layer.

Relative frequency of occurrence of the various types of fossils in the different layers of the section is as follows: Layer 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Relative frequency of occurrence of the various types of fossils in the different layers of the section is as follows: Layer 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Relative frequency of occurrence of the various types of fossils in the different layers of the section is as follows: Layer 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

on each of the various layers of the section. The relative frequency of occurrence of the various types of fossils in the different layers of the section is as follows: Layer 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

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represents endomorphy, the second mesomorphy, and the last ectomorphy.³⁰ Five body regions are considered when somatotyping. The head and neck, thoracic trunk, arms and hands, abdominal trunk, and legs and feet are all taken into consideration with Sheldon's anthropometric measurements.³¹

Sheldon feels that the somatotype does not change from one period to another in the life of a person. He explains his position in this regard in his book, Varieties of Delinquent Youth.

When I wrote that no case had been discovered in which there had been a convincing change in the somatotype I meant that in all cases where there seemed to be a change, I had been convinced, on reexamination of both or all photographs, that I (or someone) had made an unnecessary error in the first judgment: that in fact the different photographs showed the same somatotype rightly enough and that an error had in the first place been made, presumably, because of a variation of nutrition or development.³²

In addition to his physique work Sheldon has made important contributions in the area of personality characteristics and their relationship to physique. Diamond states that the really important aspect of Sheldon's work is his definition of temperamental syndromes.³³ Sheldon standardized the descriptions of sixty traits--twenty in each of three correlated clusters--which collectively make up a scale for measuring what appears to be three primary components of temperament. Within each of the clusters

³⁰ Diamond, loc. cit., p. 140.

³¹ Sheldon, loc. cit., p. 84.

³² William H. Sheldon, Varieties of Delinquent Youth (New York: Harper and Brothers, 1940), p. 32.

³³ Diamond, loc. cit., p. 145.

representative endowment, the second endowment, and the third endowment. The first body regions are considered when endowment is low, the head and neck, thoracic trunk, arm and hand, abdominal trunk, and legs and feet are all taken into consideration. Sheldon's anthropometric measurements.

Sheldon feels that the endowment does not change from one period to another in the life of a person. He explains the basis upon which this is based in his book, Variables of Maturity.

When I wrote that no one had been discovered in which there had been a surprising change in the somatotype I meant that in all cases where there seemed to be a change, I had been convinced, on examination of both of all photographs that I (or someone) had made an unnecessary error in the first judgment: that is, the different photographs showed the same somatotype slightly enough and that an error had in the first place been made, probably, because of a variation of position or development.

In addition to his physical work, Sheldon has been interested in the area of personality characteristics and their relationship to physique. He has stated that the really important aspect of Sheldon's work is his definition of temperamental types. Sheldon standardized the descriptions of sixty temperamental types and each of these correlated standard types. He actively made up a scale for measuring what appears to be the primary components of temperament. With each of the subjects

30 Diamond, loc. cit., p. 190.

31 Sheldon, loc. cit., p. 81.

32 William H. Sheldon, Variables of Maturity (New York: Harper and Brothers, 1940), p. 31.

33 Diamond, loc. cit., p. 191.

these traits are positively correlated, while all of the inter-correlations between traits not of the same cluster are negative.³⁴

The primary components of temperament are referred to as viscerotonia, somatotonia, and cerebrotonia. According to Sheldon each of these components have certain characteristics.³⁵

Viscerotonia. Characterized by general relaxation, love of comfort, sociability, conviviality, and gluttony for food, for people, and for affection. Personality seems to center around the viscera.

Somatotonia. Predominance of muscular activity and of vigorous bodily assertiveness. Motivational organization seems dominated by the soma. Characterized by vigor and push. Action and power define life's primary purpose.

Cerebrotonia. Predominance of the element of restraint, inhibition, and of the desire for concealment. These people shrink away from sociality as from too strong a light. They repress somatic and visceral expression, are hyperattentive, and sedulously avoid attracting attention to themselves. Behavior seems dominated by the inhibitory and attentional functions of the cerebrum and their motivational hierarchy appears to define an anti-thesis to both of the other extremes.

Sheldon has found high correlations between his physique types and personality components. He feels that an endomorphic person is characterized by a viscerotonic temperament, a mesomorphic person with a somatotonic temperament, and an ectomorphic person with a cerebrotonic temperament. He reports correlations of .79 for endomorphy with viscerotonia, .82 for mesomorphy with

³⁴William H. Sheldon, The Varieties of Temperament (New York: Harper and Brothers, 1942), p. 10.

³⁵Ibid., pp. 10-11.

the first two sections, especially the first, are devoted to a discussion of the correlation between the two types of disease.

The following is a summary of the results of the investigation.

1. The disease is characterized by a combination of the following features:

(a) A chronic, insidious onset, with a gradual increase in the severity of the symptoms.

(b) A marked tendency to relapse, especially after a period of apparent remission.

(c) A high mortality rate, especially in the later stages of the disease.

(d) A marked tendency to spread to other organs, especially the lungs and the heart.

(e) A marked tendency to form abscesses, especially in the lungs and the liver.

(f) A marked tendency to form fistulae, especially in the lungs and the liver.

(g) A marked tendency to form emphysema, especially in the lungs.

(h) A marked tendency to form bronchitis, especially in the lungs.

(i) A marked tendency to form pneumonia, especially in the lungs.

somatotonia, and .83 for ectomorphy with cerebrotonia.³⁶

Sheldon does state that the correlation between physique and temperament is by no means perfect and from the point of view of individual analysis it seems to be the disagreements or inconsistencies between the physical and temperamental pattern that throw the most light on behavior.³⁷ He cautions that when correlating some aspect of human behavior with somatotype, we need, in general, to consider the entire range of somatotypes rather than the variation of single components since it is possible for a trait of personality to correlate highly with somatotype and yet show zero correlation with one of the three components taken alone.

Sheldon states that there are four general factors at work in the development of a personality.³⁸ There is the total strength of endowment in each of the three primary components, the quality of such endowment, the mixture of the components or their order of relative strength, and the incompatibilities between morphology and manifest temperament.

From the time of Hippocrates men have been interested in physique. They have also been struggling to find a relationship between physique and various personality classifications. This

³⁶ Stagner, op. cit., p. 275.

³⁷ William H. Sheldon, The Varieties of Temperament (New York: Harper and Brothers, 1942), p. 11.

³⁸ Ibid.

type of study reached its highest point under Sheldon who found high correlations between physique and personality traits.

Sheldon's work has stimulated much of the current interest in this phase of psychology. There have been many criticisms of his work but there seems to be a general agreement that he has made valuable contributions in this area. Sheldon's work led to further studies which have attempted to scientifically investigate the relationship of physique and personality.

Physique and Personality Studies. Diamond feels that although it is true that Sheldon has found very high correlations between morphological and temperamental components, his results have been received with a good deal of skepticism. This is because it is obviously impossible for anyone familiar with the general theory to carry out this long process of appraisal without being influenced by knowledge of the body build of the subject. Diamond then says, "It must therefore be assumed that a strong halo effect is present in all of Sheldon's ratings, but it is not possible wholly to dismiss his conclusions on these grounds."³⁹

Stagner has also pointed out that when temperamental traits are measured by ratings made by people who know exceedingly well the basic scheme of somatotypes, as well as the defining traits of the three temperamental components, there is a virtually unlimited opportunity for subjective contamination of the temperamental ratings.⁴⁰

³⁹Diamond, op. cit., p. 143.

⁴⁰Stagner, op. cit., p. 277.

type of study - namely the history of the
high correlation between the two variables
mentioned, a work has been done in the
this phase of research. The work has
the work has shown that there is a
made valuable contributions to the
further studies which have been suggested
state the relationship of the two variables.

Physiology and Psychology
Although it is true that the relationship
between physiological and psychological
have been received with a good deal of
cause it is generally accepted that the
general theory of the mind and the
out being influenced by knowledge of the
fact. Although this is true, the fact
strong this effect is present, the fact
cannot possibly be wholly in the mind.

Stenger has also pointed out that the
are measured by tests made of the
the same nature of association, the
of the two experimental components, the
limited opportunity for the study of the
social changes.

Stenger, op. cit., p. 10.
Stenger, op. cit., p. 10.

Adcock reports a factorial examination of Sheldon's types which tends to support the portion of Sheldon's findings which states that the first component, viscerotonia, seems to be less specific and less sharply definable as a contrasting entity than is the case with the other two components, somatotonia and cerebrotonia.⁴¹ Adcock is of the opinion that somatotonia and cerebrotonia have a common bipolar factor which tends to give them a sharp contrast, whereas another factor is involved only in viscerotonia. Against each other the second and third components stand out sharply, but the amorphous first component blends more readily with other aspects of temperament.

Lorr and Fields also tend to support Sheldon in some respects although they suggest that the seventy-six somatotypes can more simply and economically be defined in terms of measurements on only two type factors. One factor is bipolar and is defined at either end by the endomorphs and ectomorphs. At one end of the factor is the individual who is fat, relatively heavy, has a low height to weight ratio, high trunk volume, wide hips, a low shoulder width to hip width ratio, and a low trunk length to leg length ratio. The ectomorphic individual who is at the other end of this continuum is thin, weighs relatively little, has small trunk volume, narrow hips, a high height to weight ratio, and a high trunk length to leg length ratio. Muscularity is relatively

⁴¹C. J. Adcock, "A Factorial Examination of Sheldon's Types," Journal of Personality, XVI (March, 1958), 319.

... which tends to support the position that the ...
... the first component, ...
... and last strongly ...
... the case with the other ...
... Adapted to the ...
... have a common ...
... sharp contrast, ...
... defines ...
... one simply, but the ...
... with other aspects of ...
... last and first also ...
... species ...
... own more slowly and ...
... means as only two ...
... first at ...
... of the factor in the ...
... allow ...
... shoulder when ...
... length ...
... of this ...
... trunk volume, ...
... high trunk length to leg length ...

absent in both groups.⁴²

The second factor which was found in this study using ninety hospitalized male psychotic patients is descriptive of the mesomorphs as a group. They are highly muscular in all regions of the body and their shoulders are relatively wide. The shoulder width to hip width ratio is high and they tend to be between the other two groups in weight, chest width, trunk volume, height to weight ratio, and trunk length to leg length ratio.

Lorr and Fields feel that this study demonstrated the existence of three distinguishable groups and two body factors. They also found that the three groups exhibited morphological trait patterns that closely resemble the patterns descriptive of Sheldon's components.⁴³

Smith checked ten hypotheses derived from Sheldon's work by means of psychometric devices. He found that only one was established with any certainty and this was verbal comprehension which was related positively to ectomorphy and negatively to mesomorphy. He did find that of the thirty-three correlations fifty-eight per cent were in the order inferred from Sheldon whereas thirty-three and one-third would be expected by chance.⁴⁴ It should be mentioned that the somatotyping procedure raises

⁴²Maurice Lorr and Victor Fields, "A Factorial Study of Body Types," Journal of Clinical Psychology, X (April, 1954), pp. 182-185.

⁴³Ibid., p. 185.

⁴⁴Henry Clay Smith, "Psychometric Checks on Hypotheses Derived from Sheldon's Work on Physique and Temperament," Journal of Personality, XVII (March, 1949), pp. 319-320.

some question in this study since the Sheldon method was not exclusively followed when rating the components of physique. It is also possible that the hypotheses Smith derived from Sheldon would not be completely accepted by Sheldon or others who are advocates of Sheldon's work.

Winthrop measured the attitude consistency of seven different somatotype groups which were based upon Sheldon's constitutional taxonomy. He found that the consistency of the subject's attitudes was related to somatotype to a significant degree. He noted that relatively low value integrity was found for individuals with a high endomorphic component and a relatively high value integrity for those with a high ectomorphic component. (These polar components seemed to be related to highly extroverted and introverted tendencies.) Of further interest was the fact that he found the value integrity achievable for the purely mesomorphic person to lie midway between that of the pure endomorph and the pure ectomorph. He suggests that this component is a balancing factor between two possible extremes of attitude consistency.⁴⁵

Sheldon carried out an extensive study of delinquent boys. He found that they tended to be decidedly mesomorphic.⁴⁶ However, he cautions that the mesomorphic category is characterized

⁴⁵ Henry Winthrop, "The Consistency of Attitude Patterns as a Function of Body Type," Journal of Personality, XXV (March, 1957), p. 382.

⁴⁶ William H. Sheldon, Varieties of Delinquent Youth (New York: Harper and Brothers, 1949), pp. 729-730.

some question in this study since the results were
exclusively followed when testing was repeated.
It is also possible that the hypothesis
Hypothesis would not be generally accepted
who are advocates of Sheldon's theory.
Although necessary, the results of this study
and nonatypical groups which were found
typical tendency. He found that the
studies was related to somatotype
noted that relatively low values
data with a high endomorphic component
intensity for those with a high
polymorphic elements seems to be
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he found the value intensity
pattern in the study between that of
pure somatotype. He suggests that this
factor between two possible extremes
Sheldon derived out an endomorphic
He found that they tended to be
over, he cautions that the measurement

⁴⁵ Henry M. Wintrop, "The Constitution
a Function of Body Type," *Journal of Psychology*,
p. 388.

⁴⁶ William M. Sheldon, *Variation in Man*,
New York: Harper and Brothers, 1941.

by energetic vitality and freedom from inhibition. These are factors which are important in most of the things man undertakes whether it be crime or some other more acceptable pursuit. Sheldon cautions that somatotype alone has virtually no predictive value. However, he does feel that it offers a clue to an understanding of criminal types (and perhaps other personality deviations) which can contribute to its treatment and control.⁴⁷

A study by Hanley on physique and reputation of junior high school boys showed associations between physique and reputation which seemed congruent with Sheldon's hypotheses insofar as the kinds of relationships are concerned, but the size of the relationships were not as large as those reported by Sheldon.⁴⁸ The highest correlations in this study were obtained between mesomorphy and variables which tend to describe the common conception of the all-American boy. Hanley feels that it should be expected that a boy with superior muscular equipment would excel in high prestige traits and thereby gain greater social rewards than would the punier lads.

Child carried out a study which is of the type needed to adequately test Sheldon's theory. A questionnaire was constructed to obtain self-ratings on a variety of personal characteristics asserted by Sheldon to be related to somatotype. Four

⁴⁷ Sheldon, ibid., p. 745.

⁴⁸ Charles Hanley, "Physique and Reputation of Junior High School Boys," Child Development, XXII (December, 1951), pp. 256-257.

hundred male college sophomores who had been accurately somatotyped answered the questionnaire. Child came to the conclusion that Sheldon's findings as to the existence and direction of correlations between somatotype and a variety of personal characteristics, when tested with this more objective technique, were on the whole confirmed. He also found that, although the correlations were consistent with the idea that somatotype is an important determinant of personality, the size of the correlations were not large enough to establish this relationship. He also cautions that the only apparent source of error which might prevent these conclusions from being taken as certain lies in the fact that the initial selection of subjects was not entirely a random one.⁴⁹

Clark Heath in his book, What People Are: A Study of Normal Young Men, makes an interesting observation about the importance which physique study has to an understanding of personality. He remarks that one of the important ways of understanding a person is to know something about his physical structure and appearance, because these are integral parts of the individual's personality. He further states that there is an element of oneness between physical structure and personality in that we are continually exposed to individual differences in physical characteristics and, in general, we believe that there are certain relations between physique and personality, but we are not certain as to the nature

⁴⁹ Irvin L. Child, "The Relationship of Somatotype to Self-Ratings on Sheldon's Temperamental Traits," Journal of Personality, XVIII (June, 1950), p. 452.

of the relationships which exist.⁵⁰

Perhaps the relationship which is commonly expected between a physique type and personality traits influences the development of a person's personality. Brodsky's study would lend support to this viewpoint. He made silhouettes of male body types and constructed a questionnaire about them. This questionnaire was given to 125 male medical and dental students, from a negro and a white university, who participated in this study.⁵¹ He found that the endomorph silhouettes were judged to be the least aggressive, to be the poorest athletes, to drink the most, and were generally rated in an uncomplimentary manner. The ectomorphs were also rated on a negative scale. Among their classification categories were those which portrayed them as being least self-sufficient, making a poor father, and smoking three packs of cigarettes a day. The mesomorphs were positively classified by the participants in this study. They were preferred most as a friend, were considered to be the best leaders, and were viewed as being the best athletes.

This study suggests the possibility of a reinforcement effect which might influence the shaping of a person's personality. For example, perhaps an endomorph would not receive adequate opportunity or encouragement to develop leadership qualities because

⁵⁰Clark W. Heath, What People Are: A Study of Normal Young Men (Cambridge: Harvard University Press, 1946), p. 56.

⁵¹G. M. Brodsky, A Study of Norms for Body Form-Behavior Relationships (Washington, D.C.: Catholic University of America Press, 1954).

of the relationship which exists
between the various types and
varieties of a person's character
and the various types and
varieties of his mind. It is
found that the human mind is
capable of being trained to
be generally more or less
responsive to the various
types and varieties of
stimuli which are presented
to it. This is the basis
of the various types and
varieties of human behavior
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varieties of human behavior
which are observed in the
world.

John A. Smith, M.D.
New York, N.Y.
1910

he would not be considered capable in this area by his parents, his teachers, or his peers. His physique would put him in a personality category which our society attributed to the endomorphic person.

Matte-Blanco hypothesizes that in some cases the body structure determines a psychical behavior while in other instances the psychical may have a determining influence on the shape of the body.⁵² He also points out that although there "obviously exists a high correlation between physique and temperament" it should not be overlooked that other factors such as cultural patterns are also very important in personality formation.⁵³ In this regard, a person with a given constitution might develop either a neurotic conflict or a conflict with his environment if placed in an environment which is not favorable to the expression of his particular temperament. In such cases, the constitutional approach might very likely help solve the problem.

William H. Sheldon makes some thought provoking claims for the importance of somatotype in personality study. He states that the somatotype appears to be the most deep-seated, most general, and most overt expression of personality that a human being presents. He thinks that it is possibly the least changing

⁵²Ignacio Matte-Blanco, "The Constitutional Approach to the Study of Human Personality," Psychiatric Research Reports 2: Approaches to the Study of Human Personality (December, 1955), p. 135.

⁵³Ibid., pp. 143, 149.

he would not be considered amenable to this area by the parents, his teachers, or his peers. His physique would put him in a personality category which is usually attributed to the athletic person.

Katze-Bianco hypothesizes that in some cases the body structure determines a particular behavior while in other instances the personality may have a determining influence on the shape of the body. He also points out that although there "obviously exists a high correlation between physique and behavior," it should not be overlooked that other factors such as emotional patterns are also very important in personality formation. In this regard, a person with a given constitutional might develop either a neurotic conflict or a conflict with his environment if placed in an environment which is not favorable to the expression of his particular temperament. In such cases, the constitutional approach might very likely help solve the problem.

William R. Shalton makes some thought provoking claims for the importance of somatotype in personality study. He states that the somatotype appears to be the most deep-seated, most general, and most over expression of personality that a human being possesses. He thinks that it is possibly the least changing

Katze-Bianco, "The Constitutional Approach to the Study of Human Personality," *Psychological Research* 2: 22-30 (December, 1953), p. 135.

manifestation of human personality that is both overt and general.⁵⁴

The other extreme in viewing the relationship of physique and personality is summed up in a humorous excerpt from Shaffer. "Perhaps all that is of value in the theories of physical habitus is adequately summarized in the old humorous statement that a fat boy has to be good-natured because he can't fight and he can't run."⁵⁵

Sheldon's original work has not been completely substantiated in subsequent studies. There is still controversy about how much we can learn about personality by studying physique. However, researchers do agree that physique studies have made important contributions to our knowledge of personality.

Physique studies were important in forming the basis for related studies which gained prominence in the literature of physical education. These studies investigated personality and its relationship to athletics and motor ability.

Athletics, Motor Ability and Personality. Expanding from physique studies researchers eventually bridged the gap to the eventual study of physical fitness and personality by investigating athletes, groups such as physical education classes, and individuals with varying degrees of motor ability.

⁵⁴ William H. Sheldon, Atlas of Men (New York: Harper and Brothers, 1954), p. xv.

⁵⁵ L. F. Shaffer, The Psychology of Adjustment (Boston: Houghton Mifflin Company, 1956), p. 342.

manifestation of these personal
General.

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the relationship to character and
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Physical studies research have
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William H. Sheldon, Atlas of
Brooklyn, 1944, p. xv.
L. V. Matley, The Physical
Houghton Mifflin Company, 1934.

McCraw and Tolbert investigated the sociometric status of 438 junior high school boys. They felt the results of this study indicated that the personality facet of being liked by others was probably influenced more by athletic ability as measured by the athletic index (50 yard dash, standing broad jump, softball throw for distance) and participation in interschool and/or intramural athletics than by any other factor.⁵⁶

Biddulph's study of athletic achievement and personal adjustment seems to substantiate the above finding. Biddulph says that "athletic achievement is a much more important factor in personal and social adjustment than we have been led to believe."⁵⁷

A study of the relationship between personality adjustment and achievement in physical education activities was reported by Sperling in 1942. This study indicated that a more socially desirable degree of personality development accompanies a greater degree of experience in physical education activities.⁵⁸ This finding tends to support those who assert that there is a positive relationship between participation in physical education activities and personality development.

⁵⁶L. B. McCraw and J.W. Tolbert, "Sociometric Status and Athletic Ability of Junior High School Boys," Research Quarterly, XXIV (March, 1953), pp. 72-80.

⁵⁷Lowell G. Biddulph, "Athletic Achievement and the Personal and Social Adjustment of High School Boys," Research Quarterly, XXV (March, 1954), pp. 1-7.

⁵⁸Abraham Sperling, "The Relationship Between Personality Adjustment and Achievement in Physical Education Activities," Research Quarterly, XIII (October, 1942), pp. 351-363.

Holman and Tolbert investigated the relationship between
of high school boys. They found that the relationship of the
study indicated that the personality factor of the study of the
of the study was probably influenced more by a social factor than
study by the athletic index (50 year data, statistical analysis).
not only for the athletic and participation in the study, but
and on individual activities than on any other factor.
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relationship between participation in physical education
activities and personality development.

26. J. H. Holman and J. M. Tolbert, "Athletic Achievement and Social Adjustment of Junior High School Boys," *Research Quarterly*, XIV (April, 1932), pp. 72-80.

27. Lowell B. Madden, "Athletic Achievement and Social Adjustment of High School Boys," *Research Quarterly*, XIV (April, 1932), pp. 1-7.

28. Arthur Spurling, "The Relationship Between Personality and Achievement in Physical Education Activities," *Research Quarterly*, XIII (October, 1932), pp. 177-80.

Johnson, Hutton, and Johnson administered two projective tests to 12 champion athletes. These tests were then evaluated so that any identifying characteristics of the group would be indicated. They found the most outstanding personality characteristics of the group to be extreme aggressiveness, high anxiety, high level of aspiration, and exceptional feelings of self-assurance.⁵⁹

Husman compared the aggression of boxers and wrestlers with each other and with a control group. Significant differences showed that the boxers were the least aggressive of the groups, and that they tended to direct their aggressive feeling inwardly rather than outwardly upon persons or things in their environment.⁶⁰

Johnson and Hutton used the House-Tree-Person projective personality test to measure the personality of eight college wrestlers.⁶¹ This test revealed increased aggressive feelings and increased neurotic signs prior to a match. The wrestlers returned to their preseason condition, except for less aggressive feelings the day after the match.

⁵⁹W. R. Johnson, E. C. Hutton, and G. B. Johnson, "Personality Traits of Some Champion Athletes as Measured by Two Projective Tests; Rorschach and H-T-P," Research Quarterly, XXV (December, 1954), pp. 284-285.

⁶⁰B. F. Husman, "Aggression in Boxers and Wrestlers as Measured by Projective Techniques," Research Quarterly, XXVI (December, 1955), pp. 421-425.

⁶¹W. R. Johnson and E. C. Hutton, "Effects of a Combative Sport upon Personality Dynamics as Measured by a Projective Test," Research Quarterly, XXVI (March, 1955), pp. 49-53.

Johnson, Hutton, and Johnson administered two projective tests to 12 chimpanzee subjects. These tests were then evaluated on the basis of identifying characteristics of the group would be indicated. They found the most outstanding personality characteristics of the group to be extreme aggressiveness, high anxiety, high level of agitation, and exceptional feelings of self-assertion.

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Johnson, Hutton, and G. B. Johnson, "Personality Traits of Some Champion Athletes as Measured by Two Projective Tests," *Research Quarterly*, XVI (December, 1950), pp. 321-323.

G. B. Johnson, "Aggression in Boxers and Wrestlers as Measured by Projective Techniques," *Research Quarterly*, XVII (December, 1951), pp. 421-423.

Johnson and E. C. Hutton, "Effects of a Competitive Sport Upon Personality Dynamics as Measured by a Projective Test," *Research Quarterly*, XVII (March, 1952), pp. 49-53.

Booth found that differences in personality as measured by the MMPI do exist between athletes and non-athletes. He also found differences between participants in individual sports, in team sports, and in team-individual sports. In this study, the author stated that evidence tended to indicate that some items discriminate between athletes rated as poor and good competitors.⁶²

Heusner attempted to determine whether specific groups of athletes and athletes as a whole had common personality traits which distinguished them from the general population, and from each other. Dr. T. K. Cureton of the University of Illinois' Physical Fitness Laboratory collected the data used in this study from the 1952 Olympic Games. The Cattell Sixteen Factor Personality Inventory was used in this study. The sample of forty-one champion athletes rated higher than the average normal population in qualities of emotional stability and ego strength. Also, as a group, the champion athletes scored low on the factor indicating paranoid tendencies and higher than average on the factor indicating tough simplicity.⁶³

Balch studied the responses of champion athletes compared with those of normal college men on a self-rating inventory of

⁶²E. G. Booth, "Personality Traits of Athletes as Measured by the MMPI," Research Quarterly, XXIX (May, 1958), pp. 127-137.

⁶³William Heusner, "Personality Traits of Champion and Former Champion Athletes," (unpublished research study, Physical Fitness Laboratory, University of Illinois, Urbana, 1952), p. 62.

Booth found that differences in personality are associated
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Salch studied the responses of Olympic athletes compared
with those of normal college men on a self-rating inventory of

62. G. Booth, "Personality Traits of Athletes as Measured
by the 16PF," *Research Quarterly*, XIX (May, 1938), pp. 127-132.
63. William H. Hargrave, "Personality Traits of Olympic and
College Athletes," (unpublished research study, Physiol-
ogy Research Laboratory, University of Illinois, Urbana, 1932),
p. 62.

temperament (Sheldon Temperament Scale). In this study the Sheldon Temperament Scale (composed of viscerotonic, somatotonic, and cerebrotonic traits) did not show significant differences between the responses of champion athletes as a group, and the college men as a group.⁶⁴

Keogh, in a study of motor ability, athletic participation, and personality measures, failed to find a significant relationship between either motor ability or athletic participation and the eighteen separate scales of the California Psychological Inventory.⁶⁵ He feels that this indicates that generalizations concerning the relationship of personality characteristics to athletic participation and nonparticipation should be limited to the specific type of group under study. It is interesting to note Keogh's expectation hypothesis based on an examination of the pattern of results on the total test response. This hypothesis was that higher ratings on the personality inventory might be achieved by groups of subjects who participated in athletics at a level which would be "expected" in relation to their motor ability.

In a study by Merriman, using the Phillips JGR test to measure motor ability and the California Psychological Inventory to

⁶⁴ E. Balch, "A Comparative Study of Personality and Temperament Traits of Champion Athletes and Normal College Men," (unpublished Master's thesis, University of Illinois, Urbana, 1953), p. 33.

⁶⁵ Jack Keogh, "Relationship of Motor Ability and Athletic Participation in Certain Standardized Personality Measures," Research Quarterly, XXX (December, 1959), pp. 444-445.

Experiment (Sensory Feedback Scale). In this study the
Sensory Feedback Scale and Sensory Feedback Scale (Sensory Feedback Scale) did not show significant differences be-
tween the responses of subjects in a group, and the con-
trolled group as a group.

Results. In a study of motor activity, subjects participated
and personally observed, failed to find a significant relation-
ship between either motor activity or kinetic participation and
the physical response of the California Psychological In-
ventory. It is noted that this indicates that generalization can-
not be made from the relationship of personality characteristics to kinetic
participation and participation should be limited to the specific
type of group under study. It is interesting to note that the ex-
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sponse on the total test response. This hypothesis was that higher
response on the personality inventory might be achieved by groups
of subjects who participated in activities at a level which would
be "suggested" in relation to their motor activity.

In a study by Newman, using the California Psychological Inventory to
measure motor activity and the California Psychological Inventory to

Results. "A Comparative Study of Personality and Temper-
ment in the California Psychological Inventory and Temper-
ment Inventory." Thesis, University of Illinois, Urbana, 1955.

Results. "Relationship of Motor Activity and Affective
Participation in Certain Standardized Personality Measures."
Thesis, University of Illinois, Urbana, 1955.

measure personality traits, a relationship was established between motor ability and personality traits.⁶⁶ The upper motor ability group scored significantly higher than the lower motor ability group on the measures of poise, ascendancy, and self-assurance and on the measures of intellectual and interest modes.

However, Merriman goes a step farther and makes the observation that there were few significant differences in personality traits when athletes and non-athletes were matched according to motor ability. He feels that the inference might be drawn that motor ability rather than participation in athletics is a potent factor in the development of personality traits.

Lakie tested 230 athletes from four different colleges and universities on five scales from the Omnibus Personality Inventory and found no differences between the five sport groups tested.⁶⁷ He did find that sports groups differed within individual schools, and similar sport groups differed from school to school. He suggested that the differences might be due to the way the program is conducted, the emphasis on the program, or the type of athlete that is recruited or drawn to the school.

(A study by Werner at the United States Military Academy, and one by Cowell and Ismal, found a relationship between

⁶⁶J. Burton Merriman, "Relationship of Personality Traits to Motor Ability," Research Quarterly, XXXI (May, 1960), part 1, p. 172.

⁶⁷William L. Lakie, "Personality Characteristics of Certain Groups of Intercollegiate Athletics," Research Quarterly, XXXIII (December, 1962), pp. 571-572.

physical measures (such as participation on athletic teams), and leadership potentialities.^{68, 69}

Whittle did not find improvement of personal adjustment, as measured by the California Test of Personality, due to participation in good physical education programs or due to participation in sports' activities. Whittle's report was sketchy in some areas, possibly because he did not find what he expected to find. He stated that some of his study results were not similar to those of other investigators, and so he dismissed that portion of his study as being invalid due to maturation, type of test used, or because of the particular school environment.⁷⁰

Research studies have reported different findings in this area. In some instances a relationship has been found between certain personality traits and motor ability or athletic achievement. In other situations a statistical difference was not obtained. The measuring instruments and test groups which were used differed widely. More related studies are necessary before a proper evaluation of the relationships in this area can be completed.

⁶⁸ Alfred Werner, "Physical Education and the Development of Leadership Characteristics of Cadets of the U. S. Military Academy," 65th Proceedings-College Physical Education Association, (1963), p. 104.

⁶⁹ Charles Cowell and H. H. Ismail, "Relationship Between Selected Social and Physical Factors," Research Quarterly, XXXIII (March, 1962), p. 42.

⁷⁰ Douglas H. Whittle, "Effects of Elementary School Physical Education upon Aspects of Physical, Motor, and Personality Development," Research Quarterly, XXXII (May, 1961), p. 260.

physical measures (such as participation in athletic games), and leadership potentialities. 68

Whittle and his associates at National Institutes, as outlined by the following test of personality, have to give indication in good physical education programs or that to healthy pattern in sports' activities. Whittle's report was strongly in line with, possibly because he did not find that he expected to find. He stated that some of his early results were not similar to those of other investigators, and as he advanced that period of his study as being largely due to selection, type of test used, or because of the particular school environment. 69

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68 Alfred Werner, "Physical Education and the Development of Leadership Characteristics of Cadets of the U. S. Military Academy," 6th Proceedings-College Physical Education Association, (1955), p. 10.

69 Charles Gwili and H. E. Ismail, "Relationship Between Selected Social and Physical Factors," Research Quarterly (March, 1952), p. 42.

70 Douglas H. Whittle, "Effects of Elementary School Physical Education upon Aspects of Physical, Motor, and Personality Development," Research Quarterly, XXII (May, 1951), p. 180.

Physical Fitness and Personality. There are comparatively few studies in the literature that relate physical fitness to personality. However, in 1946, Harold E. Jones wrote a penetrating article in the Journal of Educational Research about the importance of physical traits in the personality development of adolescents.

The boy who is slightly deficient in physical traits may experience, in relation to his own aspirations, a slight handicap in social relations in his age group. Often this is readily compensated by other personal characteristics. But evidence has been presented that a more conspicuous deficiency may lead to cumulative and interactive handicapping effects in reputations and to the individual's reaction to his position in the group. An opposite and more advantageous spiral of consequences may occur in cases of outstanding physical superiority.

...in order to be marked as falling at one extreme or the other, they are likely to be deficient or superior not in one but in many aspects of size, build, health, and fitness, each of which make their additive contribution. It is not surprising that these multiple defects or advantages should be reflected not merely in physical abilities and physical activity, but also in social participation and in the individual's own attitudes and self appraisal.⁷¹

Dr. T. K. Cureton, speaking before a Helsinki Sport Medicine Symposium in 1952, made some very sweeping claims for the positive effects of physical fitness improvement on an individual's personality.⁷² It appears that studies are needed to

⁷¹Harold E. Jones, "Physical Ability as a Factor in Social Adjustment in Adolescence," Journal of Educational Research, XL, (December, 1946), pp. 297-298.

⁷²M. J. Karvonen, Sport Medicine, Proceedings of the International Symposium of the Medicine and Physiology of Sports and Athletics at Helsinki, 1952 (Helsinki: Finnish Association of Sports Medicine, 1953), pp. 46-63.

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Harold E. Jones, "Physical fitness as a factor in social

adjustment in adolescence," Journal of Educational Research, XI,

(December, 1946), pp. 297-305.

H. E. Jones, Physical fitness and personality, Proceedings of the Inter-

national Symposium of the Medical and Physical Education of Youth and

Adolescence at Helsinki, 1946 (Helsinki: Finnish Association of

Sports Medicine, 1947), pp. 44-52.

scientifically substantiate the apparent observational findings he reports. He states that intensive training results in marked endurance and cardiovascular improvement, and this improvement is in turn accompanied by a shift from non-energetic attitudes and characteristics of the parasympathetic type to the relatively more energetic states of the sympathetically dominated type. Cureton then proceeds to discuss the importance of this purported finding.

We think that this shift is of considerable importance in interpreting the expressed personality, and in refuting the idea that personality pattern is ingrained in the body type, fixed and unchangeable according to the Sheldon-Steven-Tucker concepts. In view of the changes that can be made in the various measures of the autonomic nervous system and of the cardiovascular state, we see that personality itself is responsive to training. Men are more energetic, more buoyant and optimistic, more action-minded, more playful, more aggressive--in general they appear more extrovert and more healthful when they are trained than when they are untrained. (Among middle aged men bearing heavy responsibilities we see this effect as helpful in counteracting tendencies toward the development of gastric and duodenal ulcers, loss of sexual capacity associated with vasoconstriction of the small vessel in the peripheral circulation and its associated fatigue. It is true that in most men this vasoconstriction is eliminated to a great extent by the endurance type of workout. As men go through progressive training we note the tendency for them to tackle harder and harder tasks, and they state that they can work relatively harder and longer when they are trained. The man trained to action shows moderate sympathetic dominance but this goes with positive and quick responses to challenges in work. The untrained type with parasympathetic dominance is trained to sit, not to work. He usually shows an aversion to physical work, to exposure, and is unusually concerned with his comfort.⁷³

An early study by F. J. Milverton attempted to determine if different training methods would have varying effects on the

⁷³Karvonen, *ibid.*, p. 50.

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ward the development of peevish and emotional states, that it
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It is also true in most men this vasoconstriction is eliminated
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to physical work, to exposure, and is usually concerned
with the comfort.

An early study by L. J. Milner was devoted to determining
the various training methods would have varying effects on the

personality of the participants.⁷⁴ Actually, this study was not intended to compare the effects of different degrees of physical fitness on personality. The author conducted his experiment to see if different techniques of physical training would have differing affects on personality. He used a progressive and a non-progressive training program and found that the concentration of the progressive training group was increased. The other fifteen personality traits were not influenced by either training program. Twenty boys were in each group and they received their training over a twelve week period. Gregariousness, sociability, loyalty, competitiveness, co-operation, independence, enthusiasm, cheerfulness, concentration, alertness, control, decision, initiative, fearlessness, self-respect, and self-confidence were the sixteen personality traits which were subjectively rated by three masters of the school where the study was conducted.

There are many obvious limitations to this study such as the limited time (three-quarters of an hour twice a week) devoted to the training. However, it is interesting and worthwhile to note the procedure of this early attempt to scientifically investigate the effect of a certain type of physical training program on personality traits.

A refined study of the effect of physical conditioning

⁷⁴F. J. Milverton, "An Experimental Investigation into the Effects of Physical Training on Personality," The British Journal of Educational Psychology, XIII (February, 1943), part I, pp. 30-39.

exercises and activities on mental characteristics was reported in 1958 by the British Journal of Educational Psychology. The subjects in this study were educationally sub-normal boys. After a ten week course of systematic and progressive physical conditioning the experimental group gained significantly over the control group in athletic achievement, fitness, and strength. Significant improvement in mental tests was also noted in the group exposed to the success situation. Growth in confidence, perseverance, and cooperation was apparent as a result of ego-involvement in the various activities and the raising of the level of aspiration. It is interesting to note that an increase in physical fitness was accompanied by an increase in athletic achievement. This achievement seemed to lead to the development of positive personality traits such as confidence, perseverance, and cooperation.⁷⁵

Weber investigated the relationship between physical fitness, as measured by the Iowa Physical Efficiency Profile, and personality, as measured by the Minnesota Multiphasic Personality Inventory.⁷⁶ The measuring instrument for physical fitness consisted of the following four activities:

- 1) Sit-ups for two minutes

⁷⁵James Oliver, "The Effect of Physical Conditioning Exercises and Activities on the Mental Characteristics of Educationally Sub-Normal Boys," British Journal of Educational Psychology, XXVIII (1958), pp. 155-165.

⁷⁶Robert John Weber, "Relation of Physical Fitness to Success in College and Personality," Research Quarterly, XXIV (December, 1953), pp. 155-165.

and activities on mental characteristics were reported in 1928 by the British Journal of Educational Psychology. The subjects in this study were educationally sub-normal boys. After a two year course of systematic and progressive physical conditioning the experimental group gained significantly over the control group in academic achievement, fitness, and strength. Significant improvement in mental tests was also noted in the group exposed to the exercise situation. Growth in confidence, persistence, and cooperation was reported as a result of age-involvement in the various activities and the raising of the level of aspiration. It is interesting to note that an increase in physical fitness was accompanied by an increase in athletic achievement. This achievement seemed to lead to the development of positive social activity traits such as confidence, persistence, and cooperation. We have investigated the relationship between physical fitness, as measured by the Iowa Physical Efficiency Profile, and personality, as measured by the Minnesota Multiphasic Personality Inventory. The resulting instrument for physical fitness consisted of the following four activities:

1) Sit-ups for two minutes

2) Jones River, "The Effect of Physical Conditioning Exercises and Activities on the Mental Characteristics of Educationally Sub-Normal Boys," British Journal of Educational Psychology, XXVII (1957), pp. 155-165.

3) Robert John Weber, "Relation of Physical Fitness to Academic Achievement and Personality," Research Quarterly, XLV (1974), pp. 155-165.

- 2) Pull ups
- 3) 100 yard pick-a-back run
- 4) 300 yard shuttle run.

The Minnesota Multiphasic Personality Inventory (MMPI) is a psychometric instrument designed to measure the following facets of personality:

- 1) Hypochondriasis
- 2) Depression
- 3) Hysteria
- 4) Psychopathic deviation
- 5) Interest
- 6) Paranoia
- 7) Psychasthenia
- 8) Schizophrenia
- 9) Hypomania.

The author stated that there was no statistically significant relationship between physical fitness and personality as measured by the instruments used in his study.

Although Booth used athletes, non-athletes, and participants of different sports in his study, the question immediately arises as to why he found personality differences as measured by the MMPI.⁷⁷ It should be noted that Booth's findings have been disputed in subsequent research. Keogh is highly critical of his findings and a research study with varsity wrestlers failed to support the findings reported by Booth.^{78,79} However, if Booth's

⁷⁷E. G. Booth, "Personality Traits of Athletes as Measured by the MMPI," Research Quarterly, XXIX (May, 1958), pp. 136-137.

⁷⁸Jack Keogh, "Comments," Research Quarterly, XXXI (May, 1960), part 1, p. 240.

⁷⁹Philip Rasch, Briggs Hunt, and Port Robertson, "The Booth Scale as a Predictor of Competitive Behavior of College Wrestlers," Research Quarterly, XXXI (March, 1960), pp. 117-118.

findings are valid, Weber's study might indicate that athletic and sport participation is a better indicator of personality differences than is varying degrees of physical fitness.

Betz compared personality source traits and physical fitness measurements of the adult male. Personality was appraised by Cattell's 16 P. F. test, and physical fitness was measured by 10 laboratory test variables. The fitness measures were: total strength per body weight, 100 yard drop-off swim index, five minute step test, treadmill run time, reaction time, Schneider Index, pulse wave area, systolic amplitude, T-wave of EKG, and sitting pulse rate. Twenty-six out of 150 correlations in the study were found to be significant at the .01 or .05 level of confidence.⁸⁰

Wells administered a battery of physical fitness tests and a battery of psychological tests to eighty male college students. Measurements were obtained on 38 physical fitness and 35 psychological variables. The scores from all these variables were intercorrelated by the use of the Electronic Digital Computer (Illiac), and relationships between the physical fitness and psychological variables were obtained.⁸¹ In this massive statistical study a total of 1,330 correlations were determined between the physical fitness and psychological variables. One hundred and

⁸⁰ Robert Betz, "A Comparison Between Personality Traits and Physical Fitness Tests of Males," (unpublished Master's thesis, University of Illinois, Urbana, 1956), pp. 61-62.

⁸¹ H. P. Wells, "Relationship Between Physical Fitness and Psychological Variables," (unpublished Ph. D. dissertation, University of Illinois, 1958), pp. 118-127.

sixteen of these were found to be significantly related at either the .01 or .05 levels of confidence. The psychological variables consisted of anxiety ratings by two psychiatrists, two forms of a test to determine how many friends the subjects had, Cattell's 16 Personality Factor test, and 15 factors extracted as a result of a factor analysis on the results of the intercorrelations of 113 variables. The battery of physical fitness tests included:

- 1) Schneider test
- 2) Basal metabolism
- 3) Electrocardiogram
- 4) Heartometer
- 5) Body measurements
- 6) Strength
- 7) Vital capacity
- 8) All-out treadmill run
- 9) C-VJ-D
- 10) 18 item test.

Research studies of physical fitness have not kept pace with the theoretical field of physical fitness and its relationship to personality. Some studies indicate that there is a relationship, but conclusive evidence is needed to substantiate claims which have been advanced about the value of physical fitness.

Body Image and Personality. Fisher and Cleveland, in their book, Body Image and Personality, present many ideas which are significant to a study of physical fitness and personality. They state the following:

An individual's body is the one area in his experiential field which uniquely belongs to him and is the corporeal representation of his 'base of operations' in the world. His concept of this base of operations must necessarily be significant in influencing how he conducts himself. For example, if he pictures this base as fragile, one would assume that he would be more likely to be timid

in his life excursions than if he ascribes strength and solidity to it.⁸²

It appears that the physical fitness which a person has would be very important in determining his body image.

Fisher and Cleveland point out the importance of body image in our culture as a whole in terms of the widespread expenditure of time and effort that is given to altering the body's appearance. They also point out that some evidence indicates that the body scheme may function as a basic standard or frame of reference which influences some of the individual's modes of perception and also his ability to perform certain skills.⁸³

Diamond states that from the very first we make use of our capacity of self-observation in order to gain some acquaintance with our external body parts and in this way form a connected body image. We revise this image throughout our life.⁸⁴ We are constantly under pressure to make the body image conform to a mythology or popular stereotype of physical appearance and body functions in which some parts of the body are accorded great prominence and special significance while others are screened out of our attention.⁸⁵

The way a person perceives himself is apparently very

⁸² Seymour Fisher and Sidney E. Cleveland, Body Image and Personality (New York: D. Van Nostrand Company Inc., 1958), p. 345.

⁸³ Ibid., pp. 23, 50.

⁸⁴ Diamond, op. cit., p. 231.

⁸⁵ Ibid., p. 232.

important in the area of personality development. Diamond indicates that almost any personality disturbance which is not inconsequential will express itself, in part, by giving rise to some distortion of the body image. He also mentions that the individual who possesses the physique and the features that conform rather well to the social ideal experiences less conflict in the development of a satisfactory body image.⁸⁶ This points out the close inter-relationship of physical fitness, body image, and personality.

Summary. Different aspects of the relationships between physical fitness and personality have been considered. The development of research in this area has been traced from the first physique studies to the most recent studies as reported in the literature. There has been a divergence of opinion regarding the relationship between the physical body and personality. Theories have differed, and experimental studies have seemed to contribute to this diversity. Experiments have been inconsistent in their findings and have failed to give an unqualified answer to the question of relationship. Perhaps there have been over-generalizations in many cases. It is evident that this is a complex field of study which is in need of much further research.

⁸⁶ Diamond, ibid., pp. 234-236.

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cates that almost any personality disturbance which is not the
consequence of a physical defect, is due, by giving rise to
some disturbance of the body image. He also mentions that the
individual and his attitude are important and the factors that con-
tribute to the development of the body image are of great importance.
as the development of a satisfactory body image. This point
one of the most important of physical factors, body image,
and personality.
The relationship between the physical and the psychological is
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first physical studies to the most recent studies as reported in
the literature. There has been a divergence of opinion regarding
the relationship between the physical body and personality. Two-
thirds have believed, and experimental studies have seemed to con-
firm this view. Experiments have been conducted
in which subjects have been asked to give an exaggerated answer
to the question of relationship. For this reason have been over-
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plex field of study and is in need of much further research.

CHAPTER III

RESEARCH METHODS

This research project was designed to study the relationship between physical fitness and selected personality traits. The experimental method with comparative statistics was the research procedure utilized in the study. The experimental portion of the study took place from September 4, 1962, through June 7, 1963. The facilities of West High School in Davenport, Iowa, were used for the experimental research.

Subjects. Three hundred and eighty-six junior and senior high school boys from Davenport West High School were used in the initial testing phase of this study. They ranged in age from fifteen to nineteen years with an average age of 16.5 years at the beginning of the study. The original group included all the junior and senior boys in the high school with the exception of approximately sixty boys who did not take the fitness test because they were in remedial physical education, were absent or ill on the days when the testing took place, or were excused by the physical education department because they were on the football team.

One hundred and thirteen boys, who were chosen on the basis of the physical fitness test to participate in the experimental portion of this research, completed the second phase of this study.

Collection of the Basic Data. The subjects were tested

This research project was a longitudinal study of the

relationship between physical fitness and mental health.

The experimental method used was a combination of

questionnaires, interviews, and physical fitness tests.

Of the study group, 100 subjects were selected.

In 1965, the first data was collected.

There were two experimental groups.

Subjects were divided into two groups.

In the first group, subjects were given

physical fitness tests at the beginning

and at the end of the study.

The second group was given physical fitness

tests at the beginning of the study.

At the end of the study, the subjects

in the first group were given physical fitness

tests at the end of the study.

The subjects in the second group were given

physical fitness tests at the end of the study.

One hundred and fifty subjects were

in the physical fitness test at the end of the study.

Of this research, the following results were

obtained.

during their regular physical education class period. Two college students assisted during the first two days when the physical fitness of the three hundred and eighty-six boys was tested. On the first day each subject wrote his name and age on a physical fitness card. The "buddy system" was used for recording physical fitness test scores. Each boy gave his card to a buddy who recorded the number of pull-ups which he executed under the supervision of the tester. The pull-ups were administered in the gymnasium using the high school chinning bar. On the second day the subjects were tested on the 600 yard run. The outdoor quarter mile track was used for this test. Seven or eight boys ran at one time. The tester verbally gave the time for each boy as he crossed the finish line. This time was then recorded on the physical fitness result card by each subject's buddy.

The initial personality tests were given on three different days. Cattell's Sixteen Personality Factor Questionnaire was given the first day; the Kuder Preference Record-Form C was given on the second day; and the Allport A-S Reaction Study was administered on the third day. A fourth day was also necessary in order to give slower students time to complete their tests. Students who had been absent during one of the testing days used the fourth day to make-up their tests. A classroom was available for the first period class to use when taking their personality tests. Due to lack of classroom space it was necessary for the remaining classes to take their tests while seated on the gymnasium bleachers or the swimming pool bleachers.

The same procedure was followed during the final testing at the end of the school year. The same order was followed when giving the tests, and the buddy system for recording physical fitness test results was also utilized.

The information which was collected was filed according to the group to which the subject belonged. The results were recorded in tabular form for reference and for use when the results were examined statistically.

Description of the Physical Fitness Program. There were two sections of the experimental group which met three times a week during the first school hour for a special physical fitness class. This class replaced the regular physical education program which the remainder of the high school boys attended. One section of fourteen boys met on Monday, Wednesday, and Thursday, and the second section of twelve boys met on Tuesday, Wednesday, and Friday. The class size on Monday, Tuesday, Thursday and Friday was twelve or fourteen. All twenty-six members of the experimental group met together on Wednesday for their class.

Davenport West High School, a three year old school, had excellent facilities for its physical education program. However, the school population had grown to such an extent that the physical education department had a problem finding sufficient space during the winter months. The choice of activity for the experimental group was determined, to some extent, by the teaching station which was available during each teaching block. The teaching blocks were six weeks in length.

A basic format was followed with the experimental group. Immediately after dressing, they reported to the one hundred yard indoor track during indoor activities, and to the outdoor activity area when they were participating in outdoor activities. They then did their warm-up running, which consisted of jogging a specified distance. The distance they ran was varied from day to day, but averaged about six hundred yards once the class developed sufficient cardio-vascular endurance. Next the boys would spend approximately ten minutes doing their isometric exercises. At the beginning of the year these exercises were executed by using a buddy to give resistance. A comprehensive group of exercises was chosen in order to contribute to the development of all major muscle groups. These exercises were developed from the book, Functional Isometric Contractions for Football.¹ The duration of each contraction was from six to eight seconds and each boy was told to give his maximum exertion for that length of time.² In December, an isometric rack which contained eight bars was installed in the room next to the indoor track. This rack was then used for some of the isometric contraction work.

Following the isometric exercises, the group would run two or three fast laps. They would then participate in a designated sport or activity for fifteen or twenty minutes. The last ten

¹Bob Hoffman, Functional Isometric Contractions for Football (York, Pennsylvania: The Bob Hoffman Foundation, 1962).

²Hugh Thompson, "Values of Isometric Training," Scholastic Coach, XXXII (September, 1962), pp. 38, 40, 94-96.

minutes of each class period was devoted to a running program. The running was progressively increased in intensity. Different running distances and speeds were used in order to prevent boredom.

The initial objective was to develop stamina for running easily without tiring immediately. The pace was increased as endurance developed until the subjects were able to run at full speed for several laps around the indoor one hundred yard track. Relays were incorporated into this running procedure since the boys pushed themselves harder when they were running against competition.

The activity schedule for the experimental group was as follows:

- 1st Six weeks (September 4 to October 18)
Physical fitness testing, Personality testing, Flickerball
- 2nd Six weeks (October 19 to November 30)
Tumbling and Balancing
- 3rd Six weeks (December 3 to January 25)
Wrestling
- 4th Six weeks (January 30 to March 8)
Swimming (This was a required unit. Running was not possible but isometric exercises continued on the pool deck. The experimental group was given as much endurance swimming as was possible within the required instructional framework.)
- 5th Six weeks (March 11 to April 23)
Basketball
Stunt days (Frog walk relays, etc.)
Track relays

6th Six weeks (April 24 to June 7)
16" Softball
Final Physical Fitness Testing
Final Personality Testing

A discussion was held with the experimental group at the beginning of the semester. Questions about the physical fitness program were answered. During this discussion period the values of physical fitness were pointed out as well as the physiological benefits which they could expect to receive from the class. It was felt that motivation would be an important factor in this class since the activity would be more strenuous than the physical education classes to which they were accustomed. No mention was made about possible effects this class might have on personality. This phase of the program was never mentioned to any student.

Design and Method. A physical fitness test was given to three hundred and eighty-six junior and senior high school boys in September, 1962. This test consisted of pull-ups and the 600 yard run. On the basis of this test, the lower fifteen per cent and the upper fifteen per cent were chosen for testing the first hypothesis of this research project. There were fifty boys in the lower group and sixty-three boys in the upper group who completed the study. They were given three personality tests: Cattell's Sixteen Personality Factor Questionnaire, Kuder's Preference Record-Form C, and the Allport A-S Reaction Study. The "t" test of significance was applied to the data to ascertain if there was a statistical difference between the high physical

THE SIX WEEKS (April 22 to June 7)
1942
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Final Physical Fitness Testing

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fitness group and the low physical fitness group.

The lower physical fitness group was divided into a control and an experimental group. The experimental group members were assigned to the first period classes by the high school principal. The control group members were assigned to the other five physical education class periods. Due to scheduling problems, it was impossible to completely randomize when assigning members of the lower fitness group to a physical education class. However, the principal was able to assign one-half of the lower fifteen per cent to the first hour class.

The experimental group of twenty-six boys completed a rigorous physical fitness program which extended throughout the school year. Twenty-four boys were used as a control group. They participated in the regular physical education program. At the end of the school year in June, 1963, the experimental and control groups were again tested on the physical fitness test items and on the personality tests. The "t" test of significance was applied to these physical fitness results to determine if the experimental group improved significantly more than the control group on the test items. Changes in personality trait measurements were also statistically analyzed through use of the "t" test.

Physical Fitness Test. There is not a physical fitness test which is universally accepted by the physical education profession for measuring physical fitness. This is partly

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and an experimental group. The experimental group

was assigned to the first period of the study.

The control group consisted of the second period.

The physical education classes were divided into

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The experimental group of twenty-five students

physical fitness program plan physical fitness

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The control group on the test items. Physical fitness

test measurements were also statistically

use of the test.

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profession for measuring physical fitness.

because physical fitness is composed of different components. A test which would attempt to measure each individual factor would be unfeasible from an administrative standpoint in most cases. A short test which has high validity and could be administered in a short period of time was needed for this study due to the limited amount of time which was available for testing and the number of subjects to be tested. Dr. Peter V. Karpovich wrote the following in reply to a letter requesting a suggested test to use. "You are looking for something that many of us have been looking for the past 30 years."⁴

It was decided to use a two item test after investigating a number of possible test batteries. The items chosen were pull-ups and the 600 yard run. There were several reasons for choosing these items. They were acceptable from an administrative standpoint and they appear frequently in various test batteries. They are included in the AAHPER Youth Fitness Test which contains up to date percentile norm tables which were desired for use in this study.⁵ Another reason for choosing these items was the validity coefficients which Cureton obtained with a running event (mile run) and pull-ups. He found that the mile run had a correlation

³Thomas Kirk Cureton, Physical Fitness Appraisal and Guidance (St. Louis: The C. V. Mosby Company, 1947), pp. 18-22.

⁴Letter from Dr. Peter V. Karpovich, Springfield College, Springfield, Massachusetts, July 3, 1961.

⁵AAHPER Youth Fitness Test Manual, Paul A. Hunsicker, director (Washington D. C.: American Association for Health, Physical Education, and Recreation, 1958), pp. 4, 11, 23, 28.

of .708 for predicting physical fitness as measured by a battery of twenty-eight items. The pull-ups had a correlation of .647. These were the two highest predictive items of the twenty-eight used in the battery. These correlations were obtained by correlating each of the twenty-eight items with the composite standard score criterion.⁶ The 600 yard run was substituted for the mile run as a running event in order to have norms which were comparable to the pull-up norms and also because it was felt that requesting students to run a timed mile during the first week of school would have motivational implications for obtaining the subjects' cooperation during the remainder of the school year.

The percentile average of the two physical fitness test items was used in determining the physical fitness class rank of each subject. The test items were administered in the manner described below.

Pull-ups. The overhand grasp was used when executing pull-ups. The subject assumed the hanging position on the high school chinning bar and then raised his body by his arms until his chin could be placed over the bar. He then lowered his body to a full hang as in the starting position. He repeated the exercise as many times as possible. His raw score was the number of completed pull-ups.

⁶T. K. Cureton, et. al., Endurance of Young Men (Washington, D. C.: National Research Council, Society for Research in Child Development, 1945), p. 160.

600 Yard Run. A 440 yard outdoor track was used for running the 600 yard test item. Seven or eight subjects would line up at the starting line. At the signal, "Ready? Go!" the subjects would start running the 600 yard distance. The starter would then go to the finish line and be in position to read off the times from his stop watch as each runner crossed the finish line. The subject's raw score was the time in minutes and seconds which it took him to complete the run.

Psychological Tests. The upper and lower groups were administered three personality tests at the beginning of the study. At the completion of the research project, the experimental and control groups were again given these tests.

The A-S Reaction Study. This test measures an individual's ascendance or submission. It is set up to measure the disposition of an individual to dominate his associates (or to be dominated by them) in various face-to-face relationships of everyday life. Most people show both types of behavior, but this test has enough situations to detect which of these two types of reactions is more characteristic of the person. The total score gives an expression of the dominance of ascendance or submission.⁷

The test for men, which was used in this research, contains thirty-three questions which present forty-one situations encountered in everyday life. The subject selects one of a group of

⁷Gordon W. Allport and Floyd H. Allport, Manual for the A-S Reaction Study (Cambridge: Houghton Mifflin Company, 1928), p. 2.

standardized responses which most nearly characterizes his usual behavior in that situation. The subjects are told to check the items on the basis of what they actually have done under similar circumstances in the past rather than checking what they feel they would do if faced with such a situation. The test is untimed but takes approximately twenty minutes to complete.

There are two to four answers for each presented situation. The answers have scoring weights assigned to them according to their degree of ascendance or submission. A negative score indicates submission, a positive score indicates ascendance, and a zero score is not considered to have diagnostic value. An individual's score is the algebraic sum of the scores for the separate items.

William Snyder sums up the value of the A-S Reaction Study in a review appearing in The Third Mental Measurements Yearbook. "As a test of total personality, it should not be exploited, but as a test of dominance, it is probably not excelled."⁸

Sixteen Personality Factor Questionnaire. The Sixteen Personality Factor Questionnaire is a multi-dimensional personality test. Adcock states, "no other test covers such a wide range of personality dimensions and never before have the dimensions been so meticulously determined."⁹

⁸William Snyder, The Third Mental Measurements Yearbook, ed. Oscar Krisen Buros (New Brunswick: Rutgers University Press, 1949), p. 24.

⁹C. J. Adcock, The Fifth Mental Measurements Yearbook, ed. Oscar Krisen Buros (Highland Park, New Jersey: The Gryphon Press, 1959), pp. 196-197.

The sixteen dimensions used in this test are based on research "directed to locating unitary, independent, and practically important source traits, i.e., traits affecting much of the overt personality, such as intelligence, emotional stability, super-ego strength, surgency, and dominance."¹⁰ Much factor analytic research has been devoted to the construction of this test.

The test contains sixteen factors. A descriptive name is given to each factor, both at the low end and high end of the scale used to measure each personality trait. A technical psychological title is given together with a popular term which has more meaning for the person who is not trained in psychology.

Cattell classifies the sixteen factors in the following manner:¹¹

Factor A - Cyclothymia (Warm, Sociable)	vs.	Schizothymia (Aloof, Stiff)
Factor B - General Intelligence (Bright)	vs.	Mental Defect (Dull)
Factor C - Ego Strength (Mature, Calm)	vs.	Dissatisfied Emotion- ality (Emotional, Immature, Unstable)
Factor E - Ascendancy (Aggressive, Competi- tive)	vs.	Submission (<i>"Milk-Toast,"</i> Mild)
Factor F - Surgency (Enthusiastic, Hap- py-Go-Lucky)	vs.	Desurgency (Glum, Sober, Seri- ous)

¹⁰ Raymond B. Cattell and Glen F. Stice, Handbook for the Sixteen Personality Factor Questionnaire (Champaign, Illinois: Institute for Personality and Ability Testing, 1957), p. 1.

¹¹ Ibid., pp. 11-19.

Factor G - Super-Ego Strength (Conscientious, Persistent)	vs.	Lack of Rigid Internal Standards (Casual, Undependable)
Factor H - Parmia (Adventurous, "Thick Skinned")	vs.	Thretia (Shy - Timid)
Factor I - Premsia (Sensitive, Effeminate)	vs.	Harria (Tough, Realistic)
Factor L - Paranoid Tendency (Suspecting, Jealous)	vs.	Relaxed Security (Accepting, Adaptable)
Factor M - Autia (Bohemian, Inverted, Absent-minded)	vs.	Praxernia (Practical, Concerned with Facts)
Factor N - Shrewdness (Sophisticated, Polished)	vs.	Naivete (Simple, Unpretentious)
Factor O - Guilt Proness (Timid, Insecure)	vs.	Confident Adequacy (Confident, Self-secure)
Factor Q ₁ - Radicalism	vs.	Conservationism of Temperament
Factor Q ₂ - Self-Sufficiency (Self-sufficient, Resourceful)	vs.	Group Dependency (Sociably Group Dependent)
Factor Q ₃ - High Self-Sentiment Formation (Controlled, Exacting Will Power)	vs.	Poor Self-Sentiment Formation (Uncontrolled, Lax)
Factor Q ₄ - High Ergic Tension (Tense, Excitable)	vs.	Low Ergic Tension (Phlegmatic, Composed)

The left column indicates a person scoring high on that particular factor, while the right column indicates the personality of the low scoring individual on the same factor.

Form A, used during the first testing of the lower fitness

Factor 8 - ...
(...)
...

Factor 7 - ...
(...)
...

Factor 6 - ...
(...)
...

Factor 5 - ...
(...)
...

Factor 4 - ...
(...)
...

Factor 3 - ...
(...)
...

Factor 2 - ...
(...)
...

Factor 1 - ...
(...)
...

Factor 0 - ...
(...)
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Factor 9 - ...
(...)
...

Factor 10 - ...
(...)
...

Factor 11 - ...
(...)
...

Factor 12 - ...
(...)
...

group, and Form B, used for the second testing of this group, each contain 187 questions. The Sixteen Personality Factor Questionnaire is so designed that each form has the same number of questions to test each personality factor. It was found that the average time necessary to complete this test was about fifty minutes.

Cattell describes the design of his Sixteen Personality Factor Questionnaire as follows:¹²

Although the questionnaire type of personality test is convenient, it is a mistake to assume that it is a universally valid instrument. Its results differ somewhat as between co-operative and uncooperative, well-educated and poorly educated, honestly and ulteriorly-motivated subjects.

However, the majority of questions in the 16 P.F. are indirect, asking about interests which the subject would not necessarily perceive to be related to the trait in question, so that it escapes some of the distortions described. Moreover, in the 16 P.F. we do not interpret the factors from the nature of the subject's statements about himself, but from the known correlations between these 'mental interiors' as found in questionnaire factors and the factors established in behavior. In other words, the question responses are treated as behavior, not as valid self ratings.

There are 184 items actually contributing to factor scores. There are two buffer items at the beginning of the test to settle the subjects before the actual contributory items are encountered and the last item checks on test attitude at the end of the test.

Three alternative answers are offered for each question. If the subject does not feel strongly one way or the other on a question he can mark the middle category as his answer. There

¹²Ibid., p. 3.

From, and from 8, need to be used in the same way as the
even counts 100 questions. In this case, the results of the
questionnaire as to whether the subject is a member of the
of questions to test the subject's ability to answer the
the average time necessary to complete the questionnaire is
minutes.

Subject's answers are checked by the experimenter and
Factor: questionnaire as follows:

Although the questionnaire is a type of test, it is not
intended, it is a measure of the subject's ability to
self-reflect. The results of the questionnaire are
used to determine the subject's ability to answer the
poorly educated, generally and inferiorly educated.

However, the majority of questions are of the type
indirect, asking about interests, attitudes, and
necessarily positive to be related to the subject's
as that it is not some of the subject's interests.
over, in the 100 items, we do not know the subject's
the nature of the subject's interests, but we do know
from the known correlations between the subject's
as found in questionnaires, factors and the subject's
in behavior. In other words, the questionnaire is
designed as behavior, not as valid.

There are 100 items actually contained in the questionnaire.
There are two different types of questions: the first type
the subject before the actual questionnaire is a type of
and the last 100 items are of the type of questions
These alternative answers are given to the subject.

If the subject does not feel strong enough to answer the
question he can mark the middle circle on the questionnaire.

are no "right" and "wrong" answers except for the thirteen questions, on each form of the test, which measure intelligence.

Eight of the sixteen factors have thirteen questions each, while the other eight factors have ten questions each. The questions for each factor have been mixed throughout the test; and each question is allowed to contribute to only one factor.

A subject can make a raw score in the range anywhere from zero to twenty-six on seven of the factors, and from zero to twenty on the eight factors that have ten questions each. On factor B (intelligence), the raw score can range from zero to thirteen as one point is scored for each question answered correctly.

Kuder Preference Record - Form C. The Kuder Preference Record - Form C measures interest preferences in ten broad areas. The areas are defined as follows:¹³

0. Outdoor: Indicates a preference for work that keeps one outside most of the time, usually dealing with animals and growing things.
1. Mechanical: Indicates a preference for work with machines and tools.
2. Computational: Indicates a preference for working with numbers.
3. Scientific: Indicates a preference for discovering new facts and solving problems.
4. Persuasive: Indicates a preference for meeting and dealing with people, and promoting projects or things to sell.

¹³Frederick Kuder, Administrator's Manual For Kuder Preference Record (Chicago: Science Research Associates, 1960), p. 2.

are in "right" and "wrong" category except for the question
 question, on each item of the test, which requires information.
 Right or the wrong answer have different questions each
 while the other side of the question has the question each. The ques-
 tion for each factor have been asked throughout the test and
 each question is asked in order to be only one factor.
 A subject can have a test score in the range of 0 to 100
 and is twenty-five or seven of the factors, and five to
 twenty on the other factors that have the question each. In
 factor B classification, the test score can range from zero to
 twenty on one point is scored for each question answered cor-
 rectly.

Factor B Classification Method - Test C: The Index Factor

Method - Item D questions interest questionnaire is now used to
 The score are defined as follows:

0. Outdoors: Indicates a preference for very high range
 one outside most of the time, usually less
 than with animals and growing things.

1. Mechanisms: Indicates a preference for work with
 machines and tools.

2. Computational: Indicates a preference for working
 with numbers.

3. Patience: Indicates a preference for slow-paced work
 tasks and solving problems.

4. Persuasive: Indicates a preference for meeting and
 dealing with people, and convincing and
 leads to change of self.

1. Brodbeck Index, Administrator's Manual for Robert Frost
 since 1950 (University of Chicago Press, 1950), p. 12.

5. Artistic: Indicates a preference for doing creative work with one's hands. It is usually work that has "eye appeal" involving attractive design, color, and materials.
6. Literary: Indicates a preference for reading and writing.
7. Musical: Indicates a preference for going to concerts, playing instruments, singing, or reading about music and musicians.
8. Social Service: Indicates a preference for helping people.
9. Clerical: Indicates a preference for office work that requires precision and accuracy.

The Kuder test is best known for its use in vocational guidance. However, the results obtained in this study were used only in interpreting the interest areas of the subjects. It was felt that interests are part of the individual's personality structure. Springob's study would tend to support this feeling. He found numerous significant correlations between interests as measured by the Kuder Preference Record-Form G and what he referred to as more "normal" personality characteristics as measured by the California Psychological Inventory.¹⁴

The Kuder test consists of twelve pages which contain fourteen groups of activities on each page. The activities are listed in groups of three. The subject examines the three activities and chooses the activity he would most like to do and the activity he would least like to do. He then records his

¹⁴H. Karl Springob, "Relationship of Interests as Measured by the California Psychological Scales," The Personnel and Guidance Journal, XLI (March, 1963), pp. 624-8.

choices on the answer sheet. He follows this procedure with each group of activities. It was found that this test took approximately forty minutes for the average student.

Fowler feels that the Kuder Preference Record is one of the best available measures of interests. He particularly recommends it for high school students. He also states that it may be assumed that the obtained scores for certain wide areas of interest are reasonably objective.¹⁵

The interest level of the groups used in this study were compared on each of the ten scores which compose the Kuder Preference Record-Form C. A high score indicated a high interest and a low score indicated a low interest in the area being analyzed.

Reliability of the Tests. The split-half reliability for the Allport A-S reaction study test for men is .85.¹⁶ The split-half reliabilities which are given for Cattell's Sixteen Factor Questionnaire range from .71 to .93.¹⁷ The Kuder Preference Record-Form C is reported to have a reliability average of approximately .90. The lowest correlation reported was .84 and the highest was .93.¹⁸

¹⁵H. M. Fowler, The Fourth Mental Measurements Yearbook, ed. Oscar Krisen Buros (Highland Park, New Jersey: The Gryphon Press, 1959), p. 742.

¹⁶Synder, op. cit., p. 51.

¹⁷Adcock, op. cit., p. 99.

¹⁸Fowler, op. cit., p. 742.

choices on the number of... It was found that the...
each group of activities... approximately 10%...
...the most available means of... He also stated that...
...the obtained means for... are necessarily subjective.

The interest level of the... occurred on each of the...
...A high score indicated a high interest and a...
...low score indicated a low interest in the area being analyzed.

Reliability of the... The split-half reliability for...
...The split-half reliability...
...The split-half reliability...
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...The split-half reliability...

1. A. Fowler, The Fourth Mental Measurements Yearbook,
of the American Psychological Association, New York: The
Psychological Corporation, 1951, p. 752.

1. A. Fowler, op. cit., p. 71.
2. A. Fowler, op. cit., p. 72.
3. A. Fowler, op. cit., p. 73.

CHAPTER IV

RESULTS AND ANALYSIS

This study was undertaken with the hypothesis that there are significant relationships between physical fitness and personality traits. The hypothesis was tested by comparing high school male students who ranked low on a physical fitness test with a group of high ranking students on the same test. The groups were compared on a total of twenty-seven personality traits. The traits included ascendance-submission as measured by the Allport A-S Reaction Study, sixteen traits measured by Cattell's Sixteen Personality Factor Questionnaire, and ten personality interest traits measured by the Kuder Preference Record-Form C. These same traits were used when ascertaining whether an improvement in physical fitness was accompanied by a change in personality.

The statistical treatment of the data will be explained in this chapter. Tables will be given which show the differences between the upper group and lower group on the physical fitness test and on the twenty-seven personality traits on which the two groups were compared. Other tables will show the improvement of the experimental and control groups on the physical fitness test given at the completion of the research period. Tables will also show changes which occurred in the selected personality traits of the experimental and control groups from the first testing

RESULTS AND ANALYSIS

This study was undertaken with the hypothesis that there are significant relationships between physical fitness and personality traits. The hypothesis was tested by comparing high school male students who ranked low on a physical fitness test with a group of high ranking students on the same test. The groups were composed of a total of twenty-seven personality traits. The traits included sociability, adjustment, and leadership by the Likert 4-point rating scale, sixteen traits measured by Cattell's Sixteen Personality Factor Questionnaire, and ten personality factors measured by the Kuder Preference Record. These tests were used when ascertaining whether an improvement in physical fitness was accompanied by a change in personality.

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period in September until the final testing period at the end of the school year in June. The remainder of the chapter will be devoted to a discussion of the findings of the study.

Statistical Treatment. Raw and percentile score results for each subject on the physical fitness test appear in Appendix A. Raw scores for the personality tests are included in Appendix B. Percentiles were used for determining the rank of the subjects on the physical fitness test. Raw scores were used in analyzing the personality trait measurements.

The "t" test of significance was used to determine whether the upper and lower groups differed on the pre-test. The following formula was used:¹

$$\frac{M_U - M_L}{\sqrt{\left(\frac{N\sigma_U^2 + N\sigma_L^2}{N_U + N_L - 2} \right) \frac{N_U + N_L}{N_U N_L}}}$$

The "t" test of significance was also used to ascertain whether there was a significant difference between the control group mean change and experimental group mean change on the physical fitness test and on the personality trait tests at the conclusion of the study.²

¹Quinn McNemar, Psychological Statistics (New York: John Wiley and Sons, Inc., 1957), p. 109.

²Ibid.

period in September with the final testing period at the end of the school year in June. The remainder of the sample will be devoted to a discussion of the findings of the study.

Statistical Treatment

The main subject of the physical fitness tests appears in Appendix A. The scores for the personality tests are included in Appendix B. The correlation coefficients between the rank of the subjects on the physical fitness tests and the personality tests are given in the following table. The test of significance was used to determine whether the test of physical fitness was used in determining whether the upper and lower groups differed on the personality tests. The following table was used:

$$\frac{M_U - M_L}{\sqrt{\left(\frac{N_U^2 + N_L^2}{N_U + N_L - 2} \right) \left(\frac{N_U - N_L}{N_U N_L} \right)}}$$

The test of significance was also used to determine whether there was a significant difference between the personality tests and the physical fitness tests. The test of significance was used to determine whether the upper and lower groups differed on the personality tests. The following table was used:

Wiley and Wiley, Psychological Statistics, New York: Wiley and Wiley, Inc., 1937, p. 102.

$$\sqrt{\frac{M_{DE} - M_{DC}}{\left(\frac{N\sigma_{DE}^2 + N\sigma_{DC}^2}{N_E + N_C - 2} \right) \frac{N_E + N_C}{N_E N_C}}}$$

It was decided that a 95% level of confidence must be attained in order to accept as significant any differences found in this study. A two tailed test of significance was used. Fisher's table was used in determining the significance of the obtained differences.³ There were 111 degrees of freedom when comparing the upper and lower groups and forty-eight degrees of freedom when analyzing differences between the experimental and control groups. The formula used for degrees of freedom was $N_1 + N_2 - 2$ which equals $N - 2$.⁴ Table 1 below indicates the size of "t" which was needed for significance at the .05, .02, .01, and .001 levels of significance.

TABLE 1
SIZE OF "t" NEEDED FOR SIGNIFICANCE⁵

df	.05	.02	.01	.001
48	2.021	2.423	2.704	3.551
111	1.980	2.358	2.617	3.373

³Ronald A. Fisher and Frank Yates, Statistical Tables for Biological, Agricultural and Medical Research (New York: Hafner Publishing Company, Inc., 1953), p. 40.

⁴McNemar, op. cit., p. 111.

⁵Fisher, op. cit., p. 40.

WIDE

$$\left(\frac{WIDE - WIDE}{WIDE - WIDE} \right)$$

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COMPARISON OF THE UPPER AND LOWER PHYSICAL FITNESS GROUPS AT THE OUTSET OF THE STUDY

Comparison on Physical Fitness at Outset of Study. The subjects who finished in the upper fifteen per cent on the physical fitness test, given to 386 high school junior and senior boys, and those who finished in the lower fifteen per cent were statistically compared. The difference between these groups satisfied a research need for a physically fit group and a group that was in a significantly lower state of physical fitness. Table 2 below presents the means, standard deviations, mean difference, and the "t" of the mean difference between these groups on the physical fitness test given in September, 1962.

TABLE 2

COMPARISON OF UPPER AND LOWER GROUP MEANS ON PHYSICAL FITNESS TEST

Physical Fitness Test	Lower Group Mean	SD	Upper Group Mean	SD	Mean Diff.	t
Pull-ups and 600 Yard Run	27.11	12.51	92.52	4.21	65.41	38.48****

****Significant at .001 level

Comparison on Personality Traits at the Outset of Study

The A-S Reaction Study. The upper physical fitness group had a significantly higher ascendance rating on this test than the lower group. The upper group mean was 6.85 points higher

on the ascendance-submission scale than was the mean of the lower group. This resulted in a "t" of 2.575 when the mean difference was analyzed. The difference was significant at the .02 level. Although the upper group ranked significantly higher than the lower group on this test, both group means were located on the submissive part of the scale used for evaluating ascendance-submission.

The A-S Reaction Study was chosen as one of the personality tests because it provided an objective basis for comparing groups on the degree of ascendance which they exhibited. One of the objectives of this study was to investigate the ascendance-submission personality trait to see if a highly fit person differed from a less fit individual. It was felt that many people equate the physically fit person with an aggressive personality. This study attempted to determine whether or not there was a basis for this hypothesis.

The results which were obtained when comparing the upper and lower physically fit groups on the A-S Reaction Study support the theory that a highly fit person is likely to be more aggressive than a less fit individual. It also indicates that this person will be more likely to dominate various life situations. The norms which are used for the test provide a probable reason as to why both groups appear on the submission end of the test scale. The norms are derived from college sophomores, juniors, and seniors whose average age would be several years older than

the high school group used in this study.⁶ It has been found that an increase in age at the high school level will be accompanied by increased ascendance.⁷

Table 3 which appears below shows that the "t" of the mean difference between the upper and lower groups on The A-S Reaction Study was significant at the .02 level.

TABLE 3

COMPARISON OF LOWER AND UPPER GROUP MEANS ON THE
A-S REACTION STUDY

Test	Lower Group Mean	SD	Upper Group Mean	SD	Mean Diff.	t
A-S Reaction Study	-14.88	13.30	-8.03	14.35	6.85	2.575**

** Significant at the .02 level.

Cattell's Sixteen Personality Factor Questionnaire. The upper physical fitness group differed significantly from the lower group on three factors of Cattell's Sixteen Personality Factor Questionnaire. The factors on which they differed were F, Q₂, and Q₄. The upper group appeared more surgent on factor F, with the difference significant at the .02 level. On Q₂, the

⁶ Gordon W. Allport and Floyd H. Allport, Manual for the A-S Reaction Study (Cambridge: Houghton Mifflin Company, 1928), p. 13.

⁷ William Synder, The Third Mental Measurements Yearbook, ed. Oscar Krisen Buros (New Brunswick: Rutgers University Press, 1949), p. 24.

The high school group and its study. It has been found that an increase in age to the high school level will be accompanied by increased responsibility.

Table 3 which shows a comparison of the mean differences between the upper and lower groups on the A-S Reaction Study was significant at the .05 level.

TABLE 3

COMPARISON OF LOWER AND UPPER GROUP MEANS ON THE A-S REACTION STUDY

Test	Lower Group Mean	SD	Upper Group Mean	SD	Mean Diff.	t
A-S Reaction Study	14.50	1.50	18.00	2.00	3.50	2.50

Significant at the .05 level

Cattell's Sixteen Personality Factor Questionnaire. The upper physical fitness group differed significantly from the lower group on three factors of Cattell's Sixteen Personality Factor Questionnaire. The factors on which they differed were F, G, and Q. The upper group appeared more surgent on factor F, with the difference significant at the .05 level. On G, the

Gordon W. Allport and Floyd N. Allport, Manual for the A-S Reaction Study (Cambridge: Houghton Mifflin Company, 1935).

William S. Stetson, The Social Psychological Approach to the Study of Personality (New York: McGraw-Hill Book Company, 1935).

upper group score indicated greater social dependence than the lower group score. This difference was significant at the .001 level. The score of the upper group on the Q_4 factor indicated that they were less tense than the lower group. The significance level was .01.

Each of the sixteen factors which compose Cattell's questionnaire have descriptive terms applied to them. Some of the terms describe a person who finishes with a high score on a designated factor, and a balancing set of terms describe a person who finishes with a low score on the same factor.⁸ Factor F distinguishes between the enthusiastic person and the glum or sober person. It is also considered to be one of the most important factors in the measurement of extroversion-introversion. A person who has a high score tends toward extroversion and the introverted person has a low score. Cattell uses terms such as talkative, cheerful, serene, expressive, and alert to describe a person who finishes with a high score on this factor. A person with a low score is considered to be introspective, depressed, concerned, incommunicative, and languid. Cattell also reports that elected leaders are far higher than followers on surgency. On Q_2 the high scorer is considered to be self-sufficient and resourceful, whereas the person who scores low is considered to be socially more dependent on the group. A person who ranks high on this

⁸ Raymond B. Cattell and Glen F. Stice, Handbook for the Sixteen Personality Factor Questionnaire (Champaign, Illinois: Institute for Personality and Ability Testing, 1957), p. 13.

factor tends to be seclusive and is frequently rejected. He is also found to be dissatisfied with group integration. A much different picture is given by Cattell for the person who ranks low on factor Q_2 . He values social approval and would be likely to follow the dictates of the group. He would use group tastes and standards as his guide. Factor Q_4 distinguishes between a person with high ergic tension and one with low ergic tension. A high score indicates that the person is tense and excitable in this personality trait. He would be irrationally worried, irritable, anxious, and in turmoil. Cattell has found that a person who ranks high on this factor seldom achieves leadership. A person with a low score is described by Cattell as being composed.

On the basis of Cattell's interpretation of factor F, the upper group would be characterized by a more extroverted personality than the lower group. Factor F would also indicate that the members of the upper physical fitness group would be more likely to have leadership qualities than the lower physical fitness group members. Test score results on factor Q_2 picture the lower physical fitness group as being more seclusive than the upper group in the area of social interaction. They would be expected to be rejected more frequently. On this trait measurement we would interpret the results to show that the upper physical fitness group would be gregarious and socially acceptable. Based on Q_4 results, Cattell would describe the upper physical fitness group as being more phlegmatic than the lower group. The

Factor tends to be negative and is frequently rejected. It is also found to be associated with other factors. A group difference picture is given by Factor 1 for the persons who rank low on Factor 2. He values social approval and would be likely to follow the dictates of the group. He would be a leader and a guide. Factor 2 distinguishes between a person with high social status and one with low status. A high score indicates that the person is a leader and is likely to be a person of high status. He would be a person of high status, a person of high status, and a person of high status. Factor 3 is a person who ranks high on this factor seldom achieves leadership. A person with a low score is described by Factor 3 as being content.

On the basis of Factor 1 a distinction of Factor 2, the upper group would be characterized by a more introverted person-ality than the lower group. Factor 2 would also indicate that the members of the upper physical fitness group would be more likely to have leadership qualities than the lower physical fitness group members. Test score results on Factor 2 picture the lower physical fitness group as being more extroverted than the upper group in the area of social interaction. They would be expected to be rejected more frequently. On this trait measure-ment we would interpret the results to show that the upper physical fitness group would be more extroverted and socially acceptable. Based on the results, Factor 1 would describe the upper physical fitness group as being more physically fit than the lower group. The

theoretical explanation based on Cattell's explanation of this trait would be that the less fit group was not as able as the upper group to discharge the energy which built up within them.

Table 4 presents the mean differences between the upper physical fitness group and the lower physical fitness group on the sixteen factors which comprise Cattell's Sixteen Personality Factor Questionnaire. The significance of the difference between means on each factor is shown by the "t" score located in the right column.

TABLE 4

COMPARISON OF LOWER AND UPPER GROUP MEANS ON CATTELL'S
SIXTEEN PERSONALITY FACTOR QUESTIONNAIRE

Cattell Test Factor	Lower Group Mean	SD	Upper Group Mean	SD	Mean Diff.	t
A ^a - Warm Aloof	8.88	2.66	8.90	2.97	.02	.116
B - Bright Dull	6.62	2.06	7.05	1.69	.43	1.433
C - Mature Immature	13.60	2.92	14.52	3.56	.92	1.484
E - Ascendancy Submission	12.84	3.14	12.95	3.07	.11	.186
F - Enthusi- astic Serious	13.40	4.09	15.24	3.95	1.84	2.390**
G - Conscien- tious Undependable	11.02	3.12	11.78	3.53	.76	1.188

theoretical explanation for the results obtained in this study would be that the low level of physical fitness of the subjects was not sufficient to allow them to perform the physical tasks required for the study. The physical fitness of the subjects was measured by a physical fitness test which consisted of a 1000 m run in 10 minutes. The results of this test are shown in Table 4. The mean time for the 1000 m run was 12.5 minutes, which is a very poor performance for a healthy adult male. This suggests that the subjects were not physically fit enough to perform the physical tasks required for the study.

CONCLUSION

Category	Mean	Standard Deviation
1 - Resting	1.00	0.10
2 - Light	1.50	0.20
3 - Moderate	2.00	0.30
4 - Heavy	2.50	0.40
5 - Very Heavy	3.00	0.50
6 - Exhaustion	3.50	0.60
7 - Collapse	4.00	0.70
8 - Death	4.50	0.80

TABLE 4 -- Continued

Gattell Test Factor	Lower Group Mean	SD	Upper Group Mean	SD	Mean Diff.	t
H - Adventurous Timid	9.80	4.05	10.70	4.48	.90	1.084
I - Sensitive Tough	7.20	2.34	7.35	3.16	.15	.277
L - Suspecting Accepting	10.44	2.79	10.16	2.96	.28	.509
M - Absent-Minded Practical	11.64	2.65	10.98	3.23	.66	1.157
N - Polished Simple	10.56	2.35	10.27	2.21	.29	.659
O - Insecure Confident	12.10	3.32	11.25	3.44	.85	1.308
Q ₁ - Radicalism Conservatism	9.34	2.20	9.49	3.22	.15	.294
Q ₂ - Self-Sufficient Group Dependency	12.40	2.84	9.40	3.67	3.00	4.689****
Q ₃ - Controlled Uncontrolled	10.16	2.34	10.03	2.81	.13	.260
Q ₄ - Tense Composed	14.94	3.78	13.48	3.91	1.46	2.655***

^aFor each pair of terms on the left side of the table, the upper term describes a person with a high score and the lower term describes a person with a low score.

**Significant at the .02 level

***Significant at the .01 level

****Significant at the .001 level

TABLE 4 -- Continued

Control Test	Lower Group	Upper Group	Mean	SD	Mean	SD
H - Advancement	9.30	10.70	10.00	1.40	10.00	1.40
I - Initiative	7.30	7.30	7.30	0.00	7.30	0.00
L - Suggesting	10.40	10.10	10.25	0.15	10.25	0.15
M - Abstract	11.60	10.90	11.25	0.35	11.25	0.35
N - Self-Reliance	10.50	10.20	10.35	0.15	10.35	0.15
O - Imagination	12.10	11.60	11.85	0.25	11.85	0.25
P - Rationalization	9.30	9.30	9.30	0.00	9.30	0.00
Q - Self-Confidence	12.40	12.40	12.40	0.00	12.40	0.00
R - Dominance	10.10	10.00	10.05	0.05	10.05	0.05
S - Social	11.90	11.90	11.90	0.00	11.90	0.00

For each pair of scores on the left side of the table, the upper score describes a person with a high score and the lower score describes a person with a low score.

Significant at the .05 level

Significant at the .01 level

Significant at the .001 level

Kuder Preference Record-Form C. The upper physical fitness group differed significantly from the lower physical fitness group on seven of the ten scores which comprise the Kuder Preference Record-Form C. The difference was significant at the .05 level on scores 0 (outdoor), 1 (mechanical), 2 (computational), 3 (scientific), and 8 (social service). A significant difference at the .01 level was obtained on score 7 (musical) and score 9 (clerical).

A high score in an interest area of this test indicates that the person who obtained the score has a liking for the type of activities which apply to that score. For example, a person who ranks high on the persuasive score would be expected to enjoy promoting projects or things to sell.

The upper physical fitness group was found to prefer outdoor activities to a greater degree than did the lower fitness group. This would agree with the way the physically fit person is commonly viewed in our society. It might also be allied to the social service interest where the upper group again ranks significantly higher than the low fitness group. On the outdoor category, the person exhibits an interest in working with animals and on the social service category he indicates that he likes to work with people. The upper physical fitness group was also found to score significantly higher on the scientific and mechanical scores of the Kuder test. This would indicate that with the high school population used in this study the subjects

Kohut Preference Battery-Form 2 The upper physical fitness

group differed significantly from the lower physical fitness group on seven of the ten scores which comprise the Kohut Preference Battery-Form 2. The difference was significant at the .05 level on scores 0 (outdoor), 1 (mechanical), 2 (scientific), 3 (artistic), 4 (social service), 5 (domestic), 6 (mechanical), 7 (mechanical), and score 8 (artistic). At the .01 level was obtained on score 7 (mechanical) and score 9 (artistic).

A high score in an interest area of this test indicates that the person who obtained the score has a liking for the type of activities which apply to that score. For example, a person who ranks high on the preference score would be expected to enjoy processing projects or things to sell.

The upper physical fitness group was found to prefer outdoor activities to a greater degree than did the lower physical fitness group. This would agree with the way the physically fit person is commonly viewed in our society. It might also be added to the social service interest where the upper group again ranks significantly higher than the lower fitness group. On the outdoor category, the person exhibits an interest in working with animals and on the social service category he indicates that he likes to work with people. The upper physical fitness group was also found to score significantly higher on the scientific and mechanical scores of the Kohut test. This would indicate that with the high school population used in this study the subjects

who ranked high on physical fitness had a greater preference for discovering new facts, solving problems, and working with machines and tools than did the group which ranked low on the physical fitness test. This would seem to refute those who stereotype a highly physically fit person as being less capable than the average person of having scientifically oriented interests and abilities.

A personality syndrome for a person in a low state of physical fitness would seem to appear from the results of the Kuder Preference Record-Form G. It is noted that the low physical fitness group scored significantly higher than the high physical fitness group on the computational, musical and clerical scores. This would indicate a type of person who would prefer to work by himself. He would seem to have a preference for precision and accuracy in what he undertakes. In the light of Kuder's explanation of the scores, this type of an individual would probably lack flexibility.

The upper and lower physical fitness groups differed considerably on the Kuder Preference Record scores. Table 5 shows that a significant difference was found on all scores except the ones which measure the persuasive, artistic, and literary interest areas. The table also shows that the mechanical and social service scores approached the .02 level of significance. A "t" of 2.358 was needed for significance at this level. The "t" for the mechanical score was 2.352 and the "t" for the social service score was 2.321.

who ranked high on physical fitness had a significantly higher score on the physical fitness test than those who ranked low on physical fitness. This would be a significant finding if it were true. The study also found that the physical fitness test was a significant predictor of the physical fitness score. This would be a significant finding if it were true. The study also found that the physical fitness test was a significant predictor of the physical fitness score. This would be a significant finding if it were true.

A personality questionnaire for a period of 10 days was administered to the subjects. The results of the questionnaire were used to determine the personality characteristics of the subjects. The study found that the physical fitness test was a significant predictor of the physical fitness score. This would be a significant finding if it were true. The study also found that the physical fitness test was a significant predictor of the physical fitness score. This would be a significant finding if it were true. The study also found that the physical fitness test was a significant predictor of the physical fitness score. This would be a significant finding if it were true.

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TABLE 5

COMPARISON OF LOWER AND UPPER GROUP MEANS ON THE KUDER
PREFERENCE RECORD - FORM C

Kuder Preference Scores	Lower Group Mean	SD	Upper Group Mean	SD	Mean Diff.	t
0a- Outdoor	44.70	15.61	50.67	13.45	5.97	2.155*
1 - Mechanical	40.90	11.92	45.98	10.74	5.08	2.352*
2 - Computational	29.66	9.29	26.35	8.14	3.31	1.994*
3 - Scientific	37.18	11.05	41.32	10.45	4.14	2.020*
4 - Persuasive	38.92	11.31	37.75	11.69	1.17	.529
5 - Artistic	30.00	11.10	29.70	8.28	.30	.162
6 - Literary	19.18	5.64	16.83	7.12	2.35	1.880
7 - Musical	11.46	6.55	8.08	4.22	3.38	3.188***
8 - Social Service	35.52	10.59	40.21	10.50	4.69	2.321*
9 - Clerical	50.48	12.92	44.38	8.63	6.10	2.961***

^aA high score denotes interest in the designated area.

*Significant at the .05 level

**Significant at the .01 level

Summary of the Personality Trait Findings. Several of the test score results appeared to support each other. Factors F and Q₂ of the Cattell Sixteen Personality Factor Questionnaire both pictured the upper group as being more extroverted than the lower group. Cattell's explanation of the personality characteristics which would apply to the upper group on factors F and Q₄ indicated that leaders would be more likely to come from this group than from the

TABLE 2

COMPARISON OF LEADS AND UPPER GROUP MEANS OF THE SUMMER
EXPERIMENTAL GROUPS - 1944

Upper Group	Lower Group	Mean	SD	Upper Group	Lower Group	Mean	SD
1 - Academic	1 - Academic	11.61	1.57	11.61	11.61	11.61	1.57
2 - Vocational	2 - Vocational	11.91	1.58	11.91	11.91	11.91	1.58
3 - Commercial	3 - Commercial	11.91	1.58	11.91	11.91	11.91	1.58
4 - Technical	4 - Technical	11.91	1.58	11.91	11.91	11.91	1.58
5 - Professional	5 - Professional	11.91	1.58	11.91	11.91	11.91	1.58
6 - Literary	6 - Literary	11.91	1.58	11.91	11.91	11.91	1.58
7 - Musical	7 - Musical	11.91	1.58	11.91	11.91	11.91	1.58
8 - Social Service	8 - Social Service	11.91	1.58	11.91	11.91	11.91	1.58
9 - Clerical	9 - Clerical	11.91	1.58	11.91	11.91	11.91	1.58

* A high score denotes interest in the designated area.
 * Significant at the .05 level
 * Significant at the .01 level

By way of the Personality Test findings, several of the test
 score results appeared to support each other. Factors 3 and 4 of
 the Gaiter-Rickson Personality Test (Personality with Interest)
 the upper group as being more interested than the lower group.
 Gaiter's explanation of the personality characteristics of the
 would apply to the upper group as indicated in
 leaders would be more likely to come from this group than from the

lower group. The score of the lower group on factor Q_{44} of Cattell's questionnaire would empirically support the score obtained by this group on the clerical category of the Kuder Preference Record. On factor Q_{44} , the group which was in a low state of physical fitness appeared to be tense. This might be because they did not have the ability to "unwind" as well as the fit person. The clerical score indicated that the lower physical fitness group tended to like accuracy and precision in what they did. It would seem that a person who demands accuracy and is unable to adjust easily to social situations, as evidenced by an introverted personality, would have the ingredients for a tense personality trait.

The upper and lower physical fitness groups differed significantly on the ascendance-submission trait which was measured by the A-S Reaction Study. The two groups did not differ on factor E of Cattell's Sixteen Personality Factor Questionnaire which measures the same trait. A possible explanation might be that Allport's test of this trait is more extensive and is probably more discriminating than is the measurement of this trait on Cattell's test which measures a wide variety of personality traits with a minimum of questions applying to each trait.

A difference was found between the personality traits of the two extreme physical fitness groups used in this study. The group that ranked in the upper fifteen per cent on the physical fitness test, given to the 386 high school students, was found to exhibit more dominance than the group which finished in the lower

lower group. The score of the lower group on factor G of Cattell's questionnaire would empirically support the scores obtained by this group on the clinical category of the T-scores Preference Record. On factor G, the group which was in a low state of physical fitness appeared to be tense. This may be because they did not have the ability to "relax" as well as the high group. The clinical score indicated that the lower physical fitness group tended to like activity and precision in what they did. It would seem that a person who displays anxiety and is unable to adjust easily to social situations, as evidenced by an introverted personality, would have the high score for a tense personality trait.

The upper and lower physical fitness groups differed significantly on the questionnaire-trait which was measured by the 4-5 function study. The two groups did not differ on factor H of Cattell's Personality Preference Questionnaire, which measures the same trait. A possible explanation might be that Allport's test of this trait is more extensive and the subjects were dissatisfied than in the assessment of this trait on Cattell's test which assumes a wide variety of personality traits with a minimum of questions applying to each trait.

A difference was found between the personality traits of the two extreme physical fitness groups used in this study. The group that ranked in the upper fitness category on the physical fitness test, given to the 365 high school students, was found to exhibit more dominance than the group which ranked in the lower

fifteen per cent of this fitness test. The test results indicated that the physically fit group had personality traits which were more extroverted than the personality traits of the lower group. The upper group personality traits were also more socially oriented than were those of the lower group. They were found to be more interested in people and in group interaction. This finding would support the finding of Fait who observed that students who had low scores on tests that measure physical fitness had more social adjustment problems than those who had high scores. He feels this is due to the children withdrawing from play and sport activities because of their lack of physical fitness. They are then deprived of social contacts which are valuable in social development.⁹ The results of this portion of the study support the hypothesis that there is a difference between the personality traits of a physically fit person and an unfit person. It is possible that the range of differences between the personality traits of the physically fit group and the lower physical fitness group might have been even greater if thirty football players in the junior and senior classes would have been permitted to participate in this study. We would anticipate that they would rank high on physical fitness.¹⁰ Other studies have indicated that

⁹Hollis F. Fait, Adapted Physical Education (Philadelphia: W. B. Saunders Company, 1960), p. 61.

¹⁰J. Burton Merriman, "Relationship of Personality Traits to Motor Ability," Research Quarterly, XXXI (May, 1960), p. 167.

fifteen per cent of this fitness test. The test results indi-
 cated that the physically fit group had personality traits which
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1. Hollis F. Pitt, Adapted Physical Education (Philadelphia:
 W. B. Saunders Company, 1950), p. 81.
 2. Arthur Korman, "Relationship of Personality Traits to
 Motor Ability," Research Quarterly, XXXI (May, 1960), p. 167.

they would be expected to rank high on various personality traits such as the one which measures ascendance-submission.¹¹

COMPARISON OF THE EXPERIMENTAL AND CONTROL GROUPS AT THE CONCLUSION OF THE STUDY

Comparison on Physical Fitness at Conclusion of the Study.

The physical fitness of the experimental group improved significantly over the physical fitness of the control group during the nine month experimental period. The exercise program in which the experimental group participated made a greater contribution toward physical fitness than did the regular physical education program in which the control group participated. The experimental group had a pre-test percentile mean of 22.69 and a post-test mean of 44.37 for a mean gain of 21.67. The control group mean gain was 3.85 percentile scores. On the pre-test the control group ranked at the 31.92 percentile and on the post-test this group had a percentile mean score of 35.77. Table 6 shows that the difference in mean gains by the two groups was significant at the .001 level.

Comparison on Personality Traits at Conclusion of the Study.

The A-S Reaction Study. The mean gain of the experimental group from pre-test to post-test on the ascendance-submission scale of this test was not significant. The experimental group

¹¹ W. R. Johnson, E. C. Hutton, and G. B. Johnson, "Personality Traits of Some Champion Athletes as Measured by Two Projective Tests: Roschach and H-T-P," Research Quarterly, XXV (December, 1954), pp. 284-285.

They would be allowed to remain in the country as long as they would not be a burden on the community.

Domestication of the Wild Duck

The wild duck is a very common bird in the country and is often found in the swamps and marshes.

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TABLE 6

MEAN DIFFERENCES BETWEEN PRE-TEST AND POST-TEST OF EXPERIMENTAL
AND CONTROL GROUPS ON PHYSICAL FITNESS TEST

Physical Fitness Test	Experimental Mean Diff.	SD	Control Mean Diff.	SD	Mean Diff. Between Groups	t
Pull-ups and 600 Yard Run	21.67	12.45	3.85	10.85	17.52	5.183****

****Significant at .001 level

mean was -16.58 on the pre-test and -10.85 on the post test. The direction of the change by the experimental group was toward ascendance. At the end of the experimental period the -10.85 mean of the experimental group was moving toward the -8.03 mean which the upper physical fitness group had on the pre-test. The mean of the control group on the pre-test was -13.04 and on the post-test it was -13.50. This mean difference of .46 was in the direction of increased submission. A "t" of 1.980 was needed for significance when comparing the mean difference of the experimental group with the mean difference of the control group. Table 7 shows that the obtained "t" of 1.625 approached, but did not reach, the desired level of significance.

The 5.73 score gain of the experimental group might not adequately express the gain made by the experimental group during their exercise program. It is possible that some items on the test do not reflect the full impact of a change in dominance

TABLE 6

MEAN DIFFERENCES BETWEEN PRE-TEST AND POST-TEST ON PHYSICAL FITNESS TESTS
AND CONTROL GROUPS ON PHYSICAL FITNESS TESTS

Physical Fitness Test	Mean Diff.	Experimental Group	Control Group	Mean Diff.
100 Yard Run	21.67	12.45	3.85	17.85
100 Yard Swim	12.45	12.45	3.85	17.85

Significant at .001 level

mean was -16.58 on the pre-test and -10.55 on the post test. The direction of the change by the experimental group was toward an increase. At the end of the experimental period the -10.55 mean of the experimental group was moving toward the -8.65 mean which the upper physical fitness group had on the pre-test. The mean of the control group on the pre-test was -16.58 and on the post-test it was -13.55. This mean difference of 3.03 was in the direction of increased submission. A t of 1.980 was needed for significance when comparing the mean difference of the experimental group with the mean difference of the control group.

Table 7 shows that the obtained t of 1.655 approached, but did not reach, the desired level of significance.

The 5.75 score gain of the experimental group might not adequately express the gain made by the experimental group during their exercise program. It is possible that some items on the test do not reflect the full impact of a change in discipline.

TABLE 7

MEAN DIFFERENCE BETWEEN PRE-TEST AND POST-TEST OF EXPERIMENTAL
AND CONTROL GROUPS ON THE A-S REACTION STUDY

Test	Experimental Mean Diff.	SD	Control Mean Diff	SD	Mean Diff. Between Groups	t
A-S Reaction Study	5.73	13.72	-.46	12.60	6.19	1.625

since they are based on everyday situations. For example, the answer to a question which asks if the subject was a "goat" during childhood play does not change even though the personality of the subject might have become more dominant as a result of increased physical fitness. It is also possible that an increase in dominance would not be adequately measured by a question which rates a person high on the ascendance scale when he is the leader of several groups. A boy in the experimental group might have developed leadership abilities but he would not have had the time to become a leader of enough groups to rank higher than his previous position on the ascendance-submission scale.

Cattell's Sixteen Personality Factor Questionnaire. The experimental group changes on the sixteen factors which comprise this questionnaire did not differ significantly from the changes which took place in the control group on the same factors. The pre-test and post-test means of the experimental and control groups on each personality factor are presented in Table 8.

TABLE 7

MEAN DIFFERENCES BETWEEN PRE-TEST AND POST-TEST OF EXPERIMENTAL AND CONTROL GROUPS ON THE A-S REACTION STUDY

Test	Experimental Mean Diff.	Control Mean Diff. SD	Mean Diff. between groups	T
A-S Reaction Study	5.75	13.72 - .46 12.60	8.19	1.625

since they are based on everyday situations. For example, the

answer to a question which asks if the subject was a "goat"

during outburst play does not change even though the personal-

ity of the subject might have become more dominant as a result

of increased physical fitness. It is also possible that an in-

crease in dominance would not be adequately measured by a ques-

tion which rates a person high on the dominance scale when he is

the leader of several groups. A boy in the experimental group

might have developed leadership abilities but he would not have

had the time to become a leader of enough groups to rank higher

than his previous position on the dominance-submission scale.

Unstable Sixteen Personality Factor Questionnaire. The

experimental group changed on the sixteen factors which comprise

this questionnaire did not differ significantly from the changes

which took place in the control group on the same factors. The

pre-test and post-test means of the experimental and control

groups on each personality factor are presented in Table 8.

TABLE 8

PRE-TEST AND POST-TEST MEANS OF EXPERIMENTAL AND CONTROL GROUPS
ON CATTELL'S SIXTEEN PERSONALITY FACTOR QUESTIONNAIRE

Cattell Test Factor	Experimental Pre-Test	Group Mean Post-Test	Control Pre-Test	Group Mean Post-Test
A ^a - Warm Aloof	8.81	7.27	8.96	7.75
B - Bright Dull	7.31	7.69	5.88	7.17
C - Mature Immature	12.96	13.35	14.29	14.42
E - Ascendance Submission	12.73	10.08	12.96	11.54
F - Enthusiastic Serious	12.81	12.77	14.04	13.38
G - Conscientious Undependable	10.62	12.46	11.46	11.71
H - Adventurous Timid	8.58	10.27	11.13	11.58
I - Sensitive Tough	7.46	9.27	6.92	10.21
L - Suspecting Accepting	10.42	10.58	10.46	9.79
M - Absent Minded Practical	11.35	9.42	11.96	8.92
N - Polished Simple	10.42	9.00	10.71	10.17
O - Insecure Confident	12.31	13.39	11.88	13.71
Q ₁ - Radicalism Conservatism	8.96	8.69	9.75	9.63
Q ₂ - Self-Sufficient Group Dependency	13.42	11.00	11.29	10.75

TABLE 2

PRE-TEST AND POST-TEST MEANS OF EXPERIMENTAL AND CONTROL GROUPS
ON BARTLETT'S SIMILAR PERSONALITY FACTOR QUESTIONNAIRE

Category	Experimental Pre-Test	Experimental Post-Test	Control Pre-Test	Control Post-Test
A - Warm Alloy	8.81	7.27	8.98	7.78
B - Warm Dull	7.31	7.69	8.88	7.17
C - Warm Dour	12.98	13.32	14.29	14.42
E - Ambitious Doubtful	12.73	10.69	12.98	11.98
F - Intellectual Distant	12.81	12.77	14.04	13.78
G - Conscientious Undependable	10.82	12.46	11.46	11.71
H - Adventurous Timid	8.98	10.27	11.13	11.28
I - Sensitive Tough	7.46	9.27	6.92	10.21
J - Imaginative Accurate	10.42	10.58	10.46	9.79
M - Alert Mind Frenzied	11.32	9.42	11.98	8.92
N - Polished Rough	10.42	9.00	10.71	11.17
O - Insecure Content	12.31	13.39	11.88	13.71
Q1 - Individual Conventional	8.98	8.69	9.72	9.63
Q2 - Self-Start Obedient	13.42	11.00	11.82	10.79

TABLE 8--Continued

Cattell Test Factor	Experimental Pre-Test	Group Mean Post-Test	Control Pre-Test	Group Mean Post-Test
Q ₃ - Controlled Uncontrolled	10.19	10.81	10.13	10.50
Q ₄ - Tense Composed	15.85	14.96	13.96	14.58

^aFor each pair of terms on the left side of the table, the upper term describes a person with a high score and the lower term describes a person with a low score.

The difference between the mean changes of the experimental and control groups ranged from .14 on Q₁, which measures radicalism versus conservatism, to 1.88 on Q₂, which measures self-sufficiency versus group dependency. The experimental group change on Q₂ and Q₄ (tense-composed) was toward group dependency and low ergic tension respectively. The change on these two factors approached significance when compared with the change of the control group on these same factors. A "t" of 2.021 was needed for significance at the .05 level. The "t" for factor Q₂ was 1.958 and the "t" for factor Q₄ was 1.505. Factors Q₂ and Q₄ were two of the three factors on which the upper physical fitness group differed from the lower physical fitness group on the pre-test. The upper group was found to be more group dependent and exhibited less ergic tension. This was the direction in which the experimental group moved on the post-test given at the end of the experimental period.

TABLE 8--Continued

Control Test	Experimental Test	Group Mean Post-Test	Control Test Post-Test	Group Mean Post-Test
10.12	10.12	10.61	10.13	10.50
10.12	10.12	10.96	10.13	10.50

For each pair of scores on the left side of the table, the upper score describes a person with a high score and the lower score describes a person with a low score.

The difference between the mean changes of the experimental and control groups ranged from 1.15 on Q_1 which measures radicalism versus conservatism, to 1.38 on Q_2 , which measures self-reliance versus group dependency. The experimental group change on Q_1 and Q_2 (tense-congruent) was toward group dependency and low style tension respectively. The change on these two factors as presented significantly when compared with the change of the control group on these same factors. A t of 2.061 was needed for significance at the .05 level. The t for factor Q_3 was 1.252 and the t for factor Q_4 was 1.505. Factors Q_5 and Q_6 were two of the three factors on which the upper physical fitness group differed from the lower physical fitness group on the pre-test. The upper group was found to be more group dependent and exhibited less style tension. This was the direction in which the experimental group moved on the post-test given at the end of the experimental period.

The mean differences and "t" scores obtained on Cattell's Sixteen Personality Factor Questionnaire are given in Table 9.

TABLE 9

MEAN DIFFERENCES BETWEEN PRE-TEST AND POST-TEST OF EXPERIMENTAL AND CONTROL GROUPS ON CATTELL'S SIXTEEN PERSONALITY FACTOR QUESTIONNAIRE

Cattell Test Factor	Experimental Mean Diff.	SD	Control Mean Diff.	SD	Mean Diff. Between Groups	t
A ^a - Warm Aloof	-1.54	2.78	-1.21	2.33	.33	.446
B - Bright Dull	.38	2.44	1.29	2.19	.91	1.358
C - Mature Immature	.38	3.43	.13	3.96	.25	.234
E - Ascendancy Submission	-2.65	3.82	-1.42	3.88	1.23	1.110
F - Enthusiastic Serious	-.04	4.32	-.66	2.94	.62	.579
G - Conscientious Undependable	1.85	3.49	.25	3.23	1.60	1.649
H - Adventurous Timid	1.69	3.11	.46	3.76	1.23	1.242
I - Sensitive Tough	1.81	3.09	3.29	2.23	1.48	1.897
L - Suspecting Accepting	.15	3.19	-.67	3.88	.82	.804
M - Absent-Minded Practical	-1.92	2.86	-3.04	3.91	1.12	1.258
N - Polished Simple	-1.42	2.75	-.54	3.17	.88	1.035

The next difference and error obtained on Galt's

difference between factor observations are given in Table 2.

TABLE 2

MEAN DIFFERENCES BETWEEN PRE-TEST AND POST-TEST OF FACTORIAL
AND CONTROL GROUPS ON GALT'S FIFTEEN PERSONALITY
FACTOR QUESTIONNAIRE

Factor	Experimental Mean Diff.	Control Mean Diff.	Mean Diff. Between Groups
A - Warm Mood	-1.75	+1.21	.46
B - Bright Dull	.38	2.41	1.93
C - Mature Immature	.38	2.41	.93
E - Ambitious Unambitious	-2.65	-1.48	1.17
F - Individualistic Social	-.94	-.68	.26
G - Conventional Unconventional	1.25	2.41	1.16
H - Adventurous Timid	1.65	2.41	.76
I - Gentle Tough	1.81	2.41	.60
L - Sensitive Insensitive	.15	2.41	2.26
M - Spontaneous Controlled	-1.92	-2.05	.13
N - Polished Rough	-1.42	2.41	3.83

TABLE 9--Continued

Cattell Test Factor	Experimental Mean Diff.	SD	Control Mean Diff.	SD	Mean Diff. Between Groups	t
O - Insecure Confident	1.08	4.53	1.83	4.50	.75	.577
Q ₁ - Radicalism Conservatism	- .27	3.39	- .13	3.90	.14	.131
Q ₂ - Self-Sufficient- Group Dependency	2.42	3.21	- .54	3.46	1.88	1.958
Q ₃ - Controlled Uncontrolled	.62	3.14	.38	3.09	.24	.266
Q ₄ - Tense Composed	- .89	4.40	.63	2.12	1.52	1.505

^aFor each pair of terms on the left side of the table, the upper term describes a person with a high score and the lower term describes a person with a low score.

It appeared that an attitude change took place among the experimental subjects even though a significant change was not shown on Cattell's personality traits. The experimental subjects seemed to take pride and develop confidence in their new found physical abilities. They exhibited this attitude when they aptly demonstrated isometric exercises to other classes. It is theorized that this apparent change will have carry-over value for them and might eventually affect their personality traits enough so that a measurable change will occur.

Kuder Preference Record-Form C. The pre-test and post-test means of the experimental and control groups on the ten factors which comprise the Kuder Preference Record-Form C are presented in Table 10 below.

TABLE 10

PRE-TEST AND POST-TEST MEANS OF EXPERIMENTAL AND CONTROL GROUPS
ON THE KUDER PREFERENCE RECORD - FORM C

Kuder Preference Score	Experimental Pre-Test	Group Mean Post-Test	Control Pre-Test	Group Mean Post-Test
0 ^a - Outdoor	46.00	45.96	43.29	45.71
1 - Mechanical	42.23	43.00	39.46	40.75
2 - Computational	29.69	29.92	29.63	30.21
3 - Scientific	36.69	38.77	37.71	38.21
4 - Persuasive	37.77	37.23	40.17	39.21
5 - Artistic	31.31	31.23	28.58	28.25
6 - Literary	18.50	18.23	19.92	20.21
7 - Musical	10.31	10.77	12.71	12.79
8 - Social Service	33.70	32.65	37.50	35.29
9 - Clerical	52.38	50.58	48.42	50.71

^aA high score denotes interest in the designated area.

The experimental group mean change on score nine of the Kuder Preference Record-Form C differed significantly at the .05 level from the mean change of the control group on this same score. This was the only score on which there was a significant difference.

Table 1. Experimental Results for the 1950-1951 Season

Results of the experimental and control plots are shown in Table 1. The results show that the experimental plots produced significantly higher yields than the control plots in all years.

The experimental plots were established in 1950 and 1951. The control plots were established in 1950 and 1951. The results show that the experimental plots produced significantly higher yields than the control plots in all years.

Year	Experimental	Control
1950	1.2	0.8
1951	1.5	1.0
1952	1.8	1.2
1953	2.0	1.4
1954	2.2	1.6
1955	2.4	1.8
1956	2.6	2.0
1957	2.8	2.2
1958	3.0	2.4
1959	3.2	2.6
1960	3.4	2.8
1961	3.6	3.0
1962	3.8	3.2
1963	4.0	3.4
1964	4.2	3.6
1965	4.4	3.8
1966	4.6	4.0
1967	4.8	4.2
1968	5.0	4.4
1969	5.2	4.6
1970	5.4	4.8
1971	5.6	5.0
1972	5.8	5.2
1973	6.0	5.4
1974	6.2	5.6
1975	6.4	5.8
1976	6.6	6.0
1977	6.8	6.2
1978	7.0	6.4
1979	7.2	6.6
1980	7.4	6.8
1981	7.6	7.0
1982	7.8	7.2
1983	8.0	7.4
1984	8.2	7.6
1985	8.4	7.8
1986	8.6	8.0
1987	8.8	8.2
1988	9.0	8.4
1989	9.2	8.6
1990	9.4	8.8
1991	9.6	9.0
1992	9.8	9.2
1993	10.0	9.4
1994	10.2	9.6
1995	10.4	9.8
1996	10.6	10.0
1997	10.8	10.2
1998	11.0	10.4
1999	11.2	10.6
2000	11.4	10.8
2001	11.6	11.0
2002	11.8	11.2
2003	12.0	11.4
2004	12.2	11.6
2005	12.4	11.8
2006	12.6	12.0
2007	12.8	12.2
2008	13.0	12.4
2009	13.2	12.6
2010	13.4	12.8
2011	13.6	13.0
2012	13.8	13.2
2013	14.0	13.4
2014	14.2	13.6
2015	14.4	13.8
2016	14.6	14.0
2017	14.8	14.2
2018	15.0	14.4
2019	15.2	14.6
2020	15.4	14.8
2021	15.6	15.0
2022	15.8	15.2
2023	16.0	15.4
2024	16.2	15.6
2025	16.4	15.8
2026	16.6	16.0
2027	16.8	16.2
2028	17.0	16.4
2029	17.2	16.6
2030	17.4	16.8

A high level of statistical significance was achieved in all years.

The experimental plots were established in 1950 and 1951. The control plots were established in 1950 and 1951. The results show that the experimental plots produced significantly higher yields than the control plots in all years.

The experimental group showed less of a preference for clerical type activities on the post-test. The upper physical fitness group differed significantly from the lower physical fitness group on the clerical score of the pre-test. This might indicate that the experimental group interest pattern moved in the direction of the upper group on this score as a result of the change in fitness. Although other factors possibly contributed to this change, it is theorized that the increased physical fitness resulted in a feeling of expansiveness on the part of the subjects. This resulted in fewer internal restrictions as far as their interests were concerned. It might be possible that the personality trait which caused them to stay within a closely structured framework was undergoing a liberalization process.

Table 11 contains the statistical differences found between the pre-test and post-test means of the experimental and control groups on the ten scores of the Kuder Preference Record-Form C.

TABLE 11

MEAN DIFFERENCES BETWEEN PRE-TEST AND POST-TEST OF EXPERIMENTAL AND CONTROL GROUPS ON THE KUDER PREFERENCE RECORD - FORM C

Kuder Preference Score	Experimental Mean Diff.	SD	Control Mean Diff.	SD	Mean Diff. Between Groups	t
0 ^a - Outdoor	- .04	8.54	2.42	3.57	2.46	1.171
1 - Mechanical	.77	6.94	1.29	6.56	.52	.266
2 - Computational	.23	8.11	.58	6.38	.35	.165
3 - Scientific	2.08	8.01	.50	7.55	1.58	.702

The experimental group showed a marked loss of a tolerance for alcohol. The tolerance on the post-test. The upper physical fitness group differed significantly from the lower physical fitness group on the alcohol score at the pre-test. This might indicate that the experimental group indeed moved in the direction of the upper group on this score as a result of the change in fitness. Although other factors possibly contributed to this change, it is thought that the increased physical fitness resulted in a feeling of euphoria on the part of the subjects. This resulted in lower alcohol consumption as far as their interest was concerned. It might be possible that the personality traits which existed prior to the study were already structured to work in favor of a liberalization process.

Table II presents the statistical differences found between the pre-test and post-test means of the experimental and control groups on the score of the Ruder Preference Inventory.

TABLE II

MEAN DIFFERENCES BETWEEN PRE-TEST AND POST-TEST OF RUDER PREFERENCE INVENTORY AND CONTROL GROUPS OF THE UPPER PHYSICAL FITNESS GROUP - FEMALE

Upper Physical Fitness Group	Experimental Mean Diff.	Control Mean Diff.	Mean Diff. Between Groups
0 - Unfavorable	- .04	8.54	8.58
1 - Neutral	.77	6.96	6.19
2 - Cooperative	.13	5.11	4.98
3 - Cooperative	2.08	6.01	3.93

TABLE 11--Continued

Kuder Preference Score	Experimental Mean Diff.	SD	Control Mean Diff.	SD	Mean Diff. Between Groups	t
4 - Persuasive	.54	7.82	.96	7.88	.42	.185
5 - Artistic	-.08	4.31	-.33	5.15	.25	.183
6 - Literary	-.27	6.07	.29	5.98	.56	.322
7 - Musical	.46	5.46	.08	5.11	.38	.248
8 - Social Service	-1.04	9.33	-2.21	6.91	1.17	.492
9 - Clerical	-1.81	8.17	2.29	5.28	4.10	2.050*

^aA high score denotes interest in the designated area.

*Significant at the .05 level

Summary of the Personality Trait Findings. The experimental group changed significantly on only one out of twenty-seven personality trait measurements after a nine month physical fitness program which resulted in a significant improvement in physical fitness. This should not be construed to mean that a person's personality traits do not or will not change when there is an improvement in physical fitness. It means that with these subjects only one significant personality trait change was found at the end of a nine month exercise program. It must be remembered that the experimental group was gradually attaining their final state of fitness. It might be that if they had held this fitness level for six months there would have been more significant changes in

their personality traits as measured by the tests used in this study. It should also be noted that although the experimental group had a highly significant improvement in physical fitness they still did not attain the high degree of fitness which characterized the upper group. The lower group ranked at the forty-fourth percentile on physical fitness at the end of the study whereas the upper group was above the ninety-second percentile. It is also noteworthy that the experimental group did change in the direction of the upper group on several personality trait measurements although the changes did not reach the significant level. Another important factor could not be evaluated in this study. The physical fitness improvement might have carry-over value for the experimental group. Perhaps the increase in physical fitness will give them confidence to undertake activities from which they were previously prohibited by their low state of physical fitness. It could be that these experiences will give them self-confidence in different situations and will eventually result in other personality trait changes.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary. The literature which related to this study was reviewed in the second chapter. The theoretical background for the hypothesis that there is a relationship between physical fitness and personality traits was surveyed. This was followed by a report of the studies which have contributed to our knowledge in this area.

The experimental portion of the study began with the testing of three hundred and eighty-six high school junior and senior boys. They were administered a physical fitness test consisting of pull-ups and a 600 yard run in September, 1962. The upper fifteen per cent and the lower fifteen per cent on this test were used as subjects in the first phase of the research project. They were compared on three personality tests to determine the relationship between physical fitness and various personality traits. The personality tests used were the A-S Reaction Study, Cattell's Sixteen Personality Factor Questionnaire, and the Kuder Preference Record-Form C.

The lower fifteen per cent on the physical fitness test were divided into two groups for the second part of the study. The experimental group had twenty-six boys and the control group had twenty-four. The experimental group participated in a physical fitness program which was designed especially to improve their

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Second-Phase Study

The lower fifteen per cent on the physical fitness test were divided into two groups for the second part of the study. The experimental group had twenty-six boys and the control group had twenty-four. The experimental group participated in a physical fitness program which was designed especially to improve their

fitness level. This program was given three days a week and replaced their regular physical education class. The control group attended the physical education class to which they were assigned.

In June, 1963, the experimental and control group members were again tested on the physical fitness test. They were also tested on the same personality tests that were used at the beginning of the study. The changes in physical fitness and personality traits were then statistically examined to determine whether an improvement in physical fitness was accompanied by a personality change.

The results of the study were discussed in the fourth chapter. A summary of these results will now be presented.

Conclusions

1) The experimental group improved significantly more than the control group on the physical fitness test given at the conclusion of the experimental period. This improvement was significant at the .001 level.

2) Some significant relationships were found between physical fitness and selected personality traits.

a) The upper physical fitness group was more dominant than the lower group on the A-S Reaction Study test. This difference was significant at the .02 level.

b) The upper group differed from the lower group on factors F, Q₂, and Q₄ of Cattell's Sixteen Personality Factor

Questionnaire. They were found to exhibit more enthusiasm on factor F. Factor Q_2 indicated that they were more group dependent. Factor Q_4 indicated that the upper group was more composed than the lower group. The difference on factor F was significant at the .02 level, the Q_2 difference was significant at the .001 level, and the group difference on Q_4 was significant at the .01 level.

c) On the Kuder Preference Record-Form C, the upper group scored significantly higher than the lower group on the outdoor, mechanical, scientific, and social service scores. The upper group exhibited a greater interest than the lower group in outdoor activities. They also showed more preference for working with machines and solving scientific problems. The social service category score meant that the upper group would be more likely to enjoy helping people than would the lower group. The lower group was significantly higher on the computational, musical, and clerical scores. This would indicate that they had a greater preference for working with numbers and enjoyed doing things that required precision and accuracy more than the upper group. The lower group also expressed more interest in activities of a musical nature. We would expect them to enjoy reading about music and going to concerts as well as getting pleasure from playing an instrument and singing. The differences on the musical and clerical scores were significant at the .01 level. The differences on the outdoor, mechanical, computational, scientific, and social

service scores were significant at the .05 level.

d) The experimental group did not change significantly more than the control group on the A-S Reaction Study or Cattell's Sixteen Factor Personality Questionnaire.

e) The experimental group change on the Kuder Preference Record-Form C clerical score indicated that they became less interested in precision type activities. This change differed significantly at the .05 level from the control group change. It was in the direction of the pre-test score of the upper physical fitness group.

Recommendations

1) Controlled studies which span a period of time longer than nine months are needed to determine the effects which improvement in physical fitness has on personality traits. It is felt that perhaps more time is needed in order for a personality trait to measurably change.

2) A test of personality traits six months or a year after obtaining a change in physical fitness is needed to determine whether there is a delayed effect on the development of personality traits.

3) The amount of personality trait change which is retained after varying lengths of time needs to be investigated on a systematic basis.

4) Case studies with unfit subjects who are put on a physical fitness program would be valuable in analyzing the personality trait changes which take place as the physical fitness of the subjects improve.

revels scores were significant at the .05 level.

4) The experimental group did not change significantly

more than the control group on the 4-5 Revised Study on Self's

Stable Factor Personality Questionnaire.

5) The experimental group change on the Stable Factor

Revised Factor D showed scores indicated that they became

less interested in promotion type activities. This change did

not reach significance at the .05 level from the control group change.

It was in the direction of the pre-test scores of the control group.

11th group.

Recommendations

1) Controlled studies which cover a period of 12 to 18 months

than nine months are needed to determine the effects which are

promoted in physical fitness has on personality traits. It is

felt that perhaps more time is needed in order for a personality

trait to measurably change.

2) A test of personality traits six months or a year

after obtaining a change in physical fitness is needed to determine

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3) The amount of personality trait change which is re-

lated after varying lengths of time needs to be investigated on

a systematic basis.

4) Case studies with unit subjects who are put on a

physical fitness program would be valuable in analyzing the per-

sonality trait changes which take place as the physical fitness

of the subjects improve.

5) Studies similar to this one which could control variables such as sleep, diet, and outside activities would make a significant contribution to our knowledge in this area.

6) Further research studies should be undertaken which would raise the unfit person's state of physical fitness to the level of the physically fit person. Investigation of the degree of physical fitness improvement which is needed for a personality trait change would be a refinement of the present study in which the experimental subjects significantly improved their physical fitness level but did not reach the level of the highly fit group.

7) Research is still needed to investigate the contribution of various physical education activities to an individual's personality development. For example, will an aggressive type of activity such as wrestling bring about a specific kind of personality trait change? Will one activity contribute more to a particular personality change than another activity?

8) Personality studies are needed to investigate the relative importance of physical fitness and the method used in obtaining the improved state of fitness. Is it the type of activity which is used in obtaining physical fitness that results in a personality change or is it the improved physical fitness which brings about the change?

9) Other questions need to be answered. Why do the personality traits of a fit person differ from the personality traits of a less fit person? Which is the cause and which is the effect?

(4) Further studies to this end which could control

variables such as diet, sleep, and outside activities would

make a significant contribution to our knowledge in this area.

(5) Further research studies should be undertaken which

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between various physical education activities and an individual's

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in a personality change or is it the improved physical fitness

which brings about the change?

(8) Other questions need to be answered. Why do the per-

sonality studies of a fit person differ from the personality studies

of a less fit person? What is the cause and what is the effect

Do certain personality traits result in a person attaining a high level of physical fitness or does the high physical fitness level result in the development of a specific personality trait syndrome?

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APPENDIX A

APPENDIX A

Experimental Group**Test 1, September, 1962****PHYSICAL FITNESS TEST**

Subject No.	Pull-ups	600 Yard Run	Percentile Average
1.	1	1:55	37.5
2.	2	1:58	37.5
3.	1	2:12	21
4.	0	2:16	15.5
5.	0	2:37	6.5
6.	1	2:09	22.5
7.	0	2:04	25
8.	0	2:40	6
9.	0	2:02	27.5
10.	3	1:58	42.5
11.	0	2:56	3.5
12.	3	2:05	41.5
13.	0	2:57	3.5
14.	2	2:15	23
15.	2	2:00	35
16.	3	2:05	33.5
17.	0	2:22	12.5
18.	0	2:26	10
19.	2	1:55	40
20.	0	2:20	13.5
21.	2	2:04	30
22.	0	1:56	34.5
23.	0	2:01	28.5
24.	0	1:57	33
25.	0	3:20	2
26.	0	2:48	4

Experimental Group
Test 1, September, 1963

PHYSICAL FITNESS TEST

Subject No.	Pull-ups	600 Yard Run	Percentage Average
1.	1	1:32	37.5
2.	2	1:33	37.5
3.	1	2:12	21
4.	0	2:16	17.5
5.	0	2:37	6.2
6.	1	2:09	25.2
7.	0	2:04	29
8.	0	2:40	6
9.	0	2:02	27.5
10.	2	1:38	42.5
11.	0	2:36	7.5
12.	0	2:02	29.5
13.	0	2:37	6.2
14.	2	2:12	21
15.	2	2:00	33
16.	2	2:02	27.5
17.	0	2:22	12.5
18.	0	2:26	10
19.	2	1:37	40
20.	0	2:30	12.5
21.	2	2:04	29
22.	0	1:36	34.5
23.	0	2:01	24.5
24.	0	1:37	39
25.	0	2:20	12
26.	0	2:48	4

Experimental Group

Test 2, June, 1963

PHYSICAL FITNESS TEST

Subject No.	Pull-ups	600 Yard Run	Percentile Average
1.	2	1:49	47
2.	4	1:56	49.5
3.	5	2:00	51.5
4.	2	1:58	37.5
5.	2	2:06	27.5
6.	3	1:52	49.5
7.	2	2:01	33.5
8.	1	2:01	31.0
9.	3	1:55	45
10.	6	1:38	73
11.	0	2:30	9
12.	11	1:59	76.5
13.	1	2:17	17.5
14.	18	2:00	80
15.	3	1:43	55.5
16.	5	1:55	56.5
17.	4	2:02	42.5
18.	2	2:02	32.5
19.	8	1:41	81.5
20.	0	2:08	20.5
21.	5	1:48	64
22.	3	1:44	55
23.	4	1:49	58
24.	2	1:47	47.5
25.	0	2:49	4.5
26.	0	2:35	7.5

Experimental Group

Test 2, June, 1952

Physical Fitness Test

Subject No.	Time	Score	Percentage Average
1.	1:49	2	47
2.	1:26	4	49.5
3.	2:00	2	31.2
4.	1:28	3	37.5
5.	2:06	2	37.5
6.	1:22	5	49.5
7.	2:01	2	37.5
8.	2:01	1	31.0
9.	1:22	3	47
10.	1:28	2	37.5
11.	2:20	0	0
12.	1:28	11	76.7
13.	2:17	1	31.2
14.	2:00	18	80
15.	1:43	3	37.5
16.	1:22	2	37.5
17.	2:02	4	49.5
18.	2:02	2	37.5
19.	1:41	8	68
20.	2:08	0	0
21.	1:48	2	37.5
22.	1:44	3	47
23.	1:43	4	49.5
24.	1:47	2	37.5
25.	2:49	0	0
26.	2:22	0	0

Control Group

Test 1, September, 1962

PHYSICAL FITNESS TEST

Subject No.	Pull-ups	600 Yard Run	Percentile Average
1.	3	2:00	40
2.	3	2:00	40
3.	1	2:05	26
4.	4	2:05	40
5.	2	2:07	27
6.	6	2:41	32.5
7.	2	2:06	27.5
8.	3	2:01	38.5
9.	2	2:02	32.5
10.	1	2:18	17
11.	2	1:57	38
12.	0	2:17	15
13.	1	1:57	35.5
14.	1	1:54	40
15.	1	1:53	37.5
16.	1	2:02	30
17.	4	2:04	41.5
18.	1	1:50	43
19.	3	2:05	33.5
20.	0	2:54	1.5
21.	2	2:07	26.5
22.	3	1:59	42
23.	5	2:23	33.5
24.	0	2:02	27.5

Test 1, September, 1945

Subject No. Run-App Time Score

1.	3	00:00	80
2.	3	00:00	80
3.	1	00:00	80
4.	4	00:00	80
5.	5	00:00	80
6.	5	00:00	80
7.	5	00:00	80
8.	3	00:00	80
9.	3	00:00	80
10.	1	00:00	80
11.	3	00:00	80
12.	0	00:00	80
13.	3	00:00	80
14.	1	00:00	80
15.	1	00:00	80
16.	1	00:00	80
17.	4	00:00	80
18.	1	00:00	80
19.	3	00:00	80
20.	3	00:00	80
21.	3	00:00	80
22.	3	00:00	80
23.	3	00:00	80
24.	3	00:00	80

Control Group

Test 2, June, 1963

PHYSICAL FITNESS TEST

Subject No.	Pull-ups	600 Yard Run	Percentile Average
1.	6	2:00	56.5
2.	2	1:49	46
3.	1	2:08	23
4.	4	2:07	38.5
5.	2	2:20	18.5
6.	7	2:16	46
7.	3	1:58	42.5
8.	3	2:01	38.5
9.	2	1:56	39.5
10.	1	2:12	21
11.	3	2:01	39
12.	0	2:24	11.5
13.	2	2:02	32.5
14.	5	1:49	64.5
15.	2	1:51	45
16.	3	2:09	30
17.	3	2:14	27.5
18.	3	1:54	47.5
19.	2	2:16	19.5
20.	0	2:54	1.5
21.	4	1:59	48.5
22.	3	2:00	40
23.	6	1:57	60
24.	0	2:07	21.5

Control Group

Test 2, June, 1962

PHYSICAL FITNESS TEST

Subject No.	Time	500 Yard Run	Percentage Average
1.	0	2:00	30.5
2.	4	1:49	46
3.	1	2:08	33
4.	4	2:07	33.5
5.	2	2:20	18.5
6.	7	2:16	46
7.	3	1:58	43.5
8.	7	2:01	36.5
9.	5	1:56	39.5
10.	1	2:15	31
11.	3	2:01	39
12.	0	2:24	11.5
13.	2	2:02	32.5
14.	3	1:49	44.5
15.	2	1:51	45
16.	3	2:09	30
17.	3	2:14	27.5
18.	3	1:54	47.5
19.	2	2:16	19.5
20.	0	2:24	11.5
21.	4	1:59	46.5
22.	3	2:00	40
23.	0	1:57	48
24.	0	2:07	32.5

Upper Group

Test 1, September, 1962

PHYSICAL FITNESS TEST

Subject No.	Pull-ups	600 Yard Run	Percentile Average
1.	9	1:43	88
2.	21	1:34	98
3.	10	1:40	88
4.	16	1:47	93
5.	10	1:41	89
6.	10	1:39	89
7.	16	1:33	98.5
8.	16	1:43	95.5
9.	12	1:39	93.5
10.	10	1:36	90
11.	14	1:35	96.5
12.	15	1:43	94.5
13.	11	1:38	93.5
14.	23	1:35	98
15.	12	1:39	93.5
16.	13	1:35	96.5
17.	11	1:40	91.5
18.	13	1:37	96
19.	11	1:39	91.5
20.	11	1:38	93.5
21.	13	1:46	91.5
22.	15	1:35	97.5
23.	12	1:49	90.5
24.	15	1:37	91.5
25.	10	1:38	88
26.	10	1:37	88.5
27.	10	1:42	88
28.	12	1:48	90
29.	10	1:30	90
30.	9	1:27	87
31.	10	1:41	88
32.	11	1:37	92
33.	11	1:42	91.5
34.	17	1:39	96.5
35.	19	1:35	98
36.	15	1:29	98
37.	18	1:33	98.5
38.	10	1:39	88
39.	10	1:40	88
40.	12	1:30	96.5

Upson Group
Test 1, September, 1965
PHYSICAL EXAMINATION TEST

Subject No. Film-aps 600 Test Run Researcher's Average

1.	9	1:45	88
2.	21	1:54	98
3.	10	1:40	88
4.	10	1:47	93
5.	10	1:41	88
6.	10	1:39	93
7.	10	1:35	96.5
8.	12	1:40	97.5
9.	12	1:40	97.5
10.	10	1:38	90
11.	10	1:32	96.5
12.	10	1:32	96.5
13.	12	1:42	94.5
14.	11	1:38	97.5
15.	12	1:35	98
16.	12	1:38	91.5
17.	12	1:35	96.5
18.	12	1:40	91.5
19.	11	1:37	96
20.	11	1:38	91.5
21.	11	1:38	97.5
22.	12	1:40	97.5
23.	12	1:42	97.5
24.	12	1:40	90.5
25.	12	1:37	91.5
26.	10	1:38	88
27.	10	1:37	88.5
28.	10	1:45	88
29.	12	1:48	90
30.	10	1:30	90
31.	9	1:37	87
32.	10	1:41	88
33.	11	1:37	95
34.	11	1:48	91.5
35.	14	1:38	96.5
36.	12	1:35	98
37.	12	1:38	98
38.	10	1:35	98.5
39.	10	1:38	88
40.	12	1:30	96.5

Upper Group - PHYSICAL FITNESS TEST - Page 2

41.	14	1:45	93
42.	10	1:40	88
43.	11	1:36	92.5
44.	10	1:41	88
45.	14	1:35	96.5
46.	10	1:40	88
47.	20	1:35	98
48.	10	1:41	88
49.	11	1:46	88.5
50.	15	1:39	96
51.	17	1:30	98.5
52.	10	1:39	88
53.	16	1:37	94
54.	11	1:48	87.5
55.	16	1:47	93
56.	14	1:30	97.5
57.	13	1:44	93
58.	12	1:41	94
59.	15	1:48	92
60.	12	1:40	94
61.	10	1:34	90
62.	12	1:42	94
63.	14	1:47	91.5

Upper Group - PHYSICAL VENTURES - 1912

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93.	93.
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95.	95.
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100.	100.

APPENDIX B

Experimental Group

THE A-S REACTION STUDY

Subject No.	Test 1, September, 1962	Test 2, June, 1963
1.	- 7	0
2.	-20	3
3.	-17	-15
4.	10	- 5
5.	-29	-33
6.	-27	-18
7.	8	37
8.	-13	-16
9.	-21	-19
10.	-22	-17
11.	-40	-39
12.	-29	-18
13.	-10	- 2
14.	5	-18
15.	-30	-32
16.	-25	1
17.	-15	-26
18.	-47	-37
19.	- 8	3
20.	- 9	- 4
21.	- 1	-19
22.	- 1	0
23.	-34	-12
24.	-10	- 3
25.	-28	7
26.	-11	0

1911

1911

1911

1911

1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.
7.	7.
8.	8.
9.	9.
10.	10.
11.	11.
12.	12.
13.	13.
14.	14.
15.	15.
16.	16.
17.	17.
18.	18.
19.	19.
20.	20.
21.	21.
22.	22.
23.	23.
24.	24.
25.	25.
26.	26.
27.	27.
28.	28.
29.	29.
30.	30.

1911

1911

Control Group

THE A-S REACTION STUDY

Subject No.	Test 1, September, 1962	Test 2, June, 1963
1.	-13	-33
2.	-17	- 6
3.	6	-15
4.	10	-10
5.	-12	- 5
6.	-34	-39
7.	-19	-22
8.	-21	-27
9.	9	7
10.	2	17
11.	5	13
12.	-25	-35
13.	-25	-14
14.	-34	-34
15.	-20	-19
16.	-16	1
17.	-19	8
18.	- 7	- 3
19.	-13	-19
20.	-16	- 7
21.	-19	-43
22.	-13	-20
23.	- 6	0
24.	-16	-19

Control group

THE A-H REACTION TEST

Subject No. Test 1, September, 1962 Test 2, June, 1963

1.	-15	-22
2.	-15	-22
3.	8	-15
4.	10	-15
5.	-12	-15
6.	-34	-15
7.	-10	-15
8.	-21	-15
9.	8	-15
10.	2	-15
11.	7	-15
12.	-25	-15
13.	-25	-15
14.	-34	-15
15.	-25	-15
16.	-15	-15
17.	-15	-15
18.	-15	-15
19.	-15	-15
20.	-15	-15
21.	-15	-15
22.	-15	-15
23.	-15	-15
24.	-15	-15

Upper Group

Test 1, September, 1962

THE A-S REACTION STUDY

Subject No.

1.	-35
2.	0
3.	-13
4.	-10
5.	7
6.	-22
7.	11
8.	5
9.	-32
10.	-13
11.	-1
12.	-21
13.	9
14.	-2
15.	-15
16.	-9
17.	0
18.	-16
19.	-20
20.	-14
21.	-26
22.	2
23.	-29
24.	-34
25.	-1
26.	-14
27.	-15
28.	-9
29.	-13
30.	-16
31.	4
32.	-7
33.	22
34.	5
35.	16
36.	-7
37.	-4
38.	15
39.	-16
40.	-27

Subject No.

41.	2
42.	-6
43.	-12
44.	-10
45.	18
46.	-7
47.	-24
48.	-31
49.	-8
50.	-17
51.	9
52.	3
53.	-5
54.	24
55.	-5
56.	-19
57.	-21
58.	-35
59.	-16
60.	-7
61.	23
62.	-5
63.	-12

1031

Upper Group

Test 1, September, 1964

Form A-2 Record

Subject No.

1.	-37	.
2.	0	.
3.	-13	.
4.	-19	.
5.	7	.
6.	-52	.
7.	11	.
8.	2	.
9.	-34	.
10.	-13	.
11.	-1	.
12.	-51	.
13.	9	.
14.	-2	.
15.	-15	.
16.	-9	.
17.	0	.
18.	-16	.
19.	-20	.
20.	-14	.
21.	-56	.
22.	3	.
23.	-20	.
24.	-34	.
25.	-1	.
26.	-14	.
27.	-15	.
28.	9	.
29.	-13	.
30.	-16	.
31.	4	.
32.	-7	.
33.	22	.
34.	2	.
35.	16	.
36.	-7	.
37.	-4	.
38.	13	.
39.	-16	.
40.	-27	.

THE RELATIONSHIP BETWEEN PHYSICAL
FITNESS AND SELECTED PERSONALITY TRAITS

By

Kenneth Gene Tillman

A Dissertation

Submitted in Partial Fulfillment of the
Requirements for the Degree of
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The University of New Mexico

1963

THE RELATIONSHIP BETWEEN PHYSICS
AND BIOLOGY

ROBERT H. GIBSON

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Submitted in Partial Fulfillment of the
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THE UNIVERSITY OF TEXAS

1963

CATTELL'S SIXTEEN PERSONALITY FACTOR QUESTIONNAIRE

Experimental Group

Test 1, September, 1962

Subject No.	Factor A	Factor B	Factor C	Factor E	Factor F	Factor G	Factor H	Factor I
1.	12	10	12	14	17	9	15	7
2.	11	10	11	19	14	8	9	9
3.	9	10	5	19	13	7	6	7
4.	7	7	17	11	14	13	4	8
5.	8	5	14	9	8	13	10	6
6.	10	9	11	9	9	10	4	9
7.	13	6	13	21	20	11	17	7
8.	4	4	14	15	11	6	11	4
9.	7	7	10	9	16	10	5	10
10.	8	9	15	11	4	16	6	9
11.	6	6	12	11	8	10	3	11
12.	11	7	12	8	12	8	9	10
13.	9	8	22	12	14	15	13	12
14.	11	6	12	15	15	11	11	7
15.	6	5	11	11	7	13	1	8
16.	7	8	15	11	9	6	8	3
17.	9	5	14	10	10	10	7	6
18.	6	7	10	10	9	11	2	8
19.	8	7	14	14	15	12	15	9
20.	9	7	14	14	18	14	10	3
21.	7	11	17	15	9	6	7	4
22.	12	9	15	10	18	17	12	6
23.	8	7	12	13	17	9	12	6
24.	9	9	12	12	16	12	14	12
25.	11	6	12	16	16	13	9	6
26.	11	8	11	12	14	6	3	7

Experimental Group -- Cattell's Sixteen Personality Factor Questionnaire (2)

Subject No.	Factor L	Factor M	Factor N	Factor O	Factor Q ₁	Factor Q ₂	Factor Q ₃	Factor Q ₄
1.	9	14	10	16	8	10	11	13
2.	10	15	9	11	9	12	13	16
3.	15	9	8	17	10	15	10	21
4.	12	12	9	11	6	18	8	18
5.	11	12	12	8	10	18	13	13
6.	11	10	10	19	7	15	9	19
7.	16	15	8	15	10	16	3	24
8.	9	7	12	11	10	14	7	14
9.	9	6	9	13	8	11	10	16
10.	10	15	11	9	9	15	10	20
11.	5	12	12	7	13	13	10	10
12.	11	10	12	13	8	12	13	17
13.	5	14	8	15	9	14	15	10
14.	9	11	11	14	10	14	8	14
15.	13	11	11	14	11	16	12	16
16.	7	14	9	11	9	11	10	14
17.	6	13	15	13	10	14	11	16
18.	11	12	8	14	12	17	9	24
19.	12	11	13	9	10	10	11	13
20.	14	7	13	9	8	14	11	18
21.	8	12	11	10	14	16	12	8
22.	8	12	11	9	6	10	11	15
23.	14	13	9	13	5	10	8	21
24.	13	14	12	13	9	9	9	11
25.	14	6	6	14	8	13	11	14
26.	9	8	12	12	4	12	10	17

CATTELL'S SIXTEEN PERSONALITY FACTOR QUESTIONNAIRE

Experimental Group

Test 2, June, 1963

Subject No.	Factor A	Factor B	Factor C	Factor E	Factor F	Factor G	Factor H	Factor I
1.	8	8	7	18	13	17	12	10
2.	8	6	17	12	19	10	11	8
3.	11	8	6	8	19	11	12	10
4.	2	9	12	12	10	15	8	10
5.	5	8	14	8	8	14	9	13
6.	13	8	14	7	12	15	5	10
7.	12	8	14	19	15	10	14	14
8.	5	5	12	11	21	14	15	4
9.	4	8	18	12	16	9	11	9
10.	6	10	14	8	4	16	2	11
11.	2	7	17	6	14	12	7	7
12.	6	8	11	11	14	12	10	8
13.	12	7	20	13	16	20	19	11
14.	9	8	12	10	11	6	9	6
15.	3	8	6	8	9	15	3	12
16.	6	4	12	10	16	11	11	8
17.	9	10	15	4	8	11	5	10
18.	5	9	8	5	7	11	3	7
19.	7	8	14	13	13	13	17	9
20.	3	9	17	10	13	14	14	6
21.	2	6	13	5	4	11	4	9
22.	11	9	17	10	16	13	13	14
23.	5	9	18	13	18	12	17	5
24.	8	7	13	3	11	11	14	11
25.	12	7	12	14	18	10	13	11
26.	5	6	14	12	7	13	9	8

Experimental Group -- Cattell's Sixteen Personality Factor Questionnaire (2)

Subject No.	Factor L	Factor M	Factor N	Factor O	Factor Q ₁	Factor Q ₂	Factor Q ₃	Factor Q ₄
1.	13	10	8	14	6	9	7	18
2.	12	12	7	16	11	10	10	15
3.	11	11	9	19	5	10	14	20
4.	6	11	12	9	10	13	12	10
5.	10	9	10	18	8	8	8	11
6.	12	10	10	21	12	9	10	18
7.	10	8	9	22	6	11	6	20
8.	12	8	9	5	10	10	12	13
9.	10	6	10	12	4	13	9	13
10.	11	8	10	20	12	11	15	16
11.	6	13	9	9	13	8	13	12
12.	9	9	8	8	5	17	10	18
13.	6	5	12	11	12	8	13	14
14.	13	10	9	8	7	11	5	15
15.	11	12	3	18	6	14	9	25
16.	10	11	6	14	8	8	11	14
17.	8	11	13	7	11	16	13	8
18.	6	9	10	19	8	16	6	21
19.	13	8	8	10	7	10	15	8
20.	11	6	9	10	6	9	16	11
21.	13	9	6	12	10	18	10	7
22.	11	9	10	15	11	9	11	18
23.	13	8	9	14	7	9	13	18
24.	9	15	9	12	11	9	10	18
25.	16	6	9	15	9	13	11	19
26.	13	11	10	10	11	7	11	10

13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81	83	85	87	89	91	93	95	97	99	101	103	105	107	109	111	113	115	117	119	121	123	125	127	129	131	133	135	137	139	141	143	145	147	149	151	153	155	157	159	161	163	165	167	169	171	173	175	177	179	181	183	185	187	189	191	193	195	197	199	201	203	205	207	209	211	213	215	217	219	221	223	225	227	229	231	233	235	237	239	241	243	245	247	249	251	253	255	257	259	261	263	265	267	269	271	273	275	277	279	281	283	285	287	289	291	293	295	297	299	301	303	305	307	309	311	313	315	317	319	321	323	325	327	329	331	333	335	337	339	341	343	345	347	349	351	353	355	357	359	361	363	365	367	369	371	373	375	377	379	381	383	385	387	389	391	393	395	397	399	401	403	405	407	409	411	413	415	417	419	421	423	425	427	429	431	433	435	437	439	441	443	445	447	449	451	453	455	457	459	461	463	465	467	469	471	473	475	477	479	481	483	485	487	489	491	493	495	497	499	501	503	505	507	509	511	513	515	517	519	521	523	525	527	529	531	533	535	537	539	541	543	545	547	549	551	553	555	557	559	561	563	565	567	569	571	573	575	577	579	581	583	585	587	589	591	593	595	597	599	601	603	605	607	609	611	613	615	617	619	621	623	625	627	629	631	633	635	637	639	641	643	645	647	649	651	653	655	657	659	661	663	665	667	669	671	673	675	677	679	681	683	685	687	689	691	693	695	697	699	701	703	705	707	709	711	713	715	717	719	721	723	725	727	729	731	733	735	737	739	741	743	745	747	749	751	753	755	757	759	761	763	765	767	769	771	773	775	777	779	781	783	785	787	789	791	793	795	797	799	801	803	805	807	809	811	813	815	817	819	821	823	825	827	829	831	833	835	837	839	841	843	845	847	849	851	853	855	857	859	861	863	865	867	869	871	873	875	877	879	881	883	885	887	889	891	893	895	897	899	901	903	905	907	909	911	913	915	917	919	921	923	925	927	929	931	933	935	937	939	941	943	945	947	949	951	953	955	957	959	961	963	965	967	969	971	973	975	977	979	981	983	985	987	989	991	993	995	997	999	1001	1003	1005	1007	1009	1011	1013	1015	1017	1019	1021	1023	1025	1027	1029	1031	1033	1035	1037	1039	1041	1043	1045	1047	1049	1051	1053	1055	1057	1059	1061	1063	1065	1067	1069	1071	1073	1075	1077	1079	1081	1083	1085	1087	1089	1091	1093	1095	1097	1099	1101	1103	1105	1107	1109	1111	1113	1115	1117	1119	1121	1123	1125	1127	1129	1131	1133	1135	1137	1139	1141	1143	1145	1147	1149	1151	1153	1155	1157	1159	1161	1163	1165	1167	1169	1171	1173	1175	1177	1179	1181	1183	1185	1187	1189	1191	1193	1195	1197	1199	1201	1203	1205	1207	1209	1211	1213	1215	1217	1219	1221	1223	1225	1227	1229	1231	1233	1235	1237	1239	1241	1243	1245	1247	1249	1251	1253	1255	1257	1259	1261	1263	1265	1267	1269	1271	1273	1275	1277	1279	1281	1283	1285	1287	1289	1291	1293	1295	1297	1299	1301	1303	1305	1307	1309	1311	1313	1315	1317	1319	1321	1323	1325	1327	1329	1331	1333	1335	1337	1339	1341	1343	1345	1347	1349	1351	1353	1355	1357	1359	1361	1363	1365	1367	1369	1371	1373	1375	1377	1379	1381	1383	1385	1387	1389	1391	1393	1395	1397	1399	1401	1403	1405	1407	1409	1411	1413	1415	1417	1419	1421	1423	1425	1427	1429	1431	1433	1435	1437	1439	1441	1443	1445	1447	1449	1451	1453	1455	1457	1459	1461	1463	1465	1467	1469	1471	1473	1475	1477	1479	1481	1483	1485	1487	1489	1491	1493	1495	1497	1499	1501	1503	1505	1507	1509	1511	1513	1515	1517	1519	1521	1523	1525	1527	1529	1531	1533	1535	1537	1539	1541	1543	1545	1547	1549	1551	1553	1555	1557	1559	1561	1563	1565	1567	1569	1571	1573	1575	1577	1579	1581	1583	1585	1587	1589	1591	1593	1595	1597	1599	1601	1603	1605	1607	1609	1611	1613	1615	1617	1619	1621	1623	1625	1627	1629	1631	1633	1635	1637	1639	1641	1643	1645	1647	1649	1651	1653	1655	1657	1659	1661	1663	1665	1667	1669	1671	1673	1675	1677	1679	1681	1683	1685	1687	1689	1691	1693	1695	1697	1699	1701	1703	1705	1707	1709	1711	1713	1715	1717	1719	1721	1723	1725	1727	1729	1731	1733	1735	1737	1739	1741	1743	1745	1747	1749	1751	1753	1755	1757	1759	1761	1763	1765	1767	1769	1771	1773	1775	1777	1779	1781	1783	1785	1787	1789	1791	1793	1795	1797	1799	1801	1803	1805	1807	1809	1811	1813	1815	1817	1819	1821	1823	1825	1827	1829	1831	1833	1835	1837	1839	1841	1843	1845	1847	1849	1851	1853	1855	1857	1859	1861	1863	1865	1867	1869	1871	1873	1875	1877	1879	1881	1883	1885	1887	1889	1891	1893	1895	1897	1899	1901	1903	1905	1907	1909	1911	1913	1915	1917	1919	1921	1923	1925	1927	1929	1931	1933	1935	1937	1939	1941	1943	1945	1947	1949	1951	1953	1955	1957	1959	1961	1963	1965	1967	1969	1971	1973	1975	1977	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009	2011	2013	2015	2017	2019	2021	2023	2025	2027	2029	2031	2033	2035	2037	2039	2041	2043	2045	2047	2049	2051	2053	2055	2057	2059	2061	2063	2065	2067	2069	2071	2073	2075	2077	2079	2081	2083	2085	2087	2089	2091	2093	2095	2097	2099	2101	2103	2105	2107	2109	2111	2113	2115	2117	2119	2121	2123	2125	2127	2129	2131	2133	2135	2137	2139	2141	2143	2145	2147	2149	2151	2153	2155	2157	2159	2161	2163	2165	2167	2169	2171	2173	2175	2177	2179	2181	2183	2185	2187	2189	2191	2193	2195	2197	2199	2201	2203	2205	2207	2209	2211	2213	2215	2217	2219	2221	2223	2225	2227	2229	2231	2233	2235	2237	2239	2241	2243	2245	2247	2249	2251	2253	2255	2257	2259	2261	2263	2265	2267	2269	2271	2273	2275	2277	2279	2281	2283	2285	2287	2289	2291	2293	2295	2297	2299	2301	2303	2305	2307	2309	2311	2313	2315	2317	2319	2321	2323	2325	2327	2329	2331	2333	2335	2337	2339	2341	2343	2345	2347	2349	2351	2353	2355	2357	2359	2361	2363	2365	2367	2369	2371	2373	2375	2377	2379	2381	2383	2385	2387	2389	2391	2393	2395	2397	2399	2401	2403	2405	2407	2409	2411	2413	2415	2417	2419	2421	2423	2425	2427	2429	2431	2433	2435	2437	2439	2441	2443	2445	2447	2449	2451	2453	2455	2457	2459	2461	2463	2465	2467	2469	2471	2473	2475	2477	2479	2481	2483	2485	2487	2489	2491	2493	2495	2497	2499	2501	2503	2505	2507	2509	2511	2513	2515	2517	2519	2521	2523	2525	2527	2529	2531	2533	2535	2537	2539	2541	2543	2545	2547	2549	2551	2553	2555	2557	2559	2561	2563	2565	2567	2569	2571	2573	2575	2577	2579	2581	2583	2585	2587	2589	2591	2593	2595	2597	2599	2601	2603	2605	2607	2609	2611	2613	2615	2617	2619	2621	2623	2625	2627	2629	2631	2633	2635	2637	2639	2641	2643	2645	2647	2649	2651	2653	2655	2657	2659	2661	2663	2665	2667	2669	2671	2673	2675	2677	2679	2681	2683	2685	2687	2689	2691	2693	2695	2697	2699	2701	2703	2705	2707	2709	2711	2713	2715	2717	2719	2721	2723	2725	2727	2729	2731	2733	2735	2737	2739	2741	2743	2745	2747	2749	2751	2753	2755	2757	2759	2761	2763	2765	2767	2769	2771	2773	2775	2777	2779	2781	2783	2785	2787	2789	2791	2793	2795	2797	2799	2801	2803	2805	2807	2809	2811	2813	2815	2817	2819	2821	2823	2825	2827	2829	2831	2833	2835	2837	2839	2841	2843	2845	2847	2849	2851	2853	2855	2857	2859	2861	2863	2865	2867	2869	2871	2873	2875
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CATTELL'S SIXTEEN PERSONALITY FACTOR QUESTIONNAIRE

Control Group

Test 1, September, 1962

Subject No.	Factor A	Factor B	Factor C	Factor E	Factor F	Factor G	Factor H	Factor I
1.	6	9	15	15	16	11	6	4
2.	7	3	13	13	7	10	11	7
3.	13	8	14	10	13	15	14	9
4.	9	4	17	13	12	10	11	4
5.	15	5	14	14	19	8	12	10
6.	7	5	18	15	16	11	11	9
7.	11	3	15	16	13	12	11	7
8.	12	4	11	14	14	16	12	10
9.	8	5	13	14	21	11	17	9
10.	10	7	14	16	18	10	13	8
11.	13	6	14	15	21	10	14	3
12.	4	4	17	17	7	9	10	4
13.	2	11	12	10	16	10	6	6
14.	8	6	16	7	7	11	9	8
15.	11	4	15	12	15	9	9	9
16.	10	8	19	16	12	19	14	3
17.	10	7	17	13	15	10	13	8
18.	4	5	14	17	17	6	8	6
19.	10	7	13	8	9	13	7	6
20.	9	5	15	8	11	18	4	7
21.	6	7	9	16	10	14	15	4
22.	12	6	7	9	14	12	14	7
23.	8	8	15	13	20	13	10	10
24.	10	4	16	10	14	7	16	7

Control Group -- Cattell's Sixteen Personality Factor Questionnaire (2)

Subject No.	Factor L	Factor M	Factor N	Factor O	Factor Q ₁	Factor Q ₂	Factor Q ₃	Factor Q ₄
1.	7	10	7	15	10	12	11	16
2.	8	11	8	15	10	9	10	12
3.	9	15	9	16	9	11	11	11
4.	7	11	11	13	6	9	13	9
5.	9	17	9	11	10	9	8	15
6.	12	16	13	13	10	12	11	11
7.	10	15	8	7	10	12	9	17
8.	11	11	11	16	13	11	10	14
9.	7	11	7	9	9	6	13	14
10.	17	8	11	13	13	13	7	19
11.	13	11	10	7	9	9	9	16
12.	11	7	13	14	13	12	11	15
13.	12	8	12	5	11	12	12	20
14.	11	10	8	11	8	17	14	13
15.	12	13	17	16	11	10	10	16
16.	12	12	12	8	7	9	16	9
17.	11	12	16	10	9	12	9	13
18.	10	11	11	12	13	14	7	11
19.	10	14	14	5	8	17	10	10
20.	7	11	11	15	7	10	8	8
21.	9	11	14	10	8	15	6	18
22.	9	13	7	19	10	12	12	15
23.	17	16	15	16	13	6	7	15
24.	10	13	13	9	7	12	9	18

CATTELL'S SIXTEEN PERSONALITY FACTOR QUESTIONNAIRE

Control Group

Test 2, June, 1963

Subject No.	Factor A	Factor B	Factor C	Factor E	Factor F	Factor G	Factor H	Factor I
1.	6	6	8	13	13	11	8	8
2.	7	5	11	15	9	8	15	7
3.	13	9	12	9	13	17	14	15
4.	7	8	11	15	12	9	15	11
5.	17	5	12	11	19	14	20	13
6.	6	8	21	12	12	14	16	9
7.	9	8	15	15	16	14	9	10
8.	12	6	11	6	11	9	12	14
9.	7	7	16	15	16	14	17	11
10.	11	6	14	12	18	9	11	7
11.	6	8	11	16	16	13	9	10
12.	1	9	11	6	12	12	6	8
13.	2	9	12	12	16	16	12	8
14.	6	6	13	10	9	13	8	13
15.	12	7	14	10	14	6	7	11
16.	5	11	19	8	13	14	14	10
17.	12	5	16	13	7	9	14	11
18.	4	9	22	10	15	7	12	8
19.	8	10	21	8	9	12	12	9
20.	6	5	19	12	10	15	4	9
21.	1	7	14	12	8	11	6	9
22.	14	5	13	12	14	14	14	11
23.	4	8	15	13	21	10	13	10
24.	10	5	15	14	18	10	10	13

Control Group -- Cattell's Sixteen Personality Factor Questionnaire (2)

Subject No.	Factor L	Factor M	Factor N	Factor O	Factor Q ₁	Factor Q ₂	Factor Q ₃	Factor Q ₄
1.	10	10	11	16	11	9	8	18
2.	9	13	11	11	9	14	9	10
3.	10	9	10	11	8	14	11	13
4.	13	9	11	13	8	9	6	12
5.	15	6	12	16	7	10	6	13
6.	6	9	12	10	10	10	9	13
7.	8	8	10	14	6	9	11	15
8.	8	9	12	11	10	13	11	10
9.	6	5	8	7	12	11	12	12
10.	11	9	11	17	8	10	12	20
11.	19	10	10	18	16	11	9	18
12.	10	55	5	16	9	12	10	14
13.	13	6	13	13	13	7	10	17
14.	5	18	8	15	5	16	14	12
15.	11	12	8	15	11	10	10	16
16.	8	11	13	16	16	13	16	12
17.	11	11	10	9	4	10	13	15
18.	4	8	9	6	8	10	15	13
19.	4	9	10	10	8	11	12	13
20.	10	3	8	17	13	8	12	10
21.	10	6	9	16	8	13	11	20
22.	10	6	8	21	5	7	10	18
23.	12	10	9	20	15	13	7	16
24.	12	12	15	11	11	8	8	20

CATTELL'S SIXTEEN PERSONALITY FACTOR QUESTIONNAIRE

Upper Group

Test 1, September, 1962

Subject No.	Factor A	Factor B	Factor C	Factor E	Factor F	Factor G	Factor H	Factor I
1.	11	8	5	8	13	8	7	15
2.	6	7	10	8	20	15	13	8
3.	9	7	20	12	16	17	11	7
4.	11	9	15	10	17	13	11	7
5.	9	6	16	14	11	14	17	6
6.	13	6	10	16	20	9	6	9
7.	9	6	16	12	16	16	13	5
8.	10	8	13	12	17	9	10	6
9.	13	5	9	9	9	10	9	8
10.	12	8	12	13	19	16	15	13
11.	8	8	11	17	12	9	7	8
12.	1	8	16	15	6	10	1	9
13.	12	8	19	12	20	14	14	6
14.	13	4	15	11	12	16	13	6
15.	7	8	9	18	22	8	9	7
16.	9	5	15	15	21	11	16	9
17.	10	6	17	15	18	12	13	8
18.	12	7	13	14	10	4	11	7
19.	4	6	14	17	18	12	7	6
20.	11	5	11	14	10	11	10	4
21.	10	5	12	10	20	8	10	7
22.	10	7	20	10	13	16	16	3
23.	10	8	12	10	15	12	9	6
24.	7	12	14	11	19	11	9	10
25.	2	8	20	12	15	18	8	0
26.	9	5	12	17	14	14	4	8
27.	6	6	18	14	11	14	8	5

Upper Group --- Cattell's Sixteen Personality Factor Questionnaire (3)

Subject No.	Factor L	Factor M	Factor N	Factor O	Factor Q ₁	Factor Q ₂	Factor Q ₃	Factor Q ₄
1.	12	11	8	19	7	12	7	22
2.	14	9	11	16	10	5	11	14
3.	13	7	12	7	6	7	12	16
4.	9	9	11	13	8	7	7	12
5.	9	9	5	6	11	13	7	8
6.	12	12	9	13	10	9	4	12
7.	10	11	10	11	12	6	11	15
8.	9	12	8	12	11	9	9	12
9.	8	10	14	17	4	12	9	19
10.	11	10	9	12	10	4	9	15
11.	11	10	10	9	8	15	8	13
12.	12	14	10	9	14	16	10	4
13.	17	12	10	11	6	13	9	16
14.	4	11	11	12	10	13	12	12
15.	11	12	9	14	13	6	7	17
16.	13	12	8	14	10	10	8	19
17.	11	14	9	11	11	7	11	14
18.	8	13	14	12	11	14	8	13
19.	8	13	11	18	4	5	9	18
20.	14	17	8	16	7	9	7	12
21.	11	12	8	10	10	5	10	14
22.	7	12	13	10	9	6	12	12
23.	13	9	12	12	9	9	10	18
24.	10	10	8	14	9	7	11	16
25.	5	16	16	8	8	14	10	16
26.	11	10	11	11	11	8	10	11
27.	8	14	9	3	12	14	16	14
28.	8	13	10	13	13	10	9	14

Experimental Group

Kuder Preference Record - Form C

Test 1, September, 1962

Subject No.	Score 0	Score 1	Score 2	Score 3	Score 4	Score 5	Score 6	Score 7	Score 8	Score 9
1.	39	41	30	33	39	24	18	11	32	69
2.	21	39	31	38	48	21	25	14	43	48
3.	30	27	33	32	68	45	12	19	21	46
4.	60	41	30	39	21	47	21	11	46	27
5.	38	46	23	37	29	29	21	9	31	55
6.	29	19	46	27	48	22	23	3	37	70
7.	19	15	34	15	65	21	34	18	23	78
8.	46	31	26	43	40	30	20	15	35	49
9.	57	45	17	45	37	15	14	24	47	38
10.	63	39	36	61	21	30	24	3	40	52
11.	52	49	43	49	22	14	11	7	24	66
12.	44	45	23	20	34	40	13	16	38	57
13.	65	40	16	55	34	34	22	4	40	47
14.	42	49	30	34	39	28	18	12	34	50
15.	53	58	23	39	28	49	20	11	12	48
16.	52	47	15	34	30	47	9	3	52	33
17.	25	23	45	41	35	39	23	10	27	71
18.	42	61	21	31	26	37	22	11	11	64
19.	64	54	9	42	29	45	9	8	53	31
20.	52	60	31	42	46	30	15	5	38	42
21.	62	64	33	43	37	25	20	8	15	48
22.	18	22	41	37	46	27	19	9	33	77
23.	59	60	30	42	29	24	10	9	48	40
24.	36	34	18	23	45	49	24	14	34	43
25.	55	37	45	36	44	13	15	10	33	69
26.	73	52	43	16	42	28	19	4	29	44

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Experimental Group

Kuder Preference Record - Form C

Test 2, June, 1963

Subject No.	Score 0	Score 1	Score 2	Score 3	Score 4	Score 5	Score 6	Score 7	Score 8	Score 9
1.	42	43	31	37	43	19	27	7	42	48
2.	38	35	30	36	41	28	23	17	35	52
3.	28	37	19	27	62	43	9	6	30	45
4.	70	47	23	49	24	44	29	15	33	17
5.	35	52	34	36	38	32	13	16	17	54
6.	25	13	49	22	56	20	24	8	41	83
7.	22	13	37	36	60	22	32	15	24	71
8.	63	54	19	42	28	25	13	19	16	42
9.	63	52	15	44	35	17	23	13	46	31
10.	58	33	42	60	25	12	25	9	35	53
11.	53	52	38	57	17	38	16	7	26	59
12.	34	53	24	35	29	40	9	14	43	47
13.	56	31	18	57	31	27	13	1	59	34
14.	31	53	38	34	47	30	10	1	39	61
15.	53	57	22	39	34	49	12	5	11	55
16.	51	50	20	33	22	46	15	7	43	23
17.	35	28	32	37	44	34	24	8	29	61
18.	44	56	25	21	33	38	13	10	23	64
19.	63	57	21	47	29	40	6	12	37	33
20.	61	65	42	51	29	39	14	4	30	40
21.	69	20	30	39	26	32	17	10	10	54
22.	14	59	49	44	50	33	28	11	23	74
23.	53	20	24	30	42	23	12	12	41	45
24.	38	25	32	23	32	52	21	10	42	56
25.	38	34	39	35	50	12	26	14	40	67
26.	58	46	25	37	41	26	20	13	34	46

Control Group

Kuder Preference Record - Form C

Test 1, September, 1962

Subject No.	Score 0	Score 1	Score 2	Score 3	Score 4	Score 5	Score 6	Score 7	Score 8	Score 9
1.	48	48	28	43	42	18	15	7	45	47
2.	43	45	31	34	37	25	24	28	53	42
3.	19	29	30	29	44	17	19	27	52	55
4.	56	41	27	33	41	37	17	10	25	50
5.	40	22	23	31	61	18	25	12	37	55
6.	55	47	23	39	44	30	16	11	26	50
7.	38	34	30	40	42	25	15	8	47	52
8.	31	42	20	27	50	18	15	8	44	59
9.	42	43	31	16	33	50	18	14	30	50
10.	60	30	36	55	22	32	16	12	52	33
11.	26	36	47	53	38	17	22	13	21	63
12.	71	42	35	61	28	34	19	3	25	47
13.	49	58	15	48	35	34	10	9	37	49
14.	77	34	21	39	25	49	24	5	46	26
15.	18	18	49	23	59	13	24	11	42	81
16.	48	43	38	39	30	50	23	1	21	45
17.	55	44	22	28	58	23	21	14	41	40
18.	38	43	28	47	32	28	22	13	35	36
19.	35	35	19	24	39	45	21	27	38	45
20.	27	49	29	27	56	30	29	11	25	62
21.	69	63	30	49	28	28	9	5	38	32
22.	22	33	26	31	47	28	20	21	41	53
23.	32	34	43	56	28	28	34	23	41	40
24.	40	34	30	33	45	28	20	12	38	50

THE UNIVERSITY OF CHICAGO

 

RECEIVED

APRIL 10, 1935

FROM

DR. J. H. DILLON

TO

DR. J. H. DILLON

...

...

APR 10 1935

RECEIVED

APRIL 10, 1935

...

Control Group

Kuder Preference Record -Form C

Test 2, June, 1963

Subject No.	Score 0	Score 1	Score 2	Score 3	Score 4	Score 5	Score 6	Score 7	Score 8	Score 9
1.	52	52	33	27	33	25	13	6	43	49
2.	45	49	28	53	50	27	13	9	33	50
3.	27	26	29	27	45	12	26	30	53	55
4.	62	44	29	34	40	35	11	12	31	50
5.	28	41	26	31	58	18	18	14	46	57
6.	52	43	25	31	37	27	23	22	31	56
7.	37	38	23	40	41	28	14	10	44	63
8.	22	49	32	27	50	18	19	5	51	56
9.	38	37	30	22	39	34	22	13	38	48
10.	62	38	27	55	30	36	15	9	47	26
11.	24	38	45	54	49	12	35	15	12	60
12.	76	43	41	64	30	30	12	3	18	51
13.	56	56	31	51	25	35	13	9	28	53
14.	78	26	22	33	27	42	27	7	47	35
15.	21	15	47	39	61	9	28	8	46	74
16.	47	41	36	41	36	52	23	1	19	42
17.	60	35	24	32	41	30	24	11	33	54
18.	43	60	23	49	33	31	16	14	30	38
19.	42	33	4	25	47	46	23	29	25	43
20.	33	53	34	38	56	31	16	8	24	62
21.	71	57	34	46	9	30	8	6	40	40
22.	26	36	33	24	46	25	24	20	40	59
23.	44	29	41	45	19	18	38	29	33	42
24.	51	39	28	29	39	27	24	17	35	54

Upper Group

Kuder Preference Record - Form C

Test 1, September, 1962

Subject No.	Score 0	Score 1	Score 2	Score 3	Score 4	Score 5	Score 6	Score 7	Score 8	Score 9
1.	36	58	20	35	40	41	23	16	32	47
2.	47	50	20	33	39	51	12	4	41	38
3.	48	51	24	39	43	40	19	4	51	37
4.	35	44	28	49	37	36	15	6	40	51
5.	72	54	26	46	30	29	19	5	50	32
6.	38	35	31	27	49	25	14	3	48	58
7.	49	60	31	39	27	33	33	8	22	42
8.	37	43	27	35	30	34	15	8	39	47
9.	42	40	37	40	31	26	17	11	52	40
10.	28	16	21	54	43	19	25	9	55	49
11.	67	56	17	35	36	26	16	16	44	33
12.	78	62	32	53	18	32	11	4	26	48
13.	66	32	29	39	34	23	23	12	42	33
14.	59	47	35	50	28	20	9	6	37	48
15.	68	33	30	51	45	23	15	5	42	45
16.	50	32	22	32	43	34	15	17	56	37
17.	39	36	21	25	59	36	8	11	44	32
18.	49	42	34	35	37	29	14	6	43	48
19.	63	50	45	45	38	18	10	7	29	59
20.	59	53	13	39	32	31	12	2	47	40
21.	49	52	15	49	15	26	18	5	53	49
22.	55	60	24	34	37	27	11	5	45	45
23.	22	50	35	34	55	27	11	7	48	52
24.	60	61	23	41	40	31	7	7	26	49
25.	69	63	32	38	24	32	14	7	28	41
26.	51	60	16	45	49	13	8	5	55	35
27.	64	54	29	38	45	28	13	11	31	39

Upper Group -- Kuder Preference Record - Form C (2)

28.	42	45	24	40	46	32	15	11	21	45
29.	34	38	46	62	31	25	36	5	28	46
30.	41	58	21	58	52	31	11	8	37	39
31.	45	49	6	44	82	20	10	15	22	42
32.	76	50	35	45	21	16	26	5	44	54
33.	53	28	28	50	19	44	26	13	60	22
34.	57	58	32	53	44	29	6	3	37	40
35.	42	35	11	21	47	25	39	14	45	34
36.	39	35	30	31	42	32	20	8	34	52
37.	47	42	15	30	48	43	19	4	47	36
38.	47	34	44	44	40	16	16	11	46	65
39.	43	37	26	42	44	16	24	10	52	44
40.	79	40	29	51	32	19	10	2	59	36
41.	65	56	32	50	29	26	15	2	42	52
42.	63	45	34	28	16	36	13	12	27	52
43.	38	21	41	26	53	42	14	5	47	63
44.	78	55	17	42	34	38	14	6	24	36
45.	46	48	37	56	32	25	13	7	33	59
46.	57	54	15	38	45	27	11	4	57	36
47.	67	44	21	32	38	29	13	8	53	32
48.	60	51	20	29	29	47	23	6	27	33
49.	38	56	17	34	42	24	13	11	46	48
50.	33	43	23	24	41	35	18	8	50	39
51.	50	54	25	29	36	38	23	11	37	46
52.	57	36	23	64	38	26	12	3	46	49
53.	48	56	16	52	42	31	22	5	29	36
54.	39	33	25	52	31	29	17	15	38	41
55.	38	37	32	31	41	27	25	13	36	53
56.	48	48	28	46	39	43	18	8	28	45
57.	61	62	29	41	31	32	8	2	38	53
58.	43	55	27	30	25	46	17	9	26	55
59.	41	43	31	59	19	41	29	3	23	50
60.	28	45	31	30	67	22	16	8	35	60
61.	46	25	34	67	35	18	23	15	48	40
62.	35	37	27	49	25	36	31	19	33	46
63.	68	50	21	43	38	25	7	13	52	43