

A COMPARISON OF SOME ANTHROPOMETRICAL AND MOTOR ABILITY MEASUREMENTS OF NORMAL AND SOCIALLY MALADJUSTED YOUTHS

> Thesis for the Degree of M. A. MICHIGAN STATE COLLEGE Paul John Spata, Jr. 1952

This is to certify that the

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presented by

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By

Paul John Spata, Jr.

A THESIS

Submitted to the School of Graduate Studies of Michigan State College of Agriculture and Applied Science in partial fulfillment of the requirements for the degree of

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ABSTRACT

<u>Title of Study</u>: A Comparison of Some Anthropometrical and Motor Ability Measurements of Normal and Socially Maladjusted Youths.

Statement of the Problem

The principal problem was to determine whether or not significant differences in height, weight, and some motor performance factors, exist between delinquent and non-delinquent boys.

Why the Problem was Selected

۲ ۱ So little factual knowledge is existent, today, concerning the basic causes and standards for treatment of juvenile delinquency, that much more research must be accomplished by every approach possible. This investigation was an attempt to study some physical factors in delinquency.

Questions it is Hoped This Investigation Will Answer

- 1. How do delinquents compare with non-delinquents in height? In weight?
- 2. Are delinquents actually physically superior to non-delinquents as a recent study concluded?
- 3. If this superiority does exist, does it extend to motor performance as well?
- 4. Along which avenues should subsequent investigations of this problem proceed?

Method of Securing and Source of Data

Tests of 719 delinquent boys from the Boys Vocational School,

Lansing, Michigan, and 257 non-delinquent boys from Lansing Eastern High School were conducted. The results of these tests were treated statistically to determine the significance of the differences between the two groups.

Some of the Significant Findings

- 1. The non-delinquents exceeded the delinquents in every test element.
- 2. In every case but one the difference was significant.
- 3. Where significance was obtained, in every case it indicated a high degree of probability.
- 4. Broad conclusions could not be made because of factors limiting the validity and reliability of the results.

Defense of the Study

Juvenile delinquency is so prominent among educational problems today that we must turn every phase of education to work through research and ferret out the facts of crime causation.

Suggestions for Further Study

- 1. A physical comparison of urban and rural delinquents.
- 2. An investigation into the influence of physical education on behavior adjustment.
- 3. A determination of the potential motor ability of delinquents as compared with non-delinquents.

R.W. Webster

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APPROVED

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P. J. S.

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"Nothing is so lacking in criminology as reliable facts obtained under adequate controls."

R. J. Corsini

CHAPTER I

THE PROBLEM AND DEFINITIONS OF TERMS USED

I. THE PROBLEM

Statement of the problem. The principal problem of this study was to determine whether or not significant differences in height, weight, and some motor ability factors exist between delinquent and non-delinquent, adolescent boys.

<u>Importance of the study</u>. Delinquency is a problem foremost ch the educational scene today. The basic causes of juvenile delinquency are far from being well established, nor are the principles of treatment, as yet, fully understood. As one prominent author team¹ states,

• • • from the point of view of preventing and 'curing' the maladaptions of youth, the crucial requisite is still lacking: sufficiently exact knowledge of the causes of youth's maladjustment to the stresses, strains, and prohibitions of modern civilization. Without [such] knowledge . • • the elaborate apparatus set up in juvenile court statutes . • • cannot be too successful • • • •

In short, a much more extensive investigation into the very nature of delinquency--a dissection of the problem into its component parts, while keeping sight of the relationship of the parts to the whole--must be accomplished in order to discover how best to eliminate the growing threat to our society.

A logical method, which has long been utilized in gaining this

¹Sheldon and Eleanor Glueck, <u>Unraveling</u> <u>Juvenile</u> <u>Delinquency</u> (New York: The Commonwealth Fund, 1950), p.3.

knowledge, is to compare the delinquent with the non-delinquent for the purpose of determining in which areas, and by how much, the delinquent differs from his more fortunate and better adjusted, "brothers." In this way, standardized procedures can be devised to predict, treat, and rehabilitate the delinquent, and ultimately prevent delinquency, itself, from occurring.

One part of the overall problem, largely overlooked in past investigations, involves the physical aspects of delinquency. If it can be established that the delinquent differs physically from the nondelinquent, one more avenue will be opened for the pursuit of the basic causes. It was the purpose of this study to probe this one facet of the problem and to introduce evidences of physical difference, both in gross size and in some factors of motor performance, between delinquents and non-delinquents, in order to determine the need for a full scale experiment aimed at revealing the physical characteristics of delinquency.

Limitations of the problem. It is emphasized that this study was not, in itself, an exhaustive research into the full anthropometric relationships and complete motor performances of delinquents as compared to non-delinquents, but merely an analysis of certain selected factors of these two physical measurements.

Factors influencing the validity and reliability of results. Although a sincere effort was made in the organization and administration of this experiment to control all the factors, which could

possibly affect the results, certain conditions operated, at various times, in a manner which may have had some influence on the data obtained. A list of the more apparent, uncontrolled factors, which may have influenced the validity and reliability of the results, follows:

> (1) Different types of motivation prevailed in administering the battery to the two groups. The control group was tested in the regular gym classes of one hundred or more boys, by squads, so that the natural spirit of competition among friends was added to the desire to excel on the test. The test group, however, was administered the battery shortly after intake, with other newly arrived boys, in groups seldom numbering more than fifteen. Motivation here resulted mainly from the desire for status, in a group of relative strangers, plus the fact they were told that they would be classified for physical education in accordance with their test scores.

(2) The apparatus, used to test the two groups, differed in some instances. It was necessary for a horizontal ladder to be used for chinning with the non-delinquents, while the delinquents used a chinning bar. A balance scale was used to weigh the delinquents, but a spring scale was used to weigh the non-delinquents. In the chinning, especially, it appears that the apparatus influenced the data.

(3) Any conclusions based on the comparison of the I.Q.'s of the two groups must be interpreted in light of the fact that different tests, of varying reliability, were used to measure

the I.Q.'s of the control group, whereas the test group was administered the same, very highly standardized and carefully validated, measure of intelligence.

(h) The assumption, that certain factors of motor ability would indicate tendencies in this area, is subject to some criticism, although the literature appears to support this assumption.
(5) The control group was selected from one high school and may not be representative of a typical, non-delinquent, group in the State of Michigan. This is all the more important because the test group was composed of delinquents from all parts of Michigan.

(6) Latent maladjustment (i.e., maladjustment not manifested in behavior, which would warrant commitment to an institution), may have been present in the control group in significant proportions.

(7) No attempt was made to screen the delinquents by the nature of the offense for which they were committed, nor by the duration of the delinquency, so that both serious and mild delinquents were treated similarly.

II. DEFINITIONS OF TERMS USED

Delinquent. This term exists only in a legal sense and for the purpose of this study it described an adolescent boy, committed by the courts to an institution for the treatment of youthful offenders. Whether it be for his first offense or the result of a well defined,

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and long established, pattern of maladjusted behavior, had no influence on the definition.

<u>Normal</u>. The use of this word, to describe a non-delinquent, is a compromise to convention, and in no way implies that the subject, or group, is completely disassociated from the various stresses which are operating against the delinquent. The term, as used in the problem, merely denoted a boy who had never been committed to an institution for juvenile delinquents.

CHAPTER II

REVIEW OF THE LITERATURE

In the field of juvenile delinquency the literature grows more labyrinthine with each passing year, yet nothing is so conspicuous in all the literature as the paucity of investigation into the physical and physiological bases for maladjusted behavior. The researchers have been much too one-sided in their approaches to the nature of crime causation, pursuing the socio-economic, psychoanalytic, and genetic theories to the virtual exclusion of other factors.²

Literature related to the physical causes of maladjustment. To

be sure, there have been studies concerning the relationship of the endocrine glands to growth, in general, and maladjustment, in particular,³ but none of these has yet explained why some people with malfunctioning glands turn to crime while others adjust adequately to their situations. There have even been attempts to predict delinquency on the basis of constitutional body type,⁴ but, here again, correlation does not reveal causation. At least one author, reviewing Seltzer's paper, "Constitutional Aspects of Juvenile Delinquency," refutes the

2<u>Ibid</u>., pp. 4-6.

³R. G. Hoskins, <u>Endocrinology</u> (New York: W. W. Norton & Co., Inc., 1941), p. 186.

W. A. Willemse, Constitution-Types in Delinquency (London: Kegan, Paul, Trench, Trubner, & Co., Ltd., 1932), [n.pp.], cited by Sheldon and Eleanor Glueck, op. cit., p. 197.

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somatotype theory quite succinctly.5

The one outstanding work on this problem has been accomplished by Sheldon and Eleanor Glueck, in their exhaustive research, published under the title, "Unraveling Juvenile Delinquency."⁶ The Gluecks worked for ten years in the study of crime causation, using 500 cases, each, of delinquents and non-delinquents, matched on the basis of age, intelligence, ethnic origin, and residence in an under-privileged neighborhood.⁷ They painstakingly investigated the socio-cultural, somatic (physical), intellectual, and emotional-temperamental levels of inquiry, as factors in the integration of the total personality.⁸

The Gluecks' research, with the physical side of the problem, revealed that (1) very little, if any, difference existed between the physical condition of delinquents and non-delinquents;⁹ (2) the delinquents possessed a slightly greater grip strength although not enough greater to be of statistical significance;¹⁰ (3) a significantly lower proportion of the delinquents than the non-delinquents[had] neurological handicapsⁿ;¹¹ (h) the delinquents were superior to the

⁵Isaac Assimov, "Origin and Evolution of Man," <u>Evolution</u>, VI ⁶Op. cit., 399 pp. ⁷<u>Ibid</u>., p. 35. ⁸<u>Ibid</u>., p. 15. ⁹<u>Ibid</u>., p. 181. ¹⁰Ibid. ¹¹<u>Ibid</u>. non-delinquents in gross bodily size;¹² (5) the delinquents spurted ahead of the non-delinquents in physical growth at about the fourteenth year;¹³ (6) delinquents tended to be mesomorphic (muscular) in physique, while the non-delinquents, although containing no large proportion of any one sometotype, showed substantial numbers of ectomorphs (tall, thin).¹⁴

It is most important to point out that the only mention of a comparison of the physical performances of delinquents and nondelinquents in the Gluecks' research, is in a dynamometer grip strength test. Neither do they indicate that height and weight comparisons were made individually.¹⁵ These appear to be notable omissions of a fundamental nature in any approach to the physical causes of delinquency.

In addition to a perusal of the literature pertaining to physical comparisons between delinquents and non-delinquents, it was also necessary to make a systematic survey of the literature concerning several subjects related both directly and indirectly to the problem. Some of these areas of investigation included (1) the relationship of intelligence to motor performance; (2) the nature and composition of motor ability; (3) the factors of chinning, dipping, and vertical

¹²<u>Ibid</u>., p. 196. 13<u>Ibid</u>.

¹⁵On p. 191 a height-weight ratio is used to show that the delinquents have a much less frequent disproportion in the relationship of height to weight.

jumping as measures involved in motor performance; and (4) studies of comparisons of the intelligence quotients of delinquent and nondelinquent boys.

Literature concerning motor ability. Research in the field of motor ability has been chiefly concerned with inter-correlations among motor skills. Little current research has delved into the nature of motor ability and its component parts. Even less has been written about the role of motor ability in maladjustment. Only one doctoral thesis in the physical education field was published between 1930-1946, which was concerned with juvenile delinquency.¹⁶ General motor ability, according to one author, is synonymous with "developed capacity.¹⁷ Palmer refers to it as "that ability in the manipulation of the body which . . . permits an individual to learn motor skills easily¹⁸ She goes farther and brings in the concept of "inherent motor capacity"¹⁹ in speaking of motor ability. According to Clarke, an analysis of motor ability actually would have to include physical, mental, emotional, and social factors.²⁰ He cites McCloy's ten prerequisites

¹⁰T. K. Cureton, "Doctorate Theses Reported by Graduate Departments of Health, Physical Education and Recreation 1930-1946, Inclusively," Research Quarterly, XX (March, 1949), 21-59.

17 Charles H. McCloy, Tests and Measurements in Health and Physical Education (New York: F. S. Crofts & Co., 1939), p. 127.

18 Irene Palmer, Tests and Measurements, a Workbook in Health and Physical Education (New York: A. S. Barnes and Company, Inc., 1932), p. 78.

19 Loc. cit.

²⁰H. Harrison Clarke, The Application of Measurement to Health and Physical Education (New York: Prentice-Hall, Inc., 1945), p. 223. ·

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to effective learning of motor skills (1) muscular strength; (2) dynamic energy; (3) ability to change direction; (4) flexibility; (5) agility; (6) peripheral vision; (7) good vision; (8) concentration; (9) understanding the mechanics of the techniques of the activities; and (10) the absence of disturbing or inhibiting emotional complications.²¹ Added

to these are

• • insight into the nature of the skill; ability to visualize spatial relations; ability to make quick and adaptive decisions; sensory-motor co-ordination relations of eye to head, hand, or foot; sensory-motor co-ordination related to weight and force; judgement of the relationship of the subject to external objects in relation to time, height, distance, and direction; accuracy of direction and small angle of error; general kinesthetic sensitivity and control; ability to co-ordinate a complex series or combinations of movements that follow one another in rapid succession; arm control; factors involved in the function of balance; timing; motor rhythm; sensory rhythm; and esthetic feeling.^{w22}

Literature related to chinning, dipping, and vertical jumping as measures of motor performance. Rapparlie writes that factorial studies indicate that the inter-correlations of motor tests can be grouped around certain "poles such as strength, rhythm, manipulative ability, steadiness, and pursuit."²³ He continues, "Motor tests of a dynamic

²¹C. H. McCloy, "A Preliminary Study of Factors in Motor Educability," <u>Research Quarterly</u>, XI (May, 1940), 28, cited by H. Harrison Clarke, <u>op. cit.</u>, pp. 223-224.

²²Ibid., p. 224.

²³John H. Rapparlie, "Motor Ability of the Larger Musculature with Particular Reference to Athletic Performance," <u>Abstracts of</u> <u>Doctoral Dissertations</u>, Spring Quarter 1941 (Columbus: Ohio State University, 1942), p. 268. nature seem to offer more in the way of predictive value than such static measures as weight, height, and other anthropometric measures. *24

McCloy points out that a study of motor ability revealed two types of measure which best measured general motor performance: (1) a combination of three or four track and field events, together with (2) a strength test.²⁵ It should be emphasized that <u>when other items were</u> added to the battery, no significant additional predictive values resulted.²⁶ Furthermore, he found chinning ability to correlate .90 with total strength.²⁷ Finally, McCloy discovered, and it has since been validated several times, that the <u>vertical jump</u> (Sargent jump) correlates .89 with track ability.²⁸

Literature concerning comparisons of the intelligence quotients of delinquent and non-delinquent boys. The literature is generally agreed that the delinquents and non-delinquents score roughly the same on intelligence tests with non-delinquents holding a slight edge. This slight superiority is offset, when the influence of the verbal factor is eliminated, so that the test measures performance intelligence only. This contention is borne out by the Gluecks, who state, "On the whole, the delinquents average less in verbal intelligence than do the nondelinquents, but the two groups resemble each other closely in

24<u>Ibid.</u>, p. 269. ²⁵Tests and Measurements, <u>loc. cit.</u> ²⁶Loc. <u>cit.</u> ²⁷<u>Ibid.</u>, p. 128. ²⁸<u>Ibid.</u>, p. 59

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performance intelligence.^{#29} It is also significant that they found the delinquents to be "superior in those intellectual tasks in which the approach to meaning is by direct physical relationships $^{#30}$ The same general tenor is sounded by another author, who states:

With further advancements in intelligence testing and proper samplings, it has become evident that the delinquents, while probably lower intellectually than non-delinquents, were not as defective as previously believed. Intelligence tests are culturally loaded and the special environment of delinquents must be taken into account in interpreting results.

Literature concerning the relationship of intelligence to motor performance. Some authors have found approximately sero correlation between the intelligence quotient and motor performance.³² Others have found, in working with the mentally deficient, a very definite and positive relationship between intelligence and motor ability.³³ The solution to this seeming conflict is simply one of range (90-110) of intelligence little significant difference between I.Q. and motor performance will be observable. But, at the extremes, especially at the lower end of the scale, intelligence has a marked influence on motor skill.

²⁹Gluecks, <u>op</u>. <u>cit</u>., p. 207.

30_{Ibid}.

³¹H. Shulman, "Intelligence and Delinquency," <u>Journal of</u> <u>Criminal Law and Criminology</u>, XXXXI (1951), p. 763.

³²McCloy, <u>op</u>. <u>cit</u>., p. 66.

³³M. Murphy, "The Relation Between Intelligence and Age of Walking in Normal and Feeble Minded Children," <u>Psychological Clinic</u>, XXII (1933), 187-197.

CHAPTER III

METHODS OF PROCEDURE

As soon as the scope of the problem was determined and the decision was made to test only for evidence of significant, physical differences between delinquents and non-delinquents, the matter of what tools and procedures to utilize in measuring these differences, erose. In this chapter an attempt was made to explain the method and the logic which guided in the (1) selection of test item; (2) selection of subjects; (3) administration of the battery; and (4) analyzation of the data.

Selection of the test items. In Chapter II it was pointed out that some serious flaws appeared to exist in the Gluecks' experiment, relative to the physical character of the delinquent. Furthermore, there was disagreement with the Gluecks' conclusions regarding the physical condition and constitution of the delinquent. There was little on which to base this disagreement; no scientific evidence to exhibit, but merely a subjective appraisal, derived from several years of teaching physical education at an institution for juvenile delinquents. To duplicate the Gluecks' experiment, not only was an impossibility but, would prove nothing that wasn't already known. Indeed, it could well be argued, from the outset, that the Michigan delinquent was different from the Massachusetts delinquent, due to such variables as geographic locale, ethnic background, and socio-cultural environment. The logical step, then, was to test those items which the Gluecks' failed to explore thoroughly-namely, height, weight, and motor performance. The first two items were easy but the problem of testing motor performance loomed as a formidable hurdle, indeed. There was no real agreement as to what the components of motor performance were. However, the literature, as discussed in Chapter II, did tell us that a combination of a strength test with track and field events correlated very highly with motor ability.³⁴ It also demonstrated that chinning correlated .90 with total strength and the vertical jump correlated .89 with track ability.35 Finally, the literature revealed that further loading the test with other items would, in all probability, avail little significant additional results.³⁶ With this backing, and because of ease of administration, it was decided to use chinning and vertical jumping as the motor ability factors with dipping as a further check on chinning. These three items were not selected to measure the subjects' total motor ability but merely to represent elements that we know to exist in motor ability.

Obviously, age would have to be recorded because of its effect on the battery and, also, the intelligence quotient, because the I.Q. has been shown to influence motor performance within certain ranges.³⁷

34 McCloy, loc. cit. ³⁵Ibid., pp. 128, 59. 36 Loc. cit. 37 N. Murphy, <u>loc.</u> cit.

Selection of subjects. The entire intake of delinquents for one year, at the Boys Vocational School, Lansing, Michigan was selected to represent the delinquent group. These boys are committed to the institution as juvenile delinquents, and range in age from twelve to seventeen years. They are committed from any county in the state, usually after a history of delinquent behavior, but sometimes for first offense. At the end of a year, 719 delinquents had been tested.

The control group was selected from the Lansing Eastern High School gym classes because that school is immediately adjacent to the Boys Vocational School and the school population was at least as representative of a normal group as any other high school in Lansing. Three gym classes were tested for two days, (an hour each day), and 257 control tests were obtained in this manner (after discarding those tests for subjects, whom the school records showed to have a court record).

Administration of the battery. Some slight variations (i.e., length of time, number of subjects in the group, number of assistants, type of apparatus) existed, from time to time, among the delinquent groups, and between these and the non-delinquent groups, regarding the administration of the battery; but only where the deviation could possibly have materially influenced the data will mention be made of this in the following discussion of the procedure.

The sizes of the delinquent groups were much smaller than the

non-delinquent since the testing was done once each week over a period of a little more than a year. The groups ranged in numbers from about five to twenty-five, with the average approximately twelve. The test was always administered by experienced physical education teachers, usually two. The normal boys were tested in three sections with from ninety to one hundred and thirty boys, approximately, in each class. Five physical educators tested the non-delinquents; three physical education teachers from Lansing Eastern High School and two from the Boys Vocational School, who had been associated with the experiment throughout.

Both the delinquent and non-delinquent groups were motivated by a short talk on the importance of performing the tests to the limit of endurance, or maximum of ability. The instructions were always phrased in the same manner, using the same words, and no practice was allowed in any of the performance tests.

Administration of the chinning. The subject was instructed to grasp the bar with a forward grip (i.e., palms facing away), and to hang at full length, momentarily, before pulling himself up until his chin was even with the bar. No kicking, jerking, or kip motion was permitted. Each time the subject lowered himself to a full length, hanging, position he scored one count. Failure to lower himself to a straight arm position before starting up again, or failure to raise himself until his chin was even with the bar, resulted in a loss of one half-count. Only four half-counts were permitted to be scored.

Subjects were instructed against dropping off the bar from the top of the last chin but were advised to lower themselves to a hanging position and to attempt to obtain an additional half-credit before leaving the apparatus.

Administration of the dipping. The parallel bars were adjusted as necessary so that there was sufficient, but not too much, shoulder room. The subject was instructed to grasp the bars and jump to a front support, then lower himself until the angle of the upper arm and forearm was less than a right angle. Each time he returned to a front support position he scored one count. Failure to lower himself sufficiently to form an acute angle at the elbow (inner surface), or failure to return to a straight arm position before starting the next dip resulted in the loss of one half-count. No jerking or kipping motion was permitted. A maximum of four half-counts was allowed to be scored.

Administration of the vertical jump. A sheet of wrapping paper five feet long and twenty-four inches wide was ruled off in centimeters so that every fifth line was red and every tenth line was green. The in-between lines were black. This permitted easier identification of the score. The red and green lines were numbered, starting from the bottom. The chart was mounted on a piece of masonite and hung on the gym wall. First, each subject stepped to the chart and, with his toes and nose against the wall, and heels flat on the floor, he raised his arm overhead, stretching to his limit, and touched the chart with his

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fingers. These measures were recorded. The instructor then demonstrated the procedure for the vertical jump to all the subjects in the group. Standing at right angles to the chart and about twelve inches from it, the instructor dipped his fingers into a cup of water, crouched down until his thighs were roughly at right angles to the lower legs, and extended his arms backward. Then, looking straight ahead, and without hitching, he leaped into the air thrusting both arms rapidly, and foreefully, forward and upward. At the top of the leap the outside arm was forcibly thrust sideward and downward and, simultaneously, the inside hand slapped the chart. The instructor repeated this movement two times, explaining each step. Then, with no further explanation, each subject performed the manuever three times and the best of the three jumps was recorded. The standing reach was subtracted from the jumping reach for the individual's score. Violations were not scored and the subject forfeited that jump.

Recording the age, height, and weight. The subject was asked to give his age in years and months and this was verified against his birth date. The age was recorded to the nearest month. The height was measured against a wall marked off in inches and was recorded to the nearest quarter-inch. The weight was recorded to the nearest half-pound.

Recording the intelligence quotient. Each delinquent at Boys Vocational School is administered a Wechsler-Bellevue Intelligence Scale, Form I or II, by competent psychometricians shortly after intake. The results of this test were made available by the psychological clinic.

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The intelligence quotients for the non-delinquents were obtained from their school records. There were anywhere from one to six scores on record for a single subject, and a variety of tests were used, including the Herman-Nelson, Illinois Intelligence, Otis, California Mental Maturity, and Kuhlman-Anderson tests. Where more than four scores were recorded, the highest and lowest were eliminated and an average of the remaining ones taken. Where fewer than four scores were available, the average of all scores was taken. While the delinquents were all administered individual intelligence tests we can assume that most of the non-delinquents were administered group tests.

Deviations in administration of the battery. The most significant deviation was in the use of a horizontal ladder, as a substitute for a chinning bar, in testing the non-delinquents. Spring scales were used to record the weight of the non-delinquents, while balance scales were used for the delinquents. The spring scales were checked after each squad was weighed and readjusted if necessary. The non-delinquents were measured by means of a height measuring device attached to the scales while the delinquents were measured against a wall.

<u>Analyzation of the data</u>. The original two groups of 719 delinquents and 257 non-delinquents were equated for age and I.Q., in order to eliminate the influence of these two factors on the data. This resulted in equated groups of 426 delinquents and 175 non-delinquents between the ages of fourteen and three-quarters and eighteen years. The I.Q.'s of the equated groups ranged from eighty to one hundred and

thirty.

The statistical procedure involved the use of the large sample method, in which the raw scores of height, weight, chinning, dipping, and the vertical jump of the two groups were manipulated to derive the mean, standard deviation, and standard error of the mean for each test item. Then, the standard error of the difference between the means for each test item was extracted, and the <u>mtm value</u> computed, in order to determine the <u>significance of the difference between the</u> means.

The formulae used in the statistical procedure were as follows:

(1)
$$M = \frac{\sum x}{N}$$

(2)
$$\sigma = \sqrt{\frac{\sum (f \cdot d)^2}{N} - \left(\frac{\sum f \cdot d_*}{N}\right)^2}$$

$$(3) \quad \mathcal{O}_{M} = \underbrace{\mathcal{O}}_{1/N-1}$$

$$(L) \quad \mathcal{O}_{\underline{d}_{\underline{M}}} = \sqrt{(\underline{M}_{\underline{1}})^2 + (\underline{M}_{\underline{2}})^2}$$

$$(5) t = \frac{M_1 - M_2}{\sigma_{d_M}}$$

where:

σ=	standard deviation
i =	interval
٤=	sum of
f =	frequency of the interval
d =	deviation from an assumed mean

N = number of cases O_{M}^{-} standard error of the mean O_{M}^{-} standard error of the difference between the means M_{1}^{-} mean for non-delinquent group M_{2}^{-} mean for delinquent group t = critical ratio x = frequency multiplied by the raw score

CHAPTER IV

RESULTS OF THE STUDY

1. In every test element the non-delinquent group obtained a greater mean than the delinquent group and in every item, except the chinning, the difference was a significant one (see Table I).

2. Although equated for age there was a mean difference of .99 inches in height and 7.48 pounds in weight in favor of the nondelinquent group. In both cases the probability of the difference being due to chance was less than one chance in ten thousand, indicating a high degree of significance.

3. In the dip test there was a difference of .99 dips in favor of the non-delinquent group. The probability of this difference was significantly between one chance in a hundred and one chance in a thousand.

4. There was a mean difference of only .19 between the two groups in chinning, which was not significant.

5. A mean difference of 3.1;7 centimeters was obtained in the vertical jump. This was highly significant; less than one chance in ten thousand.

6. In equating for age a mean difference of only .25 years was obtained, which was not significant, indicating that the two groups were equated for age.

7. The mean difference in I.Q.'s was 7.08 points which was statistically significant, the probability being less than one chance

in ten thousand, but this area will be discussed thoroughly in the interpretations.

The statistical results of the study were summarized in Table I.

TABLE I

RESULTS OF STATISTICAL ANALYSIS OF THE DATA

FACTOR	TEST ELEMENT	۲	щ2	q	ษี	β	4	4
Equating	Age (yrs.)	16.16	15.91	0.25	8.58	8.01	0.32	Not Significant
	I•Q• (pts•)	104.54	91-16	7.08	01.11	10,20	7.30	1000• >
Anthropo-	Ht. (inches)	68.54	67.55	0•99	2.91	2.80	3.81	1000• >
Metrio	Wt. (lbs.)	145.91	138.43	7•48	21 . 80	20.80	3•86	1000•>
	Chin (no.)	5•88	5•69	0.19	3.16	3.07	0.68	Not Significant
Motor Ability	Dip (no.)	6•47	5•48	0•99	4.19	3.54	2•75	Between •01 & •001
	Vertical Jump (om.)	20∙tı́l	37•55	3.47	8.34	8.07	4•39	1000,>









Delinquent group



Non-delinquent group





MEANS OF THE ANTHROPOMETRIC FACTORS OF HEIGHT AND WEIGHT FOR THE TWO EQUATED GROUPS



Delinquent group

M₁ =

Non-delinquent group







MEANS OF THE MOTOR ABILITY FACTORS OF CHINNING, DIPPING AND VERTICAL JUMPING -FOR THE TWO EQUATED GROUPS

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Delinquent group

Non-delinquent group

CHAPTER V

INTERPRETATIONS OF RESULTS

In a study of this nature it is inevitable that the results require some interpretation before any conclusions can be drawn. Certain variables creep into the problem and influence the statistics; other variables, seemingly of importance in affecting the results, are reduced to insignificance, when examined in relation to the objectives of the study. This chapter will attempt to explore the various facets of the raw results and interpret them relative to the study.

Interpretation of the results of chinning. Of all the elements of the test proper, only the chinning failed to show a significant difference between the two groups. Yet the only real difference between chinning and dipping is in the opposing muscles being tested the biceps in the one case and the triceps in the other. Similar results should have been obtained from these two tests. The reason for the failure of chinning to follow the pattern of the other test elements was due, in all probability, to the substitution of the horizontal ladder for a chinning bar in testing the non-delinquent group. The ladder was close enough to the floor to require taller boys to raise their legs during the chinning in order to keep from touching the floor. Also, the ladder did not provide as good a grip as did the chinning bar. These factors undoubtedly influenced the chinning so as to make the results invalid. Interpretation of the results of equating for intelligence. The attempt to equate the two groups for intelligence resulted in a mean difference of 7.08 points of intelligence quotient, (see Table I), which was statistically significant. However, the main question is not whether a real difference existed between the two groups in intelligence but, rather, how this difference affected the performance of the two groups. Also, the necessity of reducing the mean intelligence quotient difference between the two groups to statistical insignificance is open to serious question. A survey of this phase of the problem revealed some interesting facts.

First of all, the conditions by which the I.Q. scores for the normal group were obtained were very questionable, and would largely invalidate any conclusions which would depend upon two groups, closely matched in intelligence. The delinquents were administered a highly standardized and carefully validated individual intelligence test, the Wechsler-Bellevue, by a trained psychometrician. The normal subjects were administered a heterogeneous variety of, largely, group tests, whose standardizations were obtained using techniques somewhat less accurate than Wechsler's. It is not known who administered the tests to the normal students. It seems unjustified, therefore, to compare the scores of the delinquents, who were administered a rigorously standardized test, with those of the non-delinquents. Furthermore, intelligence tests are designed with a standard I.Q. of one hundred. The non-delinquents in this study possessed a mean I.Q. of 104.54.

Yet, there was no evidence to support a score this far above the norm. It should be assumed, therefore, that the I.Q. of the non-delinquents was elevated rather than to conclude that they were superior to the delinquents. Several authorities were cited in Chapter II who were agreed that there are no real differences in the I.Q.'s of delinquents and non-delinquents, once the verbal factors are eliminated.

The important consideration in this problem of equating for intelligence was a relative equality rather than a statistical one, especially in light of the motor skills performed. As Wechsler, himself, has said, "The great advantage of using the I.Q. as a basis for mental classification is that it does not permit us to lose sight of the fact that all measures of intelligence are necessarily relative."³⁸ As further evidence of the inadvisability of attempting to match the groups any closer in I.Q., the Gluecks allowed a ten point difference in matching their pairs of delinquents, even though both groups were administered the Wechsler-Bellevue test.³⁹

Lastly, two stark facts cannot be ignored; (1) the range of I.Q. was between eighty and one hundred and thirty. In this range I.Q. should have very little influence on the types of motor skills performed in the study; and (2) the mean I.Q.'s of both groups were well up in the middle of the normal range.

³⁸David Wechsler, The Measurement of Adult Intelligence. Third Edition (Baltimore: The Williams & Wilkins Company, 1944) p. 46.

³⁹Gluecks, op. cit., p. 206.

In summarizing the facts concerning the intelligence factor in relation to chinning, dipping, and jumping vertically, it can be seen that:

(1) A mean difference of 7.08 points existed between the two groups, of which, better than four points were due to a probable I.Q. elevation and the rest to verbal factors in the test.

(2) I.Q. does not affect motor performance where the I.Q.'s are in the normal range.

(3) The range of eighty to one hundred and thirty I.Q. (representing the range in the two groups) can be considered a normal range for the tasks which were performed in the battery.
(4) Were an intellectual task to be performed the two groups could not be called equated, but for the skills involved in this study they may be considered equated.

Interpretation of the results of height and weight comparisons. The fact must not be lost sight of that the delinquents were tested within a few days after intake. Whatever the results of a comparison between the heights and weights of delinquents and non-delinquents, those results were not influenced by institutionalization. This was not true of the Gluecks' study where the delinquents were tested after verying periods of institutionalization. This may, or may not, account for the fact that their research showed no significant differences in height and weight for the two groups 40 while this study revealed the non-delinquents to be decidedly heavier and taller.

Another point to consider is the fact that in the Massachusetts study the delinquents were seen to exhibit a growth spurt around the fourteenth year which carried them ahead of the non-delinquents.⁴¹ Yet the Boys Vocational School study showed that, in an equated group of 426 delinquents, in which none was under fourteen and three-quarters years, the very opposite was true--the normal boys were unquestionably taller and heavier.

- ⁴⁰Ibid., p. 172.
- 11 Ibid., p. 196.

CHAPTER VI

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

I. THE SUMMARY

This investigation had, as its principal objective, the determination of physical differences between delinquents and nondelinquents in order to further study the causes and effects of these differences upon delinquency. That some physical differences were observed in the groups tested and under the specific conditions of the experiment, appeared unquestionable. Yet, the total study was subject to certain fundamental (and uncontrolled) variables and lapses in technique, which would make any broad conclusions, as to the physical inferiority or superiority of the juvenile delinquent, indefensible.

II. THE CONCLUSIONS

1. Significant differences existed in the anthropometric and motor performance factors tested between the delinquents and nondelinquents of this investigation.

2. The results of the chinning were invalidated by faulty administration of the test of the control group.

3. No broad, positive, conclusions can be drawn from the study due to the limitations of the problem and some questionable technique in gathering data.

4. The overall weight of statistical evidence of difference was

so one-sided in favor of the non-delinquent as to indicate the need for a more complete and better controlled experiment in the same areas.

III. THE IMPLICATIONS

1. The differences between the delinquents and non-delinquents of this study may be due to differences in geographic locale, socioeconomic environment, and a lack (or failure to take advantage) of opportunity, on the part of the delinquent, to develop the necessary motor skills.

2. By definition, the delinquent is not socially wellintegrated. If the results of this study are valid, he is also not physically well-integrated. This may well have a circular effect upon the delinquent, resulting in attempts to compensate for his lack of physical ability by demonstrating his prowess in socially unacceptable activities which do not require such a high degree of motor skill. In this way he may hope to gain the status which his peers accomplish in a conventional manner.

3. If the above is true, it follows that delinquency can be prevented by proper coaching, training, and education to develop these skills. This theory seems to be borne out by the investigation made for the Chicago Recreation Commission in which it was found that participation in supervised recreation acted as a preventive of delinquency.¹²

4. Physical education and recreation programs at training

⁴²Ethel Shanas, <u>Recreation and Delinquency</u> (Chicago: Chicago Recreation Commission, 1942), p. 245.

schools should be intensive ones, whose coordinated aims are threefold:

> (a) provide opportunity for exploration, by the boy, of the field of motor activity, in order to find modes of physical expression most suitable to his interests and motor capacity; then develop skills in these areas;
> (b) provide individualized instruction in motor activities to a much higher degree than normally feasible in the public schools in order to narrow the gap as much as possible and

in the shortest possible time,

(c) provide a flexibility of program and an accepting attitude in physical education, which will encourage the direction of aggression into more acceptable channels.

5. Some pre-delinquents may be materially assisted in the public school and community through some timely attention to their individual motor needs.

<u>Problems for further study which arose from this investigation</u>. Many different tangents to the original problem appeared during the investigation. The more significant of these are listed below:

(a) a duplication of that part of the Gluecks' research pertaining to physical condition, using a midwestern population of mixed urban and rural delinquents.

(b) a physical comparison of urban and rural delinquents;

(c) an investigation into the influence of physical education on

behavior adjustment;

(d) an analysis of the effect of an institutional program in physical education and recreation on motor performance;
(e) a determination of the potential motor ability of delinquents as compared with non-delinquents;

(f) a survey of post institutional recreational interests of delinquents as compared with those developed during residency.

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