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VITAL and HEALTH STATISTICS
DATA FROM THE NATIONAL HEALTH SURVEY

Intellectual Maturity of Children as Measured by the Goodenough-Harris Drawing Test United States

Distribution of point (raw) scores and standard scores by age and sex for noninstitutionalized children 6 through 11 years of age in the United States, obtained by administering this instrument as a draw-a-person test.

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Series 11 reports present findings from the National Health Examination Survey, which obtains data through direct examination, tests, and measurements of samples of the U.S. population. Reports 1 through 37 relate to the adult program. Additional reports concerning this group will be forthcoming and will be numbered consecutively. The present report is the fifth of a large number of reports of findings from the children and youth programs, Cycles II and III of the Health Examination Survey. These reports, emanating from the same survey mechanism, are being published in Series 11 but are numbered consecutively beginning with 101. It is hoped this will facilitate efforts to provide users with all the data and only the data in which they are interested.

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NATIONAL CENTER FOR HEALTH STATISTICS

DIVISION OF HEALTH EXAMINATION STATISTICS

COOPERATION OF THE BUREAU OF THE CENSUS

In accordance with specifications established by the National Health Survey, the Bureau of the Census, under a contractual agreement, participated in the design and selection of the sample, and carried out the first stage of the field interviewing and certain parts of the statistical processing.

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THIS NEW REPORT from the National Center for Health Statistics contains national estimates of intellectual maturity for children 6-11 years of age as measured by the Goodenough-Harris Drawing Test. These data were obtained in the second cycle of the Health Examination Survey, conducted in 1963-65. For this survey a probability sample of 7,417 children was selected to represent the 24 million children 6-11 years of age in the noninstitutional population of the United States. Of the 7,417 children selected in the sample, 7,119, or 96 percent, were examined. These examinees were closely representative of the child population of the United States from which they were drawn with respect to age, sex, race, region, size of place of residence, and change in size of place of residence from 1950 to 1960.

The findings on intellectual maturity are presented by age and sex. In addition to information from the distributions of raw scores, standard score equivalents and percentile ranks of these raw scores as derived from this highly representative national sample are included.

Comparison is made with the data available for the group on which Harris standardized the 1963 revision of the Goodenough-Harris Drawing Test. Mean scores for children 6-11 years in the United States were found to be lower than those from Harris' normative data throughout the age range on the Man and Woman Scales for both boys and girls. The differences were found to become progressively greater with age. The variability of scores within each year of age from the present study tends to be slightly less than that in Harris' normative groups, particularly on the drawings of a man by boys.

SYMBOLS

Data not available	---
Category not applicable	...
Quantity zero	-
Quantity more than 0 but less than 0.05	0.0
Figure does not meet standards of reliability or precision	*

INTELLECTUAL MATURITY OF CHILDREN
AS MEASURED BY THE GOODENOUGH-HARRIS DRAWING TEST

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INTRODUCTION

This report contains information on the intellectual maturity of children 6 through 11 years of age in the United States as estimated from the 1963 Goodenough-Harris Drawing Test data obtained in the Health Examination Survey of 1963-65. Consideration is limited in this first report of a series of reports on these test findings to age and sex differentials.

The Health Examination Survey is carried out as one of the major programs of the National Center for Health Statistics, authorized under the National Health Survey Act of 1956 by the 84th Congress as a continuing Public Health Service activity.

The National Health Survey is carried out through three different survey programs.[1] One of these, the Health Interview Survey, is primarily concerned with the impact of illness and disability upon people's lives and actions and the differentials observable in various population groups. It collects information from the people themselves by household interviews. A second, the Health Record Survey, includes follow-back studies based on vital records, institutional surveys to establish sampling frames as well as to provide data, and surveys based on hospital records. The third major program of the National Health Survey is the Health Examination Survey.

In the Health Examination Survey, data are collected by direct physical examinations, tests, and measurements performed on the sample population studied. This is the best way to obtain definite diagnostic data on the prevalence of certain medically defined illnesses. It is the only way to secure information on unrecognized and undiagnosed conditions as well as on a variety of physical, physiological, and psychological measurements within the population. In addition it provides demographic and socioeconomic data on the sample population studied.

The Health Examination Survey is carried out as a series of separate programs referred to as "cycles." Each cycle is concerned with some specific segment of the total U.S. population and with certain specified aspects of the health of that subpopulation. Thus the first cycle obtained data on the prevalence of certain chronic diseases and on the distribution of various measurements and other characteristics of a defined adult population.[2,3]

The second program, or cycle, of the national Health Examination Survey, on which this report is based, involved the selection and examination of a probability sample of the Nation's noninstitutionalized children aged 6 through 11 years. The examination focused particularly on health factors related to growth and development. It included an examination by a pediatrician; examination by a dentist; tests administered by a psychologist; and a variety of tests, procedures, and measurements given by technicians. A comprehensive description of the survey plan, sample design, content of the examination, and operation of the survey is contained in another report.[4]

This program of the survey was started in July 1963, and field collection operations were completed in December 1965. Of the 7,417 children selected for the sample, 7,119 (96 percent) were examined. This national sample is representative of the roughly 24 million noninstitutionalized children in the United States 6 through 11 years of age.

A standardized single-visit examination was given each child by the examining team in the specially designed mobile units used for the survey. Prior to the examination, information was obtained from the parent of the child, including demographic and socioeconomic data on the household members as well as a medical history and behavioral and related data on the child to be examined. Ancillary data for the child were requested from the school, including grade placement, teacher's rating of his behavior and adjustment, and health problems known to the teacher. Birth certificates for verification of the child's age and information related to the child at birth were also obtained.

PSYCHOLOGICAL TEST BATTERY

After consultation with child psychologists from five leading universities and the National Institute of Mental Health, a 60-minute test battery to assess the mental aspects of growth and development was included as part of the standard examination. The battery contained measures of, or those closely related to, intelligence as well as other tests designed to assess some personality factors.

The Vocabulary and Block Design subtests of the Wechsler Intelligence Scale for Children (WISC) and the Draw-a-Person Tests were the direct measures of intelligence used. Five cards of the Thematic Apperception Test (TAT) were included for the assessment of personality factors. Two subtests of the Wide Range Achievement Test (WRAT) were included to measure achievement in the basic skills of arithmetic computation and reading. These tests were also used because it is reasonable to expect that school achievement should be related to intellectual status and to social and emotional adjustment.

A methodological study was carried out to obtain a critical evaluation of the psychological procedures chosen for the second cycle of the Health Examination Survey. This study included a literature review of previous research and evaluation known to be available on each of the battery components, recommendations concerning the types of inferences which could appropriately be made from the results to be obtained from the battery, and recommendations with respect to additional research which was deemed necessary in order to make proper use of the data collected. The methodological study was done on a contract basis by Dr. S. B. Sells of the Institute of Behavioral Research, Texas Christian University. The results have been published in the Center's methodological series.[5]

HUMAN FIGURE DRAWINGS AS MEASURES OF INTELLECTUAL MATURITY: HISTORICAL DEVELOPMENT

For many years, psychologists and educators have known that young children use drawings as a kind of "language" to express their knowledge and ideas. Presumably, then, a child's drawing might be studied to reveal aspects of his mental life. Noting the regular improvement, with age, of drawings in detail and complexity and the extraordinary crudity of drawings by mentally deficient children, Sir Cyril Burt in 1921 included the drawing of a man as one of his mental and scholastic tests devised for the London County Council.[6] To arrive at a score, a child's drawing was compared with a set of examples or standards. This score was only one of a number of components used in assessing ability and intelligence.

In 1926 Florence Goodenough published her Draw-a-Man Test which offered the first explicit and standard instructions for administering and scoring a human figure drawing.[7] She selected the drawing of a man because the male figure is a common subject in collections of children's free drawings and it is one of the first subjects spontaneously attempted by very young children. She believed the man to be a particularly useful object to draw because the male garb, being more uniform than the female, presents a uniform stimulus which can be executed in varying de-

grees, from the most simple schematic form to the most detailed representation.

Her method of scoring was based on the point score system. That is, a single point was credited for each of a series of features or parts, which is described specifically in the scoring instructions. These points were selected empirically to meet two criteria: In each successive age group of children a greater percentage included the point; and duller children were less likely than brighter children to score the point. This latter criterion of intelligence was assessed very simply by taking as relatively dull children those who had been retarded in school progress and as relatively bright children those who had been accelerated in school progress.

A total score was achieved by summing the individual points achieved or "passed." Goodenough transformed this point score into a mental age (expressed in years and months) by a simple process of discovering mean raw values made by unselected children in successive year age groups and interpolating intermediate values. An intelligence quotient (IQ) for a given child was calculated according to the procedures of that time, taking the ratio of mental age in months to chronological age in months.

Through the years the Goodenough Draw-a-Man Test has been widely accepted in the repertoire of the child psychologist's tests. A young child likes to draw. Being more relaxed than for other tests, he may behave more naturally, setting the stage for the work which follows. A drawing is a good "ice breaker" in establishing rapport between psychologist and child. From the psychologist's point of view the test is exceedingly easy to administer. The product rather than aspects of the performance process is scored, and hence scoring can be deferred. A child very seldom thinks of his drawing as a test or examination.

The Goodenough Draw-a-Man Test has several virtues in addition to its ease- and pleasure-giving quality described above. It is a *performance* test. That is, the child is *doing* something rather than saying something. This feature has considerable advantage for a child with speech and hearing difficulties. It is readily used in situations where the elaborate procedures of translating and equating complex verbal instructions or problems are not possible. Furthermore it has consistently yielded substantial correlations with complex, verbal, and individual measures of intellectual ability.[8]

Nevertheless the Goodenough measure possesses a number of shortcomings which became increasingly apparent with further use of the test. It tended to give decreasing IQ's in the older age groups (10, 11, and 12 years), suggesting that increments in mental age were not sufficiently calibrated and that the test was not adequately measuring abilities at the older ages. Furthermore the original standardization was done before modern concepts of sampling and representativeness had been developed. There was clearly a need to establish a better basis for evaluating the score yielded by tests in relation to standards or norms.

During the decade following World War II, a renewed interest in children's drawings focused on the use of drawings to assess personality qualities such as aggressiveness and insecurity and psychological adjustment factors such as direction of sexuality and feelings toward self and other people. There arose a widely accepted hypothesis that when the stimulus was an undesignated "person" rather than a "man" the sex of the figure drawn was significant in indicating unconscious sex role identification. Consequently, clinical psychologists more and more began collecting human figure drawings in which sex was not designated by instruction for the first drawing. A second drawing was usually requested to be of the sex opposite that of the first. Sometimes qualitative comparisons of the two figures were used to interpret personality dynamics.

Objective standards for evaluating such drawings were not immediately forthcoming, and considerable experimentation by psychologists took place. Indeed, a review of the literature by Cassell, Johnson, and Burns in 1958[9] placed the reliability of such interpretations at a very low level. Eventually several methods of evaluation were published. Machover's method was described in very general terms in 1949.[10] More specifically described and more widely used is Buck's House-Tree-Person Test published in 1948.[11] The scoring manual gives a basis for estimating general intellectual level, but it also goes into some detail about the assessment of

personality and adjustment dynamics. Other methods have been published by Jolles in 1952,[12] Hammer in 1954,[13] and Koppitz in 1968.[14] Goodenough's method of evaluation, however, continues to be widely used whenever an estimate of intellectual level is required.

GOODENOUGH-HARRIS DRAWING TEST

During the 1950's, Harris attempted to extend and restandardize the Goodenough measure and to develop an alternate form, the drawing of a woman. This attempt has been fully described in his publication of 1963.[8] His effort was largely successful. In both scales, items were selected according to three criteria: (1) The item must show a steady increase, through successive age groups, in the percentage of children including or "passing" it. (2) The item must be significantly more often included by intellectually bright than by intellectually dull children in each age sample. (3) The item must be significantly more often included by children in each age group scoring high on the test as a whole (less the contribution of the item concerned and other points based on that item) than by children scoring low on the test as a whole (less such contribution). In addition the percent at each age of a large group of mentally retarded children in educable classes including the item was used as a fourth criterion. This percent was in every case substantially below that of the dull children, as defined below, in regular school classes.

For these criteria, bright children were defined as all those in each age group who scored among the highest 25 percent on intelligence tests in school records. Dull children were those scoring among the bottom 25 percent in each age group. The raw scores on these tests were reduced to standard scores to obviate the differences in standard deviation of scores from test to test. The simple criterion of acceleration or retardation in school grade for age used by Goodenough was abandoned because of the practice of "social promotion," widespread during the 1950's.

Considerable effort was expended to extend the scale beyond 12 years, where Goodenough terminated it. From Harris' work it is clear that the drawing test discriminates best among elementary school age children. It is also clear that the test does not reveal substantial increments in growth in mid and late adolescence. The drawing of a woman can be scored to yield a measure which will correlate substantially with the drawing of a man, but the drawing does not yield an identical estimate of intellectual maturity. Both scores have validity as measures of intellectual maturity and predict reading and academic performance about as well as so-called intelligence tests. The drawing of a man continues to be more commonly used as a measure than the drawing of a woman.

The restandardization process confirmed Goodenough's earlier finding that girls do somewhat better than boys on the test and further established the fact that this cannot be due solely to selective factors in the sample but must be recognized as a genuine sex difference in maturation, cultural effects, and perhaps drawing proficiency. The sex difference, favoring girls, is especially pronounced in the drawing of a woman. Hence in the restandardization Harris developed separate norms for boys and girls.

In the revision, the ratio intelligence quotient concept (mental age/chronological age) was abandoned. In keeping with more recent practice, a standard score (or deviation IQ within a given age) method of evaluation was substituted. As used here, this score translates the mean of the distribution of raw scores to 100 and the standard deviation to 15 at each age level.

For psychological purposes, the standard score has considerable descriptive and diagnostic value. The *exceptionality* of a particular score standard is that it is statistically comparable from age to age. A standard score can be converted readily to a percentile score, which is easily understood by teachers and parents. For example, a Drawing Test (man) raw score of 49 achieved by a 10-year-old girl converts to a standard score of 127. Such a score is exceeded only by 2 percent of unselected 10-year-old girls. It is clearly an exceptional score. It looks like an IQ, for an IQ of 127 is also superior, but it is not an IQ. This standard score is perhaps more readily understood when converted to a percentile score of 98. A percentile score of 98

on the Drawing Test is directly comparable (in scale units) with a percentile score of 98 achieved on the basis of an arithmetic test performance. Both scores express the same degree of exceptionality in relation to children in general, but of course each is measuring different attributes or aspects of ability.

The Harris revision included the drawing of a woman as well as of a man to supply a second estimate of ability. His instructions specified the drawing of the man to be made first. In the Health Examination Survey, which began before the publication of the Harris volume, the more general instruction to "draw a person" was used. To score the drawing, Harris' standards for the sex of the figure drawn were used. The norms for this method had been worked out carefully on samples of public school children selected to represent children with parents whose occupational distribution closely matched that from the 1960 census, with separate norms for boys and girls and for the man and woman drawings. Goodenough-Harris scoring instructions were used because they were the most explicit and objective standards available. The standards were followed in the manner outlined. Thus in the materials which follow four sets of raw score data are presented—drawings of a man and of a woman by boys and drawings of a man and of a woman by girls.

FIELD ADMINISTRATION AND SCORING

Testing Procedures

Drawings of a human figure were obtained from the children as the first procedure in a 60-minute individual testing session which included administration of the previously indicated tests in the following order: Vocabulary and Block Design subtests of the WISC, the Arithmetic and Reading sections of the WRAT, and five cards (Nos. 1, 2, 5, 8BM, and 16) from the TAT. All testing was done in small, adequately lighted climate-controlled and sound-conditioned examining rooms in the mobile examination center by psychologists who had obtained at least a master's degree and who had previous experience in administering tests to children. There were two psychologists (usually a man and a woman to whom the examinees were assigned essentially at random) with the examining team at all times. The examiners were selected, trained in field testing procedures, and supervised by the psychological advisor to the Health Examination Survey. In the initial training and the ensuing supervision of the examiners, strong emphasis was placed on uniform methods of test administration, scoring, and recording of data. During the course of the children's survey, a total of 25 examiners participated in administering the tests.

In the testing sessions the sample children were presented with the standard Goodenough Intelligence Test form (copyright 1926 by Harcourt, Brace, and World, Inc.) on which their drawings were made according to the following instructions:

> "On this paper I want you to make a picture of a person. Make the very best picture you can. Take your time and work very carefully."

If the child asked how big his picture should be, he was told:

> "Make it as big as you like."

If the child drew just a face, he was given a second test form and told:

> "That is fine. Now, I want you to draw a whole person."

If the child drew a figure which could not be scored accurately because of its position (e.g., partially hidden by furniture or only the back shown), because of the nature of the figure (e.g., comic character), or because it was so small that details were unclear, he was asked to draw another person on another test form. The original instructions were repeated, and a concise statement was added indicating that he was to make a "real person" or "a person not hidden behind a chair," according to the change appropriate. The order in which the drawings were made, if more than one was attempted by a child, was indicated on the test forms.

Examiners were instructed to observe the child while he was drawing and to record any remarks made by the child about the drawing.

After the drawing was completed, the examiner was allowed to ask questions to clarify any unusual or confusing aspects of the figure. For example, it was sometimes necessary to ask the child to identify parts of the person or to give some information about clothing. Questions were intended to be nondirective and to avoid indicating approval or disapproval. Often the derived information was elicted by simply saying:

"Tell me about your drawing."

All information about the drawing was recorded on the test form with direct remarks from the child appearing in quotation marks and the examiner's rephrasing and summary remarks without quotation marks.

In cases where a child was reluctant to begin or complete the assigned task, gentle nondirective verbal persuasion, such as would typically be used when testing children usually resulted in the production of a scorable drawing. Of the total examined sample of 7,119, only 51 did not have drawings or had drawings that were unscorable. Of the 51 missing drawings (appendix) 34 were lost because of factors not directly attributable to the sample child. These included such things as inadequate time for psychological examination, unavailability of an examiner or examiner error in administration, lack of parental consent, and unavailability of an adequately air-conditioned examining room.

Only 17 drawings were missing because of some characteristic of the child being examined, such as atypical behavior, incapacitating mental retardation and sensory-motor defects, or inability to speak or understand English.

Quality Control

The maintenance of standard administration procedures and uniform methods of recording are all important in massive data-collecting operations such as the Health Examination Survey. Besides the initial training of examiners in the survey procedures (which included memorization of all test instructions), several ongoing procedures were devised to assure the continuing quality of the data. Each day the field psychologists exchanged all test forms and checked them for any apparent errors in administration and for any mistakes in recording. All errors were noted and discussed with the other examiner. All field psychologists tape recorded one entire testing session each week. The tapes were sent to the supervisor who reviewed them and made notes of errors and suggestions regarding testing procedure. These notes were sent to the examiners for their use. In addition to these two regular procedures, the psychological advisor or supervising field psychologist made periodic visits to the field for direct observation and supervision of the work, and test forms were intermittently checked when they arrived at headquarters.

Scoring

Each drawing was scored independently by two scorers using the Goodenough-Harris scale. For the purpose of this analysis and for others to follow, one total score for each drawing is obtained by taking the average of the two independent scores. If the average score is not a whole number, the fraction is dropped.

Scoring was done under the direction of Dr. James L. McCary at the University of Houston. A total of six scorers were trained in scoring methods and were supervised by Dr. McCary while scoring the children's human figure drawings. The psychological advisor to the Health Examination Survey and Dr. Dale B. Harris acted as consultants in the solution of any problems which arose regarding particular items in the scale. The supervisor of the scoring project was responsible for implementing quality control procedures in an effort to assure valid and reliable results. Interscorer reliability coefficients on both man and woman drawings by both boys and girls at all age levels were all +0.96 or above (appendix).

FINDINGS

As indicated previously, the human figure drawing test was administered as a draw-a-person test in the Health Examination Survey. Table A shows national estimates for the number and percent of boys and girls by age and by the type of drawing produced on which intellectual maturity was rated in this study.

Table A. Number and percent of children aged 6 through 11 years in the noninstitutional population rated on the drawings of a Man and a Woman, by age and sex: United States, 1963-65

Age	All boys and girls	Boys			Girls		
		Total	Man figure	Woman figure	Total	Man figure	Woman figure
	Number in thousands						
Total, 6-11 years--	23,784	12,081	10,167	1,914	11,703	2,281	9,422
6 years	4,098	2,082	1,825	257	2,016	507	1,509
7 years	4,084	2,074	1,733	341	2,010	395	1,615
8 years	3,986	2,026	1,635	391	1,960	328	1,632
9 years	3,957	2,012	1,668	344	1,945	347	1,598
10 years	3,867	1,963	1,655	308	1,904	346	1,558
11 years	3,792	1,924	1,651	273	1,868	358	1,510
	Percent						
Total, 6-11 years--	...	100.0	84.0	16.0	100.0	19.2	80.8
6 years	...	100.0	87.5	12.5	100.0	25.0	75.0
7 years	...	100.0	83.4	16.6	100.0	19.5	80.5
8 years	...	100.0	80.6	19.4	100.0	16.6	83.4
9 years	...	100.0	82.8	17.2	100.0	17.7	82.3
10 years	...	100.0	84.2	15.8	100.0	18.0	82.0
11 years	...	100.0	85.7	14.3	100.0	19.0	81.0

Over 80 percent of the examinees drew figures of their own sex—about 84 percent of the boys drew a man, and about 81 percent of the girls drew a woman. Among boys the proportion was just slightly higher at the extremes of the age range (6 and 11 years), where about 88 and 86 percent, respectively, made this choice, and lower at age 8 (about 81 percent) than at the other ages. Among girls the proportion drawing a woman was slightly lower at age 6 (75 percent) than at the other ages, where the proportion varied from 81 percent at ages 7 and 9 to 83 percent at age 8.

In 1952 Jolles[15] found that children aged 5 to 8, when asked to draw a person, drew their own sex first in about 80 percent of the cases. After age 8 the percentage of boys drawing the male figure first rose, and the percentage of girls drawing the female figure first fell. Several other studies, which include a range of ages, show that the percentages are surprisingly stable.[16-18] Typically 80-85 percent of the boys and 65-70 percent of the girls drew their own sex first. These data compare favorably with the nationally representative sample of the present study, although the percentage of girls drawing the female figure first was somewhat higher here than in other studies.

Boys 6 through 11 years of age in the United States tended to score at about the same level as girls of that age on the Man Scale, as estimated from findings among noninstitutionalized children in the Health Examination Survey of 1963-65 (tables 1 and 2; figure 1). None of the differences between means achieved by the sexes is statistically significant (at the 5-percent level).

On the Woman Scale boys scored consistently lower than girls throughout the age range (tables 1 and 2; figure 1). Here the sex difference

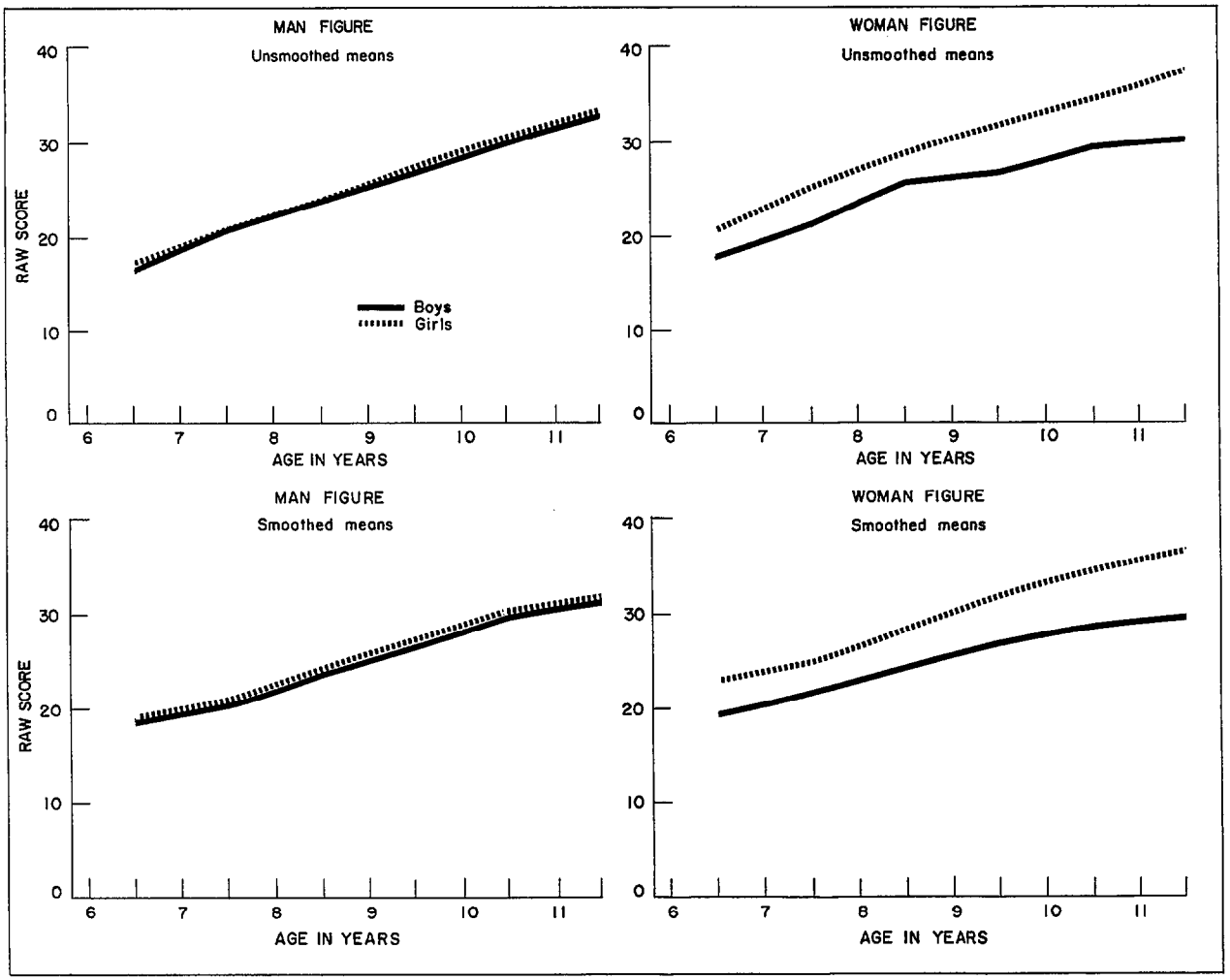

Figure 1. Unsmoothed and smoothed point score means for boys and girls aged 6 through 11 years on the Goodenough-Harris Drawing Test, by type of drawing and age: United States, 1963-65.

was at once apparent, and the mean difference was statistically significant at the 5-percent level or less at each single year of age. As expected, when the distributions of scores for boys and girls on this scale were combined, the resultant mean values were closer to the performance for girls, reflecting the greater percentage of girls choosing to draw the female figure (table A).

The two scales developed by Harris for the male and female figures were not necessarily designed to give direct comparability of raw scores since the two scales were developed independently. It is clear, however, that the drawing of a woman yielded results, for all children, approximately four raw score points higher on the average at each year of age, a highly statistically significant difference (tables 1 and 2; figure 2). The drawing of a woman scoring standard apparently contained more "easier" points.

Among boys scores tended to be at about the same level whether the figure drawn was a man or a woman. Younger boys (6 through 8 years of age) made slightly higher scores on the Woman Scale, while older boys achieved

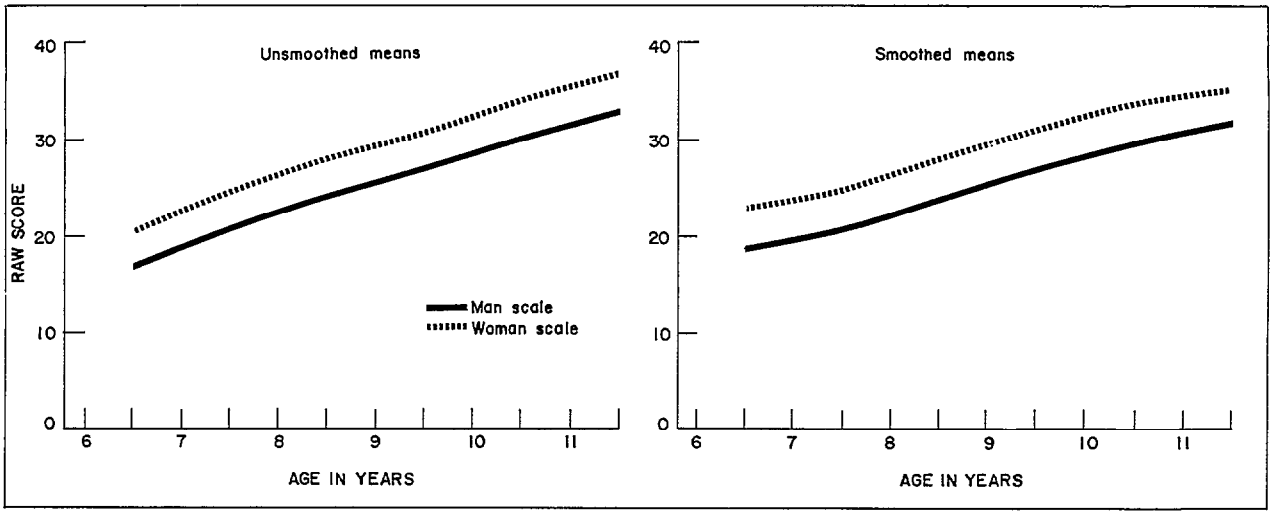

Figure 2. Unsmoothed and smoothed point score means for children aged 6 through 11 years on the Goodenough-Harris Drawing Test, by type of drawing and age: United States, 1963-65

slightly higher scores on the Man Scale (figure 1). None of these differences approached statistical significance.

Girls scored significantly lower on the Man than on the Woman Scale throughout the age range, the difference being typically 4 or 5 points less. Thus the Woman Scale apparently includes points which, though related to intellectual maturity, are more likely to be included by girls. These points chiefly relate to items of clothing and facial features.[8] This finding emphasizes the need to use separate norms for boys and girls when interpreting the results of the female figure.

The means and standard deviations of the point (raw) scores are shown in table 2 and figures 1 and 2 as smoothed by a 3-year moving average to eliminate some of the unevenness possibly due to sampling error. The smoother curves show the above described patterns even more clearly than in table 1 and figures 1 and 2.

Comparison With Harris' Normative Data

Test norms for the 1963 revision of the Goodenough Draw-a-Man Test, called the Goodenough-Harris Drawing Test, were derived from test data supplied by nearly three thousand children aged 5-15 years in four geographic areas of the United States: the Middle Atlantic and New England Area, the South, the West Coast, and the Upper Midwest. From this test pool Harris assembled a quota sample of children with parents whose occupational distribution matched that from the 1950 census.[a] The sample consisted of 75 children from each of the four geographic areas at each single year of age, divided as equally as possible between boys and girls within each occupational stratum and in each age and geographic group. Thus a sample of approximately 300 supports the norms reported for each single year of age. Furthermore each age group in each geographic area approximated the U.S. occupational distribution, with the total age group following this distribution closely. At each age level children were selected so that the sample centered at midyear, with an approximately equal number of children from each month in that age interval. This method is often followed in the construction of group paper-and-pencil tests because truly random or probability samples are so difficult and costly to obtain. The results

[a]The data are summarized by Harris (pp. 100-107)[8] and reported fully in tables on file with the Test Department of Harcourt, Brace, and World, Inc.

have usually been accepted as reasonably adequate "norms" for the use and interpretation of educational and psychological instruments.

The present study is unique in the degree of control exercised to furnish a truly representative sample of the U.S. noninstitutionalized children. The results are all the more interesting in comparison with Harris' norms supplied by the above method. It should be kept in mind, as previously indicated, that the Harris norms were based on approximately 150 boys and a similar number of girls at each single year of age, whereas the number of examinees in the present study ranged from about one-half to two-thirds of that number for drawings of the opposite sex to from half again to twice as many for drawings of the same sex (table I).

Mean scores for children aged 6-11 years in the United States tended to be lower than those from the Harris norms consistently throughout the age range on the Man and Woman Scales for both boys and girls (figures 3 and 5). There was a distinct trend for this difference to become progressively greater with age. The mean differences were statistically significant (at the 5-percent level or less) at ages 6, 10, and 11 for boys on the Man Scale and at ages 7, 10, and 11 for girls on the Woman Scale. If the comparison had been made on the basis of the smoothed data (figure 4), the means would have differed significantly at 9, 10, and 11 years for boys on the Man Scale and at 11 years for boys on the Woman Scale. For girls the differences were significant at ages 9, 10, and 11 on the Woman Scale. At age 6 on the Woman Scale the differences in mean raw scores were negligible; when smoothed, means from the present study were even slightly above the norms.

Yet the graphic presentation of the data shows consistently that, whether significant by statistical standards or not, the present data fall below Harris' published norms, with the exception indicated at age 6. The levels of significance vary as a function of the sample size of the groups compared. Thus the particular ages at which "significance" does or does not appear is in part a product of the uneven distribution of the numbers of boys and girls in the present study electing to draw their "person" as a man or as a woman. It is probably appropriate to conclude that the differences between Harris' data and the data of the present study are significant in a research sense throughout, if not always statistically significant, and deserve attention.

Moreover the variability of scores at each year of age from the present study tends to be slightly less than that reported by Harris[8], particularly on the drawing of a man by boys. The relative variation among the scores attained in the present study—as measured by the ratio of the standard deviation to the mean—is, however, similar to that found by Harris for his normative group (table 5). All chi-square tests on both raw and smoothed data using Harris' ratios as the expected values are not significant. In the present data the ratio tends to be more nearly constant for the Woman Scale, particularly for boys. This measure has the value of permitting a comparison of dispersions of scores in different series where the means vary considerably in size. A fairly constant relative variation over progressively ordered groups is generally a desideratum in psychological and educational measures, for as the mean raw score increases beyond zero, the variability around that mean should increase proportionately with the size of the mean. This is one indication that the test has a sufficient number of items and is fairly consistent over the various groups in differentiating ability.

Standard Scores and Percentiles

To express scores in a form so that a child's relative standing in his age group with respect to intellectual maturity is apparent and to make such scores comparable from age group to age group, the raw scores must be converted to some relative measure. The standard score and the percentile equivalent of a raw score are commonly used for this purpose. In regular, normal distributions the percentile rank may be derived directly from the standard score and is more readily understood by teachers and parents, as mentioned earlier in this report.

One major reason for abandoning the IQ as an indication of intellectual ability or maturity

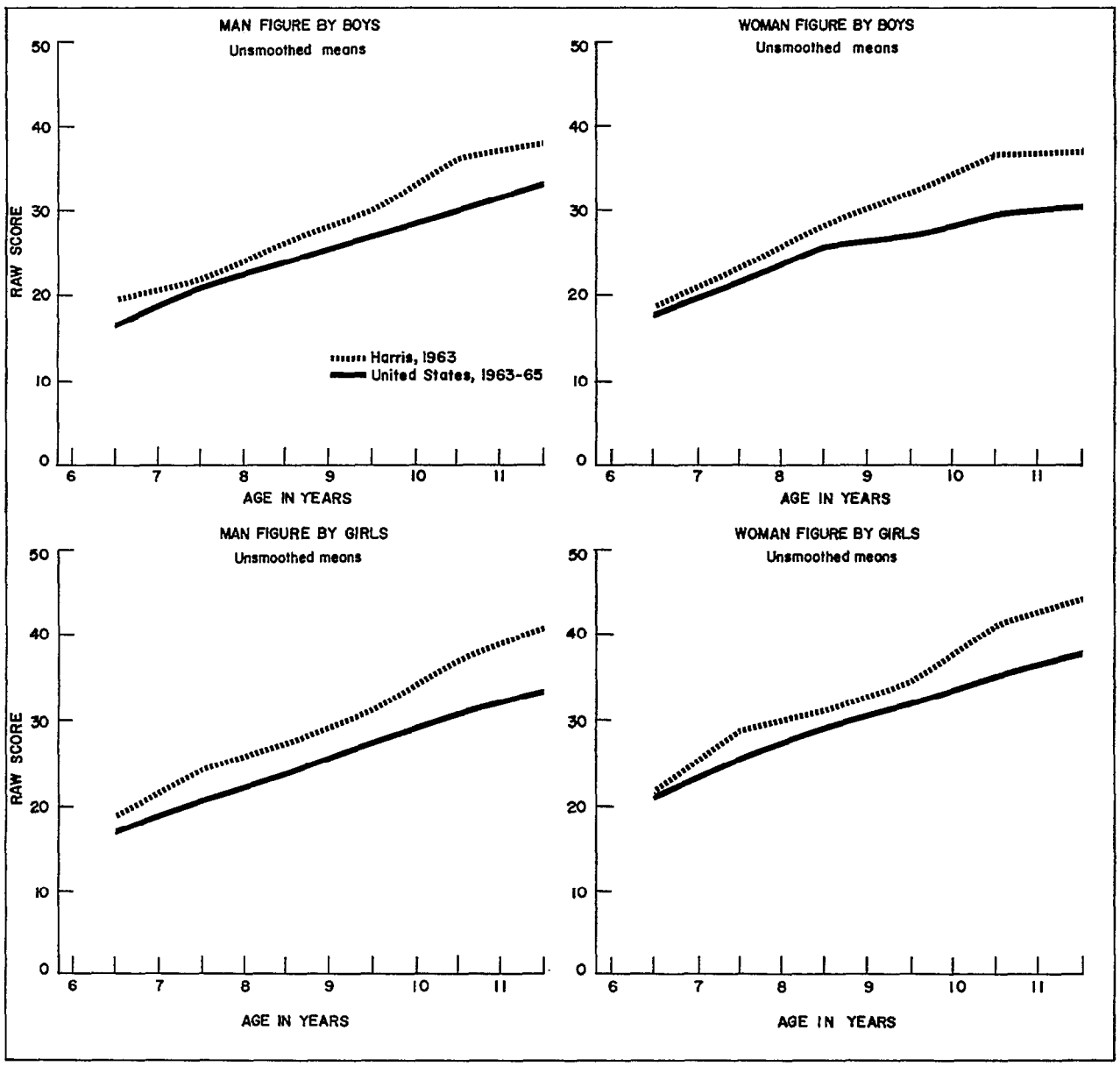

Figure 3. Unsmoothed point score means for boys and girls aged 6 through 11 years on the Goodenough-Harris Drawing Test, by type of drawing and age: United States, 1963-65, and the 1963 Harris Normative Group.

is that mental growth is clearly not a rectilinear function; that is, it does not apparently increase at a constant rate with age,[8,19-21] which was assumed by the older Mental Age concept. The standard score, relative to the development at each year of age, permits a direct comparison across a wide span of ages.

To permit comparisons of psychological measures of the Health Examination Survey and to provide a basis for comparison of other studies or test results with the national norms from the survey, standard score equivalents for raw scores are shown in tables 6-11 from data for the total national sample.

In constructing these standard scores at each year of age, the average has been set at 100 and the standard deviation at 15 points, as previously indicated, consistent with the practice used by Harris in his development of this instrument and by Wechsler both in his Adult Intelligence Scale of 1955 [22] and his Intelligence Scale for Children in 1949.[23]

The means and standard deviations of standard scores for the drawing of each sex figure by boys and girls are shown in table 12. The nonsignificant deviations from the parameters (mean of 100 and standard deviation of 15) reflect the effect of the weighting process used to produce national estimates as described in the appendix.

Percentile rank equivalents for raw scores on this test, as obtained in the present national study, for the drawings of a man and of a woman are shown in tables 13-15. The per-

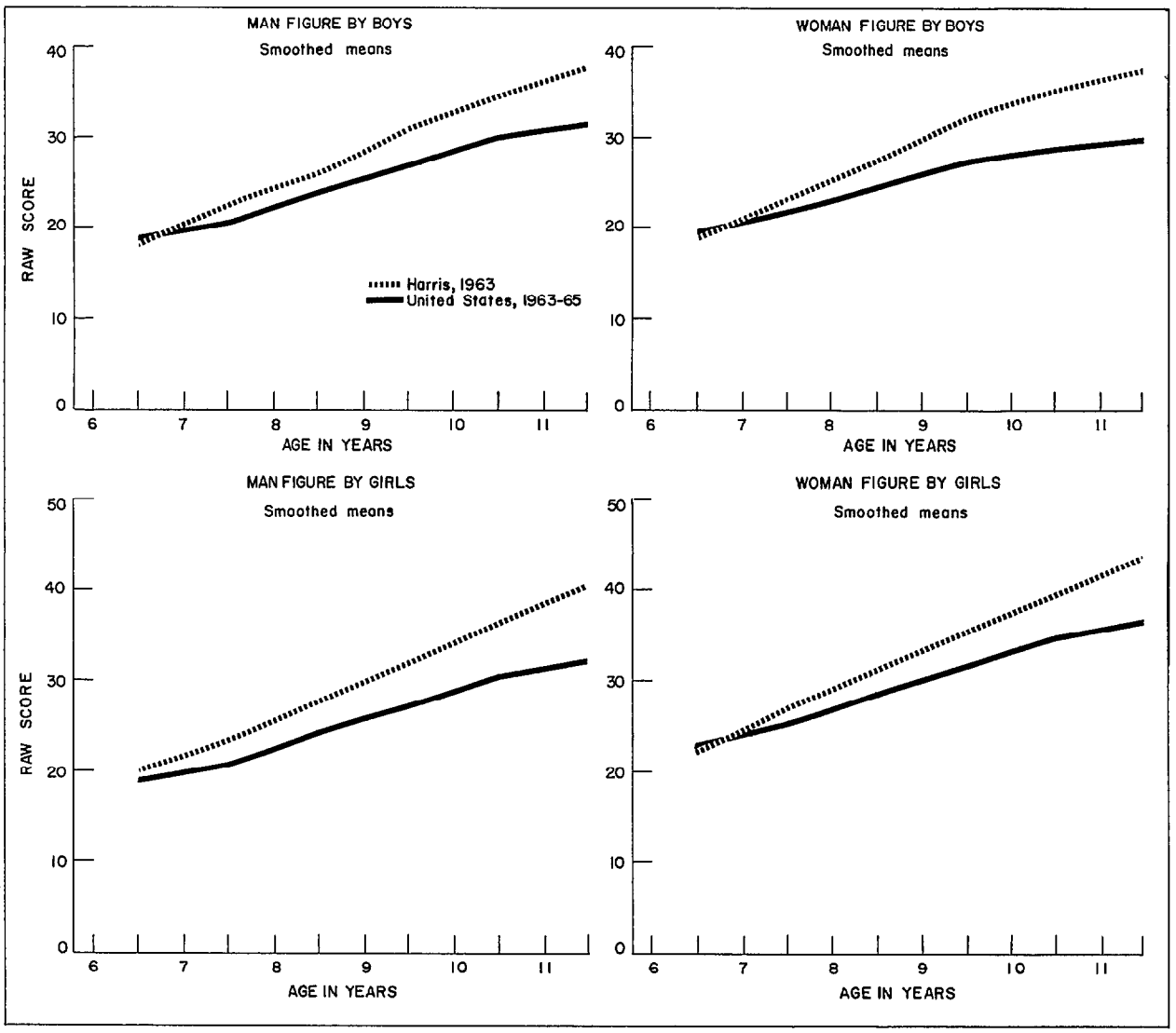

Figure 4. Smoothed point score means for boys and girls aged 6 through 11 years on the Goodenough-Harris Drawing Test, by type of drawing and age: United States, 1963-65, and the 1963 Harris Normative Group.

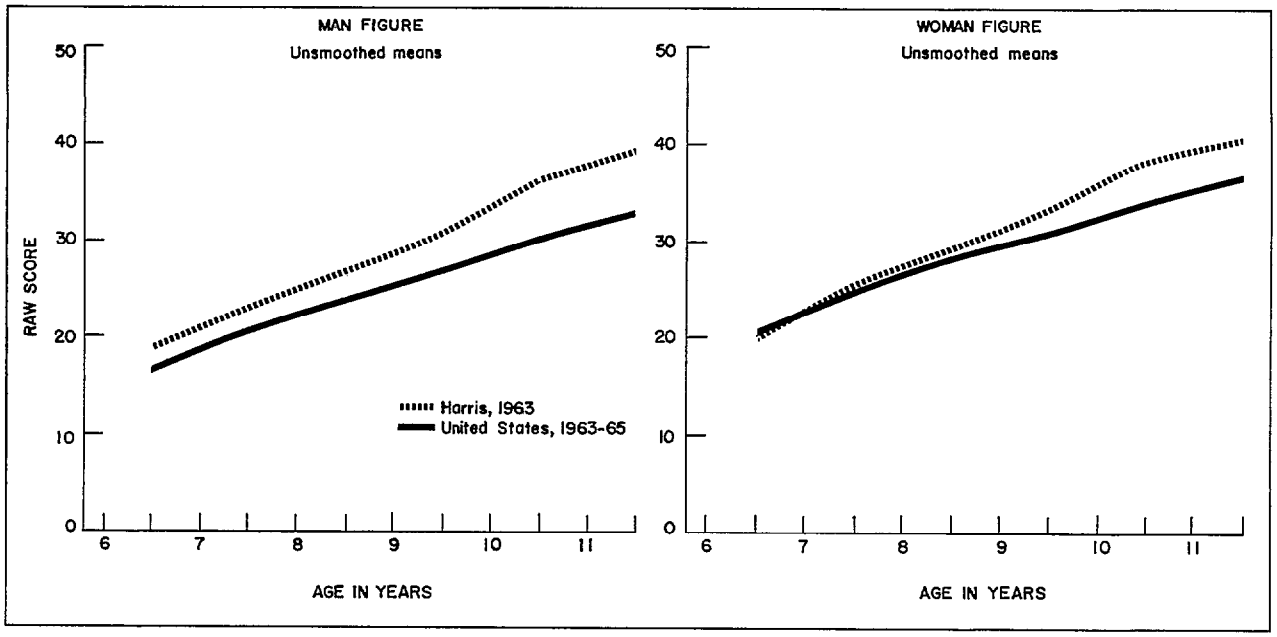

Figure 5. Unsmoothed point score means for children aged 6 through 11 years on the Goodenough-Harris Drawing Test, by type of drawing and age: United States, 1963-65, and the 1963 Harris Normative Group.

centile ranks show the relative standing of the score for a child in a theoretical group of 100 or the score below which the indicated percentages of children were found to fall. The distribution of the percentile equivalents of raw scores shows a consistent pattern throughout the age range (figure 6).

For convenience in assessing the normality of these distributions of scores, percentile equivalents for the standard score equivalents of these raw scores are shown in tables 16-19 along with the comparable standard scores from a normal distribution. A rough test of the extent of agreement with the normal distribution is shown in these tables. Here a chi-square test of the goodness of fit of these distributions to the normal curve was used, with the values from the normal curve being the expected values. Each of the arrays of scores were quite normally distributed. The likelihood of deviations in standard scores as large or larger occurring solely through chance is considerably greater than the 5-percent level, which has been used as the level of statistical significance in this report.

DISCUSSION

One principal contribution of the present study to psychological science is the establishment of national norms for the Goodenough-Harris Drawing Test based on the highly representative national sample of children used in the second cycle of the Health Examination Survey. The finding that the mean scores from the present study fall below the data reported by Harris therefore constitutes one of the principal points for discussion. It is essential to account for these differences and to appraise the present data as a basis for evaluating the norms established by Harris.

While the mean differences were not always statistically significant at every age level, it was pointed out that smaller samples for some groups with their correspondingly larger sampling variability may account for the "nonsignificance" of trends which are uniformly in the same direction (figures 3 and 4).

One factor to be considered in comparing data from the present study with the Harris

data is the difference in the circumstances of testing. The original Harris data were gathered in group settings, while data for this study were gathered by the individual testing technique. Can the difference in procedure account for the difference in the results obtained? A recent methodological study in the *Vital and Health Statistics* series [24] suggests that there may be some validity in this argument. Ordinarily in a testing situation a child is permitted to finish at his own rate. For the present study, however, the testing time of necessity had to be curtailed. In the group situation used by Harris in standardizing the test, the testing time was much less constrained. Most of the children were permitted to finish at their own rate; only a few in each class had to be hurried to complete their drawings in the time allotted.

The methodological study [24] just referred to was specifically designed for and conducted with adolescents. In general, younger children take considerably less time to complete a drawing than do older children. However, there remains the possibility that the individual testing situation constrained at least some of the younger children to an unknown extent. While this factor could probably be expected to produce somewhat lower scores, it is doubtful that it could in itself account for all the consistent and rather sizable differences noted between the original Harris data and the data of the present study.

Perhaps more plausible is the possibility that in group settings the drawing task was not strictly controlled. Indeed in "art" work children often look at and sometimes discuss each other's

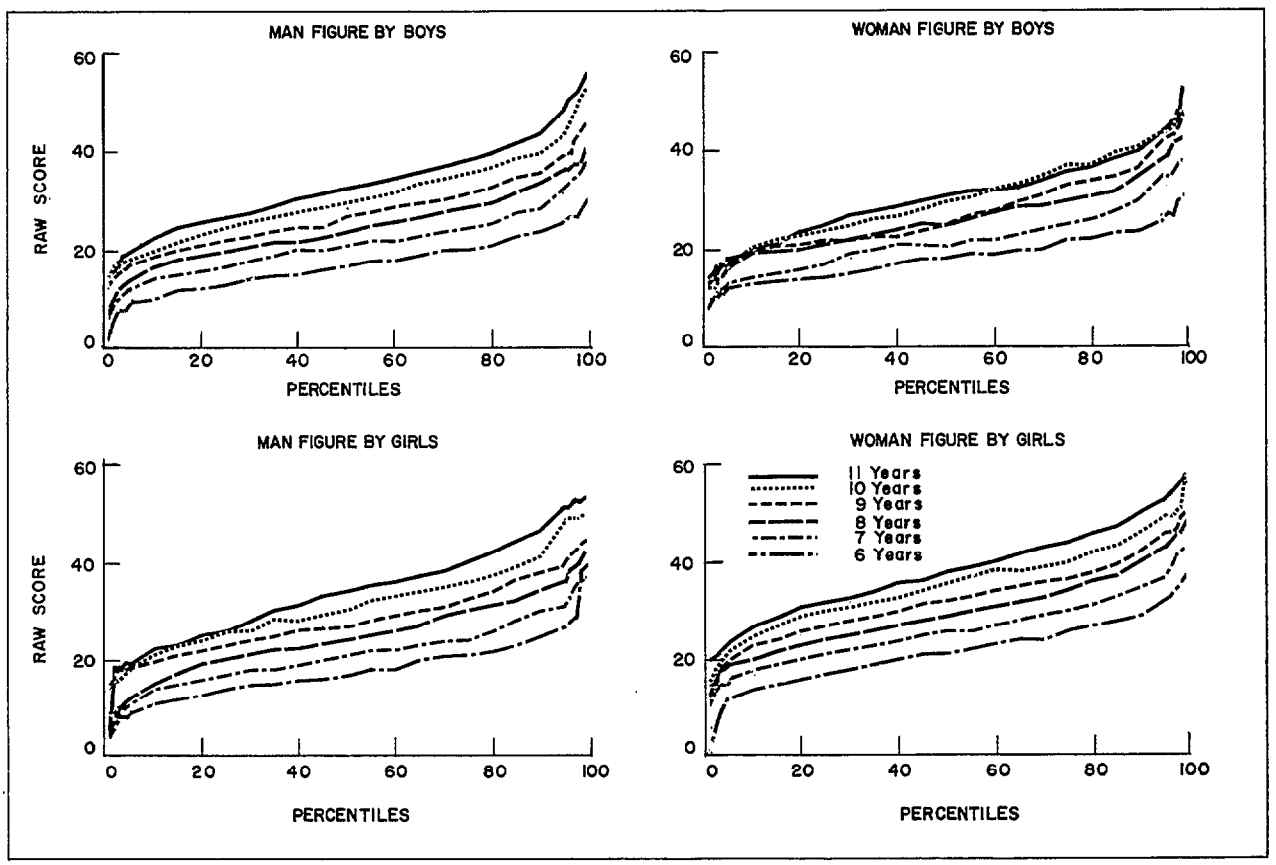

Figure 6. Distribution of percentile equivalents of raw scores of boys and girls aged 6 through 11 years on the Goodenough-Harris Drawing Test by type of drawing and age: United States, 1963-65.

work. If such circumstances occurred in the collection of Harris' data, some children were probably stimulated to include additional ideas or concepts in their drawings, thus gaining scoring points. Then too, there is the motivational effect which appears to accrue to tasks conducted in groups. The possibility of both types of social facilitation of performance cannot be discounted.

Could differences in scoring standards, consistently applied, account for the observed differences? A constant bias in the present study toward stricter application of standards and greater quality control on scoring could possibly be responsible. However, the present study attempted to allow for this factor by constant reference to the original standards and to the interpretations and training sessions for scorers provided or supervised by Harris. In the training procedures established for scoring, a few of the ambiguous points were redefined but in a conservative way. It seems doubtful that these scoring differences could in themselves account for the consistent differences in trends of the data.

There remains the obvious fact that the present study posed a different problem for subjects than did the original Goodenough-Harris measure. That is, children in the present study were asked simply to draw a person. Children in the Goodenough-Harris study were asked to make three drawings in specified sequence—a man, a woman, and a drawing of the self.

It has clearly been shown in the present study that when asked to draw a person the the majority of children of both sexes drew their own sex. In the literature of clinical psychology the selection of sex, when the test situation specified a person, is presumed to convey certain psychological characteristics of the subject. These characteristics have been variously defined in the literature, but ordinarily these definitions refer to self-image or personality factors and not to cognitive abilities. Again, this factor probably should not make a great difference in the scoring of the drawings for intellectual level. It was this assumption which led to the use of the Goodenough-Harris standards as the basic scoring device for the drawings obtained in the draw-a-person situation posed by the present survey. It is unfortunate that no "hard" data are available to test this assumption. It is a reasonable one but it remains untested.

A counter hypothesis would be that there are intellectual as well as personal differences between children electing to draw a figure of like rather than opposite sex when asked to draw a person. There is certainly nothing in the literature on sex differences to suggest that scoring a drawing for intellectual factors would be significantly affected by the personal qualities which would lead a boy, for example, to draw a female rather than a male figure when the sex of the subject to be drawn is unspecified.

With regard to the present data, to account for differences from Harris' norms on the basis of this hypothesis, the effect would have to be somewhat as follows: One assumes that a standard population gives a certain level of performance when the subject of drawing is specified as a man. One assumes further that Harris' norms are accurate and representative of the groups from which they were derived and that the data of the present study should be comparable. If there is a selective, intellectual factor in the tendency to draw an opposite-sex figure when asked to draw a *person* other than a specified sex, the male and female figures drawn by these subsamples should differ considerably in intellectual level when compared with Harris' norms. The mean point scores in table 1 have been translated to equivalent standard scores on the Harris norms in table B. There appears to be no selectivity; the tendency of the present data to fall below the Harris norms

Table B. Standard score equivalents, according to the 1963 Harris Norms, for mean point (raw) scores shown in table 1

Age	Man figure		Woman figure	
	Boys	Girls	Boys	Girls
6 years------	102	98	103	100
7 years------	94	95	97	96
8 years------	96	93	95	96
9 years------	94	92	91	94
10 years-----	93	90	90	93
11 years-----	91	87	89	88

appears in all groups. The hypothesis that the self-selection of sex of the person drawn may relate in unknown ways to intellectual maturity seems scarcely tenable. Yet the fact of self-selectivity of sex of subjects remains and serves to render results which are not comparable, in a strict sense, with those gathered under standard conditions; i.e., when specific subject matter of the drawing is specified. Clearly the distributions of scores in the present study are from subsamples as delineated by the sex of the drawing and the child, determined on unknown psychosocial bases, of samples that are known to be representative by age, sex, race, region, size of place of residence, and rate of population change from 1950 to 1960, the latter factor being indicative of the economic stability of the area of residence.

A final possibility exists which relates to the representativeness of samples used by Harris to establish national norms. He followed two procedures frequently used—a quota sampling based on a characteristic (parental occupation) known to relate significantly to intelligence of offspring and a geographic representation which, though far from optimal, was nevertheless greater than that obtained in tests until recent years. It is possible that subtle selective factors favoring the admission to school or the retention in school of generally brighter children to his samples would somewhat elevate his norms. There is the observation from the present study that the discrepancy between the two sets of data becomes progressively larger at the older ages. This may reflect the fact that duller children tend to be transferred to special educational facilities when it is apparent that they cannot benefit from the regular classwork. There is also a possibility that during recent years in this Nation, which presumably has universal elementary schooling, an increasing number of the duller children are being sent to school than was formally true. Whatever the reason, the nationally representative noninstitutional sample apparently does include proportionately more dull children in the age groups than age groups selected systematically from the school populations of various parts of the country to represent children generally. If so, this factor could possibly account in part for differences in the data and draw attention to the need for more rigorous standardization of many psychological and educational tests.

It is probable that the observed differences between the two sets of data stem from multiple factors, including some if not all of the contingencies mentioned above. Perhaps of greater significance, however, is the basic observation that the general findings of Harris [8] are borne out by the substantial age increment in performance on the drawing task shown in the raw score distributions of drawing test scores from the present study. While there are some differences in performance which may possibly be due to setting a more general task for a child (to draw a person rather than to draw a man or draw a woman), when raw scores are translated into percentile rank scores, the differences between the two testing situations are not very great on the average in comparison with the spread of scores within any one age.

SUMMARY

As a part of the second program (or cycle) of the Health Examination Survey in 1963-65, a number of psychological tests were administered to a probability sample which was closely representative of the Nation's noninstitutionalized children 6 through 11 years of age. One of these tests, which was included to obtain information on intellectual maturity, was the draw-a-person test. This test was scored by the Goodenough-Harris drawing standard, utilizing the scales appropriate to the sex of the figure drawn by the boys and girls who were subjects of the present study. The data from this study presented in detail show that the performance of children 6-11 years of age in the United States is somewhat below that reported as the 1963 national norms by Harris but follows a consistent pattern of substantial increase in raw score from age to age. The possibility that self-selection of the subject to be drawn relates to intellectual maturity was examined and tentatively rejected. Nevertheless the fact remains from the present data that when the drawing of a person is used to assess intelligence by the Goodenough-Harris scoring method, there must be a slight adjustment in the Harris norms to give accurate estimates of intellectual maturity. The present data affords a basis for such renorming and the pertinent data are supplied in the present report for children 6-11 years.

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Table 1. Unsmoothed means and standard deviations (SD's) of point (raw) scores for children aged 6 through 11 years on the Goodenough-Harris Drawing Test, Man and Woman Scales, by age and sex: United States, 1963-65

Scale and age	All boys and girls		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD
	Raw score					
Man Scale						
Total, 6-11 years	24.9	7.16	24.9	7.10	24.8	7.40
6 years	16.3	5.84	16.3	5.50	17.0	6.94
7 years	20.7	6.76	20.6	6.57	20.6	7.56
8 years	23.9	7.15	23.8	6.82	23.6	8.86
9 years	26.6	7.27	26.5	7.16	27.2	7.84
10 years	29.9	8.49	29.7	8.35	30.4	9.16
11 years	32.5	9.18	32.4	8.92	33.0	10.27
Woman Scale						
Total, 6-11 years	29.2	7.58	25.3	7.07	29.9	7.68
6 years	20.2	6.22	17.6	4.77	20.7	6.47
7 years	24.5	6.81	21.2	6.43	25.2	6.89
8 years	28.1	7.33	25.5	6.50	28.7	7.52
9 years	30.5	7.69	26.4	7.64	31.4	7.70
10 years	33.8	8.30	29.3	8.49	34.6	8.26
11 years	36.2	8.74	29.9	7.90	37.4	8.91

Table 2. Smoothed[1] means and standard deviations (SD's) of point (raw) scores for children aged 6 through 11 years on the Goodenough-Harris Drawing Test, Man and Woman Scales, by age and sex: United States, 1963-65

Scale and age	All boys and girls		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD
	Raw score					
Man Scale						
Total, 6-11 years	24.9	7.16	24.9	7.10	24.8	7.40
6 years	18.5	6.30	18.5	6.04	22.0	7.25
7 years	20.3	6.58	20.2	6.30	23.9	7.78
8 years	23.7	7.06	23.6	6.85	27.6	8.09
9 years	26.8	7.64	26.7	7.44	30.8	8.62
10 years	29.6	8.31	29.5	8.14	33.7	9.09
11 years	31.2	8.83	31.1	8.64	35.2	9.71
Woman Scale						
Total, 6-11 years	29.2	7.58	25.3	7.07	29.9	7.68
6 years	22.4	6.51	19.4	5.60	22.9	6.68
7 years	24.3	6.78	21.4	5.90	24.8	6.96
8 years	27.7	7.28	24.4	6.86	28.4	7.37
9 years	30.8	7.77	27.1	7.54	31.6	7.83
10 years	33.5	8.24	28.5	8.01	34.5	8.29
11 years	35.0	8.52	29.6	8.19	36.0	8.58

[1]Means and standard deviations smoothed by 3-year moving average. The end points at 6 and 11 have been estimated on the basis of 2-year data.

Table 3. Unsmoothed means and standard deviations (SD's) of point (raw) scores for children aged 6 through 11 years in the Harris standardization groups for the 1963 revision of the Goodenough-Harris Drawing Test, Man and Woman Scales, by age and sex

Scale and age	All boys and girls		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD
	Raw score					
Man Scale						
6 years	19.3	5.86	19.7	5.68	19.0	5.96
7 years	23.0	6.98	21.6	6.78	24.3	6.95
8 years	26.8	7.91	26.3	7.99	27.2	7.82
9 years	30.6	8.76	30.0	8.53	31.2	8.95
10 years	36.5	9.81	36.0	10.32	37.1	9.27
11 years	39.1	10.38	37.6	10.67	40.6	9.84
Woman Scale						
6 years	20.2	6.63	18.8	6.34	21.4	6.66
7 years	25.8	8.89	22.9	7.93	28.7	8.84
8 years	29.4	7.81	28.0	7.23	30.8	8.14
9 years	33.2	9.01	32.0	8.64	34.4	9.22
10 years	38.5	9.36	36.4	9.25	40.6	9.03
11 years	40.3	10.44	36.6	9.57	44.0	9.93

Table 4. Smoothed[1] means and standard deviations (SD's) of point (raw) scores for children aged 6 through 11 years in the Harris standardization groups for the 1963 revision of the Goodenough-Harris Drawing Test, Man and Woman Scales, by age and sex

Scale and age	All boys and girls		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD
	Raw score					
Man Scale						
6 years	19.2	5.95	18.4	5.71	20.0	5.94
7 years	23.0	6.92	22.5	6.82	23.5	6.91
8 years	26.8	7.88	25.9	7.77	27.6	7.91
9 years	31.3	8.83	30.7	8.95	31.8	8.68
10 years	35.4	9.65	34.5	9.84	36.3	9.35
11 years	38.9	10.42	37.6	10.85	40.2	9.78
Woman Scale						
6 years	20.8	7.07	18.8	6.41	22.8	7.08
7 years	25.2	7.78	23.3	7.17	27.0	7.88
8 years	29.5	8.57	27.6	7.93	31.3	8.73
9 years	33.7	8.71	32.1	8.37	35.3	8.80
10 years	37.3	9.60	35.0	9.15	39.7	9.39
11 years	40.3	9.96	37.3	9.53	43.3	9.41

[1]Means and standard deviations smoothed by 3-year moving average.

Table 5. Coefficient of variation (standard deviation/mean—unsmoothed and smoothed) for point (raw) scores on the Goodenough-Harris Drawing Test, by type of drawing, age, and sex: United States, 1963-65, and the 1963 Harris standardization data

Age	Man figure by:					
	All boys and girls		Boys		Girls	
	United States, 1963-65	Harris, 1963	United States, 1963-65	Harris, 1963	United States, 1963-65	Harris, 1963
	Coefficients ($SD/\bar{x}$)					
	Unsmoothed					
6 years	0.356	0.303	0.337	0.283	0.408	0.313
7 years	0.329	0.303	0.320	0.313	0.367	0.286
8 years	0.301	0.295	0.290	0.303	0.375	0.287
9 years	0.271	0.286	0.272	0.284	0.288	0.286
10 years	0.284	0.268	0.279	0.286	0.301	0.249
11 years	0.283	0.265	0.275	0.283	0.311	0.242
	Smoothed [1]					
6 years	0.341	0.309	0.324	0.310	0.310	0.297
7 years	0.325	0.300	0.312	0.303	0.297	0.294
8 years	0.300	0.294	0.288	0.300	0.272	0.286
9 years	0.284	0.282	0.277	0.291	0.259	0.272
10 years	0.280	0.292	0.274	0.285	0.250	0.257
11 years	0.282	0.267	0.277	0.288	0.250	0.243
Age	Woman figure by:					
	All boys and girls		Boys		Girls	
	United States, 1963-65	Harris, 1963	United States, 1963-65	Harris, 1963	United States, 1963-65	Harris, 1963
	Coefficients ($SD/\bar{x}$)					
	Unsmoothed					
6 years	0.308	0.328	0.271	0.337	0.313	0.311
7 years	0.278	0.344	0.304	0.346	0.273	0.308
8 years	0.261	0.265	0.255	0.258	0.262	0.264
9 years	0.252	0.271	0.289	0.270	0.245	0.268
10 years	0.246	0.243	0.290	0.254	0.238	0.222
11 years	0.242	0.259	0.264	0.261	0.238	0.225
	Smoothed [1]					
6 years	0.291	0.339	0.289	0.340	0.291	0.310
7 years	0.280	0.308	0.275	0.307	0.280	0.291
8 years	0.263	0.290	0.281	0.287	0.259	0.278
9 years	0.252	0.258	0.278	0.260	0.248	0.247
10 years	0.246	0.257	0.280	0.261	0.240	0.236
11 years	0.244	0.247	0.277	0.255	0.238	0.217

[1] Means and standard deviations smoothed by 3-year moving average.

Table 6. Table for converting point (raw) scores to standard score equivalents—man figure by boys—by age: United States, 1963-65

Raw score	Age in years					
	6	7	8	9	10	11
	Standard score					
00	54	52	48	46	46	46
01	57	54	50	48	47	48
02	59	57	53	50	49	50
03	62	59	55	52	51	51
04	64	61	57	54	53	53
05	67	64	59	56	55	55
06	69	66	61	58	57	56
07	72	68	64	60	58	58
08	74	71	66	62	60	60
09	76	73	68	64	62	62
10	79	76	70	66	64	63
11	81	78	72	68	66	65
12	84	80	75	70	68	67
13	86	83	77	72	70	69
14	89	85	79	74	71	70
15	91	88	81	76	73	72
16	94	90	83	78	75	74
17	96	92	85	81	77	76
18	99	95	88	83	79	77
19	101	97	90	85	81	79
20	104	99	92	87	82	81
21	106	102	94	89	84	83
22	109	104	96	91	86	84
23	111	107	99	93	88	86
24	113	109	101	95	90	88
25	116	111	103	97	92	89
26	119	114	105	99	93	91
27	121	116	107	101	95	93
28	124	118	110	103	97	95
29	126	121	112	105	99	96
30	129	123	114	107	101	98
31	131	126	116	109	103	100
32	134	128	118	111	105	102
33	136	130	120	113	106	103
34	139	133	123	115	108	105
35	141	135	125	117	110	107
36	144	138	127	119	112	109
37	146	140	129	121	114	110
38	149	142	131	123	116	112
39	151	145	134	125	117	114
40	154	147	136	127	119	116
41	156	149	138	129	121	117
42	158	152	140	131	123	119
43	161	154	142	133	125	121
44	163	157	145	135	127	122
45	166	159	147	137	128	124
46	168	161	149	139	130	126
47	171	164	151	141	132	128
48	173	166	153	143	134	129
49	176	168	156	145	136	131
50	178	171	158	147	138	133
51	*	173	160	149	140	135
52	*	176	162	151	141	136
53	*	178	164	153	143	138
54	*	180	166	155	145	140
55	*	183	169	157	147	142
56	*	*	171	159	149	143
57	*	*	173	161	151	145
58	*	*	175	163	152	147
59	*	*	177	165	154	149
60	*	*	180	167	156	150
61	*	*	*	169	158	152
62	*	*	*	171	160	154
63	*	*	*	173	162	155
64	*	*	*	175	163	157
65	*	*	*	177	165	159
66	*	*	*	*	167	161
67	*	*	*	*	169	162
68	*	*	*	*	171	164
69	*	*	*	*	173	166
70	*	*	*	*	175	168
71	*	*	*	*	*	169
72	*	*	*	*	*	171
73	*	*	*	*	*	173

Table 7. Table for converting point (raw) scores to standard score equivalents—man figure by girls—by age: United States, 1963-65

Raw score	Age in years					
	6	7	8	9	10	11
	Standard score					
00	61	61	56	53	50	51
01	63	63	58	55	52	53
02	65	65	60	56	53	54
03	67	66	61	58	55	56
04	69	68	63	60	57	57
05	72	70	65	62	58	59
06	74	72	67	63	60	60
07	76	74	69	65	62	62
08	78	76	71	67	63	64
09	80	78	73	69	65	65
10	82	80	74	70	67	66
11	84	82	76	72	68	68
12	86	84	78	74	70	70
13	88	86	80	75	72	71
14	90	88	82	77	73	73
15	92	90	84	79	75	74
16	94	92	86	81	77	76
17	96	93	87	82	78	77
18	98	95	89	84	80	79
19	100	97	91	86	81	80
20	103	99	93	88	83	82
21	105	101	95	89	85	83
22	107	103	97	91	86	85
23	109	105	99	93	88	87
24	111	107	100	95	90	88
25	113	109	102	96	91	90
26	115	111	104	98	93	91
27	117	113	106	100	94	93
28	119	115	108	102	96	94
29	121	117	110	103	98	96
30	123	119	111	105	100	97
31	125	120	113	107	101	99
32	127	122	115	109	103	100
33	129	124	117	110	105	102
34	132	126	119	112	106	104
35	134	128	121	114	108	105
36	136	130	123	116	110	107
37	138	132	124	117	111	108
38	140	134	126	119	113	110
39	142	136	128	121	115	111
40	144	138	130	122	116	113
41	146	140	132	124	118	114
42	148	142	134	126	119	116
43	150	144	136	128	121	117
44	152	145	137	129	123	119
45	154	147	139	131	124	121
46	156	149	141	133	126	122
47	158	151	143	135	128	124
48	160	153	145	136	129	125
49	163	155	147	138	131	127
50	165	157	149	140	133	128
51	*	159	150	142	134	130
52	*	161	152	143	136	131
53	*	163	154	145	138	133
54	*	165	156	147	139	134
55	*	167	158	149	141	136
56	*	*	160	150	143	138
57	*	*	162	152	144	139
58	*	*	163	154	146	141
59	*	*	165	156	148	142
60	*	*	167	157	149	144
61	*	*	*	159	151	145
62	*	*	*	161	152	147
63	*	*	*	163	154	148
64	*	*	*	164	156	150
65	*	*	*	166	157	151
66	*	*	*	*	159	153
67	*	*	*	*	161	154
68	*	*	*	*	162	156
69	*	*	*	*	164	158
70	*	*	*	*	166	159
71	*	*	*	*	*	161
72	*	*	*	*	*	162
73	*	*	*	*	*	164

Table 8. Table for converting point (raw) scores to standard score equivalents—woman figure by boys—by age: United States, 1963-65

Raw score	Age in years					
	6	7	8	9	10	11
	Standard score					
00	48	46	47	46	47	46
01	51	48	49	48	48	48
02	53	51	51	50	50	50
03	56	53	53	52	52	51
04	59	56	55	54	54	53
05	62	58	58	56	56	55
06	64	61	60	58	58	57
07	67	63	62	60	60	59
08	70	66	64	62	62	61
09	72	68	66	64	63	62
10	75	71	69	66	65	64
11	78	73	71	68	67	66
12	80	76	73	70	69	68
13	83	79	75	72	71	70
14	86	81	77	74	73	71
15	88	84	79	76	75	73
16	91	86	82	78	77	75
17	94	89	84	80	78	77
18	96	91	86	82	80	79
19	99	94	88	84	82	81
20	102	96	90	86	84	82
21	104	99	93	88	86	84
22	107	101	95	90	88	86
23	110	104	97	92	90	88
24	112	107	99	94	92	90
25	115	109	101	96	93	92
26	118	112	104	98	95	93
27	120	114	106	100	97	95
28	123	117	108	102	99	97
29	126	119	110	104	101	99
30	128	122	112	106	103	101
31	131	124	114	108	105	103
32	134	127	117	110	106	104
33	136	129	119	112	108	106
34	139	132	121	114	110	108
35	142	135	123	116	112	110
36	145	137	125	118	114	112
37	147	140	128	120	116	114
38	150	142	130	122	118	115
39	153	145	132	124	120	117
40	155	147	134	126	121	119
41	158	150	136	128	123	121
42	161	152	139	130	125	123
43	163	155	141	132	127	125
44	166	157	143	134	129	126
45	169	160	145	136	131	128
46	171	162	147	138	133	130
47	174	165	149	140	135	132
48	177	168	152	142	136	134
49	179	170	154	144	138	136
50	182	173	156	146	140	137
51	*	175	158	148	142	139
52	*	178	160	150	144	141
53	*	180	163	152	146	143
54	*	183	165	154	148	145
55	*	185	167	156	150	147
56	*	*	169	158	151	148
57	*	*	171	160	153	150
58	*	*	174	162	155	152
59	*	*	176	164	157	154
60	*	*	178	165	159	156
61	*	*	*	167	161	157
62	*	*	*	169	163	159
63	*	*	*	171	165	161
64	*	*	*	173	166	163
65	*	*	*	175	168	165
66	*	*	*	*	170	167
67	*	*	*	*	172	168
68	*	*	*	*	174	170
69	*	*	*	*	176	172
70	*	*	*	*	178	174
71	*	*	*	*	*	176
72	*	*	*	*	*	178
73	*	*	*	*	*	179

Table 9. Table for converting point (raw) scores to standard score equivalents—woman figure by girls—by age: United States, 1963-65

Raw score	Age in years					
	6	7	8	9	10	11
	Standard score					
00	49	46	42	40	38	37
01	51	49	44	41	39	39
02	53	51	46	43	41	41
03	55	53	48	45	43	42
04	57	55	50	47	45	44
05	60	57	52	49	47	46
06	62	59	54	51	48	48
07	[illegible]	62	56	53	50	49
08	[illegible]	64	58	55	52	51
09	[illegible]	66	60	57	54	53
10	[illegible]	68	63	59	56	55
11	73	70	65	61	58	56
12	75	72	67	63	59	58
13	78	74	69	64	61	60
14	80	77	71	66	63	62
15	82	79	73	68	65	63
16	84	81	75	70	67	65
17	87	83	77	72	68	67
18	89	85	79	74	70	69
19	91	87	81	76	72	70
20	93	90	83	78	74	72
21	96	92	85	80	76	74
22	98	94	87	82	77	76
23	100	96	89	84	79	77
24	102	98	91	85	81	79
25	105	100	93	87	83	81
26	107	102	95	89	85	82
27	109	105	97	91	86	84
28	111	107	99	93	88	86
29	114	109	101	95	90	88
30	116	111	103	97	92	89
31	118	113	105	99	94	91
32	120	115	107	101	95	93
33	123	118	109	103	97	95
34	125	120	111	105	99	96
35	127	122	113	107	101	98
36	129	124	115	108	103	100
37	132	126	117	110	105	102
38	134	128	119	112	106	103
39	136	130	122	114	108	105
40	138	133	124	116	110	107
41	141	135	126	118	112	109
42	143	137	128	120	114	110
43	145	139	130	122	115	112
44	147	141	132	124	117	114
45	150	143	134	126	119	116
46	152	146	136	128	121	117
47	154	148	138	130	123	119
48	156	150	140	131	124	121
49	159	152	142	133	126	123
50	161	154	144	135	128	124
51	*	156	146	137	130	126
52	*	158	148	139	132	128
53	*	161	150	141	133	130
54	*	163	152	143	135	131
55	*	165	154	145	137	133
56	*	*	156	147	139	135
57	*	*	158	149	141	137
58	*	*	160	151	143	138
59	*	*	162	153	144	140
60	*	*	164	154	146	142
61	*	*	*	156	148	144
62	*	*	*	158	150	145
63	*	*	*	160	152	147
64	*	*	*	162	153	149
65	*	*	*	164	155	151
66	*	*	*	*	157	152
67	*	*	*	*	159	154
68	*	*	*	*	161	156
69	*	*	*	*	162	158
70	*	*	*	*	164	159
71	*	*	*	*	*	161
72	*	*	*	*	*	163
73	*	*	*	*	*	165

Table 10. Table for converting point (raw) scores to standard score equivalents—man figure by boys or girls—by age: United States, 1963-65

Raw score	Age in years					
	6	7	8	9	10	11
	Standard score					
00	56	54	50	47	46	47
01	58	56	52	49	48	49
02	61	58	54	51	50	50
03	63	61	56	53	52	52
04	65	63	58	55	54	54
05	68	65	60	57	56	56
06	70	67	62	59	57	57
07	73	70	64	61	59	59
08	75	72	67	63	61	61
09	77	74	69	65	63	62
10	80	77	71	67	65	64
11	82	79	73	69	66	66
12	84	81	75	71	68	67
13	87	83	77	73	70	69
14	89	86	79	75	72	71
15	92	88	81	77	74	73
16	94	90	84	79	75	74
17	96	92	86	81	77	76
18	99	95	88	83	79	78
19	101	97	90	85	81	79
20	103	99	92	87	83	81
21	106	102	94	89	84	83
22	108	104	96	91	86	84
23	111	106	98	93	88	86
24	113	108	101	95	90	88
25	115	111	103	97	92	90
26	118	113	105	98	93	91
27	120	115	107	100	95	93
28	123	118	109	102	97	95
29	125	120	111	104	99	96
30	127	122	113	106	101	98
31	130	124	115	108	102	100
32	132	127	118	110	104	101
33	134	129	120	112	106	103
34	137	131	122	114	108	105
35	139	133	124	116	110	106
36	142	136	126	118	111	108
37	144	138	128	120	113	110
38	146	140	130	122	115	112
39	149	143	132	124	117	113
40	151	145	135	126	119	115
41	153	147	137	128	120	117
42	156	149	139	130	122	118
43	158	152	141	132	124	120
44	161	154	143	134	126	122
45	163	156	145	136	128	123
46	165	159	147	138	129	125
47	168	161	149	140	131	127
48	170	163	152	142	133	129
49	173	165	154	144	135	130
50	175	168	156	146	137	132
51	*	170	158	148	139	134
52	*	172	160	150	140	135
53	*	174	162	152	142	137
54	*	177	164	153	144	139
55	*	179	166	155	146	140
56	*	*	169	157	148	142
57	*	*	171	159	149	144
58	*	*	173	161	151	146
59	*	*	175	163	153	147
60	*	*	177	165	155	149
61	*	*	*	167	157	151
62	*	*	*	169	158	152
63	*	*	*	171	160	154
64	*	*	*	173	162	156
65	*	*	*	175	164	157
66	*	*	*	*	166	159
67	*	*	*	*	167	161
68	*	*	*	*	169	163
69	*	*	*	*	171	164
70	*	*	*	*	173	166
71	*	*	*	*	*	168
72	*	*	*	*	*	169
73	*	*	*	*	*	171

Table 11. Table for converting point (raw) scores to standard score equivalents—woman figure by boys or girls—by age: United States, 1963-65

Raw score	Age in years					
	6	7	8	9	10	11
	Standard score					
00	49	46	43	41	39	38
01	51	49	45	43	41	40
02	53	51	47	44	43	42
03	55	53	49	46	45	44
04	58	55	51	48	46	45
05	60	57	53	50	48	47
06	62	60	55	52	50	49
07	65	62	57	54	52	51
08	67	64	59	56	54	53
09	69	66	61	58	55	54
10	72	68	64	60	57	56
11	74	71	66	62	59	58
12	76	73	68	64	61	60
13	78	75	70	66	63	61
14	81	77	72	68	65	63
15	83	80	74	70	66	65
16	85	82	76	71	68	67
17	88	84	78	73	70	68
18	90	86	80	75	72	70
19	92	88	82	77	74	72
20	95	91	84	79	75	74
21	97	93	86	81	77	75
22	99	95	88	83	79	77
23	101	97	90	85	81	79
24	104	99	92	87	83	81
25	106	102	94	89	85	82
26	108	104	96	91	86	84
27	111	106	99	93	88	86
28	113	108	101	95	90	88
29	115	110	103	97	92	89
30	118	113	105	98	94	91
31	120	115	107	100	95	93
32	122	117	109	102	97	95
33	124	119	111	104	99	97
34	127	122	113	106	101	98
35	129	124	115	108	103	100
36	131	126	117	110	105	102
37	134	128	119	112	106	104
38	136	130	121	114	108	105
39	138	133	123	116	110	107
40	141	135	125	118	112	109
41	143	137	127	120	114	111
42	145	139	129	122	115	112
43	148	141	132	124	117	114
44	150	144	134	125	119	116
45	152	146	136	127	121	118
46	154	148	138	129	123	119
47	157	150	140	131	125	121
48	159	152	142	133	126	123
49	161	155	144	135	128	125
50	164	157	146	137	130	126
51	*	159	148	139	132	128
52	*	161	150	141	134	130
53	*	163	152	143	135	132
54	*	166	154	145	137	133
55	*	168	156	147	139	135
56	*	*	158	149	141	137
57	*	*	160	151	143	139
58	*	*	162	152	145	140
59	*	*	165	154	146	142
60	*	*	167	156	148	144
61	*	*	*	158	150	146
62	*	*	*	160	152	148
63	*	*	*	162	154	149
64	*	*	*	164	155	151
65	*	*	*	166	157	153
66	*	*	*	*	159	155
67	*	*	*	*	161	156
68	*	*	*	*	163	158
69	*	*	*	*	165	160
70	*	*	*	*	166	162
71	*	*	*	*	*	163
72	*	*	*	*	*	165
73	*	*	*	*	*	167

Table 12. Means and standard deviations (SD) of standard scores[1] for children aged 6 through 11 years on the Goodenough-Harris Drawing Test, Man and Woman Scales, by age and sex: United States, 1963-65

Scale and age	All boys and girls		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD
	Standard score					
Man Scale						
Total, 6-11 years	100.1	14.59	100.1	14.71	100.0	13.99
6 years	99.9	14.97	99.9	15.21	99.7	14.09
7 years	100.1	14.78	100.1	15.18	99.7	13.01
8 years	100.4	14.29	100.5	14.37	99.8	13.88
9 years	99.7	14.28	99.6	14.43	99.7	13.56
10 years	100.2	14.04	100.1	14.43	100.4	14.22
11 years	100.2	14.62	100.1	14.53	100.6	15.10
Woman Scale						
Total, 6-11 years	100.0	14.59	99.8	14.77	100.1	14.56
6 years	99.8	14.68	99.0	13.70	99.9	14.85
7 years	100.2	14.77	99.9	15.24	100.2	14.68
8 years	100.3	14.21	100.1	14.07	100.3	14.24
9 years	100.1	15.00	99.7	15.44	100.1	14.91
10 years	100.0	14.50	99.9	14.75	100.0	14.46
11 years	100.1	14.08	100.0	13.29	100.0	14.23

[1]Standardized for all races combined.

Table 13. Percentile rank equivalents of point (raw) scores for children aged 6 through 11 years on the Goodenough-Harris Drawing Test, by type of drawing and age: United States, 1963-65

Percentile[1]	Man figure						
	Total, 6-11 years	Age in years					
		6	7	8	9	10	11
	Point (raw) score						
99	51	32	38	40	45	52	55
98	46	29	36	39	44	50	54
97	44	28	35	38	42	49	52
96	42	27	34	37	41	46	51
95	42	26	33	36	40	45	50
90	37	24	29	34	37	41	43
85	35	23	27	32	35	39	42
80	33	22	26	30	33	37	40
75	31	21	25	29	32	36	39
70	30	20	24	28	31	35	38
65	28	19	23	27	30	34	36
60	27	18	22	26	29	32	35
55	26	18	22	25	28	31	34
50	24	17	21	24	27	30	33
45	23	16	20	23	26	30	32
40	22	16	19	22	25	28	31
35	21	15	19	22	24	27	29
30	20	14	18	21	23	26	28
25	19	13	17	20	22	25	27
20	18	12	16	19	21	24	26
15	16	12	15	18	20	22	24
10	15	10	14	16	19	20	22
5	12	9	12	14	17	18	20
4	11	8	11	13	16	18	19
3	10	8	10	12	16	17	18
2	9	7	9	9	14	16	16
1	8	5	7	8	13	14	15

Percentile[1]	Woman figure						
	Total, 6-11 years	Age in years					
		6	7	8	9	10	11
	Point (raw) score						
99	53	37	43	47	50	54	58
98	50	35	42	46	48	51	56
97	48	34	40	44	47	50	55
96	47	32	38	43	46	49	53
95	46	32	37	42	45	48	52
90	42	29	34	39	41	45	49
85	40	27	32	36	39	43	46
80	38	26	31	35	38	41	45
75	36	25	30	34	37	40	43
70	34	24	28	32	35	39	42
65	33	23	27	31	34	38	40
60	32	22	26	30	33	37	39
55	30	21	26	29	32	36	38
50	29	21	25	28	31	35	37
45	28	20	24	27	30	34	36
40	27	19	23	26	29	32	34
35	25	18	22	26	28	31	33
30	24	18	22	24	27	30	32
25	23	17	21	23	26	29	31
20	22	16	20	22	24	27	29
15	20	15	19	21	23	26	28
10	18	14	17	20	22	23	25
5	16	12	15	18	19	21	22
4	15	11	14	18	18	20	21
3	14	10	14	17	16	18	20
2	13	8	13	16	15	17	19
1	11	1	9	15	13	15	17

[1]Score below which the indicated percent of children at each given age fall.

Table 14. Percentile rank equivalents of point (raw) scores for children aged 6 through 11 years on the Man Scale of the Goodenough-Harris Drawing Test, by age and sex: United States, 1963-65

Percentile[1]	Man figure by boys						
	Total, 6-11 years	Age in years					
		6	7	8	9	10	11
	Point (raw) score						
99	50	30	38	40	46	53	56
98	46	28	36	38	44	51	53
97	44	27	35	38	42	48	52
96	42	27	34	37	40	46	51
95	41	26	33	37	40	44	49
90	37	24	29	34	36	40	44
85	35	23	28	32	35	39	42
80	33	21	26	30	33	37	40
75	31	20	25	29	32	36	39
70	30	20	24	28	31	35	37
65	28	19	23	27	30	34	36
60	27	18	22	26	29	32	35
55	26	18	22	25	28	31	34
50	25	17	21	24	27	30	33
45	23	16	20	23	25	29	32
40	22	15	20	22	25	28	31
35	21	15	19	22	24	27	29
30	20	14	18	21	23	26	28
25	19	13	17	20	22	25	27
20	18	12	16	19	21	23	26
15	16	12	15	18	20	22	25
10	15	10	14	17	19	20	23
5	12	9	12	14	17	18	20
4	11	8	11	13	16	18	19
3	10	8	10	12	15	17	17
2	9	6	9	10	14	17	16
1	8	2	6	8	12	14	15

Percentile[1]	Man figure by girls						
	Total, 6-11 years	Age in years					
		6	7	8	9	10	11
	Point (raw) score						
99	51	39	37	42	44	50	53
98	48	38	36	40	43	49	52
97	45	29	35	39	42	49	52
96	44	28	33	38	41	49	51
95	42	27	31	36	39	48	51
90	38	25	30	34	38	41	46
85	36	23	28	32	36	39	44
80	33	22	26	31	34	37	42
75	31	21	24	30	33	36	40
70	30	21	24	29	31	35	38
65	28	20	23	27	30	34	37
60	26	18	22	26	29	33	36
55	25	18	22	25	28	32	35
50	24	17	21	24	27	30	34
45	23	16	20	23	26	29	33
40	22	16	19	22	26	28	31
35	21	15	18	22	25	28	30
30	20	15	18	21	24	26	28
25	18	14	17	20	23	26	26
20	17	13	16	19	22	24	25
15	16	12	15	17	21	23	23
10	14	11	14	15	19	21	22
5	11	9	11	12	18	18	19
4	11	8	10	10	18	17	19
3	10	8	10	10	18	16	18
2	9	7	9	8	17	16	18
1	8	7	8	4	14	15	6

[1]Score below which the indicated percent of children at each given age fall.

Table 15. Percentile rank equivalents of point (raw) scores for children aged 6 through 11 years on the Woman Scale of the Goodenough-Harris Drawing Test, by age and sex: United States, 1963-65

Percentile[1]	Woman figure by boys						
	Total, 6-11 years	Age in years					
		6	7	8	9	10	11
	Point (raw) score						
99	46	31	38	43	48	48	53
98	44	30	37	42	45	48	46
97	43	27	36	42	44	45	46
96	42	27	35	39	43	44	45
95	41	26	35	38	42	44	44
90	37	24	30	35	37	41	40
85	35	23	28	32	35	40	39
80	33	22	26	31	34	37	37
75	31	22	25	30	33	37	36
70	30	20	24	29	31	35	34
65	28	20	23	29	30	33	33
60	27	19	22	28	28	32	32
55	26	19	22	27	27	31	32
50	24	18	21	25	25	30	31
45	24	18	21	25	24	28	30
40	23	17	21	24	23	27	29
35	22	16	20	23	23	26	28
30	21	15	19	22	22	25	27
25	20	14	17	21	22	24	25
20	19	14	16	20	21	23	24
15	18	13	15	20	21	22	21
10	16	13	14	19	19	20	20
5	14	12	13	18	16	16	17
4	13	11	12	17	15	15	17
3	13	11	12	17	15	14	16
2	12	10	10	15	14	12	14
1	11	10	8	14	14	12	13

Percentile[1]	Woman figure by girls						
	Total, 6-11 years	Age in years					
		6	7	8	9	10	11
	Point (raw) score						
99	54	37	43	48	50	58	58
98	51	35	42	46	49	51	56
97	49	34	41	45	47	50	55
96	48	33	39	44	46	49	54
95	47	32	38	43	46	49	53
90	43	29	35	40	42	46	50
85	40	28	33	37	40	44	47
80	38	27	31	36	38	42	46
75	37	26	30	34	37	40	44
70	35	24	29	33	36	39	43
65	34	24	28	32	35	38	42
60	32	23	27	31	34	38	40
55	31	22	26	30	33	37	39
50	30	21	26	29	32	36	38
45	29	21	25	28	31	34	36
40	27	20	24	27	30	33	36
35	26	19	23	26	29	32	34
30	25	18	22	25	28	31	33
25	24	17	21	24	27	30	32
20	22	16	20	23	26	29	31
15	21	15	19	22	24	27	29
10	19	14	18	20	23	25	27
5	16	12	16	19	20	22	24
4	16	11	15	18	19	21	23
3	15	10	15	18	18	20	22
2	13	7	14	16	16	18	21
1	11	1	11	15	13	16	20

[1]Score below which the indicated percent of children at each given age fall.

Table 16. Normalized and actual standard scores for children aged 6 through 11 years on the Goodenough-Harris Drawing Test at selected percentile levels, by age: United States, 1963-65

Percentile[1]	Normalized standard score[2]	All drawings—boys and girls						
		Total, 6-11 years	Age in years					
			6	7	8	9	10	11
		Actual standard score						
99	135	138	139	138	137	138	140	137
98	131	133	133	135	132	133	132	133
97	128	130	129	130	130	131	128	131
96	126	128	127	129	128	128	127	128
95	125	126	125	126	127	126	125	126
90	119	119	118	119	120	119	119	120
85	116	115	115	114	115	115	115	116
80	113	112	112	111	112	112	112	113
75	110	110	109	109	109	110	110	111
70	108	107	106	105	107	108	108	108
65	106	105	104	104	105	106	106	106
60	104	103	103	102	103	103	104	104
55	102	101	101	101	101	101	102	102
50	100	99	99	99	99	100	100	100
45	98	98	97	97	97	98	98	98
40	96	96	95	96	95	96	96	96
35	94	94	93	94	93	93	94	94
30	92	92	92	92	92	91	92	92
25	90	90	89	90	89	90	90	90
20	87	88	88	88	87	88	88	88
15	84	85	85	86	84	85	85	85
10	81	82	82	83	82	82	82	81
5	75	77	77	78	78	77	77	76
4	74	76	77	76	76	76	76	75
3	72	74	74	75	73	75	74	74
2	69	72	72	72	71	73	71	72
1	65	66	59	65	64	68	67	69
X^2[3]	-	0.57	1.29	1.10	0.54	0.89	0.54	0.66

[1]Score below which the indicated percent of children at each given age fall.

[2]Mean of 100, standard deviation of 15.

[3]Approximate test for normality of distribution. Chi-square value for the 5-percent probability level is 33.9, and for the 1-percent level it is 36.8.

Table 17. Percentile rank equivalents of standard scores for children aged 6 through 11 years on the Goodenough-Harris Drawing Test, by type of drawing and age: United States, 1963-65

Percentile[1]	Man figure					
	Age in years					
	6	7	8	9	10	11
	Standard score					
99	141	140	135	138	140	139
98	133	135	133	136	136	136
97	130	133	131	132	134	133
96	128	131	129	130	129	132
95	125	128	127	126	127	130
90	120	119	122	121	120	118
85	117	114	118	117	116	116
80	114	112	113	113	112	113
75	112	110	111	111	111	111
70	109	107	109	109	109	108
65	106	105	107	107	107	106
60	104	103	104	104	104	104
55	103	102	102	102	102	102
50	101	100	100	100	100	100
45	98	98	98	98	99	99
40	97	96	96	96	96	97
35	96	95	95	94	94	94
30	93	93	93	92	93	92
25	90	91	91	90	91	90
20	89	89	89	88	88	88
15	87	86	87	86	85	85
10	82	84	81	84	83	81
5	79	79	77	79	78	78
4	77	77	75	77	77	76
3	76	75	73	76	76	74
2	74	72	67	74	74	71
1	69	68	64	71	71	69
x^{2}[2]	1.65	1.80	0.62	2.37	2.29	1.52

Percentile[1]	Woman figure					
	Age in years					
	6	7	8	9	10	11
	Standard score					
99	140	142	138	137	136	137
98	135	140	136	133	130	134
97	133	135	132	131	129	132
96	129	130	130	129	127	129
95	128	128	128	127	125	128
90	121	121	122	120	120	122
85	116	117	116	116	116	117
80	113	114	113	114	113	115
75	111	111	110	112	111	111
70	109	107	107	108	110	110
65	106	105	105	106	107	106
60	104	104	103	104	105	104
55	101	102	101	102	104	103
50	100	101	99	100	102	101
45	99	98	97	98	99	98
40	97	96	96	97	96	96
35	95	94	94	95	95	94
30	93	93	92	93	93	92
25	92	91	89	91	91	91
20	89	89	87	87	87	87
15	87	87	85	85	86	85
10	84	82	83	83	80	80
5	80	78	79	77	77	75
4	77	76	79	75	75	73
3	75	74	77	72	71	72
2	69	73	75	70	70	70
1	53	64	73	66	66	66
x^{2}[2]	4.09	2.33	3.29	0.50	0.41	0.66

[1] Score below which the indicated percent of children at each given age fall.
[2] Approximate test for normality of distribution. Chi-square value for the 5-percent probability level is 33.9, and for the 1-percent level it is 36.8.

Table 18. Percentile rank equivalents of standard scores for children aged 6 through 11 years on the Man Scale of the Goodenough-Harris Drawing Test, by age and sex: United States, 1963-65

Percentile[1]	Man figure by boys					
	Age in years					
	6	7	8	9	10	11
	Standard score					
99	138	139	137	140	142	141
98	132	135	132	136	138	136
97	129	133	131	133	133	134
96	128	131	130	127	127	133
95	127	128	129	126	126	129
90	121	119	122	120	119	120
85	118	116	118	117	117	116
80	113	112	114	113	113	113
75	111	110	112	111	111	111
70	109	108	110	109	109	108
65	107	105	107	107	108	106
60	104	104	105	105	104	104
55	103	102	103	103	102	103
50	102	101	101	100	100	101
45	99	98	98	96	99	99
40	96	97	97	95	97	97
35	95	96	96	94	95	94
30	93	94	94	92	93	92
25	91	92	92	90	91	90
20	88	89	89	88	88	89
15	87	87	87	86	86	87
10	82	85	85	84	82	83
5	80	80	78	80	79	78
4	77	78	76	78	78	76
3	76	75	74	76	77	73
2	71	73	69	73	76	71
1	59	65	64	70	71	69
X^{2}[2]	1.76	2.13	1.36	2.18	2.47	2.03

Percentile[1]	Man figure by girls					
	Age in years					
	6	7	8	9	10	11
	Standard score					
99	153	139	137	135	136	129
98	151	137	132	133	135	128
97	129	134	130	131	134	127
96	126	129	128	128	133	126
95	124	125	124	124	132	126
90	119	122	120	121	120	119
85	114	117	117	119	116	116
80	112	113	114	115	112	113
75	109	108	112	112	110	110
70	108	108	110	107	109	107
65	106	105	106	105	107	106
60	103	103	104	103	105	105
55	101	102	102	101	103	103
50	100	101	100	99	100	102
45	97	98	98	97	98	100
40	96	96	96	96	97	97
35	95	93	95	95	96	96
30	95	92	94	92	93	93
25	92	91	92	90	91	90
20	90	89	90	88	89	89
15	87	86	86	86	87	86
10	85	84	82	82	83	84
5	80	77	76	80	78	80
4	78	74	72	80	76	80
3	78	74	72	79	74	79
2	76	72	68	78	73	79
1	75	69	60	71	72	61
X^{2}[2]	9.42	1.68	0.94	3.70	2.77	3.85

[1]Score below which the indicated percent of children at each given age fall.
[2]Approximate test for normality of distribution. Chi-square value for the 5-percent probability level is 33.9, and for the 1-percent level it is 36.8.

Table 19. Percentile rank equivalents of standard scores for children aged 6 through 11 years on the Woman Scale of the Goodenough-Harris Drawing Test, by age and sex: United States, 1963-65

Percentile[1]	Woman figure by boys					
	Age in years					
	6	7	8	9	10	11
	Standard score					
99	140	139	140	141	133	158
98	137	136	138	136	132	140
97	127	134	137	133	127	139
96	126	132	131	132	126	138
95	124	131	129	130	125	135
90	118	120	122	120	120	125
85	115	115	115	116	118	123
80	112	112	113	114	113	118
75	111	109	110	112	113	115
70	107	106	108	108	110	110
65	105	104	107	106	106	108
60	103	102	106	103	104	106
55	102	101	102	101	103	104
50	101	99	99	97	101	102
45	100	99	98	95	97	100
40	97	98	96	93	96	97
35	94	97	94	92	94	95
30	91	95	92	91	92	92
25	88	90	89	90	90	87
20	87	88	87	89	89	85
15	85	85	86	89	87	77
10	84	83	84	85	83	75
5	82	81	82	79	76	67
4	79	79	81	77	74	66
3	78	78	80	77	73	65
2	76	74	76	75	70	59
1	74	69	73	74	68	57
X^{2}[2]	4.30	2.98	5.74	4.54	0.63	15.41

Percentile[1]	Woman figure by girls					
	Age in years					
	6	7	8	9	10	11
	Standard score					
99	137	138	136	136	142	137
98	133	135	132	134	129	133
97	130	133	130	130	127	131
96	128	129	128	128	125	130
95	126	127	126	127	124	128
90	119	121	120	121	120	122
85	117	116	114	117	116	117
80	113	112	112	113	113	115
75	111	110	109	111	109	112
70	108	108	107	109	108	110
65	106	106	105	107	106	108
60	105	104	103	105	105	104
55	103	102	101	103	103	103
50	100	101	99	101	101	101
45	99	100	97	99	100	97
40	98	97	95	97	97	96
35	96	95	93	95	95	94
30	93	93	91	93	93	92
25	91	91	89	91	91	90
20	89	89	87	89	90	88
15	87	87	84	85	86	85
10	84	85	82	83	82	80
5	80	80	79	78	77	75
4	77	78	77	76	75	74
3	75	77	76	74	74	72
2	68	76	73	70	70	70
1	54	69	71	64	67	68
X^{2}[2]	3.00	2.92	1.60	0.69	1.86	0.8

[1] Score below which the indicated percent of children at each given age fall.
[2] Approximate test for normality of distribution. Chi-square value for the 5-percent probability level is 33.9, and for the 1-percent level it is 36.8.

APPENDIX

STATISTICAL NOTES

Survey Design

The sample design for the second cycle of the Health Examination Survey, similar to the one used for the first cycle, was that of a multistage, stratified probability sample of loose clusters of persons in land-based segments. Successive elements dealt with in the process of sampling are primary sampling units (PSU), census enumeration district (ED), segment, household, eligible child (EC), and finally the sample child (SC).

At the first stage, the nearly 2,000 PSU's into which the United States (including Hawaii and Alaska) had been divided and then grouped into 357 strata for use in the Current Population Survey and the Health Interview Survey were further grouped into 40 superstrata for use in Cycle II of the Health Examination Survey. The average size of each Cycle II stratum was 4.5 million persons, and all fell between the limits of 3.5 and 5.5 million. Grouping into 40 strata was done in a way that maximized homogeneity of the PSU's included in each stratum, particularly with regard to degree of urbanization, geographic proximity, and degree of industrialization. The 40 strata were classified into four broad geographic regions (each with 10 strata) of approximately equal population and cross-classified into four broad population density groups (each having 10 strata). Each of the 16 cells contained either two or three strata. A single stratum might include only one PSU (or only part of a PSU as for example New York City, which represented two strata) or several score PSU's.

To take account of the possible effect that the rate of population change between the 1950 and 1960 censuses might have had on health, the 10 strata within each region were further classified into four classes, ranging from those with no increase to those with the greatest relative increase. Each such class contained either two or three strata.

One PSU was then selected from each of the 40 strata. A controlled selection technique was used in which the probability of selection of a particular PSU was proportional to its 1960 population. In the controlled selection an attempt was also made to maximize the spread of the PSU's among the States. While not every one of the 64 cells in the 4x4x4 grid contributes a PSU to the sample of 40 PSU's, the controlled selection technique ensured the sample's matching the marginal distributions in all three dimensions and being closely representative of all cross-classifications.

Generally, within a particular PSU, 20 ED's were selected with the probability of selection of a particular ED proportional to its population in the age group 5-9 years in the 1960 census, which by 1963 roughly approximated the population in the target age group for Cycle II. A similar method was used for selecting one segment (a cluster of households) in each ED. Each of the resultant 20 segments was either a bounded area or a cluster of households (or addresses). All of the children in the age range properly resident at the address visited were EC's. Operational considerations made it necessary to reduce the number of prospective examinees at any one location to a maximum of 200. The EC's to be excluded for this reason from the SC group were determined by systematic subsampling.

The total sample included 7,417 children in the 6-11 age group, with approximately 1,000 at each of the single years of age, and from 25 different States.

Reliability

Measurement processes employed in the Survey were highly standardized and closely controlled. Of course this does not mean that the correspondence between the real world and the survey results is exact. Data from the survey are imperfect for three major reasons: (1) Results are subject to sampling error, (2) the actual conduct of a survey never agrees perfectly with the design, and (3) the measurement processes themselves are inexact even though standardized and controlled.

The first report on Cycle II[4] describes in detail the faithfulness with which the sampling design was carried out. It notes that of the 7,417 sample children the 7,119 who were examined—a response rate of 96 percent—gave evidence that they were a highly representative sample of children of this age in the noninstitutional population of the United States. The response levels for the various demographic subgroups—including those for age, sex, race, region, population density, parents' educational level, and family income—show no marked

Table I. Number of examinees aged 6 through 11 years, by type of drawing, age, and sex: Health Examination Survey, 1963-65[1]

Age	All examinees	Boys			Girls		
		Total	Man figure	Woman figure	Total	Man figure	Woman figure
Total, 6-11 years	7,119	3,632	3,050	582	3,487	670	2,817
6 years	1,111	575	503	72	536	134	402
7 years	1,241	632	527	105	609	119	490
8 years	1,231	618	498	120	613	102	511
9 years	1,184	603	499	104	581	103	478
10 years	1,160	576	485	91	584	105	479
11 years	1,192	628	538	90	564	107	457

[1] Includes estimated data shown in table III.

differentials. Hence it appears unlikely that nonresponse could bias the findings much in these respects.

The number of examinees by age, sex, and type of figure drawn for part of the examination is shown in table I.

Measures used to control the quality of the data from this survey in general have been cited previously;[4] those relating specifically to the Human Figure Drawing Test are outlined in the section "Field Administration and Scoring." As indicated, these measures included two independent scorings of each drawing by two adults who were carefully trained in the methods used in this survey. The high level of agreement realized may be seen in table II, which shows by age and by type of drawing the average score obtained by each scorer and the correlation between the two sets of scores.

Data recorded for each sample child are inflated in the estimation process to characterize the larger universe of which the sample child is representative. The weights used in this inflation process are a product of the reciprocal of the probability of selecting the child, an adjustment for nonresponse cases, and a poststratified ratio adjustment which increases precision by bringing survey results into closer alignment with known U.S. population figures by color and sex for single years of age 6 through 11.

In the second cycle of the Health Examination Survey the sample was the result of three stages of selection—the single PSU from each stratum, the 20 segments from each sample PSU, and the sample children from the eligible children. The probability of selecting an individual child is the product of the probabilities of selection at each stage.

Since the strata are roughly equal in population size and a nearly equal number of sample children were examined in each of the sample PSU's, the sample design is essentially self-weighting with respect to the target population; that is, each child 6 through 11 years old had about the same probability of being drawn into the sample.

Table II. Average scores for children aged 6 through 11 years obtained by each of two independent scorers, and interscorer reliability coefficients, by age, type of drawing, and sex: Health Examination Survey, 1963-65

Age, type of drawing, and sex	Scorer 1	Scorer 2	Interscorer reliability coefficient[1]
	Average score		
Total, 6-11 years	26.8	27.2	0.976
6 years	18.2	18.2	0.965
7 years	22.4	22.6	0.969
8 years	25.8	26.2	0.961
9 years	28.6	29.0	0.964
10 years	31.6	32.2	0.964
11 years	33.9	34.7	0.966
Man figure			
Boys	24.8	25.2	0.976
Girls	24.9	25.1	0.976
Woman figure			
Boys	25.3	25.5	0.976
Girls	29.6	30.2	0.973

[1] Correlation between scores given by Scorer 1 and Scorer 2.

The adjustment upward for nonresponse is intended to minimize the impact of nonresponse on final estimates by imputing to nonrespondents the characteristics of "similar" respondents. Here "similar" respondents were judged to be examined children in a sample PSU having the same age (in years) and sex as children not examined in that sample PSU.

The poststratified ratio adjustment used in the second cycle achieved most of the gains in precision which would have been attained if the sample had been drawn from a population stratified by age, color, and sex and makes the final sample estimates of population agree exactly with independent controls prepared by the Bureau of the Census for the U.S. noninstitutional population as of August 1, 1964 (approximate midsurvey point) by color and sex for each single year of age 6 through 11. The weights of every responding sample child in each of the 24 age, color, and sex classes are adjusted upward or downward so that the weighted total within the class equals the independent population control.

In addition to children not examined at all, there were some whose examination was incomplete in one procedure or another. The extent of missing data for the Human Figure Drawing Test is shown in table III.

For each of the 51 examined children with data missing for the Human Figure Drawing Tests, a respondent of the same age-sex-race group with similar findings on other parts of the psychological test battery and related parts of the examination, insofar as these were available, was selected at random, and his results for this test were assigned to the nonexamined person. Theoretically this controlled selection technique would minimize the error introduced by the estimate.

Table III. Number of children aged 6 through 11 years with no or unusable Human Figure Drawing Tests, by age and sex: Health Examination Survey, 1963-65

Age	All examinees	Boys	Girls
Total, 6-11 years--	51	21	30
6 years----------	10	4	6
7 years----------	7	1	6
8 years----------	9	2	7
9 years----------	9	5	4
10 years----------	10	5	5
11 years----------	6	4	2

Sampling and Measurement Error

In the present report, reference has been made to efforts to minimize bias and variability of measurement techniques.

The probability design of the survey makes possible the calculation of sampling errors. The sampling error is used here to determine how imprecise the survey test results may be because they come from a sample rather than from the measurements of all elements in the universe.

The estimation of sampling errors for a study of the type of the Health Examination Survey is difficult for at least three reasons: (1) Measurement error and "pure" sampling error are confounded in the data—it is not easy to find a procedure which will either completely include both or treat one or the other separately, (2) the survey design and estimation procedure are complex and accordingly require computationally involved techniques for the calculation of variances, and (3) from the survey are coming thousands of statistics, many for subclasses of the population for which there are a small number of cases. Estimates of sampling error are obtained from the sample data and are themselves subject to sampling error which may be large when the number of cases in a cell is small or even occasionally when the number of cases is substantial.

Estimates of approximate sampling variability for selected statistics used in this report are presented in table IV. These estimates have been prepared by a replication technique which yields overall variability through observation of variability among random subsamples of the total sample. The method reflects both "pure" sampling variance and a part of the measurement variance.

In accordance with usual practice, the interval estimate for any statistics may be considered the range within one standard error of the tabulated statistic, with 68-percent confidence, or the range within two standard errors of the tabulated statistic, with 95-percent confidence. The latter is used as the level of significance in this report and referred to here as the 5-percent level.

An overestimate of the standard error of a difference $d=x-y$ of two statistics x and y is given by the formula $S_d = (S_x^2 + S_y^2)^{1/2}$, where S_x and S_y are the sampling errors, respectively, of x and y.

Small Categories

In some tables magnitudes are shown for cells for which the sample size is so small that the sampling error may be several times as great as the statistic itself. Obviously in such instances the statistic has no meaning in itself except to indicate that the true quantity

Table IV. Standard errors (SE) for means of point and standard scores for boys and girls aged 6 through 11 years on the Goodenough-Harris Drawing Test, Man and Woman Scales, by age: United States, 1963-65

Scale and age	Boys	Girls	Boys	Girls
	SE, point score means		SE, standard score means[1]	
Man Scale				
Total, 6-11 years-	0.32	0.53	0.65	0.76
6 years	0.34	0.59	0.94	1.44
7 years	0.35	0.60	0.82	1.45
8 years	0.36	1.03	0.82	2.10
9 years	0.42	0.89	0.88	1.86
10 years	0.54	0.90	0.98	1.67
11 years	0.64	1.13	1.08	1.83
Woman Scale				
Total, 6-11 years-	0.40	0.24	0.80	0.47
6 years	0.56	0.34	1.69	0.78
7 years	0.60	0.27	1.41	0.57
8 years	0.54	0.38	1.27	0.74
9 years	0.84	0.39	1.61	0.75
10 years	1.21	0.41	2.17	0.74
11 years	0.87	0.58	1.54	1.00

[1]Standardized for all races combined.

is small. Such numbers, if shown, have been included in the belief that they may help to convey an impression of the overall story of the table.

Standard Scores

The following formula was used for computing the standard scores (SS) shown in this report:

$$SS_i = \frac{1}{s_{x_i}} (15)(x - \bar{x}_i) + 100.$$

In tables 6-11 for the drawings indicated, s_{x_i} is the standard deviation of the raw scores in the i^{th} year of age, $\bar{x}_i$ is the arithmetic average, or mean raw score, in that age interval (both s_{x_i} and $\bar{x}_i$ derived from the inflated sample), and x is the raw score for which the standard score is being derived. In table 16 the standard deviations and means used are from the combined distribution of standard scores from the drawings of a man and a woman for the weighted sample.

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