

A COMPARISON OF THE BODY MEASUREMENTS OF GIRLS
FROM 6 TO 14 YEARS WITH THE MEASUREMENTS
OF DRESSES OF CORRESPONDING SIZE

by

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INTRODUCTION

Consumers have expressed dissatisfaction because of their inability to buy children's garments that fit and are comfortable. The lack of standardization of garment sizes is not improved by the multiplicity of choices afforded the consumer-buyer. Although the system of sizing in vogue for so long is based upon the chronological age of the child, a mother is advised by retailers to buy garments larger by 2 or 3 sizes than the age of her child would indicate. Retailers acknowledge the existing inadequacies of their system of garment sizing. However, the fear of disclosing trade secrets, combined with the lack of money to carry on an extensive measurement study of their own, has hindered progress in systematizing the measurement methods now in use.

Garment sizes vary with manufacturers and style trends, according to Coles (1932), and for that reason are not generally uniform. By the elimination of this existing chaos in the garment industry, one of the greatest problems confronting the retailer would be partially solved. Bush (1934), in a study of returned goods, made

by the United States Department of Commerce, found that dresses, misses' wear, women's and misses' outer wear, and children's clothing accounted for 41.2 per cent of returned goods. In this study, the majority of consumers stressed the lack of uniformity in measurements and proportions of similar products produced by different manufacturers. Mothers stressed the dread of shopping because of difficulty in obtaining correctly sized garments for their children. The consumer is becoming aware of the costliness of returned goods and the money transactions involved. Boldin (1933) claims that wearing apparel leads the list of returned merchandise and amounts to 4 or 5 billions of dollars a year.

Since the size of the child's garment is so closely linked with actual size of his body structure, it would follow that the basis for the origin of patterns and garment sizes would be the size norms of children.

A director of one of the testing laboratories of a large retail establishment, while trying to arrive at size specifications for children's clothing sold by her organization, read all the available studies she could find on body measurements of boys and girls of different ages and nationalities. After several months' work, she finally

concluded that most of the available measurements were not applicable to clothing problems because they were taken from the health standpoint. She concluded that new data, taken with the clothing problem in mind, were greatly to be desired.

In order to show how the discrepancies in size have crept into the manufacturing industry, it may help to glimpse the changes that have come in the evolution of clothing manufacturing from the tailor and dressmaker to that of mass production.

The earliest type of manufacture was for use, not sale. Gras (1930) terms this "usufacture". The commodities were made directly for the user and in accordance to his ideas, at his own convenience, and from raw materials supplied by him.

Usufacture passed through the stage known as the domestic phase, wherein the family possessed raw materials and converted them into useful commodities. It was found efficient to let the household industry decline as rapidly as outside agencies developed to take its place. Later, outside labor was brought in to assist the family in the manufacturing activities, the stage known as retail handicraft.

Until the middle of the last century in Lombardy the tailor and shoemaker arrived to set up shop for a week or month, each to do his lot toward refurbishing the depleted family wardrobes. Mandarins in China kept skilled artisans to manufacture commodities out of silk, wool, et cetera for household use.

At the time of Washington's presidency in 1791, three-fourths to four-fifths of all clothing was made in the home according to Levine (1924). Of the 4,000,000 inhabitants in the United States at that time, nine-tenths were rural. The seamstress and tailor made yearly visits to families to make up the annual supply of clothing. Homespun and "linsey-woolsey" served for common dress. Imports from England and France were used, however, for their good garments. Even in the early colonial period, the women were prone to dress well and their clothing reflected the English court influence.

Another phase of manufacturing evolved. Materials were taken outside the home for finishing purposes, the cloth passing into the hands of the fuller and dyer for finishing. Bryner (1916) states that until the early part of the nineteenth century, all clothing was made to order. The first ready-to-wear garments were made for sailors at

Bedford, Massachusetts who found specially tailored garments prohibitive in cost. The clothing thus made for them was called "slop-work".

A factory in New York with branches in Memphis and Charleston was opened as early as 1830. By 1835, the manufacture of medium grade ready-to-wear goods had begun. Five years later, it was firmly established.

A great impetus to industry came with the invention of the sewing machine by Elias Howe in 1846, thus increasing sewing speed to 800 or 900 stitches per minute. All clothing had been hand-sewed before this time. Dealers supplied fabrics, ready cut, to women in nearby homes where the garments were sewn. Greater demands made it necessary to send materials out over a wider area of territory. Most of this work was of a distinctly inferior quality, and was done during the slack winter season when women were not helping on the farms.

Southern plantation owners bought these low priced, poorly made garments for their slaves who, prior to 1840, had made their own clothes. As the cultivation of cotton became widespread, the negro slave's help was used on the plantation.

The gold rush to California in 1849 furnished another

sales outlet for ready-made garments. The building of railroads and opening of mines came about so rapidly that the old system of manufacture within the home was inadequate.

The temporary lull in the ready-to-wear industry at the outbreak of the Civil War caused much alarm. But within 6 months the government orders for uniforms supplied the factories with more work than they could do. The demand for sewing machines was great and many factories were built. At the close of the war, instead of another shutdown, the industry found itself with so many demands for civilian clothes that the factory system was the only solution.

Following the business depression of 1873 when people, who formerly wore tailored clothes, were forced to buy from retail stores a better quality of wearing apparel developed.

Improvements in production methods were so great that by 1895 knives were used to cut great thicknesses of cloth, and sewing machines could make from 2,000 to 4,000 stitches per minute. Skilled tailors had given way to a "team system" introduced to speed up production. Here was planted the seed of our present day "sweat shops".

Tarbell (1916) states that labor has always come cheap. In the early 90's, women began to enter industry. The garment trade had become a flourishing business by this

time, and children's garments were added to the making of adult's garments.

According to Nystrom (1928), the World War curtailed the production of women's and children's garments because the factories were detailed to make soldiers' uniforms. But as soon as the war was over the factories were flooded with orders for ready-made garments. Soldiers were desirous for new civilian clothes. Women found a certain type of self expression in the "new" in dress. Their entry into business resulted in less home sewing. The wild spending orgy that followed the epochal event of the war came to an end, and in 1920 and 1921 the manufacturing industry found itself in the midst of a great depression.

While industry was trying to gain a foothold, a new individual, the "jobber", was carving a niche for himself in the manufacturing world. He secured contracts for the construction of certain garments and sublet these contracts to smaller manufacturers. This led to terrific cut-throat competition, and as a direct result, we find skimping of material in garments so that they frequently are undersized; cheap materials of inferior quality are substituted; poor workmanship results; and less attention is paid to inspection for quality work. There are men in industry who

believe that if these evils are not corrected, they will lead to a decline of the industry and the probable rise of merchant tailoring again.

With the rather amazing growth of such a vast industry, it is easy to see how the first venture into women's and children's garment manufacture came unexpectedly, and found the manufacturers totally unprepared to provide an adequate scale of garment sizes. Sailors' garments and soldiers' uniforms probably were made in 3 different sizes, and little thought given to the fit of the garment. Nystrom (1928) says that some height and chest measurements on Civil War soldiers served as a basis for the manufacture of their uniforms. Again at the close of the World War, certain body measurements were secured, but many important measurements were omitted that would have been of value in the manufacture of civilian clothes.

After attending a few conferences of ready-to-wear and pattern manufacturers, O'Brien (1930) was prompted to investigate the origin of garment sizes. Her goal was to find the origin of the set of measurements from which the various sizes had been derived. Until this time, the idea in most people's mind was that large numbers of persons had been measured, and the average measurements of those groups set

up as norms. No such study was found. Manufacturers, when questioned, gave vague and hazy replies. When skimmed sizes were mentioned, one merchant said that psychologically it was good to make parents feel that their children were large for their age. So the fact remains that no one knows where or how the size norms were derived.

Saum (1925) believes that standardization of garment sizes would offer possibilities of large savings to the clothing manufacturer. He says that size standardization, carried out scientifically, will not meet with sales resistance, but will help break down all such opposition because of the resulting better fit and appearance of garments. The feeling expressed is that the misfit of clothing is due to the failure of the manufacturer to recognize the various types of figures, and to draft his patterns to care for those proportional differences. He says that the adoption of these standards based on scientific measurements will not remove the low grade goods from the market; but public confidence will be strengthened as the standard values are advanced. It will mean taking sub-standard goods out of competition with standard goods.

Some standardization of clothing has been affected. More has been done toward developing standards for men's

and boys' clothing than for women's and girls'. As a result of conference called by the United States Bureau of Standards to consider garment sizes, it was recommended that a comprehensive and truly scientific study of body measurements be conducted, preferably by the United States Bureau of Home Economics.

In 1937, a grant of money made possible a scientific study of body measurements. The United States Bureau of Home Economics called a conference in Washington to discuss the problems of various manufacturers, and the technique of measuring. Anthropometrists were called in to conduct the study from a scientific as well as from a clothing angle.

The measurement of 100,000 children throughout the United States was the ultimate aim of the United States Bureau of Home Economics. From these body measurements, they hope to develop new norms of size for garment construction.

Statisticians are working on the interrelationships of the 36 body measurements taken. The results summarized will give the size norms which the analysis has shown to be most practical. Perhaps the data will reveal some key measurements more effective for sizing than age.

Purpose

The purpose of this investigation has been to study the measurements of a selected group of Kansas girls from each of the nine age groups from 6 to 14 years, and to compare these measurements with corresponding measurements of dresses of specified design made by four garment manufacturers.

REVIEW OF LITERATURE

Garment construction, in the final analysis, is the art of combining materials that have been cut into segments and so fashioned as to cover the various members of the body. The fit of such garments presupposes adequate tolerance for ease and comfort.

For the construction of garments, a knowledge of body structure is essential. From the scientific aspect, the study of the proportions of the human body is termed anthropometry. A history of anthropometry is traced by Wilder and Pfeiffer (1924) in their introduction to the scientific study of body measurements of Smith College

girls. Since the time of the Egyptians, the carving left by the early artists have emphasized racial characteristics of face and head, but paid no attention to the body. The Negroid proportions of the Appollo Belvedere are explained by some as the result of the classic sculptors of Greece and Rome using African slaves as models. White inaugurated the science of comparative anthropometry in 1794 with his statement, "The forearm of a Negro, in proportion to the upper arm, was longer than in white men". This showed that there was a difference in bodily proportions of different human races. Humphrey, 44 years later, made a study of the femur and tibia of 25 mounted skeletons of negroes and whites and found a correspondingly greater length in the tibia. Broca said that the height of the mounted skeleton depended upon how it was put together. He compared bones and found the same results. The next advance was to call into service living subjects. Bertillion, 1882, saw in body measurements a solution to identification of criminals and developed his system of "Bertillionage" based upon 11 easily taken body measurements. Then investigators began to measure between landmarks found by locating heights from the floor at various landmarks, and subtracting one measurement from another.

In the twentieth century, anthropometry of the living body became an active branch of study. The following developments mark the growth of this science. Dastra (1904) reported that the stature of man has not diminished throughout the centuries as fables of giants have led us to believe. Scientists do not consider that man of today is a mere pigmy. The furtherest removed ancestor of man, *Pithecanthropus erectus*, was estimated to be 1.7 meters high. The Neanderthal man, whose skeleton was found in a cave in Europe in 1857, was 1.6 meters tall. The Cro-Magnon man was thought to be 1.8 meters tall. Today the tall bodied person exemplified by the Scotchman is 1.76 meters tall; the German, an average size person, is 1.65 to 1.7 meters tall; the Chinese is below the average or 1.63 meters tall.

In 1912, the Fourteenth International Congress of Anthropology and Archeology met at Geneva, Switzerland to standardize equipment and procedure so that various data might be compared. According to Wilder and Pfeiffer (1924), certain measurements were prescribed, 39 linear distances from the floor, 11 girths, and 2 contours. These contours were of the hand and foot.

Baldwin (1921) studied the measurements of children at

various age levels for the purpose of establishing a basis for physical and mental growth.

Talbot (1924) studied certain measurements of children. He found that the circumference of the head and chest were almost identical up to 18 months, after which the chest measurement increased more rapidly. There was a relatively greater growth in the length of the legs of boys after 6 years than in girls.

Hrdlicka (1925), in his study of Old Americans, dealt with the increase of stature due to favorable changes in environment. His study was limited to the eastern part of the United States. He said that the American male was 1.74 meters tall and the female 1.62 meters tall. The correlation of the chest and stature was found to be positive and direct.

Davenport (1926) developed a human growth curve. He credits Quetelet for having first measured children of each age as early as 1870.

Wissler (1927) found in his study of the measurements of Hawaiians that in stature and in width of head there is an increase from birth to 36 or 40 years. After that, both measurements tend to decrease. These data were collected by Dr. Lewis R. Sullivan under the auspices of the Bishop

Museum in Honolulu.

Extensive studies dealing with the growth and development of normal children have been carried on mostly from a medical viewpoint where height and weight were correlated as indices of growth. Some of these are reviewed here.

Christopher (1900) has compiled a permanent record of growth and nutrition of children, and has set up norms for height and weight.

Pyle (1913) derived norms of standing height for girls from 6 to $18\frac{1}{2}$ years of age.

Baldwin (1914) studied the normal child, its physical growth, and mental development. He established a series of norms based on height and age distributions. He found that a marked retardation before adolescence is usually accompanied by a period of rapid acceleration during adolescence. He pictured rapid growth from 7 years to adolescence, and stated that since weight and height are relatively proportional to each other, their coefficient is most useful and practical as an index of growth. He claims that under normal conditions short children did not become tall or tall children become short. The percentage gain from year to year shows each child remaining practically within its percentile group. The percentage increase in weight incre-

ments over initial height for a given chronological age from 6 to 18 years is so uniform for each normal individual that growth curves enable us to prophecy with considerable accuracy how tall a child should be at a subsequent age provided his relation to any given median or norm be known. If the rate of growth before adolescence is uniform, this uniformity tends to persist throughout adolescence. Unusually rapid growth from seven years to the beginning of adolescence frequently connotes decrease during adolescence.

Robertson (1916), in his studies on the growth of man, dealt with the variability of weight and stature of school children and its relationship to their physical welfare. He selected at random records of 50 children of each sex and age from 6 to 14 years, inclusive. From height and weight averages and their variabilities, he concluded that the rate of growth in weight in both sexes increases continuously from 7 to 15 years, and the variability in weight undergoes a parallel increase during this period. There is a tendency for maximum variability in weight to coincide with the maximum of yearly increment. The stature increases during this period at an almost uniform rate, and the variability of stature is correspondingly uniform and

less variable than weight. He also studied the influence of environment upon variability of weight and stature of 50 children from factory, residential, and average districts. He concluded that as conditions became unfavorable, there was a deficiency in weight and stature.

Gray and Jacomb (1921) studied the size and weight of 136 Groton boarding school boys. They recommended new standards for judging the size and weight of children of high economic classes; that is, of boarding and country day schools not including private schools in the city. Of the boys studied, only eight per cent were excessively thin and two per cent excessively fat.

A few studies have been made of the measurements of individuals in relation to garment and pattern sizes. The first and most extensive of these was the one made by Ireland, Davenport and Love (1921) at the close of the World War when 100,000 men were measured. The object of the study was to obtain measurements for patterns for uniforms.

Little (1928) made a study of the physical measurements for the various size groups and compared these with the measurements of certain commercial patterns. Patterns did not agree with either median or maximum physical measure-

ments as to rate of increase in size. A wide variation in sizes of patterns of the same size and various makes was found to exist.

A number of studies have been made at Kansas State College of body measurements as they relate to measurements of garments and patterns.

La Fleur (1931) made a comparative study of body measurements of a selected group of college women with certain commercial patterns. She found the least variation in the size of the shoulder; the most marked deviation from median was in the waist and the hip. The pattern study indicated that supposedly patterns of the same size in various makes vary in actual measurements; measurements on the envelope do not correspond to the pattern inside; certain measurements, as shoulder and chest which should remain the same in all patterns even though the style varies, are not the same in commercial patterns.

Morgan (1931) made a comparative study of body measurements on a selected group of women with those of certain commercial patterns. She found great confusion resulting from deviations in size of commercial patterns that supposedly conformed to standards; she concluded that further standards are needed in girth and width measurements of

mature women.

Jernberg (1932) made a comparison of the relation between certain body measurements of individuals and those shown in commercial patterns. She concluded that the slope of shoulder of four commercial patterns was greater than the mean established slope of shoulder; commercial patterns need further standardization; and that their price had no influence on the deviation from the mean measurement of 100 college women.

Musgrave (1933) measured a selected group of women and compared their measurements. She found little relationship between the length of the French dart line and the vertical depth of the armseye; or between the drop of the front and back shoulder line. The greatest relationship existed between circumference of the upper arm.

Jacobson (1933) studied the relation of price to similarity between measurements of certain commercially made garments and similar measurements of a selected group of women. Little relationship was found between the increase in measurements of commercially made dresses from one size group to another. Price bore some relationship to garment proportions; that is, the highest price showed the most ample proportions.

Johnston (1933) compared variations in size of some commercially made garments with variations in body measurements of a selected group of women. She concluded that the mean physical and dress measurements varied in amount from one measurement to another, and from one size group to another. There was little relationship between the increase in each measurement of the commercially made dress from one size group to another. The human figure in the majority of cases showed a fairly definite rate of increase between the mean measurements from one size group to another.

METHODS OF PROCEDURE

The body measurements of a selected group of girls of ages 6 to 14 years inclusive were secured from those taken in Kansas by the United States Bureau of Home Economics. Seventeen measurements, significant to the construction of dresses, were selected for study. The measurements of 100 girls in each age group were taken as a sample. These data were tabulated, and the arithmetic mean, median, and standard deviation were calculated for each of the 17 measurements within each age group.

The equipment and method used in taking the body meas-

urements was that prescribed by the Bureau of Home Economics and described in the terms of the Manual on Body Measurements (1937).

Instruments Used and Clothing Worn

Wooden Anthropometer. The wooden anthropometer consisted of two meter sticks which were joined by a brass dowel and a wooden key to prevent twisting. The upper stick had a fixed horizontal arm at the top, and a sliding horizontal arm with a reversible and tapered brass point piece. The horizontal arms were braced with brass corner triangles. The sliding arm was provided with a lower brass collar which helped to hold it perpendicular to the long shaft and was also used to indicate readings on the long shaft. This was calibrated in the metric system. The two metric scales on opposite sides of the long shaft had zero points at opposite ends of the shaft so that the anthropometer could be used to measure either heights from the floor or the distance between the horizontal arms.

When height from the floor was measured, the straight side of the brass point piece was directed toward the floor, and the reading was made at the lower beveled margin

of the brass collar directly in line with the point of the straight edge of the brass point piece.

Protractor Head. This instrument was used in the present study to measure slope of shoulder line. The frame in which the protractor was set was equipped with a wooden guide piece which rested on the intersections of the shoulder line with the neck base and the armscye. The revolving protractor carried a spirit level which when set in a horizontal plane permitted one to read directly from the protractor scale the acute angle formed by the shoulder line with the horizontal plane.

Sliding Caliper. The caliper, a craftsman's tool, was used for locating the underarm midpoint of the armscye. The zero point of the scale was 3.5 cm. away from the inside margin of the fixed jaw. Readings were made at the first line marked to the right on the sliding jaw. This gave the distance between the jaws. The point on the shaft which bisects this distance was 3.5 cm. to the left of the arithmetic half of the given reading on the scale.

Portable Weighing Scales. The scales provided were accurate to approximately one pound. Each weighing scale was provided with a set screw with which the calibration could be set at zero before the subject was weighed. This

adjustment was of great importance if the error of the scales was to be kept at a minimum.

Tapes. The pocket tapes were all provided with a spring release for rewinding. The calibration of one side of the tapes was metric and of the other side, the English system. When measuring girths, if the tape case was held in the right hand with the button of the spring release toward the floor the metric side would always be directed toward the measurer. When measuring linear distances, the metric scale would be toward the observer if the case was held in the right hand with button away from the floor.

Neck Chain. The neck chain was a fine gauge, small link chain which was long enough to pass around the neck with ends crossed over at the center back and hung free down the sides of the neck toward the front. If the middle of the chain was placed at the center front, the hanging ends would balance one another and the chain could be readily adjusted to the size of the neck base.

Steel Knitting Needle. The needle used was 2 mm. in diameter and about 30 cm. long. It was useful to indicate the direction of certain straight lines to be marked on the body.

Leveling Platform. This platform was 2 by 3 feet. It

was made of ply board with battens and was provided with four set screws and two spirit levels. It was used when taking stature and height above the floor of cervicale. It was also used when measuring slope of shoulder. The leveling platform aided in taking accurate measurements in situations where the floor was pitched, corrugated or pitted. It was used regularly for the measurements specified. The platform was leveled readily by means of set screws in the four corners and the spirit levels on the two sides. Floors which were found, on test, to be level were measured from without using the platform.

Clothing. Clothing worn by the children during measurement conformed to specifications given by the Bureau. Boys and girls wore "gym knit scants". These were small cotton pants with lastex at the waist. They were cut high on the thigh where they fit loosely. Older girls wore a nonbinding uplift brassiere as well. Garments which had been worn once were laundered before they were issued to a second child.

Body Landmarks

Body landmarks which served as points of reference

for the measurements were located on each subject by the measurer. They were marked on the body with physicians' skin pencils sharpened to a point so that they would draw a clear, narrow line. A description of landmarks and their placement follows. Plate I and Plate II illustrate the placement of the body landmarks.

Upper Border of the Medial Ends of the Clavicles, Right and Left. The upper border could be readily distinguished by palpation. It was marked with a short horizontal line for both right and left bones.

Point in the Median Sagittal Plane at the Level Midway Between the Shoulder Point of the Armscye and the Point of Lowest Extension of the Armscye. This point was located by sighting. The observer sat with eyes at chest level and judged the position of the mid point of the scye-depth as seen when the subject's arms hung loosely at the sides. The level of the point was indicated by a short horizontal line intersecting the median sagittal plane.

Waist Level, Right and Left Sides. The waist level was defined in this study as the lower border of the lowest rib which could be palpated in the mid-axillary line. The observer sat in front of the subject and palpated right and left sides simultaneously, using the index fingers to press

Plate I

Placement of body landmarks, front view

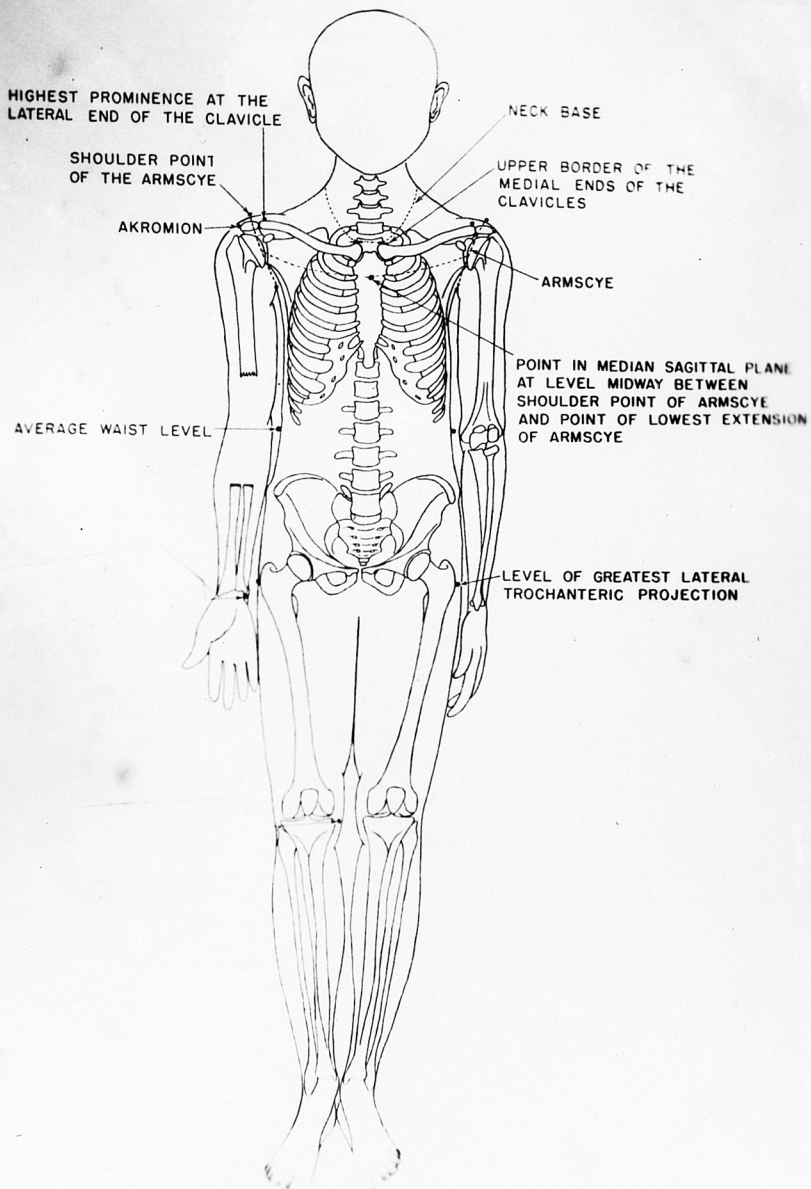
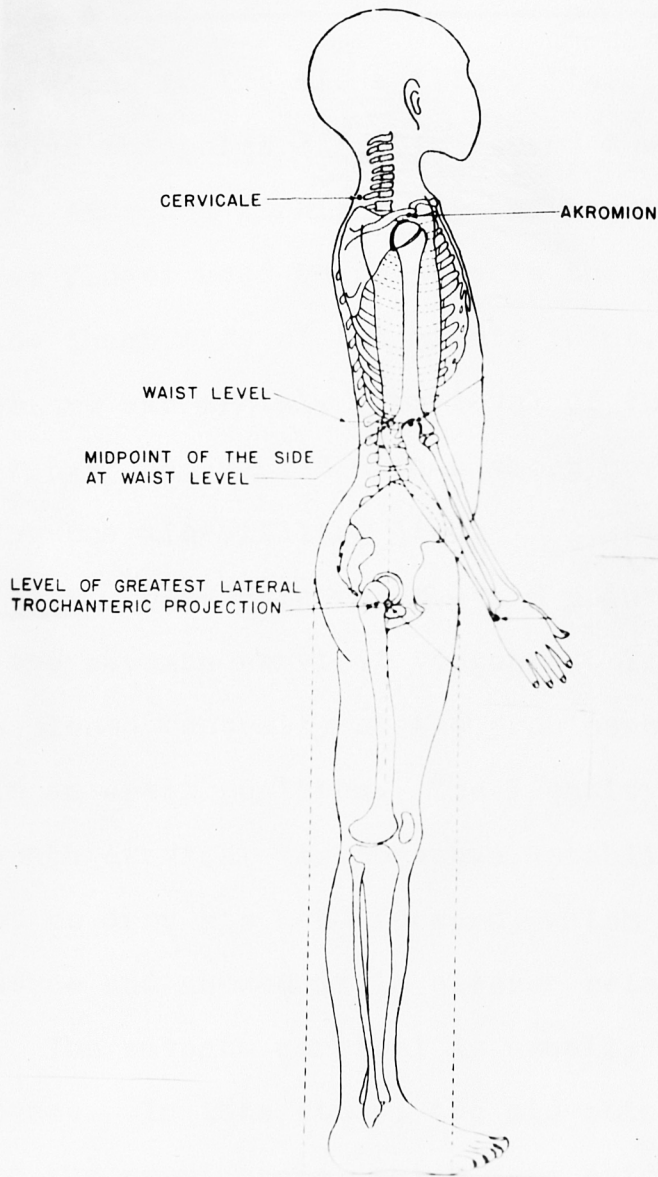


Plate II

Placement of body landmarks, side view



against the sides in the mid-axillary line. The hands were held with the palms directed toward the floor. The fingers were extended straight out and together. The part of the index finger used to palpate in the mid-axillary line was the thumb side of the middle joint. The direction of the pressure was medial. The level of the midline of the index finger was marked with a short horizontal line intersecting the mid-axillary line.

Cervicale. Cervicale was the mid point of the prominence of the seventh cervical vertebra. It was indicated by a cross placed centrally on the prominence when the head was held in an erect position. The identity of the process of the seventh cervical vertebra was established by asking the subject to drop his head forward, which accentuated the prominence and showed it in clearer relation to adjacent vertebrae. The seventh cervical is usually the most superior prominence. In this study, the mid point of the most superior of the prominences, which were evident when the head was dropped forward, was termed cervicale. The point was palpated while the head was dropped forward. It was marked while the head was erect.

Mid Point of Prominence of Fourth Thoracic Vertebra.

The prominence of the fourth thoracic vertebra was the

fourth by count below that of the seventh cervical vertebra. The mid point was indicated by a cross centrally located on the prominence. At this point with the tape held parallel to the floor, the width of the chest posterior was taken.

Akromion, Right and Left. The akromion was defined in this study as the most laterally projecting point of the acromial process of the scapula. The lateral border of the process at the shoulder level was identified by pressing the thumb nail against the border. The most lateral point was judged by palpation. The subject was steadied if the right and left borders were palpated simultaneously. The direction of the border was indicated by a line. The point of greatest lateral extension was indicated by the intersection of this line with a second at right angles to it.

Highest Prominence of the Lateral End of the Clavicle, Right and Left. This landmark was a region rather than a point. The observer placed his eye at the shoulder level of the subject and directly behind the shoulder concerned. The highest point on the shoulder profile at the lateral end of the clavicle was marked with the pencil point.

Shoulder Point of the Armscye, Right and Left. The measurer stood looking down on the akromion and lateral

clavicular point of the shoulder concerned. The shoulder point of the armscye was placed midway between the akromion and the point at the lateral end of the clavicle.

Level of Greatest Lateral Trochanteric Projection, Right. The observer placed his eyes at the level of the hips. The observer's left hand was used to brace the left side of the subject's body and the tips of the index and middle fingers of the right hand were used to palpate the region of the trochanter of the femur. When the lateral fat pads of the hips were well developed, the most lateral prominence of the femur in this region could not be readily identified. The subject was asked to bend the trunk forward slightly and then to stand erect to assist the observer in finding the point. Usually a low rounded subcutaneous bony prominence was distinguished. The level of the most laterally projecting point of this region was marked with a short horizontal line.

Neck Base. The neck base was outlined by the neck chain, adjusted so that posteriorly it rested on cervicale and anteriorly on the upper borders of the medial ends of the clavicles. The chain, so placed over three points, took a curved position on either side of the neck. The line of the neck base was marked in the center front with

a cross and by curved lines at the center of both right and left sides.

Armscye, Right. The observer sat in front of the subject, raised the subject's arms from his sides until the natural creases in the axillary fossa were visible. A horizontal line was marked just below the major crease, taking into consideration the sleeve and its tolerance in relation to the axillary fossa. Large rolls of flesh necessitated deeper marks.

A chalked string was passed under the arm and drawn upward until the string met the under arm, the ends of the string were drawn up over the shoulder and crossed over the armscye point of the shoulder to make an impression outlining the armscye. The chalked line was marked in with pencil over the top of the shoulder and in front and in back.

Armscye, Left. The left armscye was located in the same manner as the right armscye. It was necessary to mark only the front and back chalk lines and the underarm level.

Underarm Mid Point of the Armscye, Left. The observer sat at the left side of the subject. The subject's position was his normal posture with feet directed straight forward. The subject extended his arm outward horizontally

in line with the shoulder. The arm was rested lightly on the head of the observer. The long arm of the sliding caliper was placed against the trunk and up in the axillary fossa at the level of the armscye line of the trunk. The long arm was parallel to the floor. The jaws were closed lightly against the shoulder, front and back. The point midway between the jaws was marked on the armscye line of the trunk.

Trunk Line, Left. The upper end only of the line was drawn on the trunk between the underarm mid point of the armscye and the mid point of the side at the average waist level. The line passed vertically downward but in some cases of winged scapulae and hollow backs, the line inclined from the vertical position.

Underarm Mid Point of the Armscye, Right. This point was located in the same manner as for the left side.

Trunk Line, Right. This line was located in the same manner as for the left side.

Shoulder Line, Right. The shoulder line followed the anterior border of the trapezius muscle and passed through akromion. The border of the trapezius muscle was identified as the subject raised his shoulder toward his ear. The knitting needle was used to show the direction of the

line along the border and through akromion. The intersections of the shoulder line with the neck base and the armscye were marked on the right shoulder only.

Measurements

Measurements between landmarks were taken by the measurer and recorded.

Weight. The first measurement after the landmarks were placed was weight. The zero point of the scale was adjusted before each subject was weighed. The subject stood quietly in the center of the platform.

Standing Height.

Instrument.- Anthropometer, leveling platform.

Position of subject.- On the leveling platform placed against a flat wall. The subject stood with heels against the wall, and together. Shoulders and buttocks just touched the wall. Eyes were directed forward and head was erect. Palms of the hands touched the thighs.

Position of observer.- At the subject's right side.

Procedure.- The anthropometer was held and balance in the right hand. The left hand palpated the vertex of the head. The right hand slid the moving arm of the anthropometer down to rest on the vertex. The straight edge

of the brass point piece was directed toward the floor. The measurement was taken quickly as the child could not stand more than a few seconds without swaying.

Slope of Shoulder, Right.

Instrument.- Protractor head, leveling platform.

Position of subject.- Identical to that for stature but away from the wall.

Position of observer.- To the right side and in back of the subject.

Procedure.- The wooden blade of the protractor rested on the intersections of the shoulder line with the neck base and with the armscye. The subject was asked to carry the weight of the instrument on his shoulder without altering the position of his shoulder. The intersection of the shoulder line and the armscye was used as a pivotal point and the other end of the wooden blade was lowered to the shoulder line at the neck base intersection where it rested lightly without depressing the skin surface. The protractor head was rotated until the spirit level indicated that it was horizontal. Before taking the measurement, it was helpful to show the protractor to the child so that he did not twist to look at it when it was in use.

Width of Chest, Front.

Instrument.- Tape.

Position of subject.- As for stature, but away from the wall.

Position of observer.- In front of the subject with eyes at chest level.

Procedure.- The measurement was taken with the upper border of the tape at the level of the point in the median sagittal plane, mid way between the shoulder point of the armscye and the point of lowest extension of the armscye. The tape was parallel to the floor and passed between the right and left armscyes.

Length of Waist, Front.

Instrument.- Tape.

Position of subject.- As for stature, but away from the wall.

Position of observer.- In front of the subject.

Procedure.- The tape passed from the neck base to the waist level (center front).

Width of Chest, Back.

Instrument.- Tape.

Position of subject.- As for stature, but away from the wall.

Position of observer.- In back of the subject with eyes at chest level.

Procedure.- The upper border of the tape passed over the fourth thoracic vertebra, parallel to the floor, between the right and left armscyes.

Waist Length, Back.

Instrument.- Tape.

Position of subject.- As for stature, but away from the wall.

Position of observer.- In back of the subject.

Procedure.- The measurement was taken from the neck base to the average waist level, center back.

Girth of Chest at the Armscye.

Instrument.- Tape.

Position of subject.- Arms were raised slightly to permit the tape to pass under at the level of the armscye on the trunk. They were then dropped to the sides. Posture was that which was normal for the individual.

Position of observer.- In back of the subject.

Procedure.- The tape was placed around the trunk without constriction. The upper border of the tape rested under the arms at the marked level of the armscye on the trunk, and passed through the underarm mid points of the

right and left armscyes. When the subject's arms were raised slightly in order to place the tape in proper position in relation to the underarm mid points, the tape was slack anteriorly. If this precaution was observed, the tape would not constrict the chest muscles when the arms were lowered. Failure to observe this procedure resulted in reduced girths. If the subject hunched up his shoulders, he was asked to relax.

Depth of Scye.

Instrument.- Tape.

Position of subject.- As girth of chest at armscye but without raising the arms. The position should be the individual's normal posture, with head erect and eyes directed forward.

Position of observer.- In back of the subject.

Procedure.- The measurement was taken from cervicale to the mark of the level of the upper border of the tape at armscye level.

Anterior Arc of the Chest.

Instrument.- Tape.

Position of subject.- Normal nonfatigue posture. The arms hung loosely at the sides. The observer asked the subject to permit him to place the subject's arms in the

desired position. This was with shoulders in normal position, elbows bent slightly and arms raised enough from the trunk to permit the observer to see the underarm mid points of the armscyes. Great care was taken not to elevate the shoulders. The most desirable position of the arms was the one in which the underarm mid points were least disturbed from the position they occupied when the arms hung loosely at the sides.

Position of observer.- In front of the subject with eyes at chest level.

Procedure.- The measurement was taken between the underarm mid points of the right and left armscyes.

Girth of Waist.

Instrument.- Tape.

Position of subject.- Normal nonfatigue, with feet together.

Position of observer.- In front of the subject.

Procedure.- The tape was passed around the body at waist level with the upper border at the average waist level. The measurement was read while the subject's breathing was normal. Where a breathing excursion was observed the mid point was read.

Girth of Hips at Trochanteric Level.

Instrument.- Tape.

Position of subject.- Normal nonfatigue, feet together.

Position of observer.- To the right side of the subject with eyes at hip level.

Procedure.- The tape was passed around the body, without constriction, at the average level of the greatest lateral trochanteric projection. It was found convenient to locate the tape first on the left side and then close the ends over the hip level of the right side. The upper border of the tape rested at the level of the landmarks.

Girth of Neck Base.

Instrument.- Tape.

Position of subject.- Normal nonfatigue, feet together.

Position of observer.- To the right side and in back of the subject.

Procedure.- The tape passed about the neck, its lower border resting on cervicale, and on the markings of the neck base at the right and left sides and the center front.

Shoulder Length, Right.

Instrument.- Tape.

Position of subject.- Normal nonfatigue, feet together.

Position of observer.- To the right side and in back of the subject.

Procedure.- The measurement was taken between the intersections of the shoulder line with the neck base and with the armscye. The subject was cautioned not to drop his shoulder, and to stand steadily.

Girth of Armscye, Right.

Instrument.- Tape.

Position of subject.- Normal nonfatigue. The arm was raised sufficiently to pass the tape under and for the observer to place the margin of the tape at the level of the underarm mid point of the armscye. The arm was then dropped. If the child hugged the tape or hunched his shoulder, he was asked to drop his arm and shoulder as though no tape were there.

Position of observer.- To the right side and in back of the subject.

Procedure.- The two ends of the tape were brought up and crossed over the shoulder without constriction.

Girth of the Upper Arm, Right.

Instrument.- Tape.

Position of subject.- Normal nonfatigue. The arm was raised slightly to allow the tape to pass under and then dropped to the side.

Trunk Line, Right.

Instrument.- Tape.

Position of subject.- Normal nonfatigue. The arms hung loosely at the sides and the observer placed the right arm in the desired position. The forearm was flexed at right angles to the upper arm and extended forward. The entire arm was then moved forward a few centimeters. The elbow was lifted slightly from the body and laterally. Care was taken not to disturb the shoulder. The object of this procedure was to expose the underarm mid point without disturbing it from its position when the arms hung loosely at the side.

Position of observer.- Sitting at the right side of the subject, with eyes at midtrunk level.

Procedure.- The zero point of the tape was placed at the underarm mid point of the armseye and the distance to the mid point of the side at waist level was read.

Measurements of Commercially Made Dresses

Dresses made by four different manufacturers were measured in the sizes corresponding to the age groups measured. The measurements decided upon were those considered to have direct bearing upon garment construction and related definitely to the body measurements taken. The relationship is recognized by a comparison of the following measurements taken on the dresses and on the children:

Dress measurement	Body measurement
neck girth	girth of neck base
shoulder length	shoulder length
armscye, total	girth of armscye
chest width, front	width of chest, anterior
chest width, back	width of chest, posterior
length waist, front	length of waist, anterior
length waist, back	length of waist, posterior
girth of chest at scye	girth of chest at armscye
girth of chest, front	anterior arc of chest
arm band	girth of upper arm
girth of waist	girth of waist
under arm line	trunk line
girth of base of sleeve	girth of upper arm at
cap	armscye
girth of hip	girth of hip
slope of shoulder	slope of shoulder
center back	height of cervicale

All of the measurements were made with Lufkin linen and steel two-meter tapes after the lines had been estab-

lished on the dress.

To prevent distortion of the dresses, they were laid flat on a table and after the lines were established and marked with pins, readings of the measurements were taken. Two readings were made to assure against gross error, and the average of these readings recorded. Plate III presents the plan for measuring the garments.

The neck line was measured along the inside curve of the neck of the dress.

The length of the shoulder was measured along the shoulder seam, terminating at the neck and armseye seams.

Total armseye girth was determined by measuring the front and back arcs and adding these measurements together.

Widths of chest were determined by bisecting the armseye arcs, back and front, and measuring between these points parallel to the waist line.

The waist line was measured as indicated on the garments.

Sixteen centimeters below the waist line, the hip line was established and the measurement taken.

The trunk line was designated as the under arm line beginning at the armseye and ending at the waist line.

The measurement was taken.

Plate III

Lines measured on the garments

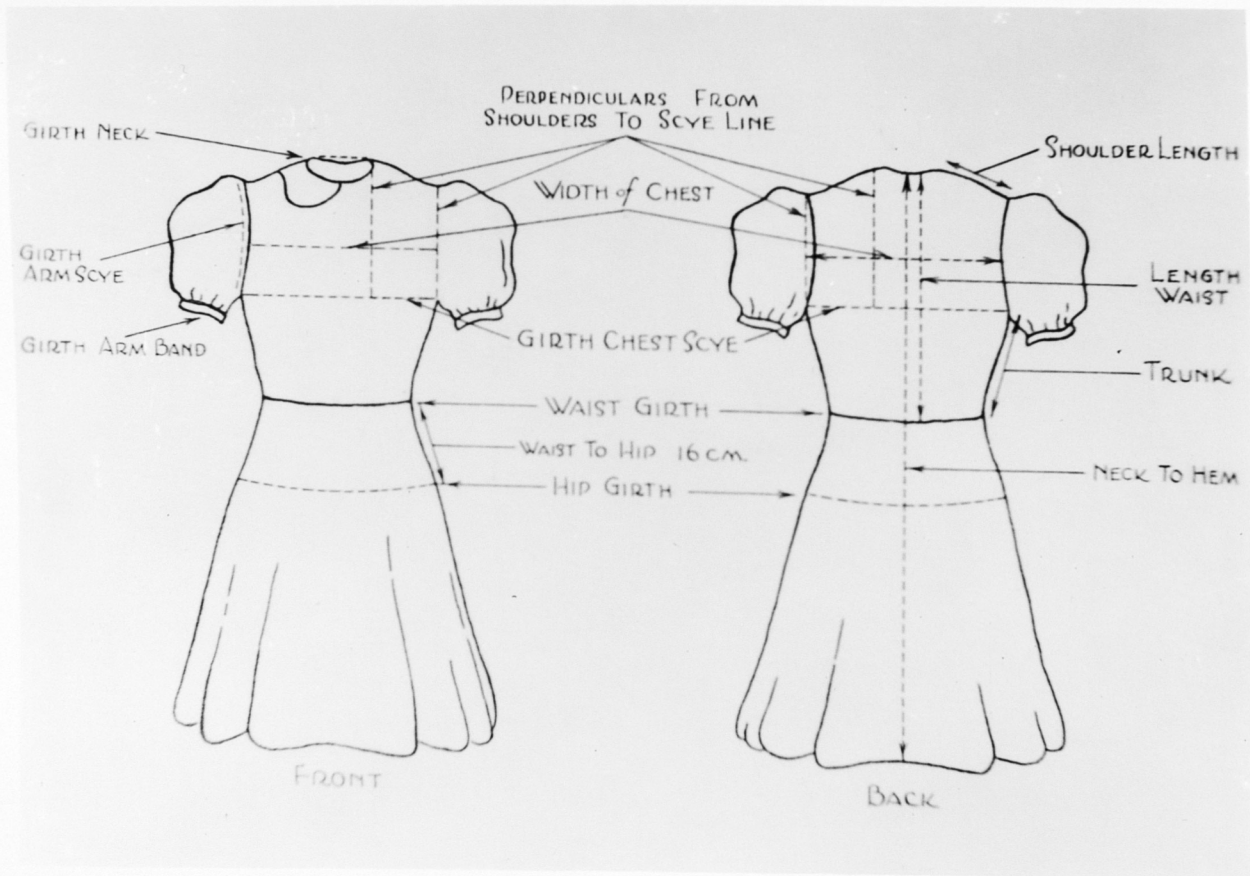


Plate III

The back waist length was measured from the center point of the neck perpendicular to the waist. The extension of this line to the hem gave the neck to hem measurement.

The scye line was located parallel to the waist line at the intersection of the trunk and armscye lines. The front and back arc were measured and totaled.

The shoulder slope was determined in the following manner: Perpendiculars from the scye line to the shoulder line at its extremities were erected. The height of each perpendicular represented the distance from the scye to the shoulder at these points. A drawing of the shoulder line, the scye and the perpendiculars erected between the two were drawn for each garment, both front and back. A protractor was used to measure the angle formed by the intersection of the shoulder line and the perpendicular at the neck, Fig. 1, angle a. This angle was subtracted from a right angle to give the slope of the shoulder. The slopes of the front and back shoulder were averaged to give the shoulder slope of the dress.

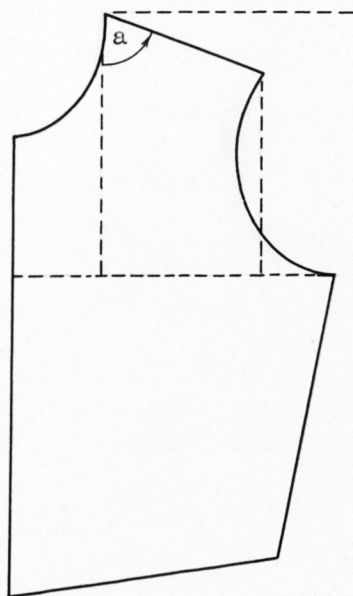


Fig. 1. Method of measurement of the slope of the shoulder of the dresses studied. Angle a is measured and subtracted from a right angle to give the slope of the shoulder.

FINDINGS AND DISCUSSION

Interpretation of the data on body measurements necessitates the use of some measure of central tendency. Mills (1924) says that the arithmetic mean is a type of average which may be used to represent a distribution. It is a calculated average affected by the value of all individual items. Garrett (1937) considers the mean to be the best known measure of central tendency, and defines it as the sum of the separate scores or measures in a series divided by their number. Garrett's formula $M = AM + \left(\frac{f \cdot x}{N} \right) i$ was used, when AM equals the assumed mean, f equals the number of scores on each step interval, and x equals the deviation of the interval from the assumed mean, and i equals the step interval.

The median, according to Mills (1924), is the value of the x-variable so selected that 50 per cent of the total number of cases, when arranged in order of magnitude, lie below it, and 50 per cent above it. Garrett (1937) terms the median the midscore or midpoint in the series, when ungrouped scores or other measures are arranged in order of size.

In Garrett's formula, $Mdn = l + \left(\frac{\frac{N}{2} - F}{f_m} \right) i$, l equals the lower limit of the step interval, F is the sum of the scores below l , and f_m is the frequency within the step upon which the median falls. This measure is used when there are extreme cases which would affect the mean disproportionately.

The standard deviation is said by Garrett to be the most reliable measure of variability and is customarily employed in research. It is the square root of the mean of the squared deviations taken from the arithmetic mean of the distribution. Mills calls it the root-mean square deviation. The deviations are always measured from the arithmetic mean. The following formula of Garrett's was used: $\sigma = \left[\frac{fx'^2}{N} - \left(\frac{fx'}{N} \right)^2 \right]^{1/2}$

Frequency distributions were made and all three measures were calculated for the data obtained so that a statistical picture might be gained. The mean gives the extreme cases a chance to be of equal weight with average cases. The median eliminates these extreme cases and gives a measure denoting the central measurement.

A Comparison of Body Measurements

The mean and median measurements of the 100 girls in each age group were closely related, indicating a homogeneous group. These data are presented in Table 1.

Table 1. Body measurements in centimeters of 100 girls in each of the age groups from 6 to 14 years, inclusive.

Age:	Weight pounds			Stature			Cervicale height			Trunk line		
	Mean	Median	σ	Mean	Median	σ	Mean	Median	σ	Mean	Median	σ
6	45.16	44.65	15.85	115.91	115.96	4.65	96.27	96.01	4.16	14.10	14.07	1.33
7	51.05	49.93	8.19	121.53	122.39	5.23	101.13	101.20	4.75	14.48	14.43	1.67
8	57.75	56.55	8.50	127.96	127.36	5.69	106.94	106.58	5.44	14.80	14.64	1.79
9	62.47	60.86	10.92	131.73	131.49	6.00	110.77	110.11	5.53	15.11	15.00	1.61
10	68.40	66.70	10.06	137.64	137.67	5.95	116.42	116.65	5.33	15.77	17.46	1.62
11	80.25	78.16	13.12	145.44	145.11	6.54	123.41	122.80	6.04	16.32	16.05	1.88
12	88.49	88.67	18.14	149.81	151.40	6.75	127.95	129.03	7.68	17.23	17.18	1.67
13	96.67	95.90	21.29	155.47	156.51	6.95	132.43	132.67	7.04	18.28	18.17	1.98
14	107.69	108.88	16.58	158.15	158.83	7.02	135.15	135.90	5.80	18.78	18.86	1.19

Table 1. (cont.)

Waist length						Chest width						Chest scye					
anterior			posterior			anterior			posterior			anterior			posterior		
Mean	Median	σ	Mean	Median	σ	Mean	Median	σ	Mean	Median	σ	Mean	Median	σ	Mean	Median	
23.78	23.91	1.28	25.90	26.55	1.45	21.23	21.18	1.42	25.50	25.90	1.49	30.45	30.40	1.91	28.92	28.59	
24.82	24.70	1.43	27.56	27.53	1.50	22.38	22.29	1.54	26.42	26.37	1.83	32.05	31.90	2.22	29.43	29.17	
25.55	25.73	2.14	28.44	28.28	1.64	23.57	23.52	1.68	27.33	27.37	1.67	33.51	33.27	2.59	30.41	30.47	
26.12	26.08	1.56	29.11	29.16	1.80	23.95	23.72	1.84	27.77	27.67	1.89	34.53	33.87	3.18	30.92	30.79	
27.13	27.02	2.31	30.42	30.51	1.62	24.45	24.72	1.65	28.91	28.86	1.80	35.61	35.40	2.05	32.27	31.67	
28.35	28.33	1.65	32.41	32.28	2.13	26.05	26.00	1.88	30.55	30.47	2.31	37.33	37.23	2.82	33.82	33.58	
29.25	29.16	1.98	33.47	33.47	2.39	27.15	27.01	2.28	31.40	31.18	2.38	39.36	39.45	3.43	34.75	34.63	
30.24	30.24	1.83	35.07	34.85	2.43	27.87	27.75	1.69	32.25	32.22	2.64	39.77	39.87	2.99	36.77	36.99	
31.24	31.16	1.90	36.62	36.90	2.00	29.15	29.25	3.53	31.90	32.69	2.45	42.26	42.89	3.02	37.37	37.29	

Table 1. (cont.)

: Total girth				: Waist girth				: Hip girth				: Neck girth				: Armscye girth			
:Mean	:Median:		σ	:Mean	:Median:		σ	:Mean	:Median:		σ	:Mean	:Median:		σ	:Mean	:Median:		σ
1.56	58.81	58.85	3.21	51.75	51.79	2.92	60.15	59.61	3.81	28.43	28.39	1.35	25.62	25.70	1.56				
1.28	61.53	60.91	3.86	53.35	52.79	4.20	63.43	63.07	4.81	28.83	28.78	1.48	26.96	27.02	2.06				
1.98	64.05	64.01	3.66	55.25	54.75	3.78	66.20	65.66	4.71	29.86	29.41	1.62	28.49	28.34	1.75				
2.52	64.27	64.17	4.46	55.78	54.91	4.41	68.71	67.93	5.36	30.41	30.36	1.60	29.19	28.94	2.59				
2.25	67.19	67.86	4.45	57.06	56.94	4.08	71.53	70.81	4.96	31.15	31.17	1.50	30.31	30.22	2.25				
2.34	71.11	70.71	4.68	59.59	59.07	4.73	76.57	76.15	5.67	32.21	32.07	2.13	32.32	31.91	1.83				
3.30	74.17	74.83	5.57	61.17	60.85	5.31	80.69	80.24	7.66	33.54	33.55	2.07	33.72	33.41	2.90				
3.61	76.63	76.87	5.59	62.43	62.05	4.47	82.66	81.17	5.59	34.24	34.18	1.44	34.42	34.48	2.12				
2.94	79.69	79.45	4.18	64.03	63.65	4.26	88.67	88.55	6.33	35.27	35.35	1.72	36.36	36.51	1.45				

Table 1. (cont.)

Upper arm girth			Slope			Shoulder		
Mean	Median	σ	Mean	Median	σ	Mean	Median	σ
17.03	16.87	1.41	27.87	27.49	3.79	8.04	8.00	0.73
17.76	17.58	1.75	26.44	26.05	3.43	8.47	8.49	0.73
18.70	18.49	1.55	27.65	28.06	3.53	8.98	8.91	0.77
19.06	18.64	1.96	27.35	27.94	3.66	9.26	9.10	0.74
19.54	19.41	1.90	26.96	27.18	3.33	9.65	9.73	0.85
20.55	20.13	1.89	27.19	27.58	3.43	10.40	10.34	0.86
21.54	21.30	2.35	26.35	26.33	3.65	10.55	10.55	0.86
21.82	21.90	2.42	25.69	25.05	3.53	10.85	10.73	0.93
23.27	23.22	2.20	25.86	26.08	3.66	11.29	11.24	0.81

The increase in weight and height seemed to reaffirm Baldwin's and Little's statements that growth is gradual from 6 to 15 years. In 11 of the 17 measurements studied, the greatest period of growth was between the tenth and eleventh years. Table 2 shows the increment of growth from one age to another. The measurements indicating greatest growth were: weight, stature, height of cervicale, length of waist posterior and anterior, total girth of scye, girth of waist, girth of armscye, and length of shoulder. The greatest growth increment for anterior arc of chest, girth of hip, and girth of upper arm was between the thirteenth and fourteenth years.

The period of greatest growth, which occurred between the tenth and eleventh years, was preceded by a marked retardation. In 9 of the 17 measurements, the period of least growth was between the eighth and ninth years.

The differences in increment were greatest in stature, weight and height of cervicale as was shown by their standard deviations within each group. The tendency to show a greater dispersion from the mean indicated that these measurements were a less reliable measurement of "age-size" than that of some other body measurements.

Table 2. Increment of growth from one age to another based upon the body measurements in centimeters of 100 girls of each age group from 6 to 14 years, inclusive.

Years:	Weight: pounds:	Stature: height	:Cervicale: height	Trunk: line	Waist length		Chest width		Chest scye		Total girth
					anterior:	posterior:	anterior:	posterior:	arc	arc	
6-7	5.89	5.62	4.86	0.38	1.04	1.66	1.15	0.92	1.10	0.51	2.72
7-8	6.70	6.43	5.81	0.32	0.73	0.88	1.19	0.91	1.46	0.98	2.52
8-9	4.72	3.77	3.83	0.31	0.57	0.67	0.38	0.44	1.02	0.51	0.22
9-10	5.93	5.91	5.65	0.66	1.01	1.31	0.50	1.14	1.08	1.35	2.92
10-11	11.85	7.80	6.99	0.55	1.22	1.99	1.60	1.64	1.72	1.55	3.92
11-12	8.24	4.37	4.54	0.91	0.90	1.06	1.10	0.85	2.03	0.93	3.06
12-13	8.18	5.66	4.48	1.05	0.99	1.60	0.72	0.85	0.41	2.02	2.46
13-14	11.02	2.68	2.72	0.50	1.00	1.55	1.28	-0.35	2.49	0.60	3.06

Table 2. (cont.)

Upper:						
arm	Waist	Neck	Hip	Armscye	Shoulder	:
girth	girth	girth	girth	girth	slope	length
:	:	:	:	:	:	:
0.73	1.60	0.40	3.28	1.34	-1.43	0.43
0.94	1.90	1.03	2.77	1.53	1.21	0.51
0.36	0.53	0.55	2.51	0.70	-0.30	0.28
0.48	1.28	0.74	2.82	1.12	-0.39	0.39
1.01	2.53	1.06	5.04	2.01	0.23	0.75
0.99	1.58	1.33	4.12	1.40	-0.84	0.15
0.28	1.26	0.70	1.97	0.70	-0.66	0.30
1.45	1.60	1.03	6.01	1.94	0.17	0.44

Apparently the greatest growth had been reached at 13 years of age, for the group of girls studied. The measurements in the fourteenth year showed a retardation, as seen in Table 2.

A Comparison of Measurements of Commercially Made Dresses

The dresses selected for the study were simple in line, having a natural neck line, armseye line, and a waist line well defined. The sleeves were short and puffed. All dresses measured within the same line were similar in design.

The regular size ranges among children's dresses were found to be 3, 4, 5, 6, and 6x and 7, 8, 10, 12, and 14. Dresses measured in this study came from the latter range with the exception of the size 6. One size 6x was measured for comparison. In dress group 1, two size 6 garments and one 6x garment were measured. In dress group 3, no size 6 was available. In group 4, two size 7 and two size 8 were measured.

The dresses studied were priced from \$1.00 to \$2.95. Group 1 sold for \$1.00; group 2 sold for \$1.19; group 3 was priced at \$1.95 and group 4 at \$2.95. The dresses rep-

resent lines sold in Manhattan and Topeka.

The measurements of dresses made by four manufacturers are given in Table 3. Analysis of the data indicated the extent to which uniformity existed in the sizes of ready-made dresses. An increase in measurements from one size to the next was generally noted within the product of one manufacturer. The measurements of dresses did not show a consistent increase from size to size within the same line. For example, in dress 1, eight of the measurements of size 6 were greater than those of 6x, which is considered larger than size 6. These measurements were: front and back waist length, front and back chest width, front and back arcs of chest, total girth of scye, and girth of the arm band. Size 12 was greater than size 14 in the width of the front chest arc, girth of waist, girth of arm band and length of shoulder.

In dress 2, the front width of chest of size 7 was greater than size 8 as was the front chest arc. Size 6 had a greater neck and waist girth than did size 7, the hip of size 6 was greater than size 7 and 8. The shoulder length of size 7 was greater than that of the 8, 10, 12, or 14 size.

In dress 3, size 7 was consistently larger than size

8 in nine measurements. Three measurements showed even greater variation. The back chest width was greater than the 8, 10, and 12; the hip girth was larger than that of the 10; and the size 12 was larger than the 14. Again in the length of shoulder the 7 was greater than the 8, 10, or 12. These dresses were the only identically styled dresses found in all the sizes 7, 8, 10, 12, and 14. Size 6 was not made by this company. These dresses were the most expensive group studied, the price being \$2.95.

The dresses in group 4 likewise varied within their own group. The trunk or under arm line of size 7 was greater than that of size 8. The front chest arc of sizes 8 and 10 were equal, the size 8 waist girth was greater than that of size 10. In hip girth, size 6 was greater than size 7, and size 10 greater than the 12; the girth of the arm band of size 12 was greater than that of size 14; and the neck girth of size 10 was greater than size 12.

Greater variations were found between the measurements of dresses of the same size produced by various manufacturers than between two dresses of the same size produced by one manufacturer.

Table 3. Measurements in centimeters of the 4 groups of ready-made dresses studied.

Group of dresses	:Neck to: hem	Trunk: line	Waist length		Chest width		Chest scye		:Waist: girth	Hip girth	:Neck girth	Armscye: girth	Upper arm: girth	Shoulder	
			ant.	post.	ant.	post.	ant.	post.	girth	girth	girth	girth	girth		slope° length
Group 1, size 6	61.10	3.50	17.10	19.70	29.30	27.90	40.20	38.40	78.40	72.40	102.70	31.90	33.10	25.10	17.80 8.50
6a	59.70	3.70	15.40	19.10	27.10	27.60	56.80	36.80	73.60	71.00	95.90	32.00	33.10	22.60	21.58 8.70
6x	61.90	3.00	16.60	19.20	27.20	28.40	38.40	36.90	75.30	72.50	102.80	33.80	34.60	20.90	17.75 9.10
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	72.10	7.00	20.00	24.80	29.80	29.00	44.50	40.70	85.20	71.00	96.80	33.50	39.90	26.50	27.00 9.50
10	82.30	9.30	24.20	27.60	31.30	30.40	46.50	42.70	89.20	75.20	100.40	34.90	43.00	25.20	21.75 9.00
12	88.30	11.90	26.30	31.10	35.70	30.20	48.80	44.50	93.30	80.10	100.90	35.00	43.30	28.10	21.50 10.50
14	98.40	14.10	29.70	33.30	32.50	31.40	48.40	46.10	94.50	78.10	101.20	38.20	45.60	27.90	23.25 10.30
Group 2, size 6	52.80	2.50	15.10	17.90	25.00	27.20	37.40	36.30	73.70	75.10	118.80	36.50	34.90	24.30	17.25 7.80
7	66.60	6.60	20.25	23.35	29.25	29.20	39.50	36.45	75.95	69.45	95.35	33.10	36.80	24.50	21.75 11.20
8	69.90	9.30	22.90	27.00	26.65	28.55	37.65	37.85	75.50	73.40	93.20	37.00	37.30	28.90	21.75 8.95
10	77.80	10.65	25.00	29.65	28.80	30.00	40.40	41.20	81.60	77.20	91.50	38.90	38.90	30.45	21.50 10.25
12	88.55	12.90	27.85	33.10	29.85	31.75	44.85	43.40	88.25	79.90	95.60	38.50	41.70	30.65	22.00 10.10
14	95.25	14.55	29.70	34.55	31.50	32.50	44.80	45.00	89.80	81.00	97.80	41.30	43.60	31.70	25.75 10.95
Group 3, size 6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	68.10	8.20	21.00	23.20	30.20	31.30	40.50	40.20	80.70	72.70	102.00	39.10	34.80	25.10	18.75 9.00
8	71.20	9.30	21.20	24.10	29.70	30.50	39.80	39.50	79.30	69.80	97.80	39.50	33.90	23.60	19.00 8.60
10	80.40	10.60	23.10	26.60	30.60	32.10	41.70	42.70	84.40	73.60	87.70	40.70	36.60	27.30	19.75 8.80
12	87.90	11.90	25.20	28.80	31.70	31.60	43.30	41.50	84.80	76.50	101.10	42.60	38.10	27.30	18.75 8.80
14	95.00	12.90	25.80	30.20	32.40	32.20	44.20	43.20	87.40	76.90	98.20	32.80	40.10	27.50	20.50 9.60
Group 4, size 6	61.50	6.50	16.80	21.10	26.50	25.90	35.00	34.20	69.20	66.00	90.80	29.70	29.20	24.50	20.00 9.80
7a	67.70	13.30	19.60	23.90	25.70	28.10	36.50	35.90	72.40	72.40	100.30	35.50	30.00	25.30	23.50 9.10
7b	68.20	12.30	19.80	23.60	27.70	28.40	38.70	36.30	75.00	71.00	81.50	33.20	29.50	24.70	21.50 10.00
8a	72.30	8.90	21.60	25.20	29.30	29.80	41.30	39.00	80.30	75.30	85.60	34.40	31.80	27.80	21.25 10.80
8b	71.60	9.80	21.40	26.30	29.00	28.80	38.60	37.50	76.10	70.90	93.60	37.00	31.50	26.10	21.50 9.90
10	78.40	11.60	24.00	29.00	31.00	31.10	41.30	40.10	81.40	74.90	95.30	38.70	33.00	28.00	23.75 10.60
12	86.10	13.50	26.70	30.30	32.10	33.00	44.80	43.20	88.00	80.70	89.10	36.90	35.90	28.70	19.50 11.60
14	93.90	15.60	28.20	33.90	35.00	34.80	47.70	45.40	93.10	88.00	96.30	37.30	38.20	28.55	21.25 12.90

A Comparison of the Body Measurements With the Dress Measurements

Such minimum tolerances as are required for adult garments were allowed. These are 1.2 centimeters on the shoulder length; 3 centimeters, armband; 4 centimeters, armscye; 10 centimeters, scye line; 10 centimeters on the hip. No allowances were made on the neck, waist or length measurements.

Table 4 gives the body measurements compared with the measurements of dresses made by four manufacturers.

Table 4. A comparison in centimeters of mean body measurements for a certain age with the actual dress measurements for corresponding sizes.

												:Cervicale:	Trunk:	Waist length	Chest width	Chest scye		Waist:	Hip	Neck	Armscye:	Upper arm:	Shoulder							
												:Weight:	Stature:	height	:line	: ant.	: post.	: ant.	: post.	: ant.	: post.	:girth	:girth:	:girth	:girth	:girth	:slope°:	length:		
Body measurement, age 6												45.16	115.91	96.27	14.10	23.78	25.90	21.23	25.00	30.45	28.92	58.81	51.75	60.15	28.43	25.62	17.03	27.87	8.04	
Size 6, Group 1a														61.10*	3.50	17.10	19.70	29.30	27.90	40.20	38.40	78.40	72.40	102.70	31.90	33.10	25.10	17.80	8.50	
1b														59.70*	3.70	15.40	19.10	27.10	27.60	36.80	36.80	73.60	71.00	95.90	32.00	33.10	22.60	21.58	8.70	
2														52.80*	2.50	15.10	17.90	25.00	27.20	37.40	36.30	73.70	75.10	118.80	36.50	34.90	24.30	17.25	7.80	
3														-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4														61.50*	6.50	16.80	21.10	26.50	25.90	35.00	34.20	69.20	66.00	90.80	29.70	29.20	24.50	20.00	9.80	
Body measurement, age 7												51.05	121.53	101.13*	14.48	24.78	27.56	22.38	26.42	32.05	29.43	61.53	53.35	63.43	28.83	26.96	17.76	26.44	8.47	
Size 7, Group 1														-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2														66.60*	6.60	20.25	23.35	29.25	29.20	39.50	36.45	75.95	69.45	95.35	33.20	36.80	24.50	21.75	11.20	
3														68.10*	8.20	21.00	23.20	30.20	31.30	40.50	40.20	80.70	72.70	102.00	39.10	34.80	25.10	18.75	9.00	
4a														67.70*	13.30	19.60	23.90	25.70	28.10	36.50	35.90	72.40	72.40	100.30	35.50	30.00	25.30	21.50	9.10	
4b														68.20*	12.30	19.80	23.60	27.70	28.40	38.70	36.30	75.00	71.00	81.50	33.20	29.50	24.70	21.50	10.00	
Body measurement, age 8												57.75	127.96	106.94	14.80	25.55	28.44	23.57	27.33	33.51	30.41	64.05	55.25	66.20	29.86	28.49	18.70	27.65	8.98	
Body measurement, age 9												62.47-	131.73	110.77	15.11	26.12	29.11	23.95	27.77	34.53	30.92	64.27	55.78	68.71	30.41	29.19	19.06	27.35	9.26	
Size 8, Group 1														72.10*	7.00	20.00	24.80	29.80	29.00	44.50	40.70	85.20	71.00	96.80	33.50	39.90	26.50	27.00	9.50	
2														69.90*	9.30	22.90	27.00	26.65	28.55	37.65	37.85	75.50	73.40	93.20	37.00	37.30	28.90	21.75	8.95	
3														71.20*	9.30	21.20	24.10	29.70	30.50	39.80	39.50	79.30	69.80	97.80	39.50	33.90	23.60	19.00	8.60	
4a														71.60*	9.80	21.40	26.30	29.00	28.80	38.60	37.50	76.10	70.90	93.60	37.00	31.50	26.10	21.25	9.90	
4b														72.30*	8.90	21.60	25.20	29.30	29.80	41.30	39.00	80.30	75.30	85.60	34.40	31.80	27.80	21.30	10.80	
Body measurement, age 9												62.47	131.73	110.77	15.11	26.12	29.11	23.95	27.77	34.53	30.92	64.27	55.78	68.71	30.41	29.19	19.06	27.35	9.26	
Body measurement, age 10												68.40	137.64	116.42	15.77	27.13	30.42	24.45	28.91	35.61	32.27	67.19	57.06	71.53	31.15	30.31	19.54	26.96	9.65	
Body measurement, age 11												80.25	145.44	123.41	16.32	28.35	32.41	26.05	30.55	37.33	33.82	71.11	59.59	76.57	32.31	32.32	20.55	27.19	10.40	
Size 10, Group 1														82.30*	9.30	24.20	27.60	31.30	30.40	46.50	42.70	89.20	75.20	100.40	34.90	43.00	25.20	21.75	9.00	
2														77.80*	10.65	25.00	29.65	28.80	30.00	40.40	41.20	81.60	77.20	91.50	38.90	38.90	30.45	21.50	10.25	
3														80.40*	10.60	23.10	26.60	30.60	32.10	41.70	42.70	84.40	73.60	87.70	40.70	36.60	27.30	19.75	8.80	
4														78.40*	11.60	24.00	29.00	31.00	31.10	41.30	40.10	81.40	74.90	95.30	38.70	33.00	28.00	23.75	10.60	

* length from neck to hem

Table 4. (cont.)

				:Cervicale:	Trunk:	Waist length		Chest width		Chest scye		Waist:		Hip	:Neck	:Armscye:	Upper arm:	Shoulder	:
		:Weight:	Stature:	height	:line	: ant.	: post.	: ant.	: post.	: ant.	: post.	:girth	girth:	girth	:girth	:girth	:girth	:slope ^o :	length:
Body measurement,	age 11,	80.25	145.44	123.41	16.32	28.35	32.41	26.05	30.55	37.33	33.82	71.11	59.59	76.57	32.21	32.32	20.55	27.19	10.40
Body measurement,	age 12,	88.49	149.81	127.95	17.23	29.25	33.47	27.15	31.40	39.36	34.75	74.17	61.17	80.69	33.54	33.72	21.54	26.35	10.55
Body measurement,	age 13,	96.67	155.47	132.43	18.28	30.24	35.07	27.87	32.25	39.77	36.77	76.63	62.43	82.66	34.24	32.42	21.82	25.69	10.85
Size 12, Group 1				88.30*	11.90	26.30	31.10	35.70	30.20	48.80	44.50	93.30	80.10	100.90	35.00	43.30	28.10	21.50	10.50
	2			88.55*	12.90	27.85	33.10	29.85	31.75	44.85	43.40	88.25	79.90	95.60	38.50	41.70	30.65	22.00	10.10
	3			87.90*	11.90	25.20	28.80	31.70	31.60	43.30	41.50	84.80	76.50	101.10	42.60	38.10	27.30	18.75	8.80
	4			86.10*	13.50	26.70	30.30	32.10	33.00	44.80	43.20	88.00	80.70	89.10	36.90	35.90	28.70	19.50	11.60
Body measurement,	age 13,	96.67	155.47	132.43	18.28	30.24	35.07	27.87	32.25	39.77	36.77	76.63	62.43	82.66	34.24	34.42	21.82	25.69	10.85
Body measurement,	age 14,	107.69	158.15	135.15	18.78	31.24	36.62	29.15	31.90	42.26	37.37	79.69	64.03	88.67	35.27	36.36	23.27	25.86	11.29
Size 14, Group 1				98.40*	14.10	29.70	33.30	32.50	31.40	48.40	46.10	94.50	78.10	101.20	38.20	45.60	27.90	23.25	10.30
	2			95.25*	14.55	29.70	34.55	31.50	32.50	44.80	45.00	89.80	81.00	97.80	41.30	43.60	31.70	25.75	10.95
	3			95.00*	12.90	25.80	30.20	32.40	32.20	44.20	43.20	87.40	76.90	98.20	43.80	40.10	27.50	20.50	9.60
	4			93.90*	15.60	28.20	33.90	35.00	34.80	47.70	45.40	93.10	88.00	96.30	37.30	38.20	28.55	21.25	12.90

*length from neck to hem

A comparison of the body with the garment measurements showed that the back length of waist was inadequate on all but 3 of the 48 comparisons made. This may be the result of styling. Each size dress was compared with its corresponding age group and with the age just preceding or following.

Of the dresses studied, the distance from the floor varied within a single size, and markedly from one size to another. Comparing the distance from the floor of certain garments of size 6 and size 14, it was found that a difference of only one centimeter existed.

Within one size group, the greatest variance in distance from the floor was 9 centimeters. A number of the groups showed a variance of only 2 to 4 centimeters.

The differences between body and dress measurements are shown in Table 5.

Shoulder length was inadequate in 27 of the 48 comparisons made. The measurement was adequate for children of the age group just smaller than the corresponding dress size.

In most cases, the girth of scye measurement was adequate when 10 centimeters tolerance was allowed. Size 14 was not adequate for age 14, and size 14 was barely adequate for age 13. Inadequacies occurred most often on the anteri-

or arc.

In all cases, the neck girth, upper arm girth, and waist measurements were adequate. In most cases the hip measurement was excessive; one instance showed 58 centimeters in excess of body measurements. One style dress in which the pleats were stitched in the skirt was inadequate for some sizes.

One dress was consistently small in the armscye. This dress sold for \$1.95. Within the groups of dresses studied, higher price was no indication of superior fitting quality.

The slope of shoulder as measured on the children studied varied between 25 and 27 degrees; on the dresses the variation was from 17 to 27 degrees. Discrepancies of as much as 10 degrees would indicate poorly fitted shoulders.

Table 5. The differences in dress and body measurements expressed in centimeters.

:Distance:																
	:hem to	:Trunk:	Waist length	: Chest width	:	Chest scye		:	Waist	:Hip		Neck	:Armscye:	Upper arm:	Shoulder	
	:floor	:line	: ant. : post.	: ant. : post.	:	: ant. : post.	: girth	:	:girth	:girth		:girth	: girth	: girth	: length	
Body measurement, age 6	96.27*	14.10	23.78	25.90	21.23	25.00	30.45	28.92	58.81	51.75	60.15	28.43	25.62	17.03	8.04	
Size 6, Group 1a	35.17	-10.60	-6.68	-6.20	8.07	2.90	9.75	9.84	19.59	20.65	42.55	3.47	7.48	8.07	0.46	
1b	36.57	-10.40	-8.38	-6.80	2.20	2.60	6.35	7.88	12.79	19.25	35.75	3.75	7.48	5.57	0.66	
2	43.47	-11.60	-8.68	-8.00	3.77	2.20	6.95	7.38	12.89	23.35	58.65	8.07	9.28	7.27	-0.24	
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4	34.77	-7.60	-6.98	-3.80	5.27	0.90	4.55**	4.28**	10.39 ¹	14.25	30.65	1.27	3.58**	7.47	1.76	
Body measurement, age 7	101.13*	14.48	24.78	27.56	22.38	26.42	32.05	29.43	61.53	53.35	63.43	28.83	26.96	17.76	8.47	
Size 7, Group 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2	34.53	-7.88	-4.53	-4.21	6.87	2.78	7.45	7.02	14.42	16.10	31.92	4.37	9.84	6.74	2.73	
3	33.03	-6.28	-3.78	-4.36	7.82	4.88	8.45	10.77	19.17	19.35	38.57	10.27	7.84	7.34	0.53**	
4a	33.43	-1.18	-5.18	-3.66	3.32	1.68	4.45**	6.47	10.87 ¹	19.05	36.87	6.67	3.04**	7.54	0.63**	
4b	32.93	-2.18	-4.98	-3.96	5.32	1.98	6.65	6.87	13.47	17.65	18.07	4.37	2.54**	6.94	1.53	
Body measurement, age 8	106.94*	14.80	25.55	28.44	23.57	27.33	33.51	30.41	64.05	55.25	66.20	29.86	28.49	18.70	8.98	
Size 8, Group 1	34.84	-7.80	-5.55	-3.64	6.23	1.67	10.99	10.29	21.15	15.75	30.60	3.64	11.41	7.80	0.52	
2	37.04	-5.50	-2.65	-1.44	3.08	1.22	4.14**	7.44	11.45	18.15	27.00	7.14	8.81	10.20	-0.03	
3	35.74	-5.50	-4.35	-4.34	6.13	3.17	6.29	9.09	15.25	14.55	31.60	9.64	5.41	4.90	-0.38	
4a	35.34	-5.00	-4.15	-2.14	5.43	1.47	5.09 ¹	7.09	12.05	15.65	27.40	7.14	3.01**	7.40	0.92	
4b	34.64	-5.90	-3.95	-3.24	5.73	2.47	7.79	8.59	16.25	20.05	19.40	4.54	3.31**	9.10	1.82	
Body measurement, age 9	110.77*	15.11	26.12	29.11	23.95	27.77	34.53	30.92	64.27	55.78	68.71	30.41	29.19	19.06	9.26	
Size 8, Group 1	38.67	-8.11	-6.12	-4.31	5.85	1.23	9.97	9.78	20.93	15.22	28.09	3.09	10.71	7.44	0.24	
2	40.87	-5.81	-3.22	-2.11	2.70	0.78	3.12**	6.93	11.23 ¹	17.62	24.49	6.59	8.11	9.84	-0.31	
3	39.57	-5.81	-4.92	-5.01	5.75	2.73	5.27 ¹	8.58	15.03	14.02	29.09	9.09	4.71	4.54	-0.66	
4a	39.17	-5.31	-4.72	-2.81	5.05	1.03	4.07**	6.58	11.83 ¹	15.12	24.89	6.59	2.31**	7.04	0.64	
4b	38.47	-6.21	-4.52	-3.91	5.35	2.03	6.77	8.08	16.03	19.52	16.89	3.99	2.61**	8.74	1.54	

*height of cervicale

**insufficient tolerance allowed

¹barely adequate

-inadequate measurements

Table 5. (cont.)

		:Distance:															
		:hem to	:Trunk:	Waist length	: Chest width	:		Chest scye		:Waist	:Hip			Neck	:Armscye:	Upper arm:	Shoulder
		:floor	:line	: ant.	: post.	: ant.	: post.	: ant.	: post.	: girth	:girth	:girth		girth	:girth	:girth	:length
Body measurement, age 9		110.77*	15.11	26.12	29.11	23.95	27.77	34.53	30.92	64.27	55.78	68.71	30.41	29.19	19.06	9.26	
Size 10, Group 1		28.47	-5.81	-1.92	-1.51	7.35	2.63	11.97	11.78	24.93	19.42	31.69	4.49	13.81	6.14	-0.26	
2		32.97	-4.46	-1.12	0.54	4.85	2.23	5.87 ¹	10.28	17.33	21.42	22.79	8.49	9.71	11.39	0.99	
3		30.37	-4.51	-3.02	-2.51	6.65	4.33	7.17	11.78	20.13	17.82	18.99	10.29	7.41	8.25	-0.46	
4		32.37	-3.51	-2.12	-0.11	7.05	3.33	6.77	9.18	17.13	19.12	26.59	8.29	3.81**	8.94	1.34	
Body measurement, age 10		116.42*	15.77	27.13	30.42	24.45	28.91	35.61	32.27	67.19	57.06	71.53	31.15	30.31	19.54	9.65	
Size 10, Group 1		34.12	-6.47	-2.93	-2.82	6.85	1.49	10.89	10.43	22.01	18.14	28.87	3.75	12.69	5.66	-0.65	
2		38.62	-5.12	-2.13	-0.77	4.35	1.09	4.79**	8.93	14.41	20.14	19.97	7.75	8.59	10.91	0.60	
3		36.02	-5.17	-4.03	-3.82	6.15	3.19	6.09	10.43	17.21	16.54	16.17	9.55	6.29	7.76	-0.85	
4		38.02	-4.17	-3.13	-1.42	6.55	2.19	5.69 ¹	7.83	14.21	17.84	23.77	7.55	2.69**	8.46	0.95	
Body measurement, age 11		123.41*	16.32	28.35	32.41	26.05	30.55	37.33	33.82	71.11	59.59	76.57	32.21	32.32	20.55	10.40	
Size 10, Group 1		41.11	-7.02	-4.15	-4.81	5.25	-0.15	9.17	8.88	18.09	15.61	23.83	2.69	10.68	4.65	-1.40	
2		45.61	-5.67	-3.35	-2.76	2.75	-0.55	3.07**	7.38	10.49 ¹	17.61	14.93	6.69	6.58	9.90	-0.15	
3		43.01	-5.72	-5.25	-5.81	4.55	1.55	4.37**	8.88	13.29	14.01	11.13 ¹	8.49	4.28 ¹	6.75	-1.60	
4		45.01 ¹	-4.72	-4.35	-3.41	4.95	0.55	3.97**	6.28	10.29 ¹	15.31	18.73	6.49	0.68**	7.45	0.20	
Body measurement, age 11		123.41*	16.32	28.35	32.41	26.05	30.55	37.33	33.82	71.11	59.59	76.57	32.21	32.32	20.55	10.40	
Size 12, Group 1		35.11	-4.42	-2.05	-1.31	9.65	-0.35	11.47	10.68	22.19	20.51	24.33	2.79	10.98	7.55	0.10	
2		34.86	-3.42	-0.50	0.69	3.80	1.20	7.52	9.58	17.14	20.31	19.03	6.29	9.38	10.10	-0.30	
3		35.51	-4.42	-3.15	-3.61	5.65	1.05	5.97 ¹	7.68	13.69	16.91	24.53	10.39	5.78	6.75	-1.60	
4		37.31	-2.82	-1.65	-2.11	6.05	2.45	7.47	9.38	16.89	21.11	12.53	4.69	3.58**	8.15	1.20	

*height of cervicale

**insufficient tolerance allowed

¹barely adequate

-inadequate measurements

Table 5. (cont.)

		:Distance:														
		:hem to	:Trunk:	Waist length		Chest width		Chest scye		:Waist	:Hip	Neck	:Armscye:	Upper arm:	Shoulder	
		:floor	:line	: ant.	: post.	: ant.	: post.	: ant.	: post.	: girth	:girth	:girth	:girth	:girth	:length	
Body measurement, age 12	127.95*	17.23	29.25	33.47	27.15	31.40	39.36	34.75	74.17	61.17	80.69	33.54	33.72	21.54	10.55	
Size 12, Group 1	39.65	-5.33	-2.95	-2.37	8.55	-1.20	9.44	9.75	19.13	18.93	20.21	1.46	9.58	6.56	-0.05	
2	39.40	-4.33	-1.40	-0.37	2.70	0.35	5.49 ¹	8.65	14.08	18.73	14.91	4.96	7.98	9.11	-0.45	
3	40.05	-5.33	-4.05	-4.67	4.55	0.20	3.94**	6.75	10.63 ¹	15.33	20.41	9.06	4.38	5.76	-1.75	
4	41.85	-3.73	-2.55	-3.17	4.95	1.60	5.44 ¹	8.45	13.83	19.53	8.41 ¹	3.36	2.18**	7.16	1.05	
Body measurement, age 13	132.43*	18.28	30.24	35.07	27.87	32.25	39.77	36.77	76.63	62.43	82.66	34.24	34.42	21.82	10.85	
Size 12, Group 1	44.13	-6.38	-3.94	-3.97	7.83	-2.05	9.03	7.73	16.67	17.67	18.24	0.76	8.88	6.28	-0.35	
2	43.88	-5.38	-2.39	-1.97	1.98	-0.50	5.08 ¹	6.63	11.62 ¹	17.47	12.94	4.26	7.28	8.83	-0.75	
3	44.53	-6.38	-5.04	-6.27	3.83	-0.65	3.53**	4.73**	8.17**	14.07	18.44	8.36	3.68**	5.48	-2.05	
4	46.33	-4.78	-3.54	-4.77	4.23	0.75	5.05	6.43	11.37 ¹	18.27	6.44**	2.66	1.48**	6.88	0.75	
Body measurement, age 13	132.43	18.28	30.24	35.07	27.87	32.25	39.77	36.77	76.63	62.43	82.66	34.24	34.42	21.82	10.85	
Size 14, Group 1	34.03	-4.18	-0.54	-1.77	4.63	-0.85	8.63	9.33	17.87	15.67	18.54	3.96	11.18	6.08	-0.55	
2	37.18	-3.73	-0.54	-0.52	3.63	0.25	5.03 ¹	8.23	13.17	18.57	15.14	7.06	9.18	9.88	0.10	
3	37.43	-5.38	-4.44	-4.87	4.53	-0.05	4.43**	6.43	10.77 ¹	14.47	15.54	9.56	5.68	5.68	-1.25	
4	38.53	-2.68	-2.04	-1.17	7.13	2.55	7.93	8.63	16.47	25.57	13.64	3.06	3.78**	6.73	2.05	
Body measurement, age 14	135.15	18.78	31.24	36.62	29.15	31.90	42.26	37.37	79.69	64.03	88.67	35.27	36.36	23.27	11.29	
Size 14, Group 1	36.75	-4.68	-1.54	-3.32	3.35	-0.50	6.14	8.73	14.81	14.07	12.53	2.93	9.24	4.63 ¹	-0.99	
2	39.90	-4.23	-1.54	-2.07	2.35	0.60 ¹	2.54**	7.63	10.11 ¹	16.97	9.13*	6.03	7.24	8.43	-0.34	
3	40.15	-5.88	-5.44	-6.42	3.25	0.30 ¹	1.94**	5.83 ¹	7.71**	12.87	9.53**	8.53	3.74**	4.23 ¹	-1.69	
4	41.25	-3.18	-3.04	-2.72	5.85	2.90	5.44	8.03	13.41	23.97	7.63**	2.03	1.84**	5.28	1.61	

*height of cervicale

**insufficient tolerance allowed

¹barely adequate

-inadequate measurements

CONCLUSIONS

Based upon the findings of this study, the following conclusions may be drawn:

Gradual growth increments were found to exist in the body measurements studied.

Great variation exists in measurements of dresses of the same size.

A definite need for garment size standardization is shown.

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LITERATURE CITED

- Baldwin, Bird T.
The normal child: its physical growth and mental development. Pop. Sci. Mo. 85: 559-569. 1914.
- Baldwin, Bird T.
The physical growth of children from birth to maturity. Iowa Univ. Studies Child Welfare, 1(1): 1-411. 1921.
- Boldin, Laura T.
Responsibility for merchandise returns. Jour. Home. Econ. 25: 34-36. Jan. 1933.
- Bryner, Edna.
The garment trades. Cleveland. The Survey Committee of Cleveland Foundation. 153 p. 1916.
- Bush, Ada Lillian.
Consumer viewpoint on returned goods. U. S. Dept. Commerce, Bureau of Foreign and Domestic Commerce Series 87: 1-23. 1934.
- Christopher, W. S.
The measurement of Chicago school children. Jour. Am. Med. Assoc. 35: 618-623, 683-687. Sept. 1900.
- Coles, Jessie V.
Standardization of consumer goods. New York. Ronald Press. 323 p. 1932.
- Dastra, A.
Stature of man at various epochs. Annual Rpt. Smithsonian Inst. 1904: 517-532. (Translated from Revue des Deux Mondes, Paris, Sept. 1904.)
- Davenport, Charles Benedict.
Human growth curve. Gen. Physiol. 10: 205-216. July, 1926.

- ✓ Garrett, Henry E.
Statistics in psychology and education. New York.
Longmans, Green. 493 p. 1937.
- ✓ Gras, N. S. B.
Industrial evolution. Cambridge. Harvard Univ.
Press. 259 p. 1930.
- ✓ Gray, H. and Jacomb, W. J.
Size and weight in one hundred and thirty-six board-
ing school boys (Groton). Amer. Jour. Diseases of
Children, 22: 259-271. Sept. 1921.
- ✓ Hrdlicka, A.
The old Americans. Baltimore. Williams & Wilkins.
438 p. 1925.
- ✓ Ireland, M. W., Davenport, Charles and Love, Albert.
The medical department of the U. S. Army in the world
war. Army Anthropology, 15(1): 1-635. 1921.
- ✓ Jacobson, Almyra Viola.
Relation of price to the similarity between meas-
urements of certain commercially made garments and
similar measurements of a selected group of women.
Unpublished thesis, Kansas State College of Agricul-
ture and Applied Science. 53 p. 1933.
- ✓ Jernberg, Ingrid Karin.
A comparison of the relation between certain body
measurements of individuals and those shown in com-
mercial patterns. Unpublished thesis, Kansas State
College of Agriculture and Applied Science. 50 p.
1932.
- ✓ Johnston, Faith Eleanor.
A comparison of the variation in size of some commer-
cially made garments with variations in body meas-
urements of a selected group of women. Unpublished
thesis, Kansas State College of Agriculture and Applied
Science. 60 p. 1933.
- ✓ La Fleur, Louise Beatrice.
A comparative study of body measurements of a selected
group of college women, with certain commercial
patterns. Unpublished thesis, Kansas State College of
Agriculture and Applied Science. 40 p. 1931.

Levine, Louis.

The women's garment workers. New York. Huebsch. 607 p. 1924.

Little, Caroline Barnes.

A comparative study of the sizes of commercial patterns. Unpublished thesis, University of Minn. 93 p. 1928.

Manual of Measurements. Bureau of Home Economics United States Dept. of Agri. Mimeographed Manual. Washington, D. C. 47 p. June, 1937.

Mills, Fredrick Cecil.

Statistical methods, applied to economics and business. New York. Henry Holt. 604 p. 1924.

Morgan, Prudence Martha.

A comparative study of the body measurements of a selected group with those of certain commercial patterns. Unpublished thesis, Kansas State College of Agriculture and Applied Science. 34 p. 1931.

Musgrave, Pearl Frances.

A comparison of the relationship existing between certain body measurements of a selected group of women. Unpublished thesis, Kansas State College of Agriculture and Applied Science. 46 p. 1933.

Nystrom, Paul H.

Economics of fashion. New York. Ronald Press. 521 p. 1928.

O'Brien, Ruth.

Garment sizes and body measurements. Jour. Home Econ. 22: 751-754. Sept. 1930.

Pyle, W. H.

The examination of school children. New York. Macmillan. 70 p. 1913.

Robertson, T. Brailsford.

Studies of the growth of man. IV. The variation of the weight and stature of school children and its relationship to their physical welfare. Amer. Jour. Physiol. 41: 547-554. Nov. 1916.

Saum, George E. F.

Standards in clothing manufacture making garments that fit. Management and Administration, 9: 59-61. Jan. 1925.

Talbot, Fritz B.

Studies in growth. I. Growth of normal children. Am. Jour. Diseases of Children, 27: 541-555. June, 1924.

Tarbell, Ida M.

New ideals in business. New York. Macmillan Co. 339 p. 1916.

Wilder, Harris Hawthorne and Pfeiffer, Margaret Washington. The bodily proportions of women in the United States; based upon measurements taken from one hundred Smith College students. Amer. Acad. Arts and Sci. Proc. 59(16): 441-603. Dec. 1924.

Wissler, Clark.

Age changes in anthropological characters in childhood and adult life. Philadelphia Philos. Soc. Proc. 66: 431-438. April, 1927.