

## The Long and Short of It \_\_\_\_\_

NANCY BAYLEY

IT HAS NOW become a truism that in physical form the infant is not just a miniature adult. We all know that during growth the proportions of the body change, but we often do not stop to consider at what times, and in just what ways, these changes occur, or how they may be related to individual differences in velocities of maturing and to inherited variations in kinds of body build. Furthermore, we often fail to realize the importance of these growth changes and individual variations as they are related to the attitudes and emotions of the growing child himself.

### *Growing Spurts*

There are two periods of rapid growth during the life of a child (Figure 1). Both periods involve marked changes in body proportions, and significant developmental differentiation. The first of these periods is in infancy—as a matter of fact it starts with the life of the embryo, and though at the time of birth the velocity is subsiding, the changes which take place during the first year or two of life are very great. However, by school-age the process of growth has become steady, with little change in proportions from year to year. In this period of "neutral childhood" a child's concept of himself as a growing physical organism is merely one of growing larger.

The second period of rapid growth, the adolescent spurt, occurring at an age when the intellect and social and emotional attitudes are fairly well advanced, becomes a very important factor in the life of the child. Even if these changes in build all occurred at the same age and in the same way for all children, they would require considerable adjustment to the new, mature, body proportions and functions. But the situation is further complicated by a number of other factors. There are, of course, the obvious sex differences in both build and velocities of growth which only become marked at the time of puberal growth changes. There are, furthermore, great individual differences in velocities of maturing, and in size and proportions of the body. These differences are resultants of combinations in differing proportions of several diverse factors, the most important of which are inheritance, glandular balance, health, and nutrition. A knowledge of these various aspects of growth should give us insight into one group of problems confronting adolescents and make it possible for us to help them to understand themselves and to accept their changed physical status.

### *Girls Take an Early Lead*

Up to the age of about 10 years there is little difference, on the average, in either size or build of boys and girls. Boys tend to be slightly larger, but the individual differences within each

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Courtesy Jackson School, St. Louis, Mo.



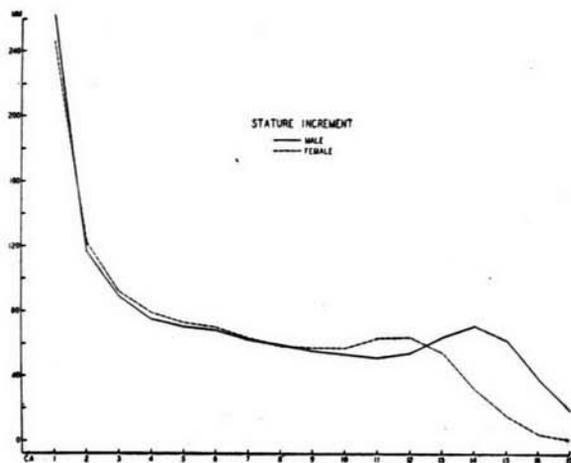


Fig. 1—Annual increment means for standing height. Brush Regular Series, male and female (Simmons).

sex are so great that this difference in averages is practically meaningless. Around 10 to 11 years, however, girls start growing very rapidly and until about 15 years of age their averages are actually larger than those for boys. This rapid growth is not all of a piece: some areas and dimensions of the body grow more rapidly than others, so that girls are taking on very mature physical proportions when most of the boys in their age-grade at school are still "little boys" in size and physique. The boys' rapid growth starts about two years later, and by the age of 16 they have outstripped the girls in height and weight and are still growing rapidly.

The onset of rapid growth at puberty initiates changes in the relative speed of growth in different parts of the body. Among both boys and girls the main body (or stem) starts growing faster than the legs which had for years been contributing most to increments

*We cannot hope to understand fully the moods of "the little fat boy" or the "unreasonableness" of the overly tall girl until we have a practical knowledge of the physical changes occurring in the life of a growing youngster. What these changes are, when they are likely to take place, and how they vary from child to child are discussed here by Nancy Bayley, research associate of the University of California's Institute of Child Welfare.*

in height. The girls' hips now grow rapidly broader, relative to height, while the boys' shoulders grow broader. These changes result, in a few years, in unmistakably masculine or feminine physiques for most children. (Figures 2 and 3.)

#### *Skeleton Key to Maturation*

In recent years a number of investigations<sup>1</sup> in which the same children have been observed and measured repeatedly over a number of years have taught us much about the inter-relationships of growth and physical maturation, so that we are now able to predict, to some extent, the kinds of growth changes we may expect in individual children. Perhaps the most valuable criterion of physical

maturation is found in the development of the skeleton as seen in the formation of new areas of ossification and changing outlines of the bones. Changes in both the size and proportions of the skeleton are closely related to the functioning of the ductless glands. This is obvious in young children when there are glandular deficiencies, notably of the thyroid gland which results (among other things) in immature bones and stunted growth. In adolescence the active functioning of the sex hormones coincides with the periods of rapid growth and changing proportions of the skeleton, as well as with the maturing of the sex organs themselves, the

<sup>1</sup> Abernethy, E. M., *Relationships between Mental and Physical Growth*. Monographs of the Society for Research in Child Development, I, No. 7 (Washington: National Research Council, 1936), 80.

Bayley, N., "Size and Body Build of Adolescents in Relation to Rate of Skeletal Maturing," *Child Development*, XIV (1943), 47-90.

Dearborn, W. F. and Rothney, J. W. M., *Predicting the Child's Development*, (Cambridge, Mass.: Sci-Art Publishers, 1941), p. 359.

Richey, H. G., *The Relation of Accelerated, Normal, and Retarded Puberty to the Height and Weight of School Children*. Monographs of the Society for Research in Child Development, II, No. 1. (Washington: National Research Council, 1937), 67.

Simmons, K., "The Brush Foundation Study of Child Growth and Development. II. Physical Growth and Development." Monographs of the Society for Research in Child Development, 9, No. 1 (1944), xviii+87.

secondary sex characters, and the beginning of menstruation in girls.

It is now possible to assess "skeletal age," from early infancy to physical maturity at 17 to 19 years of age, by means of such series of standards as those to be found in T. Wingate Todd's *Atlas of Skeletal Maturation*.<sup>2</sup> Such assessments, compared with anthropometric measurements of various dimensions of the body, reveal clearly the individual differences among children in their processes of maturing.

In all areas of physical and skeletal maturity, girls are very little advanced over boys before the age of 10 years. But at about 10 years a rapid change in girls soon results in a difference of two years (on the average) in the degree of maturity of the sexes, and this difference is maintained until the girls have reached their full growth at about 16½ years. The boys attain full growth (again on the average) at 18½ years. *However there is, within each sex, a normal range of four years between the most and least advanced child of any given age: approximately 67 per cent are within a year of their age-sex norm.* Children who are advanced or retarded as much as two or more years, being well out of line in degree of physical maturity, will also differ from most children their age in size, body proportions, and general maturity of physiological functions. It has been found, furthermore, that there are different patterns of growth which are characteristic of each deviating group—accelerated or retarded, boy or girl.

#### Early and Late Maturers

A striking difference between early maturing and late maturing children is that the former go through a much more intense period of rapid growth, while the latter, when their growth spurts finally occur, grow less rapidly, but continue growing over a longer period.

<sup>2</sup> Todd, T. W., *Atlas of Skeletal Maturation (Hand)* (St. Louis: C. V. Mosby Co., 1937), p. 303.

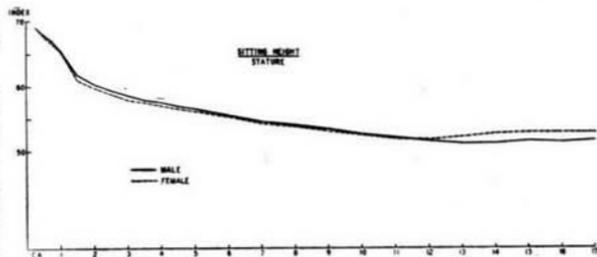


Fig. 2—Sitting height/stature index, Brush Regular Series, male and female (Simmons).

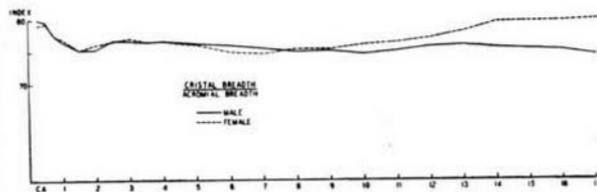


Fig. 3—Cristal breadth/acromial breadth (hip width/shoulder width) index, Brush Regular Series, male and female (Simmons).

(See Figure 4.) This means that the early maturing child suddenly becomes relatively very large, but after a few years is again back to normal in size; while the late maturer lags behind, remaining small when his peers have far outdistanced him, and only gradually, after several years, does he regain his physical status. In general these differences between the early and late maturers are true of both sexes, but in certain respects there are sex differences in these trends. The growth and sex hormones which are active during this adolescent period of physiological maturing, being different for the sexes, affect growth somewhat differently.

The early maturing girls are in the lead in growth among all children their age. Around 9 and 10 years they start growing rapidly. They become large—tall, broad-hipped, mature in build—well in advance of their classmates. They may well be conspicuously out of place, and so find difficulty in fitting into their age-group. This may make them either withdraw from social contacts or seek social outlets among older, equally mature children. But they do not remain over-size for long:

soon other girls catch up with them, and they eventually find themselves relatively short adults.

The slow-maturing girls, on the other hand are the ones who are growing up along with the boys their own age. Although they are, before about 13 or 14 years, smaller than other girls their same age, their growth, though slow, is continuous over a longer period of time. For the same degree of skeletal maturity the late maturers are larger than the early maturers. They have a moderate spurt of growth around 13 to 15 years, after which age they are usually the taller girls, and become the tall adult women. (This, of course is on the average—there are always wide variations due to inheritance, health, and nutrition).

There is little tendency for early and late maturing girls to differ from each other in body proportions or build when they are compared at equal stages of physical maturity. But somewhat more often than average the late maturers have longer legs and broader shoulders than the early maturers.

The boys present a different picture. The early maturers are growing rapidly at about the same time as the main group of girls is growing fast. The late-maturers, on the other hand, lag far behind. They are still little boys at 13, 14 and often even 15 years. They simply cannot keep pace with the other children in their age group.

Among boys the differences in physical maturity during adolescence are further accentuated by differences in build between the two extreme groups. The early maturers are usually broad-built, strong-muscled and large. The late maturers are, as a rule slender-built, and "skinny," with poorly developed muscles. Though they continue to grow in height—often on into their twenties—and are likely to become tall adults, they do not broaden out to equal the husky builds of the early maturers. As young adults the early maturing boys are likely to be average in height or tall and broad-built. The late maturers are usually also tall, but their height is due primarily to their long legs; and they are slender, though they may have broad shoulders.

#### *Being "Different" Can Make Life Difficult*

Practically, in status and social acceptance within their age-grade groups, these differ-

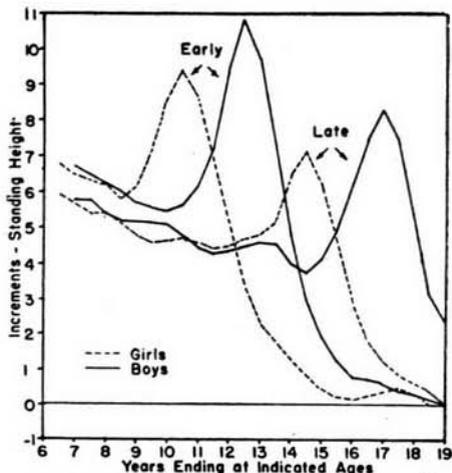


Fig. 4—Growth in height in terms of average annual increments. (After Shuttleworth)

ences in size and build of children who are physically extremely accelerated or retarded may be very important. The greatest hazards to good social adjustments may be expected among the two groups who are most extreme—the early maturing girls, and the late maturing boys.

The accelerated girls, though eventually their size and builds will not be unusual, are conspicuously out of the ordinary at an age when they are usually most sensitive and easily disturbed at being different from their associates.

On the other extreme are the late maturing boys. In addition to being left far behind in their growth they have the further disadvantage of being slender-built, poor-muscled, and weak. (There is, among boys, a fairly close relation between increases in strength and physical maturing.) These little boys cannot compete in athletics requiring strength and size. They must seek their social satisfactions elsewhere—often among younger children who are below them intellectually. Or they may, with their own age group, make use of compensating characteristics of intellectual or social interests and abilities.

Being different from the group with whom one is thrown is always a possible hazard in social and emotional adjustments, but especially so during the adolescent years of grow-

ing into adulthood, when there seems to be a hypersensitivity to any deviations from the accepted norm. The physical differences which are thrust on some children by the mere difference in their velocities of maturing are among those hazards. The adult who is aware of these hazards and recognizes them when they occur, may through his understanding guidance help such children to understand themselves and to develop adequate

compensations in other ways. Often, when the deviations are only temporary the knowledge of their temporary nature may help a youth to accept them with less emotional disturbance. For more permanent deviations, an honest evaluation of one's self in relation to others is an important start in the formation of a sound basis for building emotional attitudes which make for happy social adjustments.

## Growing Pains

*If you've forgotten what you worried about when you were 15, perhaps these statements from boys and girls not many years past that age will help you remember. Among the most vivid recollections of these youngsters are their worries about changes in their bodies—growing too fast or not growing fast enough, being fat, changing voice and facial appearance. Miss Bayley's article on the preceding pages gives evidence that much they worried about as "abnormal" was quite "normal," if they but knew it. Mr. Stolz and Mr. Kirkendall in the articles following this one make suggestions about how we can help youngsters to understand these changes in themselves.*

*These statements, typical of scores from which they were chosen, are published in the hope that they will help us as teachers see more clearly the viewpoints and problems of boys and girls in our own schools. They were collected by Lester A. Kirkendall, U. S. Office of Education, from college freshmen.*

### *They Called Me "Half-pint"*

• One of my adolescent concerns was the fact that I was so small in stature. Most of the girls of my age were taller, and I was the victim of much kidding and joking. I had all kinds of nicknames such as "Squirt," "Half-pint," "Shorty," etc. After a while I became quite conscious of my size and did all kinds of exercises to make myself grow.

• When will I grow bigger? When will I grow bigger? This question kept flashing into my mind very often when I was 15. Most of my friends had grown quite a bit larger than I, and occasionally someone "kidded" me about my size. The answer which I gave myself was, "Oh well, I'll shoot up any day now." The only trouble was that the day forgot to come. It seems silly now, for in one year I grew 7 inches and have kept growing until now I stand 5 feet 10 inches.

### *"My, How You've Grown"*

• An adolescent worry of mine came at the age of 13 when I was beginning to dance. I had always been taller than most of the girls

in my class and I was just a little bit proud of it because I was above average in athletics and so stood out in the group. However, when social dancing became a prime activity in our young lives it came at the age when boys were very small and girls were shooting up. For the first time I was ashamed of my height.

*Courtesy Central School, Glencoe, Ill.*



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