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SPECIAL ARTICLE

AN ASSESSMENT OF GROWTH IN HIGH AND LOW SOCIO-ECONOMIC STATUS SCHOOLCHILDREN IN SOUTH AFRICA

G J Louw, S M Naidoo

'We are guilty of many errors and many faults, but our worst crime is abandoning the children, neglecting the foundation of life. Many of the things we need can wait. The child cannot. Right now is the time his bones are being formed, his blood is being made and his senses are being developed. To him we cannot answer "Tomorrow". His name is "Today".'

(Gabriela Mistral, 1948, World Health Organisation, 1997

The patterns of physical growth (height, weight, length of trunk and limbs, circumference of trunk and limbs, and limb breadths) and function (grip strength of both hands and neuromuscular reaction time) of Cape Coloured (specifically mixed origin) schoolchildren from urban and rural areas and contrasting socio-economic status (SES) levels, were measured. The mixed longitudinal study accumulated data over more than a decade, and included 929 male and 1 160 female pupils of high SES (HSES) in the Cape Town urban area, aged 5 - 20 years, and 954 male and 1 030 female pupils of low SES (LSES) in rural areas of the Little Karoo, aged 5 - 19 years. Means for every anthropometric character were calculated and matched against age for each of the four groups, for comparative purposes. Standard deviations were recorded for each character. Figs 1 - 16 show the means for each of the anthropometric characters, matched with age groups, for HSES and LSES boys and girls.

The results reflect the importance of positive intervention in the growth and development of the LSES children at different periods for the girls and boys, namely pre-pubertally in girls, particularly during the period of possible pre-pubertal growth spurt (8 - 10 years of age), and continuously and consistently for the boys, from 5 to 19 years and onwards. Intervention should take the form of improved diet, increased exercise, and plenty of time spent outdoors in the sun.

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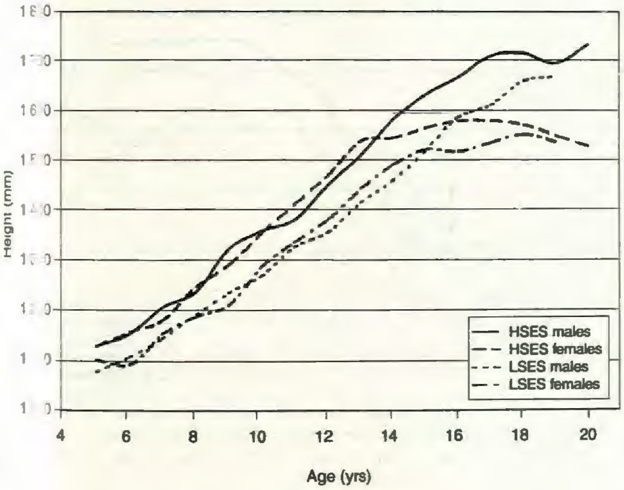


ig. Means of total body height (mm) for age (yrs).

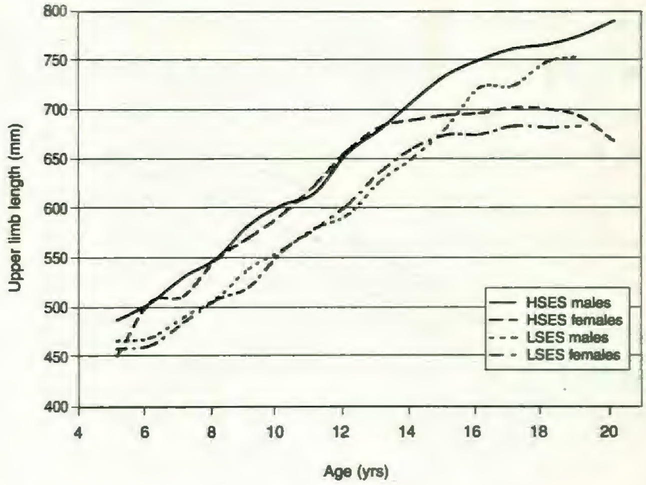
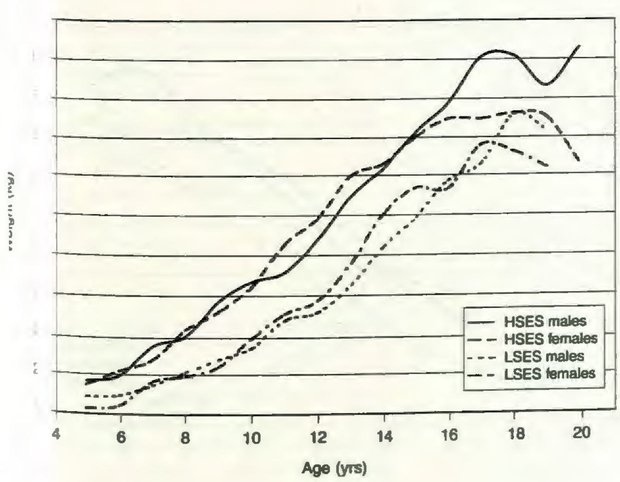


Fig. 4. Means of upper limb length (mm) for age (yrs).



ig. Means of body weight (kg) for age (yrs).

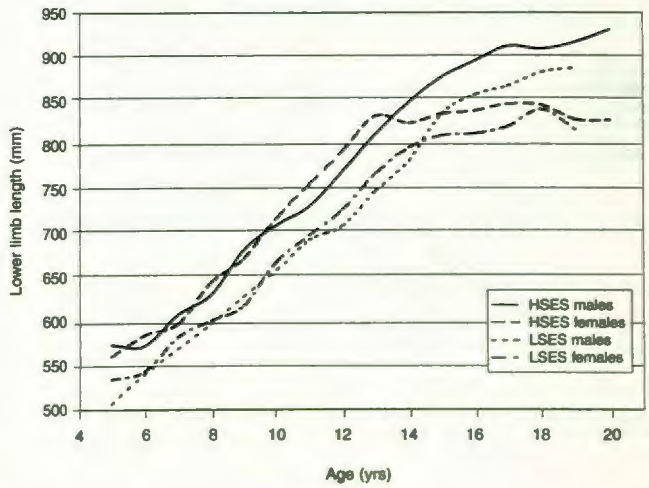
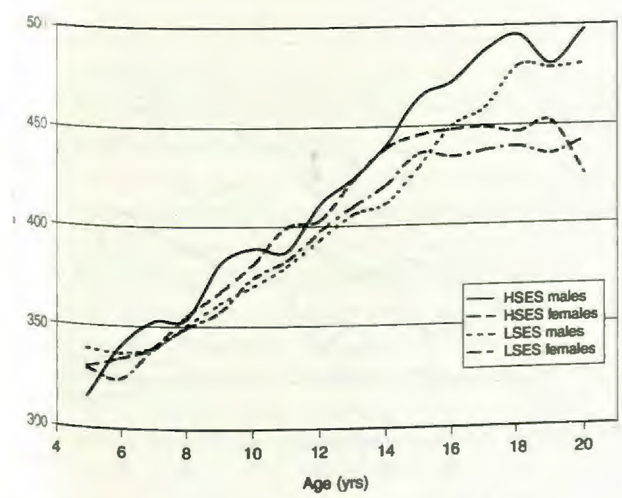


Fig. 5. Means of lower limb length (mm) for age (yrs).



ig. 3. Means of trunk length (mm) for age (yrs).

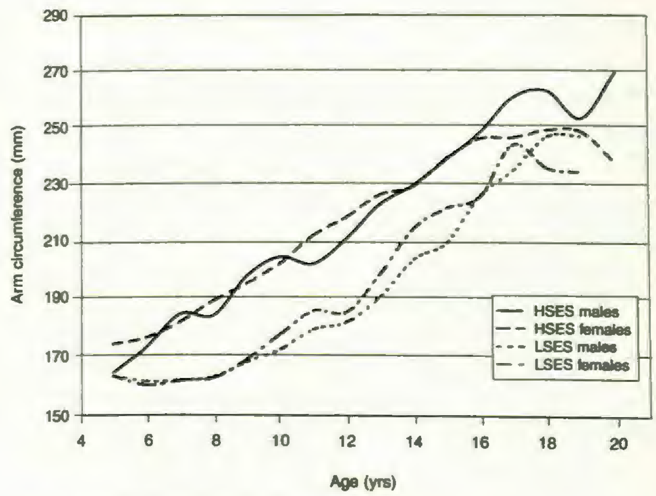


Fig. 6. Means of arm circumference (mm) for age (yrs).

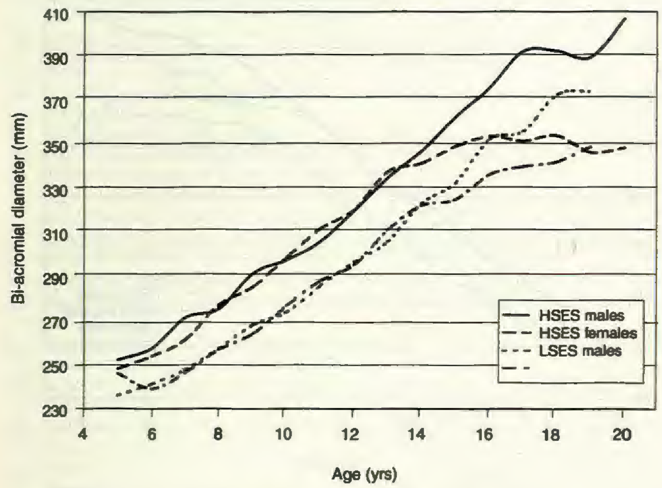


Fig. 7. Means of bi-acromial diameter (mm) for age (yrs).

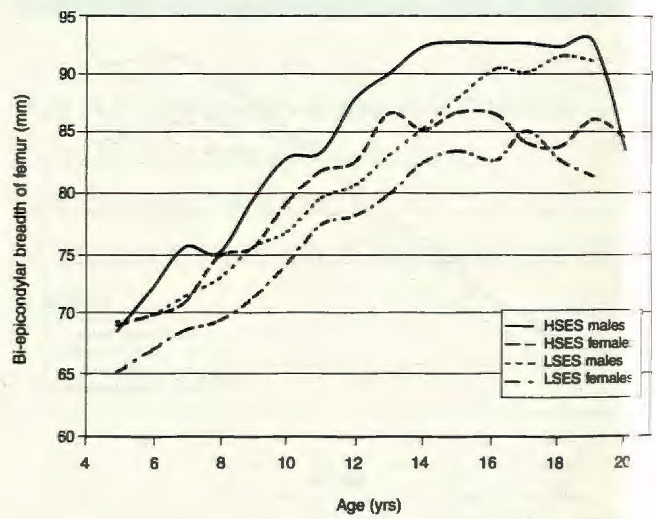


Fig. 10. Means of bi-epicondylar breadth of femur (mm) for age (yrs).

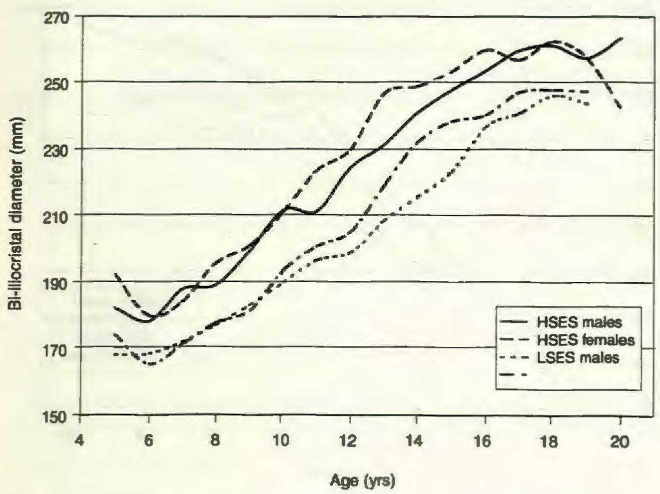


Fig. 8. Means of bi-iliocristal diameter for age (yrs).

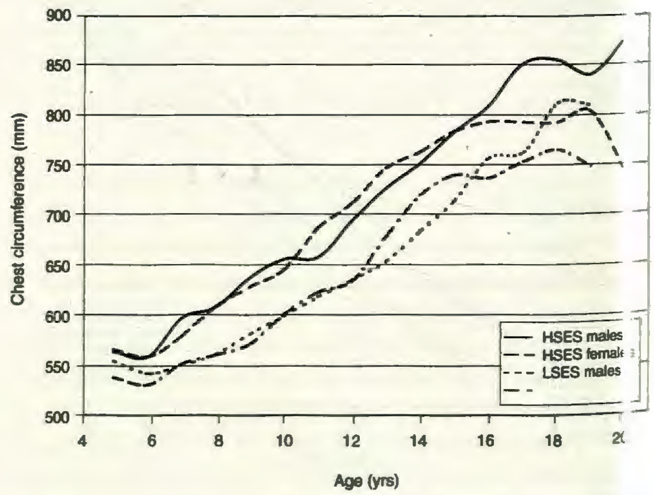


Fig. 11. Means of chest circumference (mm) for age (yrs).

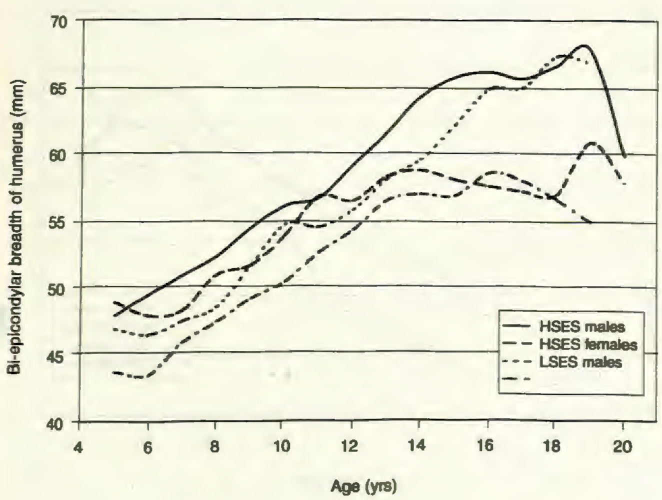


Fig. 9. Means of bi-epicondylar breadth of humerus (mm) for age (yrs).

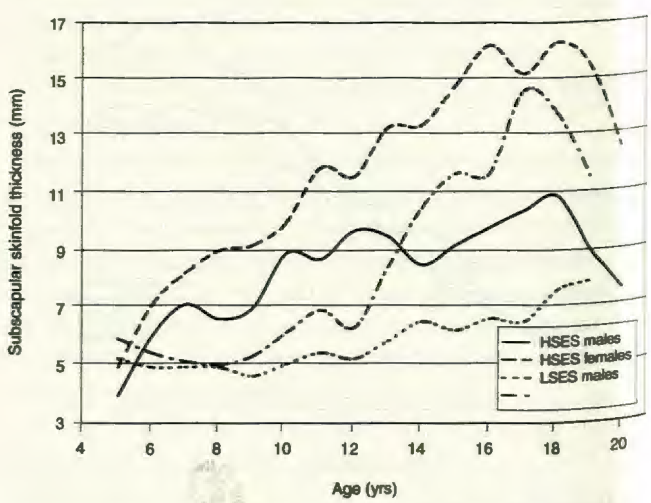


Fig. 12. Means of subscapular skinfold thickness (mm) for age (yrs).

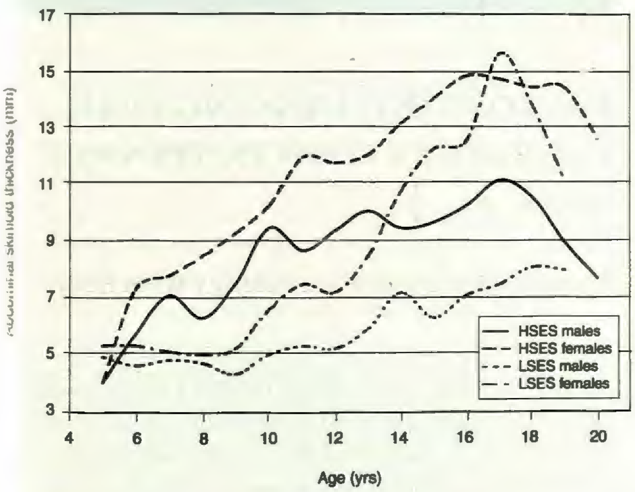


Fig. 13. Means of abdominal skinfold thickness (mm) for age (yrs).

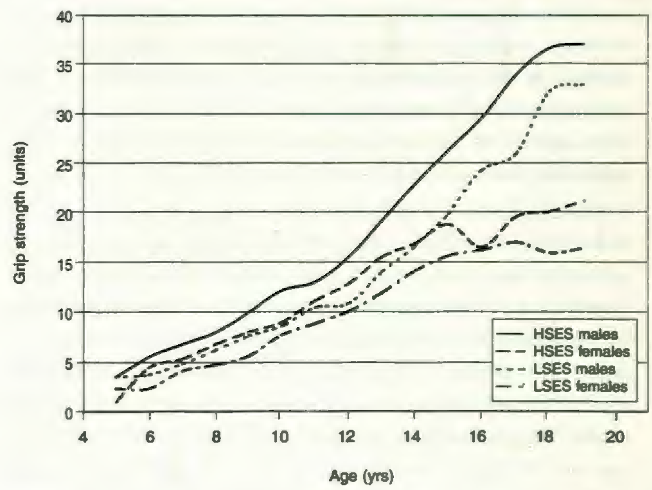


Fig. 15. Means of left-hand grip strength (units) for age (yrs).

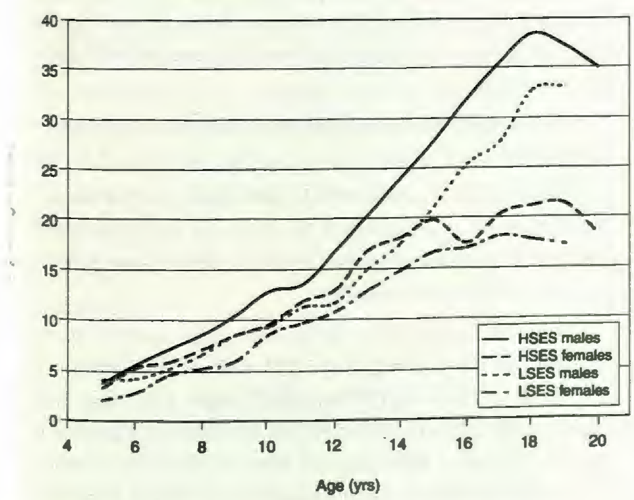


Fig. 14. Means of right-hand grip strength (units) for age (yrs).

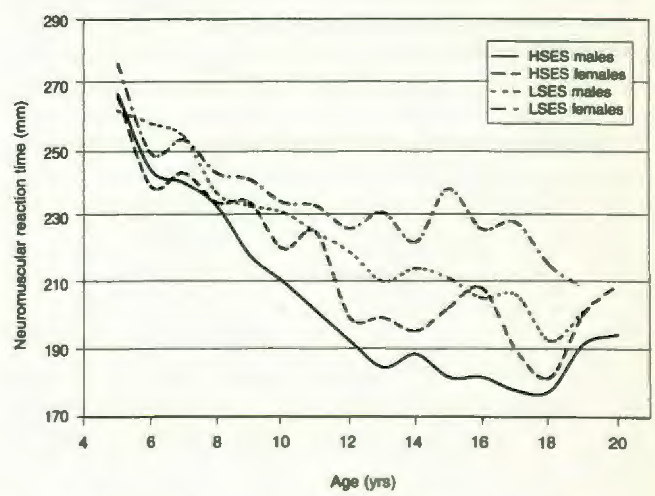


Fig. 16. Means of neuromuscular reaction time (mm) for age (yrs).

Four patterns of growth and development emerge from this analysis, and the anthropometric characters falling into each pattern are grouped accordingly.

The majority of characters fell into the first pattern, namely total body height, body weight, trunk length, upper extremity length, lower extremity length, arm circumference, bi-acromial diameter, bi-iliocristal diameter, bi-epicondylar width of humerus, bi-epicondylar width of femur, and chest circumference. The rates of increase of the anthropometric characters, as reflected by the slopes of the graphs, are similar for HSES and LSES males and females from age 5 until puberty, where the values for the girls drop off rapidly as the growth plates of their bones close. The different values observed along the graph are a reflection of differing starting points at age 5 for the HSES and LSES groups, and there is no 'catch-up' achieved at any time. The males have higher final values because they continue growing postpubertally, into their twenties. For all four groups, only a small pre-pubertal growth spurt is visible.

The second pattern of growth was similar for the various skinfold thicknesses. The skinfold thicknesses, as a reflection of 'fatness', fluctuate continuously, but a pre-pubertal peak is visible in all groups. Although both HSES and LSES groups commence at similar values at age 5, the HSES group rises rapidly, with females exceeding the males at all ages. Both HSES and LSES males show lower values after puberty since their linear characters all continue to increase, and the LSES females overtake the HSES males at the time of puberty. A girl's 'fatness' is an important trigger for menarche.

The third pattern of development was for left and right grip strengths, which are virtually identical. The pattern for boys is markedly different from that of the girls in that there is a dramatic increase in the strength just before puberty right through to the mid-teens, after which the graphs plateau. The values for the girls increase at the same rate as those of the boys, as reflected by similar slopes, but the girls reach their maximum strength at a younger age, shortly after puberty.

The last pattern of development was shown by neuromuscular reaction time. The graphs for all four groups of schoolchildren are similar in shape from 6 to 16 years in that there is a declining reaction time from 6 to 8 years, then a slow increase from 8 to 12 years, after which the time decreases again until 16 years of age. The graphs demonstrate that HSES males have the quickest reaction times, followed by the LSES males. The girls of both groups show considerable fluctuation, but the LSES girls have the slowest reaction times of all groups at all ages, and do not achieve a 'catch-up' period.

The authors wish to thank the staff and students of this Department for their assistance in collecting the data over the years, and the staff and pupils of the schools visited for their wonderful co-operation.

STUDENT PAPER

FACTORS INFLUENCING PEAK EXPIRATORY FLOW IN TEENAGE BOYS

S N van Helden, E G Hoal-van Helden, P D van Helden

Background. Peak expiratory flow (PEF) is a useful measure of pulmonary health status and is frequently utilised in asthma management. Reduction in PEF is usually indicative of onset of asthma symptoms. However, use can be made of PEF values only if normal values are known. The definition of normal range is always difficult and may vary between regions and be affected by a variety of factors.

Objective. To establish PEF values for teenage boys in a Cape Town suburb and examine factors that possibly influence this measurement.

Setting. A high school for boys in the southern suburbs of Cape Town.

Methods. Measurements of PEF were taken for 124 boys. Subjects were approximately 16 years old and apparently healthy at the time of survey. Further details were provided by means of a questionnaire.

Results. PEF ranged from 350 to 760 l/min, with a mean (± standard deviation (SD)) of 539 ± 68 l/min. Factors expected to influence PEF included height and mass, whereas unexpected factors included sport intensity and academic grade. A trend to reduced peak flow was already evident in boys who smoked and boys from homes where a parent smoked. Regression analysis suggested peak flow differences in our population compared with the standard reference.

Conclusion. Interpretation of results obtained from peak-flow instruments should take into account additional knowledge concerning the individual. Further surveys of the South African population and of different groups should be done to establish local standards and factors influencing PEF.

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