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PHYSICAL FITNESS OF SOUTH AFRICAN COMPARED WITH BRITISH AND AMERICAN HIGH SCHOOL CHILDREN*

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Few reports of international comparisons of physical fitness of children have been published, but such comparisons as have been made are interesting. On the Kraus-Weber tests of flexibility much higher standards were attained by Austrian, Italian and Swiss children than by children in the USA; whereas 80% of American children failed to complete one or more of the tests, the failure rate for each of the European countries was less than 10%.[1,2] On the same tests both White and African children in South Africa were superior to American but inferior to European children.[3] Measuring work capacity with a bicycle ergometer, little difference was found between Swedish and Californian children.[4] On a comprehensive battery of tests of athletic fitness there was no marked difference in physical performance between American and German children, but Swedish children were superior to both.[5]

Campbell and Pohndorf[6] applied the AAHPER battery of athletic tests to more than 10,000 boys and girls aged 10 - 17 years in Great Britain and Cyprus and to about 8,500 boys and girls in the same age-groups in the USA. They found that the performance of British and American boys and of British girls improved with age, whereas American girls showed little improvement or even regressed. British boys were superior to American at all the tests except the softball throw and British girls were superior to American at all the tests. In some of the younger age-groups British girls were superior to American boys at 4 out of the 7 tests.

I have compared the performance of South African boys and girls at the AAHPER tests with the performances of British and American children reported by Campbell and Pohndorf.

SUBJECTS

The subjects of the present investigation were about 6,000 boys and girls at 15 high schools in or near Cape Town. The schools were selected to include White, Coloured, and African high school children in approximately the proportions which they form of the community. An inter-racial analysis of fitness tests on these children has been published in this *Journal*.[7] Since there were not enough children below the age of 12 years in South African high schools for satisfactory statistical analysis, no comparison with the younger age groups (10 and 11) reported by Campbell and Pohndorf was attempted. At the other end of the age-range there were not enough American children or British boys over 17 or British girls over 16 years of age in Campbell and Pohndorf's series for comparison with the South African results. Analysis of the South African children for the international comparison was therefore limited to the age-groups 12-17, comprising 5,765 subjects.

METHODS

The tests performed were those of the AAHPER test battery, viz.: pull-up (modified pull-up for girls), sit-up, shuttle run, standing broad jump, 50-yard dash, softball throw for distance, and 600-yard run-walk. Full details of each test are given in a previous paper in this *Journal*.[7] The South African boys and girls performed the same tests under the same conditions as the British and American children. In each country the investigation took a whole scholastic year in order that any seasonal influence should be minimal.

For the analysis, age is taken as age in years at last birthday, height is measured to the nearest half-inch, and weight to the nearest pound. The height and weight of British children are from Campbell and Pohndorf's survey;[6] those of American children are from a study in Iowa City.[9] The significance of the differences was determined with the aid of an ICT computer (Model 1,301); as might be expected when dealing with such a large number of subjects most of the differences are highly significant.

RESULTS

Height and weight. The younger South African boys and girls (12 years old) were taller and heavier than the British and American (Figs. 1 and 2). Thereafter British and American boys were taller and British boys were heavier at most ages. There was no significant difference in height between the different national groups of girls but American girls were consistently lighter than the others.

Pull-up and modified pull-up. Except in the youngest age groups South African boys were superior to British and American at pull-ups (Fig. 3). At all ages South African girls were superior to British, who in turn were superior to American, at modified pull-ups (with an arbitrary maximum of 40).

Sit-up. Except in the youngest age-group of boys, in which the British were superior, and the 15-year-old group of girls, where the difference between South African and British children was not significant, the South African children were superior to the British and American at sit-ups (Fig. 4). This test, like the previous one, has an arbitrary maximum (100 for boys and 50 for girls).

Shuttle run. At the shuttle run, South African boys were superior to British up to the age of 16 and to American at all ages. (Fig. 5). South African girls were superior to British up to the age of 15, after which British girls were superior. American girls were the poorest at this test.

Standing broad jump. At the standing broad jump South African boys were superior to British who in turn were superior to American at all ages (Fig. 6). South African girls were significantly better than British only in the younger age-groups but surpassed the American girls at all ages.

50-yard dash. At the 50-yard dash South African boys were superior to British and American in the younger age-groups (Fig. 7). South African girls were better than British up to the age of 15 and better than American at all ages.

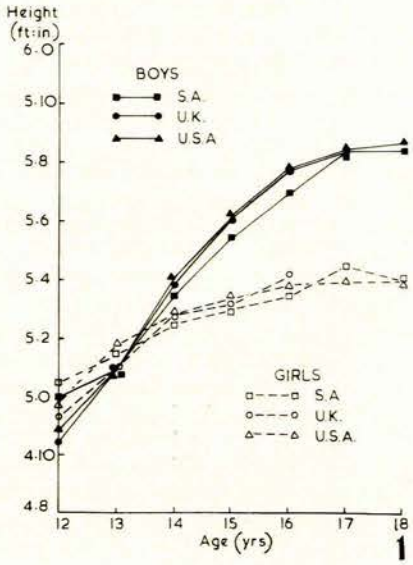
Softball throw for distance. At all ages American boys were better than South African at the softball throw and South African boys were better than British (Fig. 8). Except in the oldest age-groups South African girls were better than British or American at this test.

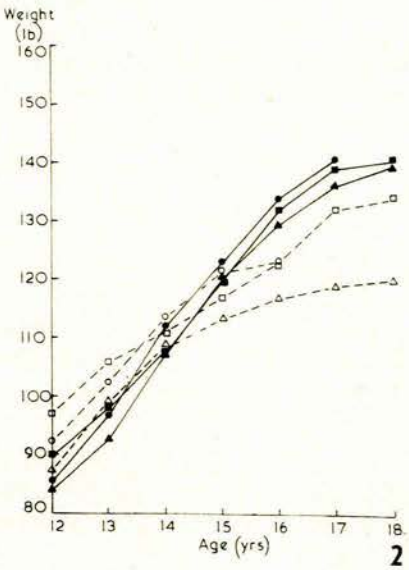
600-yard run-walk. Up to the age of 15 years South African boys and girls were significantly better than British at the 600-yard run-walk and at all ages they were better than American children (Fig. 9).

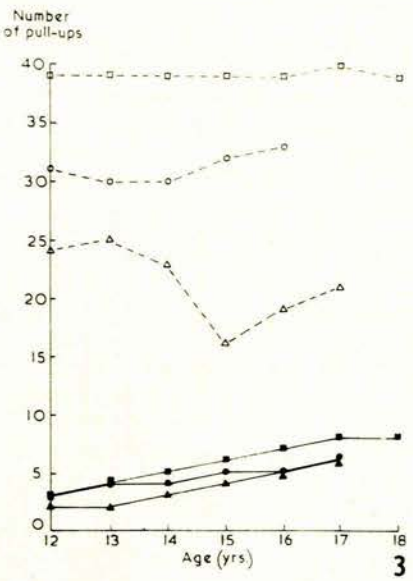
DISCUSSION

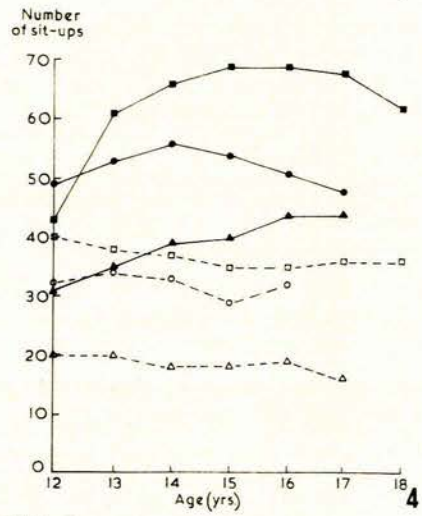
In general there is less difference in heights and weights between the 3 national groups than in their performance of the AAHPER tests. At most ages White South African boys and girls are taller and heavier than their British or American[10] counterparts but the inclusion of Coloured and African children in the present series brings the figures

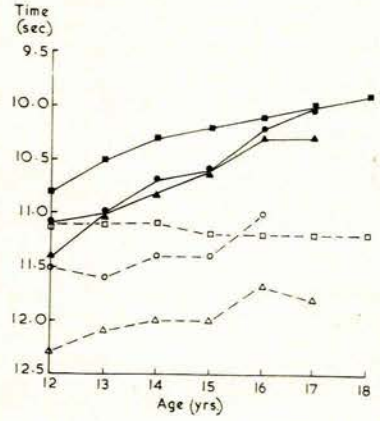
*The work on which this paper is based forms part of a thesis submitted for the degree of Ph.D. of the University of Cape Town.

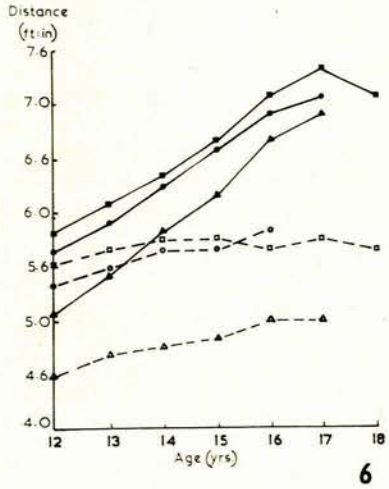


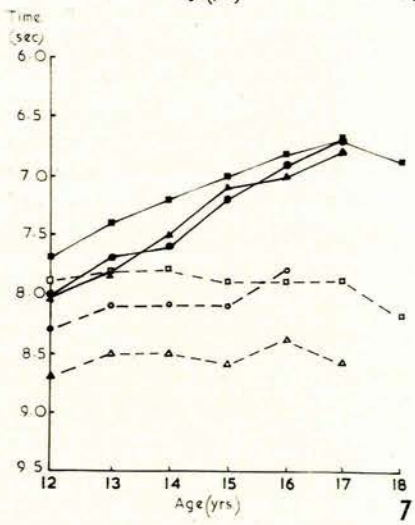


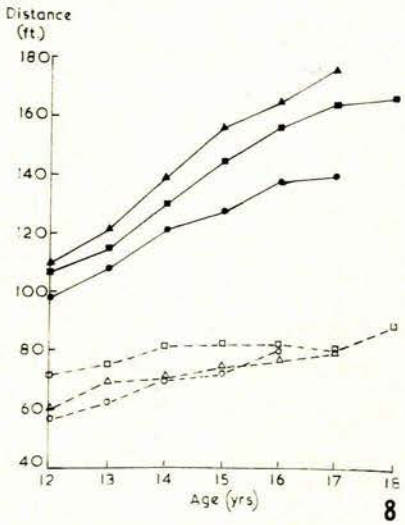












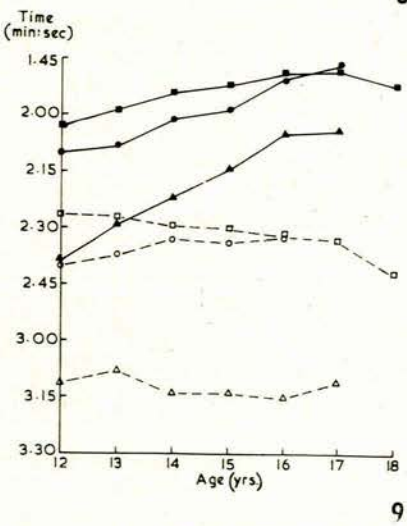


Fig. 1. Height. *Fig. 2.* Weight. *Fig. 3.* Pull-up and modified pull-up. *Fig. 4.* Sit-up. *Fig. 5.* Shuttle run. *Fig. 6.* Standing broad jump. *Fig. 7.* 50-yard dash. *Fig. 8.* Softball throw. *Fig. 9.* 600-yard run-walk.

below those of the British and American at most ages. In an inter-racial analysis of the South African children Coloured and African children were shorter and lighter than White children of the same age, except for African girls, who gained weight rapidly from the age of 14 years.[7]

The superiority of the multi-racial group of South African boys at pull-ups is unexpected as one would expect the heavier British and American boys to be stronger. If their extra weight was due to muscle, one would expect their performance to be better than the South African, but if due to fat one would expect it to be worse. An international comparison of body composition in relation to tests such as these would be very helpful in explaining the results. The poor performance of British and American girls at modified pull-ups is surprising since all races in South Africa performed the test so well that it proved useless for distinguishing degrees of fitness.[7]

In the tests of trunk strength and flexibility, agility, and power (sit-ups, shuttle run, and standing broad jump) the general pattern was of superiority of South African over British children and of British over American. At the speed test (50-yard dash) the South Africans were again the best, but there was little difference between British and American boys.

The superiority of American boys at the softball throw may be due to practice at throwing a softball or baseball from an early age, whereas these games are rarely played in Great Britain or South Africa. Because this test may depend more on acquired skill than on physical fitness it has been suggested that it should be excluded from the battery.[11,12] American girls do not reflect the superiority of American boys at this test.

The endurance test (600-yard run-walk) shows the greatest difference between South African and British children, and American children. The name of this American test, 'run-walk', implying that many will be unable to run 600 yards, indicates the standard of endurance expected of American children, and the results confirm this supposition.

Two important questions arise from these observations. Firstly, why do South African children, who are considerably fitter than British in most of the younger age-groups, lose their lead in 3 of the tests at the age of 17 in boys and in 5 of the tests at the age of 16 in girls? And secondly, why are American boys and girls so much worse than the others at most of the tests?

I believe that the greater fitness of the younger South African children may be due to the active outdoor life which is appropriate to the South African but more difficult to achieve in the British climate. Also South Africa does not have television. The falling off in the older age groups of South African children relative to British and the lesser fitness of young men and women in South Africa than in England[13] may be due to the greater amount of time spent by the older South African adolescents basking in the sun whereas more physical activity is required in Great Britain to maintain the body temperature. South African children are probably more dependent than British on motor transport but most high school children in both countries are active at outdoor sports.

The American pattern of life is more sedentary. If a child lives more than a very short distance from school he is driven each day by the school bus from his home to school and from school to his home, instead of walking or cycling to and from school as is common practice both in South Africa and Great Britain. Physical education is not compulsory in many American schools and only the 10 - 15% of American children actively engaged in competitive sport attain a reasonable standard of physical fitness.[14]

Encouraged by the President's Council on Youth Fitness[15] many American schools have intensified their physical education programmes during the last few years. The Education Department of the State of New York reports that the performance of the AAHPER tests both by boys and by girls in 1962 was much better than the national standards established for the USA in 1957.[16] It would be interesting to ascertain whether any such secular change in the physical fitness of high school children is taking place in South Africa or in Great Britain, where there has been no drive of comparable intensity for improved standards.

SUMMARY

The heights and weights of boys and girls aged 12 - 17 years in high schools at the Cape of Good Hope were compared with the heights and weights of British and American boys and girls in the same age-groups reported by other observers. There was little difference between the national groups except that American girls, in the older age-groups, were lighter than either the South African or British girls.

The performance of the AAHPER test battery by the South African boys and girls was compared, in each age-group, with the scores at the same tests of British and American boys and girls reported by Campbell and Pohndorf. In general the South African children were the fittest and the British were fitter than the Americans but the South Africans lost their lead in the older age-groups. American boys were the best at throwing a softball. Reasons for the observed order of fitness are suggested.

I am deeply indebted to the principals, physical education staff, and pupils of the Cape Town schools who took part in this investigation and to Mr. W. R. Campbell (St. Luke's College, Exeter, England) and Dr. R. H. Pohndorf (University of Illinois, U.S.A.) for allowing me to use the raw data of their investigations. The computer analysis was performed by Miss C. Myburgh and the graphs were drawn and photographed by Mr. S. M. Craig. The expenses of the investigation were defrayed by the C. L. Herman Research Fund and the Staff Research Fund of the University of Cape Town.

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