there may even be problems in secondary schools of overlap between subject areas. What I have attempted to imply is that the reason for employing fitness testing should be clearly thought out, as it may dictate a number of specific considerations that will have to be taken into account.

Some general problems arise from attempting to perform fitness testing in schools. These stem from the fact that a relatively large group of subjects will have to be dealt with in the same limited time. Testing pupils one at a time, or even in small groups, is not a realistic option in schools, especially if testing is going to be a continual activity — even if it is only carried out once or twice a year. The questions, therefore, which have to be asked about any proposed tests, include the following:

- Can the test be done with a large group, or with the pupils in the group performing the tests as individuals, in pairs or in small groups?
- Is enough equipment available for the group or can the test be adapted for use with whatever equipment is available?
- Is the test acceptably accurate? 'Absolute' accuracy is not essential, but the test has to be worth doing (cf Armstrong, ref. 1, who also details the problems with respect to the accuracy of performance tests in this issue of Education and Health).

These questions, it is suggested, favour relatively simple tests as opposed to more elaborate ones which may require greater resources in terms of both time and equipment.

A further and perhaps slightly less general question is the frequency with which the testing should be repeated. As was stated above, Worsley & Coonan (11) found that boredom and even lessening of performance could result from too frequent monitoring. Although the reason for employing the tests may have some influence on their frequency and timing, it would seem sufficient to carry them out either near the beginning and end of the school year or perhaps once a term.

Many of the points made in this paper could be regarded as being fairly obvious, but sometimes it is easy to overlook the obvious. If fitness testing — for whatever reason it is being employed — is going to be effective, it is important to get as many aspects as possible clarified in the planning stage, to avoid loss of enthusiasm by both pupils and teachers.

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References

What does ‘fitness testing’ really test?

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The author suggests that differences in performance in fitness tests between pupils in a single year group are closely linked to physical maturity. If this fact is ignored, unjustified assumptions about levels of fitness will be made. While being of great potential value in raising levels of knowledge and awareness, ‘performance tests simply determine the obvious, and do no more than distinguish the mature child from the immature child’.

The use of performance tests of physical fitness such as those described by Christopher Venters and others in the previous article may be justified from a pedagogical or psychological viewpoint. They may be valuable teaching aids in stimulating interests, introducing new concepts in health related fitness, or in helping children to understand their bodies. They are not, however, generally based on sound physiological foundations, and are of little value in the complex analysis and assessment of children’s fitness. Much of the data is meaningless, not capable of rigorous interpretation and more likely to cause confusion than solve problems.

Performance tests are primarily dependant upon motivation and maturation. Several writers emphasise the use of means, standard deviations or norm tables to compare subjects — but how can tables constructed on the basis of chronological age(0,3),(999,995) provide worthwhile information about children at different levels of skeletal and biological maturation? For example, in any 3rd-year class of boys, 20% of the group may be pre-pubertal, 20% at puberty stage 5, and the rest somewhere in between. We have documented the effects of growth and maturation on performance elsewhere (1), but in order to clarify the role of testing I will outline some of the major factors in relation to Wibberley’s tests.

Muscular strength, endurance, and power output (tests 2, 4, 5 and 6) are specific to each muscle group, and there is no single test which is able accurately to define an individual’s muscular fitness. Tests such as sit-ups and press-ups are notorious for their reliance upon motivation! Sexually immature children have low levels of male hormones (androgens), and maximal strength-gaining potential is not possible until adult levels of androgens are achieved. The extent of the development and performance of muscle is also dependent on the relative maturations of the nervous system, which is not complete until sexual maturity is reached. The immature child cannot be expected to respond to strength training, or achieve the same performances, as the mature child. When this information is combined with the fact that immature children also have a lower concentration of the glycolytic rate-limiting enzyme phosphofructokinase (PFK), the value of comparing the muscular fitness of children of the same chronological age but different biological age is put into perspective.
Flexibility is joint-specific, and there is no single indicator of body flexibility. It is a popular belief that young children are very flexible and then gradually lose this flexibility as they grow older. The evidence for this premise is extremely limited, and ‘flexibility’ seems to vary with the test administered. Variations of the ‘sit and reach’ or ‘stand and reach’ test (test 7) are by far the most popular tests of flexibility; however, during growth the legs become proportionally longer in relation to the trunk, and this change in the trunk length/leg length ratio will undoubtedly influence scores; so such an extent that the use of norms with growing children must be questionable.

Sprint velocity (test 1) increases with maturation, and it seems that great increases in speed development occur during two phases. The first phase, which occurs at around 8 years of age, but with wide individual variations, is probably due to the development of the nervous system and the improvement in the coordination of arm and leg muscles. The second phase, which occurs around 12 years of age for girls and between 12 and 15 for boys, is related to the increase of body size and the concomitant increase in muscular strength and power. Comparing the running speed of children at different stages of maturation is therefore of limited value.

Wibberley’s tests 3 and 8 claim to measure endurance, but in fact test 3 is predominantly dependent upon anaerobic metabolism and does not adequately assess the fitness of the cardio-respiratory system. Younger children are severely disadvantaged when working anaerobically for the reasons described above – in particular, the low concentration of PFK. The step test (number 8) does not last long enough to ensure a ‘steady state’ and, as the work rate is dependent upon body weight, subjects of different weights cannot realistically be compared with one another. Using the ‘resting’ heart rate in the calculation is not valid, as the pre-exercise heart rate or anticipatory heart rate is dependent upon a whole range of factors, including anxiety, and will probably change from test to test due to habituation.

Even when assessed correctly, it is of questionable value to classify children at different stages of development according to an index of cardio-respiratory fitness. During puberty there is a dramatic increase in boys’ ability to consume oxygen which corresponds to the time of peak height velocity and increased secretion of androgens. These changes result in hypertrophy of skeletal and cardiac muscle, stimulation of red cell and haemoglobin production, and the proliferation of metabolic enzymes which altogether make possible large increases in cardio-respiratory fitness. Pre-pubertal children have a limited ability for cardiac hypertrophy and metabolic enzyme synthesis, and do not seem to respond to endurance training as well as more mature children and young adults.

In summary, I would suggest that performance tests simply determine the obvious, and do no more than distinguish the mature child from the immature child. They may be of great value as a pedagogical tool, by raising levels of knowledge and awareness, but they are of limited use in the assessment of children’s fitness. Before teachers spend many hours attempting to assess fitness (while really assessing the potency of the motivational conditions under which they were collecting data of questionable value), perhaps we should think carefully about what fitness testing in schools really achieves.

Reference

Match or Mismatch?
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The level of involvement of pupils in sports and energetic pastimes is a reflection of motivation and provision. To what extent should a school seek to complement existing enthusiasms, and to what extent should it try to promote new ones? How far should its range of sporting activities take into account the facilities in the community? A study of the match or mismatch between in-school and outside-school activities throws light on these questions.

The Health Related Behaviour Questionnaire, now in its 10th version, has been used by some 800 pupils in 380 secondary schools. The belief which inspired its development in the late 1970s, which is that teachers often have the most distorting conception of their pupils’ lifestyles, is as strong in me as ever. The background to its development has already been described (1).

Among the many aspects of young people’s life at home, at school, and with their friends which are explored by the 66 questions in the Questionnaire, active sports and recreations are documented in Question 20 (overleaf). It will be seen that the sports and activities are divided into three groups – team activities and individual activities (the borderline between these being sometimes unclear), and other sports. The degree of participation In school and Out of school is recorded using two levels of activity, At least once a week and At least once a month. There are, therefore, several different dimensions to the resultant measure of ‘physical activity’.

Refining the ‘physical activity’ data
Recently there has been much interest in levels of physical activity in children, and the relationship between aerobic activity and health. The Coronary Prevention Project, a new initiative supported by the University of Exeter and the Exeter District Health Authority, is seeking to relate blood cholesterol with young people’s lifestyle – in particular, their physical activity and stress levels. These and other parameters are to be measured by new questionnaires in course of development in conjunction with the HEC Schools Health Education Unit. It will be most exciting if substantial links can be demonstrated; and if they can, then schools may wish us to differentiate between the typical energy demands made by the different activities in Question 20, perhaps using the well-known analysis by Bar-Or (2). Our aim is to offer just such an analysis in our new Questionnaire Version 11, due to appear in 1987.

Another innovation planned for Version 11 is to identify the different sports and activities that play a part in the pupils’ lives both inside and outside school. This article presents a selection of trial coding results from a small sample of pupils in two secondary schools (one urban, one rural) from each of the five year-groups, and records the percentage who are involved ‘at least once a week’.