The educational experiments of school health promotion for the youth in Japan: analysis of the ‘sport test’ over the past 34 years

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SUMMARY
The objective of this study was to analyze independently the results of a ‘sport test’ that had been conducted in Japanese schools for 34 years without interruption, and to examine how physical education in Japanese schools affects health promotion in youths and what problems remain to be solved. The source of materials for the present study were the Annual Reports on the Survey of Physical Fitness and Athletic Ability for the period 1965–1998, published by the Ministry of Education, Science, Sports and Culture. Means and standard deviations of total scores from physical fitness and athletic ability tests in 11-year-olds (6th graders in elementary school), 14-year-olds (3rd graders in junior high school) and 17-year-olds (3rd graders in senior high school) were analyzed. The results of this study suggest that the trends of changes in mean score and coefficient of variation (CV) for physical fitness and athletic ability in Japanese youths are associated with the outcome of physical training through physical education in school, as well as the effect of the media—mainly television and television games. (1) The increase in mean scores and the decrease in CV observed from 1964 to the first half of the 1970s were probably due to the positive influence of the Guideline for Teaching. This guideline emphasized a systematic approach to athletic techniques, together with active practice of physical fitness training in schools, under the directives of the Boards of Education in response to the social ‘Physical Fitness Campaign’ policy at that time. (2) The leveling off of mean scores and CVs observed from the early half of the 1970s to the later half of the 1980s might be a result of the invasion of television into Japanese family life. (3) The decrease in mean scores and increase in CV observed since the later half of the 1980s were assumed to be caused by the negative influence of a Guideline for Teaching characterized by the key words ‘Physical Education for More Pleasure’ and a steep increase in the number of television games. (4) In terms of methodology, analyzing not only the mean scores but also the CV probably provided a more accurate evaluation of the outcome of health promotion in youths. In conclusion, strategies for health promotion in youths, especially for proper nurturing of physical fitness and athletic ability, should include not only delivery of physical fitness training in schools, but also continuous monitoring of multiple indicators, and ensuring proper ‘Learning of the Body’. The latter should include providing learning opportunities centering on the ‘body’ (not the ‘body’ for the sake of labour or military manpower, but one’s own ‘body’ per se); guiding young people to recognize the states of their own body and physical fitness, and to understand how they can be improved. To be effective in implementation, the need to increase the number of professional teachers in physical education should be examined. All possible opportunities should also be taken to inform youths of the negative effects of television and television games, and to encourage them to spend less time on these and more time being physically active from the moment they arise.

Key words: educational experiments; physical fitness/athletic ability; school health promotion; youth
INTRODUCTION

Aiming at achieving ‘Health for All by the Year 2000’, the World Health Organization (WHO) adopted ‘The Declaration of Primary Health Care at Alma Ata’ on 12 September 1978 as the health strategy for developing countries (WHO, 1978), and also ‘The Ottawa Charter on Health Promotion’ on 21 November 1986 as the health policy targeting these nations (WHO, 1986). To fully apply these international declarations, charters and treaties to make the 21st century a real ‘Century for the Children’, it is essential to formulate health promotion strategies based on evidence (Tilford, 2000), putting children as the first priority. For this purpose, it is necessary to review the activities in health promotion for children in the 20th century and to analyze in detail the achievements and the drawbacks.

Currently, the WHO is greatly concerned with the global spread of lifestyle-related diseases resulting from an inactive lifestyle, and has advocated the ‘WHO Global Initiative on Active Living’ since 1997 (WHO, 1997). In Japan, as part of the promotion efforts of this initiative, ‘The Meeting on the Promotion of Physical Activity Among Children’ was held on 15 March 1999 in Tokyo (WHO Collaborating Center for Health Promotion through Research and Training in Sports Medicine/Department of Preventive Medicine and Public Health, Tokyo Medical University, 2000). This meeting was attended by a variety of experts on children, including:

- experts from the WHO Headquarters and Regional Office for the Western Pacific Region;
- administrations in Japan (Ministry of Health and Welfare, Board of Education of Tokyo Metropolitan Government);
- teachers engaged in school education (including ‘yogokyoyu’, a teaching profession unique to Japanese schools whose duties are diverse, including health management of school children and teachers, and planning and guidance for health promotion);
- researchers (physical education science, epidemiology, public health, etc.); and
- doctors (pediatricians, etc.).

In the meeting, the various levels of physical activity found in Japanese and Western Pacific children, especially those from Asia, were presented. As an outcome of this meeting, priority actions for the promotion of children’s physical activity in Japan and the WHO Western Pacific region were declared. One of the actions proposed was implementation of continuous monitoring of the amount of physical activity and physical fitness of children.

In discussing this priority action in Japan, the first source documents that come to mind are the surveys of physical fitness and athletic ability conducted by the Ministry of Education, Science, Sports and Culture. The contents of these surveys include the ‘Athletic Ability Test for 1st to 4th Graders in Elementary School’ (implemented after 1983), the ‘Sport Test for 5th and 6th Graders in Elementary School’ (implemented after 1964, but pilot tested in 1964), the ‘Sport Test’ for junior high school students up to 29 years of age, and the ‘Physical Fitness Test for the Adults’, targeting subjects of 30–60 years of age (implemented after 1967). The two sport tests are collectively referred to as ‘sport test’ hereafter. These tests had been conducted every year using the same test items for up to 34 years. In addition, the results of these surveys had been statistically processed annually by the Ministry of Education, Science, Sports and Culture, and published as the ‘Annual Report on the Survey of Physical Fitness and Athletic Ability’. Surveys such as these, which are conducted uninterruptedly for >30 years on a national scale at public expense, using the same test items, are unique to Japan. The data of the Survey of Physical Fitness and Athletic Ability can be described as a valuable property of mankind.

On the other hand, the educational practice in Japanese schools is implemented almost uniformly based on the ‘Government Guideline for Teaching for Kindergartens’ and the ‘Government Guideline for Teaching’ issued by the Ministry of Education, Science, Sports and Culture. For this reason, teaching practice at any given time is approximately unified nationwide, therefore it is possible to conduct educational experiments on a national scale.

School physical education in post-war Japan had undergone various changes at various times according to the characteristics of the Guideline for Teaching: from ‘New Physical Education’ to ‘Living-related Physical Education’, ‘Systematic Physical Education’, ‘Physical Education for Physical Fitness’, ‘Physical Education for Pleasure’ and ‘Physical Education for More Pleasure’. However, despite the availability of a rich pool of resource materials, the effect of the different characteristics of the Guideline for Teaching, i.e. differences in health promotion, on the outcome
of physical fitness and athletic ability of young people has not been studied in detail.

The present study assumed that the results of the aforementioned sport test reflect the outcome of health promotion achieved through enthusiastic conduct of physical education by teachers in Japanese schools. The working hypothesis was that the physical fitness and athletic ability of Japanese youths changed over time according to the curriculum of physical education and other social factors. By viewing these data from a broad perspective and analyzing them meticulously, this study aimed to delineate the achievement of physical education in Japan and to examine the drawbacks, as well as to derive some internationally recognizable opinions on health promotion in youths.

**METHODS**

*Materials and data*

The sport test conducted in Japan during the period 1964–1997 can be broadly divided into the physical fitness tests and athletic ability tests, the contents of which are summarized in Table 1.

The sport tests were conducted annually from April to October during physical training classes or school events. The schools selected for the survey were based on the number of sample

<table>
<thead>
<tr>
<th>Measurement item</th>
<th>Brief explanation of measurement</th>
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<tbody>
<tr>
<td>Physical fitness test (physical fitness element)</td>
<td>No. of stepping over three lines of fixed interval by side step in 20 s. The test was completed twice and the best record was adopted.</td>
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<tr>
<td>Side step (physical ability)</td>
<td>Distance jumped over in a vertical course without approach run. The test was completed twice and the best record was adopted.</td>
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<tr>
<td>Vertical jump (instantaneous power)</td>
<td>Trunk muscular strength measured by adopted back strength meter. The test was completed twice and the best record was adopted.</td>
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<tr>
<td>Back strength (muscle strength)</td>
<td>Forearm muscular strength measured by a hand dynamometer. The test was completed twice each in the left and right arms, and the best records of the left and right arms were averaged.</td>
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<tr>
<td>Grip strength (muscle strength)</td>
<td>Distance from floor to chin when bending the upper body upward in a face down posture. The test was completed twice and the best record was adopted.</td>
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<tr>
<td>Trunk extension (flexibility)</td>
<td>Distance from floor to finger-tip when bending the body forward in a standing position. The test was completed twice and the best record was adopted.</td>
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<tr>
<td>Standing flexion (flexibility)</td>
<td>Heart rates were measured after performing up and down exercise for 1, 2 and 3 min and the evaluation index was calculated. The test was completed once.</td>
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<tr>
<td>Step test (endurance capacity)</td>
<td>Time record of a 50 m run using a straight running track. The test was completed once.</td>
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<tr>
<td>Long jump</td>
<td>Distance of a long jump using the sandbox with a runway. The record was measured from the take-off point. The test was completed twice and the best record was adopted.</td>
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<tr>
<td>Ball throw&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Distance of a ball throw using a softball or handball. The test was completed twice and the best record was adopted.</td>
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<tr>
<td>Pull-ups&lt;sup&gt;b&lt;/sup&gt;</td>
<td>No. of pull-ups using a high horizontal bar. The test was completed once.</td>
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<tr>
<td>Zigzag dribble&lt;sup&gt;c&lt;/sup&gt;</td>
<td>Time to dribble in a zigzag path by setting poles at fixed intervals. The test was completed twice and the best record was adopted.</td>
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<tr>
<td>Continuous going up foot over foot&lt;sup&gt;d&lt;/sup&gt;</td>
<td>The number of successively going foot over foot using a low horizontal bar in 10 s. The test was completed once.</td>
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<tr>
<td>Endurance run&lt;sup&gt;d&lt;/sup&gt;</td>
<td>Time record of endurance run using the track. The test was completed once.</td>
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</table>

<sup>a</sup>Boys and girls of elementary school: softball throw; boys and girls of junior high/high school: handball throw.  
<sup>b</sup>Boys and girls of elementary school and girls of all school grade: modified pull-ups.  
<sup>c</sup>Only boys and girls of elementary school, after 1966.  
<sup>d</sup>Only boys and girls of junior high/high school: boys, 1500 m; girls, 1000 m.
schools designated by the Ministry of Education for individual prefectures. The Education Board of each prefecture then considered regional characteristics (overpopulated city, urban district, rural district). In each of the schools surveyed, students in ordinary classes (except those for whom test implementation was judged difficult) were tested. The results were always published in October of the following year in the ‘Annual Report on the Survey of Physical Fitness and Athletic Ability’. This report shows the means and standard deviations of the values measured for each test item, for male and female students. To allow overall evaluation of physical fitness and athletic ability, the measured value of each item is converted to a score (a maximum score of 5 and 20 points for each physical fitness or athletic ability test item, respectively). Higher scores represent better performance. All tests were weighed equally. The total scores for physical fitness and athletic ability tests were computed separately, and the means and standard deviations of these total scores were also shown in the annual reports.

The present study used the annual reports as source research material. The data set used for analysis comprised the means and standard deviations of the total scores of physical fitness and athletic ability tests in male and female students of the top grade for each school section, i.e. 6th graders of elementary school (11 years of age), 3rd graders of junior high school (14 years) and 3rd graders of full-time senior high school (17 years).

Table 2 shows the total registered student populations and the numbers and rates of students sampled in elementary schools, junior high schools and full-time senior high schools by year.

Data analysis

The means and standard deviations of the total physical fitness and athletic ability test scores were first subjected to the Grubs–Smirnov rejection test to eliminate outliers. The coefficient of variation (CV) was then calculated using the equation: \( CV = \frac{\text{standard deviation(s)}}{\text{mean value}} \). The trends in annual changes of mean values and CVs for both scores were examined, divided them into periods according to the year of notification of the revised Guidelines for Teaching.

RESULTS

Figure 1 shows the annual trends of the means and CVs for the total scores for the physical fitness tests during the period 1964–1997, and Figure 2 shows the corresponding data for the athletic ability tests. Each panel is divided into periods according to the year of notification of the Guideline for Teaching.

For all age groups and for males and females, the mean values of total scores for both the physical fitness and athletic ability tests showed a trend of increasing from the time of initiation of the sport test, which then leveled off from the early half of the 1970s to the later half of the 1980s, followed by a trend of decreasing from around 1990. On the other hand, the CVs for total scores started to decrease from the initiation of the sport tests, then stayed almost constant or increased gradually from the early half of the 1970s to the later half of the 1980s, followed by a
rapid increase, showing an opposite trend to that of the mean values.

In addition, excluding the acute decrease in total scores of athletic ability tests in the 11-year-olds from around 1990 (Figure 2A), the trends of changes for both total scores in the other age groups showed that although there has been a trend to decrease in recent years, the levels were approximately the same as those at the beginning of the sport tests.

**DISCUSSION**

The present study focused on the results of the Survey of Physical Fitness and Athletic Ability
conducted by the Japanese Ministry of Education, Science, Sports and Culture, and analyzed meticulously the trends of changes related to the characteristics of the Guideline for Teaching. Research of this nature, which relates results of sport tests to the characteristics of the Government Guideline for Teaching and spans a period of >30 years is probably only feasible in Japan, where a rich archive of information has been collected and stored.

As shown in Figures 1 and 2, the trends of changes in mean values and CVs for the total scores of physical fitness and athletic ability tests can be divided into three phases according to the characteristics of the trend. The first phase is from 1964, when the sport test was initiated, to the early half of the 1970s. The second phase is from the early half of the 1970s to the later half of the 1980s, and the third phase is from around 1990 to 1997 when the sport test items were changed. These three phases correspond precisely to the periods of implementation of Guidelines for Teaching with different characteristics.

The following discussions focus on the trends of changes in mean value and CV for the total scores of physical fitness and athletic ability tests, in each of the above-mentioned three periods and in relation to the characteristics of the Guideline for Teaching and the lifestyle background of the children. Finally, the validity of the two indices used in this study, mean values and CV, in confirming the achievement of health promotion is also discussed.

**From 1964 to the early half of the 1970s**

Although the Guideline for Teaching in Japan during this period focused on a systematic approach to athletic techniques (Table 3) and did not necessarily place any emphasis on physical fitness training, a rapid improvement in physical fitness and athletic ability in youths can be observed. These results are most interesting, in that physical education focusing on the systematic approach of athletic techniques not only increases athletic ability but also improves physical fitness.

During this period, triggered by the 1964 Tokyo Olympic Games, the low level of physical fitness of the Japanese people was focused on as an

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**Table 3:** The characteristic of the physical education in each ‘Government Guideline for Teaching’ notified by the Ministry of Education, Science, Sports and Culture in Japan

<table>
<thead>
<tr>
<th>Notification year (complete enforcement year)</th>
<th>[Catch phrase]</th>
<th>Physical education characteristics in each Guideline for Teaching</th>
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<tr>
<td>1958 (1961)&lt;sup&gt;a&lt;/sup&gt;, 1958 (1962)&lt;sup&gt;b&lt;/sup&gt;, 1960 (1963)&lt;sup&gt;c&lt;/sup&gt;</td>
<td>[Systematic Physical Education]</td>
<td>The character of the Guideline for Teaching was different from the former one because ‘The School Education Act’ enforcement regulations were partly revised. Its character of reference/guide was changed to a ‘standard’, and legally bound by law. Importance of a learning style on exercise technical systems was emphasized in this guideline.</td>
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<td>1968 (1971)&lt;sup&gt;a&lt;/sup&gt;, 1969 (1972)&lt;sup&gt;b&lt;/sup&gt;, 1970 (1973)&lt;sup&gt;c&lt;/sup&gt;</td>
<td>[Physical Education for Physical Fitness]</td>
<td>In this Guideline for Teaching, an item of lessons about physical education was founded as item 3 of Chapter 1, general rule. Importance of physical education activity through the whole education activity in a school was stated clearly. With respect to physical education classes, ‘systematic physical education’ was changed to ‘physical education for physical fitness’, which prompted physical fitness.</td>
</tr>
<tr>
<td>1977 (1980)&lt;sup&gt;a&lt;/sup&gt;, 1977 (1981)&lt;sup&gt;b&lt;/sup&gt;, 1980 (1982)&lt;sup&gt;c&lt;/sup&gt;</td>
<td>[Physical Education for Pleasure]</td>
<td>In this Guideline for Teaching, ‘long-life sports theory’ was placed as important. ‘Physical education for pleasure’, which was theoretically derived from a play theory, was emphasized.</td>
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<td>1989 (1992)&lt;sup&gt;a&lt;/sup&gt;, 1989 (1993)&lt;sup&gt;b&lt;/sup&gt;, 1989 (1994)&lt;sup&gt;c&lt;/sup&gt;</td>
<td>[Physical Education for More Pleasure]</td>
<td>In this Guideline for Teaching, ‘the education that regarding an individual as important’ was emphasized under a title of ‘New outlook on scholarship’. This guideline still pursues pleasure and, on the other hand, interest/will/manner was regarded as more important than acquirement of knowledge/skill. In addition, a ‘selection system’ in which one can select some sports items in the whole physical education was introduced.</td>
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<sup>a</sup>Elementary school; <sup>b</sup>junior high school; <sup>c</sup>high school.
Fig. 1: The annual trend of means (♂: boys, ♀: girls) and coefficient of variation (△: boys, ▲: girls) of total scores of physical fitness tests. These data are based on the ‘Annual Report on Survey of Physical Fitness and Athletic Ability’ by the Ministry of Education, Science, Sports and Culture in Japan. (a) 11-year-olds (6th graders in elementary school); (b) 14-year-olds (3rd graders in junior high school); (c) 17-year-olds (3rd graders in full-time high school). (1) The period aiming at ‘Systematic Physical Education’ in the Guideline for Teaching; (2) the period aiming at ‘Physical Education for Physical Fitness’ in the Guideline for Teaching; (3) the period aiming at ‘Physical Education for Pleasure’ in the Guideline for Teaching; (4) the period aiming at ‘Physical Education for More Pleasure’ in the Guideline for Teaching.
Fig. 2: The annual trend of means (○: boys, ●: girls) and coefficient of variation (△: boys, ▲: girls) of total scores of athletic ability tests. These data are based on the ‘Annual Report on Survey of Physical Fitness and Athletic Ability’ by the Ministry of Education, Science, Sports and Culture in Japan. (a) 11-year-olds (6th graders in elementary school); (b) 14-year-olds (3rd graders in junior high school); (c) 17-year-olds (3rd graders in full-time high school). (1) The period aiming at ‘Systematic Physical Education’ in the Guideline for Teaching; (2) the period aiming at ‘Physical Education for Physical Fitness’ in the Guideline for Teaching; (3) the period aiming at ‘Physical Education for Pleasure’ in the Guideline for Teaching; (4) the period aiming at ‘Physical Education for More Pleasure’ in the Guideline for Teaching.
important social problem, and physical fitness training boomed. At government level, inquiry and reply sessions were repeatedly directed to the Consultative Committee for the Health and Physical Education from around 1960. The Sports Promotion Law (1961) was promulgated, and the sport test was drafted and published (1962), pilot tested (1963) and enforced (1964) in rapid succession, leading to the early establishment of a system. In 1964, Japan welcomed the Tokyo Olympic Games. Immediately afterwards, the Health and Physical Fitness Related Cabinet Minister Conference (1964) was held, in which ‘Measures to Promote Health and Physical Fitness of the People’ were decided, leading to the establishment of the Physical Fitness National Conference. The Physical Fitness Campaign at this time was in full flow (Masaki, 2000).

Responding to the public concern regarding the ‘low physical fitness in youths’, the educational field also acted by adding a new item No. 3 ‘Guidance on Physical Education’ to Chapter 1 ‘General Provisions’ in the revised Guideline for Teaching in the late 1960s (elementary school, 1968; junior high school, 1969; senior high school, 1970). This item specified emphasis on physical activities throughout educational activities in schools. This was actively implemented, as physical fitness training practices utilized the time before lessons and during recess. Furthermore, physical education lessons also switched from ‘Systematic Physical Education’ towards ‘Physical Education for Physical Fitness’, with physical fitness training brought to the forefront. Therefore, although the characteristics of school physical education in the Guideline for Teaching during this period emphasized ‘Systematic Physical Education’, this was a period when physical fitness became a large social issue and an educational problem also unfolded, which was hotly debated. The after-effects also spread to the area of physical education in schools. Long before the revision of the Guideline for Teaching in the late 1960s, school physical education was already being developed to focus on ‘physical fitness’ under the directives of the Board of Education (Kumita and Komatsu, 1971).

These observations indicate that the improvement of physical fitness and athletic ability in the youths during this period was a result of a positive influence of the Guideline for Teaching emphasizing a systematic approach to athletic technique, combined with physical fitness training practiced in schools under the so-called ‘top-down’ directives from the administration including the Board of Education.

The practice during this period, which emphasized a systematic approach to athletic technique while consciously building physical fitness, gradually removed the individual differences in athletic ability, as shown by the trend in CVs for the two total scores. When a decrease in individual difference is observed among a population, this may also include the possibility of lowered levels of physical fitness and athletic ability in subjects with initially high scores, so that the distribution range is narrowed. However, since the mean values showed an increasing trend, a reasonable assumption is that improvement in subjects with low initial scores contributed to narrowing the distribution range.

These findings suggest that in order for school physical education to play a role in the important goal of achieving a certain level of physical fitness and athletic ability in all young people, educational practice to build physical fitness is a very important factor.

From the early half of the 1970s to the later half of the 1980s

The continuous increases in physical fitness and athletic ability from the time of initiation of the sport test almost leveled off from the first half of the 1970s to the later half of the 1980s.

The school physical education in this period fully implemented ‘Physical Education for Physical Fitness’, which was emphasized in the Guideline for Teaching revised in the late 1960s. Shortly after the revision, however, criticism started to emerge against forcing physical fitness training on youths. The Guideline for Teaching revised in the later half of the 1970s (elementary and junior high school, 1977; senior high school, 1978) was changed to one that emphasized ‘Physical Education for Pleasure’, based on the Play Theory represented by the theories of Hizinga and Caillois (Takeda et al., 1997). In the background to this change was the global advocacy of ‘Sports for All’ by the United Nations Educational, Scientific and Cultural Organization (UNESCO, 1967). This concept of extended rights to sports was mistakenly interpreted in Japan as ‘lifelong sports’. The pursuit of ‘pleasure’ in school physical education was regarded as an important action in accomplishing ‘lifelong sports’, which also exerted an impact on physical education in school.
If one considers the fact that ‘Physical Education for Physical Fitness’ was fully implemented from the beginning of the 1970s, and that training for physical fitness had started in earnest in all schools nationwide, plus the fact that Japanese youths were growing continuously in physique, then the stagnated increase in physical fitness and athletic ability during this period is indeed an unexplainable phenomenon.

A large volume of research has been devoted to the physical strength and activity of children in relation to the media, especially with respect to the amount of time spent watching television, and concern has been expressed about this (Anderson et al., 1998; Armstrong et al., 1998; Robinson, 1999). In particular, Armstrong et al. reported that the longer the television viewing time, the higher the BMI and skinfold in children (Armstrong et al., 1998), and that although no significant correlation was observed with muscular strength, endurance and flexibility, these aspects required further study. In addition, when we reported a part of this study at the XVIth World Conference on Health Promotion and Health Education held in Puerto Rico in June 1999 (Noi et al., 1998), we obtained comments from many participants on the negative influence of television and television games. These findings and suggestions indicate that when discussing the health, physical fitness and athletic ability of children, comprehensive consideration of lifestyle, including the effect of the media, must be taken into account. Among these factors, discussion of the amount of physical activity is indispensable.

In this context, we searched the ‘Yearbook of Machinery Statistics’ compiled by the Research and Statistics Department, Minister’s Secretariat, Ministry of International Trade and Industry, and observed the trends in annual television shipments and sales (Figure 3). The sales, which were maintained at a constant low level, rose dramatically from 1965 to the early 1970s, and then plateaued at a high level.

Therefore, the sudden arrest of increase in physical fitness and athletic ability in Japanese youths coincided remarkably with the period when televisions became popular in all Japanese families. This factor is suspected of being one of the reasons for the failure of school physical education to accomplish the expected goal of physical fitness building in Japanese youths. Therefore, measures to correct the decrease in physical activity in everyday life are an important issue in health promotion for young people.

Fig. 3: (a) The annual trend of sum of shipment and sales of television receivers (□). These data are based on the ‘Yearbook of Machinery Statistics’ compiled by the Research and Statistics Department, Minister’s Secretariat, Ministry of International Trade and Industry in Japan. (b) The annual trend of sum of shipment of metallic toys, including electronic toys after 1994 (television games, etc.) (■). These data are based on the ‘Census of manufacturers, report by commodity’ compiled by the Research and Statistics Department, Minister’s Secretariat, Ministry of International Trade and Industry in Japan.
In addition, one should not neglect the background of the switch from ‘Physical Education for Physical Fitness’ (which was not favoured by youths at the time) to ‘Physical Education for Pleasure’ in schools. One suggestion is that the change was associated with the fact that physical training at that time was not a voluntary activity favoured by the youths, but was forced upon them by the school authority (Takeda et al., 1997). These observations suggest that in the practice of body building or fitness building, it is indispensable that youths are given systematic learning opportunities, through which they recognize the states of their own body, physical strength and athletic ability, and from this may find out what kind of body, physical strength and athletic ability they wish to accomplish. An example of such learning is ‘Learning of the Body’.

On the other hand, as shown in Figures 1 and 2, the CVs in this period were extremely low compared with the other periods. This finding confirms earlier speculation that the practice of physical fitness training in schools, starting from the initiation of the sport test to the early half of the 1970s, had raised the level of physical fitness and athletic ability of youths to a high baseline level, as discussed above. This aspect may be evaluated frankly as an achievement of the school physical education in this period.

**From around 1990 to 1997, when the sport test items were changed**

The levels of physical fitness and athletic ability that had increased markedly during the several years after the initiation of the sport test and had thereafter plateaued at a high level began to decrease from the later half of the 1980s, accompanied by a trend of increasing CV.

The later half of the 1980s corresponds to the period when the Guideline for Teaching used today was introduced. In this Guideline for Teaching, the feature of ‘Sports for Pleasure’ has been strengthened to the realization of ‘Lifelong Sports’. Under the heading of ‘New Viewpoint of Academic Achievement’, ‘Education Attaching Importance to the Individual’ is being emphasized. Instead of learning and mastering ‘knowledge and skills’, the cultivation of ‘interest, motivation and attitude’ is being stressed. In addition, under administrative directives, guidance that may discourage ‘Sports for Pleasure’ has been modified, and emphasis is placed upon delivering sport practices within the limit of giving support to the person practicing them. With respect to the subjects taught in physical education lessons, a selection system has been actively introduced, where students can choose from several sport items, aiming to respect the students’ independence.

Obviously, pleasure is an important factor to consider in the process of learning. However, many people question the appropriateness of setting ‘taking pleasure’ as a learning objective in school physical education lessons (Takeda et al., 1997). As regards the selection system, although helping students to master the techniques and skills of their sports of choice according to individual capability and proficiency is at times an important aspect in school physical education, the present situation of introducing the selection system without waiting to substantiate the hardware part, such as the number of teachers and equipment, is creating many contradictions. There is a viewpoint that learning fundamental skills and reaching a certain level in sport are indispensable elements of school physical education; however, over this period there has been the beginning of an acute decline in the level of, and an increase in the individual difference of, physical fitness and athletic ability in youths, which probably highlights a drawback of the school physical education provided by the present Guideline for Teaching.

With the emphasis of ‘Lifelong Sports’ and ‘The New Viewpoint of Academic Achievement’ as a background to current physical education in schools, the above results cast doubts on whether solely pursuing ‘pleasure’ actually enhances the enthusiasm towards sports and cultivates the ability to enjoy exercise or sports throughout life. Furthermore, we anticipated that lifestyle, including the media, may exert an influence during this period on the downturn in physical fitness and athletic ability. To examine this hypothesis, we surveyed the annual trend of the sum of shipments of metallic toys (including electronic toys such as television games) after 1994, recorded in the ‘Census of Manufacturers’, Report by Commodity, edited by the Research and Statistics Department, Minister’s Secretariat, Ministry of International Trade and Industry (Figure 3). Although there was a gently increasing trend up to 1984, this became a drastic rise from 1985 to 1993. Therefore, the annual trend of the sum of shipment of metallic toys represented by television games coincides precisely with the period of downturn in physical fitness and athletic ability of Japanese youths.
One other point is noteworthy with respect to the trend of physical fitness and athletic ability during this period. The total scores of athletic ability in 11-year-old boys and girls both showed very marked declines not seen in other age groups. As can be seen from the sport test items, athletic ability tests assess how much an individual is capable of utilizing and demonstrating her/his physical strength efficiently in an athletic situation. It follows that this ability should be based on physical strength. However, viewing the total scores of physical fitness in 11-year-old boys and girls, there are no significant differences from the other age groups. These findings indicate that the extremely low athletic ability is caused by the inability to fully demonstrate the level of physical strength in an athletic situation.

To evaluate the efficacy of an experimental health-related physical education curriculum and professional development program (Sports, Play and Active Recreation for Kids, SPARK), McKenzie et al. conducted an intervention study by observing physical education lessons delivered by physical education specialists (PES), trained classroom teachers (TT) and controls (McKenzie et al., 1998). They concluded that children’s manipulative skills can be improved by quality physical education programs delivered by PES and TT. This report provides very useful information for discussion on the abnormally low athletic ability demonstrated in Japanese elementary schools. In Japan, most elementary schools are not equipped with specialist teachers in physical education, which is delivered by classroom teachers, whereas junior and senior high schools are. Therefore, junior and senior high schools staffed with specialist teachers in physical education are able to maintain a certain level of athletic ability despite the decline suspected to be caused by the characteristic of the Guideline for Teaching of this period and changes in lifestyle due to the popularization of television games. On the other hand, elementary schools not staffed with specialist teachers in physical education are able to maintain a certain level of athletic ability despite the decline suspected to be caused by the characteristic of the Guideline for Teaching of this period and changes in lifestyle due to the popularization of television games. On the other hand, elementary schools not staffed with specialist teachers in physical education are unable to contain the decline, resulting in a drastic and continued decrease, and continuation of this trend may be predicted for the future. If this hypothesis is true, then the task of putting a stop to the decline in athletic ability in 11-year-old boys and girls may be solved unexpectedly easily by a policy of staffing elementary schools with specialist teachers in physical education.

The coefficient of variation as an effective evidence-based index

In general, the mean values for a population are the statistical values used as indices for the outcome of health promotion. In the present study, however, we attempted to use the CV as an additional index besides the mean value. The reason is that one of the important tasks of school physical education is to achieve a certain level of physical fitness and athletic ability in all youths. Besides, it is our understanding that the opportunity for such development is the right of the children.

Our study shows that the outcome of health promotion not only affects the mean value for the population but also the CV, which reflects the size of individual difference, and that it is necessary to evaluate the outcome using both parameters. These findings demonstrate that by supplementing the changes in mean value with the changes in CV, more accurate evaluation of the outcome of health promotion can be achieved.

The sport test used during the survey period of 1964 to 1997 was constructed based on the standards of physical fitness science in Japan in the early 1960s, and is not compiled based on international opinions. Furthermore, this test is a survey to evaluate the maximum performance of physical strength and athletic ability, and measures physical fitness and athletic ability based on a theory different from the concept of health-related fitness that has emerged mainly in the Western world in the 1980s (Falls, 1980; Gutin, 1980; Pate, 1983; Casperson et al., 1985). Nevertheless, the Japanese government has persistently surveyed physical fitness and athletic ability annually using the same items for 30 years. The result is the accumulation of a rich body of data that have permitted such detailed research as the present study. These data, which are extremely valuable for mankind, should not be held within Japan; sharing them internationally is important. Nowadays, when school physical education is being neglected as a global trend (International Council of Sport Science and Physical Education, 2000), these data provide us with valuable research materials.

Although the data are not shown in this article due to length constraints, we also examined the characteristics of the changes in each item of the sport test and focused on the differences in individual elements. For example, a decreasing
The trend has now been confirmed for the physical fitness parameters of back strength, trunk extension and standing flexion; and for all athletic ability parameters except the 50-m run. In particular, the persistent decrease in back strength in Japan since the initiation of the surveys in 1964 has been a cause for concern (Shimizu et al., 1998). While the same trend of decrease has been observed in other countries (Heebøll-Nielsen, 1982; Anderson and Henckel, 1987), this is indeed a crisis faced by humans, who have acquired a variety of cultures and abilities from walking erect on two feet. Therefore, we propose that the trend of decreasing trunk muscular strength indicated by reduced back strength, accompanied by drastically reduced body flexibility (trunk extension and standing flexion) are issues confronting school physical education that deserve international focus.

On 24 June 1998, the United Nations Committee on the Rights of the Child examined a report by the Japanese Government from various angles and submitted their ‘Concluding Observations’ (United Nations Committee on the Rights of the Child, 1998). Paragraph 9 of the document raised the major concern of insufficient statistical data collection concerning children. Paragraph 31 recommends the establishment of data collection systems with respect to children. From the viewpoint of seriously responding to the recommendations of the Committee, and also from the perspective of the enormous international value of the sport test data, the hasty change in 1998 to the sport test items that had been tested continuously for 34 years is without doubt a great loss to mankind. The change was made without adequately summing up the data collected or exchanging information with the people concerned, including the children. The Ministry of Education explained the reasons for change as being due to changes in scientific thinking concerning physical fitness, the need to develop a physical fitness test for those >60 years of age (accompanying the rapid ageing of society), and revision of the appropriateness of measurements and evaluation standards (Aoki and Arai, 1997). Even assuming that the changes are necessary, they should be based on international opinions and concepts. In this context, the new sport test should have been compiled by revising the discussions of the International Committee of the Standardization of Physical Fitness Tests [(ICSPFT and Larson, 1974); established at the International Congress of Sports Sciences held during the 1964 Tokyo Olympic Games] with respect to the present situation, as pointed out by Mizuno (Mizuno, 1997). The new sport test is in effect being implemented nationwide. In order that the data of the sport test (which was accumulated involving great efforts by schools) do not go to waste, we recommend that at least those items showing a decline at present should be revived and added to the new sport test as optional items, at least until the declining trend is halted.

The WHO and IUHPE have summed up the health and physical fitness of children all over the world and published the ‘White Paper on Health and Physical Fitness of Children in the World’. This initiative is expected to be accomplished through health promotion efforts with the target of improving the health and physical fitness of the people who will be ‘in charge’ in the 21st century.

**Future directions**

The present study has clearly shown that educational practice is important in building physical fitness, and that the concept and practice of physical education affects the level of physical fitness and athletic ability of youths. The next action will be to examine how education should be implemented to achieve the goal of building and maintaining physical fitness. This should be examined using a comprehensive approach, including a focus on the physical education curriculum, the school infrastructure for physical education such as staffing, and the curriculum for youths, including an age-specific approach. Urgent studies in these areas to provide guidelines for future policies are required. We would therefore recommend the following actions for the promotion of physical fitness and athletic ability of youths: (i) the introduction of ‘Learning of the Body’ in the school curriculum; (ii) the recruitment of professional teachers in physical education in elementary schools; and (iii) the formulation of a counter-plan against the negative influence of television and television games.

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REFERENCES


