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SECULAR TREND AND MOTOR PERFORMANCE SCORES IN HUNGARIAN SCHOOL-BOYS

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Abstract. *The aim of the present investigation was to compare the height, body mass, relative body fat content and two of motor test scores (30 m dash and 1200 m run) in the samples of Budapest children aged between 10 and 13 years investigated in 1975 (n = 739) and 2000 (n = 660).*
As one of the consequences of secular growth trend the boys were significantly taller and heavier in 2000 than 25 years ago in all the four studied age groups. Their mean relative body fat content was also greater. No significant differences were found between the means of 30 m dash time, nevertheless, their average running time in endurance test was statistically longer in 2000.
The possible explanations of the observed unfavourable tendencies can be: The prestige of general, non-competitive like regular physical activity, the number of classes with special PE curriculum, the number of sport schools and youth departments within the sport clubs have decreased markedly during the past decades.

Key words: *height, body mass, run*

1. INTRODUCTION

All living creature continuously change under the pressure of environmental conditions. These changes affect either the genotype or the phenotype (when the environment modifies the manifestation of genetic endowment).

In auxology the term secular trend is generally applied to such positive changes that have become manifested in a faster growth, an earlier maturation of children a taller stature of adults etc. (Susanne & Bodzsár, 1998). However, negative tendencies were also described, when the living conditions have markedly decreased for longer period.

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Consequently secular changes in growth and development are ways to observe socio-economic conditions of populations as well as their state of health.

The secular trend is more marked among the lower social classes than in the upper ones in the European countries (Vercauteren & Slachmuylder, 1993).

The series of height and body mass means for the Budapest (capital of Hungary) children embrace the years 1930 through 1990 and show a significant trend of increase (Bodzsár, 1998). The increase of mean stature and body mass was larger in the boys and young adult males during the past 20-30 years (Eiben et al., 1991; Mészáros et al., 1981).

Regarding physique and body composition two observations may be of interest. Eiben, (1995) described a more or less marked increase in the endomorphy of somatotype within 30 years observation period. Mohácsi and associates (1994) investigated the growth type of Conrad, (1963) in the 1975 and 1991 data of Budapest youngsters and they have that the mean growth type as more linear in 1991.

Unfortunately no observations are available for the changes in motor performance either in Hungary or in Europe. The only publication refers to Wolansky, (1978). The author made only a theoretical conclusion. Parallel with increase in height and weight the linearity of physique also increases, however the physical performance decreases both in children and adults as the consequences of secular growth trend.

The aim of the present investigation was to compare the height, body mass, relative body fat content and two of motor test scores in the samples of Budapest children aged between 10 and 13, investigated in 1975 and 2000.

The increase in mean height and body mass is out of question in this respect, but greater body fat content and lower mean endurance and speed performances were hypothesised at the sample of 2000.

2. SUBJECTS AND METHODS

The subjects were volunteer boys living in the same districts of the capital in both data collection. All of them were non-athletes, they took part only in the curricular PE classes (2-3 classes in a week, 45 minutes each). Children taking part in the additional sports lessons were excluded from these samples.

The age groups were created by the suggestions of International Biological Program (Weiner & Lourie, 1969). Frequency distribution of the subjects by age and investigation was as follows.

Age	1975	2000
9.51-10.50	188	160
10.51-11.50	191	165
11.51-12.50	180	166
12.51-13.50	180	169

Stature, body mass and the necessary skinfold thicknesses were taken by the suggestions of IBP (Weiner & Lourie, 1969). Taking into account the significant relationship between height and body mass the relative body mass was also calculated (relative body mass = body mass $\times$ 0.01stature^{-1}).

Body fat content was expressed as a percentage of total body mass using the tables of Parizková, (1961).

Cardiorespiratory endurance, speed performance were estimated by the time of 1200 m run, and 30 m dash. Execution was as determined by the rules of track and field athletics. In the speed test 3 trials were completed and the best result was entered into the statistical analysis.

Differences between the respective means were tested by t-test at 5% level of random error.

3. RESULTS

The results of descriptive and comparative statistics are summarised in tables. Table 1 contains the means and standard deviations of height. The prepubertal boys were significantly taller in 2000 than 25 years ago in all the four studied age groups, however, the standard deviations around the means did not change during the observation period.

Table 1. Differences between the height means (cm)

Age	1975		2000		P
	Mean	SD	Mean	SD	
10	138.80	6.38	141.59	6.18	< 0.05
11	143.56	6.51	146.68	6.28	< 0.05
12	149.79	7.80	153.37	6.99	< 0.05
13	156.18	9.26	160.90	9.47	< 0.05

Abbreviations: SD = standard deviation, P < 0.05 = the difference between the means is significant at 5% level of random error.

The absolute and relative (relative to stature) body mass means and standard deviations can be seen in Table 2. The youngsters in the second investigation were significantly heavier than their age mates in the first data collection. The greater body mass is the consequence of their significantly taller height in part, nevertheless the differences between the relative body mass means were also significant. The boys in the second investigation were consistently heavier in relative meaning too.

Table 2. Differences between the absolute and relative body mass means

Absolute body mass (kg)

Age	1975		2000		P
	Mean	SD	Mean	SD	
10	33.01	5.50	35.56	5.59	< 0.05
11	36.42	6.89	38.95	6.87	< 0.05
12	40.77	8.27	43.59	8.31	< 0.05
13	45.50	8.77	49.82	8.32	< 0.05
Relative body mass (kg × cm-1)					
10	23.78	3.96	25.11	3.95	< 0.05
11	25.27	4.74	26.55	4.68	< 0.05
12	27.22	5.52	28.42	5.42	< 0.05
13	29.13	5.61	30.96	5.17	< 0.05

Abbreviation are as in Table 1.

The height and body mass means in 1975 were very close to the respective Budapest reference data (Eiben et al., 1971), but our samples investigated in 2000 were slightly taller and heavier than the characteristic means at the beginning of the final decade of the past century (Eiben et al., 1992).

The taller stature and heavier body mass means can be related to the effects of secular growth changes, however, the differences in relative body fat content are the consequences of a modified life style. These results are summarized in Table 3. The height related fatness was significantly and consistently greater in the second investigation. The standard deviations around the fat means were markedly high (ranging between 25-33% of the respective averages) in both investigations. The increasing fatness coincides with the observation of Eiben, (1985), who investigated the Körmend (south-west Hungary) population.

Table 3. Differences between the relative body fat content means (%)

Age	1975		2000		P
	Mean	SD	Mean	SD	
10	17.72	5.92	19.36	5.36	< 0.05
11	18.79	6.30	19.85	6.00	< 0.05
12	19.26	6.23	20.33	6.24	< 0.05
13	19.32	5.79	20.41	5.51	< 0.05

Abbreviation are as in Table 1.

We have to note that the fat content between 18-20% of body mass can be qualified as high, unfavourably and unhealthy in 10-13-year-old boys in both investigation, and this moderate obesity is basically the consequence of sedentary life style. Our former results indicate 14-15% body fat in regularly training youngsters (but not competitive athletes) of the same age range (Mészáros et al., 1991).

No consistent differences were found between the means of the used speed test (30 m dash), thus the numeric data were slightly greater in the time of second investigation (Table 4). In our opinion the scoring in short burst out activity in non athletic individuals depends in a major part on the inheritance. The marked change in the genetic background (in healthy groups of the population) is not a real expectation during 25 years.

Table 4. Differences between the 30m dash means (s)

Age	1975		2000		P
	Mean	SD	Mean	SD	
10	5.89	0.44	5.99	0.76	NS
11	5.74	0.41	5.79	0.75	NS
12	5.64	0.40	5.67	0.83	NS
13	5.42	0.37	5.50	0.59	NS

Abbreviation are as in Table 1 and
NS = the difference between the means is not significant at 5% level of random error.

The aerobic fitness was estimated by running time in 1200 m run. Mean running times and standard deviations can be seen in Table 5. The endurance was significantly weaker at the time of second investigation in all the compared groups.

Table 5. Differences between the 1200m run means (s)

Age	1975		2000		P
	Mean	SD	Mean	SD	
10	367.20	53.21	398.08	51.52	< 0.05
11	357.01	48.51	371.08	54.37	< 0.05
12	345.20	44.69	372.69	49.29	< 0.05
13	330.29	37.75	354.46	48.41	< 0.05

Abbreviation are as in Table 1.

The unchanged speed and the significantly decreased endurance performance between 1975 and 2000 seem to be a bit amazing. By the significant negative relationship between height, body mass, 30m dash and 1200 m run scores (Mészáros et al., 1985) the better physical performances would be predicted and expected.

4. Discussion

The stature and the body mass means of the Budapest youngsters were significantly taller and heavier than 25 years ago. These differences are in harmony with the described tendencies of secular growth trend (Bodzsár, 1998; Bodzsár & Susanne, 1998), however the increased relative body fat content cannot be evaluated as a favourable consequence of the trend. The greater body fat content and the lower performance in the endurance test do not predict towards the favourable health status of our next generation.

Among the possible reasons and explanations of the observed unfavourable tendencies can be mention.

Thus, the successfulness of the Hungarian athletes in competitive sports represent important and high quality even in Hungary, the prestige of general, non-competitive-training like regular physical activity has decreased markedly during the past decades. The ratio of young athletes has reduced significantly, from 20-25% to 7-8%. The ratio of classes with special PE curriculum was about 30% 25 years ago, and they represent exceptions nowadays.

As one of the consequences of technical development the "screen-age generations" (sitting in front of the computer screen) have developed in Hungary as in the western countries did it earlier, as well.

Parallel with the continuously decreased living standard between 1980-1995, the number of sport schools and youth departments within the sport clubs have dramatically reduced. Consequently the physical activity became a beneficial business. However, the major part of the families cannot and do not want to pay for their children's regular physical activity. The unchained ratio of PE classes in the elementary schools cannot compensate for the missing, but biologically necessary physical stimuli.

5. Conclusion

Secular changes in growth and development are ways to observe socioeconomic condicions of populations as well as their state of health.

The series of height and body mass means for Budapest shows a significiant trend of increase (Bodzsar, 1998). The increase of mean stature and body mass were langer in the boys and young adult males during the past 20-30 year (Eiben et al., 1991; Meszaros et al., 1981).

Unfortunately no published data ara available for the changes in motor performance either in Hungary or in Europe.

The aim of the present investigation was to compare the height, body mass, relative body fat content and two of motor test scores (30m dash and 1200 m run) in the samples of Budapest children aged between 10 and 13 years investigated in 1975 (n =739) and 2000 (n = 660).

As one of the consequences of secular growth trend the boys were significantly taller and heavier in 2000 than 25 years ago in all the four studied age groups. Unfortunately their mean relative body fat content was also greater. No significant differences were found between the means of 30 m dash time, nevertheless, their average running time in endurance test was statistically longer in 2000.

The possible explanations of the observed unfavourable tendencies can be: The prestige of general, non-competitive like regular physical activity, the number of classes with special PE curriculum, the number of sport schools and youth departments within the sport clubs have decreased markedly during the past decades.

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SVETSKI TREND I MOTORIČKO IZVOĐENJE DEČAKA ŠKOLSKOG UZRASTA U MAĐARSKOJ

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Cilj ovog istraživanja je bio komparacija telesne težine, telesne mase i sadržaja relativnog telesnog masnog tkiva, kao i dva motorička testa za merenje rezultata brzine trčanja (30 m sa preponama i 1200 m) na uzorcima dece iz Budimpešte, uzrasta između 10 i 13 godina ispitivanih 1975. (n = 739) i 2000 (n = 660). Kao jedna od posledica periodičnog razvojnog trenda utvrđeno je da su dečaci značajno viši i teži u 2000-toj, nego pre 25 godina u sve četiri ispitivane grupe. Na žalost, prosečna vrednost relativne telesne masnoće je takođe veća. Nisu utvrđene značajne razlike između prosečnih vrednosti rezultata trčanja na 30 m sa preponama, a vrednosti izdržljivog trčanja su značajno manje u 2000-toj. Moguće objašnjenje posmatranih nepovoljnih tendencija može da bude: preovladavanje generalne u odnosu na regularnu fizičku aktivnost, broj razreda sa specijalnim programom fizičkog vaspitanja, smanjenje broja sportskih škola i odeljenja unutar sportskih klubova.

Ključne reči: *visina, telesna visina, masa, trčanje*