

SOME CHARACTERS OF SOMATOPSYCHIC STATUS OF CHILDREN

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Abstract: The authors summarized results of somatopsychic examination of 7 year old children (N=95) and 11 year old (91) children on the basis of follow-up study with 2 year interval. The changes of weight, height, percent body fat, total body fat, lean body mass, reaction time, attention and IQ were examined.

The authors established, among others, girls have significant increment both in LBM ($p < 0.001$) and in total body fat ($p < 0.05$) in two examined intervals, while boys have significant increment only in LBM ($p < 0.001$).

The reaction time decreased significantly in two sexes (except 7-9 year old boys). However, the attention progressed significantly both in boys and girls during puberty.

The rate of boys' IQ (Raven test) increased significantly between 11-13 years of age, while girls' IQ remained unchanged.

Key words: Longitudinal study; Body composition; Disjunctive reaction time; Attention; Intelligence; 7-year-old, 11-year-old-children.

Introduction

The number of investigations concerned with the relationship between the physical and mental development are relatively few in Hungary (Bodzsár 1981, Bodzsár and Pápai 1993), and in foreign countries as well (Barker 1937, Scripcaru et al. 1984, Shuttlewath 1939, Stone et al. 1955, Tanner 1966, Lindgren 1979). The different results of the examinations are not entirely correspond. According to some authors there can be a parallelism between the physical and mental development, but others deny it.

In the present study we summarise the results of anthropological and neurofunctional examinations on the basis of a follow-up study with a 2-year interval during the period 1981-1983 at a primary school in an inner district of Budapest.

The purpose of this study:

- to establish the sexual differences of anthropological and neurofunctional parameters
- to determine the sexual difference of the rate of growth,
- to determine the differences of the neurofunctional parameters of boys and girls subgrouped by the body fat percent,
- to establish connections between somatic and psychic development of children.

Material and methods

We have carried out a 5 year longitudinal study of the children in primary school based on anthropological, neurofunctional, cardiorespiratoric, motor and sociologic parameters.

The sample consisted of 95 (45 boys and 50 girls) 7-year-old, and 91 (43 boys and 48 girls) 11-year-old children. Two age groups (7-9 and 11-13 years) of these children were investigated during these years.

We evaluated the changes of weight, height, and body composition (Durnin and Rahaman 1967, Siri 1956), disjunctive 4-choice reaction time, attention, and level of intelligence (Lehman 1962, Woodworth and Schlosberg 1966).

The disjunctive reaction time with disjunctive reaction time measuring equipment (in modes perception and reaction), the attention with tachistoscope, and the level of intelligence with Raven test were carried out.

As for statistical methods, comparison of various parameters was performed with Student test, and Kruskal-Wallis test, and the connection between various parameters with Kendall-Spearman correlation (Yule and Kendall 1964).

Results

Significant differences were found between the boys and girls at the ages of 7 and 9 in LBM and in body fat percent. The rate of growth - except body fat% - was significant in every anthropological parameter in both sexes. The rate of growth was significantly different between the boys and girls only in body fat%. There was more intensive increase of body fat% in boys between 7 and 9 years (Figure 1).

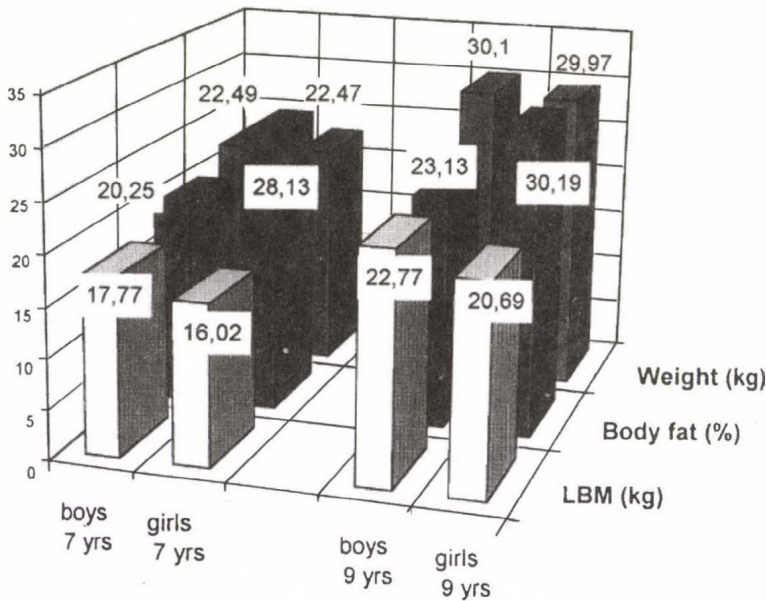


Fig. 1: Changes of some anthropological parameters between 7-9

There were significant differences in the anthropological means of boys and girls - except the LBM- at the age of 11. These differences were maintained at the age of 13 as well. The rate of growth - except the body fat% - was significant in all anthropological parameters in both sexes (Fig. 2).

At the age of 7 the disjunctive reaction time was shorter, and the performance % of the disjunctive reaction time was better in girls, than boys. There was a significant difference between boys and girls in the intensity of reaction time shortening (Figs. 3, 4).

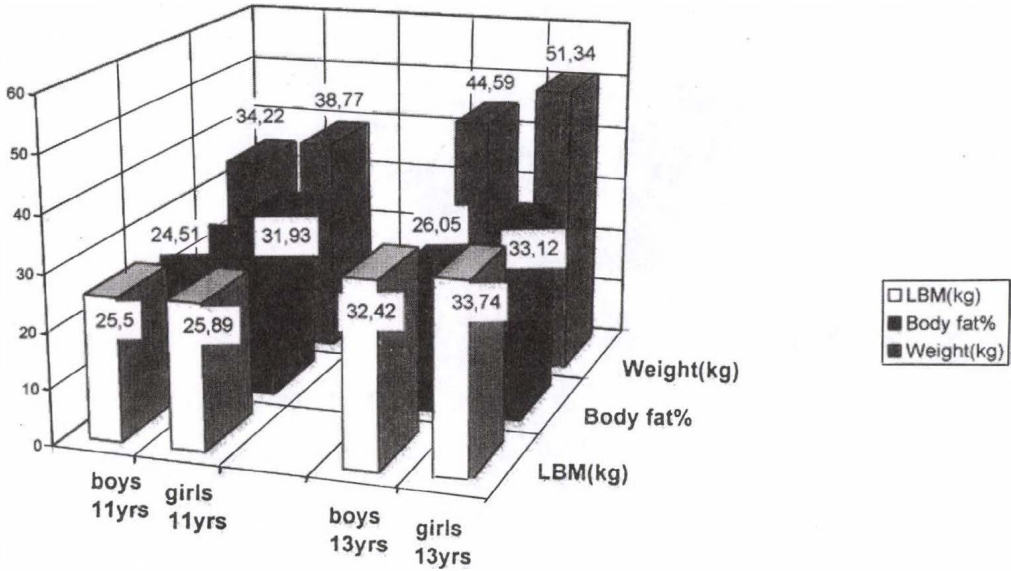


Fig. 2: Changes of some anthropological parameters between aged 11-13

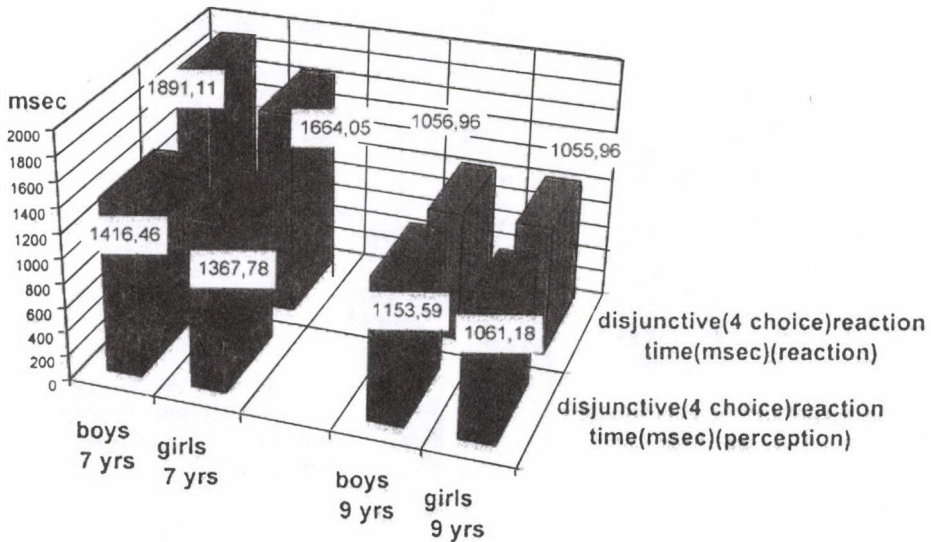


Fig. 3: Changes in disjunctive reaction time between aged 7-9

We did not find significant differences either between boys and girls of 11 or between boys and girls of 13 in neurofunctional parameters. The decrease of reaction time during the two years, and the improvement of performance % of reaction time were significant in both sexes as well (Figs. 5, 6).

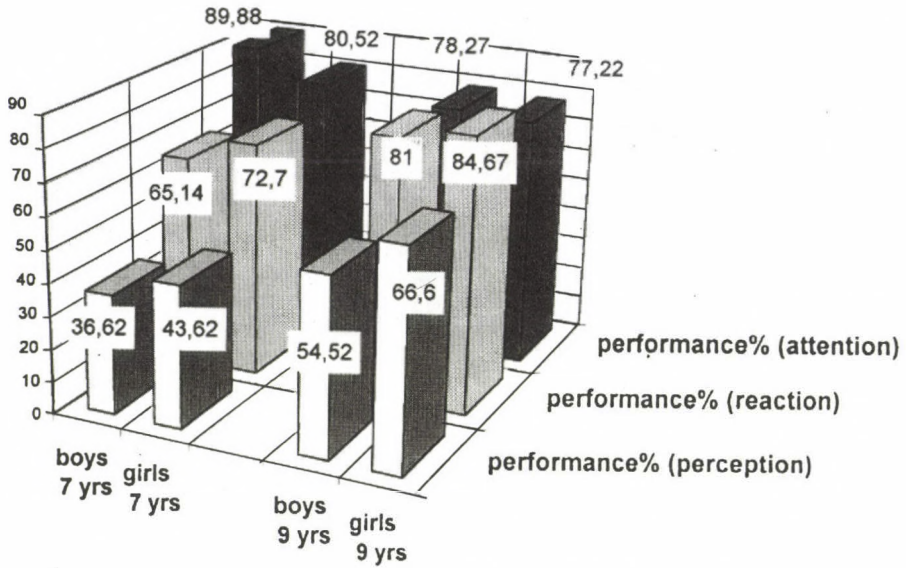


Fig. 4: Changes in the performance % of reaction time between aged 7-9

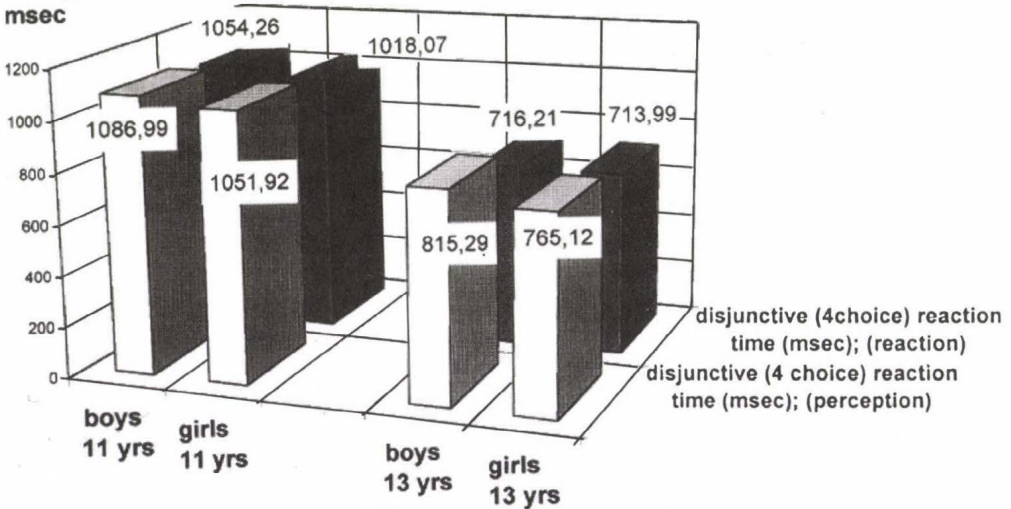


Fig. 5: Changes in disjunctive reaction time between aged 11-13

The results of the comparative investigation of neurofunctional parameters show no definite tendency. Significant differences were found in disjunctive reaction time between various body fat % groups in 11-year-old girls, and in 13-year-old boys, in percent of Raven test in 9-year-old boys, the rate of development of Raven-test in 9-year-old boys, and the performance % of attention in 13-year-old girls (Table 1).

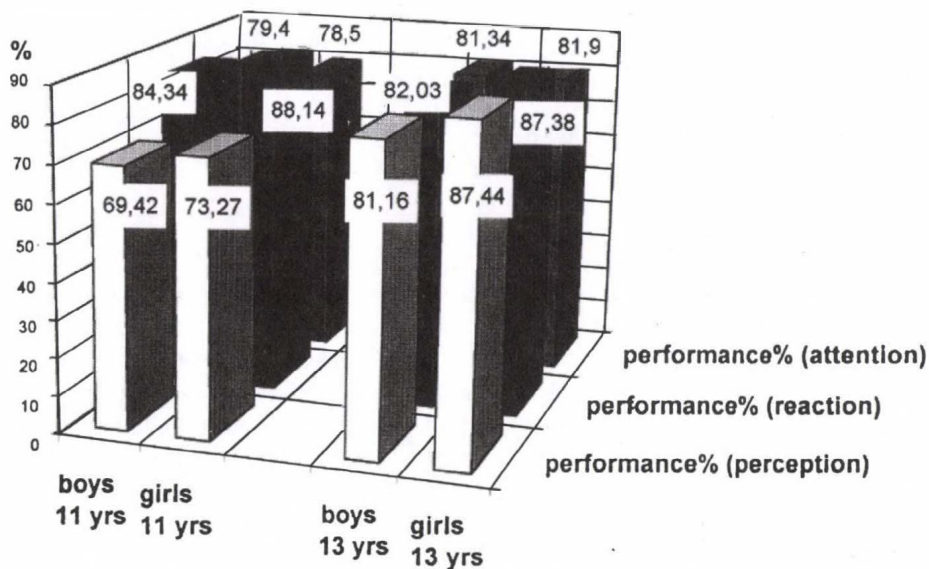


Fig. 6: Changes in the performance % of reaction time between aged 11-13

Table 1: Significant differences in some neurofunctional parameters of children' subgrouped by body fat

Neurofunctional Parameters	Age in years							
	7 yrs boys	7 yrs girls	9 yrs boys	9 yrs girls	11 yrs boys	11 yrs girls	13 yrs boys	13 yrs girls
D. Reaction Time (msec) Perception						*		*
Performance % of D. Reaction Time						*		
Performance % of Raven Test			*					
Rate of Raven Test			*					
Performance % of Attention								*

* $p < 0.05$

Conclusions

The difference of anthropological parameters between the boys and girls in preadolescence was significant in body fat percent and LBM, and the rate of growth in body fat percent. In adolescence, the sexual differences in anthropological parameters was significant only in body fat percent, but not in LBM.

While there were significant differences between the boys and girls in reaction time in preadolescence, there were no significant differences in adolescence. Girls had better results.

The rate of growth was not significant in body fat percent at this age.

The children were divided into 3 groups on the basis of percent of body fat.

A significant difference in reaction time have been found in children of the first and second groups (low and medium body fat%) and the second and third groups (medium and high body fat%), i.e. 11-year-old girls and 13-year-old boys, as well as in 9-year-old boys on the basis of the Raven-test.

Routine school doctor examinations, do not include the determination of body fat%, although it shows a significant connection with neurofunctional characteristics which should be optimized for good school performance.

A statistically significant connection has been found between height and reaction time in boys at the age of 9, and between weight and attention, as well as between weight and the Raven-test result in girls of 13. Some parameters (height, weight and body fat%) of somatic development influence the development of neurofunctional parameters and this effect was different at the age of preadolescence and adolescence. Neurofunctional parameters of boys in preadolescence and boys and girls in adolescence show a significant connection with the parameters of somatic development, the increase of body development parameters is accompanied by a positive change in neurofunctional parameters. A more precise determination of this connection could be carried out if the results of our longitudinal study have been completely processed.

References

- Bayley, N. (1955) On the growth of intelligence. *Amer. Psychol.*, 10: 805-818.
- Boas, F. (1941) The relation between physical and mental development. *Science*, 93: 339-342.
- Bodzsár, É.B., and Pápai, J. (1992) Physical development and maturation in relation to mental performance in girls from age 10 to 14. *Anthrop. Közl.*, 34: 7-11.
- Bodzsár, É.B. (1981) Relationship between physical and mental development. *Coll. Antrop. Suppl.* 5: 21.
- Davidson, H. H. and Gottlieb, L. S. (1955) The emotional maturity of pre- and post-menarcheal girls. *J. Genet. Psychol.*, 86: 261-267
- Durnin, I.V.G.A., and Rahaman, M.X.I. (1967) The assessment of the amount of fat in the human body from measurement of skinfold thickness. *Brit. J. Nutr.*, 21: 681.
- Lindgren, G. (1979) Peak velocities in height and mental performance. A longitudinal study of school-children aged 10-14 years. *Ann. Hum. Biol.*, 6: 559-84.
- Scripcaru, G. (1984) Result of biomedical, psychological and sociocultural studies on the children and adolescents included in the research. *Rev. Med. Chir. Soc. Med. Nat. Tasi.*, 8: 41-46.
- Shuttleworth, F.K. (1939) The physical and mental growth of girls and boys age six to nineteen. *Monogr. Soc. Res. Child. Develop.*, 4: (3) 34-39.
- Siri, W.E. (1956) *Body composition from fluid spaces and density*. MS UCRL 3349. Donner Lab. University of California.
- Slevensm, S.S. (1981) *Handbook of experimental psychology*. New York..
- Stone, C. P., and Barker, R. G., (1937) Aspect of personality and intelligence in post-menarcheal girls and premenarcheal girls of the some chronological ages. *J. comp. physiol. Psychol.*, 23: 439-455.
- Tanner, J.M. (1966) The relation of body size, intelligence test score, and social circumstances in children and adults. *Eugen. Rev.*, 58: (3) 122-135.
- Tanner, J.M. (1961) *Education and physical growth*. University of London Press Ltd, London.
- Woodworth, R.S., and Schlosberg, H. (1966). *Kísérleti pszichológia*. Akadémiai Kiadó, Budapest.
- Yule, G.U., and Kendall, M.G. (1964) *Bevezetés a statisztika elméletébe*. Közgazdasági és Jogi Könyvkiadó, Budapest.

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