

AGE AND SEX VARIATIONS OF SOMATOTYPE

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Abstract: The author gives an overview on somatotype of 6924 7-14 year-old children based on her Bakony Growth Study. Within the framework of the cross-sectional growth study carried out in 23 villages in the Bakony Hills, Western Hungary, she examined differences of age and sex among the somatotype of children of this region. The changes of somatotype with age were demonstrated by somatoplots on Sheldon's somatochart. The differences between the means of somatoplots in the age-groups were tested by Hotelling's T^2 -test. To analyze homogeneity of the children's somatotype in different age-groups the author calculated several indices: SDI, SAM, SASD and sex differences were characterized by SDD and I-index.

Key words: Bakony Growth Study, Cross-sectional growth study, Somatotype, Somatoplot, SAM, SASD, SDI, SDD, I-index.

Introduction

The Bakony Growth Study, a cross-sectional anthropometric examination has been carried out on 6924 children of between 7 and 14 years, living in 23 settlements of the Bakony Hills, which is one of the ethnic regions of Hungary. The sample represents rural children living in a very industrialized environment.

In the anthropometric examination 23 body measurements were taken following the recommendation of the IBP. The secondary sex characteristics of the girls were also studied. Besides the anthropometric examination, data were collected about the social and economic factors influencing the children's biological status.

The sample was analyzed from a number of aspects such as:

- the sex differences in body measurements,
- the proportional differences of age and sex for the trunk, trunk-extremity and extremities,
- the variations of the somatotype and body composition with age and sex,
- the changes of the secondary sex characteristics of the girls with age as well as the relationship of the secondary sex characteristics with each other and with the menarcheal age,
- the influence of socio-economic factors on the growth process (B. Bodzsár 1982a, b, c, d, 1984).

In the present study the author wish to summarize the results referring to the dispersion of the somatotype of children belonging to the same age-group and the sex differences of the somatotype.

Material and Methods

The somatotype of 6924 7-14 year-old children was determined by the Heath-Carter's anthropometric somatotype method (Carter 1971, Hebbelinck et al. 1973). The deviation of the individual somatotypes from the mean somatotype was, respectively, the distance of the somatoplots of the children in the same age-group from the mean somatoplot were estimated by the SAM, SASD (Duquet-Hebbelinck 1977) and SDI (Ross-

Wilson 1973). The values of the SDD and the I-index (Ross et al. 1977) were calculated to describe the sex differences. The differences between the somatoplots of boys and girls of the same age were tested by Hotteling's T^2 -test.

Results and Discussion

Analyzing the variations of the somatotype components with age it was found that the second component had the most stable value both in boys and girls in the studied age-interval. The changes with age in the first and third components had an opposite tendency in the two sexes. The first component increased with age in girls, while in boys it was the third component that increased (Table 1).

Regarding of the sex differences of the somatotype components the values of the first component were found to be significantly higher in all the age-groups of the girls, whereas in the boys the values of the second component are significantly higher. Significant differences in the mean values of the third component can be detected only from age 11 on, in favour of the boys (Table 1).

The somatoplots reflect very well the age-dependent differences between the somatotype of boys and girls, as well as the tendency of the changes in their somatotype. The somatoplots of the boys shifted with age from the field of ectomorphic-mesomorphy to the field of mesomorphic-ectomorphy. The somatoplots of the prepubertal girls are also located in the field of ectomorphic-mesomorphy, but nearer to the central field. In puberty a shift of the somatoplots can be observed throughout the central field to the area of endomorphy (Fig. 1).

The homogeneity of the groups, i.e. the relationship between the somatotypes, respectively the somatoplots of the individuals and the mean of the group was tested by SAM and SASD as well as SDI (Table 2). The tendency of the change of SDI and SAM with age seems to be similar. Both parameters are nearly the same till the age of 9 in the girls and till the age of 10 in the boys. This is the age-interval in which they have the smallest value. The highest SAM and SDI values can be observed in the girls from 11 to 13 years, and in the boys from 12 to 14. The highest value of SASD, expressing the dispersion of the deviations from the mean somatotype and also showing their homogeneity could be found in the group of girls aged 12 and in the group of boys aged 13. The dispersion of children's somatotype belonging to the same age-group varies in the different age intervals. The age-groups are most homogeneous in prepuberty and the children aged 11–13 are least homogeneous. The most likely reasons for this may be the fact that the greatest differences in the children's growth-rate can be observed in this age-interval, the differences become more marked in their body proportions, too, and the physique is manifesting itself step by step.

The differences of the somatoplots of boys and girls of the same age are significant as shown by the results of Hotteling's T^2 -test, in every age-group (Table 2).

The values of SDD showing the distance between the somatoplots representing the mean somatotype of boys and girls in the same age-group are the same till the age of 9. In the subsequent age-groups its value gradually increases. The facts that the mean somatotypes are changing with age in both boys and girls and that the distance between the somatoplots of the two sexes remains constant indicate that the tendency of the changes in the somatotype of boys and girls is the same. This means that the differences between the somatotypes of the two sexes do not increase between 7 and 9 years of age. But from 10 years of age the differences become more and more marked, because there is an opposite tendency in the changes of the first and third components in the boys and girls. The grad-

Table 1. Statistical parameters of the somatotype components

Age	1st component							2nd component					3rd component				
	Boys			Girls				Boys		Girls			Boys		Girls		
	n	\bar{x}	s	n	\bar{x}	s	p <	\bar{x}	s	\bar{x}	s	p <	\bar{x}	s	\bar{x}	s	p < (t)
7	387	1.61	0.99	388	2.41	1.15	0.001	4.21	0.74	3.90	0.75	0.050	3.18	0.91	3.20	0.96	-
8	478	1.78	1.09	457	2.82	1.27	0.001	4.20	0.72	3.82	0.81	0.050	3.45	0.94	3.57	0.97	-
9	485	2.23	1.27	369	3.13	1.45	0.001	4.21	0.94	3.80	1.01	0.050	3.42	0.99	3.49	1.08	-
10	471	2.57	1.30	419	3.59	1.51	0.001	3.99	1.02	3.65	0.98	0.001	3.80	1.10	3.74	1.18	-
11	433	2.71	1.48	454	3.61	1.56	0.001	3.86	1.05	3.44	0.97	0.001	4.73	1.28	3.69	1.27	0.001
12	439	2.87	1.50	455	3.98	1.61	0.001	3.75	1.03	3.40	1.11	0.001	4.83	1.19	3.70	1.23	0.001
13	461	2.83	1.66	428	4.49	1.63	0.001	3.83	1.06	3.29	1.14	0.001	5.13	1.15	3.68	1.21	0.001
14	399	2.81	1.52	401	5.35	1.59	0.001	3.78	1.03	3.17	1.12	0.001	5.11	1.14	3.57	1.24	0.001

Table 2. Parameters of the distribution of the somatotypes in age-group

SAM	Boys			Age	Girls			SDP	I-index	p < (T ²)
	SASD	SDI			SAM	SASD	SDI			
1.40	0.64	3.29		7	1.51	0.81	1.68	1.89	50.63	0.01
1.42	0.79	3.34		8	1.54	0.85	1.61	1.90	55.73	0.05
1.45	0.81	3.34		9	1.60	0.90	1.69	1.87	57.03	0.05
1.57	0.90	3.31		10	1.77	0.98	2.07	2.26	56.34	0.01
1.82	1.01	4.22		11	1.94	0.99	2.05	2.18	54.41	0.01
2.07	1.07	4.59		12	2.19	1.07	2.18	2.54	46.66	0.01
1.99	1.11	4.64		13	2.13	0.99	2.02	2.60	36.40	0.01
1.91	1.00	4.29		14	1.95	1.01	2.01	3.32	20.17	0.01

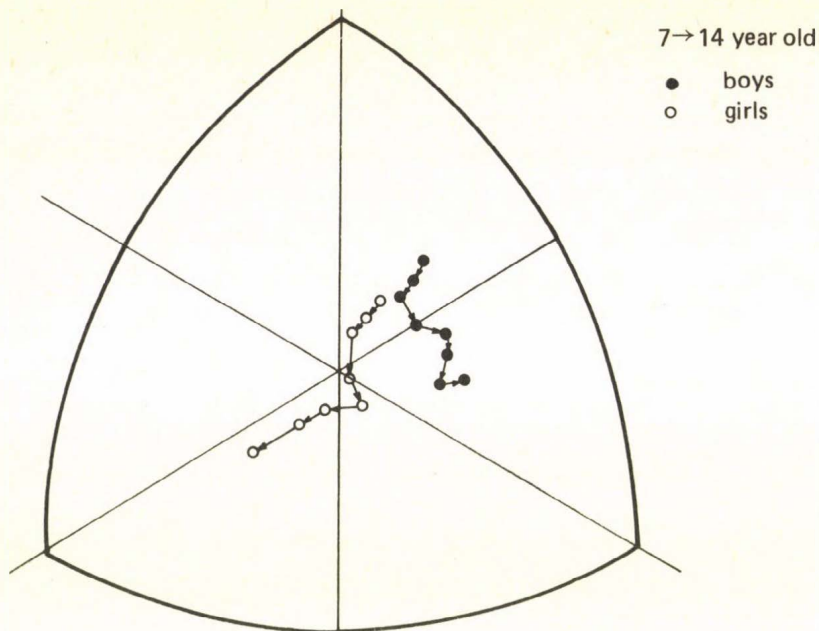


Fig. 1: Mean somatotypes of age groups

ual decrease of the value of the I-index after the age of 10 also indicates the manifestation of sexual dimorphism in the somatotype during the puberty.

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