Anthrop. Közl. 26; 129—134. 1982.

THE INDICES OF THE PHYSIQUE AND THE SOCIO-ECONOMIC FACTORS BASED ON A GROWTH STUDY IN BAKONY GIRLS

by É. B. Bodzsár

Department of Anthropology, Eötvös Loránd University, Budapest, Hungary

Abstract: The author examined the connection between three components of the somatotypes of 1313 10—14 years old girls — determined with *Heath—Carter's method*—as indices of the physique and the socio-economic status. When characterizing that status, she founded herself on the father's profession, on the size of the family, on the number of siblings and on the earnings per capita.

The results of her monofactorial examination show that the socio-economic factors have a rather significant part in the manifestation of linearity. Between the components of fatness serving for characterizing endomorphy and the size of the family, as well as the number of siblings a negative, between the said component and the earnings per capita a positive correlation could be demonstrated. On the other hand, with the daughters of fathers of an intellectual profession endomorphy was less marked than with the ones of physical workers. The IInd component of the somatotype, the characteristic of robustness of the bones and muscles did not display significant differences on the various social levels.

Key words: Physique, somatotype, socio-economic factors influencing growth, father's profession, size of the family, number of siblings, earnings per capita.

There are many factors that exert an influence on the pace of development. The hereditary components influence physiological maturation from early youth on, on the other hand, the effect of the environmental factors upon development is more dynamic in compliance with the changes in the environment (Tanner 1955, Johnston et al. 1980). The effect of the physique — as of a quality determined in high measure hereditarily — on physiological maturation was examined by numerous researchers, and they unambiguously demonstrated a relationship between the two (Roberts 1969, Kralj—Čerček 1956, Bodzsár 1975, Borms et al. 1977). At the same time, several examinations called attention to the important part played by one of the groups of the environmental factors, by the socio-economic ones in the attainment of an optimum development (Kralj—Čerček 1956, Bodzsár 1975, Eiben 1972). Naturally, the direct effect of the factors influencing development is rather difficult to demonstrate on account of the multidirectional interferences of the various external and internal elements. For example, physique as a qualitative property is in fact greatly determined genetically, however, the environmental factors contribute in a quite considerable degree to its phenotypical formation. Founded upon the trends of the various measurements and upon those of their interrelations to one another the manifestation of physique can be followed.

The question arises whether the development of the components determining the physique is affected by the socio-economic factors in an identical measure.

In the present paper the author intends to report the results of her examinations on the relationship between the three components of physique as determined HEATH and CARTER's anthropometric somatotyping method (CARTER 1975), and the socio-economic factors.

Material and Methods

In 1978 we conducted a more detailed anthropological survey of the growth of 7—14 year old children in one of the ethnic regions of Hungary, in the Bakony Hills. To this surveyed sample belonged those 1313 girls of 10—14 years of age among whom we examined the relationship between the three components of the somatotype each as an index of physique (the Ist component is the index of fatness and fullness, respectively, the IInd one that of the robusticity of the bones and muscles, the IIIrd one that of linearity) and the social factors. The socio-economic status was characterized by the fathers' occupation, by the size of the families, by the number of siblings and by the earnings per capita.

The indices of the physique of the girls living on different social levels but being of the same age were compared by means of *Student-Fischer's t-test.*

Results and Discussion

According to the *occupation of the fathers* we distinguished three groups: the intellectuals, the physical workers, and the one not be to be ranged with in these two categories. The girls belonging into the latter mentioned category were not taken into consideration further on. The mean values of the Ist component are in each group lower among the children of the intellectual workers (Table 1). The development of the bones and muscles of daughters of the intellectual workers falls behind that of those of physical workers, but the difference is not significant. On the other hand, as regards the component

Table 1

Somatotype components of the Bakony girls according to their father's occupation

Age group (years)	Ist component				IInd component				IIIrd component			
	intellectual workers		physical workers		intellectual workers		physical workers		intellectual workers		physical workers	
	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
10	3.59	1.17	4.21	1.84	3.67	1.97	3.42	2.01	3.77	2.17	3.42	2.30
11	3.16	1.24	3.58	1.61	3.48	2.01	3.60	2.14	3.98	2.08	3.68	1.97
12	3.19	1.47	3.52	2.00	3.35	1.87	3.35	1.95	4.56	2.40	3.55	2.70
13	4.09	2.01	4.56	2.17	3.40	1.97	3.47	2.07	3.85	2.19	3.47	2.40
14	3.84	1.61	3.89	1.84	3.19	2.01	3.31	2.12	4.18	2.30	3.55	2.12

Table 2

Somatotype components of the Bakony girls according to number of their siblings

Age group (years)	First group		Second group		Third group	
	according to number of siblings					
	x	s	$\bar{x}$	s	$\bar{x}$	s
	Ist component					
10	3.17	2.10	2.98	1.42	2.95	1.97
11	3.62	1.87	2.87	1.92	2.84	1.64
12	4.00	1.97	3.45	1.65	3.20	2.10
13	4.49	2.01	3.88	1.83	3.21	1.98
14	4.23	2.50	3.99	1.17	3.31	1.40
	IInd component					
10	3.19	1.17	3.65	1.30	3.44	1.40
11	3.44	1.82	3.74	1.99	3.50	1.87
12	3.39	1.64	3.43	2.10	3.41	2.40
13	3.37	1.91	3.56	1.87	3.41	1.98
14	3.02	1.42	3.41	1.68	3.35	2.01
	IIIrd component					
10	3.98	2.17	3.55	1.88	3.50	1.77
11	4.21	2.71	3.61	2.23	3.10	1.94
12	4.19	2.40	3.58	1.91	3.19	1.87
13	3.70	1.98	3.36	2.11	3.29	2.00
14	3.63	2.01	3.58	2.03	3.31	2.11

of fatness, the daughters of the physical workers significantly surpass those of the intellectual workers, excepting the 14 year old age-group. Similarly, the difference between the mean values of the IIIrd component is significant in each age-group. Based on these we can say that, considering their stature, the daughters of the physical workers are heavier, their skeleton are broader and their muscles are thicker.

According to the *number of siblings* and the *size of the family* we separated our sample into three groups. As to the number of siblings we ranged with the first group the girls who had no and/or only one sibling, the second group was formed by those who had two, and the third one by those who had three or more sisters and/or brothers. According to the number of the members of the families we distinguished among girls who lived in families of 4, 5, 6 or more members.

When comparing the groups by the number of siblings and the size of the families a similar tendency can be observed (Table 2, 3). The mean values of the fatness component decrease with the growth in the number of the siblings and/or members of the family. The difference in the number of siblings between the Ist and IInd groups is significant at the ages of 11, 12 and 13 years, that between the IInd and IIIrd ones at the ages of 13 and 14 years. The mean values of the Ist component of physique of the girls living in families of 4 and/or 5 members are significant in the 12, 13 and 14 year-old age-groups. Although in none of the age-groups the difference between the second and

Table 3

Somatotype components of the Bakony girls according to size of the family

Age group (years)	First group		Second group		Third group	
	according to size of the family					
	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
	Ist component					
10	3.27	1.70	3.08	1.60	2.95	1.67
11	3.42	1.73	3.17	1.74	3.10	1.58
12	3.70	1.90	3.25	1.11	3.15	1.41
13	3.81	1.87	3.30	1.47	3.17	1.80
14	4.18	2.40	3.60	1.67	3.31	1.91
	IInd component					
10	3.25	1.17	3.34	1.30	3.55	1.40
11	3.34	1.82	3.47	1.99	3.68	1.87
12	3.39	1.64	3.43	1.87	3.47	1.72
13	3.37	1.42	3.56	1.24	3.58	1.65
14	3.42	1.58	3.78	1.77	3.80	1.90
	IIIrd component					
10	3.97	2.11	3.60	1.97	3.30	1.77
11	4.19	2.41	3.61	1.88	3.09	1.99
12	4.21	2.27	3.59	2.01	3.01	2.13
13	3.80	1.49	3.26	1.58	3.20	1.69
14	3.73	1.67	3.49	1.79	3.31	1.52

third groups according to the size of the families was significant, with increase in number of the members of the families the component of endomorphy displays a decreasing value.

In the robusticity of the bones and muscles there is not significant difference among the groups separated according to the number of siblings and to the size of the families. With an increase in number of the members of the families a minimal growth in the mean values of the index of robusticity can be demonstrated. Out of the three groups separated according to the number of siblings, the development of the bones and muscles of those who have two siblings is the most marked. The mean values of the first groups, representing those living in a so-called "better social milieu" are the lowest.

The decrease of the ratio index with the growth in number of siblings and members of the families, respectively, can be clearly proved. The smaller the number of members of the family (1 child or 2 children) the more linear is the build of the girl's body, ti weighs less as compared to her stature.

On the average, all the three components of physique of the groups separated according to the income per capita display higher values than those of the daughters of families of higher income (Table 4). In the indices of endomorphy and ectomorphy these differences are significant, — in the index of robusticity, although statistically the differences are not significant, if expressed in absolute values the means by age-groups are the lowest in the worst social group.

Summing up the results, one can find that the better social conditions have a significant part in bringing about linearity. In the development of the robust-

Table 4

Somatotype components of the Bakony girls according to earnings per capita

Age group (years)	First group		Second group		Third group	
	according to earnings per capita					
	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
	Ist component					
10	3.27	1.77	3.08	1.65	2.85	1.49
11	3.72	1.81	2.97	1.71	2.84	1.71
12	4.10	2.27	3.55	1.81	3.10	1.90
13	4.49	2.07	3.98	1.97	3.21	1.89
14	4.33	2.13	4.09	2.19	3.31	1.89
	IInd component					
10	3.75	1.72	3.54	1.42	4.08	1.97
11	3.84	1.64	3.60	1.71	4.21	1.99
12	3.53	1.91	3.51	1.84	4.17	2.02
13	3.66	1.88	3.51	1.91	3.68	2.11
14	3.51	1.62	3.41	1.52	3.65	1.72
	IIIrd component					
10	4.08	2.17	3.55	1.79	3.40	1.82
11	4.21	2.03	3.57	1.82	3.10	1.70
12	4.17	1.97	3.58	1.75	3.08	1.81
13	3.68	1.89	3.37	1.99	3.19	2.00
14	3.65	1.91	3.47	1.79	3.21	1.82

icity of the bones and muscles there is no essential difference among the examined social groups. Between the fatness component serving for characterizing the manifestation of endomorphy and the better social conditions a positive relationship can be demonstrated, with the exception of the social groups distinguished relying on the occupation of the fathers. The most obvious explanation of this inconsistency and, at the same time also its resolution should be sought for in the different nutritional habits of the physical and intellectual workers.

Founded on the results of these monofactorial examinations, we can not draw, of course, far-reaching conclusions, since the factors determining the socio-economic status are also connected with each other. For a more complete disclosure of the relationship between the physique and the socio-economic factors an examination of the joint effect of these factors, a multifactorial survey is needed.

REFERENCES

Bodzsár, B. É. (1975): *Data to puberty of girls.* — Humanbiol. Budapest. *3;* 176 p.

Borms, J.—Hebbelinck, M.—Van Gheluwe, B. (1977): Early and late maturity in Belgian boys, 6 to 13 years of age and its relation to body type. — *In:* Eiben, O. G. (Ed.): *Growth and Development; Physique.* Symp. Biol. Hung. *20;* 399—406.

Carter, J. E. L. (1975): *The Heath—Carter somatotype method.* San Diego State University, San Diego. 190 p.

EIBEN, O. G. (1972): Genetische und demographische Faktoren und Menarchealter. — Anthrop. Anz. *33;* 205—212.
JOHNSTON, F. E.—ROCHE, A. F.—SUSANNE, C. (1980): *Human Physiological Growth and Maturation: Methodologies and Factors.* — Plenum, New York.
KRALJ-ČERČEK, L. (1956): The influence of foot, body build and social origin on the age at menarche. — Hum. Biol. *28;* 393—406.
ROBERTS, D. F. (1969): Race, genetics and growth. — J. biosoc. Sci. *1;* 43—67.
TANNER, J. M. (1955): *Growth at adolescence.* — Blackwell Scientific Publications, Oxford, 313 p.

Author's address: Dr. B. BODZSÁR ÉVA
Budapest, Puskin utca 3.
H-1088 Hungary