

HUMANBIOLOGICAL COMPARISON OF THE SOMATIC DEVELOPMENT OF SECONDARY SCHOOL STUDENTS AND STUDENTS TRAINED FOR SKILLED WORK

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Abstract

A comparison is given the means of the body height, body weight, normal chest circumference of 12831 secondary school students and 6200 students trained for skilled work. It is determined that the arithmetic mean are lower, as demonstrable statistically, in 53.3 p.c. of the age groups of the boys, and 20 p.c. of the girls receiving vocational training, as compared with those of the secondary school students.

In case of the girls attending both types of school, the frequency of irregular menstruation cycle is equally around 5—6 p.c. in the 4—5th year following the menarche.

64.2 p.c. of the girls attending secondary school, and only 43.8 p.c. of the girls trained for skilled work discussed sexual problems with their parents; their sexual education is not satisfactory.

Key words: somatic development, students trained for skilled work, secondary school students.

Introduction

In a former publication (FARKAS et al. 1983) a detailed report was given about a survey aiming at studies on the puberty of Hungarian girls. Within the frame of these studies it was possible to measure the body height, body weight and normal chest circumference of the youths.

One part of the studied youths is being trained for skilled work, the other part attends grammar school or specialized secondary school (hereinafter: secondary school). This provided possibility for comparing the somatic development and a few characteristic criteria of puberty of the students attending the two different types of school.

The comparison is also accounted for by the fact that there are only few subsequent data on Hungarian students trained for skilled work.

The studies published in the 60s and 70s mainly aimed at the examination of muscularity (BUGYI, 1965, 1966, 1971—72; BUGYI and LŐRINCZ, 1966), or gave analysis of productivity (BUGYI, 1971) and the connections between the circulatory organ system and burden, resp. (BUGYI, 1971a). The study on body composition also belongs to this (BUGYI, 1971b).

In a study published in 1976 involving six body measurements of students trained for skilled work, the somatic development was found to be satisfactory in general (GIRINYI et al. 1977).

Eiben compared the somatic development of 199 Budapest students receiving training for work in chemical industry with the Budapest data of 1968/69 (EIBEN et al. 1971, 1979).

In a recently published report (BAKONYI, 1984) the differences in the somatic characters of 7464 secondary school students and 3088 students trained for skilled work are analysed.

There are deviations in respect to the final conclusions drawn in the cited publications. Certain authors did not find essential differences between the somatic development of the students attending the two types of school (GIRINYI et al. 1977, EIBEN et al. 1979), while observations made on a larger sample led to opposite conclusions (BAKONYI, 1984).

On the basis of them, it does not seem unnecessary to report on our experiences gained in connection with the measurements deriving from the beginning of the 80s from this point of view as well.

Material and method

In the years 1981 — 1984 3677 boys and 2367 girls trained for skilled work, and 3144 boys and 9395 girls attending secondary schools were studied. The dissimilar ratio of the two sexes is partly related to the trend of vocational training, partly to our original objective (studies on menarche). The observations concerning the somatic development of the students attending the two types of school can be comprehended as the "secondary product" of our original objective.

Table 1. The more important parameters of the body weight of boys trained for skilled work (n_1) and those attending grammar school and specialised secondary school (n_2), according to half-year age-groups

Age	Boys trained for skilled work			Boys attending grammar school and specialised secondary school		
	n_1	\bar{x}_1	s_1	n_2	\bar{x}_2	s_2
14.0	126	51.23	10.15	34	56.73	12.42
14.5	549	54.29	11.20	303	56.28	9.95
15.0	535	56.74	10.90	450	58.42	10.20
15.5	613	59.75	11.28	420	59.94	9.39
16.0	581	60.82	10.28	416	62.82	9.62
16.5	535	63.82	11.40	368	64.46	10.26
17.0	430	64.11	11.00	404	65.79	9.06
17.5	166	65.16	10.39	357	65.89	9.35
18.0	102	64.21	8.99	306	68.37	9.59
18.5	40	64.60	8.13	86	66.12	9.24
Total:	3677			3144		

In the course of the measurements the introductions of Martin were followed (MARTIN and SALLER, 1956). The body height and normal chest circumference were measured with mm, the body weight with 50 g accuracy.

The information on puberty were collected by means of questionnaires.

The evaluations were obtained with R-55 type computer by the co-workers of the László Kalmár Cybernetics Laboratory of the Attila József University, Szeged.

The results are summarized in Tables 1.—6., with the arithmetic means of the three body measurements given according to sex, age groups and types of school. The elemental numbers indicated in the Tables are not always identical in case of the three characters, since not every student could be measured.

In our evaluation the arithmetic means (\bar{x}) and standard deviation (s) were also calculated, on the basis of its using the two-sample Student's test it was examined whether the differences in arithmetic means could be verified according to character between the two types of students of the same age and sex. The probability level for our statements was chosen 95 p.c.

Results

I. SOMATIC DEVELOPMENT

Though differences between the arithmetic means are manifested in several age groups regarding both sex and all three characters, these are not significant in every case. It could be determined, however, that from the studied 10 age groups (between age 14—18.5), the body weight was found to be lower in 6, the body height in 9, and the normal chest circumference in 1 age group(s) of the boys trained for skilled work, as compared to the secondary school students. These 16 cases correspond to 53.3 p.c. of all the chances (30 in case of the 3 characters of the 10 age-groups).

Table 2. The more important parameters of the body height of boys trained for skilled work (n_1) and those attending grammar school and specialised secondary school (n_2), according to half-year age-groups

Age	Boys trained for skilled work			Boys attending grammar school and specialised secondary school		
	n_1	\bar{x}_1	s_1	n_2	\bar{x}_2	s_2
14.0	126	163.32	7.56	34	166.44	8.12
14.5	549	165.07	8.23	303	167.72	8.48
15.0	535	167.18	8.15	450	169.50	7.26
15.5	613	170.10	7.16	420	171.46	7.12
16.0	581	170.91	7.10	416	172.96	6.65
16.5	535	172.54	6.68	368	174.19	6.43
17.0	430	171.89	6.65	404	175.06	6.32
17.5	166	173.05	6.71	357	174.99	6.28
18.0	102	173.89	7.11	306	176.01	6.71
18.5	40	173.48	6.54	86	175.06	6.68
Total:	3677			3144		

In respect to the girls trained for skilled work, lower values were only found for the body height arithmetic means in 6 cases, while their normal chest circumference was found to be higher than the means obtained for the secondary school students in case of two age-groups. Accordingly, the means found for the girls trained for skilled work were lower in only 20 p.c. of the cases compared to the girls attending secondary school.

Table 3. The more important parameters of the normal chest circumference of boys trained for skilled work (n_1) and those attending grammar school and specialised secondary school (n_2), according to half-year age-groups

Age	Boys trained for skilled work			Boys attending grammar school and specialised secondary school		
	n_1	\bar{x}_1	s_1	n_2	\bar{x}_2	s_2
14.0	126	79.61	7.07	34	81.85	7.68
14.5	548	81.29	7.55	303	82.05	6.94
15.0	534	83.07	7.11	449	83.89	6.96
15.5	613	85.41	7.29	420	85.08	6.35
16.0	581	86.23	6.63	416	86.98	6.37
16.5	535	88.49	7.50	368	87.95	6.80
17.0	430	88.89	7.01	404	89.34	6.10
17.5	166	89.73	7.04	357	89.51	6.03
18.0	102	89.19	5.78	306	90.51	5.85
18.5	40	90.28	6.01	86	90.24	5.81
Total:	3675			3143		

Table 4. The more important parameters of the body weight of girls trained for skilled work (n_1) and those attending grammar school and specialised secondary school (n_2), according to half-year age-groups

Age	Girls trained for skilled work			Girls attending grammar school and specialised secondary school		
	n_1	\bar{x}_1	s_1	n_2	\bar{x}_2	s_2
14.0	25	159.57	5.51	115	159.57	6.51
14.5	264	158.96	6.05	869	160.67	5.69
15.0	402	159.03	5.99	1603	161.36	5.85
15.5	406	159.73	6.12	1457	161.37	5.87
16.0	404	160.03	5.98	1256	161.58	5.86
16.5	347	159.83	7.32	1098	161.92	5.93
17.0	307	160.23	6.05	1051	162.04	6.11
17.5	149	160.63	7.36	924	162.03	5.95
18.0	46	161.19	5.58	787	162.00	6.34
18.5	17	160.95	7.25	235	161.17	6.93
Total:	2367			9395		

Fundamentally, therefore, backwardness in regard to somatic development can firstly be experienced in case of the boys trained for skilled work, while in case of the girls this backwardness is of slighter degree and is only manifested in body height.

Our experiences are contradictory to the final conclusions of the studies made in the case of the Budapest boys trained for work in chemical industry, according to

Table 5. The more important parameters of the body height of girls trained for skilled work (n_1) and those attending grammar school and specialised secondary school (n_2), according to half-year age-groups

Age	Girls trained for skilled work			Girls attending grammar school and specialised secondary school		
	n_1	\bar{x}_1	s_1	n_2	\bar{x}_2	s_2
14.0	25	54.27	11.03	115	51.15	8.53
14.5	264	53.66	9.23	869	53.79	8.20
15.0	402	54.73	9.98	1595	54.39	8.31
15.5	406	54.94	8.78	1453	54.94	8.11
16.0	404	55.01	8.19	1256	55.84	8.34
16.5	347	55.81	9.09	1098	55.99	7.74
17.0	307	56.46	9.13	1051	56.24	7.50
17.5	147	55.63	8.03	924	56.55	7.98
18.0	46	56.57	6.90	787	56.42	8.18
18.5	17	59.40	9.21	235	55.65	7.71
Total:	2365			9383		

Table 6. The more important parameters of the normal chest circumference of girls trained for skilled work (n_1) and those attending grammar school and specialised secondary school (n_2), according to half-year age-groups

Age	Girls trained for skilled work			Girls attending grammar school and specialised secondary school		
	n_1	\bar{x}_1	s_1	n_2	\bar{x}_2	s_2
14.0	25	85.32	7.76	115	81.96	6.66
14.5	264	84.39	7.77	869	84.26	6.68
15.0	402	85.14	7.77	1603	84.73	6.74
15.5	406	85.59	7.22	1457	85.22	6.66
16.0	404	85.72	6.47	1255	85.95	6.95
16.5	347	86.17	6.96	1098	86.03	6.23
17.0	307	87.14	7.48	1051	86.47	6.26
17.5	149	86.53	6.96	924	86.96	6.56
18.0	46	87.46	5.15	787	86.69	6.61
18.5	17	89.18	7.22	235	86.09	6.49
Total:	2367			9394		

Table 7. Regularity of menses of the girls in the period following the first menstruation

a) Primary school students

Time elapsed since first menstruation (years)	Is the menstruation regular?						Together
	Yes		No		No answer		
	n	%	n	%	n	%	
0	2403	67.0	732	20.4	450	12.6	3585
1	1841	83.2	267	12.0	106	4.8	2214
2	923	86.4	96	9.0	49	4.6	1068
3	248	87.6	24	8.5	11	3.9	283
4	35	85.4	3	7.3	3	7.3	41
5	10	76.9	1	7.7	2	15.4	13
0-5 years	5460	75.8	1123	15.6	621	8.6	7204

b) Secondary school students

0	279	63.0	143	32.3	21	4.7	443
1	918	79.1	219	18.9	23	2.0	1160
2	1956	86.4	271	12.0	36	1.6	2263
3	2160	89.0	220	9.1	47	1.9	2427
4	1631	91.4	136	7.6	17	1.0	1784
5	953	93.8	56	5.5	7	0.7	1016
6	314	94.3	16	4.8	3	0.9	333
7	75	97.4	2	2.6	—	—	77
0-7 years	8286	87.2	1063	11.2	154	1.6	9503

c) Girls trained for skilled work

0	117	66.9	51	29.1	7	4.0	175
1	311	85.7	43	11.8	9	2.5	363
2	606	87.6	60	8.7	26	3.7	692
3	560	87.4	57	8.9	24	3.7	641
4	287	94.1	16	5.2	2	0.7	305
5	132	93.6	9	6.4	—	—	141
6	38	95.0	1	2.5	1	2.5	40
7	11	84.6	—	—	2	15.4	13
0-7 years	2062	87.0	237	10.0	71	3.0	2370

which there are no differences between the somatic development of the Budapest boys attending secondary school and those of receiving vocational training (EIBEN et al. 1979). In our opinion, this may be in connection with the extremely divergent elemental number of the sample.

There is a better conformity, however, between our study results and the experiences of a national survey performed in 9 large cities (BAKONYI, 1984). This author found the means of body measurements of the boys trained for skilled work to be lower in 86.28 p.c.; in case of the girls in 80.40 p.c., as compared to the parameters of the secondary school students of similar age and sex. The latter observation is essential all the more, since it covered several characters (e.g. width measurements, vital capacity, etc.).

2. CHARACTERISTICS OF PUBERTY RELATED TO THE GIRLS

The girls were also questioned in respect to whether their menstruation cycle became regular or not during the time elapsed since their first menstruation (menarche) in both absolute and relative regard. Those cases were regarded as

Table 8. Distribution of discussions within the family about sexual problems related to the girl students trained for skilled work and attending secondary schools

Study site		Type of school						Together			Total
		Inst. for voc. training			Secondary school			Yes	No	No answer	
		Yes	No	No answer	Yes	No	No answer				
County Csongrád	n %	908 43.8	276 13.3	890 42.9	2203 53.2	563 13.6	1376 33.2	3111 50.0	839 13.5	2266 36.5	6216
Transdanubia	n %	63 66.3	21 22.1	11 11.6	566 68.3	120 14.5	143 17.2	629 68.1	141 15.2	154 16.7	924
Territory east of the river Tisza	n %	75 54.3	24 17.4	39 28.3	1690 74.1	450 19.8	140 6.1	1765 73.0	474 19.6	179 7.4	2418
Northern Hungary	n %	33 71.7	1 2.2	12 26.1	1228 75.2	196 12.0	209 12.8	1261 75.1	197 11.7	221 13.2	1679
Territory between the Danube and Tisza rivers	n %	46 21.5	11 5.1	157 73.4	623 66.4	219 23.3	97 10.3	669 58.0	230 20.0	254 22.0	1153
Together:	n %	1125 43.8	333 13.0	1109 43.2	6310 64.2	1548 15.8	1965 20.0	7435 60.0	1881 15.2	3074 24.8	12390
Total:	n %		2567 20.7			9823 79.3			12390 100.0		

regular menstruation where the cycle was not shorter than 21 days and not longer than 35 days (SAS and KOVÁCS, 1984). Table 7 (a, b, c) comprises the data of students attending primary school, secondary school and those trained for skilled work.

It is to be mentioned in respect to the realistic evaluation of Table 7 that the menarche-median for the studied girls is 12.79 years, the first menstruation appeared at this age in 50 p.c. of the cases. In Hungary this age corresponds to class 7 in primary school. During the first year following the first menstruation, the menses was not regular in a high percentage of the girls (12 — 19 p.c.), which can be regarded as a natural phenomenon. Nevertheless, it is a fact that the cycle was found to be irregular in the 4. — 5 year following the menarche in 5.5 — 7.6 p.c. of the girls attending secondary school and in 5.2 — 6.4 p.c. of the girls trained for skilled work.

A further subject of the analysis was whether the parents discussed questions relating to puberty with the studied students within the family. It was found important to gain a notion about education within the family concerning the correct sexual attitude. The obtained results are summarized in Table 8, according to which 64.2 p.c. of the girls attending secondary school, and 43.8 p.c. of the girls trained for skilled work indicated discussions within the family about the norms of sexual behaviour. This question was left unanswered by the girls trained for skilled work in 43.2 p.c. and by those attending secondary school in 20 p.c. There may be several reasons for this: the girls did not find this question important, they did not understand it, they did not attach particular importance to it, they regarded it a private affair, etc.

Striking differences were experienced analysing the questions according to the geographical regions of Hungary. In Northern Hungary (mainly based on data from county Nógrád) more than 70 p.c. of the girls attending both types of school received information from their parents related to sexual questions. On the contrary, in Southern Hungary (firstly in county Csongrád) only 43.8 p.c. of the girls trained for skilled work and 53.2 p.c. of the girls attending secondary school were able to give positive answers.

Table 9. Distribution of discussions within the family about sexual questions in county Csongrád, according to school types (boys)

Type of school	Yes		No		No answer		Total	
	n	%	n	%	n	%	n	%
Grammar school and spec. second. school	911	49.8	505	27.6	414	22.6	1830	100
Inst. for voc. training	726	44.8	419	25.9	475	29.3	1620	100
Together	1637	47.4	924	26.8	889	25.8	3450	100

Accordingly, well demonstrable deviations can be evidenced between the girls attending secondary school and those receiving vocational training in respect to the degree of sexual education, on the account of the latter.

Simultaneously with our data collection, in county Csongrád a sexual-pedagogical survey was accomplished involving over 7 thousand youths of both sexes receiving some form of sexual education (NÉMETH and GALAMBOS, 1984). The gained experiences confirmed our study results pertaining to discussions within the family about sexual questions (Table 9—10). According to the above mentioned survey — for the availability of which we express our thanks herewith — a fewer number of boys than girls answered “yes” to the aforementioned subject, regarding both types of school.

The experiences from county Csongrád showed that 50 p.c. of the boys already had concrete sexual experiences at the age of 15.39 and the girls at the age of 15.9 (NÉMETH and GALAMBOS, 1984). The problem is on the other hand, that the knowledge of family life and the hygienic culture of the students attending the two types of the school are insufficient.

Discussion

The practical significance of our observations relating to the differences in somatic development first appears at the time of choosing a career. In general, the students trained for skilled work choose physical work, that requires exertion. At the practical occupations they are exerted to physical burden, which even the normally developed young organism is only able to bear after appropriate toughness and accustoming. Since the calcification of the skeleton system is continuous and lasts throughout growth, the child bone may become deformed on the effect of constant burden. The musculature of the youths is also unfit for long-lasting, static burden.

Therefore, at the time of registration for vocational training, the somatic developmental level of the candidates should be inevitably taken into consideration in an increased degree. In case of constitutional deformities it is not correct to choose a trade requiring work carried out in constraint posture (e.g. parquetry).

Table 10. Distribution of discussions within the family about sexual questions in county Csongrád, according to school types (girls)

Type of school	Yes		No		No answer		Total	
	n	%	n	%	n	%	n	%
Grammar school and spec. second. school	1655	69.1	488	20.4	251	10.5	2394	100
Inst. for voc. training	878	69.4	199	15.7	189	14.9	1266	100
Together:	2533	69.2	687	18.8	440	12.0	3660	100

The correct way of living, up-to-date intake of food, proper ratio of active and passive resting are of particular importance at the age of puberty. At the same time, this is the period when the youths start to get accustomed to deleterious habits (smoking, consumption of alcohol and drugs), the chances of which are greater in case of students receiving vocational training as they work in the surroundings of adults.

In the long run, the experiences of our study results point to the insufficiencies of educational work as well, the improvement of which is indispensable in the interest of the adult generation.

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