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GROWTH AND BODY DEVELOPMENT IN VISUALLY IMPAIRED CHILDREN

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Abstract: *The growth and body development of visually impaired children and physique of visually impaired adults have rarely been studied. In our study, the total number of examined children was 597, 318 boys and 279 girls, aged from 6 to 15 years. This is practically the total number of visually impaired children in Hungary in these ages. The data were evaluated in two groups: children with low vision and blind, and partially sighted children.*

The visually impaired children were found to be as tall as the control group but their widths were narrower, the girths of extremities were less and they were heavier. than the control groups. As it is well-known, visual impairment involves a special way of life including little physical activity and therefore less muscular development. This tendency seems to correspond to the severity of impairment.

Keywords: *Visually impaired children; Growth; Development.*

Introduction

The growth of visually impaired children has attracted relatively little study perhaps because the numbers of these children are limited in most countries. There are only two exceptions: a number of publications deal with the onset of menarche in blind girls. The other is a limited number of publications about the sports activities of visually impaired adults.

The motor development of visually impaired children is impeded and as adults they live with limitations of movement. Their growth and body development is thought to be determined by this special situation.

The aim of this study is to summarise some features of their growth based on the examination of the total number of institutionalised visually impaired children. The author is conscious that the special problems of their growth cannot be solved by this study because of the limited number of these children in Hungary, but he hopes to call his colleagues' attention to this problem.

Subject and method

The medical and the pedagogical definitions of visual impairment are different. We do not intend to discuss this difference in detail. Regarding *the severity of impairment* we refer to partially sighted and practically blind children (Table 1).

Partially sighted children's far visual acuity is between 0.1 and 0.3 (according to Snellen) on the best (corrected) eye with a narrowed visual field of more than 20° or have progressive myopia, or far visual acuity of less than 0.1, but the near visus is better than Csapody VII. Low vision children have far visual acuity of less than 0.1. They are

practically blind, although from the pedagogical point of view, this group can be divided in three subgroups: children with light perception (visus: 0.00-0.01), finger counting children (visus: 0.01-0.05) and children with object perception (visus: 0.05-0.10). There were only few totally blind children with no light perception. Two different groups were examined in this study: partially sighted children and children with low vision (Csocsán 1996).

Table 1: The division of visually impaired children according to visual acuity

Name	Visus
Partially sighted	-
Higher degree of vision	0.2-0.3
Lower degree of vision	0.1-0.2
Low vision	-
Object perception	0.05-0.1
Finger counters	0.01-0.05
Light perception	0.00-0.01
Blind	0.00

The *aetiology of impairment* has changed in the last fifty years (Méhes 1985). In the blind children fibroplasia retrolentalis was found to be the most frequent (58.8%). About one third of children with fibroplasia have different levels of learning disabilities. Other frequent impairments include prae- and perinatal damages such as developmental disorders of eyeball such as microphtalmus, microcornea or aniridia, atrophia or aplasia nervi optici etc. Among the partially sighted children the most frequent pathogeneses were two refraction problems: myopia (38.9%) and hypermetropia (17.3%) and also amblyopia (23.6%). There were only five children with genetical backrounds of ocular disorders. One of them has Marfan's syndrome and four with different aminoacidurias. It was no possibile to study the influence of different syndromes on the growth because of the limited number of children (Table 2).

Table 2: Aetiological background of visually impaired children

Aetiology	Blind		Partially sighted	
	N	%	N	%
Infection	8	3.3	6	1.7
Fibroplasia retroletalis	144	58.8	-	-
Other diseases	32	13.2	19	5.4
Prae/perinatal damages	52	21.1	22	6.3
Refraction problems	-	-	198	56.3
Amblyopia	-	-	83	23.5
Unknown	9	3.6	24	6.8
Total	245	100.0	352	100.0

In the last twenty school years, the number of institutionalized visually impaired children was about 600, which is about 0.06% of the total number of Hungarian primary schoolchildren. There are also a number of partially sighted children with special correction integrated into mainstream schools with the special help of peripatetic

teachers. There are three insitutes for visually impaired children in Hungary, two for partially sighted and one for blind and practically blind children (Buday and Kaposi 1991).

We could only examine the institutionalized children. The total number of the examined children was 597 (318 boys and 279 girls) aged from 6 to 15 years. We only have a few children under 6 years of age. The group referred to as "Blind" also includes children with low vision, because of the low number of totally blind children. The exact numbers of partially sighted children and children with low vision are shown in Table 3. The data was compared with the Nationwide Growth Study of Hungarian Children and Youth (Eiben and Pantó 1988).

Table 3: Number of examined children

	Partially sighted		Low vision		Total	
Age	Boys	Girls	Boys	Girls	Boys	Girls
6	16	14	11	9	27	23
7	18	13	12	10	30	23
8	16	15	13	14	29	29
9	17	13	14	10	31	23
10	22	14	13	11	35	25
11	19	14	15	14	34	28
12	29	18	10	14	39	32
13	18	21	15	14	33	35
14	19	23	12	11	31	34
15	18	15	11	12	29	27
Total	192	160	126	119	318	279
	352		245		597	

A detailed anthropometric programme was carried out with 14 body measurements. Median age of menarche was estimated by the status quo method and probit analysis.

Results and discussion

Studying the tables of body measurements it is remarkable that the standard deviations in both visually impaired groups are higher than that of the normal control group. Similar findings were observed in the growth studies of the mentally retarded. It means that the visually impaired groups are not homogenous even if they were divided according to the severity of impairment. The reason for the heterogenity of these groups is the different aetiological background of children.

Apart from some age groups of blind children, the body weight is between the 50th and 75th percentiles of the normal control group. There are no significant differences either between the boys and girls, or the blind and partially sighted. Growth of the body weight seems to be similar to the normal control (Table 4). In puberty the girls are heavier than the boys.

Table 4: Body weight (kg)

Age (year)	Blind				Partially sighted			
	Boys		Girls		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
6	17.2	1.14	21.7	3.89	20.4	3.06	20.6	3.23
7	19.0	3.05	22.9	3.42	22.9	3.47	23.0	2.51
8	22.9	5.01	24.0	3.15	26.4	5.51	28.6	5.87
9	28.9	6.55	24.6	3.20	28.6	3.57	30.2	7.75
10	32.8	6.63	29.5	5.37	32.4	5.93	32.0	7.26
11	35.6	6.54	36.1	6.21	36.1	8.36	38.1	9.00
12	39.0	6.29	42.5	5.23	39.7	9.03	40.2	3.68
13	44.8	5.27	46.3	9.51	44.6	8.52	46.7	8.06
14	47.1	7.02	49.8	5.43	51.2	9.55	50.4	9.47
15	54.0	9.41	53.8	9.60	54.0	9.20	53.3	9.22

The body height of blind children is a little less than that of the partially sighted although the differences are not significant (Table 5). Compared with the control group, the body height of both groups is situated between the 25th and the 50th percentile of the normal control group. The growth of body height seems to be similar to that of the control group. In puberty, the girls are taller than the boys.

Table 5: Body height (cm)

Age (year)	Blind				Partially sighted			
	Boys		Girls		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
6	109.0	5.42	112.0	4.59	112.5	3.68	114.5	2.86
7	122.0	3.04	116.6	3.05	122.9	4.99	119.3	2.72
8	125.8	5.77	125.2	4.85	126.5	7.06	127.2	7.46
9	132.7	5.63	131.0	6.43	133.1	5.75	132.5	8.19
10	134.4	8.42	137.3	4.44	138.1	8.21	138.4	8.77
11	139.4	8.53	143.4	11.07	142.9	8.76	144.2	9.16
12	145.0	8.80	150.8	4.40	148.1	9.18	150.9	6.45
13	151.7	9.24	154.2	5.75	155.8	9.89	154.7	6.69
14	159.7	9.91	157.6	8.03	158.5	8.64	157.7	6.67
15	163.8	6.32	159.1	7.78	161.0	5.45	160.6	9.22

The upper extremity length (Table 6) seems to be longer than that of the control group: the means are between the 50th and the 90th percentiles. There are no significant differences between the visually impaired groups. The lower extremity length (Table 7) was measured as the iliocristal height, therefore we cannot compare with the control group (iliospinal height). Taking into consideration the short difference between the iliospinal and iliocristal height in vertical projection, the iliocristal height of visually impaired chidren is probably higher than that of the control group. Length measuremets are in high correlation with the body height.

Table 6: Lenght of the upper extremities (cm)

Age (year)	Blind				Partially sighted			
	Boys		Girls		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
6	48.0	2.50	48.8	4.40	50.1	2.23	48,9	3.26
7	54.6	3.92	52.6	4.01	54.4	3.26	51.6	1.36
8	57.0	5.49	55.4	3.71	57.0	3.48	56.1	3.45
9	69.6	4.28	57.5	4.84	58.6	3.39	59.0	2.90
10	60.4	3.49	59.4	2.20	61.2	3.86	61.8	4.68
11	64.1	5.55	62.5	4.34	64.6	4.36	64.8	3.39
12	67.6	7.31	65.0	2.97	67.3	5.08	65.2	3.63
13	69.9	5.07	69.4	3.95	69.7	7.06	66.6	4.92
14	72.0	6.36	70.1	5.01	72.3	5.03	68.9	5.64
15	76.5	3.44	70.3	4.74	74.4	2.44	69.6	4.98

Table 7: Iliocristal height (cm)

Age (year)	Blind				Partially sighted			
	Boys		Girls		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
6	66.8	1.22	71.6	4.76	72.3	4.07	70.9	1.29
7	73.2	2.55	69.0	4.35	74.3	4.90	71.7	2.98
8	74.9	1.32	73.1	3.29	76.1	4.91	75.7	7.60
9	76.1	4.59	77.8	4.07	79.9	3.89	81.0	5.21
10	79.1	7.72	78.1	9.37	84.5	5.93	86.1	6.59
11	84.5	6.04	86.1	4.51	87.5	5.85	86.2	4.37
12	88.1	8.65	92.3	2.69	87.3	5.08	89.2	3.63
13	93.1	5.81	91.8	5.68	96.4	8.82	94.6	4.49
14	96.8	7.77	94.3	3.89	98.1	5.27	95.7	4.63
15	99.4	5.87	95.2	5.13	100.1	3.40	97.7	6.45

The biacromial diameter (Table 8) and the bi-iliocristal diameter (Table 9) in both visually impaired groups are narrower than in the control group: the mean values are between the 50th and the 25th percentiles. In boys older than 10 the biacromial diameter is wider than the girls. The bi-iliocristal diameter is also wider in the girls' groups after ten years. Sexual dimorphism in these measurements can be seen in the visually impaired groups.

The biepicondylar width of the humerus (Table 10) and femur (Table 11) seem to have similar growth patterns to the normal control group. Both these measurements are significantly less in blind children than in the control group. The means of the partially sighted children approximate to the control group or higher.

Because these measurements are in correlation with the skeletal age, this points to a retarded biological development in blind children. This statement is inconsistent with the previous findings on the median age at menarche of blind girls which was detected almost one year earlier than in the sighted girls (Zacharias and Wurtman 1969). The difference was less between the median age at menarche of partially sighted and sighted girls (Buday 1981). This contradiction can be solved by systematic studies of the skeletal age of blind children.

Table 8: Biacromial diameter (cm)

Age (year)	Blind				Partially sighted			
	Boys		Girls		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
6	22.4	2.01	25.5	2.37	25.3	0.97	24.0	1.32
7	25.7	1.93	27.2	1.69	26.0	0.52	24.8	1.11
8	27.2	2.38	27.4	1.22	26.9	1.64	27.2	1.41
9	28.5	2.17	27.5	1.77	28.7	1.36	28.6	1.21
10	29.6	2.23	28.5	1.02	29.4	1.80	29.9	1.27
11	29.5	2.30	30.0	2.36	30.9	2.17	31.3	2.26
12	31.8	2.74	32.7	1.77	32.0	2.38	32.5	1.48
13	32.8	2.92	32.8	1.57	33.9	2.96	32.9	2.17
14	34.8	2.61	33.9	0.81	35.0	2.71	34.2	2.48
15	37.2	2.48	35.1	2.86	37.5	2.46	35.2	2.23

Table 9: Bi-iliocristal diameter (cm)

Age (year)	Blind				Partially sighted			
	Boys		Girls		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
6	17.0	1.62	17.3	0.60	18.5	1.25	18.2	1.03
7	19.1	1.45	17.7	0.86	19.0	1.17	18.8	0.90
8	19.4	1.36	19.7	0.76	19.4	1.45	19.4	1.88
9	20.3	1.03	20.3	2.10	20.6	1.38	20.3	2.48
10	21.1	2.04	21.4	1.66	21.3	1.53	21.3	1.48
11	21.3	2.35	22.2	1.82	22.0	1.69	22.4	1.83
12	22.4	1.99	23.7	1.00	22.8	2.09	23.5	1.75
13	23.8	2.39	24.6	2.15	24.0	2.50	24.9	1.81
14	24.9	2.09	25.2	1.63	23.9	1.94	25.2	2.17
15	25.4	2.81	26.2	1.97	25.8	2.72	25.4	2.65

Table 10: Biepicondylar width of humerus (mm)

Age (year)	Blind				Partially sighted			
	Boys		Girls		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
6	45.3	0.80	45.3	1.01	48.6	0.97	46.4	0.78
7	47.0	0.92	47.1	0.98	50.4	1.94	48.7	0.80
8	50.1	1.02	48.0	0.69	51.6	1.38	49.0	1.10
9	51.6	1.33	50.1	0.48	52.8	1.19	51.6	1.82
10	52.8	1.47	52.4	0.83	55.3	2.55	54.5	1.44
11	55.4	1.86	54.3	0.70	56.4	1.77	56.7	1.29
12	57.3	1.57	55.5	1.14	59.2	1.79	57.7	1.45
13	58.8	2.22	57.2	1.34	61.4	1.61	59.1	1.35
14	60.7	1.27	58.7	0.73	65.5	1.83	60.5	1.52
15	65.3	2.05	58.9	1.31	67.3	1.08	61.3	1.56

Table 11: Biepicondylar width of femur (mm)

Age (year)	Blind				Partially sighted			
	Boys		Girls		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
6	70.3	0.55	69.9	1.69	73.4	1.22	70.8	1.09
7	73.6	0.67	70.7	1.42	77.7	1.38	72.4	1.67
8	75.5	1.85	74.4	0.98	80.5	2.15	77.9	1.72
9	78.7	2.29	76.0	1.49	81.0	1.99	79.5	2.78
10	82.7	2.65	79.9	1.24	84.6	3.07	80.1	2.89
11	85.1	2.16	81.3	1.91	87.3	2.55	85.5	1.83
12	87.3	1.94	82.6	1.55	90.6	2.86	86.1	1.67
13	89.0	2.83	87.0	1.97	97.8	2.48	87.6	1.95
14	92.7	1.47	86.5	1.14	98.4	2.62	90.5	3.00
15	94.3	2.78	89.7	1.49	100.1	2.43	91.8	2.20

The differences in the two upper arm circumferences (relaxed: Table 12, and contracted: Table 13) between the visually impaired and the control group are greater in younger children. At the end of the examined age period the mean values are around the same as the mean of the control group, but on the other hand the differences between the relaxed and contracted cirumference of the upper arm at the same age are less than that of the normal control group. A lower muscle mass of the upper arm can be supposed.

The calf circumference (Table 14) of the partially sighted does not differ from that of the normal control group. The differences between the blind and the sighted group are greater.

The growth of the skinfolds is similar to that of the control group. The blind children's skinfolds are less than those of the normal control group: they are between the median and 25th percentiles. The skinfolds of the partially sighted are more or less similar to those of the control group (Table 15-18).

Table 12: Upper arm circumference (relaxed, cm)

Age (year)	Blind				Partially sighted			
	Boys		Girls		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
6	14.2	3.98	16.5	1.76	15.6	2.46	16.6	2.23
7	14.5	2.03	17.1	1.97	16.5	1.76	16.7	1.15
8	17.1	2.27	17.3	1.34	18.2	2.57	18.1	2.37
9	19.0	2.84	18.1	0.77	18.6	1.50	18.5	3.27
10	20.1	3.53	19.2	2.23	19.3	1.87	19.6	2.56
11	20.3	3.26	20.5	2.17	20.1	3.29	20.5	3.79
12	21.1	2.30	22.0	2.22	21.0	3.47	20.9	1.01
13	22.4	4.39	22.4	3.51	22.4	3.64	22.3	3.24
14	23.2	2.79	23.0	1.45	23.8	2.95	23.1	2.94
15	25.9	5.77	25.2	3.69	25.9	3.79	24.2	2.23

Table 13: Upper arm circumference (contracted, cm)

Age (year)	Blind				Partially sighted			
	Boys		Girls		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
6	14.6	2.25	17.0	2.23	16.6	2.50	17.0	2.34
7	15.0	2.64	17.6	2.01	17.6	1.96	17.2	1.16
8	17.9	2.50	17.7	1.37	19.0	1.85	18.7	2.07
9	19.4	2.24	18.6	2.32	19.2	1.28	19.1	3.44
10	20.5	3.39	19.6	2.40	20.0	1.82	20.9	2.31
11	20.9	2.38	21.0	2.02	21.8	3.54	21.0	3.81
12	21.7	2.47	22.6	2.57	21.9	3.53	21.6	1.20
13	23.0	4.67	23.0	3.66	23.2	3.43	23.7	3.51
14	24.0	3.09	23.7	4.29	26.2	2.63	24.7	2.76
15	26.4	7.31	26.0	5.45	26.3	4.21	24.8	2.83

Table 14: Calf circumference (cm)

Age (year)	Blind				Partially sighted			
	Boys		Girls		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
6	22.1	4.32	23.3	3.25	24.2	2.28	23.3	2.18
7	22.2	3.98	24.1	2.18	25.0	1.83	23.5	1.94
8	23.1	3.48	24.3	1.35	25.8	3.06	25.7	2.60
9	25.5	2.88	25.3	1.97	26.1	2.41	26.7	3.27
10	26.2	3.34	25.9	2.24	27.9	2.60	27.8	3.26
11	26.7	2.94	28.0	3.08	28.0	4.19	29.5	4.01
12	28.8	2.63	28.8	2.07	29.4	3.88	30.0	1.81
13	30.9	5.46	29.4	3.63	31.4	3.46	32.7	3.82
14	31.4	4.65	30.9	2.61	32.9	2.87	33.1	3.88
15	32.9	6.03	31.8	2.89	33.3	5.73	33.7	2.72

Table 15: Subscapular skinfold (mm)

Age (year)	Blind				Partially sighted			
	Boys		Girls		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
6	4.0	5.60	6.3	2.87	6.0	2.56	7.0	2.43
7	5.0	4.38	5.5	2.98	6.1	3.59	6.0	2.00
8	5.5	1.19	5.9	3.76	6.6	2.62	7.2	4.99
9	6.5	7.55	6.0	2.12	7.1	3.22	8.5	4.66
10	7.6	8.14	7.8	4.83	7.0	3.72	9.1	3.32
11	8.8	4.02	9.8	6.28	9.1	6.69	10.1	8.35
12	10.3	6.70	10.2	3.83	9.2	6.83	11.9	4.19
13	10.8	3.03	12.3	6.65	9.5	8.14	12.3	6.78
14	10.1	3.82	13.3	5.89	9.7	4.53	13.6	7.84
15	10.7	5.24	13.0	9.13	10.2	1.69	14.8	8.16

Table 16: Triceps skinfold (mm)

Age (year)	Blind				Partially sighted			
	Boys		Girls		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
6	9.1	1.50	9.0	2.76	9.9	3.28	11.0	3.28
7	7.3	2.73	8.9	3.24	10.2	5.74	11.9	3.52
8	10.5	2.58	9.5	3.34	10.3	3.62	12.5	4.57
9	11.5	5.95	10.9	2.89	10.9	3.66	12.9	5.83
10	12.0	7.32	11.8	4.83	11.9	4.25	13.9	4.56
11	12.0	5.84	14.5	5.09	12.6	7.19	15.0	5.92
12	13.1	8.64	15.0	4.65	12.9	5.83	15.4	4.59
13	12.0	9.12	15.8	6.92	13.0	7.35	16.4	7.76
14	10.9	4.67	15.9	3.44	10.9	3.78	16.9	8.04
15	11.0	6.92	16.1	4.73	11.4	9.20	18.9	4.10

Table 17: Suprailiac skinfold (mm)

Age (year)	Blind				Partially sighted			
	Boys		Girls		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
6	6.2	1.29	10.5	4.40	6.9	3.32	10.5	3.42
7	6.9	2.23	10.3	4.54	7.8	6.24	11.5	1.59
8	7.5	2.07	10.9	4.72	9.0	4.76	13.0	8.32
9	10.2	5.72	12.6	3.99	10.1	5.76	13.9	6.83
10	11.3	1.69	14.7	5.82	11.0	6.63	15.9	7.45
11	13.1	8.20	16.3	7.43	13.4	9.41	18.1	7.98
12	14.1	7.23	17.8	4.46	13.9	9.12	19.9	5.91
13	13.9	2.50	19.7	6.45	14.5	6.72	21.4	9.56
14	14.1	5.22	21.0	7.91	14.3	5.13	21.8	9.14
15	14.8	2.89	22.9	9.19	14.3	2.39	22.3	6.53

Table 18: Medial calf skinfold (mm)

Age (year)	Blind				Partially sighted			
	Boys		Girls		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
6	8.9	2.24	12.0	5.63	9.9	3.45	12.0	3.24
7	9.9	3.28	11.6	3.42	10.0	3.32	12.8	4.15
8	10.0	3.92	10.9	3.52	10.3	5.10	13.8	6.20
9	11.5	7.43	12.8	2.09	11.2	3.79	15.0	4.91
10	12.3	6.27	14.9	4.01	12.8	5.67	16.2	5.92
11	13.0	5.71	16.7	4.98	13.9	7.45	17.3	7.44
12	13.8	5.32	17.8	4.57	13.9	9.12	17.9	4.95
13	13.9	6.26	19.0	6.74	23.5	7.43	19.8	8.51
14	13.7	4.33	19.9	7.63	13.1	8.11	20.5	7.19
15	13.1	9.40	21.7	6.21	13.2	5.85	21.7	7.52

All the 9-year-old girls were asked about the fact and the date of onset of menarche. The girls were also divided into two groups according to the severity of visual impairment. Their birthplace and some data regarding their social status (education level and income of parents, number of brothers and sisters etc) were also recorded. There were some difficulties with the evaluation because of the limited number of girls. The median ages of menarche of these groups were similar. These girls have been living for number of years in an institution. Their environment was the same even if they often visited their home and family.

The median age of menarche of the blind girls is the lowest in Hungary and also that of the partially sighted girls is also low (Table 19). The confidence limits of these two values are wider than those of the control group. The reason is probably same as the reason for the high standard deviation values: the aetiological heterogenity of these children.

Table 19: Median age at menarche of visually impaired girls

Group	N	$Me \pm s_{me}$
Blind	86	11.90±0.27
Partially sighted	118	12.20±0.48
Control (Eiben and Pantó 1984)	-	13.09±0.15

This part of the study repeats one of our previous studies of the median age at menarche of girls with sensory deprivation (Buday 1981). The results of the previous study and the present one are almost the same.

The visually impaired children are as tall as the control group but their width measurements are narrower and they are somewhat heavier. Regarding the structure of their extremities, their length is in high correlation with the body height, but the girths are less than in the normal control groups. These tendencies are more evident in the blind groups.

These findings are similar to the influence of environmental changes on the growth of the children which was described first in Hungary in connection with the secular changes in the Körmend Growth Study (Eiben 1994). The positive changes of environmental factors have ambivalent influences on the growth of the children, the length measurements and the weight seem to grow faster. Therefore the children are taller but the trunk has become narrower and girths of the extremities are less than they were ten or twenty years ago. This body shape points to lower muscularity.

The body shapes of visually impaired children may show similar tendencies which seem to correspond to the severity of impairment: their muscles are less developed than those of the control group. The reason is also due to an environmental factor: visual impairment involves a special way of life involving little physical activity and as a consequence less muscular development.

There have been some attempts to solve the problem. A child who receives low vision therapy as a part of as early intervention programme may have the opportunity for greater muscular development and therefore better physical ability — if his movement training is not neglected later. More than half of these children will have some sort of

physical job as adults. Thus, for them it is a bread and butter question, whether their structure and physical ability is suitable for such work.

The physical education of these children is the great responsibility of the parents and also the special teachers.

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