Anthrop. Közl. *34;* 109–113. (1992)

BODY DEVELOPMENT AND FAMILY SIZE

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Abstract: *Connection between family size and body measurements was investigated in a sample of Hungarian university students (6915 male and 1390 female) measured between 1976–1985. Different tendencies were found between the male and female students in this respect. The majority of the body measurements in male students showed a decreasing tendency with increase of children's number in the family. At the same time the majority of the body measurements in female students showed an opposite tendency. This phenomenon may be caused not only by the smaller number of the female students investigated, but by other socio-economic factors (urban-rural differences and educational level of the parents), too.*

Key words: *University students; Body measurements; Family size.*

Introduction

It is well known, that socio-economic factors, such as social class (or occupation) and educational level of parents, place of birth, family size (the number of children in the family) etc. affect growth and development of children and youth.

Among these factors family size is an important one, because it has a great influence on the per capita income. For example in 1987 in Hungary the family income per capita was only 76.1% in a family with one child, 64.6% with two children, 51.6% with three children and only 37.1% with four or more children compared to a couple without any child (Harcsa 1990).

The connection between family size and body measurements was reported in Hungary only for children up to the age of 18 years (Gyenis – Szerényiné Pásztor 1984, Eiben – Pantó 1985, Bodzsár 1991). The aim of the present study is to investigate the same phenomenon in a special group of young adults: in university students.

Material and Methods

The sample consists of 20 year old male (n=6915) and 19 year old female (n=1390) first year students investigated in successive classes between 1976–1985 at the Technical University Budapest.

The anthropometric measurements were taken according to the techniques suggested in Weiner – Lourie (1969). The data referring to weight and length (height, sitting height, arm length and iliac spine height), circumference (chest, upper arm, thigh and calf circumference), width (biacromial, chest and biiliocristal diameter) and skinfold (biceps, triceps, subscapular and suprailiac) measurements, as well as body mass indices are presented here. Body mass index was calculated according to Micozzi et al. (1986), because they showed, that W/S^2 in men and $W/S^{1.5}$ in women maintain the greatest correlation with weight, on the one hand, and independence from stature, on the other hand. Statistical analysis (means, standard deviations, percentages, variance analyses, chi-squered tests and Student's *t*-test) was performed at the Computer Center of the Eötvös Loránd University using the BMDP package program (Dixon – Brown 1978).

Table 1. **Body measurements, and body mass index of the 20 year old male and 19 year old female students (Technical University, Budapest), according to the number of children in the family**

Measurements	Number of the children									
	1		2		3		4, or more		Total	
	M	SD	M	SD	M	SD	M	SD	M	SD
Male students	*(n = 1781)*		*(n = 3935)*		*(n = 861)*		*(n = 338)*		*(n = 6915)*	
Height+	177.14	6.43	176.90	6.40	176.76	6.66	176.70	7.04	176.92	6.47
Sitting height+	92.76	3.34	92.84	3.33	92.87	3.38	92.68	3.18	92.80	3.33
Arm length+	78.84	3.76	78.79	3.76	78.87	3.78	78.64	3.99	78.79	3.77
Iliac spine height*	100.31	4.74	100.01	4.64	99.83	4.89	99.80	5.31	100.04	4.73
Weight****	69.74	8.86	68.65	8.28	68.42	8.84	68.23	8.35	68.87	8.512
Body mass index****	22.19	2.33	21.91	2.19	21.85	2.13	21.83	2.14	21.95	2.22
Chest circumference***	92.02	5.65	91.44	5.53	91.22	5.45	90.98	5.25	91.53	5.55
Upper arm cirmumference***	27.55	2.35	27.17	2.28	27.06	2.23	26.92	2.10	27.23	2.29
Thigh circumference***	54.68	4.12	53.98	3.86	53.74	3.83	53.60	3.86	54.10	3.94
Calf circumferencex*	36.59	2.50	36.37	2.40	36.38	2.43	36.36	2.51	36.41	2.41
Biacromial diameter+	40.69	1.95	40.66	1.89	40.69	1.89	40.45	1.97	40.65	1.91
Chest transversal diameter***	29.42	1.99	29.31	1.93	29.36	1.93	29.15	1.88	29.32	1.94
Biiliocristal diameter*	28.77	1.93	28.63	1.76	28.58	1.80	28.59	1.71	28.64	1.81
Biceps skinfold***	4.78	2.78	4.33	2.38	4.17	2.16	3.98	2.18	4.41	2.47
Triceps skinfold***	11.49	4.94	10.67	4.39	10.24	4.46	9.87	4.15	10.79	4.56
Subscapular skinfold***	13.53	5.67	12.41	5.06	11.89	4.63	11.72	4.52	12.60	5.18
Supra-iliac skinfold***	18.88	9.74	16.98	8.83	16.28	8.36	15.51	8.28	17.30	9.05
Female students	*(n = 388)*		*(n = 768)*		*(n = 178)*		*(n = 56)*		*(n = 1390)*	
Height+	164.52	6.24	164.62	5.90	164.31	6.15	164.71	5.75	164.55	6.02
Sitting height+	87.75	3.02	87.86	3.18	87.93	3.16	87.88	2.90	87.83	3.12
Arm length+	71.65	3.72	71.71	3.62	71.53	3.27	71.96	3.73	71.68	3.61
Iliac spine height+	92.71	4.62	92.75	4.42	92.30	4.34	93.01	4.53	92.69	4.47
Weight+	56.02	7.12	56.26	6.74	56.75	6.74	57.21	8.67	56.29	6.93
Body mass index+	26.52	2.91	26.61	2.67	26.93	2.85	27.05	3.86	26.64	2.82
Chest circumference+	86.33	6.31	86.51	5.88	86.41	6.26	85.62	6.21	86.41	6.06
Upper arm cirmumference+	24.53	2.12	24.48	2.07	24.81	2.33	24.59	2.44	24.54	2.13
Thigh circumference+	54.77	3.89	54.74	3.89	55.01	3.87	55.12	4.50	54.80	3.91
Calf circumferencex+	34.86	2.65	34.88	2.35	35.18	2.39	35.36	2.56	34.93	2.45
Biacromial diameter+	36.52	1.62	36.56	1.59	36.60	1.46	36.98	1.55	36.57	1.62
Chest transversal diameter+	26.13	1.82	26.22	1.63	26.23	1.80	26.35	1.47	26.20	1.70
Biiliocristal diameter+	28.33	1.97	28.07	1.78	28.26	1.95	28.08	2.08	28.16	1.87
Biceps skinfold+	7.63	3.64	7.64	3.49	7.73	3.27	7.88	3.89	7.66	3.52
Triceps skinfold+	16.90	4.78	16.97	4.92	17.15	4.97	17.25	4.84	16.98	4.88
Subscapular skinfold+	14.38	5.60	14.26	5.48	14.53	5.39	14.14	6.23	14.33	5.53
Supra-iliac skinfold+	20.32	8.27	20.12	8.15	20.12	7.69	20.91	8.66	20.21	8.14

**** $p < 0.001$
* $p < 0.05$
+ non significant

Table 2. **Distribution of the 20 year old male and 19 year old female students (Technical University, Budapest) according to their birth–place and the educational level of the father**

Educational level of the father		Place of birth			
		Male students**** born		Female students**** born	
		in Budapest[1]	out of Budapest[2]	in Budapest[1]	out of Budapest[2]
Primary	n	446	1662	83	221
	%	16.4	40.2	13.0	30.4
Secondary	n	627	1088	124	193
	%	23.0	26.3	19.4	26.5
College or university	n	1650	1389	432	313
	%	60.6	33.6	67.6	43.1
Total	n	2723	4139	639	727
	%	100.0	100.0	100.0	100.0

**** $p < 0.0001$

1,2 Differences between the male and female students born in Budapest and out of Budapest: $p < 0.01$ and $p < 0.001$

Table 3. **Distribution of the 20 year old male and 19 year old female students (Technical University, Budapest) according to their birth–place and the educational level of the mother**

Educational level of the father		Place of birth			
		Male students**** born		Female students**** born	
		in Budapest[1]	out of Budapest[2]	in Budapest[1]	out of Budapest[2]
Primary	n	577	1868	110	256
	%	21.2	45.1	17.2	35.2
Secondary	n	1307	1599	300	386
	%	48.0	38.6	46.9	39.3
College or university	n	841	672	229	186
	%	30.9	16.2	35.8	25.5
Total	n	2725	4139	639	728
	%	100.0	100.0	100.0	100.0

**** $p < 0.0001$

1,2 Differences between the male and female students born in Budapest and out of Budapest: $p < 0.05$ and $p < 0.001$

Results

Table 1 shows the values of the body measurements of the 20 year old male and 19 year old female students. In male students in the length measurements, weight and body mass index with increase in the number of children in the family a decrasing tendency was found in the majority of these measurements (except for the sitting height) and the differences were significant for three of them (iliac spine height, weight and body mass index).

Table 1 also presents the values of the body measurements of the 19 year old female students. Comparing their length measurements of the male students an opposite tendency appeared here, because with increase in the family size the majority of the values of measurements has also increased, but the differences were non-significant.

Table 1 also shows the values of the circumference, width and skinfold measurements of male students. For these measurements the decreasing tendency through the groups formed according to the number of children in the family was more stressed than in the case of the other measurements. The differences were significant, except for the biacromial diameteer.

The same measurements of the female students showed again an increasing tendency with the increase in the number of children in the family. Here the differences were also non-significant, similarly to the other measurements (*Table 1*).

Discussion

An interrelationship between family size and body measurements, especially with the height of children and youth has often been reported (Scott 1961, Grant 1964, Dougles – Simpson 1964, Goldstein 1971, Olivier – Tissier 1974, Walter et al. 1975, Rona et al. 1978, Gyenis – Szerényiné Pásztor 19784, Eiben – Pantó 1985, Bodzsár 1991). However, only one of them (Dougles – Simpson 1964) referred to such differences between the sexes as we found in our sample.

The reasons of these differences may be explained by other socio-economic factors (*Table 2* and *3*). They can be summarized as follows:

1. The sample size of the female students was too small compared to the sample of the male students.

2. In female students the proportion of those born in Budapest was higher (46.8%), than in male students(40.0%). Nowadays, in all societies the urban children are higher and heavier, than their rural counterparts (Eveleth – Tanner 1976). Moreover, Lindgren (1976) described that growth and maturation of urban children were no longer related to the social classes in Sweden.

3. In female students the proportion of parents having higher educational level was greater, than in male students. Usually, the majority of the higher educated people belongs to the upper social classes. Dougles – Simpson (1964) and Rona et al. (1978) found, that the body measurements of children in the upper social classes, as well as the body measurements of non-manual workers were not related to the family size. At the same time the body measurements, especially the height of children in the other social classes were strongly influenced by the family size. Similarly to our results Dougles – Simpson (1964) also showed that the association between the social classes of parents and the family size was marked only in boys.

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Acknowledgement: This study was funded by the Hungarian National Foundation for Scientific Research (OTKA grant Nº I/3/2225).

Köszönetnyilvánítás: A tanulmány az OTKA I/3/2225. sz. támogatásával készült.

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A Magyar Biológiai Társaság Embertani Szakosztályának 1992. november 2-i, 280. szakülésén elhangzott előadás; közlésre beérkezett: 1992. november 12-én.

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