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BODY MASS INDEX OF CZECH AND SLOVAK CHILDREN AND ITS SECULAR TREND

ABSTRACT: *The paper examines the age development and secular changes in Body Mass Index (BMI, Quetelet's index) of Czech and Slovak children aged 1.5–15 years. In addition to comparing the same sex within both groups, inter-sexual differences are examined. To evaluate secular development, both average values of BMI of the two present authors' own surveys and those reported in three published Czech and two Slovak groups were used. The comparison demonstrated an undesirable increase in BMI in both groups during the 20th century.*

KEY WORDS: *Body Mass Index – Secular trend – Czech and Slovak children*

INTRODUCTION

Changes in lifestyle and, most importantly, the altering nutritional conditions of a number of populations over the 20th century have led, among other things, to changes in some physical features (e.g., increases in body weight and height) and, consequently, their ratioproportions. These changes may have an adverse effect on one's health; hence, it is critical to pay attention to their secular trend.

In anthropology, the ratio of body height and weight is regarded as a marker of body fullness. The ratio is expressed using various formulas and shows the adequacy of body weight in relation to height. Its evaluation, especially so in children and in adolescents, however, should also take into account the individuals' age because of its ratio's considerably great variability.

The expression of the ratio, referred to as the so-called body mass index (BMI), is generally recognized as the criterion. While used as in the form of so called Quetelet's index for almost 130 years on account of its simplicity, it is reportedly not the most ideal one (Bláha *et al.* 1994). Still, its frequency in today's and, probably, also future studies, allows to compare the above ratio relationship in various populations – that is why it has been used also in the present study. Moreover, some authors demonstrate its close relation to total body fat (e.g., Ravicki, Israel 1986, Garrow 1986, etc.). However, Norgan (1994), in a study of Australian Aborigines living their traditional way of life, demonstrated a surprisingly high subcutaneous fat with a low BMI without any health problems.

The first survey of body height and weight of Czech, and especially Prague children aged 6–15 years allowing to calculate BMI, was conducted as early as 1894–1895 by J. Matiegka (see Matiegka, Preininger 1894, Matiegka 1927). Unlike these, today more than one hundred years old values, the first data of this kind in Slovak children date back to the mid-1930s (Chura 1934). Other records of surveys of height and weight of the bodies of Czech and Slovak children come only from so-called nationwide surveys of children and youth conducted in Czechoslovakia after World War II. Of these, and especially with a view to the time of recording the first Slovak data from 1961 were selected for the presented comparison of secular trends in BMI (Fetter *et al.* 1965, Suchý 1967).

To use the basic values of current Czech and Slovak populations, which appropriately indicate the development of changes in the fullness of the body of children, we regard data emerging from two of our own surveys, conducted in 1976–1978 and 1987–1988 (Hajniš *et al.* 1989, Hajniš 1993). Only to make the picture complete in figures and tables do we record also BMI data from the latest nationwide survey of Czech children and youth made in 1991 (Lhotská *et al.* 1993). The values of Slovak children from the same year are regrettably not available.

MATERIAL AND METHOD

To establish the body height to weight ratio of the Czech and Slovak children aged 1.5 to 15 years, the Body Mass Index (BMI) was used:

$$\text{BMI} = \frac{\text{body weight (kg)}}{\text{body height (m}^2\text{)}}$$

As in earlier surveys, whose data we used for comparison, and which are referred to in the introduction section of the study, it was necessary, for the purpose of the present study, to calculate BMI from published average mean values using the above equation. It is for this reason that the data of these groups show neither standard deviation nor the middle error of average. The differences in view of our groups are therefore not tested.

Except for Chura's group surveyed in 1931–1933, and Matiegka's data from 1894–1895, all groups used for calculating BMI and referred in the introduction section, include probands from the whole respective territory, i.e., either of the whole Czech or Slovak Republics. The locations of our two basic groups (1976–78, 1987–88) were included into the survey based on a three-step statistical selection from the whole territory of the then Czechoslovakia. As a result, it can be assumed that the data reflect the true status of BMI and its changes in children and adolescents below the age of 15 years from both surveyed countries.

The average mean values of BMI for all used groups are shown in tables and are also evident from uneven curve figures.

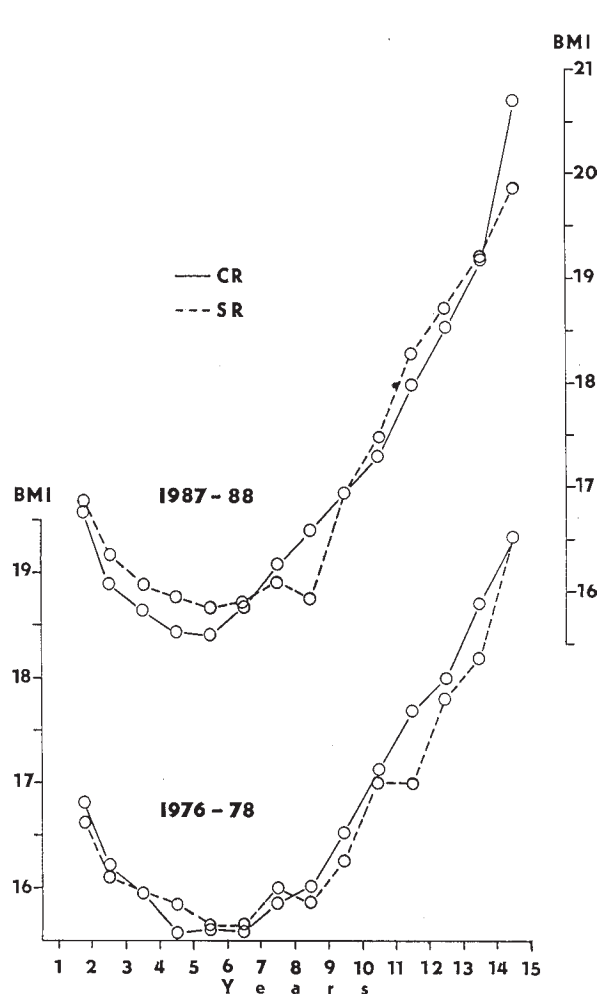


FIGURE 1. Ontogenetical development of BMI in Czech and Slovak boys.

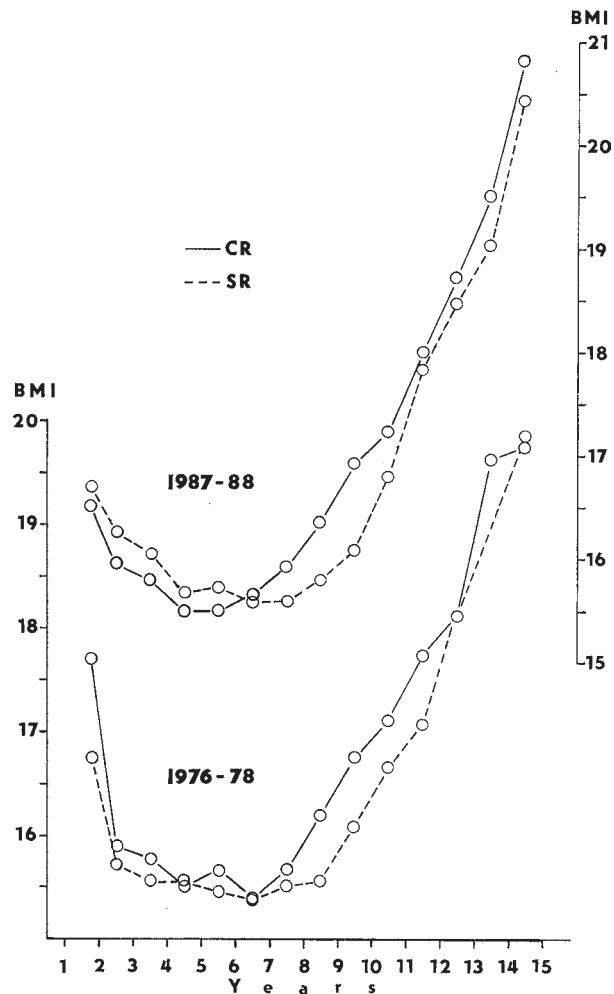


FIGURE 2. Ontogenetical development of BMI in Czech and Slovak girls.

In 1894, Matiegka and Preininger used for their survey, which allowed us to calculate the oldest Czech BMI values, a total of 5,632 Prague children of either sex aged 6–15 years. However, the study does not give the numbers of probands in individual age categories.

Slovak children, surveyed over the years 1931–33 by J. Chura (1934) attended schools in Zvolen district. They were 2,764 boys and 3,059 girls, again aged 6–15 years. The calculated average mean values of BMI are given in *Table 6*.

TRENDS IN BMI OF CZECH AND SLOVAK CHILDREN

The growth curves of BMI of Czech and Slovak children of both of our own groups surveyed in 1976–78 and 1987–88, clearly show a very similar course in both sexes (*Figures 1, 2, Tables 1, 2*). After an initial decrease in the average mean values, due to the more rapid growth of height than body weight, an increase in BMI from the age of 7 years upward could be seen in the 1970s in both sexes in Czech and Slovak children. In the second half of the 1980s, however, the process (of a more marked increase in average mean weight than body height) starts earlier by a year in boys of both groups and in Czech girls, while, in Slovak girls, we encounter the start of a permanent rise again at age 7.

From the above age, especially so in girls and Czech boys, a fluent rise of both groups in BMI can be observed (i.e., *Figures 1, 2*). In some age categories, the calculated means are fairly similar between both nations surveyed.

Bigger differences between the Czech and Slovak groups are more evident in girls than in boys, and especially so in puberty. The above more marked differences between girls of both nations persisted in the groups surveyed in of the 1970s between about 9 and 12 years of age; however, in later probands surveyed in the 1980s, from 8 to 11 years of age. Thus, there was a shift into the lower age stratum. The differences in this period are statistically highly significant. So, for instance, the value of $t_{(388)}$ of difference between 9 to 10-year-old Czech and Slovak girls from 1976–78 equals $3.140 < P 0.001$, in age-matched girls from 1987–1988, $t_{(1230)} = 6.508 > P 0.001$. In boys, the differences between the Czech and Slovak populations are smaller from both the above decades with the only exception in puberty. So, for instance, the mean difference of BMI in boys between the 12- to 13-year-olds from 1976–1978 was 0.240 and its $t_{(407)} = 1.004 < P 0.30$. The differences for age-matched boys from the survey conducted in 1987–1988 were even as low as 0.200, and its $t_{(1144)} = 0.506 < P 0.60$.

As is evident from *Tables 1 and 2* and from *Figures 1 and 2*, the average values of BMI in the second half of the second year of life in Czech and Slovak children usually reach 16.5–17 units. The initial decrease up to 6–7 years of age equals in both time periods about 1 index unit, the subsequent increase up to the age of 15 in the group surveyed in the 1970s was about 4; in the second group surveyed in the 1980s, however, the figure in both sexes and nationalities was as big as 5 and more units. This fact demonstrated the undesirable phenomenon in children of both sexes and groups, i.e., increasing body fullness in children in the 1980s compared to previous periods. Even higher average

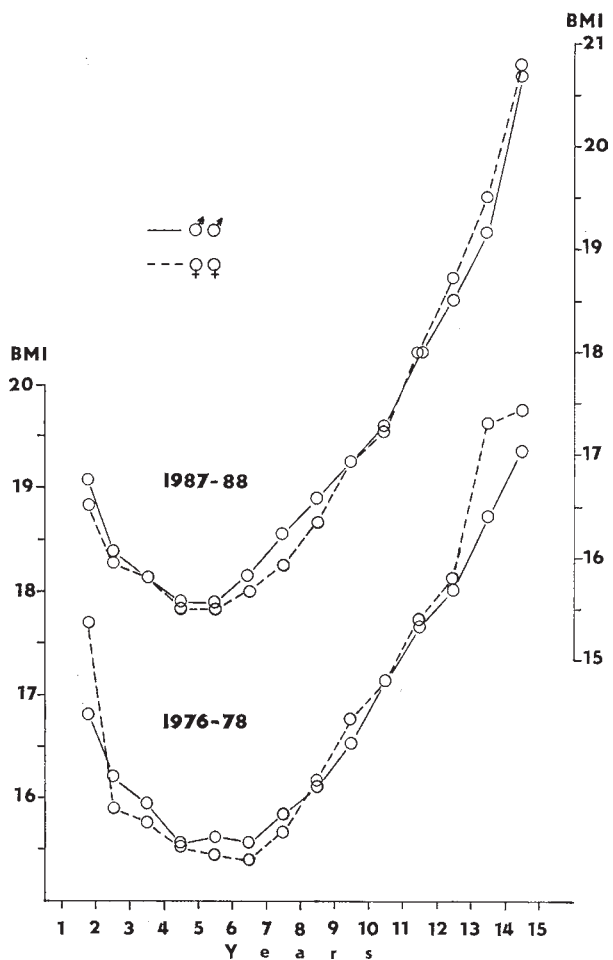


FIGURE 3. Comparison of ontogenetical development of BMI in Czech boys and girls.

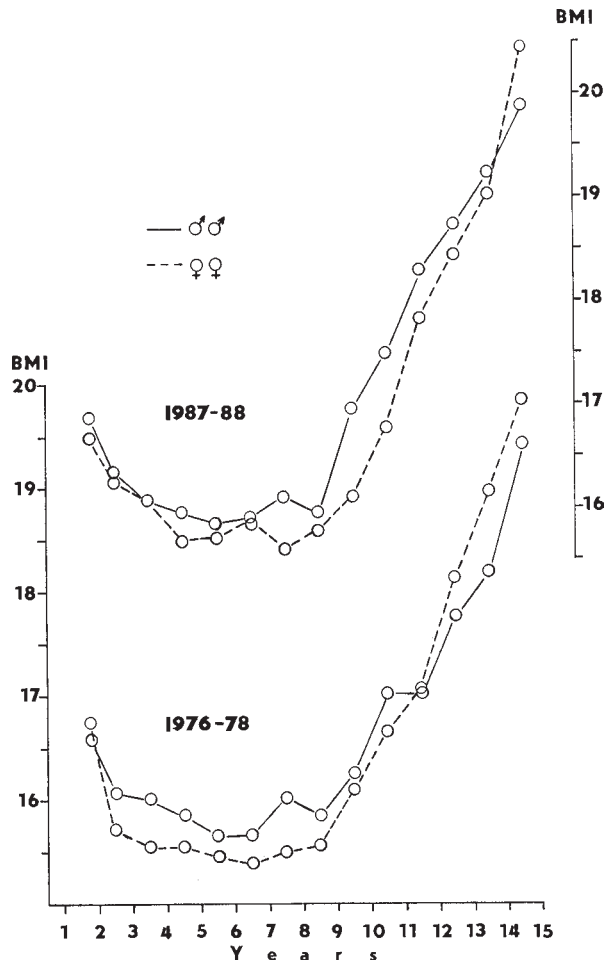


FIGURE 4. Comparison of ontogenetical development of BMI in Slovak boys and girls.

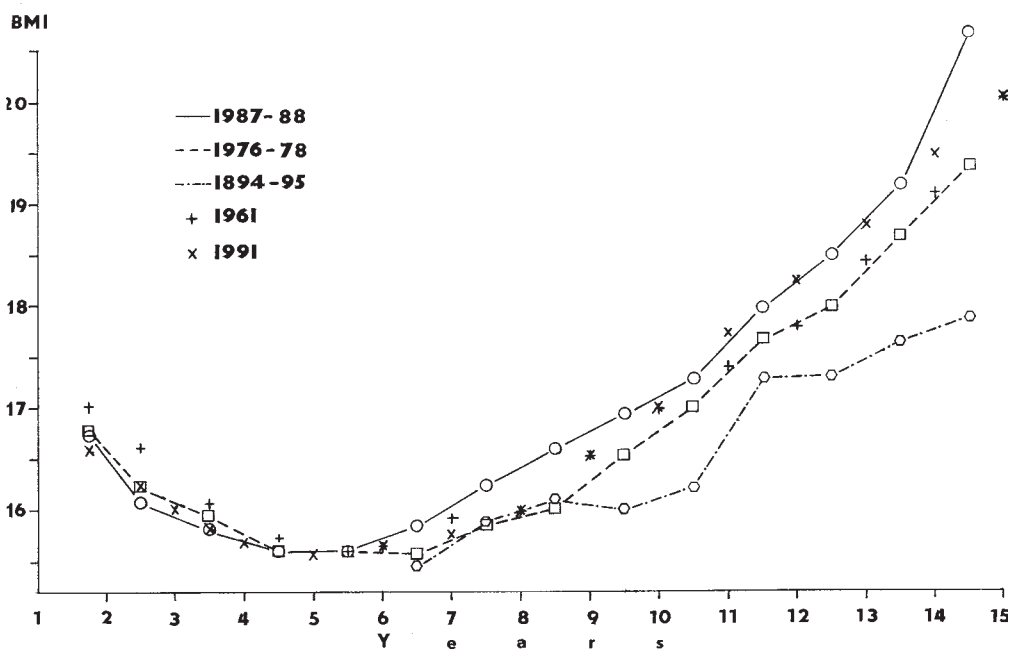


FIGURE 5. Secular changes of ontogenetical development of BMI in Czech boys.

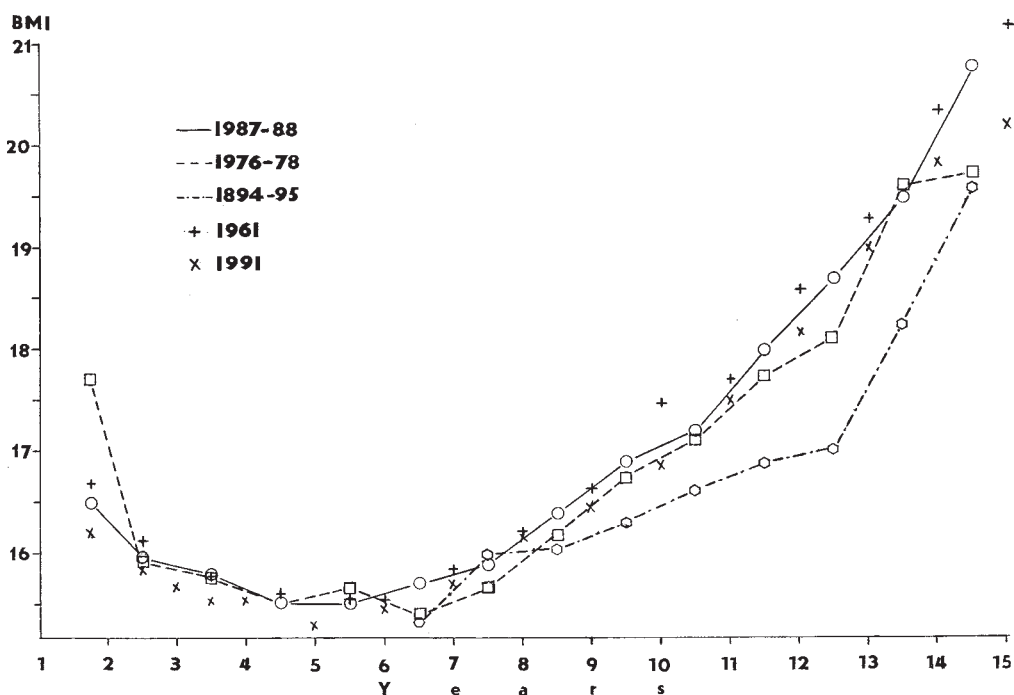


FIGURE 6. Secular changes of ontogenetical development in Czech girls.

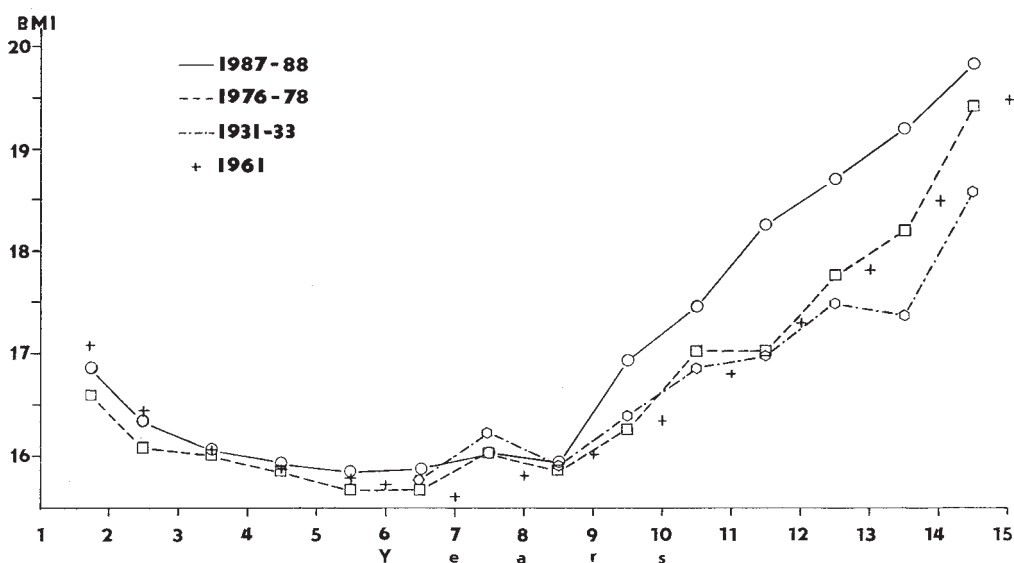


FIGURE 7. Secular changes of ontogenetical development of BMI in Slovak boys.

values for 15-year-old adolescents from the nationwide anthropometric survey in 1981 in the Czech Republic were reported by Prokopec and Bellisle (1992). These authors noted even higher increases in the average values of BMI up to the oldest age category of their group, i.e., up to 18 years of age.

In girls surveyed in the 1970s, and also in their group of the 1980s, except for a period up to the end of middle childhood (i.e., up to about 6 years of age), the average values of BMI are always higher in Czech than in Slovak populations. In boys, this regular feature cannot be found; by contrast, it is evident that, especially in the period of early and middle childhood, the Slovak population seems to show more physical body fullness than the Czech population. In late childhood and in adolescence, in the 1970s survey, the Czech male population showed more fullness; in the 1980s survey, the opposite was partly true.

For 15-year-old white Americans from the first national survey of health and nutrition in 1971-74, Hammer *et al.* (1991) reported an average BMI of 19.8, that is a value slightly higher than the average values of age-matched Czech and Slovak boys from the same decade, and about the same reported for Slovak girls from the same period. The data of the above mentioned authors are also identical with the average values of BMI of boys of both of our nations surveyed in the 1980s; however, the values are lower than in Czech girls of both our groups, and than in Slovak girls in the 1980s. The above differences may be, apart from ethnic differences of the populations compared, due to the time differences between both surveys. Practically the same differences in relation to 15-year-old Czech and Slovak children can be found with age-matched French children (Rolland-Cachera *et al.* 1991). Markedly higher average BMI values than those obtained in Czech and Slovak children have

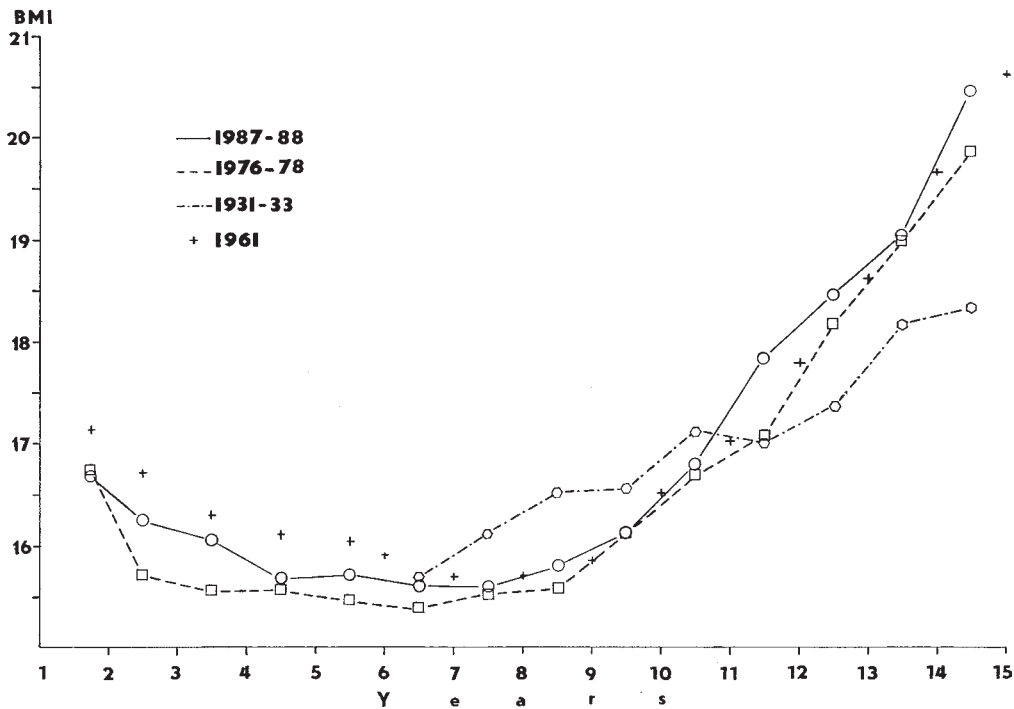


FIGURE 8. Secular changes of ontogenetical development of BMI in Slovak girls.

recently been reported for 6- to 14-year-old probands from central Italy by Zannoli and Morgese (1996). The data evidence more body fullness of central Italian than the Czech and Slovak populations during child pediatric ontogenesis.

A comparison of inter-sexual differences in *Tables 1* and *2* and in *Figures 3* and *4* shows that these differences are evidently smaller in Czech than in Slovak children, and this in both the survey decades. However, the differences in the survey made in the 1980s are also in Czech children, considering the high number of probands, in some cases statistically evident (e.g., for 7- to 8-year-olds, where $t_{(1665)} = 3.039 < P 0.002$), while this is not so in children surveyed in the 1970s (e.g., $t_{(575)}$ in 6- to 7-year-olds = 1.340 < P 0.01).

Slovak children in both surveyed groups show bigger differences between both sexes but, because of the smaller number of probands surveyed, especially in the 1970s, they usually are not statistically significant even at a 95% level of significance. Only the biggest of these (e.g., 3- to 4-year-olds where $t_{(244)} = 2.305 < P 0.02$) lie above the limit. The picture is quite different in the Slovak group of the past decade where substantially more children were surveyed. So, for instance, the not too big difference in BMI of 0.25 in 4- to 5-year-old boys and girls has a value of $t_{(770)} = 2.174 < P 0.02$, etc.

In Czech children of both groups, and more clearly in Slovak children whose data were obtained from the earlier survey in 1976-78, up to ages 11 or 12, boys rather than girls seem to exhibit more physical fullness.

TABLE 1. Body Mass Index of boys from the Czech and Slovak Republics.

Age category (years)	1976-1978						1987-1988					
	Czech Rep.			Slovak Rep.			Czech Rep.			Slovak Rep.		
	n	X	s	n	X	s	n	X	s	n	X	s
1/2-2	106	16.80	1.33	116	16.59	1.39	705	16.74	1.54	582	16.86	1.71
2-3	230	16.20	1.23	137	16.08	1.16	852	16.07	1.35	614	16.33	1.39
3-4	226	15.96	1.22	123	15.98	1.40	759	15.81	1.51	373	16.05	1.62
4-5	198	15.56	1.25	126	15.84	1.61	782	15.58	1.41	392	15.93	1.49
5-6	236	15.61	1.38	126	15.65	1.50	725	15.56	1.53	388	15.84	1.65
6-7	283	15.57	1.55	140	15.66	1.92	799	15.84	1.71	374	15.89	1.78
7-8	288	15.85	1.61	156	16.03	1.72	847	16.26	2.27	466	16.10	2.15
8-9	236	16.11	1.89	149	15.85	1.59	800	16.58	2.16	347	15.94	1.89
9-10	256	16.54	2.14	144	16.27	1.94	780	16.94	2.34	413	16.94	2.38
10-11	272	17.14	2.13	160	17.03	2.05	805	17.29	2.38	360	17.47	2.43
11-12	271	17.67	2.45	136	17.03	2.38	765	17.98	2.70	440	18.27	2.55
12-13	254	18.02	2.41	153	17.78	2.30	815	18.52	2.72	329	18.72	2.67
13-14	275	18.73	2.41	138	18.21	1.97	759	19.17	2.58	464	19.22	2.57
14-15	253	19.37	2.19	151	19.44	2.25	1211	20.69	2.89	486	19.86	2.28

TABLE 2. Body Mass Index of girls from the Czech and Slovak Republics.

Age category (years)	1976-1978						1987-1988					
	Czech Rep.			Slovak Rep.			Czech Rep.			Slovak Rep.		
	n	X	s	n	X	s	n	X	s	n	X	s
1/2-2	112	17.71	1.62	101	16.75	2.30	708	16.49	1.64	562	16.68	1.81
2-3	225	15.90	1.17	134	15.72	1.34	864	15.95	1.42	637	16.25	1.62
3-4	212	15.77	1.34	121	15.55	1.51	788	15.79	1.68	350	16.05	1.53
4-5	188	15.51	1.29	136	15.56	1.78	758	15.49	1.45	378	15.68	1.69
5-6	236	15.66	1.49	127	15.45	1.36	804	15.50	1.70	388	15.71	1.82
6-7	292	15.39	1.67	153	15.38	1.66	766	15.66	1.81	363	15.59	1.99
7-8	273	15.66	1.84	160	15.52	1.85	818	15.93	2.16	479	15.60	2.08
8-9	261	16.19	2.05	148	15.57	1.61	786	16.36	2.16	362	15.79	2.15
9-10	245	16.76	2.24	143	16.11	1.83	837	16.93	2.44	393	16.11	1.98
10-11	278	17.12	2.39	151	16.67	2.41	790	17.24	2.46	363	16.79	2.45
11-12	255	17.75	2.80	140	17.07	2.68	805	18.01	2.69	406	17.83	2.98
12-13	266	18.13	2.37	152	18.16	2.37	821	18.72	2.71	323	18.46	2.50
13-14	279	19.63	2.83	145	18.98	2.24	750	19.51	2.79	366	19.03	2.48
14-15	252	19.76	2.41	137	19.86	2.80	1342	20.83	2.81	558	20.45	2.83

TABLE 3. Body Mass Index of Czech children - 1991.

Age category (Years)	Boys		Girls	
	n	X	n	X
1.75-2.25	1855	16.58	1854	16.21
2.26-2.75	1502	16.23	1493	15.83
2.76-3.25	1575	15.97	1573	15.66
3.26-3.75	1530	15.83	1554	15.53
3.76-4.50	2536	15.73	2553	15.54
4.51-5.50	1887	15.54	1865	15.28
5.51-6.50	1530	15.60	1708	15.44
6.51-7.50	1786	15.76	1800	15.71
7.51-8.50	1922	16.16	1861	16.16
8.51-9.50	1902	16.54	1889	16.45
9.51-10.50	1930	17.11	1859	16.88
10.51-11.50	2014	17.73	1934	17.51
11.51-12.50	2189	18.27	2094	18.16
12.51-13.50	2311	18.77	2255	19.09
13.51-14.50	2335	19.50	2342	19.82
14.51-15.50	2601	20.11	2732	20.24

In the ensuing development, by contrast, as a well known manifestation of sexual dimorphism, bigger body weight accounts for 1 cm of height in girls than in boys. Unlike the Slovak group surveyed in 1987-88, the growth curve of girls does not exceed that of the boys until the age of 14 years.

The growth curves of Slovak children, especially of boys, are more irregular, presumably due to the smaller number of probands than in Czech children.

SECULAR TRENDS IN THE DEVELOPMENT OF BMI

As is evident from the above tables and *Figures 1* and *2*, and also from *Figures 5-8*, there was an increase in the average values of BMI over a

single decade in the Czech and Slovak populations, especially in boys. In terms of health, it is an alarming, adverse civilization-related phenomenon due both to nutrition and the overall lifestyle, particularly to reducing physical activity.

A comparison of the average values of BMI in all presented tables, and, even better so, with a view to its growth curves of our own data and those derived from other groups of Czech and Slovak children in *Figures 5-8*, indicates its secular changes.

Evaluation of the presented data of BMI over an almost 100 years of development of the body build of Czech children aged 1.5 to 15 years indicates roughly the same trend of development. As has been noted, a slight slimming in the course of early and middle childhood in both sexes is followed, from 6-7 years of age in all surveyed groups, by a progressive increase in average BMI. More marked fullness in both sexes

TABLE 4. Body Mass Index of Czech and Slovak children – 1961.

Age category (Years)	Czech Rep.				Slovak Rep.			
	Boys		Girls		Boys		Girls	
	n	X	n	X	n	X	n	X
1 3/4	970	17.08	944	16.69	980	17.08	980	17.16
2 1/2	1113	16.62	1142	16.16	1132	16.45	1143	16.71
3 1/2	1469	16.05	1551	15.77	1463	16.06	1548	16.29
4 1/2	1477	15.73	1420	15.61	1466	15.87	1388	16.12
5 1/2	1425	15.61	1465	15.55	1419	15.78	1437	16.04
6	760	15.64	763	15.54	1195	15.72	1207	15.91
7	1686	15.92	1851	15.85	1736	15.61	1735	15.69
8	1877	16.12	2113	16.23	1957	15.81	1980	15.69
9	2226	16.55	2324	16.63	2136	16.02	2234	15.85
10	2427	16.98	2797	17.49	2402	16.36	2653	16.51
11	2788	17.39	1355	17.72	2820	16.78	3220	17.01
12	3369	17.79	3263	18.60	3003	17.29	3253	17.79
13	4083	18.46	3155	19.29	3783	17.82	3127	18.60
14	5242	19.12	2903	20.37	4516	18.49	2887	19.65
15	5027	20.06	2650	21.24	4136	19.55	2720	20.62

TABLE 5. Body Mass Index of Czech children (1894–1895).

Age category (Years)	Boys	Girls
6–7	15.41	15.32
7–8	15.89	15.97
8–9	16.12	16.05
9–10	15.99	16.29
10–11	16.25	16.62
11–12	17.28	16.87
12–13	17.31	17.11
13–14	17.67	18.26
14–15	17.87	19.60

TABLE 6. Body Mass Index of Slovak children (1931–1933).

Age category (Years)	Boys	Girls
6–7	15.77	15.68
7–8	16.24	16.11
8–9	15.91	16.49
9–10	16.40	16.54
10–11	16.86	17.11
11–12	16.97	16.97
12–13	17.49	17.34
13–14	17.38	18.15
14–15	18.59	18.29

TABLE 7. T-values of BMI differences in Czech and Slovak children between years 1976–1978 and 1987–1988.

Age category	Czech Rep.		Slovak Rep.	
	Girls	Boys	Girls	Boys
1.5-2	7.39***	0.44	0.29	1.85
2-3	0.55	1.44	4.01***	2.21*
3-4	0.18	1.59	3.14**	0.46
4-5	0.18	0.06	0.68	0.56
5-6	1.41	0.47	1.72	1.22
6-7	2.31*	2.52*	1.23	1.24
7-8	2.01*	3.36***	0.46	0.41
8-9	1.15	3.26**	1.26	0.55
9-10	1.02	2.56*	0.00	3.37***
10-11	0.72	0.98	0.51	2.13*
11-12	1.31	1.75	2.82**	5.23***
12-13	3.41***	2.80**	1.27	3.97***
13-14	0.61	2.56*	0.22	4.93***
14-15	6.33***	8.25***	2.21*	2.00*

t > P 0.001 ***; t > P 0.01 **; t > P 0.05 *

in the more recent groups can be observed from about 11 years of age, while, in both sexes, in the last decade of the past century the onset of this new development is not evident until about 2 years later. An interesting finding is that, in the periods of early and middle childhood, boys seem to show more fullness than girls in all the four compared groups. In the period of late childhood and adolescence, however, in keeping with the generally recognized facts – girls obviously prevail with their BMI values over boys. In terms of physical fullness and slimness of body in the ontogenesis, the range of middle and late childhood can, in Czech children, be regarded as an age-related dividing line for sexual differentiation.

The appreciably lowest BMI of all the other compared groups in boys from 10 years of age and in girls already from 9 years of age, seems to be the calculated average BMI in Matiegka's group from the late 19th century. The groups surveyed later are obviously closer one to the other in their average values. However, their mutual position is not consistent in all age brackets. The mutual position is an important aspect, especially in pre-puberty and puberty, which in fact predetermines the body composition of man for the ensuing ontogenetic development, thereby affecting their BMI. In this sense, our assumption of the approximately secular increasing BMI values in the Czech and Slovak populations in boys is supported by the highest averages obtained from our surveys conducted in the late 1980s. These are closely approximated by values obtained in 1991. In the comparison of girls the average values

of BMI of the group from the second nationwide survey of children in 1961 are slightly above the current standard of 1987–1988 (see *Figure 6*), the BMI values obtained for our earlier group surveyed in 1976–1978 are slightly below it.

This finding can presumably be explained by an increase in the BMI of Czech children in the post-war period due to improved nutrition. It is especially girls who tend to a more intensive deposition of energy stores. Subsequently, as a result of health-care education and fashion, especially so in girls and young women, the Czech population showed a purposeful reduction in body weight and, hence, also in BMI. Evidence of this process, starting as early as 7 years of age, is the lower placed growth curve of the group surveyed in 1976–1978. The slightly higher placed BMI values from the 1987–1988 period and 1991, however, serve as evidence of another undesirable increase in the proportion of weight per one cm of height in recent years.

Unlike the situation in girls, the BMI of boys, as indicated by the survey conducted in the 1980s, further rose after a slight initial reduction in relation to the groups surveyed in the 1960s and in 1976–1978. Through the remaining surveyed period of ontogenesis, i.e., from age of 6 to 15 years, its values are above all the other values we used for the presented analysis. The conclusion is equally negative as with Czech girls.

As has been mentioned, with Slovak children the oldest usable data for calculating BMI were Chura's data on height and weight of schoolchildren from Zvolen district obtained in the years 1931–1933. Unlike all expectations, a look into *Figures 7* and *8*, and *Table 6* makes it clear that in girls from the end of their seventh year of life up to age 11, and in boys from ages 7 to 9, the BMI of Slovak children in the 1930s was greater than in all the other groups compared. It is not before the above-mentioned age and at the age of 10 in boys, that their development curve of BMI starts to decline below the curves of the other three compared groups. In girls, just as in the Czech population, we find the average BMI values from 1961 up to the course of age 8 above those of the compared groups surveyed in the 1970s and 1980s. The BMI values start to decrease thereafter to be eventually somewhere in between. From the calculated average values in *Table 2*, and even more clearly from *Figure 8*, it is evident that there was an increase in BMI in Slovak girls (as was in Czech children) between both of our surveys conducted in the second half of the 1970s and 1980s throughout the whole period of ontogenetic development from 1.5 to 15 years of age. In Slovak boys, body fullness was permanently the highest from 9 years of age upward in the latest compared group, i.e., that surveyed in the 1980s, too.

It is thus evident that, with slight differences also in Slovak as well as in Czech children, there has been, in the course of the 20th century, an undesirable phenomenon of an obvious increase in body weight in relation to height.

The differences between the mean BMI values of both groups from the 1970s and 1980s were evaluated with the t-test for the verification of above-mentioned situation. With regard to the oldest Czech and Slovak groups (1895, 1931–1934) as well as to the arithmetic values of BMI from 1961 the differences with our own series cannot be tested, because we have not the necessary statistical data, neither the numbers of the probands investigated.

The arithmetic values of Student's t-test for the reciprocal differences of both our own groups from 1976–1978 and 1987–1988 are given in *Table 7*, separately for Czech and Slovak probands and for both sexes, too. In boys of both groups the above mentioned tendency of conspicuous increase of BMI during the period of late childhood and in adolescence has been confirmed, while in girls the occurrence of higher or high statistically significant differences in both Czech and Slovak groups is lower and little regular. The cause may be the already mentioned influence of healthy adult education and modern trends to the slim.

CONCLUSION

A comparison of ontogenetic development of average BMI values in five Czech and four Slovak groups of children aged 1.5–15 years from the end of the 19th century to the 1990s has revealed the following:

1. In all surveyed groups there was an initial decrease in BMI by more than one unit, i.e., slimming of children in all surveyed groups.
2. Approximately from 6–7 years of age, an irregular yet persistent increase in BMI can be seen in either sex of the Czech and Slovak populations, the increase lasts up to age 15. Hence, the onset of late childhood in Czech and Slovak children can be regarded as a period of body transformation.
3. While in Czech girls in the past and at present there has been more physical fullness than in Slovak girls, in boys surveyed in the 1980s, the BMI was higher in the Slovak population than in previous surveys. This fact may reflect the currently altered lifestyle, mainly nutritional circumstances in Slovakia.
4. In the 1970s, boys showed more fullness than girls up to age 9 in Czech children, and up to age 12 in Slovak ones. After this period, the girls of both groups seemed to show more physical fullness. In the 1980s, however, a slightly higher BMI could be found in Czech girls than in boys only after the age of 12, in Slovak children only at about age 14. The delayed crossing of growth curves of BMI in boys and girls of both compared groups may be due to the effect of health education and, more importantly perhaps, the influence of fashion in the sense of an effort to be slim in girls in childhood and adolescence.
5. Throughout the 20th century, with some variations, the ratio proportion of body weight per unit of height has tended to rise inconsistently in both sexes, so as do the body build in both Czech and Slovak children, especially with the onset of adolescence, becomes fuller, which is not desirable. The phenomenon is perceptible above all in boys during the late childhood and puberty. The differences ascertained here during mere 10–12 years between both investigations are in most cases of statistically high significance.
6. The mean BMI of Czech and Slovak children has ranged from 15.5 to 21 units from the late 19th century to date.

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