

THE DEVELOPMENT OF BASIC PHYSICAL FEATURES OF CZECHOSLOVAK ADULT POPULATION IN 1955—1965

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The big concentration of adult population during The National Spartakiade nation-wide organized physical exercises offers a good occasion for a state-wide anthropological research. I National Spartakiade took place in 1955, II in 1960 and III National Spartakiade took place in 1965. In 1963, V. Fetter referred about the changes during the first five years.*) The anthropological research of the participants in III National Spartakiade took place in dressing places of the Strahov's Spartakiade Stadium in Prague in the last days of June and the first days of July 1965. The investigation was carried out by the Anthropological Department of the Faculty of Natural Sciences of Charles' University in Prague, under the leadership of Professor V. Fetter and by the Anthropological Laboratory of the Pedagogical Faculty of Charles' University in Prague, under the leadership of Assistant Professor J. Suchý, in cooperation with the members of the Czechoslovak Anthropological Society.

Besides the personal data of participants, concerning place of birth, place of residence, age, occupation, sports-activity, some body measurements were taken: height, weight, circumferences of the chest and neck, and three other trunk dimensions. The circumferences were measured, as it does not require any special anthropological apparatus and gives a good knowledge of circumferential dimensions of the trunk which is important for industrial needs and for medical investigations, particularly for the obesity research.

Mechanical processing of data was done thanks to the understanding of the computing department of The State Planning Commission. The scientific programme of mathematical analysis was accomplished by Dr. R o b e k, the scientific worker of this Commission.

In this work the analysis of basic physical characteristics like height, weight and circumference of the chest of men and women is given, both from Czech lands and Slovakia. The investigation during III National Spartakiade did not bring so numerous

results as the investigation during II National Spartakiade, because the time of investigation was much shorter, and only ten persons were permitted into the cloakrooms to carry out the investigation, so that it was possible to form three measurements groups, at most. Also the time for investigation was very short, because it could take place only between the arrival of gymnasts to the dressing places and their departure for the exercising field.

Besides, the number of investigated features was twice as large as the number acquired during II National Spartakiade.

The greatest number of investigated persons, both men and women, originated from Czech lands, and the most interesting phenomenon — continuous prolongation of physical fitness and activity of adult population was observed. Some active participants in the age over 65 years were measured, both men and women. In total, 5187 persons were measured, i.e. 2148 men and 3039 women. It was not possible to measure older age groups from Slovakia, because from this country there came mostly members of younger age groups.

THE BODY HEIGHT

The values of body height ascertained during I National Spartakiade were compared with the values ascertained by J. Matiegka in 1895, and it was found that the body height of our population had increased considerably in the course of the last 60 years. For the present this phenomenon is one of the most important anthropological problems, and it is characterised as the secular factor. According to the Mexican anthropologist Genoves, the phenomenon involved is world-wide and shows the average increase of 1 cm of the body height in ten years. Most important in our investigation is the age group from 18 to 19 years, when the ontogenetic dynamics of growth is considerably slowing down and completed. The difference of the body height in this age group of men between II and III National Spartakiads is 0.6 centimetres, which roughly corresponds with the situation of Genoves, i.e. the average growth increases by 1 centimetre in every ten

*) V. F., Ergebnisse der anthropologischen Untersuchung auf der II. gesamtstaatlichen Spartakiade im Jahre 1960. *Anthropos* Nr. 15 (N. S. 7) — Brno 1963.

TABLE 1
Body height Men Bohemia, Moravia

III. CS 1965					
Age	n	\bar{x}	s	$\pm m$	min. — max.
18—19	241	176.2	6.42	0.414	157.0—195.0
20—24	337	174.9	5.94	0.324	159.0—193.0
25—29	153	174.9	5.42	0.438	163.0—189.0
30—34	198	173.7	4.73	0.336	161.0—187.0
35—39	210	173.5	5.06	0.349	160.0—187.0
40—44	217	172.4	5.92	0.402	158.0—187.0
45—49	133	172.0	5.69	0.493	159.0—184.0
50—54	119	171.6	6.56	0.601	157.0—187.0
55—59	69	169.3	5.56	0.669	158.0—185.0
60—64	33	169.6	5.61	0.977	159.0—181.0
II. CS 1960					
18—19	895	175.6	6.34	0.211	159.0—196.5
20—24	629	175.0	6.14	0.244	158.0—195.0
25—29	384	173.8	6.60	0.336	155.0—190.5
30—34	405	173.5	6.72	0.333	151.0—194.0
35—39	466	173.2	6.34	0.293	156.5—192.0
40—44	270	172.2	6.00	0.365	156.0—187.0
45—49	249	170.5	6.41	0.406	149.0—190.0
50—54	146	170.4	6.54	0.541	157.5—187.0
55—59	75	168.8	6.80	0.785	155.0—188.0
60—64	25	168.9	6.61	1.322	157.5—185.0
I. CS 1955					
18—19	240	172.9	6.50	0.420	157.0—190.0
20—24	369	173.9	6.60	0.340	156.0—194.0
25—29	545	174.0	6.30	0.270	155.0—198.0
30—34	617	173.3	6.30	0.250	153.0—192.0
35—39	303	171.8	5.90	0.340	156.0—187.0
40—44	318	170.8	6.00	0.340	156.0—187.0
45—49	223	170.7	6.20	0.410	154.0—187.0
50—54	117	168.6	5.20	0.480	156.0—181.0
I. CS 1955					
25—39	1465	173.2	—	—	153.0—198.0
II. CS 1960					
25—39	1255	173.5	6.54	0.184	151.0—194.0
III. CS 1965					
25—39	561	173.9	5.19	0.219	160.0—187.0

CS = National Spartakiade

years. In other age groups the values of body height are equal or somewhat higher in comparison with the values ascertained at II National Spartakiade. The average of the body height in the age group from 25 to 39 years, which represents the fully adult population without changes of growth, and without involution caused by age, increased by 0.4 centimetre. During II National Spartakiade the ascertained average height was 173.5 centimetres and at III National Spartakiade 173.9 centimetres. The corresponding deviation at III National Spartakiade is 5.19 centimetres and at II National Spartakiade 6.54 centimetres. The

TABLE 2
Body height Women Bohemia, Moravia

III. CS 1965					
Age	n	\bar{x}	s	$\pm m$	min. — max.
18—19	357	163.5	5.82	0.308	148.0—180.0
20—24	511	163.3	5.49	0.243	153.0—180.0
25—29	283	162.3	5.40	0.321	150.0—178.0
30—34	358	162.6	5.01	0.265	157.0—179.0
35—39	330	161.4	4.96	0.273	150.0—178.0
40—44	291	161.3	5.16	0.303	147.0—174.0
45—49	115	159.6	5.16	0.481	147.0—176.0
50—54	59	160.7	5.00	0.651	152.0—175.0
55—59	27	157.7	4.70	0.904	149.0—168.0
60—64	10	157.0	4.67	1.476	151.0—163.0
II. CS 1960					
18—19	833	162.4	5.62	0.194	144.4—179.5
20—24	1259	162.3	5.45	0.153	148.0—178.5
25—29	867	161.5	5.40	0.183	147.0—184.0
30—34	964	160.9	5.51	0.177	144.0—176.0
35—39	823	160.5	5.67	0.197	143.0—179.0
40—44	297	159.8	4.87	0.282	146.0—172.0
45—49	192	158.2	4.87	0.351	147.5—173.0
50—54	91	157.8	5.43	0.569	146.0—169.0
55—59	21	156.3	3.82	0.833	149.0—165.0
I. CS 1955					
18—19	425	161.1	5.80	0.300	143.0—178.0
20—24	718	160.3	5.70	0.210	143.0—178.0
25—29	446	160.9	5.70	0.270	145.0—175.0
30—34	420	160.7	5.30	0.260	147.0—178.0
35—39	176	159.2	5.40	0.410	146.0—177.0
40—44	148	158.6	5.20	0.430	144.0—171.0
45—49	84	157.5	5.40	0.600	145.0—169.0
50—54	33	157.6	5.40	0.940	147.0—168.0
I. CS 1955					
25—39	1042	160.5	—	—	145.0—178.0
II. CS 1960					
25—39	2654	161.0	5.54	0.107	143.0—184.0
III. CS 1965					
25—39	971	162.1	5.05	0.162	150.0—179.0

CS = National Spartakiade

increase of 0.4 centimetre again corresponds roughly with the expected value according to Genoves. When compared with I National Spartakiade, the increase is 0.7 centimetre, which is approaching again to the values expected. If we follow the various width of the whole in individual height classes, we can observe a larger homogeneity at III than at II National Spartakiads. This can be observed in corresponding deviations which at III National Spartakiade are generally lower than at II National Spartakiade, with the exception of the age groups 18—19 and 50—54 years, which is the result of greater variability in the period of termi-

TABLE 3

Body height

Men

Slovakia

III. CS 1965					
Age	n	\bar{x}	s	$\pm m$	min. — max.
18—19	167	173.1	6.05	0.468	
20—24	199	174.2	5.67	0.402	162.0—186.0
25—29	33	171.5	6.36	1.107	161.0—188.0
30—34	13	173.5	8.03	2.228	161.0—184.0 159.0—182.0
II. CS 1960					
18—19	326	172.8	6.18	0.342	
20—24	188	173.3	6.01	0.438	157.5—190.0
25—29	81	171.1	6.16	0.684	159.0—186.0
30—34	34	170.9	6.05	1.037	154.5—188.5
35—39	23	171.5	6.56	1.368	161.5—183.5
40—44	14	172.0	5.04	1.347	162.0—186.0
45—49	4	169.1	6.18	3.090	163.0—180.5 169.5—175.0
I. CS 1955					
18—19	52	171.8	6.90	0.960	
20—24	58	171.7	5.50	0.720	157.0—187.0
25—29	69	171.7	6.80	0.820	157.0—182.0
30—34	33	171.6	5.20	0.900	156.0—189.0
35—39	16	169.7	9.70	2.430	160.0—181.0
40—44	11	167.8	3.20	0.970	164.0—175.0
45—49	3	169.3	4.10	2.410	162.0—173.0 164.0—174.0
I. CS 1955					
25—39	118	171.4	—	—	156.0—189.0
II. CS 1960					
25—39	138	171.1	6.23	0.530	154.5—188.5
III. CS 1965					
25—39	53	172.1	6.96	0.956	159.0—184.0

CS = National Spartakiade

nating growth and of the beginning involution of the age group 50—54 years.

During II National Spartakiade, gymnasts in the age group from 55 to 59 years were measured, at III National Spartakiade the age group from 60 to 64 years is still quite large, and even certain number of gymnasts over 65 years of age was measured. This ascertainment is an evident demonstration of the prolongation of active age, which is probably connected with the prolongation of the average length of life.

Slovak participants were measured in smaller groups than the case was during II National Spartakiade. Nevertheless, considerable results were noticed in age groups which are the main object of anthropological investigation, i.e. from 18 to 34 years. In these age groups, higher values were found in comparison with those, found during II National Spartakiade. Similar to Czech lands, the average body height increased in the age group from 18 to 19 years. In the joint groups from 25 to 39 years of age the average body

height increased from 171.1 centimetres at II National Spartakiade to 172.1 centimetres at III National Spartakiade. In comparison with I National Spartakiade, the difference is equal to that in the Czech lands, i.e. 0.7 centimetre.

The values of body height acquired by the measurement of women in Czech countries in all age groups of III National Spartakiade are higher than the values of II National Spartakiade. In the age group from 18 to 19 years this difference, in the period of five years, is 1.1 centimetre, which surpasses the value expected by Genoves. Also the total average of women height in the joint age group from 25 to 39 years increased by 1.1 centimetre, because the average found out at II National Spartakiade was 161.0 centimetres, and at III National Spartakiade 162.1 centimetres. In comparison with I National Spartakiade, i.e. during ten years, the difference is 1.6 centimetres. The measurement of Slovak women in the age group from 18 to 19 years a considerable increase of body height re-

TABLE 4

Body height

Women

Slovakia

III. CS 1965					
Age	n	\bar{x}	s	$\pm m$	min. — max.
18—19	272	165.4	5.57	0.338	149.0—179.0
20—24	299	163.5	5.66	0.327	146.0—177.0
25—29	49	160.9	5.83	0.833	147.0—181.0
30—34	36	159.2	5.50	0.916	150.0—171.0
35—39	13	159.3	4.27	1.185	151.0—169.0
40—44	15	159.1	4.16	1.073	150.0—164.0
II. CS 1960					
18—19	229	160.4	5.54	0.366	147.0—176.0
20—24	328	160.8	5.20	0.287	145.0—175.0
25—29	91	159.8	5.60	0.587	146.0—172.0
30—34	63	160.4	5.12	0.645	145.5—172.0
35—39	52	160.5	5.54	0.768	145.0—164.0
40—44	8	158.7	3.43	1.212	151.5—164.0
45—49	5	161.6	3.78	1.690	155.0—165.0
I. CS 1955					
18—19	55	158.0	5.30	0.710	145.0—168.0
20—24	75	158.1	5.80	0.670	144.0—171.0
25—29	17	158.8	4.10	1.000	153.0—167.0
30—34	22	159.4	5.20	1.070	153.0—169.0
35—39	6	156.5	6.30	2.060	146.0—163.0
40—44	4	157.0	5.10	2.550	149.0—163.0
I. CS 1955					
25—39	45	158.7	—	—	146.0—169.0
II. CS 1960					
25—39	206	160.2	5.47	0.381	145.0—172.0
III. CS 1965					
25—39	98	160.1	4.84	0.489	147.0—181.0

CS = National Spartakiade

veals, similar to that in the age group from 20 to 24 years. In the other age groups the values are approximately equal to those of II National Spartakiade. The total average 160.1 centimetres in the joint group 25–39 years is almost equal to that of II National Spartakiade, i.e. 160.2 centimetres. In comparison with I National Spartakiade the average body height of Slovak women increased by 1.4 centimetres, which makes an increase a bit higher than the value expected according to Genoves.

TABLE 5

Body weight Men Bohemia, Moravia

III. CS 1965					
Age	n	\bar{x}	s	$\pm m$	min.—max.
18–19	241	69.9	7.71	0.496	57.0–85.0
20–24	337	72.1	6.35	0.346	57.0–90.0
25–29	153	75.5	9.27	0.749	60.0–95.0
30–34	198	75.9	8.68	0.617	62.0–95.0
35–39	210	79.4	10.51	0.725	63.0–105.0
40–44	217	77.6	9.86	0.669	61.0–104.0
45–49	133	77.8	9.52	0.825	61.0–99.0
50–54	119	75.1	10.77	0.987	61.0–95.0
55–59	69	75.8	8.54	1.028	61.0–94.0
60–64	33	74.5	8.04	1.399	61.0–92.0
II. CS 1960					
18–19	894	69.0	7.56	0.252	50.0–97.0
20–24	628	71.1	9.10	0.363	53.0–107.0
25–29	384	72.3	9.00	0.536	47.5–107.0
30–34	404	75.5	9.20	0.457	50.0–110.0
35–39	465	77.5	9.44	0.437	52.5–110.0
40–44	270	76.4	9.30	0.566	52.5–109.0
45–49	249	74.8	9.10	0.576	55.0–101.0
50–54	146	75.6	9.00	0.840	54.0–106.0
55–59	75	73.0	7.77	0.897	58.0–95.0
60–64	25	74.4	8.45	1.690	55.0–93.0
I. CS 1955					
18–19	240	67.5	7.30	0.470	51.0–92.0
20–24	369	71.5	8.60	0.450	53.0–101.0
25–29	545	74.1	9.10	0.390	51.0–105.0
30–34	617	75.5	9.80	0.390	49.0–107.0
35–39	303	74.5	9.40	0.530	50.0–104.0
40–44	318	74.0	9.20	0.520	52.0–98.0
45–49	223	75.0	9.20	0.620	49.0–103.0
50–54	117	72.6	8.20	0.760	55.0–97.0
I. CS 1955					
25–39	1465	74.8	—	—	49.0–107.0
II. CS 1960					
25–39	1253	75.3	9.95	0.281	47.5–110.0
III. CS 1965					
26–39	561	77.1	9.74	0.411	60.0–105.0

CS = National Spartakiade

TABLE 6

Body weight

Women

Bohemia, Moravia

III. CS 1965					
Age	n	\bar{x}	s	$\pm m$	min.—max.
18–19	357	59.6	6.56	0.347	42.0–79.0
20–24	511	60.5	6.40	0.283	41.0–91.0
25–29	283	62.7	8.40	0.499	45.0–87.0
30–34	358	65.2	7.91	0.418	49.0–89.0
35–39	330	66.4	8.03	0.442	50.0–96.0
40–44	291	66.7	8.68	0.509	45.0–99.0
45–49	115	67.0	9.39	0.875	49.0–101.0
50–54	59	68.7	8.86	1.153	51.0–87.0
55–59	27	67.7	9.59	1.846	54.0–97.0
60–64	10	65.7	10.44	3.302	52.0–87.0
II. CS 1960					
18–19	832	58.4	6.80	0.235	42.0–83.0
20–24	1259	59.5	7.30	0.206	40.0–83.0
25–29	867	61.7	6.46	0.219	43.0–94.0
30–34	957	64.2	8.56	0.276	44.0–95.0
35–39	815	64.6	8.20	0.287	44.0–97.0
40–44	297	65.5	8.80	0.510	46.5–94.0
45–49	192	66.2	8.20	0.591	45.0–91.0
50–54	91	66.8	8.77	0.919	50.0–92.0
55–59	21	69.2	6.35	1.385	—
I. CS 1965					
18–19	425	59.5	6.10	0.300	44.0–76.0
20–24	718	59.6	7.20	0.270	43.0–86.0
25–29	446	62.4	8.40	0.400	46.0–92.0
30–34	420	64.7	9.20	0.450	45.0–97.0
35–39	176	65.3	8.60	0.650	42.0–90.0
40–44	148	66.2	8.80	0.730	48.0–96.0
45–49	84	66.8	9.00	0.980	49.0–85.0
50–54	33	67.7	9.90	1.740	44.0–88.0
I. CS 1955					
25–39	1042	63.8	—	—	42.0–97.0
II. CS 1960					
25–39	2639	63.5	7.94	0.154	43.0–97.0
III. CS 1965					
25–39	971	64.9	8.22	0.264	45.0–96.0

CS = National Spartakiade

THE BODY WEIGHT

In Czech lands a considerable increase of body weight in all age groups of men could be observed. The highest values are to be found in the age group from 35 to 39 years, i.e. 79.4 kilograms. In other age groups, gradual decrease of body weight is observed, both in older and younger age groups. In older age groups it decreases gradually till the value of 74.5 kilograms in age group of men from 60 to 64 years. In younger age groups the average of weight is decreasing up to the value of 69.9 kilograms in the age group from 18 to 19 years. On the whole, the body weight of men in the age groups from 25 to 34 years does not

change. The general course of the weight curve shows the regular phenomenon which has the corresponding tendency both during II and III National Spartakiads.

In comparison with I National Spartakiade the tendency of the weight curve is similar to that of II and III National Spartakiads. At the beginning it has a sharp course and it reaches the top one age group sooner than during II and III National Spartakiads. Its course gradually decreases from the top in the direction to the higher age groups. If the extreme values of variational width of weight at III National Spartakiade are observed, it may be seen that the minima of all age groups are considerably higher than at both previous Spartakiads. The lowest value of the minimum weight at I National Spartakiade is 49 kilograms, at II 47.5 kilograms and at III National Spartakiade 57 kilograms. On the contrary, the values of the maximum at both previous Spartakiads are higher than at III National Spartakiade where the maximum weight

TABLE 7

Body weight Men Slovakia

III. CS 1965					
Age	n	\bar{x}	s	$\pm m$	min.—max.
18—19	167	65.7	7.05	0.546	55.0—81.0
20—24	199	69.9	7.09	0.503	65.0—86.0
25—29	33	71.1	8.00	1.392	60.0—85.0
30—34	13	76.3	11.04	3.062	61.0—92.0
II. CS 1960					
18—19	326	65.3	6.71	0.371	48.0—90.0
20—24	188	67.8	8.50	0.619	51.0—90.0
25—29	81	69.8	8.45	0.938	52.5—104.0
30—34	34	74.5	9.40	1.612	58.0—98.0
35—39	23	72.7	8.95	1.866	56.0—98.0
40—44	14	75.5	11.70	3.127	54.0—96.0
45—49	4	75.0	5.44	2.720	70.0—83.0
I. CS 1955					
18—19	52	65.9	5.90	0.820	55.0—79.0
20—24	58	67.5	6.80	0.890	53.0—84.0
25—29	69	70.5	7.40	0.890	56.0—90.0
30—34	33	73.0	8.50	1.390	58.0—91.0
35—39	16	73.9	4.70	1.160	67.0—87.0
40—44	11	74.8	5.90	1.790	61.0—91.0
45—49	3	74.0	6.50	3.820	65.0—86.0
I. CS 1955					
25—39	118	71.6	—	—	56.0—91.0
II. CS 1960					
25—39	138	71.4	9.30	0.791	52.5—104.0
III. CS 1965					
25—39	53	72.7	8.95	1.300	60.0—92.0

CS = National Spartakiade

TABLE 8

Body weight Women Slovakia

III. CS 1965					
Age	n	\bar{x}	s	$\pm m$	min.—max.
18—19	272	57.5	3.33	0.202	42.0—79.0
20—24	299	57.8	6.17	0.357	42.0—74.0
25—29	49	60.7	10.21	1.459	45.0—85.0
30—34	36	58.7	9.65	1.608	49.0—75.0
35—39	13	64.4	8.81	2.443	51.0—85.0
40—44	15	63.9	11.11	2.844	51.0—90.0
II. CS 1960					
18—19	229	56.4	6.34	0.418	42.0—77.0
20—24	328	57.4	6.65	0.367	43.0—79.0
25—29	91	57.7	8.20	0.859	44.0—79.5
30—34	63	64.0	8.76	1.103	49.0—86.0
35—39	51	62.1	7.05	0.987	45.0—78.0
40—44	8	60.3	6.69	2.365	52.0—70.0
45—49	5	63.7	7.50	3.354	50.4—71.0
I. CS 1955					
18—19	55	56.8	6.40	0.860	45.0—72.0
20—24	75	58.0	6.40	0.740	46.0—72.0
25—29	17	60.6	5.60	1.360	49.0—72.0
30—34	22	62.5	8.80	1.870	50.0—82.0
35—39	6	67.5	8.10	3.360	51.0—75.0
40—44	4	62.8	10.10	5.050	51.0—78.0
II. CS 1955					
25—39	45	62.5	—	—	49.0—82.0
II. CS 1960					
25—39	205	60.7	8.62	0.602	50.0—71.0
III. CS 1965					
25—39	98	60.5	9.87	0.997	45.0—85.0

CS = National Spartakiade

was 105 kilograms. At I National Spartakiade the maximum weight was 107 kilograms and at II 110 kilograms. From the afore-mentioned facts can be inferred that the resulting average of weight was not influenced by the maximum weight.

The increase of the average of the body weight is to be taken into consideration when determining the limits of obesity and in industrial questions, especially when calculating the weight-load of the transport means, motorcars, and everywhere where the body weight must be considered.

A similar sort of situation is with Slovak men, too, where in the age groups where the measurement was possible, the values are higher than during both previous Spartakiads. The average body weight in joint age groups from 25 to 39 years is in Slovakia 72.7 kilograms, and is so higher than that ascertained during I National Spartakiade, i.e. 71.6 kilograms, and during II National Spartakiade, i.e. 71.4 kilograms.

The weight of women increases continuously since 18 to 50 years. The higher age groups were not yet investigated during the Spartakiads. The greatest increase of weight is in age groups from 20 to 30 years. Then the increases of weight are lower, but regular. When comparing the body weight of women during III National Spartakiade with the weight ascertained during the 1st and IInd National Spartakiads, an increase can be observed in all the age groups, as well as it was ascertained during the measurement of men. In the joint groups from 25 to 39 years, the value of women's body weight in Czech lands is 64.9 kilograms, which is 1.4 kilograms higher than the value ascertained during II National Spartakiade.

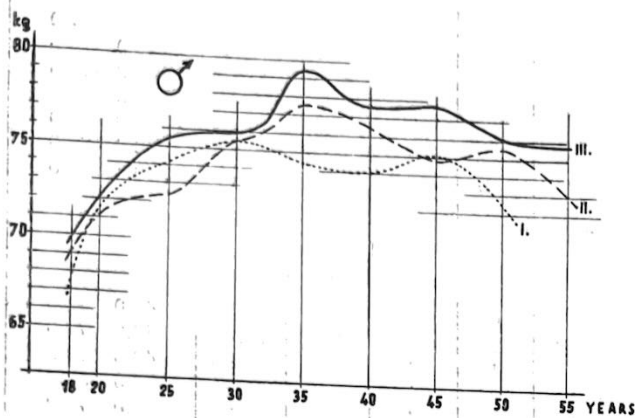


FIG. 1
Body weight — Bohemia, Moravia, men
I. — 1955, II. — 1960, III. — 1965.

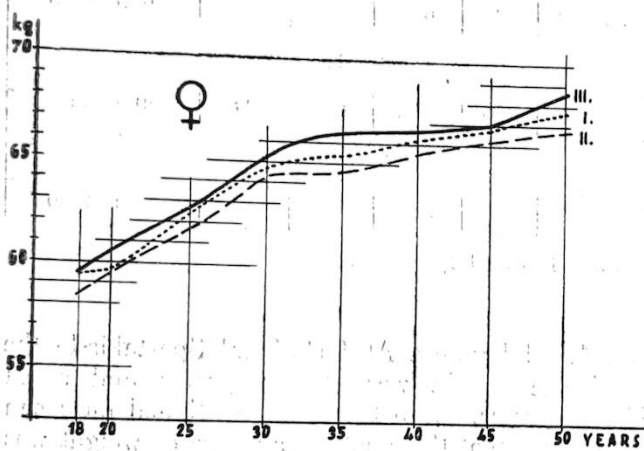


FIG. 2
Body weight — Bohemia, Moravia, women
I. — 1955, II. — 1960, III. — 1965.

Groups of Slovak women are sufficiently numerous in the first and the second age groups. When taking into consideration the small number of cases, the same phenomenon as was observed with the measurement of the gymnasts from Czech lands, i.e. the gradual increase of body weight in higher age groups, may be registered. The average body weight ascertained by the measurement of Slovak women in joint age groups from 25—39 years remains nearly without changes, i.e. 60.7 kilograms at II Spartakiade and 60.5 kilograms at III National Spartakiade.

Similarly as with the body height and body weight, also with the circumference of chest in all age groups of men from Czech lands a considerable increase of values of this feature can be found. From the starting value of 91.9 centimetres in the age group from 18 to 19 years, the circumference of chest of men from Czech lands increases considerably till the age group from 40 to 44 years. Then the values are nearly without change up till 60 years. In joint age groups from 25 to 39 years the average circumference of men's chest from Czech lands is 98.3 centimetres. This value is by 2.9 centi-

TABLE 9

Chest circumference Men Bohemia, Moravia

III. CS 1965					
Age	n	\bar{x}	s	$\pm m$	min.—max.
18—19	241	91.9	5.00	0.322	80.0—109.0
20—24	337	94.6	4.17	0.227	80.0—109.0
25—29	153	96.6	6.56	0.530	83.0—113.0
30—34	198	97.4	5.74	0.408	83.0—113.0
35—39	210	100.4	8.92	0.616	82.0—118.0
40—44	217	100.9	8.19	0.556	84.0—115.0
45—49	133	100.3	6.85	0.594	84.0—116.0
50—54	119	100.5	6.89	0.632	84.0—116.0
55—59	69	100.7	7.72	0.930	84.0—115.0
60—64	33	99.7	5.90	1.026	85.0—111.0

II. CS 1960					
Age	n	\bar{x}	s	$\pm m$	min.—max.
18—19	894	90.5	6.34	0.212	80.5—114.0
20—24	629	91.8	5.81	0.231	78.0—111.0
25—29	384	93.2	6.11	0.311	78.0—118.0
30—34	404	95.5	5.85	0.210	83.0—118.0
35—39	465	97.0	7.02	0.325	78.0—118.0
40—44	270	97.2	6.05	0.368	81.0—116.0
45—49	249	96.6	7.75	0.491	83.0—117.5
50—54	145	98.2	6.80	0.562	84.0—115.0
55—59	69	96.4	7.20	1.478	83.0—114.0
60—64	25	96.9	6.09	1.218	89.0—108.0

I. CS 1955					
Age	n	\bar{x}	s	$\pm m$	min.—max.
18—19	240	89.3	4.60	0.290	76.0—107.0
20—24	369	91.7	5.30	0.270	80.0—111.0
25—29	545	93.9	5.50	0.240	77.0—116.0
30—34	617	95.2	6.20	0.250	78.0—115.0
35—39	303	95.6	5.60	0.320	81.0—115.0
40—44	318	96.3	5.90	0.330	82.0—113.0
45—49	223	97.3	6.30	0.420	82.0—115.0
50—54	117	97.2	5.70	0.530	84.0—115.0

I. CS 1955					
Age	n	\bar{x}	s	$\pm m$	min.—max.
25—39	1465	94.8	—	—	77.0—116.0

II. CS 1960					
Age	n	\bar{x}	s	$\pm m$	min.—max.
25—39	1253	95.4	6.46	0.182	78.0—118.0

III. CS 1965					
Age	n	\bar{x}	s	$\pm m$	min.—max.
25—39	561	98.3	7.44	0.314	82.0—118.0

CS = National Spartakiade

metres higher than at II National Spartakiade where the average circumference of chest was 95.4 centimetres. In comparison with I National Spartakiade, this value increased by 3.5 centimetres (I National Spartakiade — 94.8 centimetres).

TABLE 10

Chest circumference Women Bohemia, Moravia

III. CS 1965					
Age	n	\bar{x}	s	$\pm m$	min.—max.
18—19	357	85.2	4.38	0.232	71.0—98.0
20—24	511	86.3	5.40	0.239	75.0—106.0
25—29	283	87.9	6.33	0.376	77.0—106.0
30—34	358	90.1	5.95	0.314	77.0—107.0
35—39	330	90.9	6.38	0.351	77.0—108.0
40—44	291	91.6	6.79	0.398	78.0—109.0
45—49	115	92.3	6.61	0.617	80.0—109.0
50—54	59	93.1	7.27	0.946	81.0—105.0
55—59	27	95.1	7.40	1.425	82.0—108.0
60—64	10	93.0	9.61	3.040	81.0—105.0

II. CS 1960					
Age	n	\bar{x}	s	$\pm m$	min.—max.
18—19	833	87.7	7.00	0.242	80.0—101.5
20—24	1242	85.6	4.96	0.140	80.0—112.0
25—29	866	85.8	7.78	0.264	80.0—110.0
30—34	964	87.7	6.76	0.217	78.0—109.0
35—39	824	88.5	5.94	0.206	88.0—112.0
40—44	297	89.1	7.19	0.417	78.0—117.0
45—49	192	90.1	8.40	0.606	79.0—107.0
50—54	88	91.5	8.10	0.863	80.5—109.5
55—59	24	94.5	8.06	1.645	89.0—111.0

I. CS 1955					
Age	n	\bar{x}	s	$\pm m$	min.—max.
18—19	425	84.2	4.10	0.200	71.0—97.0
20—24	718	84.6	4.80	0.180	71.0—102.0
25—29	446	86.3	5.40	0.250	73.0—106.0
30—34	420	87.7	6.40	0.310	73.0—108.0
35—39	176	88.9	5.50	0.410	78.0—105.0
40—44	148	89.6	6.40	0.580	74.0—106.0
45—49	84	90.8	6.30	0.680	77.0—106.0
50—54	33	92.0	6.90	1.210	77.0—109.0

I. CS 1955					
Age	n	\bar{x}	s	$\pm m$	min.—max.
25—39	1042	87.3	—	—	73.0—108.0

II. CS 1960					
Age	n	\bar{x}	s	$\pm m$	min.—max.
25—39	2654	87.3	6.94	0.134	78.0—112.0

III. CS 1965					
Age	n	\bar{x}	s	$\pm m$	min.—max.
25—39	971	89.7	6.23	0.200	77.0—109.0

CS = National Spartakiade

The same phenomenon was observed when men from Slovakia were measured. From the starting value of 90.4 centimetres in the age group from 18 to 19 years a fast increase up till the value of 97.1 centimetres in the age group from 30 to 34 years can be observed. In joint age groups from 25 to 39 years, the circumference of chest of the

gymnasts from Slovakia is 96.0 centimetres at III National Spartakiade. In comparison with II National Spartakiade, it is 3.2 centimetres higher.

TABLE 11

Chest circumference Men Slovakia

III. CS 1965					
Age	n	\bar{x}	s	$\pm m$	min.—max.
18—19	167	90.4	5.27	0.407	78.0—102.0
20—24	199	93.6	5.61	0.398	80.0—107.0
25—29	33	95.6	6.28	1.092	82.0—108.0
30—34	13	97.1	5.83	1.617	88.0—107.0

II. CS 1960					
Age	n	\bar{x}	s	$\pm m$	min.—max.
18—19	326	88.0	5.34	0.295	78.0—99.5
20—24	188	88.0	7.86	0.573	79.0—104.0
25—29	81	91.8	4.94	0.548	83.0—110.0
30—34	34	94.9	4.92	0.843	85.0—107.0
35—39	23	93.3	7.12	1.484	79.0—113.0
40—44	14	96.1	6.35	1.697	90.0—108.5
45—49	4	95.5	7.41	3.705	90.5—109.5

I. CS 1955					
Age	n	\bar{x}	s	$\pm m$	min.—max.
18—19	52	89.3	3.40	0.460	81.0—96.0
20—24	58	89.1	4.10	0.540	79.0—100.0
25—29	69	92.5	4.60	0.550	81.0—102.0
30—34	33	94.3	5.10	0.900	85.0—104.0
35—39	16	96.6	4.60	1.160	87.0—104.0
40—44	11	95.0	4.80	1.450	90.0—108.0

I. CS 1955					
Age	n	\bar{x}	s	$\pm m$	min.—max.
25—39	118	93.6	—	—	81.0—104.0

II. CS 1960					
Age	n	\bar{x}	s	$\pm m$	min.—max.
25—39	138	92.8	5.35	0.455	79.0—113.0

III. CS 1965					
Age	n	\bar{x}	s	$\pm m$	min.—max.
25—39	53	96.0	5.96	0.818	82.0—108.0

CS = National Spartakiade

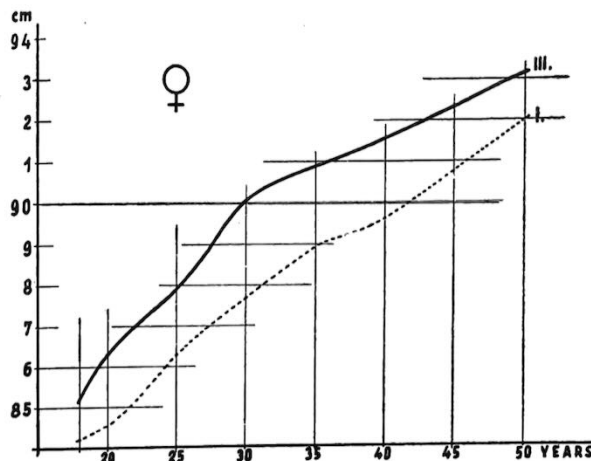


FIG. 3
Chest circumference — Bohemia, Moravia, women
I. — 1955, III. — 1965.

Chest circumference Women Slovakia

TABLE 12

III. CS 1965					
Age	n	\bar{x}	s	$\pm m$	min. - max.
18-19	272	84.6	3.53	0.214	71.0-101.0
20-24	299	84.9	3.62	0.209	74.0-101.0
25-29	49	87.2	3.96	0.566	78.0-104.0
30-34	36	86.1	5.00	0.834	76.0-101.0
35-39	13	90.3	5.94	1.648	82.0-95.0
40-44	15	92.1	7.74	1.999	82.0-103.0
II. CS 1960					
18-19	229	87.6	4.80	0.317	78.0-96.0
20-24	328	86.3	4.76	0.262	78.0-101.0
25-29	91	86.4	5.96	0.624	78.0-105.0
30-34	63	87.1	6.40	0.806	79.0-100.0
35-39	52	86.4	7.26	1.006	79.0-99.0
I. CS 1955					
18-19	55	84.5	4.40	0.590	75.0-95.0
20-24	75	85.1	4.30	0.490	76.0-97.0
25-29	17	87.5	4.00	0.980	79.0-94.0
30-34	22	90.2	6.05	1.380	79.0-101.0
I. CS 1955					
25-39	45	87.7	-	-	79.0-104.0
II. CS 1960					
25-39	206	86.6	6.40	0.445	78.0-100.5
III. CS 1965					
25-39	98	87.2	5.72	0.578	76.0-104.0

CS = National Spartakiade

The chest circumference of women from Czech lands is also in all the age groups higher at III National Spartakiade than at I and II National Spartakiads, with the exception of the age group from 18 to 19 years at II National Spartakiade. The considerable increase of the value of this phenomenon seen from the view-point of the secular factor emerges best in the comparison of the values from I National Spartakiade, i.e. in the course of ten years. The circumference of the chest of women increases in the direction to the higher age groups. In the joint age groups from 25 to 39 years, the value of circumference of the chest of women from Czech lands at III National Spartakiade is 89.7 centimetres, i.e. 2.4 centimetres higher than at II National Spartakiade (87.3 centimetres). The same difference is in comparison with I National Spartakiade.

In conformity with this fact, the increase of circumference of the chest of Slovak women in the direction to the higher age groups may be observed. In the joint age groups from 25 to 39 years, the value of circumference of the chest of Slovak women at III National Spartakiade is 87.2 centimetres. This value is 0.6 centimetre higher in comparison with the value from II National Spartakiade.