

Secular Changes in Body and Head Dimensions in Bulgarian and Russian Children

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The purpose of this research is to study the effect of secular processes on body and head and face dimensions of Bulgarian and Russian children and adolescents. The results indicate that in the case of Moscowite children in the last decade of the 20th c. there is a stabilization of stature and a trend towards astenization and gracilization. In the case of the children from Plovdiv, at the end of the 20th and the beginning of the 21st century, there continue to be positive changes in the basic somatometric parameters. In both populations the secular changes in the head and face parameters are related to debrachycephalization and leptoprosopnosis.

Key words: secular changes, body and head dimensions, children.

Introduction

The morphological aspects of secular processes are most fully reflected in the numerous studies of children and adolescents. They include mainly long-term consequences of the effect of acceleration [retardation] on the child's growth and development. One such consequence is the astenization of the constitution of the children, causing deteriorated physical condition and increase of chronic sickness rate.

Secular changes in body parameters are complemented by changes in head and face parameters. The main direction of these changes in most cases is brachycephalization and debrachycephalization. Information concerning this appears in a number of European countries [1, 4, 5, 8].

The purpose of the present research is to study the secular phenomena among Bulgarian and Russian children and adolescents and their effect on body, head and face dimensions.

Material and Methods

The subjects of the research are children and adolescents aged 7-17 from Plovdiv and Moscow. The Russian children were studied in 1996-1999 (1153 girls and 1152

boys). The Bulgarian children were studied in 2000-2002 (910 girls and 920 boys). The anthropometric programs for both sample groups include a wide range of body, head, and face dimensions taken by means of the classical method of Martin-Saller [3].

The present study focuses on 3 body dimensions – height, weight, chest circumference and 4 cephalometric dimensions: length and breadth of the head, morphological height and breadth of the face. For the analysis of the secular changes, data was used of children and adolescents from Moscow measured in the 70's and 80's, and of children from Plovdiv, measured in the 60's and the 80's. The data has been statistically processed, considering the significance of differences by t-criteria of Student.

Results and Discussion

The growth process in Moscovite children and adolescents in terms of stature show that most considerable secular changes occurred in the 70's and 80's; whereas in the 90's the growth rate is stabilized despite a preserved trend toward a positive longitudinal growth (Fig. 1).

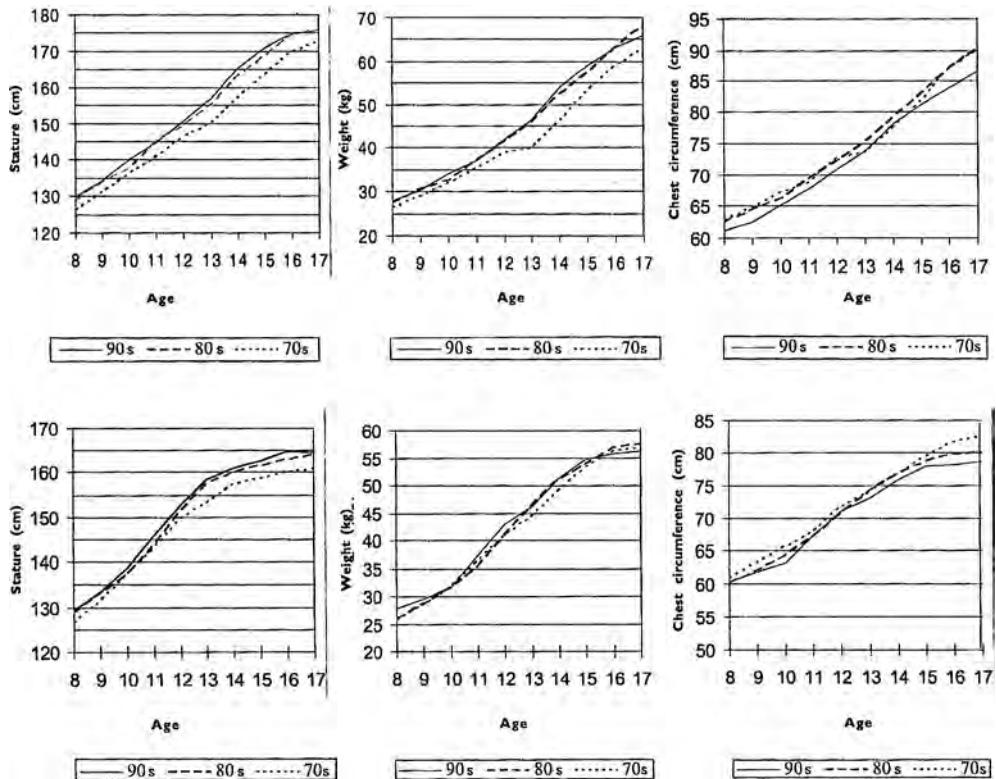


Fig. 1. Secular changes in children from Moscow

The changes in the weight have also a positive sign and are reliable ($p < 0.0001$) among boys studied in the 70's and the 80's. Secular weight changes among girls are not statistically significant in the three samples (Fig. 1).

Unlike the case with the stature and weight, the chest circumference has significantly lower values in the children and adolescents studied in the 90's as compared to the parameters in the same age group registered in the studies in the 70's and 80's. A similar trend in the dynamics of the development of the chest cage is confirmed by other authors [2, 9].

The situation, however, with the children and adolescents from Plovdiv is quite different. As seen in Fig. 2, the secular changes have a positive sign for all the three basic somatometric parameters. In one of our previous articles about the characteristics of the growth processes in different ethnoterritorial groups of children and adolescents, two distinct varieties in the course of the growth process were distinguished: "western" — with a tendency towards astenization of the stature and decreasing acceleration and "south-eastern" with continuing acceleration [7]. The children and adolescents from Moscow belong to the first group, their peers from Plovdiv belong to the second, e.g. both groups are at different stages of microevolutionary transformations.

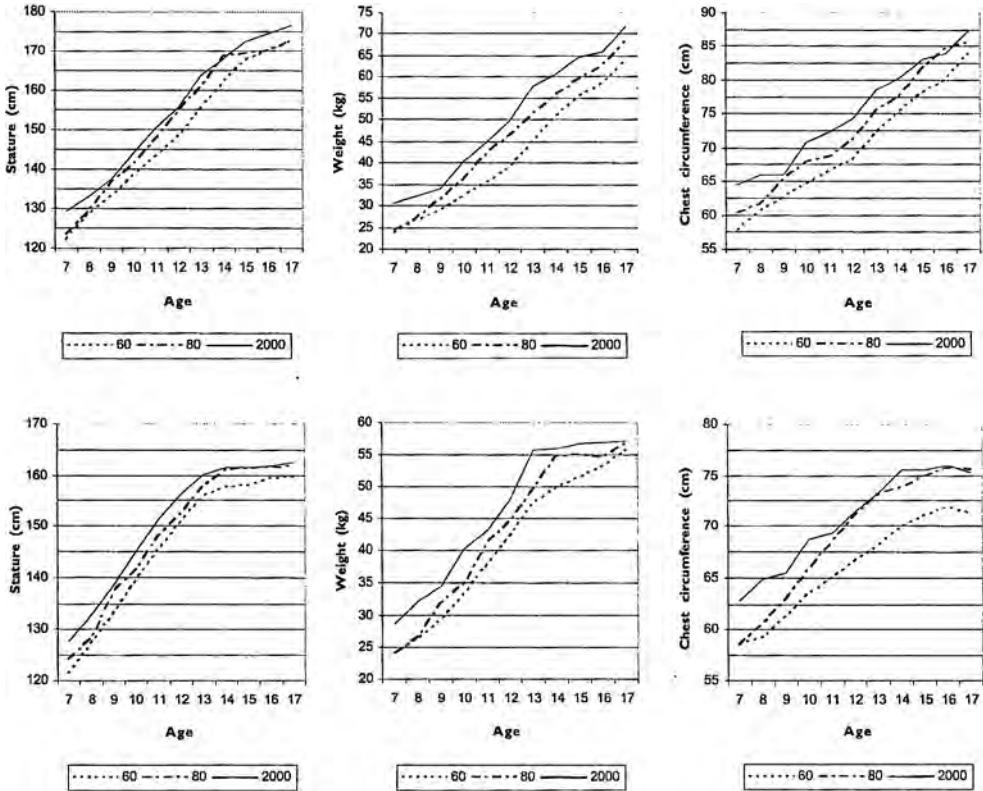


Fig. 2. Secular changes in children from Plovdiv

The secular changes in the body parameters are also complemented by the processes of brachy and debrachycephalization. In both populations an increase in the head length and the morphological height of the face is observed — for a period of 30-40 years with 4-9 mm depending on the age group, which corresponds to a difference in the stature of 4-9 cm. The breadth parameters of the head and face on the whole remain at the level of that in the 60's.

It is well known that there is a direct correlation between longitudinal head and face parameters and the stature. This fact indirectly shows that the possible reason for the changes of the parameters is the correlation of the age dynamics with the general growth processes. The changes in the mean values of the longitudinal head and face dimensions are reflected on the shape of the two divisions of the head. As shown in Tables 1 and 2, in both populations the changes in time are towards decrease of the measurements of the head index and increase in the face index. In the case with the children from Moscow, there is a stabilization of the stature, which shows that the morphological changes in the head proportions are not entirely due to acceleration changes. In the case with the children from Plovdiv, the processes occur together with ongoing positive changes of body parameters.

Table 1. Secular changes in the head and face index of children from Moscow

Age	Head index						Face index			
	boys			girls			boys		girls	
	1940's	1960's	1990's	1940's	1960's	1990's	1960's	1990's	1960's	1990's
7	84.0	84.9	82.2	82.9	83.7	80.7	79.0	91.2	77.5	90.9
8	83.3	84.1	80.7	82.8	84.4	79.9	77.8	92.1	78.4	91.9
9	84.0	83.0	80.9	83.1	84.7	80.0	78.4	93.4	77.9	92.4
10	82.5	84.0	81.3	83.3	83.7	80.7	77.6	91.5	78.1	92.4
11	82.6	83.5	80.1	83.0	83.8	80.9	77.0	90.3	77.6	91.3
12	82.3	84.0	80.9	83.1	83.0	81.0	77.3	90.6	77.5	90.5
13	82.7	83.7	80.0	82.0	83.4	79.6	76.8	91.5	92.0	90.6
14	83.6	82.2	80.3	82.5	83.1	80.2	75.8	92.0	76.7	91.1
15	83.1	82.6	80.0	82.9	83.8	80.7	75.4	91.6	77.1	90.8
16	82.9	82.7	79.2	82.5	83.4	79.6	75.8	92.0	77.1	89.6
17	82.2	81.9	80.0	82.9	83.1	81.8	75.5	91.3	77.3	88.9

Table 2. Secular changes in the head and face index of children from Plovdiv

Age	Head index						Face index					
	boys			girls			boys			girls		
	1960's	1980's	2000's	1960's	1980's	2000's	1960's	1980's	2000's	1960's	1980's	2000's
7	82.76	81.59	77.51	82.62	80.23	79.14	81.09	83.76	95.03	79.77	84.15	95.22
8	82.23	80.29	79.63	82.78	79.06	80.57	81.64	85.15	94.95	81.14	84.17	96.27
9	82.14	80.87	80.23	82.39	80.17	80.18	82.29	86.27	96.98	81.38	83.60	95.47
10	81.78	81.28	79.48	82.46	79.93	80.01	82.39	86.65	98.89	81.55	85.21	96.29
11	81.45	81.14	79.50	81.73	80.79	79.80	83.14	92.19	97.06	82.25	87.85	94.06
12	81.74	82.20	78.14	81.83	81.22	78.65	83.38	95.17	94.23	82.94	95.93	96.40
13	81.59	81.12	78.18	81.68	81.32	79.36	83.58	96.52	95.87	82.79	94.88	94.43
14	81.30	80.07	79.02	81.58	81.78	79.18	84.34	94.73	95.88	82.99	93.28	93.52
15	80.79	81.77	79.01	81.70	82.26	79.22	85.42	93.90	96.75	83.76	93.47	95.54
16	80.74	82.65	78.16	81.40	80.60	78.42	84.91	92.96	94.56	82.42	93.22	92.05
17	81.02	80.82	78.84	81.70	80.78	80.65	84.67	93.07	93.44	82.69	95.71	92.93

Conclusion

The growth curves of the basic somatometric parameters in the two populations show that they are at different stages of micro-evolutionary transformations. In the last decade of the 20th century the children and adolescents from Moscow show a certain stabilization of the stature, the beginnings of negative changes in weight and reliable decrease of chest circumference, especially in the case of girls. The children and adolescents from Plovdiv, at the end of the 20th century and the beginning of the 21st century, still have positive changes in stature, weight and chest circumference.

Secular changes in the shape of the head and face show that both populations after the 90's exhibit certain debrachycephalization and increase of leptoprosopnosis.

The time-related changes in both body parts in children from Moscow occur independently, whereas in the case of the children from Plovdiv, the transformations are more synchronized.

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