

AGE-RELATED VARIABILITY OF ANTHROPOMETRIC INDICATORS IN URBAN SCHOOL STUDENTS – BELARUSIANS AND DESCENDANTS OF INTERETHNIC MARRIAGES

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ABSTRACT

In the 1990s – early 2000s, anthropometric indicators of school students of three age groups (8, 13 and 17 years) were studied in several cities of Belarus. In total 2088 students were examined. The material was distributed into sex and age cohorts taking into account the ethnic structure – Belarusians (both parents are Belarusians) and genetically more heterogeneous descendants of interethnic marriages (DIM) where one of the parents is Belarusian, and the other is Russian, Ukrainian or Polish (Slav).

In all sex and age samples, the number of students in Belarusians cohorts was almost twice higher than the number of DIM, which corresponds to their real proportion in the urban population of Belarus.

The sex and age dynamics of average values of body height and weight, body mass index (BMI) and chest circumference, as well as the distribution of body types (somatotypes) in groups of urban school students in Belarus were observed.

The differences between Belarusians and DIM in the studied anthropometric characteristics in all sex and age groups were insignificant. The phenomena of heterosis in the first generation of DIM were more clearly manifested only by the age of 17 among young men, who were 1.7 cm taller than their Belarusian peers, with correspondingly slightly higher values of body weight and chest circumference. In comparison with Belarusians, DIM girls of this age had a weak shift in all indicators of physical development towards lower average values.

The average values of the BMI, which increase during puberty, reflect the tendency of weakly expressed gracilization of the physique of the male and especially female body in DIM compared to their Belarusian peers.

The tendency to leptosomization (skeletal gracilization) and body asthenization was shown by the intragroup distribution of somatotypes among descendants of uninational marriages – Belarusians – and even more among DIM.

Intersex differences in morphogenesis during puberty were manifested in greater asthenization of the physique against the background of gracilization of the skeleton of the female body compared to the male.

Keywords: *urban school students; Belarusians; descendants of interethnic marriages; physical development; somatotypes*

INTRODUCTION

Indigenous Belarusians predominate in the multinational ethnic structure of the population of the Republic of Belarus, but a significant percentage is made up of the largest ethnic group of Russians, as well as Ukrainians (mainly in the southeast of Belarus bordering Ukraine) and Poles (mainly in the western territory bordering Poland).

The formation of the multinational composition of cities, the strengthening of internal and external migration contributed to an increase in the frequency of interethnic marriages. After the revolution of 1917, during the struggle against religion, religious prohibitions on interfaith marriages disappeared, which also influenced the increase in their share. Mixed marriages were especially common “in areas with a multinational composition of the population, for example, large industrial centers with suburbs, in the border areas of ethnic settlement, areas of compact settlement of any ethnic group” [3, p. 372]. In the same article, I.V. Romanenko showed their dynamics: in 1926 mixed marriages constituted 17.7% of the marriages registered in the cities of Belarus, in 1959 – 23.7%, in 1970 – 29.2%, and in 1989 – 31.0%.

Among the rural population with a more homogeneous ethnic structure, in 1926 the share of interethnic marriages was smaller and amounted to 2.9% of the total number of marriages, in 1959 – 5.6%, in 1979 – 9.2%, in 1989 – 13.3%. In addition, there were gender differences in the frequency of such marriages – in the post-war period, especially since the late 1970s, women began to enter international marriages more often.

In the Gomel region, every fourth family is interethnic according to modern questionnaire research. Among mixed marriages, Slavic – Belarusian-Russian prevail; Belarusian-Ukrainian, Russian-Ukrainian, Belarusian-Polish, etc. – are also widespread. Most of the respondents (74.3%) are favourably disposed to

marriages between people of different nationalities; only 3% of respondents noted a negative attitude [1].

This coincides with the statistics for 2011 on the growth of mixed marriages with foreigners – then every fourth marriage in Belarus was concluded with a citizen of another country [4]. In 2015, 211 marriages of Belarusian women with citizens of the Russian Federation were registered in the Vitebsk region, and 157 Belarusian men married women with Russian citizenship. In the same year, 66 Belarusian women and 61 Belarusian men entered into marriage with citizens of the Republic of Ukraine. Fewer families were created by Belarusians of the Vitebsk region with citizens of other countries of the Commonwealth of Independent States – 33 and 12 marriages, respectively [4, p. 287].

The aim of the present study was to investigate the anthropometric indicators (body height and weight, body mass index, chest circumference) and distribution of somatotypes in two cohorts of urban school students – Belarusians and descendants of interethnic marriages.

MATERIAL AND METHODS

From the 1990s by 2012, the current authors conducted cross-sectional studies of school students in different cities of Belarus. There were three age groups: after the first acceleration of growth (8 years), after puberty acceleration of 13-year-old girls and at the beginning of puberty acceleration of 13-year-old boys, and 17-year-old boys and girls who had reached definitive indicators of physical development.

In total, **2088** school students were examined. The comprehensive study of secondary school students included Belarusians, Russians, Ukrainians, Poles, and descendants of interethnic marriages (DIM). The DIM group includes only descendants from marriages in which one of the parents is Belarusian and the other parent is a Russian, Ukrainian or Pole [5]. The majority of the Polish population in Belarus are descendants of Belarusians who adopted Catholicism in previous generations and consider themselves Poles on a religious basis.

Among the **619** Belarusians boys, there were **166** of 8-year-olds; **242** 13-year-olds and **211** 17-year-olds. Among the **342** DIM boys, **103** were 8, **142** – 13, and **97** – 17 years old. Among the **744** Belarusians girls, there were **207** 8-year-olds; **300** 13-year-olds and **237** 17-year-olds, and among the **383** DIM girls, **120** 8-year-olds; **132** 13-year-olds and **131** 17-year-olds.

The percentage ratios in sex and age samples of genetically homogeneous (Belarusians) and genetically heterogeneous (DIM) school students are shown in Table 1.

Table 1. Percentage of Belarusians and descendants of interethnic marriages (DIM) in the studied sex and age groups

Sex and age group	Age		
	8 years	13 years	17 years
Boys			
Belarusians	61.7	63.0	68.5
DIM	38.3	37.0	31.5
Girls			
Belarusians	63.3	69.4	64.4
DIM	36.7	30.6	35.6

So, in all the sex and age samples, the number of Belarusian school students was almost twice higher than that of DIM, which corresponds to their actual share in the urban population of Belarus.

The anthropometric measurements included body height and weight and chest circumference [2].

The body mass index (BMI) was calculated: $BMI = \text{weight kg} / \text{height m}^2$.

Individual somatotypes were determined by the quantitative method of typology of the physique developed by us in 2003 according to a set of anthropometric indicators and created for the three studied sex and age groups (8, 13, 17 years) by the special scales for anthropometric indicators [6].

Based on a comprehensive assessment of the structural features of the skeleton and subcutaneous fat deposition, and depending on the constitutional features of metabolism, the method allows to identify 7 body types.

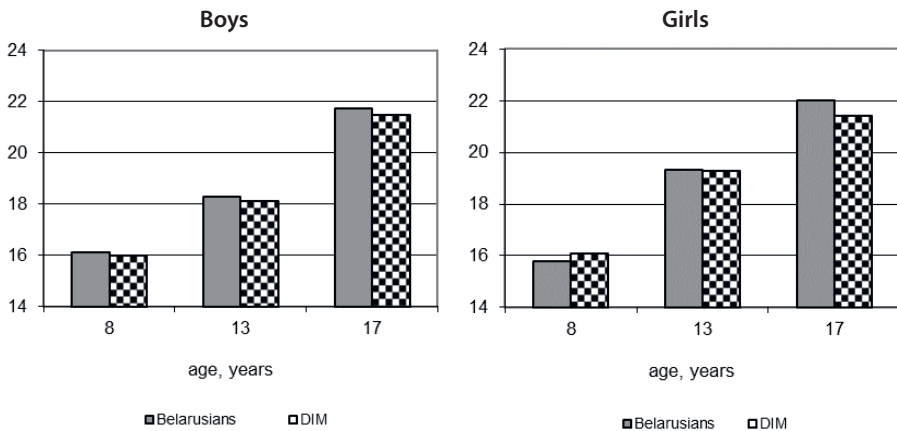
Among them, there are contrasting alternatives: 2 thinly folded types with varying degrees of leptosomy with a gracile skeleton, weak and medium fat deposition, i.e., asthenized leptosome (AstL) and leptosome (L) on the one hand, and 2 massive-build types (hypersome) with varying degrees of skeleton massiveness with increased fat deposition, i.e., hypersome (H) and adipose hypersome (AdH) on the other hand. The somatotype with a medium fat deposition is represented by the mesosome (M) variant, and the transitional variants structurally close to it are classified as mesoleptosome (ML) and mesohypersome (MH).

RESULTS

The results of the study are presented in one table and two figures. The average group values of the main anthropometric indicators of physical development are shown in Table 2 and Figures 1 and 2.

Table 2. Sex and age variability of the main anthropometric indicators of physical development of urban school students in Belarus

Characteristics	Boys		Girls	
	Belarusians	DIM	Belarusians	DIM
8 years				
N	212	103	207	120
Body height (cm)	129.04	128.09	128.43	129.20
Body weight (kg)	26.80	26.20	26.06	26.87
BMI (kg / m ²)	16.09	15.97	15.80	16.10
Chest circumference (cm)	60.45	59.98	58.88	59.65
13 years				
N	242	142	300	132
Body height (cm)	154.12	154.59	156.61	157.96
Body weight (kg)	43.38	43.23	47.41	48.15
BMI (kg / m ²)	18.26	18.09	19.33	19.30
Chest circumference (cm)	71.49	71.83	74.00	74.22
17 years				
N	211	97	237	131
Body height (cm)	176.26	178.00	165.49	165.12
Body weight (kg)	67.48	68.09	60.31	58.42
BMI (kg / m ²)	21.72	21.49	22.02	21.43
Chest circumference (cm)	87.56	87.75	82.34	81.14

**Figure 1.** Changes in body mass index (BMI) during growth and puberty of Belarusian and DIM urban school students.

DIM – descendants of interethnic marriages

The particular interest in the study of constitution of the physique is the age-related change in the nature of the distribution of somatotypes, on which the variability of the mean group values of the characteristics depends. The characteristics of sex and age variability in the nature of the distribution of somatotypes among school students of Belarusians and DIM are presented in Figure 2.

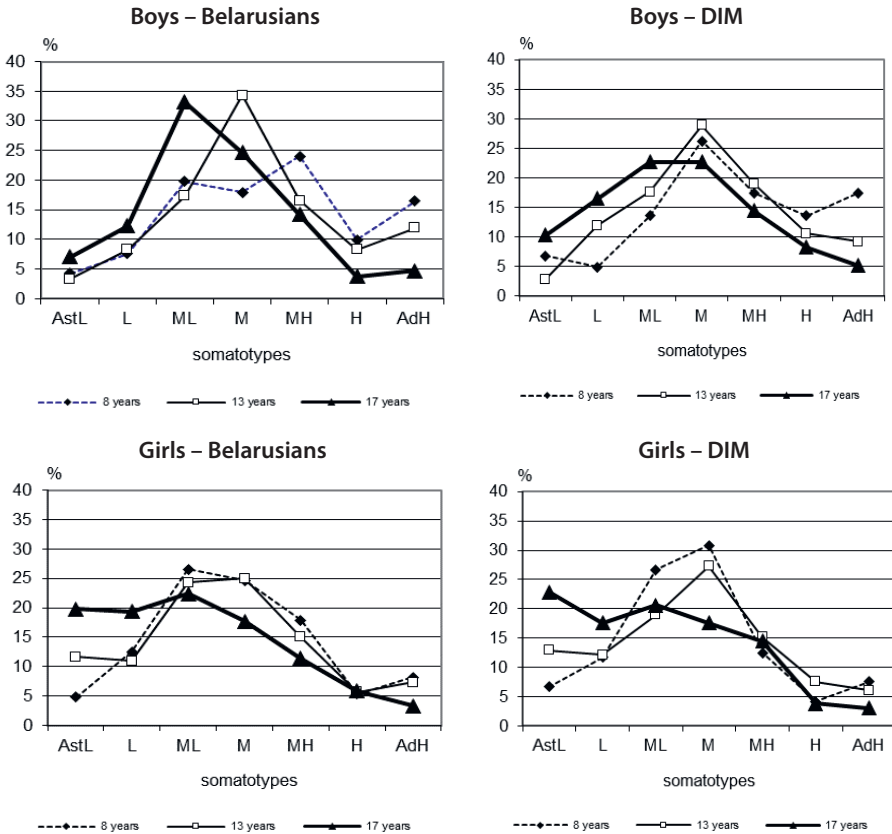


Figure 2. Sex and age variability of the distribution of somatotypes among Belarusian and DIM urban school students.

AstL – asthenized leptosome; **L** – leptosome; **ML** – mesoleptosome; **M** – mesosome; **MH** – mesohypersome; **H** – hypersome; **AdH** – adipose hypersome

DISCUSSION

The differences between Belarusians and DIM in the studied anthropometric characteristics – body height and body weight, body mass index and chest circumference – are insignificant in all sex and age groups.

The phenomena of heterosis in the first generation of DIM were more pronounced only by the age of 17 among young men, who were 1.7 cm higher than their Belarusian peers with correspondingly slightly larger values of body weight and chest circumference. DIM girls of this age, in comparison with Belarusian girls, showed a slightly pronounced shift in all indicators of physical development towards lower average values.

Sexual features of morphogenesis during puberty were manifested in more pronounced asthenization of the physique against the background of gracilization of the skeleton of the female body compared to the male.

The average values of body mass index (BMI), which increase during puberty, reflect a tendency to weakly pronounced gracilization of the physique of the male and especially the female body in DIM groups compared with their Belarusian peers.

The analysis of sex and age dynamics of the intragroup distribution of somatotypes revealed more clearly the tendency of leptosomization (skeleton gracilization) and body asthenization in descendants from Belorussian mononational marriages and a greater expression of this process among descendants from interethnic marriages (DIM).

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