

## TO THE QUESTION OF CREATING A NEW DIMENSIONAL TYPOLOGY OF CHILDREN'S FIGURES IN UZBEKISTAN

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**Abstract.** *The article substantiates the relevance of anthropometric measurements of the dimensional characteristics of children's figures of different age sex and age groups in order to study the nature of the change in dimensional characteristics to improve the quality of the fit of children's clothing, as well as create a new dimensional typology. A mass measurement of children's figures was carried out, the sample consisted of more than 3,000 people. Based on the mass measurement data, regression equations were drawn up, on the basis of which the analysis of changes in dimensional characteristics was carried out.*

**Keywords:** *dimensional characteristics, measurement, research, regression, regression coefficient.*

To solve practical problems of providing the children's population with fitted clothing, it is necessary to take into account the modern size typology of the population, know the relative number of their typical figures and predict the required size range of clothing. Such data can be obtained only when conducting mass anthropometric examinations of children's figures and correct mathematical (statistical) processing of the results of mass measurements. The results of anthropological research are used to develop new anthropometric standards for the production of children's clothing.

The scientific foundations and methods for constructing anthropological standards for mass production of garments were developed by the staff of the Research Institute of Anthropology at the Lomonosov Moscow State University together with TsNIISHP, which is discussed in detail in the works of E.B. Koblyakova and T.N. Dunaevskaya [1,2].

To increase the percentage of sales of children's clothing, it is necessary to resolve the issue of proportionality of manufactured products, i.e. the correspondence of their sizes to the dimensional characteristics of children's figures. In this case, the values of subordinate dimensional characteristics are calculated using updated coefficients of the regression equation, determined on the basis of statistical processing of the results of anthropometric studies.

To test this hypothesis about the inconsistency of the dimensional typology developed by NIIA MSU in 1986, the modern dimensional characteristics of schoolchildren, a study was conducted to determine new statistical parameters, followed by a comparative analysis of the data [2].

The aim of the study is to study and analyze changes in the anthropometric parameters of school-age children in Uzbekistan to optimize the design and manufacture of clothing.

On the basis of the department KTSHI TITLP, a study was carried out to determine new statistical parameters, followed by a comparative analysis of the data. The collection of the necessary information for the anthropometric study was carried out by mass measurement of the child population in accordance with the standard measurement methodology MTILP [2]. The volume of the stochastic sample was more than 3000 people. The sample included children of all

age groups: primary school age (6-11 years old), senior school age (12-14 years old), adolescents (15-18 years old) [3].

The program of mass measurement of the child population included 63 basic dimensional characteristics measured by the contact method. Dimensional characteristics were selected as a result of the analysis of the existing methods of designing children's products [4,5].

The anthropometric data obtained as a result of the measurement were subjected to mathematical processing. For each dimensional trait, the main statistical parameters were determined that characterize the size and variability of the trait in the sample, the degree and nature of the correlation dependence between the dimensional traits. The statistical processing of the measurement results was carried out using the professional package Mini tab., Excel 2007 [6].

Previous studies have established that the relationship between the anthropometric features of the figures of children is of a correlation or stochastic nature. More precisely, the correlation between the two dimensional characteristics can be established using the regression equation [7]. The regression equation in this case has a linear dependence of the form:  $y = kx + b$ , where  $y$  is a subordinate feature,  $x$  is the main feature,  $k$  is a proportionality coefficient,  $b$  is an intercept.

The linear correlation coefficient can take values from  $-1$  to  $+1$ . The tightness of the connection between the signs was assessed using the Chaddock scale [8]:

- 0.1 <  $r(x, y)$  < 0.3: weak;
- 0.3 <  $r(x, y)$  < 0.5: moderate;
- 0.5 <  $r(x, y)$  < 0.7: noticeable;
- 0.7 <  $r(x, y)$  < 0.9: high;
- 0.9 <  $r(x, y)$  < 1: very high.

Regression equations for determining the values of subordinate dimensional characteristics have been compiled. Table 1 shows comparable regression equations for the relationship of the investigated dimensional features with their correlation coefficients. When calculating, the chest circumference III of boys and girls of 11 years old was taken as the leading dimensional indicator.

**Table 1**

***Regression equations for the determination of subordinate RP in boys and girls 11 years old***

Dimensional sign	Dimensional feature	Regression equation	
		Boys	Girls
Body length	T1	$P/T1 = 109 + 0,495$ $Or_{III}/T16$ $r = 0,558$	$P/T1 = 99,5 + 0,611$ $Or_{III}/T16$ $r = 0,474$
Waist circumference	T18	$O_T/T18 = - 2,08 + 0,942$ $Or_{III}/T16$ $r = 0,916$	$O_T/T18 = 12,5 + 0,717$ $Or_{III}/T16$ $r = 0,834$
Hip girth	T19	$O_6/T19 = 25,8 + 0,806$ $Or_{III}/T16$ $r = 0,839$	$O_6/T19 = 14,5 + 0,974$ $Or_{III}/T16$ $r = 0,840$
Back length to waist	T40	$\Delta_{TC}/T40 = 31,7 + 0,0250$ $Or_{III}/T16$ $r = 0,501011$	$\Delta_{TC}/T40 = 23,1 + 0,132$ $Or_{III}/T16$ $r = 0,404873$

The length of the arc of the upper torso through the point of the base of the neck from the side	T44	$M_{rT}/T44 = 48,2 + 0,294$ OrIII/T16 $r = 0,519312$	$M_{rT}/T44 = 43,0 + 0,336$ OrIII/T16 $r = 0,529528$
Back width	T47	$IIIc/T47 = 29,7 + 0,0329$ OrIII/T16 $r = 0,746979$	$IIIc/T47 = 11,8 + 0,262$ OrIII/T16 $r = 0,668837$
Chest width	T45	$IIIr/T45 = 30,7 - 0,0267$ OrIII/T16 $r = 0,729807$	$IIIr/T45 = 11,3 + 0,238$ OrIII/T16 $r = 0,634522$
Inside leg length	T27	$Д_{H} /T27 = 63,9 + 0,0022$ OrIII/T16 $r = 0,162305$	$Д_{H} /T27 = 45,9 + 0,311$ OrIII/T16 $r = 0,344569$
Distance from the point of the base of the neck from the side to the wrist girth line	T33	$Д_{p3aп} /T33 = 43,0 + 0,277$ OrIII/T16 $r = 0,550132$	$Д_{p3aп} /T33 = 39,1 + 0,325$ OrIII/T16 $r = 0,572877$

Having given the value of the girth of the chest, according to these regression equations, it is possible to calculate the values of subordinate dimensional characteristics, which are subsequently used in the design of children's clothing. The sizes of clothes, calculated according to the regression equations, characterize the parameters of the modern average-typical child's figure.

Analysis of the calculations showed that the correlation coefficient between chest girth and latitudinal features reaches a fairly large value. The correlation between the chest girth is most pronounced with the transverse parameters. At the same time, the correlation between longitudinal and girth characters is very insignificant (Table 1) [2]. Consequently, it can be argued that in boys and girls, the mathematical relationship between a pair of dimensional traits T16, T18 and T16, T19 is most significant, and between the dimensional traits T16 and T1 it is moderate and equal to 0.558 and 0.474. The correlation between T27 and T16 is weak and is equal to 0.162 in boys, 0.344 in girls.

A low degree of correlation between features oriented in different planes necessitates the selection of not one, but at least two leading features [2].

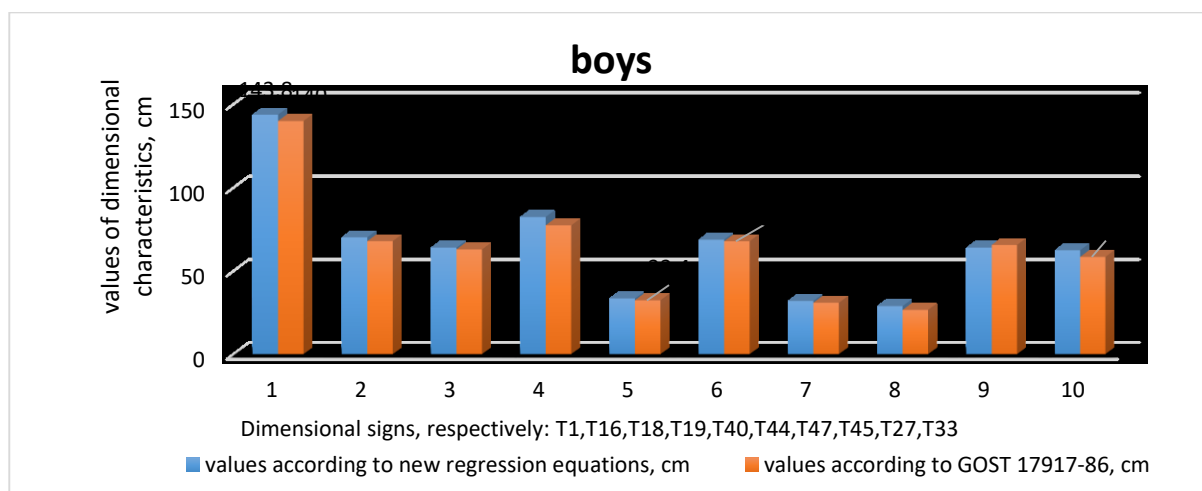
A comparative analysis of the values of dimensional characteristics, calculated using the obtained regression equations and the data of GOST [9,10], which showed the nature of the change in dimensional characteristics for the period between measurements in 1986 and the present, was carried out. An example of calculating subordinate characteristics by the value of Og3 for boys and girls of 11 years old is shown in Table 2.

The graph characterizing the change in dimensional characteristics calculated by the regression equations and the average figure according to GOST data [8, 9], in the resulting sample, is shown in Fig. 1 and 2.

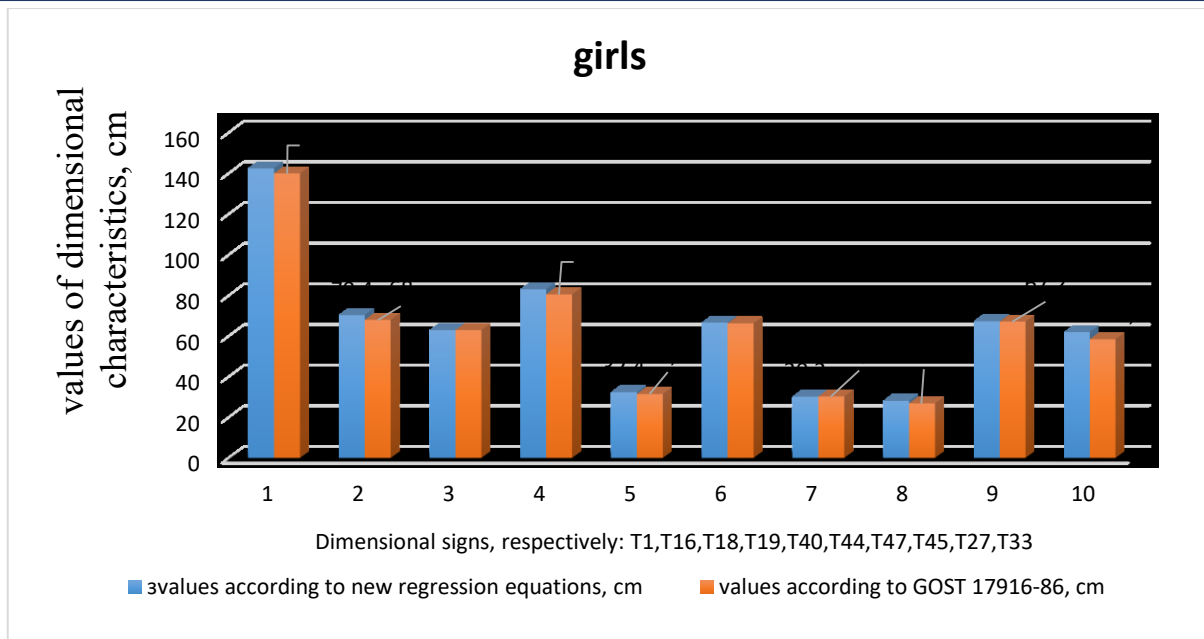
**Table 2**

**The results of calculating the values of the dimensional characteristics of boys and girls of 11 years old according to the obtained regression equations**

Dimensional sign	dimensional feature	Value according to the new regression equation, cm		Values according to GOST 17917-86, 17916-86, cm		Deviations, cm	
		Boys	Girls	Boys	Girls	Boys	Girls
Body length	T1	143,8	142,5	140	140	+3,8	+2,5
Chest girth	T16	70,3	70,4	68	68	+2,3	+2,4
Waist circumference	T18	64,1	63,0	63	63	+1,1	0
Hip girth	T19	82,5	83,1	77,5	80,6	+5,0	+2,5
Back length to waist	T40	33,5	32,4	32,4	31,5	+1,1	+0,9
The length of the arc of the upper torso through the point of the base of the neck from the side	T44	68,9	66,7	67,9	66,3	+1,0	+0,4
Back width	T47	32,0	30,2	30,9	30,3	+1,1	-0,1
Chest width	T45	28,9	28,1	26,6	26,9	+2,3	+1,2
Inside leg length	T27	64,1	67,4	65,7	67,2	-1,6	+0,2
Distance from the point of the base of the neck from the side to the wrist girth line	T33	62,5	62,0	58,5	58,5	+4	+3,5



**Figure 1. Histogram of changes in the size characteristics of 11-year-old boys**



**Figure 2. Histogram of changes in the size characteristics of girls 11 years old**

Comparative analysis of the values of dimensional characteristics calculated by the regression equations showed that the size of the average figure has changed, while there is a general trend towards an increase in body length, hip girth, chest girth. In general, the obtained modern average typical children's figure of boys and girls with a chest girth of 70.3 and 70.4 differs from the dimensional characteristics according to GOST [9.10].

Based on the results of the study, it can be concluded that the dimensional characteristics of the modern children's average figure of boys and girls have changed, the girth of the chest, the girth of the waist and hips have increased, which may be associated with a change in the lifestyle of a modern person. The computerization of leisure, decreased physical activity, and a fast food regime have led to an increase in the overweight population, and, as a consequence, an increase in transverse dimensions.

The obtained values of the correlation coefficients were compared according to the Student's test, according to which, with a probability of 0.95, it can be argued that the obtained equations are reliable and they can be applied when calculating the values of subordinate dimensional characteristics when developing a new dimensional typology.

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