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Physical status of Vilnius preschool children of different ethnicity: a pilot study

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Background. Growth and development differ between populations, and these differences are related with the impact of internal (e. g., ethnicity) and external (e. g., socio-economic status) factors. The aim of the present study was to reveal the peculiarities of physical status in preschool children of Lithuanian and non-Lithuanian nationalities (mainly Poles and Russians) in Vilnius, and to verify the suitability of the existing reference standards, based on the studies of children of Lithuanian nationality, for evaluation of the physical development of children of other nationalities.

Materials and methods. Data from a cross-sectional study carried out in 2003–2006 in Vilnius kindergartens are presented. In total, the authors investigated 1259 healthy preschool children 3–6 years old. Height, leg length (symphysion height), weight, shoulder breadth, hip breadth, chest, waist and hip circumferences were measured according to standard anthropometrical methods; the BMI was calculated. The data were analysed according to parental ethnicity and socio-economic status.

Results. Physical development of Lithuanian and non-Lithuanian preschool children was very similar. Factor analysis showed that there was no linear correlation between body size and shape indices, ethnicity and social items.

Conclusions. The existing reference standards fit for preschool children of other ethnicities, mainly Poles and Russians. Nevertheless, a study on the physical status of schoolchildren of different ethnicities should be conducted in Lithuania with the purpose to reveal the differences (according to several reports, certain inequalities in the physical status of children of different ethnicity worldwide appear mostly during sexual maturation).

Key words: preschool children, physical status, ethnicity

INTRODUCTION

The physical status of a child and a mature individual depends on genetic and environmental interaction. Obviously, growth and development differ between populations: it is known that body size and shape of children of different ethnicity vary widely, and these differences are related with a different maturation tempo and also with discrepancies in final dimensions of the mature body (1–5). However, it is not an easy task to distinguish between the impact of internal and external factors within a certain population.

All in all, the greatest differences in physical status were established among populations from highly developed and very poor countries, and within the same population the greatest differences in growth and development were obtained between children from marginal social classes (4–6). It is important that the physical status of children from developing countries also depends on socio-economic status of a sample (7, 8). Short final height in combination with accelerated puberty tempo is characteristic of small-scale primitive societies (9). On the other hand, it has been noticed that healthy children from the upper socio-economic groups differ little in growth among the countries, hence, all population groups have the same growth potential, although many do not reach this potential due to adverse environment (4).

Moreover, several studies have concluded that differences between populations in prevalence of stunting and wasting were connected with the impact of certain environmental factors (4, 10). The impact of socio-economic factors on the height and BMI is also diverse: in general, BMI varies between countries and different ethnic and socio-economic groups of the same country on a major scale in comparison with height variation (7, 8, 11–15).

Summarizing reference data from many countries such as United Kingdom (16, 17), Sweden (18, 19), the Netherlands (20–22), Germany (23), Estonia (24), Czechia (25), Hungary (26, 27),

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Belgium (28), Poland (29), France (30, 31), Italy (32–34), Spain (35), Greece (36), Belarus (37), Bulgaria (38), Russia (39), Turkey (40), Lithuania (41, 42) revealed evident differences in the height and BMI of children from different European countries.

In general, growth of preschool children from different countries is quite similar, but the differences in school ages and particularly at the end of puberty are more evident. On average, South European children are shorter than their North European peers; for example, at the age of 18 years the mean height of Dutch boys and girls was 182.6 cm and 169.8 cm (21), whereas the mean height of Turkish boys and girls was 176.0 cm and 163.1 cm (40). Analysis of conscripts' data from eight European countries showed that young Portuguese men were the lowest and the Dutch men were the highest (43). The final height in adulthood (20–74 years) in men varied from 170.0 cm in Spain to 178.9 cm in Norway and in women from 160.3 cm in Spain to 167.1 cm in the Netherlands (12).

North American children are on average shorter than North European, because growth patterns of children from North America represent a mixture of North and South European growth patterns (44, 45). The height of children in Asiatic countries – Japan (46, 47), China (48, 49), Korea (50), Iran (51, 52), India (53) – is lower than in most European countries throughout the growth period.

After revising a plenty of different growth references, Ulijaszek (45) concluded that the growth patterns of all major population groups are likely to have a similar genetic potential, with the exception of Asiatics and populations with the obscure genetic potential (Australian aborigines, inhabitants of Pacific Islands). Therefore, national or group-specific charts should be used for individual growth monitoring, though it is reasonable to develop international charts for public health and / or epidemiological purposes also (4, 42, 54–56).

At present, the majority of inhabitants in Lithuania (more than 80%) are Lithuanians (57). Therefore, most of auxological surveys in Lithuania were focusing on children of Lithuanian nationality (41, 58, 59). Nevertheless, quite a big number of people of non-Lithuanian ethnicity live in the capital city of Vilnius (Table 1).

The physical status of children of the other ethnicities living in Lithuania has been poorly studied so far. The evaluation of growth and development of children of the other ethnicities in Lithuania is based on the same standards as used for Lithuanian children. The aim of the present study was to analyse the peculiarities of physical status in preschool children of Lithuanian and non-Lithuanian nationalities in Vilnius and to verify the suitability of the existing reference standards (59) for the evaluation of physical development of children of non-Lithuanian nationality.

MATERIALS AND METHODS

The data from a cross-sectional study carried out in 2003–2006 in Vilnius kindergartens are presented in this paper. In total, the authors investigated 1259 healthy preschool children aged 30–78 months (born in 1997–2003): 528 boys and 553 girls were investigated according to a wide anthropometric program (59 indices were investigated), and the main body size indices (height, weight, chest circumference) were measured to the additional 178 children (87 boys and 94 girls). In the present study, height, leg length, weight, shoulder and hip breadths, chest, waist and hip circumferences were included for analysis.

The standard anthropometric methods (62) and standard anthropometric instruments (Siber Hegner, Swiss) were used: height, leg length (symphysion height) were measured using a metal anthropometer with the accuracy of 0.1 cm; the weight was taken using the portable electronic scale with the accuracy of 0.05 kg (children were in underwear clothing and without shoes); the breadths (shoulder and hip) were measured with the accuracy of 0.1 cm using a spreading calliper, and circumferences (chest, waist and hip) were measured with the accuracy of 0.1 cm using a non-stretchable tape. The BMI was calculated as the weight in kilograms divided by the square of the height in meters.

The questionnaires on parental ethnicity, as well as on different social items were filled in by parents. According to parents' ethnicity, two groups of children were compiled: if both parents recorded the Lithuanian nationality, the child was included into the Lithuanian group, and if both or one parent recorded non-Lithuanian nationality, the child was included into the non-Lithuanian group. Parental education was grouped as follows: secondary or lower, vocational, higher and university. Four groups of parental occupation were compiled: manual workers; non-manual employees; self-employed and employed professionals / non-professionals and higher civil servants; and unemployed. Two groups of familial status were compiled: complete family and incomplete family (more often after divorce).

The statistical analysis was performed using the standard statistical program SPSS for Windows (version 10). Descriptive statistics for raw data and standard z-scores for all measurements were calculated using the mean and SD of a total sample (standard scores show a deviation of the measurement from the sample mean, and it is possible to compare different indices and to figure them together). The comparison of body size indices between different sex, age and ethnicity groups was performed by ANOVA. The multivariate factor analysis of socio-economic status (education and occupation of parents, familial status), ethnicity, and body size indices was performed by the method of principal components with varimax rotation and Kaiser's normalization.

Table 1. **Population by ethnicity (%) in Lithuania and Vilnius city (sources: 57, 60, 61)**

Ethnicity	Lithuania			Vilnius					
	1959	1989	2001	1945	1959	1970	1979	1989	2001
Lithuanian	79.3	79.6	83.5	6.9	33.6	42.8	47.3	50.5	57.8
Polish	8.5	7.0	6.7	82.7	20.0	24.5	22.2	18.8	18.7
Russian	8.5	9.4	6.3	7.4	29.4	18.3	18.0	20.2	14.0
Belarussian	1.1	1.2	1.2	1.3	6.5	6.5	6.4	5.3	4.0
Other or unmarked	2.6	2.8	2.3	1.7	10.5	7.9	6.1	5.2	5.5

Table 2. **Parental ethnicity (%) of the study cohort**

Gender	Age, years	Ethnicity of parents: Lithuanian N	Lithuanian %	Other N	Other %
Boys	3	105	83.3	21	16.6
	4	123	79.4	32	20.6
	5	131	78.0	37	22.0
	6	128	78.5	35	21.5
Total		**487**	**79.7**	**125**	**20.3**
Girls	3	104	79.4	27	20.6
	4	121	72.9	45	27.1
	5	126	78.8	34	21.2
	6	154	81.1	36	18.9
Total		**505**	**78.1**	**142**	**21.9**

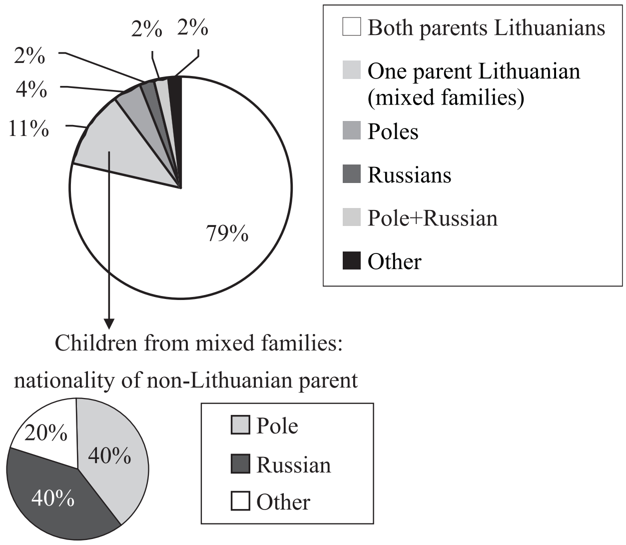

Fig. 1. Parental ethnicity (%) of children

RESULTS

The distribution of children by sex, age and the ethnicity of parents is presented in Table 2. As expected, the majority of children were from Lithuanian families, and about one fifth of the study cohort were non-Lithuanians (mainly Poles and Russians). The nationality of parents in detail is presented in Fig. 1.

The education of parents is presented in Table 3: significant differences between education of parents with different ethnicities were evident. Lithuanian parents had a higher level of education in comparison with non-Lithuanian ones.

The descriptive statistics of different body size and shape indices is presented in Tables 4 and 5. The height and leg length of Lithuanian boys was bigger than of their non-Lithuanian peers in all age groups, except the age of 4 years, but the differences were statistically insignificant ($p > 0.05$). The transverse measurements, circumferences and BMI did not differ. The height and leg length of Lithuanian girls did not differ in all age groups,

Table 3. **Parental education (%) of the study children**

Education	Secondary or lower		Vocational		Higher		University	
Ethnicity	**Lithuanians**	**Other**	**Lithuanians**	**Other**	**Lithuanians**	**Other**	**Lithuanians**	**Other**
Father	11.5	34.8	8.1	14.7	22.6	26.3	56.8	24.2
Chi test	p = 0.000		p = 0.0025		p = 0.234		p = 0.000	
Mother	8.8	32.5	5.0	10.0	25.0	28.8	61.2	28.7
Chi test	p = 0.000		p = 0.004		p = 0.243		p = 0.000	

Table 4. **Descriptive statistics for body size and shape indices in boys of different ethnicity (no statistically significant differences were obtained)**

Age (years)	Ethnicity group	N* (N**)	Height, cm X	SD	Leg length, cm X	SD	Shoulder breadth, cm X	SD	Hip breadth, cm X	SD	BMI, kg/m² X	SD	Chest circumference, cm X	SD	Waist circumference, cm X	SD	Hip circumference, cm X	SD
3	Lithuanian	105 (102)	98.2	3.8	43.8	2.7	22	1.0	16.3	0.8	16.4	1.3	52.2	2.4	50.8	3.0	55.2	3.3
	Other	21 (21)	97.5	3.7	43.0	2.5	21.8	0.9	16.0	0.7	16.5	1.4	51.9	2.0	50.9	2.9	55.1	3.6
4	Lithuanian	123 (105)	104.6	4.4	48.3	2.9	23.1	1.0	17.2	0.9	16.0	1.2	53.7	2.4	51.7	2.7	57.3	3.2
	Other	32 (25)	104.3	4.4	48.5	2.8	23.1	1.0	16.9	1.0	16.0	1.2	54.1	2.2	51.4	3.3	58.1	3.9
5	Lithuanian	131 (106)	112.0	4.7	53.2	3.0	24.6	1.3	18.2	1.2	15.8	1.7	56.0	3.3	53.4	3.7	60.2	4.3
	Other	37 (27)	111.2	5.0	52.6	3.4	24.2	1.3	17.7	1.0	16.0	1.5	55.7	3.8	54.1	4.7	60.3	4.3
6	Lithuanian	128 (110)	119.0	5.3	57.5	3.6	25.7	1.3	19.1	1.1	15.8	1.3	57.4	2.9	54.7	3.4	62.5	4.3
	Other	35 (29)	117.4	4.7	56.4	2.8	25.5	1.3	19.0	1.0	16.1	1.7	57.7	3.5	54.8	4.1	63.1	4.8

* The total number of children.

** The number of children investigated according to a wide program.

Table 5. **Descriptive statistics for body size and shape indices in girls of different ethnicity (statistically significant differences, p < 0.05, are presented in bold)**

Age (years)	Ethnicity group	N* (N**)	Height, cm		Leg length, cm		Shoulder breadth, cm		Hip breadth, cm		BMI, kg/m²		Chest circumference, cm		Waist circumference, cm		Hip circumference, cm	
			X	SD	X	SD	X	SD	X	SD	X	SD	X	SD	X	SD	X	SD
3	Lithuanian	104 (101)	96.7	4.2	43.4	2.7	21.5	1.0	16.0	0.9	16.2	1.2	50.9	2.1	50.0	2.5	55.4	2.9
	Other	27 (27)	95.6	5.1	42.8	3.6	21.2	1.1	15.7	0.9	16.1	1.2	50.3	2.6	49.1	3.0	54.7	4.0
4	Lithuanian	121 (104)	103.5	4.8	48.0	3.0	22.7	1.0	16.9	1.0	15.8	1.3	52.4	2.6	50.8	2.7	57.4	3.4
	Other	45 (32)	103.4	5.4	48.0	3.1	22.8	1.0	16.8	1.2	16.1	1.2	52.6	2.7	51.1	2.7	57.7	3.6
5	Lithuanian	126 (104)	110.9	4.9	53.2	3.0	24.0	1.1	17.8	0.9	15.6	1.1	**54.1**	2.7	**52.1**	2.9	60.7	3.6
	Other	34 (23)	111.3	6.0	53.2	4.0	24.3	1.5	17.9	1.1	16.0	1.3	**55.4**	3.4	**53.5**	3.2	61.4	4.2
6	Lithuanian	154 (134)	117.8	5.2	57.2	3.6	25.3	1.3	18.7	1.0	16.0	1.6	56.5	3.5	54.0	3.9	63.9	4.1
	Other	36 (28)	117.3	4.8	57.1	3.7	25.2	1.5	18.5	1.0	16.3	1.8	57.5	4.1	54.5	4.1	64.5	4.6

* The total number of children.

** The number of children investigated according to a wide program.

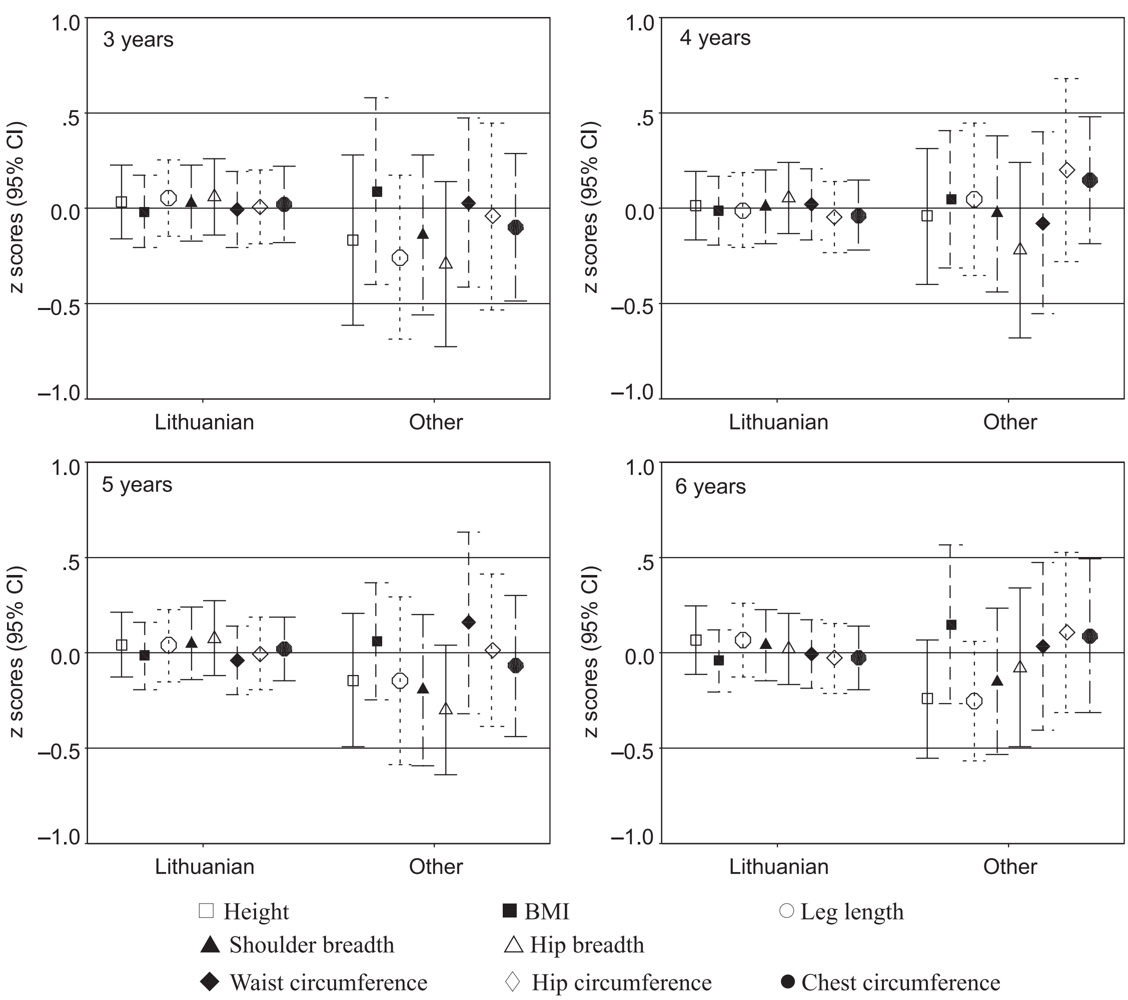

Fig. 2. Comparison of z scores for body size and shape indices in preschool boys of different ethnicity

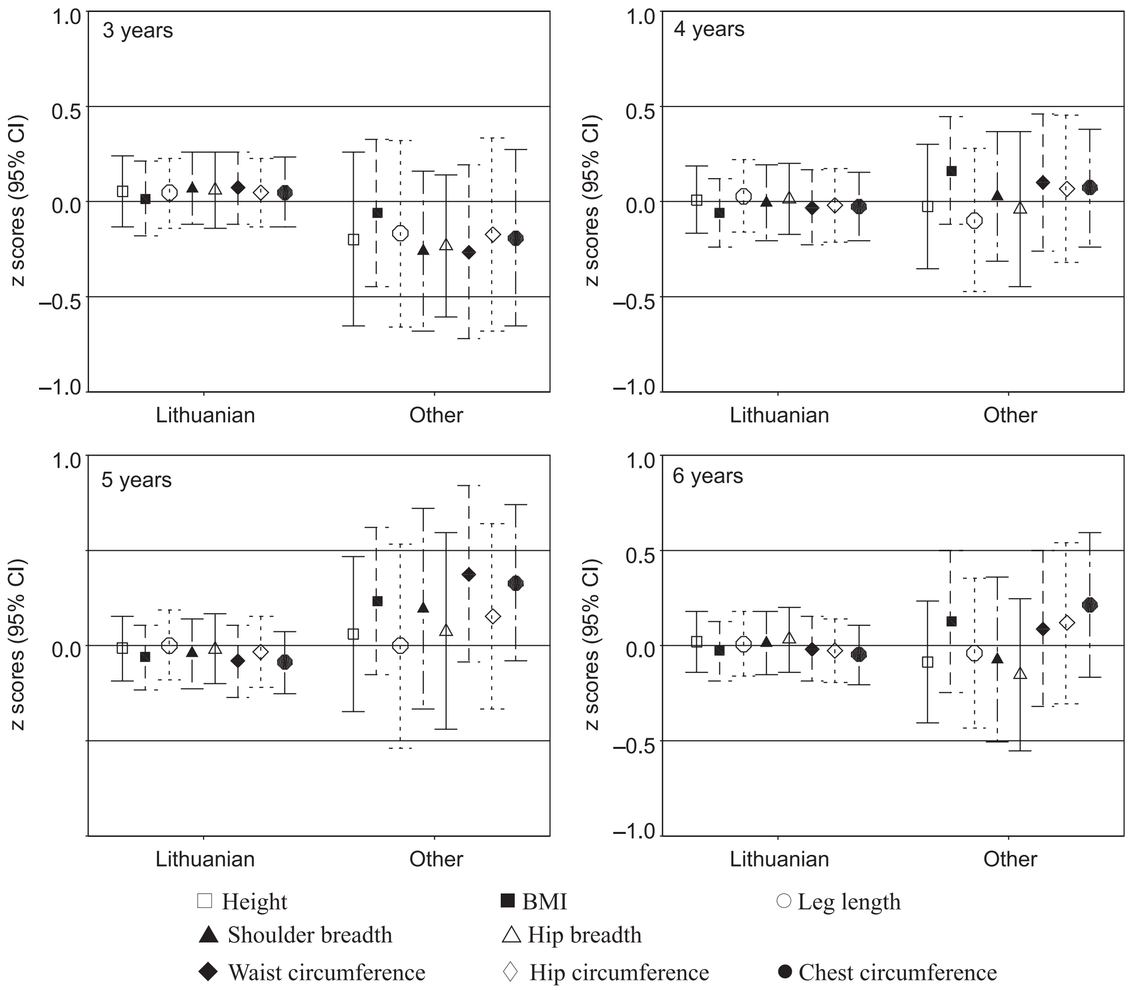

Fig. 3. Comparison of z scores for body size and shape indices in preschool girls of different ethnicity

except at the age of 3 years, but the differences were statistically insignificant ($p > 0.05$). Transverse measurements, circumferences and BMI were very similar almost in all age and sex groups. Lesser chest and waist circumferences in Lithuanian 5-year-old girls were the only statistically significant findings ($p < 0.05$).

A comparison of the mean z-scores of different indices of Lithuanian and non-Lithuanian boys and girls is presented in Figs. 2 and 3 (CI 95%). The distribution of certain measurements around the mean (zero line) was revealed. The variation of different indices was obviously unequal in Lithuanian and non-Lithuanian children: the variation was larger for all indices of non-Lithuanian children. It could be due to a rather small number of children in the non-Lithuanian group. Some tendencies in z-scores of different body measurements could be traced. Almost in all age groups (except the age of 4 years) Lithuanian boys were slightly (but insignificantly) taller in comparison with non-Lithuanian children. A more or less analogous tendency was observed in the distribution of leg length, and perhaps, the shorter legs determined the lower height of non-Lithuanian boys. Transverse measurements were slightly lower and the BMI slightly higher in non-Lithuanian boys in comparison with their Lithuanian peers, and body circumferences did not differ.

The differences between the physique of Lithuanian and non-Lithuanian girls were obscure. The height of non-Lithuanian and Lithuanian girls was very similar, whereas non-Lithuanian girls were insignificantly shorter in most of age groups. The transverse measurements did not show evident differences in Lithuanian and non-Lithuanian preschool girls, either. The body circumferences and BMI in non-Lithuanian girls in most cases were slightly but insignificantly larger than in Lithuanian girls.

Multivariate factor analysis based on principal components extracted three main factors for boys and four factors for girls (Tables 6, 7). Only factors with the eigenvalues more than 1.0 were introduced to the factorisation. Loadings of sorted rotated factors were distributed in the columns in a diminishing sequence (loadings less than 0.25 were replaced by zero). The cumulative proportion of the total variance depending on these factors was 69.6% in boys and 75.3% in girls. The first factor in boys as well as in girls was positively correlated with all morphological indices except the BMI and could be called the "body size" factor. A separate group of certain body indices composed the third "fatness" factor: the BMI and body circumferences were positively related within this factor. All social items comprised a separate group ("social factor") which was independent of the other items included into the factor analysis. The ethnicity negatively correlated with the social factor in both sexes. Familial status in the factor analysis of girls' indices formed a separate column which was influenced by the fourth factor, while in boys it fell within the "fatness factor". However, it could not essentially change the general interpretation of the factor analysis in boys and girls and shows a random variation of different indices of the sample.

Table 6. **Sorted rotated factor loadings of body size and shape indices, ethnicity and social items in boys (loadings less than 0.25 have been replaced by zero)**

Index	Factor		
	1	2	3
Height	0.968		
Leg length	0.950		
Shoulder breadth	0.938		
Hip breadth	0.928		
Hip circumference	0.858		0.429
Chest circumference	0.841		0.450
Waist circumference	0.714		0.624
Education of father		0.825	
Education of mother		0.824	
Occupation of father		0.736	
Occupation of mother		0.452	
Ethnicity		–0.409	
BMI			0.926
Family status			0.291
Cumulative %	40.008	56.732	69.622
Eigenvalue	5.887	2.403	1.458

Table 7. **Sorted rotated factor loadings of body size and shape indices, ethnicity and social items in girls (loadings less than 0.25 have been replaced by zero)**

Index	Factor			
	1	2	3	4
Height	0.984			
Leg length	0.971			
Shoulder breadth	0.929			
Hip breadth	0.910			
Hip circumference	0.831		0.482	
Chest circumference	0.774		0.531	
Education of father		0.849		
Education of mother		0.788		
Occupation of father		0.726		
Ethnicity		–0.511		
Occupation of mother		0.314	–0.274	
BMI			0.955	
Waist circumference	0.606		0.684	
Family status				0.948
Cumulative %	37.638	53.708	68.033	75.331
Eigenvalue	5.780	2.341	1.405	1.021

Table 8. **The distribution (%) of children in Vilnius kindergartens with different languages of education (sources: 67, 68)**

Year	The total number of children	Children (%) in Lithuanian kindergartens	Children (%) in Russian kindergartens	Children (%) in Polish kindergartens
2003	18809	79.7	14.5	5.7
2004	19027	79.7	14.6	5.5
2005	19795	79.2	15.3	5.3

Thus, the physical development of Lithuanian and non-Lithuanian preschool children was very similar. Moreover, the factor analysis showed that there was no linear correlation between body size and shape indices, ethnicity and social items in preschool Vilnius children of different ethnicities.

DISCUSSION

From the very beginning Vilnius was a multicultural city, and people of different ethnicities used to live in it (63). Some ethnical minorities (local Poles) in the Vilnius city and the surrounding regions originated in the 16th–20th centuries as a result of historical and cultural processes (e. g., polonisation), and there was no evident migration from Poland (60). Consequently, it could be presumed that genetically local Poles are closer to Lithuanians than to Poles from Poland. Data of craniometrical and odonthoglyphical investigations carried out in Lithuania confirm this hypothesis (64, 65).

Moreover, a study of Vilnius and Kaunas preschool children in 1962–1966 (66) reported some facts about Lithuanian and Russian peers: no statistically significant differences between the main indices (height-for-age, weight-for-age and chest circumferences) of physical status were found between Lithuanian and Russian preschool children of both sexes. The other measurements (e. g., body proportions) were not analysed in that study.

According to data of N. Kairiūkštytė, the present day inhabitants of Vilnius, are mainly the offspring of people who moved from different villages and small towns to the capital city of Vilnius after the Second World War. The huge migration of people was the main cause of floating population in Vilnius in 1945–1960: local Poles and refugees from Poland were transferred to Poland during the so-called repatriation, many Lithuanians came to the capital from the other places of Lithuania, and Russians immigrated to Vilnius from the Soviet Union. A decrease of people of other ethnicities happened after the independence was renewed in 1990 (60), and the latest demographic data have shown, that large-scale immigration isn't characteristic of Vilnius at present (57). The majority of people who moved to Vilnius in the last few years were Lithuanians from the other parts of Lithuania or returnees from abroad.

At present, there are kindergartens with different languages of education (Lithuanian, Russian, Polish) in Vilnius. Polish and Russian children have a possibility to be educated in their native languages, but their parents often choose Lithuanian kindergartens and schools. The number of children attending different kindergartens of Vilnius is presented in Table 8 (67, 68). There are no official data on how many children of the other nationalities attend Lithuanian kindergartens, but our study indicates that about 20% of children are non-Lithuanians (the majority of them are local Poles or Russians), and this fact corresponds to the ethnical structure of Vilnius citizens.

A review of recent growth studies (16–42) showed individual inequalities in the physique of children and adolescents worldwide. Moreover, several studies proved specific distinctions in the body size of children of certain ethnicities living in the same country (69–75). That's why, some important questions arise for many specialists: Are the national standards based on the data of the major ethnical group of the country suitable for evaluating the physical status of children from other ethnic groups living in the country? Is it correct to combine data on all children from a certain population together and to compile reference standards for the evaluation of growth and development of all children of that population?

As the current international opinion holds that ethnic differences in growth are minimal in comparison with the effect of socio-economic differences, another important issue for children sampling for the growth reference study is the evaluation of their socio-economic status. For example, "socio-economic status, that does not constrain growth" was among criteria defined for the selection of the reference population for WHO Multicentre Growth Reference Study (56). R. J. Rona revised more than 30 papers on height and socio-economic status in various European countries (11). Although there are many publications in relation to this issue, there is also a large variation in the methodology, results and reported conclusions. The following contributors of socio-economic status were explored more often: social class, family size, parental education, differences between geographical areas or population density, unemployment, family conflict. Though the definition of social classes was usually based on occupation, peculiarities of income in different social groups of certain countries were often unvalued. Despite the diversity of conclusions, in most cases, the height was positively associated with higher social status. Many recent publications evaluated the impact of socio-economic status on children's BMI, and the main results showed that in developed countries higher BMI values were associated with lower familial social status (4, 13).

The presented study did not reveal important differences in the physique between preschool children of Lithuanian and non-Lithuanian ethnicities, moreover, social status and body size indices had no linear correlation. The main disadvantage of this analysis was insufficient number of children from ethnical minorities in all age and sex groups, and it could influence the results. On the other hand, multivariate factor analysis of main body size indices, ethnicity and social items of total sample of investigated preschool children (more than 1200 children) was based on quite sufficient number of non-Lithuanian boys (n = 125) and girls (n = 142), and showed the independent variability of body size, ethnicity and social status of the child (Tables 7, 8).

Nonetheless, certain correlation between ethnicity and social status was noticed in total sample of Lithuanian and non-Lithuanian children, but those two factors did not correlate with body size indices by simple linear regression. This could lead to conclude, that further analysis on physical development of children with different social status in relation with ethnicity should be performed, and the investigations on growth and development of children of various ethnical minorities should be continued and expanded on more numerous data.

Summarizing the worldwide experience in compiling the reference growth standards certain sampling problems arise for many investigators (4). For example, in The Netherlands reference growth standards based on the 1997 national survey of 14500 children from birth to 20 years excluded data of children of non-Dutch ethnicity, unless one parent was Dutch and the other was West European (21). In Hungarian National Growth Study (1982–1985) data were recorded from a random sample of 41000 children aged 3 to 18 years, and minority children (5%) were included (26). In Belgium the Flemish Growth Charts for 2–20 years were based on a representative sample of 7920 Flemish boys and 8176 Flemish girls, examined between 2001–2004, and were recommended for the growth evaluation of children who have at least one parent of "Flemish origin" (28).

In the European countries, where immigrants from geographically distant countries or different ethnical groups form quite significant part of population, the growth of children from ethnical minorities is investigated separately from the main ethnical group. For example, Moroccan children in The Netherlands were substantially shorter than Dutch children; girls had higher weight-for-height and BMI for age and earlier menarche (69). Turkish children in The Netherlands were considerably shorter and more overweight than Dutch children (70). Moreover, the prevalence of overweight and obesity was considerably higher among Turkish and Moroccan children in comparison with Dutch children (71). Turkish schoolchildren under 10 years of age from families of extremely low socio-economic levels, born in Sweden, were significantly shorter than Swedish children, the differences started in preschool years (72), and the authors concluded that only genetic factors could not explain the difference in height-for-age. Another study of preschool Turkish children in Stockholm revealed their growth very close to that of the Swedish standards (73). Trends in growth and obesity in children of ethnic groups living in Britain were as follows: Afro-Caribbean children were tall and slim, but other groups (Urdu / Punjabi, Gujarati or other Indian language speaking) showed tendency towards greater obesity (74). The prevalence of overweight and obesity was higher for migrant children (Turkish, Russian, Polish) living in Germany (75).

In countries with a particularly heterogeneous population (e. g., the USA) unique standards were produced for all racial-ethnic groups: white, black and Mexican American (76). In some countries, where national paediatric system for collecting anthropometric and nutritional data does not exist, it is recommended to use other certified reference standards, e. g., 2000 CDC Growth Charts in Canada (77).

On the other hand, attempts of producing universal standards for growth monitoring appeared recently. The first internationally recommended growth references for children and adolescents were based on the 1977 NCHC growth charts (1). WHO multicentre growth reference study, released in 2006, was based on data of 6 countries: Brazil, Ghana, India, Norway, Oman and USA (56). WHO recommends it for evaluating of children's growth from birth to 5 years of age. It was concluded, that children from diverse ethnic groups grow very similarly during the first 5 years of life, if the environment supports healthy development (56). The feasibility to perform a similar growth study of school-aged children and adolescents is on the focus recently (55).

However, it is advisable to remember the opinion (42, 45) that international growth references should be used with caution. The main problem is the choice of cut-offs. The highest and lowest centiles vary widely, and a potential misclassification, especially for determining the deficit of height, may occur. On the other hand, international cut-offs may be useful for evaluation of overweight and obesity with the purpose to compare different countries (54).

In the methodological considerations about the way of sampling, in growth studies there is also the opinion (78) that recent migrants should be excluded from the studies, while olden migrants should be considered as having become integrated in the population, and children from mixed marriages cannot be excluded, either, as they are part of the changed gene pool of the population.

According to our study, certain differences in the physical status of preschool children of Lithuanian and other ethnicities are statistically insignificant, hence, the existing reference standards based on the study of children of Lithuanian nationality (59), in general, are suitable for preschool children of other ethnicities, mainly for Poles and Russians. Moreover, further analysis of the other data on children could be performed, including data on non-Lithuanian children. Nevertheless, certain differences in body measurements of children of different ethnicities could appear not only due to unequal sample sizes, but also due to a variety of the ethnicity of children: it was impossible to compile separate numerous groups of children of a certain non-Lithuanian nationality (Poles, Russians, etc.) for the analysis in this pilot study. It would be reasonable to examine the growth indices of Lithuanian children and children of other ethnicities separately (compiling separate numerous groups of Poles, Russians, etc.); specifically, schoolchildren and adolescents of various ethnicities should be investigated, because the major discrepancies in growth indices could be expected during the process of sexual maturation (4).

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ĮVAIRIŲ TAUTYBIŲ IKIMOKYKLINIO AMŽIAUS VILNIAUS VAIKŲ FIZINĖ BŪKLĖ: BANDOMASIS TYRIMAS

Įžanga. Vaikų augimo ir brendimo skirtumus tarp populiacijų lemia vidiniai (pvz., tautybė) ir išoriniai (pvz., socialinės ir ekonominės sąlygos) veiksniai. Šio darbo tikslas – išnagrinėti lietuvių ir kitų tautybių vaikų, lankančių Vilniaus miesto darželius, fizinės būklės rodiklių ypatumus ir nustatyti, ar dabar praktikoje naudojami vaikų augimo standartai tinka ikimokyklinio amžiaus kitų tautybių (daugiausia lenkų ir rusų) vaikų fizinei būklei vertinti.

Metodai. Straipsnyje išanalizuoti ir apibendrinti 2003–2006 m. ištirtų Vilniaus miesto darželinukų duomenys. Iš viso ištirti 1259 sveiki 3–6 metų amžiaus vaikai. Taikant standartinę Martino-Sallerio antropometrinę metodiką buvo išmatuotas ūgis, svoris, kojos ilgis (aukštis iki gaktos), pečių plotis, dubens plotis, krūtinės, juosmens ir klubų apimtys, apskaičiuotas kūno masės indeksas. Palyginti skirtingos lyties, amžiaus ir tautybių grupių duomenys, atlikta faktorinė fizinės būklės, tautybės ir socialinių rodiklių analizė.

Rezultatai. Lietuvių ir kitų tautybių vaikų fizinė būklė labai panaši. Faktorinės analizės duomenimis, tarp ikimokyklinio amžiaus vaikų kūno dydžio bei proporcijų rodiklių ir tautybės nėra tiesinės koreliacijos, tačiau tautybė patikimai koreliavo su socialiniais veiksniais.

Išvados. Dabar naudojama vaikų augimo vertinimo metodika, parengta pagal lietuvių vaikų tyrimų duomenis, tinka ir kitų tautybių (daugiausia lenkų ir rusų) ikimokyklinio amžiaus vaikų augimui vertinti. Literatūros duomenimis, tam tikrų etninių grupių vaikų fizinės būklės skirtumai ypač išryškėja per lytinį brendimą, todėl reikėtų ištirti skirtingų tautybių mokyklinio amžiaus Lietuvos vaikų fizinę būklę.