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Original Paper

PHYSICAL DEVELOPMENT OF SIX- AND SEVEN-YEAR-OLD CHILDREN IN RĪGA AND LATVIAN REGIONS

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The growth and maturation of a child's body are going on continuously, but unevenly. Therefore, children of the same age may have different growth and functional abilities. On the initiative of the Latvian government, a pilot project was launched, which aims to evaluate the readiness of children to start school at the age of six as well as compare physical development, separate functional abilities, and posture for six and seven-year-old children of regions of Latvia and Rīga preschool educational institutions. The study involved 918 children, who were divided into two groups — Rīga (R) and regions of Latvia (RL). Respondents in each group were further divided by age — six- and seven-year-olds, and by sex. Anthropometric parameters were determined for each individual's height, weight, chest circumference, lung vital capacity (PVC), forearm flexor muscle strength, and posture. In our study, the mean values of height for six-year-old girls were: R – 117.6 ± 5.8 cm, RL – 117.1 ± 6.3 cm, for boys R – 118.7 ± 5.0 cm, RL – 118.6 ± 5.1 cm. Seven-year-old children had an average increase in chest circumference of 1 to 2 cm, both by sex and by place of residence. Symmetrical posture was observed only for six-year-old children in 23.1% of cases and 17.1% of seven-year-old children. 59.5% of the children in the study group spent more than one hour a day watching TV, and 66.3% played computer games every day. The results of the study showed that children aged six and seven years grew and functionally developed very differently and individually. These age groups of children did not have accelerated growth ages; there were no large annual increases. A relatively small sex dimorphism was observed. The readiness of six-year-old children to start school should be assessed very individually by the child's parents in collaboration with the pediatrician.

Keywords: *6- and 7-years old children, physical development, functional maturation, posture.*

INTRODUCTION

In the ontogenesis of an individual's development, the first seven years of a child's life are important and sensitive in human life. Physiometric parameters reflect the functioning of organs and organ systems, their functional capacity, and their compliance with age standards. The child's growth intensity is high in the first year of life and the pre-school age (six–seven years). As children are the most vulnerable and sensitive part of the population and respond more quickly to changes in living conditions, their health status was assessed by evaluating their growth and development (Karkliņa *et al*., 2013). The growth process is influenced by both internal and external factors. According to the speed of a child's growth and development, three stages of somatic development are distinguished — accelerated, medium, and slowed. The growth and development of the body take place continuously, but not evenly and sequentially. The same chronological age does not guarantee the same biological age. Therefore, children of the same age may have different growth and functional abilities. They characterise the response of any organism to the changing external and internal environmental conditions. During the period of accelerated growth, tissue differentiation is relatively slow, but during the time of tissue differentiation time, growth slows. As a result of uneven growth, certain tissues and organs in

the body develop differently. In Latvia, at the government level, the issue of at what age to start compulsory education at school, whether from the age of six or seven, has become a topical issue. Therefore, a pilot project was launched on the physical and functional development of preschool children both in Rīga and Latvian regional primary schools.

This work aims to compare the physical development, separate functional abilities, and posture for six- and seven-year-old children in regions of Latvia and Rīga preschool educational institutions.

MATERIALS AND METHODS

In the study, 918 children (445 girls and 474 boys) of preschool educational institutions (PEI) were measured and surveyed, and then divided into two groups — children of Rīga (R) and children of Latvian regions (RL). The children in each group were divided into six-year-olds and seven-year-olds and sex groups were separated. The research was approved by the Ethics Committee of Rīga Stradiņš University. Informed consent was obtained from all subjects involved in the study. The study participants participated voluntarily and free of charge. The measurement results of the study participants were anonymous and recorded in previously developed standardised protocols. Personal identifiers were not used in the collection and processing of data.

Anthropometric parameters (height, weight, chest circumference) as well as physiometric parameters such as lung volume, and forearm flexor muscle strength were determined by means of certified and calibrated instruments according to the methods of Martin and Saller (1957). All measurements were performed by three professionals of the medical staff. Posture types and posture asymmetries of the children were determined according to the methodology of Bieziņš *et al.* (1966), Makarova (2008), and Umbraško (2005). All asymmetries were measured with an anthropometer. Shoulder height (cm) was determined from the base, height of the lower angles of the shoulders (cm), the distance of the lower angles of the shoulders (cm) from the spine, leg lengths (cm), lumbar triangle (cm), spinal rhomb — the distance (cm) from C 7 *processus spinosus* to the lower angles of the shoulders, and from the lower angles of the shoulders to L 5 *processus spinosus* on the right and left sides of the body. The asymmetry between the right and left sides up to 1 cm was considered as small, from 1 cm to 2 cm as moderate, and greater than 2 cm as pronounced. Microsoft Excel and SPSS 21 were used for statistical data processing and analysis. Descriptive and analytical statistical methods were used for data processing: means, standard deviation, minimum and maximum parameter values, and frequency distribution. Results were considered statistically significant if the *p*-value was less than 0.05. The probability of outcome was calculated by performing both single-factor and multi-factor analyses.

RESULTS

Latvia is located in the northern part of Europe. In Latvia, 32% of the population lives in Rīga, the capital city, and 68% in Latvian regions. The growth of a child is an important quantitative process, which means an increase in height, weight, etc. Anthropometric parameters are considered to be the most sensitive indicators for assessing a child's physical development and health. Comparison of the physical and functional development of a particular child with the average indicators allows for early detection of possible health disorders, and congenital pathologies. Height is one of the main parameters that characterise physical development. In our study, the average height of six-year-old girls were: R (Rīga) (n = 137) – 117.8 ± 5.8 cm; (minimum 104.0 cm, maximum 131.7 cm); RL (regions of Latvia) (n = 108) – 117.1 ± 6.3 cm (min. 97.5 cm, max. 128.5 cm). The difference between these groups was not significant (Table 1). The difference between the maximum and minimum height of six-year-old girls, which characterises the range of parameters, was 27.7 cm for R girls and 31.0 cm for RL girls (Table 1).

The average height of six-year-old boys was: R (n = 136) – 118.7 ± 5.0 cm (min. 103.4 cm, max. 131.3 cm); RL – (n = 100) is 118.6 ± 5.1 cm (min. 106.4 cm, max. 130.8 cm). The difference between these groups was not significant. The range of parameters for R boys was 27.9 cm, and RL — 24.4 cm (Table 1).

The average height of six-year-old girls (n = 245: 117.5 ± 6.0 cm) was lower than the height of boys (n = 236), 118.7 ± 5.0 cm, t (479) = –2.39, $p = 0.017$. The effect size of this difference was small, Cohen's d = 0.22.

The average height value for seven-year-old girls was: R (n = 104) – 122.7 ± 5.2 cm (min. 109.4 cm), max. 139.2 cm) and RL (n = 96) – 122.2 ± 5.5 cm (min. 109.3 cm, max. 137.0 cm). The range of height values for R girls was 29.8 cm, RL 27.7 cm. Average values for both girl groups were similar (Table 2), t (198) = 0.66, $p = 0.510$.

The average height for seven-year-old boys was: R (n = 136) – 124.7 ± 5.0 cm (min. 114.7 cm, max. 142.6 cm) and RL (n = 101) – 122.8 ± 5.1 cm (min. 112.4 cm, max. 139.8 cm) (Table 2).

Table 1. The height of six-year-old girls and boys

Group	Rīga					Latvian regions					t	*p*
	M ± SD (cm)	Min. (cm)	Max. (cm)	Range (cm)	n	M ± SD (cm)	Min. (cm)	Max. (cm)	Range (cm)	n		
Girls	117.8 ± 5.8	104.0	131.7	27.7	137	117.1 ± 6.3	97.5	128.5	31.0	108	0.90	0.368
Boys	118.7 ± 5.0	103.4	131.3	27.9	136	118.6 ± 5.1	106.4	130 .8	24.4	100	0.15	0.880

Table 2. The height of seven-year-old girls and boys

Group	Rīga					Latvian regions					t	*p*
	M ± SD (cm)	Min. (cm)	Max. (cm)	Range (cm)	n	M ± SD (cm)	Min. (cm)	Max. (cm)	Range (cm)	n		
Girls	122.7 ± 5.2	109.4	139.2	29.8	104	122.2 ± 5.5	109.3	137.0	27.7	96	0.66	0.510
Boys	124.7 ± 5.0	114 .7	142.6	27.9	136	122.8 ± 5.1	112.4	139.8	27.4	101	2.87	0.005

Table 3. The body mass of six-year-old girls and boys

Group	Rīga					Latvian regions					t	*p*
	M ± SD (kg)	Min. (kg)	Max. (kg)	Range (kg)	n	M ± SD (kg)	Min. (kg)	Max. (kg)	Range (kg)	N		
Girls	22.0 ± 4.0	14.5	36.0	21.5	137	22.1 ± 3.8	14.0	32.3	18.3	108	-0.20	0.843
Boys	22.0 ± 3.5	16.7	36.0	19.3	136	22.5 ± 4.5	16.5	42.0	25.2	100	-0.96	0.338

Boys in Rīga were 1.9 cm higher than boys in regions, and this difference was significant, t (235) = 2.87, p = 0.005. However, the effect size was relatively small, Cohen's d = 0.38. The increase in height in cm/year at the age of six to seven years for girls in Rīga was 4.9 cm/year, in the regions of Latvia 5.1 cm/year, for boys in Rīga 6.0 cm/year, in the regions of Latvia 4.2 cm/year.

The average body weight value of six-year-old boys and girls in Rīga and Latvia was similar — 22.00 ± 4.0 kg R for girls, RL 22.10 ± 3.8 kg, t (243) = –0.20, p = 0.843; for boys R 22.00 ± 3.5 kg, RL 22.50 ± 4.5 kg, t (234) = –0.96, p = 0.338 (Table 3). There were also no significant differences between boys and girls, t (479) = –0.56, p = 0.579.

The highest range of body mass was in boys of Latvian regions — 25.2 kg (Table 3).

Weight gain from six years to seven years for girls in Rīga and Latvian regions was 1.8 kg/year, for boys in Rīga 3.0 kg/year, and in Latvia 1.5 kg/year.

Chest circumference is one of the main anthropometric indicators of children's physical maturation. Mean indicators of chest circumference in six-year-old children was: girls R 57.20 ± 3.9 cm, RL 57.20 ± 3.6 cm; for boys R 58.0 ± 3.1 cm, RL – 57.90 ± 8.2 cm (Table 4). There were no significant differences for R and RL girls, t (243) = 0, $p > 0.999$, and boys, t (234) = 0.13, p = 0.897. There was also no significant sex dimorphism, t (479) = –1.80, p = 0.073.

The mean values of chest circumference in seven-year-old children, the difference between the maximum and minimum, are shown in Table 5. The average annual increase in chest circumference for girls was: R – 1.6 cm/year, RL – 1.5 cm/year, for boys R – 2.4 cm/year, RL – 2.0 cm/year. The difference between R and RL girls, t (198) = 0.18, p = 0.860, and boys, t (235) = 1.06, p = 0.282, was not significant. The sex dimorphism difference was significant, t (435) = –3.90, $p < 0.001$, and chest circumference was higher in boys, 60.2 ± 3.5 cm, than in girls, 58.8 ± 4.0 cm. The effect size of the difference was relatively small, Cohen's d = 0.37.

Table 4. Chest circumference of six-year-old children

PEI	Sex	M ± SD (cm)	Min. (cm)	Max. (cm)	Range (cm)	t	*p*
Rīga	Girls	57.2 ± 3.9	50.5	72.5	22.0	0	>0.999
RL	Girls	57.2 ± 3.6	50.7	65.8	15.1		
Rīga	Boys	58.0 ± 3.1	52.8	71.0	17.2	0.13	0.897
RL	Boys	57.9 ± 8.2	53.0	81.5	28.5		

PEI, preschool educational institutions; RL, regions of Latvia

Table 5. Chest circumference for seven-year-old children

PEI	Sex	M ± SD (cm)	Min. (cm)	Max. (cm)	Range (cm)	t	*p*
Rīga	Girls	58.8 ± 3.7	51.1	76.1	25.0	0.18	0.860
RL	Girls	58.7 ± 4.3	46.0	77.0	31.0		
Rīga	Boys	60.4 ± 3.4	53.8	73.0	17.2	1.06	0.282
RL	Boys	59.9 ±3.7	54.4	78.0	23.6		

For abbreviations see Table 4.

Some functional parameters were also determined for the children involved in our study — for the respiratory system and the strength of the flexor muscles of the forearm. Spirometry is the most commonly used method to assess respiratory function and early diagnosis. Since 2007, spirometry has also been awarded the title of the first choice for preschool children, as reported by the US Thoracic Society and the European Respiratory Society. Assessment of lung function in preschool children is important not only clinically but also anatomically-physiologically, based on the growth and development of the respiratory system that forms other respiratory mechanisms in children (Withrow *et al*., 2008). Dynamic ventilation parameters are determined during forced breathing when maximum respiratory muscle strength is used. Dynamic ventilation parameters are the characteristic values of the condition of the airways. Vital capacity (VC) indicates the amount of air that can be exhaled in the strongest breath after the deepest inhalation. According to physiological standards, vital capacity (VC) increases intensively in proportion to change in height. Lung volume increases six-fold by six years of age compared to neonatal lung volume. At the age of seven, the res-

piration rate is 23 times/minute, PVC is 1400 ml, and lung ventilation is 3500 ml/minute (Aberberga-Augškalne *et al*., 2007). In our study, six-year-old children had average PVC readings: for girls R – 1000.0 ± 280.0 ml, RL – 1069.2 ± 268.7 ml; for boys R – 1031.0 ± 243.0 ml, RL – 1026.7 ± 275.8 ml. There were no significant differences between R and RL girls, t (243) = –1.95, $p = 0.052$, and boys, t (234) = 0.13, $p = 0.899$, and no sex dimorphism, t (479) = 0.05, $p = 0.957$. The range of the parameter was higher than its mean value (Table 6).

For seven-year-old children, PVC was: girls R – 1139.0 ± 261.0 ml, RL – 1087.6 ± 233.5 ml; for boys R – 1281.0 ± 334.0 ml, RL – 1168.0 ± 283.1 ml (Table 7). There were no significant differences between R and RL girls, t (198) = 1.46, $p = 0.145$, while boys had significantly higher PVC in Rīga than in the regions of Latvia, t (235) = 2.75, $p = 0.007$. The effect size for differences in boys was relatively small, Cohen's d = 0.36.

In the children in our study, the average lung volume was lower than physiological norms. The average increase in lung vital volume from the age of six to seven years in girls was: R –139 ml/year, RL – 128 ml/year; for boys R – 251 ml/year, RL – 142 ml/year. Therefore, boys from Rīga demonstrated the highest increase in the vital volume of the lung.

In our study, symmetric posture in six-year-old children was observed in 23.1% of cases, moderate asymmetry (the difference between the right and left parameters was 1–2 cm in several indicators) was observed in 2.5% of children. Seven-year-old children had symmetric posture in 17.1% of cases, moderate asymmetry in 71.2%, and pronounced asymmetry in 11.7%. The distribution of observed asymmetry was significantly higher in seven-year-old children, $\chi^2(2) = 32.38$, $p < 0.001$.

We also found that 35.5% of children in the sample used to watch TV for up to 1 hour a day and 59.5% for more than one hour. In addition, 66.3% of them were playing computer games every day.

Table 6. PVC (ml) for six-year-old children

PEI	Sex	M ± SD (ml)	Min. (ml)	Max. (ml)	Range (ml)	t	*p*
Rīga	Girls	1000.0 ± 280.0	300.0	1800.0	1500.0	–1.95	0.052
RL	Girls	1069.2 ± 268.7	300.0	1700.0	1400.0		
Rīga	Boys	1031.0 ± 243.0	500.0	1600.0	1100.0	0.13	0.899
RL	Boys	1026.7 ± 275.8	500.0	1600.0	1100.0		

For abbreviations see Table 4.

Table 7. PVC (ml) for seven-year-old children

PEI	Sex	M ± SD (ml)	Min. (ml)	Max. (ml)	Range (ml)	t	*p*
Rīga	Girls	1139.0 ± 261.0	600.0	2000.0	1400.0	1.46	0.145
RL	Girls	1087.6 ± 233,5	500.0	1800.0	1300.0		
Rīga	Boys	1281.0 ± 334.0	400.0	2100.0	1700.0	2.75	0.007
RL	Boys	1168.0 ± 283.1	500.0	1900.0	1400.0		

For abbreviations see Table 4.

DISCUSSION

In Latvia, there has been little research on the physical development of preschool children and no research at all on posture in children of this age. The physical development of children in Latvia's regions has also been little studied. Anthropometric research for Rīga children in 1962–1963 was performed by Millere (1963). The author surveyed 100 children in each age and sex group. The average height was 115.28 ± 4.94 cm for six-year-old girls, 116.30 ± 4.86 cm for boys, 121.88 ± 5.16 cm for seven-year-old girls, and 122.62 ± 5.02 cm for boys. A study by Millere (963) on the physical development of preschool children in Rīga showed a wide range of anthropometric parameters. In six-year-old boys (n = 100) the minimum height was 101.5 cm, the maximum 127.4 cm, and the range 25.9 cm; in seven-year-old boys (n = 100) min. 109.5 cm, max. 137.4 cm, range 27.9 cm; body mass for six-year-old boys min. 15.5 kg, max. 33.4 kg, range 17.9 kg; seven-year-old boys min. 17.5 kg, max. 35.4 kg, range 17.9 kg; for six-year-old girls (n = 100) height min. 101.5 cm, max. 131.4 cm, range 29.9 cm; seven-year-old (n = 100) min. 109.5 cm, max. 133.4 cm, range 23.9 cm; body mass for six-year-old girls min. 15.5 kg, max. 33.4 kg, range 17.9 kg; seven-year-old min. 17.5 kg, max. 35.4 kg, range 17.9 kg (Aberberga-Augškalne *et al*., 2007). For more than 50 years, the average indicators of height for children in Rīga have increased by 2 cm. The average annual increase in height was 6.60 cm/year for girls and 6.32 cm/year for boys.

Comparison of the chest circumference indicators with the results Millere's measurements taken 50 years ago in Rīga (Millere, 1963) showed that the average values were very similar for both sexes. The author Duļevska (2002) conducted a study on the physical and sexual development of Latvian girls of school age in Rīga. In her study, the mean height of seven-year-old girls (n = 78) was 125.9 ± 4.7 cm, (min. 116.7 cm, max. 136.6 cm, range 19.9 cm), the mean body mass of these girls was 24.3 ± 4.2 kg, (min. 17.5 kg, max. 34.5 kg, range 17.0 kg). In the study by Umbraško (2005), in 2003, on the physical development and walking of schoolchildren in Rīga, seven-year-old boys (n = 31) had a mean height of 125.3 ± 5.7 cm (min. 107.5 cm, max. 139.1 cm, range 31.6 cm) and a mean body mass of 25.4 ± 4.3 kg, (min. 19.1 kg, max. 39.8 kg, range 20.7 kg); seven-year-old girls (n = 39) had a mean body length of 124.8 ± 4.6 cm (min. 114.5 cm, max. 135.8 cm, range 22.3 cm); mean body mass was 24.8 ± 3.6 kg (min. 17.1 kg, max.

36.5 kg, range 19.4 kg) (Umbraško, 2005). In this study, symmetrical posture was found in 31.2% of seven-year-old children, moderate asymmetry in 66.2%, and marked asymmetry was rare in 2.6% of children (Makarova *et al.,* 2008). In the study by Cederstrema (2010) on the physical and sexual development of seven-year-old boys of school age in Rīga (n = 72), the mean body length was 125.3 ± 5.5 cm (min. 108.8 cm, max. 138.2 cm, range 29.4 cm); the mean body mass was 24.9 ± 4.1 kg (min. 18.0 kg, max. 41.1 kg, range 23.1 kg) (Cederstrema, 2010). Kārliņa (2013) studied the physical development and obesity of children aged five and six years. According to the author's study, six-year-old boys (n = 114) have an average height of 121.0 ± 3.6 cm, an average body weight of 23.3 ± 1.8 kg, a height of 121.2 ± 5.8 cm for six-year-olds (n = 104), a mass of 23.2 ± 4.1 kg (Kārliņa *et al*., 2013). In another study (Krūmiņa *et al*. 2007) the height of six-year-old boys (n = 144) was 117.5 ± 4.7 cm, the mass was 21.8 ± 2.8 kg, the height of six-year-old girls (n = 127) — 116.0 ± 5.0 cm, mass 21.4 ± 2.8 kg. Both authors studied the population of Latvian children, while our study measured individual children in Rīga and Latvia's regions. In the analysis of the average physical development parameters on a 10-year cycle, small waveform fluctuations of values are observed, which are likely related to socio-economic conditions in Latvia during the mentioned period. However, we did not carry out a study on the socioeconomic status of children's families. According to the above-mentioned authors' studies on children, a wide range of parameters between the maximum and minimum values has been observed in Latvia for many years. Factors that influence children's growth and health are diverse and include both individual predisposition and socioeconomic status. Rumba *et al.* (1997) in their study on child health in Latvia concluded that a child's growth and health are the results of the unpredictable interaction of elements of a multifactorial system. Our study did not analyse nutritional and socioeconomic conditions in children, as this was not part of our goal. We assumed that these conditions were similar in all Latvian preschool educational institutions, based on the Latvian Cabinet of Ministers Regulation No. 716, 21 Nov 2018. (Minutes No. 5329) – Regulations on the National Preschool Education Guidelines and Curriculum.

An important indicator of physical development is a person's posture. Various disorders of the musculoskeletal system reduce the body's functional capacity and over time can cause disorders of the internal organ systems, decreased lung capacity, and heart problems. Postural disorders can contribute to foot deformities over time. In the future, this may reduce children's opportunities to play sports as well as their professional occupation. The problem of posture disorders is very topical, and timely diagnosis and treatment of changes are of great importance. Various factors are mentioned in the literature for postural disorders — obesity, which is found in one in three overweight and obese children aged six–nine years in the world (Loring *et al*., 2014). Such overweight children are at high risk of developing cardiovascular disease and diabetes mellitus (de Onis *et al*., 2010). Changes in posture are most common at the age of six-seven years and puberty (Penha *et al*., 2005). Our findings confirm this tendency. During pre-school, the activity of children's movements decreases rapidly, and children spend six–eight hours a day sitting, often on furniture that is not suitable for their height. In addition to sitting sessions, children spend more and more time at the computer or TV. This promotes the development of overweight and asymmetric posture (Rusek *et al*., 2018). Concerning COVID-19 studies in recent years, we have acquired initial evidence that self-isolation and distance learning leave a negative impact on children's physical development by increased time spent without physical activity (Moore *et al.,* 2020; López-Gil *et al*., 2021); and effect on sleep (Dellagiulia *et al*., 2020), child nutrition (Marino *et al*., 2021), and mental health (Racine *et al*., 2020). Surveys of children at an early school age revealed statistically significant differences in body weight and adipose tissue between urban and rural children. Postural asymmetry is more common in children living in rural areas (Chwalczynska *et al*., 2017). Other literature sources describe contrasting results. According to studies by several authors, it is believed that functional disorders and deformities are believed to be caused by a lack of movement activities, resulting in the weakening of the muscular system, prolonged sitting, and non-observance of the work and rest regimen. These factors are closely interrelated and affect each other (Hricková *et al*., 2016). The most common posture disorders at the beginning are functional in nature and can be eliminated by correcting muscle imbalance. In our study, symmetrical posture was found in 17.1% of seven-year-olds. Compared to a study 20 years ago, the number of children with symmetrical posture has decreased, and the number of children with moderate asymmetry has increased, but it is worrying that the number of children with marked postural asymmetry has increased five-fold from 2.5% (Makarova *et al*., 2008) to 11.7%. The World Health Organisation (WHO) recommends that children and adolescents aged five to 17 years should do at least 60 minutes of moderate to vigorous physical activity every day. For this age group, physical activity includes play, games, sports activities, walking, physical education, or other planned activities in the family, school, and community (World Health Organization, 2018). The use of electronic media by preschool children is restricted in many countries around the world by both legislation and guidelines. Regulation No. 890 of the Cabinet of Ministers of the Republic of Latvia of 17.09.2013 "Hygiene Requirements for Child Supervision Programs" stipulates that the use of electronic means of communication (e.g., TV, computer) by children is allowed for no more than 15 minutes and no more than twice a day.

Functional impairments are asymmetries in muscle tone that cause unfixed postural distortions in several planes. Such disturbances occur most frequently during periods of more intense growth and when the activity of the trunk is reduced. The most unfavourable posture for the development of postural disorders is sitting, which exceeds the physiological norms of age. Often, children sit on furniture that is inappropriate for their height. In our study, 53% of pre-

schools had old furniture without labels that did not correspond to the children's height, more often in the regions of Latvia. Therefore, we believe that the main causes of asymmetric posture are prolonged sitting on unsuitable furniture, sedentary behaviour, prolonged viewing of television, and sitting in front of a computer.

The study group of respondents attended a preschool institution where daily work was planned and organised according to regulations. The prevalence of trunk asymmetry in six-seven-year-old children is associated with an unbalanced diet and deficiency of vitamin D, frequent illness during childhood, and reduced physical activity (Juskeliene *et al.,* 1996). Children spend more time in a seated position at preschool during class and at home in front of a computer or television. Maintaining a sitting position for a long time and the introduction of posture education programmes in preschool education institutions decreased children's asymmetries of the trunk (Drza-Grabiec *et al*., 2015). Children in Latvian regions have fewer opportunities to attend various sports. Taking into account the situation in Latvia, when there is a shortage of sports teachers in PEI, especially in the regions of Latvia, consequently sports activities are not carried out professionally and not to a sufficient extent. According to the data of our study, the factor influencing the posture of children was the place of residence, the use of television and IT technologies for more than one hour a day, as well as insufficient physical activity.

CONCLUSIONS

The ages of six- and seven-year-olds are the age at which the growth in height is slowed down and organ differentiation occurs more intensively. The results of the study showed that children aged six and seven years grow and develop very differently and individually, with a wide range of values of parameters. There are no significant differences between the average values of anthropometric parameters in the Rīga and Latvian regions for six-year-old children, except for a small sex dimorphism in height. The study also showed a relatively small sex dimorphism in the chest circumference of seven-year-old children. A slightly larger annual increase in physical development parameters from the age of six to seven was observed for height and PVC of boys in Rīga compared to boys in Latvian regions. The number of children with moderate asymmetric posture in both study groups was high. A statistically significant increase in posture asymmetry was found in seven-year-old children. Two-thirds of the children surveyed were spending too much time watching television and playing computer games. The physical developmental, functional, and postural parameters of six-year-olds vary widely. Therefore, it is necessary to individually assess the ability of each child to start school at the age of six or at the age of seven.

AUTHORS CONTRIBUTIONS

Conceptualisation, S.U., L.P.; methodology, S.U.; software, S.U.; validation, S.U., J.V.; formal analysis, S.U., I.D.; investigation, S.U.; resources, S.U., L.P.; data curation, S.U., L.M.B, I.D.; writing—original draft preparation, S.U., L.P.; writing—review and editing, J.V., L.M.B., E.E.; visualisation, S.U.; supervision, S.U. All authors have read and agreed to the published version of the manuscript.

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ETHICS

The research was approved by the Ethics Committee of Rīga Stradiņš University, issued on 28-06-2018, No. 18. Before conducting the research, the parents of the children filled in a questionnaire about the child's movement activity and place of residence, sex, and age, and confirmed the consent in writing – consent to measure the child. Informed consent was obtained from all subjects involved in the study. The study participants participated voluntarily and free of charge.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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RĪGAS UN LATVIJAS NOVADU SEŠUS UN SEPTIŅUS GADUS VECU BĒRNU FIZISKĀ ATTĪSTĪBA

Analizēta pirmsskolas izglītības iestāžu (PII) 918 (Rīgas bērni – 513, Latvijas novadu – 405) bērnu fiziskā attīstība, fiziskā sagatavotība un bērnu stājas. Rīgas bērni un Latvijas novadu bērni tika sadalīti sešgadīgajos un septiņgadīgajos, atsevišķi izdalītas dzimuma grupas. Pētījuma veikšanai tika iegūta Rīgas Stradiņa universitātes Pētījumu ētikas komitejas atļauja. Pētījumā tika iesaistīti tikai tie bērni, kuru vecāki rakstiski ar parakstu apstiprināja atļauju — piekrišanu bērna mērīšanai. Pētījuma dalībnieku mērījuma rezultāti ir anonimizēti, personas identifikatori datu vākšanā un apstrādē netika izmantoti. Mērījumi tika veikti ar sertificētiem un kalibrētiem mērinstrumentiem, kurus pielieto antropoloģijā. Pētījuma rezultāti parāda, ka sešus un septiņus gadus veci bērni aug un attīstās ļoti dažādi un individuāli. Bērniem netiek novērots izteikts dzimuma dimorfisms. Nedaudz lielāks fiziskās attīstības parametru gada pieaugums no sešu līdz septiņu gadu vecumā tiek novērots Rīgas bērniem, salīdzinot ar Latvijas novadu bērniem. Bērnu skaits ar vidēji izteiktu asimetrisku stāju abās pētāmās grupās ir liels. Analizējot pētāmās bērnu izlases vecuma un dzimuma nozīmi uz stājas asimetriju, statistiski nozīmīga ietekme netika atrasta. Visiem bērniem konstatēta nepietiekoša kustību aktivitāte, īpaši Latvijas novados. Divas trešdaļas no apsekotajiem bērniem pārāk ilgu laiku pavada pie TV ekrāniem un spēlējot datorspēles. Apmēram pusei no apsekotajām PII pietrūkst atbilstošu mēbeļu, kurās bērni pavada daudzas stundas dienā.