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DIFFERENCES BETWEEN PHYSICAL FITNESS PROFILES OF CHILDREN IN URBAN AND SUBURBAN AREA IN THE MUNICIPALITY OF KISELA VODA

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(Original scientific paper)

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Abstract

Objective: The goal of the study was to determine the differences in fitness components between children and adolescents, from urban and suburban areas. Design/method: A sample of 1485 respondents, (885) school children and (600) adolescents from urban and suburban areas from the municipality of Kisela Voda (Macedonia). Physical fitness is assessed with nine tests: sit and reach test, flamingo balancing, plate tapping, hand grip test, standing broad jump test, bent arm hang test, sit-ups 30 sec, shuttle run 4×10 meters and three-minute step test. Height, body weight, upper arm and upper leg circumferences, body fat percentage, muscle mass percentage, systolic and diastolic blood pressure were measured, and body mass index was calculated. Differences in fitness tests, anthropometric measures, and body mass were determined by t-test for large independent samples. Based on the obtained results, it can be concluded that students who study in suburban areas, generally have smaller circumferences, body fat percentage, and body mass index, higher speed of alternative movements coordination, agility and speed, and better aerobic capacity, compared to students who study in urban environment. Students from urban environment have better results in the test for assessing the repetitive strength of the abdominal muscles. There were no statistically significant differences in the flexibility, between urban and suburban children, and adolescents. Conclusion: The place of residence, in addition to other environmental factors, should be taken into account when creating a state strategy and interventions that will promote physical activity and health.

Key words: *Anthropometry, Muscul Fitness, Motor fitness, Aerobic capacity, Measurements*

Introduction

The concept of physical fitness is as old as humankind. Throughout the history of mankind, physical fitness has been considered an essential element of every day life. The ancient people were mainly dependent upon their individual strength, vigor and vitality, for physical survival. Therefore, mastering basic skills, like strength, speed, endurance, agility for running, jumping, climbing and other skills, were essential when hunting for their survival.

The physical fitness is related to health condition during childhood and adolescence (Myers J, et.al. 2002; Andersen LB, et.al 2006). Even among children, fitness is universaly associated with cardiovascular risk factors for chronic diseases, such as high blood pressure (Sallis JF, et. al. 1998; Ruiz JR, et. al. 2006), total fatness (Ruiz JR, et. al. 2006), hyperinsulinemia (Gutin B, et. al. 2004), abdominal adiposity (Brunet M, et.al. 2006), atherogenic lipid profile (Mesa, J.L, et. al. 2006) insulin resistance (Gulati M, et. al. 2003), and clustering of metabolic risk factors (Brage S., et. al. 2004; Ruiz J.R, et. 2007). Unfortunately, in the last two decades, we have witnessed more evident tendency of decreasing of the physical activity among children, that happens not only in our state, but also in the countries nearby (Šiljeg, Zečić, Mrgan and Kević, 2008; Strel, Bizjak, Starc and Kovač, 2009), as well as in the developed countries (Janz, Dawson & Mahoney, 2000; Tomkinson, Olds & Gulbin, 2003; Wedderkopp, Froberg, Hansen & Andersen, 2004).

Huge number of the environmental factors such as: socio-economic status, cultural influence, life style, health condition and many other factors influence the level of physical activity among children, and at the same time, there is also an indirect influence upon the anthropological characteristics of children. Both, children and adolescents differ at the level of physical fitness regarding the socio-economic characteristics, as well as the living environment, and that is because they depend on the economic and cultural potentials of their family.

Parents and the environment have a huge influence on the development of the abilities and characteristics of most adolescents, thus they have a big responsibility for their proper physical development, education and development of the overall abilities. This influence is especially important for the sporting results achieved by children.

The first assumption of this study is that the students with different residential status have different level of physical fitness. In our state, there are no studies for physical fitness among students, regarding different residential statuses, whereas many foreign authors have dealt with this matter during the last few years (Loucaides, Chedzoy, & Bennett, 2004; Eiben, Barabás, & Németh, 2005; Badrić i Petračić, 2007; Bathrellou et al., 2007; Petrić, 2009; Tinazci & Emiroğlu, 2010).

Differences in physical fitness due to place of residence are specific in each country and region. Data from multiple countries are needed for better understanding of the relationship between place of residence and physical fitness among young people. In addition, school-related physical education and lifestyle may differ between children and adolescents and it is interesting for further investigation whether the relationship between place of residence and fitness differs between children and adolescents.

The goal of this study was to determine the differences in different components of physical fitness between urban and suburban children living in the municipality of Kisela Voda, Macedonia.

Methods

In the municipality of Kisela Voda, there is no school located in a pure suburban area. In order to obtain preliminary information whether there are statistically significant differences in anthropometric measures, body composition and motor tests among students living closer to the downtown area and students living in the periphery of the municipality, a comparative analysis was made between two schools located in the periphery of the municipality, one in the village of Drachevo, elementary school "Kliment Ohridski" and the other in Pintija, the regional primary school "Rajko Zhinzifov", and two schools located near the central city area, the primary school "Nevena Georgieva-Dunja" and the primary school "Kiril Pejcinovich".

The study is conducted on a sample of 1485 participants at the primary schools in the Municipality of Kisela Voda, Republic of Macedonia. The sample is divided into eight sub-samples: 297 male respondents of early school age who are studying in an urban environment, 150 male respondents of early school age who are studying in a suburban environment, 196 male adolescents respondents who are educated in an urban environment, 136 male adolescents who are educated in a suburban environment. 273 female respondents of early school age who are studying in an urban environment, 165 female respondents of early school age who are studying in a suburban environment, 154 female adolescents studying in urban environment and 114 female adolescents studying in suburban environment.

All the students who participated, obtained consent from their parents, allowing them to participate in the project, and were psycho-physically healthy and regularly attended classes of physical and health education. The participants were treated in accordance to the Helsinki Declaration.

The measuring was conducted in March, April and May 2017, in standard school conditions, during the regular classes of physical and health education. The measuring was conducted by professionals from the area of kinesiology and medicine, who were previosly trained for measuring of the determined tests and measurements.

Anthropometric measurements

Anthropometric measurements were taken according to standard methodology of International Biological Program (IBP) and by the recommendations of the World Health Organisation (WHO) and Weiner-Lurie (Weiner JS, Lourie JA., 1981).

The weight of the participants was measured with them only wearing underwear and with bare feet, with a medical decimal weight scales, to the nearest 0.1 kg, and their height was measured on bare feet in the Frankfort horizontal plane with a telescopic height measuring instrument (Martin's anthropometer) to the

nearest 0.1 cm. Body mass index was calculated as body weight in kilograms, divided by the square of height in meters.

The components of the body composition are determined by the method of bioelectrical impedance (measuring of electrical conductivity - Bioelektrical Impedance Analysis - BIA). The measuring was conducted by the Body Composition Monitor, model "OMRON - BF511", by which the body weight, the percentage of body fat, percentage of muscular mass and the index of body mass were measured (BMI). Before the measuring in the Body Composition Monitor, the following parameters were entered: gender, age and height of the participant. In order to achieve maximum precise results during the measuring i.e. evaluation of the body composition, preconditions which are recommended by ACSM (2005) and Heyward (2006) were fulfilled before every measuring.

Evaluation of Physical Fitness

Prior to starting the study, the researchers involved in the project undertook training sessions, in order to guarantee the standardization, validation, and reliability of the measurements (Moreno LA, et. al. 2003). Nine tests, that are part of the EUROFIT battery, validated and standardized by the European Council, were applied in the following order:

1. Sit and Reach test. The subject sits on the floor and using a standardized support, reaches the maximum distance with the tip of the fingers. Forward flexion of the trunk is measured. The test indicates amplitude of movement or flexibility.
2. Flamingo. Balancing on one leg as long as possible, while standing on the preferred foot. This test measures general balance.
3. Plate Tapping. Test Rapid tapping of 2 plates alternately with the preferred hand. The subject performed 25 cycles twice, and the score was the better result.
4. Hand Grip test. Using a digital Takei TKK 5101 dynamometer (range, 1-100 kg), the maximum grip strength was measured for both hands.
5. Standing broad jump test. The maximum horizontal distance attained, with feet together, was measured. This test evaluates lower limb explosive-strength.
6. Bent Arm Hang test. A standardized test was used to measure the maximum time hanging on a fixed bar. This test estimates the upper limb endurance- strength.
7. Sit-ups 30 sek. Maximum number of sit-ups, achieved in 30 seconds. This test measures the endurance of the abdominal muscles
8. Shuttle run 4×10 meters. This test provides an integral evaluation of the speed of movement, agility and coordination. The subject performs four shuttle runs as fast as possible between 2 lines that are 10 meters apart. At each end the subject places or picks up an object (a sponge) beside the line on the floor.
9. The aerobic capacity is evaluated with the three-minute step test. The participant was tasked to go up and down on the 30,5 cm high bench for three minutes in four cycles (up, up, down, down) with standardized rhythm 96 beats per minute (bmp), dictated by the metronome. After the completion of the test (in response to a signal) the participant was supposed to sit on the bench in order to measure the heart rate, as well after the first and second minute at rest. If the participant felt dizziness, losing breath, sickness and headache, the test was aborted. The heart rate is measured by monitor for registration of the heart rate (Polar RS800). The heart rate at rest, heart rate immediately after completion of the test, heart rate after the first minute at rest and the rate after the second minute at rest was considered as final result. The maximum oxygen consumption was calculated by the formula: VO2 max = -2,045 + (Height in cm * 0,025) + (Resting Heart Rate * 0,01) + (Step Test Heart rate load + Heart rate recovery first minute + Heart rate recovery second minute)/Resting Heart Rate) * -0,405) The aerobic fitness test used in this study has been validated for use with adolescents (Topp et. al., 2011).

Blood Pressure

Measuring of blood pressure (systolic and diastolic) and heart rate were conducted by professionals in the area of medicine, specialist in sport's medicine. The measurements were performed in special premise with optimal ambiental conditions in a relaxed state of the participant, where the relaxation was performed at least one minute before the measuring. The measuring was conducted on the forearm above the wrist of the palm, with a clinically tested electronical digit device for measurement of the blood

pressure by the firm „Omron". The measuring was performed on the left hand and previously, the proper set of the cuff, the hand to be on the same height as the heart and the participant to sit upright, not to move or talk, was taken into consideration. The blood pressure was measured three times in the interval of 60 seconds, and as a result was considered the average value of the three measuring.

Statistical analysis

The data presented mean for continuous variables. The differences in the variables between the respondents of different residential status are determined by t-test for independent samples. The normality of the distribution of the applied variables is checked with the Kolmogorov-Smirnov method. All the analyses were performed using the Statistical Package for Social Sciences software (SPSS, v. 22.0 for WINDOWS; SPSS Inc., Chicago, IL, USA), and values of $p < 0.05$ were considered statistically significant.

Results

The testing of the normality of the distribution with Kolmogorov-Smirnov's procedure had shown that most of the variables among the participants from both genders do not deviate from the normal distribution (data are not shown).

The results of the comparative analysis are shown in Tables 1 to 4. Comparison of the results (Table 1) of boys from early school age according to the place of residence, shows that the boys of early school age who are educated in a suburban environment have smaller circumferences of the upper arm and upper leg, lower body fat percentage and body mass index, and have better results in hand tapping test, palm flexion and have lower values of systolic pressure compared to boys of early school age who are educated in an urban environment. The boys from the urban environment have better results in the test for assessing the repetitive strenght of the abdominal muscles.

Table 1. Differences in anthropometric measures, body composition, motor tests, and blood pressure between early age school boys from primary schools in urban and suburban areas in the municipality of Kisela Voda

Variables	**Urban**	**Suburban**	t-value	df	p
	Mean	Mean			
ACIUPAR	21,15	19,91	-3,58	440,00	**,00**
ACIUPLE	44,06	42,25	-2,47	438,00	**,01**
AHEIGHT	134,12	133,69	-0,42	439,00	,68
ALELEG	75,51	75,97	0,64	440,00	,52
ASEATHEI	72,27	71,63	-1,43	441,00	,15
AWEIGHT	35,36	33,50	-1,73	441,00	,08
BODY FAT%	25,07	23,43	-2,10	422,00	**,04**
MUSCLE MASS%	30,13	30,42	0,86	424,00	,39
BMI	19,44	18,53	-2,37	423,00	**,02**
MFLAMIN	2,24	2,22	-0,12	434,00	,91
MSTALOJU	120,88	121,92	0,46	432,00	,65
MPLATAP	20,04	18,87	-2,63	439,00	**,01**
MSU30SEC	12,31	9,84	-4,32	441,00	**,00**
MBAHANG	4,30	4,28	-0,03	440,00	,97
MHANDGRIP	13,76	14,80	2,58	438,00	**,01**
MSITREACH	13,02	13,24	0,38	427,00	,71
MSHRAN4x10	16,15	16,03	-0,76	435,00	,45
FSYSTOLIC	102,47	99,90	-1,95	417,00	**,05**
FDYASTOLIC	66,11	65,64	-0,47	428,00	,64

Comparing the results of girls of early school age (Table 2) according to the place of residence, it is obvius that girls of early school age who are educated in a suburban environment have smaller

circumference of upper arm and upper leg, lower body fat percentage and body mass index, have better results in the test shuttle-run 4x10m which measures speed, agility and coordination compared to girls of early school age who are educated in an urban environment. Girls from the urban environmet have better results in the test sit-ups for 30 sec. (they show better repetitive strenght of the abdominal muscles).

Table 2. Differences in anthropometric measures, body composition, motor tests, and blood pressure between early age school girls from primary schools in urban and suburban areas in the municipality of Kisela Voda

Variables	**Urban**	**Suburban**	t-value	df	p
	Mean	Mean			
ACIUPAR	20,53	19,62	-3,07	456,00	**,00**
ACIUPLE	43,61	41,82	-2,89	451,00	**,00**
AHEIGHT	132,86	132,04	-0,83	456,00	,41
ALELEG	75,81	75,90	0,14	457,00	,89
ASEATHEI	71,37	70,64	-1,53	457,00	,13
AWEIGHT	33,49	31,71	-1,79	458,00	,07
BODY FAT%	23,57	21,87	-2,05	443,00	**,04**
MUSCLE MASS%	29,64	29,49	-0,57	442,00	,57
BMI	18,70	17,91	-2,26	443,00	**,02**
MFLAMIN	2,31	2,17	-1,39	455,00	,17
MSTALOJU	107,34	109,27	1,04	456,00	,30
MPLATAP	20,39	19,86	-1,21	457,00	,23
MSU30SEC	10,93	8,15	-4,86	458,00	**,00**
MBAHANG	2,56	2,12	-1,29	451,00	,20
MHANDGRIP	12,24	12,87	1,84	457,00	,07
MSITREACH	14,86	15,18	0,56	455,00	,58
MSHRAN4x10	17,31	16,95	-2,27	454,00	**,02**
FSYSTOLIC	99,31	99,29	-0,01	435,00	,99
FDYASTOLIC	65,78	66,08	0,31	440,00	,76

The analysis of the results obtained from the t-test from Table 3 show that there are significant statistical differences in adolescent boys in anthropometric measures circumference of the upper arm and upper leg, body weight, body fat percentage, body mass index, as well as in the motor tests standing broad jump, sit-ups for 30 sec, shuttle-run 4x10m and indicators for assessing the cardio-respiratory (aerobic) capacity. Adolescent boys educated in suburban areas have smaller circumferences, lower weight, lower body fat percentage, lower body mass index, higher speed of alternative movements coordination, agility and speed, and better aerobic capacity compared to adolescent boys, that are educated in an urban environment. Adolescent boys from the urban environment have better results only in the motor test sit-ups for 30 sec.

Analyzing the results of the t-test from Table 4, it can be seen that there are significant statistical differences between adolescent girls who are educated in urban and suburban environment in the anthropometric measures, circumference of upper arm and upper leg, body height, seated height, body weight, as well as in motor tests sit-ups for 30 sec, bent arm hang test and in the indicators for assessing the cardio respiratory capacity obtained from the 3 minute step test (heart rate in recovery, heart rate in recovery first and second minute and average heart rate). Adolescent girls educated in suburban areas have smaller body circumferences, height, seated height, body weight, better static strength and endurance of arms and shoulders and better indicators of cardio respiratory capacity, and weaker repetitive muscle strength of the abdominal muscles than adolescent girls studying in urban areas.

Table 3. Differences in anthropometric measures, body composition, motor tests, and blood pressure between adolescent boys from primary schools in urban and suburban areas in the municipality of Kisela Voda

Variables	**Urban**	**Suburban**	t-value	df	p
	Mean	Mean			
ACIUPAR	24,83	23,41	-3,76	427,00	**,00**
ACIUPLE	53,29	49,10	-5,47	420,00	**,00**
AHEIGHT	159,12	158,17	-0,82	426,00	,41
ALELEG	92,26	92,04	-0,30	427,00	,76
ASEATHEI	82,92	81,96	-1,61	425,00	,11
AWEIGHT	56,85	52,02	-3,13	426,00	**,00**
BODY FAT%	22,62	19,53	-3,52	421,00	**,00**
MUSCLE MASS%	36,13	36,81	1,90	421,00	,06
BMI	22,15	20,56	-3,63	422,00	**,00**
MFLAMIN	3,40	3,58	0,79	422,00	,43
MSTALOJU	160,17	167,24	2,33	426,00	**,02**
MPLATAP	14,01	13,37	-2,65	425,00	**,01**
MSU30SEC	17,14	15,82	-2,07	427,00	**,04**
MBAHANG	8,73	10,00	1,01	427,00	,31
MHANDGRIP	26,65	28,28	1,86	424,00	,06
MSITREACH	11,77	12,45	0,99	405,00	,32
MSHRAN4x10	13,93	13,47	-3,39	424,00	**,00**
FSYSTOLIC	115,44	114,11	-0,96	412,00	,34
FDYASTOLIC	70,15	67,86	-2,43	419,00	**,02**
FSTEPEND	160,09	150,05	-5,28	405,00	**,00**
FSTEP1M	116,32	106,03	-5,13	405,00	**,00**
FSTEP2M	107,01	98,80	-4,69	405,00	**,00**
FSTEPMEAN	127,81	118,29	-5,48	405,00	**,00**
VO2_l_min	2,18	2,15	-0,59	308,00	,55
VO2_ml_min_kg	39,61	41,74	2,25	308,00	**,03**

Discussion

Students living in suburban areas generally have smaller circumferences, lower body fat percentage, and body mass index, higher speed of alternative movements coordination, agility and speed, and better aerobic capacity compared to students studying in urban environment. Students from urban environment have better results in the test for assessing the repetitive strength of the abdominal muscles. There were no statistically significant differences in the flexibility between urban and suburban children and adolescents. However, all fitness tests show small mean differences and small to medium size effects between suburban and urban participants, that can explain a large percentage of the variance in fitness (e.g. genetics).

Recent studies have shown contradictory results regarding children and adolescents living in urban and suburban areas, but large number of studies are mainly in line with the results obtained in this study (Kriemler et al. 2008; Dollman et al. 2002; Albarwani et al. 2009). Suburban children and adolescents have higher level of fitness compared to their urban peers. The study that was obtained in Australia suggests that suburban children had higher level of cardiorespiratory fitness compared to children in urban areas. According to our study, the results obtained on suburban Swiss children (Kriemler et al. 2008) and Omani adolescents (Albarwani et al. 2009), who had a higher level of cardiorespiratory fitness compared to their urban peers. Contrary to these studies, a US based research suggests that urban children have a higher level

of cardiorespiratory fitness compared to their peers living in an suburban environment (McMurray et al. 1999).

Table 4. Differences in anthropometric measures, body composition, motor tests, and blood pressure between adolescent girls from primary schools in urban and suburban areas in the municipality of Kisela Voda

Variables	**Urban**	**Suburban**	t-value	df	p
	Mean	Mean			
ACIUPAR	24,08	22,53	-4,36	341,00	**,00**
ACIUPLE	52,46	49,78	-3,62	337,00	**,00**
AHEIGHT	156,95	155,12	-1,89	341,00	**,05**
ALELEG	90,43	89,96	-0,75	341,00	,46
ASEATHEI	82,95	81,72	-2,20	340,00	**,03**
AWEIGHT	51,78	49,19	-1,89	341,00	**,05**
BODY FAT%	25,08	24,34	-0,90	341,00	,37
MUSCLE MASS%	33,13	33,15	0,08	342,00	,94
BMI	20,98	20,26	-1,56	342,00	,12
MFLAMIN	3,25	3,25	0,03	338,00	,97
MSTALOJU	140,08	139,28	-0,30	333,00	,77
MPLATAP	14,47	14,46	-0,03	340,00	,97
MSU30SEC	15,41	13,67	-2,87	342,00	**,00**
MBAHANG	4,81	3,36	-2,24	340,00	**,03**
MHANDGRIP	22,50	22,23	-0,44	340,00	,66
MSITREACH	16,31	16,99	0,80	338,00	,42
MSHRAN4x10	15,02	14,94	-0,57	330,00	,57
FSYSTOLIC	112,38	113,47	0,80	335,00	,42
FDYASTOLIC	71,14	71,52	0,40	336,00	,69
FSTEPEND	174,88	170,34	-2,23	329,00	**,03**
FSTEP1M	134,54	125,36	-4,44	328,00	**,00**
FSTEP2M	122,25	115,75	-3,32	328,00	**,00**
FSTEPMEAN	143,93	137,15	-3,71	328,00	**,00**
VO2_l_min	2,05	2,07	0,58	205,00	,57
VO2_ml_min_kg	41,53	42,62	0,94	205,00	,35

In other studies, different results are determined in relation to each fitness test. For example, urban children from Mexico 17 have better results in the explosive strength and strength of abdominal muscles, but weaker results in grip strength tests compared to children living in a suburban environment. Between the Cypriot urban and suburban children (Tinazci et al 2009) differences in fitness tests - standing broad jump, sit-ups, 20 m shuttle run, and hand grip were found; while in equilibrium balance tests - flamingo, sit and reach, plate tappng and speed shuttle run, differences were not found. On the other hand, in a study conducted in Greece, no differences in physical fitness were determined (flexibility, cardiorespiratory, muscular fitness, and speed and agility) between children from urban and suburban areas. A study conducted in Croatia showed that children from urban areas show better results in the fitness test - 20 m dash, standing long jump and timed sit-ups. Urban and suburban boys and girls do not differ significantly in the flexibility. Also, in the study of Hian et al. (2013) and Eiben et al. (2005) it is determined that children from urban areas achieve better results in certain fitness tests than their peers who live in suburban areas. According to Loucaides et al. (2004) this is due to equipment availability and transportations, which

were better in urban than in suburban areas. Schools in urban areas had also better facilities such as field, track and others, compared with suburban schools (Hian et al. 2013).

The results of our study further point to high consistency in regard to gender and age groups. Similar tendencies have been determined for fitness and place of residence for boys, girls, children and adolescents. Less consistent results were obtained in urban and suburban Mexican shildren (Peña Reyes et al 2003), where 3 (flexibility, speed and cardiovascular fitness) of 6 tests for assessing physical fitness showed different results between gender and age groups (6 to 9 years in relation to 10 to 13 years).

The results of the study indicate that children from urban areas achieve better results only in the fitness test sit-ups 30 sec in relation to children from suburban areas. Similar results were obtained in Mexican and Spanish children where the same test was used - sit-ups test: the abdominal strength and endurance was better in urban than in suburban children (Peña Reyes et al 2003). These authors reported that sit-ups appeared to be a more familiar test to the urban, than to the suburban children. On the other hand, Turkish suburban children have achieved better results than urban children (Özdirenç et al. 2005) in this test. However, the results should be accepted with a certain precautionary approach, because the urban and suburban areas in the literature, and in different countries are differently defined, which can partly explain the consistency of the results in these studies.

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The increasing prevalence of sedentary lifestyle, especially among children living in urban environment, reduces overall physical activity, which also reduces the level of physical fitness and achievements. The results of our study suggest that boys and girls from suburban areas achieve better results in tests for assessing physical fitness. The assumption is that children in suburban environment have more spontaneous physical activity outdoors, and use more of outer terrains than children living in urban areas, and this is probably the reason why they achieve better results, especially in the abilities in which the energy component diminishes. Despite the mentioned factors for the differences in the fitness level, a huge influence has the socio-cultural differences between the urban and suburban children.

The physical fitness in childhood and adolescences is positively related with present and future health-related outcomes, such as risk for total fatness, high blood, hyperinsulinemia, abdominal adiposity, insulin resistance, skeletal health and mental health (Ortega et al.2008). Therefore it is inevitable that physical education curriculum can provide students with substantially more physical activity during physical education classes. Sallis et al. (1997) point of the fact that by raising the quality of teaching in physical education, 97% of elementary school students may be potentially assisted.

The environment can have small impact on certain fitness related health, since residence area and housing type differences were small for majority of tests. It is important to note that the place of residence and the appropriate external motivation should be taken into account when building a state strategy and interventions through which it will promote physical activity and health.

This study has some limitations. Due to its cross-sectional design, which does not allow determining the cause and effect relations between the variables. Moreover, lack of the school data does not allow adjusting the analysis for clustering within the schools. The differences in adulthood, especially between children and adolescents, can affect the results of physical fitness; lack of information about sexual maturation status of the sample, represents another limitation.

Conclusion

Analysis of the results of anthropological indicators in children educated in urban and suburban areas indicate that boys of early school age who study in suburban areas have smaller circumferences of the upper arm and upper leg, body fat percentage, body mass index, have better results in the hand tapping test, palm flexion and lower systolic blood pressure values compared to early school-age boys studying in urban areas. The boys from the urban environment have better results in the test for assessing the repetitive strength of

the abdominal muscles. Girls of early school age who are educated in a suburban environment have smaller circumferences of the upper arm and upper leg, body fat percentage, body mass index, have better results in shuttle-run test 4x10m which estimates speed, agility and coordination, than early school-age girls studying in urban areas, while girls that live in suburban areas have better results in the test sit-ups for 30 sec. Adolescent boys educated in suburban areas have smaller circumferences, lower weight, lower body fat percentage, lower body mass index, better speed of alternative movements coordination, agility and speed, and better aerobic capacity, compared to adolescent boys who are educated in urban areas. Adolescent boys that live in urban areas have better results only in motor test sit-ups for 30 sec. Adolescent girls educated in suburban areas have smaller circumferences, height, seated height, body weight, they have better static strength and endurance of upper-arms and shoulders, and better results in indicators of cardio respiratory capacity and weaker repetitive strength of the abdominal muscles, compared to adolescent girls in urban areas.

The reason for that is probably due to the fact that children who are educated in suburban environment have better conditions for games outdoors, thereby they have more spontaneous physical activity.

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