

SOMATIC AND MOTOR DEVELOPMENT OF SCHOOL-AGED CHILDREN CONCERNING LOW-FITNESS INDIVIDUALS

Radek Priputen, *Jaroslav Kupr, **Lukáš Rubín

Technical University of Liberec
Faculty of Science, Humanities and Education
Studentská 2, 461 17, Liberec 1, Czech Republic
radek.priputen@tul.cz, * jaroslav.kupr@tul.cz, ** lukas.rubin@tul.cz

Abstract

The aim of the thesis is to find out the percentage of low-fit children and to characterize their somatic and motor development.

The representative sample, which participated in the motor performance tests, consisted of 263 children (131 boys and 132 girls) aged 10-12 years. No children having any health limitation or attending specialised sport schools were included in the representative group. The measure was done by the standardised test battery FITNESSGRAM. The battery consists of tests of aerobic capacity (endurance shuttle run) and tests of strength, endurance and flexibility (curl-up, trunk lift, back-saver sit and reach, 90° push-up). For the low-fit individuals there were chosen boys and girls who did not accomplish 3 out of 5 criterion-reference standards.

We got a group of low-fit individuals of 19 members (11 girls and 8 boys), which represents 7.22 % of the target group, by the medium of the criterion-referenced standards. Somatic profile of the low-fit individuals embodies a high overweight, which influences motor profile, especially in the area of aerobic capacity, strength and endurance of the high part of the body. The results confirmed a tendency to an ambiguous relation between the basic somatic characteristics and a low level of motor efficiency.

The pedagogic specialists should concentrate their attention to the low-fit individuals. Their level of body fat is so unfavourable even though for their young age. If their life style does not change, then they can be directly threatened by the civilization diseases.

Introduction

Health is considered as the optimal level of integration of physical, psychological and social aspects of human and it should be the highest value of our lives. The current understanding of health is not just an absence of diseases. The contemporary problem is that a good fitness, as a tool for higher immunity against a physical and mental stress in difficult situations, is not the number-one-target of our lives. Among the human health affecting factors belong an positive attitude to physical activity, weight control, avoiding stress, selection of nutrition and the environment of the individual (Mora, 2007; Kutlík, 2009).

The results of targeted research showed that sports activity in adolescence creates a presumption of increased transmission of adult sports. (Bélanger, 2009) The lack of movement can cause the deterioration of health, and therefore it is important to object it, and not to underestimate this effect. Physically low-fit individuals are in danger of potential threats to civilization diseases, among which include: high blood pressure, diabetes typeII, asthma, hyperlordosis, but also depression and anxiety (Church, 2005). The attitude to such individuals should be individualized and should be encouraged to consciously responsibility for their health since childhood (Suchomel, 2002, 2004, 2006; Kupr, Suchomel, 2009).

1 Aim

The aim of the thesis was, on the base of the results of the motor performance tests, to find out the percentage of low-fit children in the age between 10 and 12 years in Liberec region and to characterize their somatic and motor development.

2 Methods

Testing of children took part at the beginning of the year 2009. Especially in January and February 2009 in Liberec and Jablonec nad Nisou. Boys and girls were measured on five elementary schools. We eliminated the sport and practical schools. The measure was done by the standardised test battery FITNESSGRAM (Cooper Institute, 2007; Kompán, Suchomel, 2009). We selecter the 7 seven indicators from the battery FITNESSGRAM: endurance shuttle run, skinfold measurements, body mass index, curl-up, trunk lift, back-saver sit and reach, and 90° push-up. In the total set of 263 tested children, there were 132 girls and 131 boys. After completion of the motor test battery FITNESSGRAM we found 132 individuals who had failed at least one standard (more than 50%).

We used criteria-related standards (see Table 2), which helped us to divide the group of low-fit individuals with 19 members, 11 girls and 8 boys, together constituting 7.22 % of total number.

3 Results and Discussion

Tab 1 Somatic and motor characteristics of the sample

Age [years]	Gender		Body height [cm]	Body weight [kg]	20-meter PACER [overruns]	90° push-up [no. completed]	Curl-up [no. completed]	Trunk lift [cm]	Back-saver sit and reach [cm]
10	Boys (n = 24)	x	148.58	40.18	48.42	15.83	69.67	26.42	28.25
		s	6.18	5.62	19.05	5.97	9.43	3.93	2.77
	Girls (n = 47)	x	148.60	42.60	34.51	10.87	64.43	26.02	30.79
		s	7.17	8.33	17.97	7.52	16.86	5.73	6.35
11	Boys (n = 75)	x	151.87	44.88	33.23	14.40	56.83	27.01	26.68
		s	8.35	10.18	16.33	8.07	19.95	6.07	6.25
	Girls (n = 55)	x	149.06	41.80	33.78	11.05	55.78	26.33	32.13
		s	7.40	8.85	17.24	6.17	21.06	5.90	5.24
12	Boys (n = 32)	x	154.55	45.57	40.31	16.78	50.22	30.09	27.19
		s	8.31	12.59	15.35	8.30	19.95	5.68	4.92
	Girls (n = 30)	x	153.90	46.01	28.07	8.17	49.23	30.13	32.47
		s	7.57	10.40	11.32	6.32	18.46	7.69	5.61

Legend: n = number; x = mean; s = standard deviation

Tab 2 The percentage incidence of individuals with unfulfilled standards of health-oriented

tested	total 263 (100 %)	girls 132 (50.19 %)	boys 131 (49.81 %)
Uncompleted at least 1 standard	132 (50.19 %)	73 (55.30 %)	59 (45.04 %)
Uncompleted standard 1x	82 (31.18 %)	45 (34.09 %)	37 (28.24 %)
Uncompleted standard 2x	32 (12.17 %)	17 (12.88 %)	14 (10.69 %)
Uncompleted standard 3x	16 (6.08 %)	9 (6.82 %)	7 (5.34 %)
Uncompleted standard 4x	3 (1.14 %)	2 (1.52 %)	1 (0.76 %)
Uncompleted standard 5x	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
Low-fit children	19 (7.22 %)	11 (8.33 %)	8 (6.10 %)

Legend: Highlighted fields are chosen by us as low-fit individuals

Tab 3 Somatic profile of low-fit individuals

		Body height [cm]	Body weight [kg]	BMI [kg/m ²]	Skin fold [mm]			Fat [%]
					Triceps	Calf	Total	
Girls (n = 11)	x	151.40	52.60	22.60	21.70	22.70	44.50	31.20
	s	9.59	12.09	3.23	4.34	7.55	10.75	6.58
Boys (n = 8)	x	156.80	56.20	22.30	18.40	21.10	39.50	30.10
	s	12.10	18.13	4.25	6.23	5.84	11.95	8.78

Legend: n = number; x = mean; s = standard deviation; BMI = Body Mass Index

The most commonly used somatic indicator is the body mass index (BMI) and percentage of body fat. Table 3 shows the measured values of our group of low-fit individuals.

Tab 4 Motor parameters of low-fit individuals

		20-meter PACER	90° push-up	Curl-up	Trunk lift	Back-saver sit and reach
		[overruns]	[number]	[number]	[cm]	[cm]
Girls (n = 11)	x	12.55	3.27	39.36	22.64	22.73
	SD	4.52	2.45	23.36	6.81	7.72
Boys (n = 8)	x	16.75	5.50	40.25	23.88	19.38
	SD	4.89	3.16	24.46	4.70	4.61

Legend: n = number; x = mean; SD = standard deviation

In motor-testing, physically low-fit children showed the worst performance in aerobic fitness and muscular strength and endurance of the upper torso. Their best results were measured in the strength and agility and trunk extensor strength and endurance of abdominal muscles.

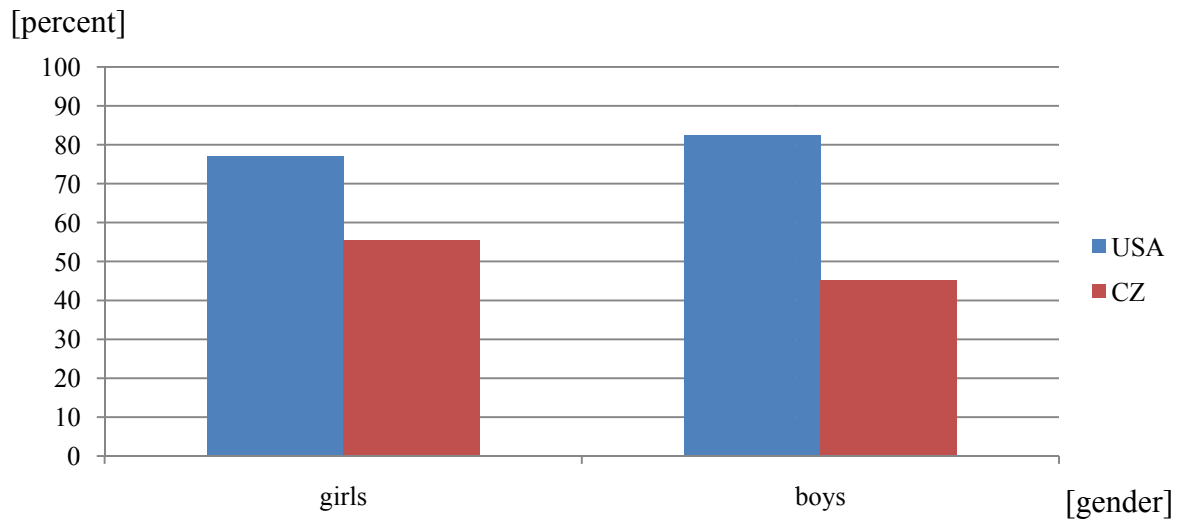


Fig. 1 Comparison of failure of at least one standard in the Czech Republic and USA.

In comparison with the U.S., the Czech population reached better results. Despite the positive achievements, we should not be fully satisfied. Experts foresee a gradual deterioration due to a similar lifestyle, which is characteristic of western civilizations (Suchomel, 2006).

Tab 5 Failure to comply with health-based standards for each test

Activity		Individuals (n = 263)	Girls (n = 132)	Boys (n = 131)
20-meter PACER	[overruns]	59 (22.43 %)	29 (21.97 %)	30 (22.90 %)
90° push-up	[no. completed]	66 (25.10 %)	42 (31.18 %)	24 (18.32 %)
Curl-up	[no. completed]	6 (2.28 %)	3 (2.27 %)	3 (2.29 %)
Trunk-lift	[cm]	45 (17.11 %)	28 (21.21 %)	17 (12.98 %)
Back-saver sit and reach	[cm]	27 (10.27 %)	11 (8.33 %)	16 (12.21 %)

Legend: n = number

Tab. 6 Comparison of results in each zone in 2009 and 2004

Somatic and motor characteristic	2009			2004		
	n	area I. %	area II. %	n	area I. %	area II. %
20-meter PACER	263	22	78	528	6	94
Curl-up	263	2	98	528	8	92
Trunk-lift	263	17	83	528	41	59
90° push-up	263	25	75	528	18	82
Back-saver sit and reach	263	10	90	528	24	76
Body mass index	263	18	82	528	20	80

Legend: n = number, area I = area results for improvement, area II = target health-oriented zone and the zone of excellent results

The schedule compares measurement of children in age from 10 to 12 years with the previous five years older results (Vondra, 2005; Suchomel, Kříž, 2009). In 2009 just a half of children participated in the measurement. The worst deterioration is noted at 20-meter PACER from 6 % to 22 %, where the highest improvement was reached at Trunk Lift from 41 % to 17 %. Relatively high amelioration could be considered at Back-saver sit and reach. The rest of indicators did not note any significant differences.

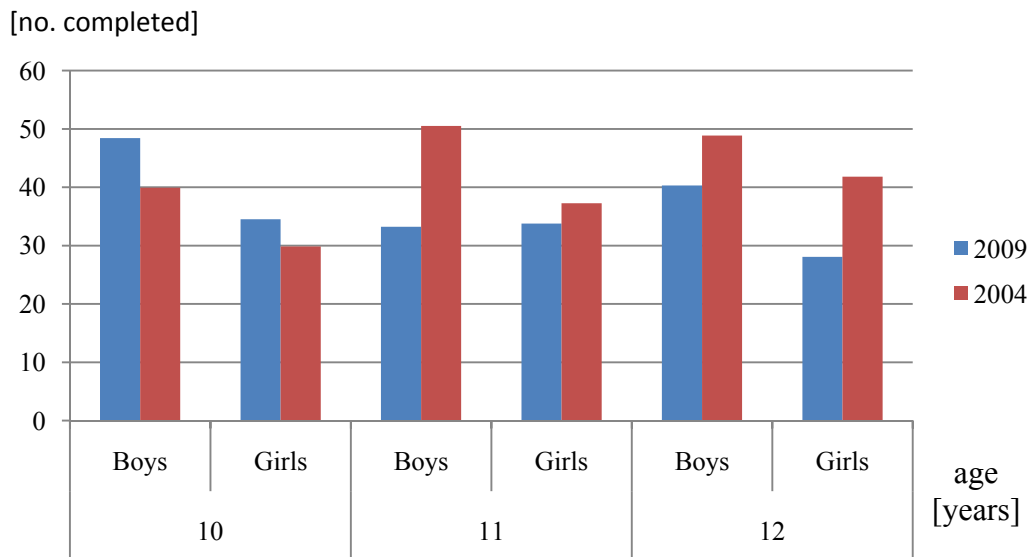


Fig. 2 Comparison of results 20-meter PACER between 2004 and 2009.

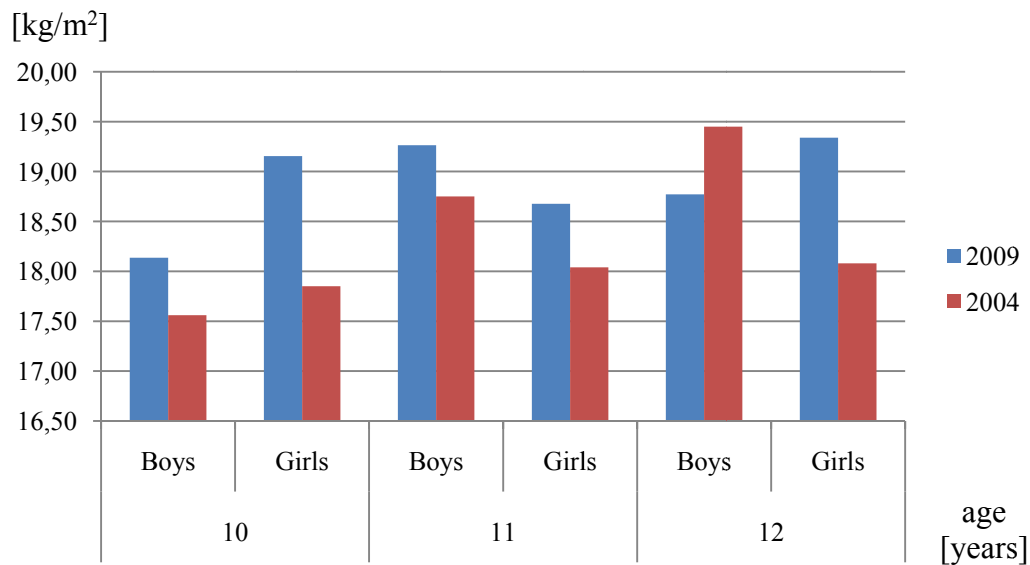


Fig. 3 Comparison of results body mass index between 2004 and 2009.

Conclusion

The aim of this work was the synthesis of knowledge and using the test battery to determine the percentage occurrence in Fitnessgram low-fit individuals amongst schoolchildren aged 10 to 12 years from the Liberec region. In all tests of the test battery FITNESSGRAM there was mostly represented the target health-oriented zone. The exception was the only test of strength and endurance of abdominal muscles - back-saver sit and reach, where the most individuals are in the area of excellence. A positive finding was that none of the age categories for boys or girls outside the area requiring improvement.

On the basis of a criteria-related standards, we found a group of low-fit individuals of nineteen members, representing 7.22 % of total. This group belongs with motor and somatic areas results in outcomes that require improvement.

Czech population with deteriorating results of various test batteries closes to the western civilizations. Compared with the U.S., our level of physical fitness is not so bad (see Picture 8). The current situation should not be indifferent to us, but a warning.

The study project was supported by the research grant IGS FP TUL, Nr. 115/2009.

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SOMATICKÝ A MOTORICKÝ ROZVOJ DĚTÍ ŠKOLNÍHO VĚKU SE ZAMĚŘENÍM NA JEDINCE S NÍZKOU ÚROVNÍ TĚLESNÉ ZDATNOSTI

Cílem práce bylo zjistit podíl tělesně nezdatných dětí a charakterizovat jejich somatický a motorický rozvoj. Testováno bylo 263 dětí (131 chlapců a 132 dívek) ve věku 10–12 let. Jedinci zařazení do reprezentativních souborů neměli žádná zdravotní omezení a nenavštěvovali školy se sportovním zaměřením. Měření byla provedena standardizovanou testovou baterií FITNESSGRAM. Testová baterie se skládá z testu aerobní kapacity (vytrvalostní člunkový běh) a testů síly, vytrvalosti a flexibility (hrudní předklony v lehu pokrčmo, záklon v lehu na břicho, předklony v sedu pokrčmo jednož, 90° kliky). Jako tělesně nezdatní jedinci byli označeni ti, kteří nesplnili 3 z 5 kritériálně vztažených standardů. Výsledná skupina tělesně nezdatných jedinců obsahovala 19 členů (11 dívek a 8 chlapců), což představuje 7,22 % z celkového souboru. Somatický profil tělesně nezdatných vykazuje vysokou míru nadváhy, která negativně ovlivňuje motorický profil jedince zejména aerobní zdatnost a sílu a vytrvalost horní části trupu. Výsledky potvrdily nejednoznačný vztah mezi základní somatickou charakteristikou a nízkou úrovní motorických schopností. Na tělesně nezdatné jedince by se měla soustředit pozornost, protože jejich úroveň tělesného tuku je natolik nepříznivá už v nízkém věku, že pokud se nezmění jejich životní styl, jsou přímo ohroženi civilizačními chorobami.

SOMATISCHE UND MOTORISCHE ENTWICKLUNG VON KINDERN IM SCHULALTER HINSICHTLICH GERINGER KÖRPERLICHER FITNESS

Das Hauptziel der Arbeit war den Anteil von Kindern mit Bewegungsmangel festzustellen und ihre somatische und motorische Entwicklung zu charakterisieren. Es wurden 263 Kinder im Alter von 10 bis 12 Jahren getestet, 131 Jungen und 132 Mädchen. Keines der Kinder in der repräsentativen Gruppe war gesundheitlich eingeschränkt und besuchte eine Sportschule. Die Messung wurde mit Hilfe der standardisierten Testbatterie FITNESSGRAM durchgeführt. Die Testbatterie besteht aus Tests der aeroben Kapazität (Dauerlauf), der körperlichen Kraft, Ausdauer und Flexibilität (Situps-auf dem Rücken liegend Oberkörper nach vorn beugen; in Bauchlage den Rumpf anheben; sitzend mit den Armen die Zehenspitzen erreichen; 90° Liegestütz). Als bewegungsarm wurden nur die Kinder eingestuft, die 3 von 5 der Kriterien nicht erfüllten. Die Endgruppe umfasste 19 (11 Mädchen und 8 Jungen), das sind 7,22 Prozent der gesamten Gruppe. Das somatische Profil von Kindern mit Bewegungsmangel zeigt ein hohes Maß an Übergewicht, welches das motorische Profil negativ beeinflusst, insbesondere aerobe Fähigkeit, Kraft und Ausdauer des Oberkörpers.

SOMATYCZNY I MOTORYCZNY ROZWÓJ DZIECI W WIEKU SZKOLNYM Z UWZGLĘDNIENIEM JEDNOSTEK O NISKIM POZIOMIE SPRAWNOŚCI FIZYCZNEJ

Celem opracowania jest weryfikacja udziału dzieci o niskiej sprawności fizycznej oraz charakterystyka ich rozwoju somatycznego i motorycznego. Badaniem objęto 263 dzieci (131 chłopców i 132 dziewcząt) w wieku 10-12 lat w okresie od stycznia do lutego 2010 r. w Libercu i Jabloncu nad Nysą. Jednostki zakwalifikowane do grup reprezentatywnych nie miały żadnych ograniczeń zdrowotnych i nie uczęszczały do szkoły o profilu sportowym. Badania prowadzono przy pomocy zestandaryzowanego zestawu testów FINTESSGRAM. Zestaw testów składa się z testu wydajności aerobowej (wytrzymałościowy "bieg czółenkowy") oraz testów siły, wytrzymałości i elastyczności (skłony klatki piersiowej na leżąco w zgięciu, odchylenie w tył w pozycji leżącej na brzuchu, skłony na siedząco w zgięciu jednoż, 90° pompki). Za niesprawnych fizycznie oznaczono te osoby, które nie spełniły 3 z 5 standardów określonych kryteriami. Końcowa grupa jednostek niesprawnych fizycznie obejmowała 19 osób (11 dziewcząt i 8 chłopców), co stanowi 7,22 % całej grupy. Somatyczny profil osób niesprawnych fizycznie odznacza się wysokim stopniem nadwagi, która wpływa negatywnie na profil motoryczny jednostki, w szczególności na sprawność aerobową i siłę oraz wytrzymałość górnej części ciała. Wyniki potwierdziły niejednoznaczną zależność pomiędzy podstawowymi cechami somatycznymi a niskim poziomem zdolności motorycznych.