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MOTOR CAPABILITIES OF CHILDREN AND ADOLESCENTS WITH DYSFUNCTIONS OF THE HEARING ORGAN ORIGINATING FROM AREAS OF EASTERN POLAND

Key words: motor capabilities, the disabled, children and adolescents

Introduction

Next to the speech, motion is the most commonly exploited and versatile tool in the contact of a man with the surrounding world (Osiński 2003). Raczek (1989) adds that motor capability serves a special function in the area of physical culture, since for the experts of physical culture it is not only one of the major functions of a live organism, an element of its personality as well as a specific object of investigations, but also the primary area of their activity.

The concept of physical fitness is, usually, linked not only with the function of a motor apparatus, but with the biological actions of the entire organism. It is based on specified predispositions and functions of an organism, while from the perspective of symptoms – it is manifested in specified motor effects of body build correctness as well as in individual physical activity. The physical fitness is claimed to be composed not only from the mastered physical exercises, but also from the effectiveness of all organs and systems, motor capabilities (strength, speed, endurance and coordination skills) and even from some elements of an active lifestyle (Osiński 2003).

A highly physically fit person is claimed to be the one who is characterized by a relatively large number of mastered physical exercises, a high effectiveness of the circulatory system, respiration, secretion and thermoregulation, as well as by some regularities in body build and a lifestyle that affirms the physical activity (Osiński 1991).

Authors usually emphasize a wide context and inaccuracy of that concept, both resulting from the fact that motor behavior is not an isolated function of a motor organ but is linked with the action of the entire personality. The motor capabilities are strongly integrated with emotions, will, cognitive skills and character traits. The term "psychomotor capability",

functioning in the psychological literature, emphasizes strongly the occurring organic unity (Osiński 2003).

The development of motor fitness proceeds based on the morphological, physiological and psychical development. The motor capabilities of a child are manifested in its movements characterized by various purpose and intensity. Each external stimulus is processed into motion. A child changes the object of interests easily and does not devote much time to one activity. Diversified motor activity of a child, manifested most of all in the play, determines the successive development of the psyche and accelerates processes of environment recognition (Czaplicki 1995).

Over the years, multiple trials have been undertaken to interpret the definition of physical fitness. The concept of physical fitness introduced by experts of the World Health Organization in 1986 assumed that the fitness means "the capability for effective performance of muscle work" (Wolański, Parizkova 1976). Literature data refer also to such terms as: motor fitness and motion fitness (Gilewicz 1964, Denisiuk, Milicer 1969, Przewęda 1981).

Contemporarily, the term in force has been adopted as *motor capabilities,* which has also been promoted in the theory of motor activity by foreign authorities (Celikovsky 1972, Grosser 1983, Kasa 1983, Blume 1984) as well as by Polish experts (Raczek 1987, 1988, Raczek, Mynarski 1991, Sankowski 1990, Osiński 1994, Szopa 1994, Szopa, Mleczko, Żak 1996). In the opinion of the latter, the motor activity has two sides, namely: potential side – reflecting the inner capabilities, *i.e.* motor predispositions, capabilities and skills, and the effective side – constituting the result of a given motor activity. Nevertheless, differentiation should be made between motor fitness and physical fitness. Motor capabilities are described as an intermediate floor between the biological basis and motor effect.

Thus, "motor capabilities are a complex of predisposition integrated with a commonly prevailing biological and motor basis, determined by genetic and environmental factors and interacting with one another. Along with motor skills, they constitute the potential side of motor activity, thus determining the state of readiness of an organism for performing various types of motor tasks" (Szopa, Mleczko, Żak 1996). Amongst the motor skills there have been distinguished: strength, speed, and endurance skills as well as specific coordination skills.

In further part of the work, likewise in scientific publications, use will be made of the term: motor capabilities.

Aim

The presented study is aimed at evaluating motor capabilities of children and adolescents with dysfunctions of the hearing organ originating from areas of eastern Poland. Results collected depict, in some part, the current health status of the surveyed subjects, manifested in the effectiveness of the functioning of internal systems and organs, whereas the mean result expressed in a point scale is a general indicator of health status.

The study was diagnostic in character, and the research method applied was a diagnostic survey (Pilch 1995). It was conducted by means of a technique of participant observation (Ryguła 2001), in the form of a questionnaire or an interview questionnaire. The level of motor capability of the subjects was evaluated based on the International Physical Fitness Test (Pilicz *et al.* 2002). Persons with dysfunctions of the hearing organs have no contraindication to perform fitness trials, hence all trials of the test were applied in the study. Results obtained were converted into points according to the binding standards. The scale of points in the test ranged from 0 to 100, and the score of 50 points corresponded to arithmetic means reported for the Polish youth in a given trial. The survey enables evaluating the general level of motor capabilities of the pupils examined. According to guidelines of the test, three levels of motor capabilities were adopted in the study, i.e. high, medium and low. Results obtained were compared with those reported by Przewęda and Dobosz (2003).

The material was elaborated with statistical methods following standard procedures using *STATISTICA* software package. The statistical analysis covered determinations of: arithmetic mean $(\bar{x})$, standard deviation *(s)*, standard errors of the arithmetic means (E_x), boundary values of the measured traits, annual increase in a given trait *(d)*, and variability coefficient *(V)*.

The environment of the subjects was characterized by means of percentage distribution of sample size, whereas correlations between the variables were analyzed with the Chi-square test for independent variables as well as based on a correspondence analysis. The strength of correlations between the variables was determined with the Pearson contingency coefficient C.

This publication is only a fragment of investigations conducted since April 2004 till June 2006 and addressing the evaluation of the physical development, motor capabilities and motor activity of children and adolescents in the free time. The study covered 339 pupils, including 185 boys (54.6%) and 154 girls (45.4%) at the age of 8-18 years with complete or partial dysfunction of the hearing organ. Over the experimental period, the subjects were attending to Education and Upbringing Centers in Lublin, Przemyśl and Olecko gathering pupils from elementary school, gymnasium and post-

gymnasium classes. The Centers were taking care over children and adolescents from the following Provinces: Podkarpackie, Lubelskie, Podlaskie as well as Warmia and Mazury. The environment the boys and girls were growing in were, in a similar proportion, the country (59.6%) and the city (40.4%). In majority of cases, the surveyed subjects were persons with residual hearing, i.e. with amblyacousia (51.9%), and deaf persons (48.1%). As it results from analyses, most of the subjects (61.9%) were deaf from birth (*i.e.* suffered from the so-called "congenital deafness"), whereas amongst the others (38.1%) the loss of audition occurred after the period of intrauterine life. The problem of audition impairment amongst the closest family members was declared by 37.2% of the respondents, whereas that problem was not reported by 62.8% of the respondents.

The family structure of the surveyed boys and girls was as follows: 79.0% of the subjects had complete families, 11.8% indicated an incomplete family, 4.7% were living in broken families, whereas 2.4% in foster families and 2.1% in reconstituted families. No statistically significant correlation was found between the place of living and family structure of the respondents ($p=0.51$).

The educational status of parents of the surveyed pupils was as follows: 20.6% of mothers and 22.1% of fathers had elementary education, 50.4% of mothers and 57.8% of fathers had occupational education, whereas 24.8% of mothers and 15.6% of fathers had secondary education. The least numerous group was constituted by parents with higher education, i.e. 4.2% of mothers and 4.5% of fathers. No statistically significant correlation was found either between the place of living and educational status of both parents ($p=0.43$ and $p=0.06$).

The respondents evaluated that living standards they were growing in were usually good (43.1%) and average (34.2%). Very poor social and living conditions were declared by 13.0%, whereas very good ones – by as little as 9.7% of the respondents. In this case also no statistically significant correlation was found between the place of living and living standards of a family ($p=0.46$). In turn, calculations demonstrated a statistically significant ($p<0.01$) correlation between the educational status of parents and the living standards of a family. The coefficient of contingency for that correlation accounted for 0.41 in the mothers and for 0.34 in the fathers. The correspondence analysis demonstrated that the respondents whose parents had higher and secondary education assessed the living standards of their family as very good and good, whereas those whose parents had elementary and occupational education evaluated their living standards as insufficient and average.

Analysis of results

Numerical characteristics of changes proceeding in the hand grip strength of the surveyed boys and girls were presented in Tables 1-2. In the case of boys, the average values of hand grip strength ranged from 15.90 kG in the 8-year-olds to 46.45 kG in the 18-year-olds. The greatest increase in the level of that capability between age groups was noted in the boys at 12 years of age (6.71 kG). In turn, in the case of girls, the mean value of hand grip strength ranged from 8.75 kG in the 8-year-olds to 28.33 in the 18-year-olds. The highest increase in the level of that trait between age groups was reported in the girls at the age of 11 years (5.82 kG).

Tab. 1. Hand grip strength of the boys with dysfunctions of the hearing organ.

Age	$\bar{x}$	E_x	s	V	Ranges of variability	d
8	15.90	1.12	3.54	22.26	10-20	-
9	14.40	1.76	5.56	38.61	4-18	-1.50
10	18.11	0.68	2.03	11.21	15-20	3.71
11	19.60	1.00	3.88	19.80	14-30	1.49
12	26.31	2.08	7.48	28.43	18-42	6.71
13	29.86	1.91	8.96	30.01	16-46	3.55
14	34.09	1.54	7.06	20.71	18-43	4.23
15	34.36	1.65	7.72	22.47	21-48	0.27
16	40.12	2.30	9.48	23.63	28-70	5.76
17	45.36	5.01	16.64	36.68	16-64	5.24
18	46.45	1.57	8.89	19.14	32-70	1.09

Tab. 2. Hand grip strength of the girls with dysfunctions of the hearing organ.

Age	$\bar{x}$	E_x	s	V	Ranges of variability	d
8	8.75	2.11	5.95	68.00	2-14	-
9	12.25	2.89	8.17	66.69	2-20	3.50
10	12.00	2.59	6.83	56.92	2-16	-0.25
11	17.82	1.47	6.04	33.89	3-28	5.82
12	19.38	2.14	7.71	39.78	5-34	1.56
13	24.67	1.38	4.77	19.34	16-34	5.29
14	25.60	1.57	4.97	19.41	16-32	0.93
15	25.60	2.22	7.04	27.50	16-36	0.00
16	26.00	1.38	5.68	21.85	16-38	0.40
17	26.09	1.08	4.96	19.01	18-40	0.09
18	28.33	1.25	5.32	18.78	22-40	2.24

The average values of arm strength of the boys analyzed based on the measurement of a flexed-arm hang (Tab. 3), ranged from 29.37 s in the 8-year-olds to 36.00 s in the 10-year-olds. The greatest increase in the level of that capability was noted at the age of 9 years (5.92 s). The analysis of arm strength based on the number of arm flexures in a hang (Tab. 4) demonstrated that it ranged from 3.77 in boys at the age of 12 to 7.47 in boys at the age of 16 years. The highest increase in arm strength level was observed in boys at the age of 14 (1.48). Mean values of arm strength of the girls (Tab. 5) obtained in a trial of the flexed-arm hang fluctuated between 11.73 s in the 18-year-old girls to 31.19 s in the 10-year-old girls. The greatest difference between the age groups in the level of arm strength was noted in the girls at the age of 11 years (10.54 s).

Tab. 3. Functional strength of arms of the boys with dysfunctions of the hearing organ (flexed-arm hang).

Age	$\bar{x}$	E_x	s	V	Ranges of variability	d
8	29.37	5.32	16.81	57.24	10.42-59.00	-
9	35.29	6.79	21.45	60.78	5-65	5.92
10	36.00	8.14	24.42	67.83	6-63	0.71
11	32.87	5.01	19.40	59.02	9-85	-3.13

Tab. 4. Functional strength of arms of the boys with dysfunctions of the hearing organ (flexures of arms in a hang).

Age	$\bar{x}$	E_x	s	V	Ranges of variability	d
12	3.77	0.74	2.68	71.09	1-10	-
13	4.28	0.65	3.03	70.79	1-10	0.51
14	5.76	0.88	4.02	69.79	1-13	1.48
15	6.86	0.78	3.68	53.64	1-12	1.10
16	7.47	1.22	5.01	67.07	2-18	0.61
17	7.09	1.01	3.36	47.39	2-15	-0.38
18	6.77	0.56	3.16	46.68	1-19	-0.32

The average values of trunk strength reported for the boys (Tab. 6) ranged from 13.05 in the 9-year-olds to 23.06 in the 18-year-olds. The greatest increase in the level of that capability was reported in boys at the age of 12 (3.34). In turn, the mean values of trunk strength determined for the girls (Tab. 7) ranged from 10.75 in the 8-year-olds to 18.30 in the 14-year-olds. The highest increase in the level of that trait was reported in girls at the age of 11 (2.14).

Tab. 5. Functional strength of arms of the girls with dysfunctions of the hearing organ.

Age	$\bar{x}$	E_x	s	V	Ranges of variability	d
8	16.11	5.04	14.22	88.27	2-41	-
9	20.88	4.55	12.82	61.40	4-34	4.77
10	31.19	7.58	20.01	64.16	4.05-55.27	10.31
11	20.65	3.08	12.71	61.55	5-47	-10.54
12	16.44	4.83	17.39	105.78	1-47	-4.21
13	22.92	5.88	20.35	88.79	3-74	6.48
14	12.66	1.59	5.03	39.73	4-20.12	-10.26
15	17.36	4.90	15.50	89.29	1-43.67	4.70
16	13.97	2.29	9.46	67.72	1-41	-3.39
17	16.37	2.99	13.68	83.57	1-53	2.40
18	11.73	1.79	7.58	64.62	1-23	-4.64

Tab. 6. Trunk strength of the boys with dysfunctions of the hearing organ.

Age	$\bar{x}$	E_x	s	V	Ranges of variability	d
8	14.30	0.94	2.98	20.84	9-18	-
9	13.05	0.83	2.63	20.15	6-15	-1.25
10	16.33	0.91	2.74	16.78	13-20	3.28
11	18.27	0.78	3.03	16.58	13-21	1.94
12	21.61	0.56	2.02	9.35	20-25	3.34
13	19.64	1.04	4.88	24.85	4-24	-1.97
14	22.71	0.85	3.90	17.17	15-30	3.07
15	21.04	0.75	3.54	16.83	13-26	-1.67
16	21.35	0.97	4.01	18.78	17-28	0.31
17	19.91	1.62	5.37	26.97	14-29	-1.44
18	23.06	0.79	4.51	19.56	14-33	3.15

Mean values of body suppleness of the boys (Tab. 8) ranged from 0.77 cm in the 13-year-olds to 5.84 cm in the 18-year-olds. The greatest difference in suppleness level between the age groups compared was reported in the boys at the age of 18 (4.57 cm). In turn, in the case of girls, the mean values of that capability (Tab. 9) ranged from 0.50 cm in the 8-year-olds to 8.22 cm in the 18-year-olds. The greatest difference in suppleness level was noted in the girls at the age of 18 (5.17 cm).

Tab. 7. Trunk strength of the girls with dysfunctions of the hearing organ.

Age	$\bar{x}$	E_x	s	V	Ranges of variability	d
8	10.75	1.15	3.24	30.14	7-15	-
9	12.50	0.89	2.51	20.08	9-16	1.75
10	14.57	0.20	0.53	3.64	14-15	2.07
11	16.71	0.97	4.01	24.00	11-27	2.14
12	15.23	1.13	4.08	26.79	6-20	-1.48
13	16.67	0.95	3.28	19.68	12-23	1.44
14	18.30	0.77	2.45	13.39	13-21	1.63
15	17.60	0.70	2.22	12.61	14-21	-0.70
16	17.94	0.89	3.68	20.51	13-24	0.34
17	16.71	0.72	3.30	19.75	10-26	-1.23
18	14.72	0.94	3.99	27.11	6-22	-1.99

Tab. 8. Body suppleness of the boys with dysfunctions of the hearing organ.

Age	$\bar{x}$	E_x	s	V	Ranges of variability	d
8	3.35	1.35	4.28	127.76	-2-12	-
9	1.60	0.95	3.02	188.75	-3-5	-1.75
10	4.33	0.62	1.87	43.19	2-8	2.73
11	4.93	0.91	3.53	71.60	-1-10	0.60
12	1.92	1.68	6.04	314.58	-3-15	-3.01
13	0.77	2.20	10.33	1341.56	-23-10	-1.15
14	2.83	0.94	4.31	152.30	-5-9	2.06
15	3.04	1.39	6.53	214.80	-16-13.5	0.21
16	2.03	2.48	10.23	503.94	-25-17	-1.01
17	1.27	2.88	9.59	755.12	-13-10	-0.76
18	5.84	1.54	8.71	149.14	-19-21	4.57

Tab. 9. Body suppleness of the girls with dysfunctions of the hearing organ.

Age	$\bar{x}$	E_x	s	V	Ranges of variability	d
8	0.50	1.05	2.97	594.00	-4-4	-
9	3.25	2.33	6.58	202.46	-4-12	2.75
10	4.28	0.18	0.48	11.21	4-5	1.03
11	4.35	0.83	3.42	78.62	-2-10	0.07
12	2.23	2.23	8.03	360.09	-14-10	-2.12
13	1.66	1.65	5.72	344.58	-9-9	-0.57
14	4.50	1.99	6.29	139.78	-9-11	2.84
15	3.40	1.71	5.42	159.41	-4-10	-1.10
16	2.17	1.30	5.37	247.47	-9-10	-1.23
17	3.05	2.23	10.24	335.74	-13-20	0.88
18	8.22	1.16	4.91	59.73	-3-16	5.17

The average scores noted in the long jump trial in boys (Tab. 10) ranged from 103.00 cm in the 9-year-olds to 198.54 cm in the 18-year-olds. The greatest increase in the level of that ability was noted in the boys aged 18 years (36.00 cm). The mean results obtained in that trial by the girls (Tab. 11) fluctuated between 82.63 cm in the 9-year-olds to 138.59 cm in the 16-year-olds. The greatest increase in the level of that ability was found in the girls at the age of 11 (22.88 cm).

Tab. 10. Results of standing long jump achieved by the boys with dysfunctions of the hearing organ.

Age	$\bar{x}$	E_x	s	V	Ranges of variability	d
8	109.60	5.03	15.91	14.52	80-135	-
9	103.00	5.64	17.84	17.32	74-120	-6.60
10	116.56	5.14	15.43	13.24	98-135	13.56
11	128.40	6.65	25.76	20.06	75-180	11.84
12	148.61	7.07	25.47	17.14	122-200	20.21
13	143.00	6.25	29.32	20.50	90-200	-5.61
14	164.67	5.75	26.36	16.01	110-208	21.67
15	158.95	5.29	24.81	15.61	105-198	-5.72
16	163.47	10.52	43.36	26.52	100-245	4.52
17	162.54	9.78	32.48	19.98	96-210	-0.93
18	198.54	5.04	28.56	14.39	131-230	36.00

Tab. 11. Results of standing long jump achieved by the girls with dysfunctions of the hearing organ.

Age	$\bar{x}$	E_x	s	V	Ranges of variability	d
8	88.00	5.96	16.81	19.10	70-110	-
9	82.63	5.71	16.11	19.50	60-100	-5.37
10	92.00	4.41	11.64	12.65	75-100	9.37
11	114.88	4.84	19.96	17.37	80-161	22.88
12	112.76	5.66	20.39	18.08	60-132	-2.12
13	126.42	4.15	14.36	11.36	91-150	13.66
14	127.00	4.95	15.63	12.31	100-152	0.58
15	138.30	6.31	19.93	14.41	85-152	11.30
16	138.59	7.11	29.29	21.13	83-182	0.29
17	135.09	4.27	19.54	14.46	97-163	-3.50
18	137.27	5.63	23.87	17.39	100-170	2.18

In the speed test, the mean results achieved by the boys (Tab. 12) ranged from 7.97 s in the 18-year-olds to 11.30 s in the 9-year-olds. The greatest increase in speed level between the age groups was noted for the boys at the

age of 11 (-0.62 s). In contrast, the mean results scored in the speed test by the girls (Tab. 13) fluctuated between 9.42 s in the 16-year-olds to 13.09 s in the 9-year-olds. The greatest increase in the level of that ability was noted in the 10-year-old girls (-1.35 s).

Tab.12. Results of a speed trial achieved by the boys with dysfunctions of the hearing organ (50 m run).

Age	$\bar{x}$	E_x	s	V	Ranges of variability	d
8	10.88	0.33	1.05	9.65	9.62-12.84	-
9	11.30	0.74	2.33	20.62	9.47-17.22	0.42
10	10.71	0.33	0.98	9.15	9.43-11.79	-0.59
11	10.09	0.42	1.62	16.06	6.71-14.22	-0.62
12	9.45	0.25	0.92	9.74	8.13-10.75	-0.64
13	9.18	0.22	1.03	11.22	7.99-11.37	-0.27
14	8.63	0.18	0.82	9.50	7.66-10.55	-0.55
15	8.86	0.30	1.41	15.91	7.60-13.41	0.23
16	8.02	0.21	0.86	10.72	6.78-9.93	-0.84
17	8.46	0.35	1.18	13.95	7.09-11.00	0.44
18	7.97	0.09	0.55	6.90	6.72-9.10	-0.49

Tab. 13. Results of a speed trial achieved by the girls with dysfunctions of the hearing organ (50 m run).

Age	$\bar{x}$	E_x	s	V	Ranges of variability	d
8	12.92	0.45	1.27	9.83	11.17-14.14	-
9	13.09	1.07	3.01	22.99	11.04-18.55	0.17
10	12.06	0.69	1.83	15.17	9.64-14.1	-1.03
11	10.71	0.22	0.91	8.50	9.34-12.52	-1.35
12	10.81	0.42	1.50	13.88	8.59-13.1	0.10
13	9.86	0.19	0.67	6.80	8.39-11.2	-0.95
14	9.67	0.26	0.82	8.48	8.47-11.17	-0.19
15	9.47	0.26	0.82	8.66	8.55-11.23	-0.20
16	9.42	0.17	0.71	7.54	8.18-10.38	-0.05
17	9.47	0.14	0.63	6.65	8.56-10.62	0.05
18	9.61	0.09	0.41	4.27	8.9-10.47	0.14

Changes proceeding in agility of the surveyed boys and girls were evaluated based on results of a shuttle run presented in Tab. 14-15. The average results achieved in the agility trial by the boys ranged from 10.98 s in the 18-year-olds to 16.29 s in the 9-year-olds. The highest increase in the level of that capability was reported in the 12-year-old boys (-2.33 s). The mean results scored in that trial by the girls ranged from 13.09 s in the 18-year-olds

to 17.90 s in the 10-year-olds, with the highest increase in the level of that trait observed for the girls at the age of 11 (-2.23 s).

Tab. 14. Agility of the boys with dysfunctions of the hearing organ (4x10 m shuttle run).

Age	$\bar{x}$	E_x	s	V	Ranges of variability	d
8	15.13	0.68	2.16	14.28	12.37-18.58	-
9	16.29	0.42	1.33	8.16	15.42-18.56	1.16
10	14.72	0.26	0.78	5.30	13.12-15.77	-1.57
11	15.08	0.83	3.21	21.29	11.87-24.00	0.36
12	12.75	0.41	1.47	11.53	10.28-14.37	-2.33
13	13.06	0.35	1.64	12.56	10.75-16.20	0.31
14	12.34	0.37	1.68	13.61	9.91-16.6	-0.72
15	12.29	0.41	1.94	15.79	10.28-19.13	-0.05
16	11.77	0.36	1.48	12.57	9.59-15.72	-0.52
17	12.69	0.63	2.11	16.63	9.53-15.45	0.92
18	10.98	0.15	0.88	8.01	9.18-12.60	-1.71

Tab.15. Agility of the girls with dysfunctions of the hearing organ (4x10 m shuttle run).

Age	$\bar{x}$	E_x	s	V	Ranges of variability	d
8	16.73	0.51	1.43	8.55	14.37-18.3	-
9	17.64	0.40	1.14	6.46	16.63-20.29	0.91
10	17.90	1.01	2.68	14.97	15.74-21.68	0.26
11	15.67	0.39	1.62	10.34	11.84-17.20	-2.23
12	15.78	0.76	2.73	17.30	11.22-21.1	0.11
13	13.67	0.32	1.11	8.12	12.22-16.7	-2.11
14	13.61	0.26	0.83	6.10	12.3-14.88	-0.06
15	13.21	0.39	1.24	9.39	12.39-16.4	-0.40
16	13.76	0.45	1.85	13.44	10.78-16.5	0.55
17	13.48	0.25	1.16	8.61	11.75-15.59	-0.28
18	13.09	0.29	1.25	9.55	11.87-15.88	-0.39

The average values of boys stamina (Tab. 16) analyzed based on the 600 m extended run trial ranged from 183.34 s in the 11-year-olds to 199.24 s in the 10-year-olds. The greatest increase in the level of stamina was noted in the 11-year-old boys (-15.90 s). In turn, the analysis conducted based on the 1000 m extended run demonstrated the mean values of 279.54 s in the 16-year-olds to 345.80 s in the 13-year-olds. Amongst the age groups analyzed,

the greatest increase in stamina level was reported for 14-year-old boys (-50.67 s).

Tab. 16. Stamina of the boys with dysfunctions of the hearing organ (extended run).

Age	$\bar{x}$	E_x	s	V	Ranges of variability	d
600 m run						
8	195.20	8.24	26.05	13.35	162-260	-
9	199.00	15.40	48.68	24.46	164-290	3.80
10	199.24	10.99	32.99	16.56	161-244	0.24
11	183.34	9.42	36.49	19.90	138.6-252	-15.90
1000 m run						
12	312.89	11.79	42.47	13.57	248-371.4	-
13	345.80	12.61	59.14	17.10	234-412	32.91
14	295.13	12.31	56.38	19.10	222-388.2	-50.67
15	316.25	19.19	90.02	28.46	221-570	21.12
16	279.54	15.93	65.64	23.48	206-482	-36.71
17	304.78	13.44	44.62	14.64	255-366.6	25.24
18	297.74	7.45	42.26	14.19	201-342	-7.04

In the case of the girls, the mean level of stamina (Tab. 17) analyzed based on a 600 m extended run ranged from 218.15 s in the 9-year-olds to 264.83 s in the 11-year-olds. The greatest difference in stamina level was observed in the girls at the age of 11 (43.97 s). In turn, the analysis conducted based on the 800 m extended run showed the mean results scored by the girls to range from 247.66 s in the 13-year-olds to 292.08 s in the 17-year-olds. The greatest increase in the level of that trait was noted in the girls at the age of 13 (-30.03 s).

The general level of motor capabilities of the boys with dysfunctions of the hearing organ (Fig. 1) was acknowledge as medium, which has been confirmed by the total score of 43.49 points achieved based on particular trials of the fitness test. The surveyed boys achieved the highest scores in the trials of: functional strength of arms, hand grip strength and body suppleness. Results of the other trials of the fitness test were at a low level. The lowest results were reported in the trials of: standing long jump, stamina and agility.

Tab. 17. Stamina of the girls with dysfunctions of the hearing organ (extended run).

Age	$\bar{x}$	E_x	s	V	Ranges of variability	d
600 m run						
8	254.40	4.34	12.25	4.82	244-269	-
9	218.15	12.71	35.84	16.43	186-274	-36.25
10	220.86	18.28	48.25	21.85	180-290	2.71
11	264.83	16.72	68.88	26.01	156-393	43.97
800 m run						
12	277.69	10.69	38.48	13.86	204-342	-
13	247.66	9.29	33.45	13.51	216-329	-30.03
14	276.16	15.55	53.79	19.48	201-390	28.50
15	264.40	14.98	47.35	17.91	212-340	-11.76
16	274.27	10.29	42.39	15.46	211-346	9.87
17	292.08	11.13	50.97	17.45	192-380	17.81
18	271.21	6.68	28.31	10.44	201-325.2	-20.87

In the case of girls with dysfunctions of the hearing organ (Fig. 2), the level of general motor capabilities was also evaluated as medium based on the score of 41.37 points obtained in the particular trials of the fitness test. Out of the trials preformed, the highest results were achieved by the girls in the functional strength of arms, hand grip strength and body suppleness, whereas the lowest ones – in standing long jump as well as agility and speed trials.

The evaluation of the general level of motor capabilities demonstrated that both girls and boys with dysfunctions of the hearing organ were characterized by the medium level of those capabilities in respect of the Polish standards, which has also been confirmed by results of investigations conducted by other authors. In both cases, the best results were achieved in the static trials, including hand grip strength and functional strength of arms, as well as in a body suppleness trial. In contrast, the worse results were reported in a standing long jump trials and in running trials, including speed, agility and stamina, as well as in a trunk strength trial.

It may thus be concluded that the greatest difference was noted in the trials requiring the appropriate efficiency of an audition analyzer, i.e. those that require a response to a stimulus, which in the case of this study was a signal or sign of starting the trial.

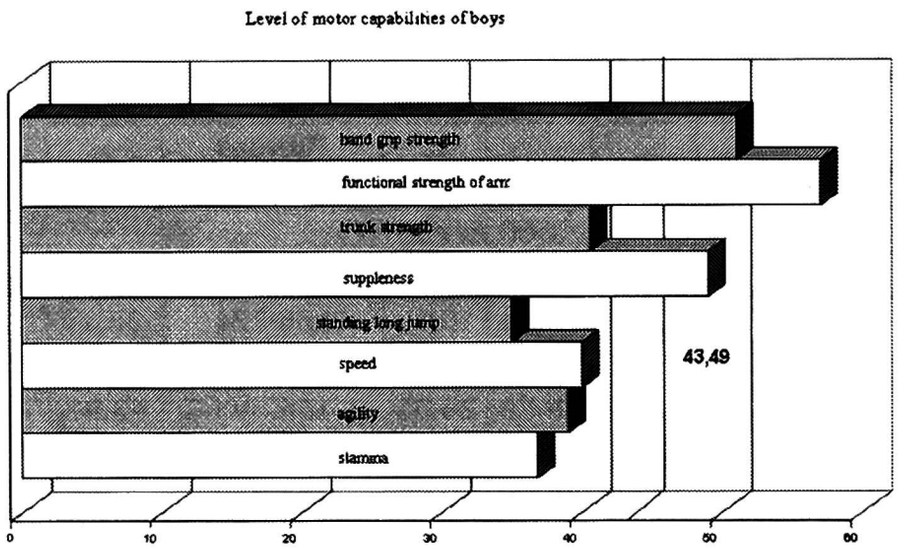

Fig. 1. Level of motor capabilities in the boys with dysfunctions of the hearing organ (points).

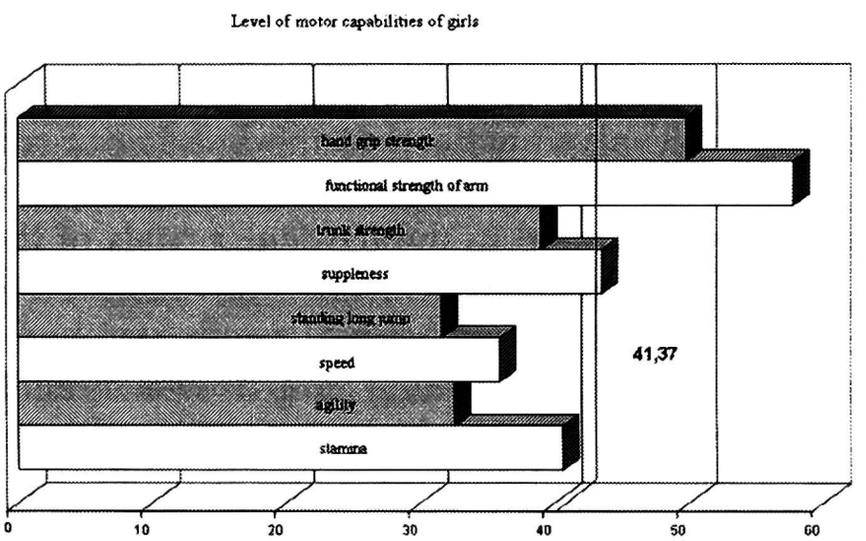

Fig 2. Level of motor capabilities in the girls with dysfunctions of the hearing organ (points).

Conclusions

The analysis of motor capabilities of the surveyed children and adolescents with dysfunctions of the hearing organ enabled formulating the following conclusions:

The general level of motor capabilities in subjects with dysfunctions of the hearing organ, analyzed based on the trials of the International Physical Fitness Test, was evaluated as medium. The analysis of results demonstrated that persons with dysfunctions of the hearing organ reached the highest results in the trials of: hand grip strength, functional strength of arms and body suppleness, whereas the lowest scores – in the trials of: standing long jump, agility as well as in all speed and endurance trials.

Abstract

The work presents results of investigations addressing the evaluation of motor capabilities of children and adolescents with dysfunctions of the hearing organ originating from areas of eastern Poland. Results collected depict, in some part, the current health status of the examined subjects, manifested in the effectiveness of the functioning of internal systems and organs.

The study was diagnostic in character, and the research method applied was a diagnostic survey. It was conducted by means of a technique of participant observation based on a questionnaire and an interview questionnaire. The level of motor capability of the subjects was evaluated based on the International Physical Fitness Test. The survey enabled evaluating the general level of motor capabilities of the pupils examined. According to guidelines of the test, three levels of motor capabilities were adopted in the study, i.e. high, medium and low. Results obtained were compared with results of the nation-wide surveys conducted for children and adolescents.

The protocol of the study was approved by the Bioethics Commission for Scientific Research at the Academy of Physical Education in Katowice (Resolution No. 3/2006 of the 27th of April 2006).

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