

## IMPACT OF A SPORTS PROGRAM ON THE FUNCTIONAL ABILITIES OF CHILDREN AGED 5 TO 6 YEARS

Biljana Trajkovski<sup>1</sup>, Zvonimir Tomac<sup>2</sup> and Dražen Rastovski<sup>2</sup>

<sup>1</sup> Faculty of Teacher Education, University of Rijeka, Croatia

<sup>2</sup> Faculty for educational sciences, University of J.J. Strossmayer in Osijek, Croatia

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### Abstract

The aim of this study is to determine the differences in functional abilities among preschool children who are involved in additional exercise programs and those children who are not, and to identify the differences between boys and girls in the expression of aerobic capacity. The factor analysis of variance for the Polygon3 minutes test showed that respondents differ significantly with respect to age, gender, group, and that there is an interaction of gender and group. Thus, it can be concluded that gender and group significantly affect the development of functional skills. In doing so, the boys score better than girls, and children from the experimental group have more developed functional abilities than children attending the regular kindergarten program. These differences are more pronounced in boys, while boys in the experimental group achieve higher scores in both age categories, and girls only at the age of 6.

**Key words:** functional abilities, preschoolers, sports program, gender, age, differences

### Introduction

Since today's preschool children satisfy the authentic need for movement to an increasingly lesser extent, the question on the decline of their kinanthropological traits and abilities is raised and whether the decline in these abilities affects their health. The conclusion follows that the consequence of non-movement in such small children undermines their harmonious growth and development, and for this reason children need to have access to daily movement (spontaneous or organized) in kindergartens and in their families and it is necessary to monitor their kinanthropological condition, especially their functional abilities which are directly related to the emergence of obesity. Research argue that children who are physically active have lower levels of blood fats, higher values of the protective lipoprotein HDL, a higher cardio-respiratory activity, better motor skills and better motor and functional abilities (Parizkova, 2008). As a result, there is a need to encourage physical activity in preschool children on a daily basis in both an organized environment (kindergarten), and during leisure time (in the family). At preschool age, from functional capacities it is desirable to develop the primarily aerobic capacity (endurance), while with the anaerobic activities the children's capacity is sufficient for the activities in the duration of 10 to 15 seconds (Malacko, 2002, Matković, 1999).

Some authors have noted that children who are not as active at preschool age have reduced functional abilities (Ferro-Luzziet al., 1979), while it was found that children who have better functional abilities have lower blood pressure already in the fifth year of life (Hofman et al., 1987). Apart from the found differences in functional capabilities between physically active and physically inactive preschool children, some studies indicate better functional abilities in boys than girls (Cardonet al., 2008).

The aim of this paper is to determine the differences in functional abilities among preschool children who are involved in additional exercise programs and those children who are not, and to identify differences between boys and girls in the expression of aerobic capacity.

### Methods

#### *The sample*

The sample consisted of 302 subjects of 5 and 6 years of age from five kindergartens in an urban area of Croatia and two kindergartens from a rural area. 146 subjects represented the experimental group (66 five-year olds (23 girls and 43 boys) and 80 six year-olds (26 girls and 54 boys) who attend a physical education program, "Through play to sport" 4 times a week for 45 minutes in the mornings (Pejčić, 2003). The control group consisted of 156 subjects (93 five-year olds (42 girls and 51 boy) and 63 six year-old (39 girls and 24 boys) who attend the regular program.

#### *The sample of variables*

The evaluation of the functional efficiency of preschool children was conducted using the polygon barrier (Polygon 3 min) whereby the checked variable was: the distance traveled (m). The polygon barrier was constructed of obstacles of the "sliding-type" and had as the main goal running for 3 minutes with the transition across simple obstacles: running around 4 stands (slalom), running over more than 4 rings, running over the bench (height 10 cm), skipping over 4 beams (height 5 cm) and running over 2 mats.

#### *Methods of data processing*

For the purposes of this research, the distance in meters for a period of 3 minutes was measured. Descriptive parameters, the t-test for independent samples and the factor analysis of variance were calculated in further processing of the data.

## Results and discussion

Table 1. Comparison of measurements of functional ability of the experimental and control groups in boys and girls aged 4, 5 and 6.

		5 YEARS				6 YEARS			
	GROUP	XM±SD	XF±SD	t	p	XM±SD	XF±SD	t	p
DISTANCE (m)	CONTROL	373±46	368±47	0,517	0,606*	403±40	386±43	1,633	0,107
	EXPERIMENT.	426±48	380±61	3,399	0,001*	439±45	423±35	1,549	0,125
t		-5,418	-0,828			-3,352	-3,750		
p		0,000*	0,411			0,001*	0,000*		

\*-p=0.05; XM - arithmetic mean boys; XF- arithmetic mean girls

Table 3. Results of the post-hoc analysis with the Bonferroni\*correction for multiple comparisons for the test DISTANCE (m)

	AGE	GENDER	GROUP	1	2	3	4	5	6	7	8
1	5	1	1		1,000	1,000	0,000	1,000	0,001	0,393	0,000
2	5	1	2	1,000		1,000	0,014	1,000	0,098	1,000	0,000
3	5	2	1	1,000	1,000		0,000	1,000	0,001	0,782	0,000
4	5	2	2	0,000	0,014	0,000		0,011	1,000	1,000	1,000
5	6	1	1	1,000	1,000	1,000	0,011		0,130	1,000	0,000
6	6	1	2	0,001	0,098	0,001	1,000	0,130		1,000	1,000
7	6	2	1	0,393	1,000	0,782	1,000	1,000	1,000		0,176
8	6	2	2	0,000	0,000	0,000	1,000	0,000	1,000	0,176	

The differences in functional abilities between boys and girls separately by age and belonging to a group (control, experimental) were verified by using the t-test for independent samples. The obtained results of the t-test for independent samples for boys and girls aged 5 and 6 in the control and experimental group and the statistical significance of differences between these two groups are shown in Table 1. Children aged 5 years are statistically significantly different with regard to gender in the experimental group in favor of the better results of boys ( $426 \pm 48$  as opposed to  $380 \pm 61$ ,  $p = 0.001$ ), and the boys are significantly differ with respect to belonging to the control and experimental group in favor of the better results of boys from the experimental group ( $426 \pm 48$  to  $373 \pm 46$ ,  $p = 0.000$ ).

Children aged 6 years in the area of functional abilities are statistically significantly different only with regard to belonging to a group. Children in the experimental group, boys ( $403 \pm 40$  to  $439 \pm 45$ ,  $p = 0.001$ ) and girls ( $386 \pm 43$  to  $423 \pm 35$ ,  $p = 0.000$ ) showed statistically significantly better results than those in the control group. Results of factor analysis of variance and the post-hoc analysis for the Polygon3 minutes test are shown in Tables 2 and 3.

Table 2. Factor analysis of variance for the polygon3 minutes test (DISTANCE (m)) for the factors age, sex and group (SS= sum of squares, MS = middle square, F= result of the F-test and p =significance level).

distance (m)	SS	MS	F	P
age	63493	31747	13,82	0,000*
gender	26130	26130	11,38	0,000*
group (e/c)	101621	101621	44,25	0,000*
age*gender	1404	702	0,31	0,736
age* group (e/c)	4758	2379	1,04	0,355
gender* group (e/c)	12963	12963	5,65	0,017*
age*gender* group (e/c)	10028	5014	2,18	0,113

\*p=0,05

In the polygon3 minutes test the subjects significantly differ with respect to age ( $F = 13.82$ ,  $p = 0.000$ ), gender ( $F = 11.38$ ,  $p = 0.001$ ) and group ( $F = 44.25$ ,  $p = 0.000$ ), and with regard to the interaction of gender and groups ( $F = 5.65$ ,  $p = 0.018$ ). Table 3 shows the statistical significances of mutual comparison for the polygon3 minutes test (DISTANCE (m)) by subgroups (according to age, gender and belonging to the experimental or control group) which were conducted by using the post-hoc analysis with the Bonferroni correction for multiple comparisons. In the area of functional abilities (Table 1) differences between boys and girls aged 5 were observed only in the experimental group where boys cross statistically significantly more meters than girls. Differences exist also among boys aged 5 between the experimental and control groups: boys from the experimental group achieve a significantly higher score in the test. In children of 6 years of age statistically significant differences between the control and experimental groups were obtained, both in boys and in girls in favor of better results in boys and girls from the experimental group. This suggests that children who regularly participate in a sports program develop better functional abilities than children who do not participate in a sports program. A factor analysis of variance for the polygon 3min (Table2) test shows that subjects differ significantly with regard to age, sex, group, and there is an interaction of gender and the group. Thus, one can say that both gender and group significantly affect the development of functional skills. Thereby boys score better than girls, and children from the experimental group have better developed functional abilities than children attending the regular kindergarten program. These differences are more pronounced in boys, whereby boys from the experimental group achieved higher scores in both age categories, and girls only at the age of 6.

The positive effects of physical activity on the increase of aerobic endurance were confirmed by other authors (Haskell et al., 1985 Hofman et al., 1987), as well as that boys are more active than girls and thus exhibit a better aerobic endurance (Oliver et al., 2007).

### Conclusion

It is not necessary to train preschool children to achieve aerobic capacity because they will develop it spontaneously if they are provided with daily

space and time to play whereby running has the dominating role. With regard to the present time when preschool children sit too much and their sedentary life style supports the emergence of obesity, the role of profession is to help the emergence of this disease and to allow each child a proper growth and development so that with the progress instead of backward they would go forward, as the old famous proverb says "healthy mind in a healthy body!" For this reason, the question of development monitoring of functional skills already from pre-school age is raised.

### References

- Cardon, G.M., & De Bourdeaudhuij, I.M. (2008). Are preschool children active enough? Objectively measured physical activity levels. *Res Q Exerc Sport*, 79(3), 326-332.
- Ferro-Luzzi, A., D'Amicis, A., Ferrini, A.M., & Maiale, G. (1979). Nutrition, environment and physical performance of preschool children in Italy. *Nutrition Dietary*, Vol. 27, 85-106.
- Haskell, W.L., Montoye, H.J., & Orenstein, D. (1985). Physical Activity and Exercise To Achieve Health-Related Physical Fitness Components. *Public Health Reports*, 100(2), 203-211.
- Hofman, A., Walter, H.J., Collelly, P.A., & Vaughan, R.D. (1987). Blood pressure and physical fitness in children. *Hypertension*, 9, 188-191.
- Malacko, J. (2002). Effects of specific programmed training on morphological characteristics and motor abilities in children sports school. *Kinesiologia Slovenica*, 2, 44-49.
- Oliver, M., Schofield, M.G., & Kolt, S.G. (2007). Physical Activity in Preschoolers. Understanding Prevalence and Measurement Issues. *Sports Medicine*, 37(12), 1015-1070.
- Parizkova, J. (2008). Impact of education on food behaviour, body composition and physical fitness in children. *Br. J. Nutrition. Suppl 1*, S26-32.
- Pejčić, A. (2003). *Igrom do sporta*. Rijeka: Dječji vrtić Rijeka, Grad Rijeka.

## UTJECAJ SPORTSKOG PROGRAMA NA FUNKCIONALNE SPOSOBNOSTI DJECE UZRASTA 5 I 6 GODINA

### Sažetak

Cilj ovog rada je utvrđivanje razlika u funkcionalnim sposobnostima između djece predškolske dobi koja su uključena u dodatne tjelovježbene programe i djece koja nisu, te utvrditi razlike između dječaka i djevojčica u izražavanju aerobnog kapaciteta. Faktorska analizom varijance za test Poligon 3 minute je pokazala da se ispitanici statistički značajno razlikuju s obzirom na dob, spol, skupinu, te postoji interakcija spola i skupine. Dakle, može se reći kako i spol i skupina značajno utječu na razvoj funkcionalnih sposobnosti. Pri tome dječaci postižu bolje rezultate od djevojčica, a djeca eksperimentalne skupine imaju razvijenije funkcionalne sposobnosti od djece koja pohađaju redovni program u vrtiću. Te su razlike izraženije kod dječaka, pri čemu dječaci iz eksperimentalne skupine postižu bolje rezultate u obje dobne kategorije, a djevojčice samo u dobi od 6 godina.

**Ključne riječi:** funkcionalne sposobnosti, predškolci, sportski program, spol, dob, razlike

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Correspondence to:

Assis.Prof. Biljana Trajkovski, Ph.D.

Faculty of Teacher Education

University of Rijeka

51000 Rijeka, Sveučilišna avenija 6, Croatia

Phone: +385 (0)51 265 811

E-mail: biljana@ufri.hr