

*Original Research Article*

# The relationship between motor abilities, physical activity and gender in preschool children

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## Abstract

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The aim of this study was to establish the relationship between motor abilities, physical activity and gender in preschool children. The research was conducted on sample of 143 preschool children (71 boys and 72 girls) at the age of six. The group who participated in physical activity program was consisted of 68 (34 boys and 34 girls) children, while the group that was not enrolled in any physical activity in kindergarten was made of 75 (37 boys and 38 girls) pre-schoolers. The sample of variable was composed of six motor tests, gender and physical activity. For determining the relationship between motor abilities, physical activity and gender the regression analyses was used. The significant relations were found between boys and coordination, also between girls and flexibility and balancing. Concerning physical activity the positive correlations are found in explosive strength and negative between active girls and balancing. These results are important to consider when establishing physical activity recommendations or targeting health promotion interventions in preschool boys and girls.

**Keywords:** Boys, Early childhood, Girls, Motor proficiency, Physical exercise

## INTRODUCTION

Preschool age is a very important period for human motor behaviour because it is critical in the development of fundamental motor skills (Gallahue and Donnely, 2003). The mastery of certain fundamental motor skills is a prerequisite if we are to function on a daily basis and participate in later physical or sport activities (Venetsanou and Kambas, 2011). It has been demonstrated that the motor abilities in early age has an important role in performance of numerous fundamental movement skills (Ikeda and Aoyagi, 2009; Gontarev et al., 2014), so the significance of motor abilities in that period of life is obvious.

The motor abilities of preschool children have been investigated by a number of researchers. In some studies, gender differences in motor abilities have been reported (Ikeda and Aoyagi, 2009). The previous research of motor abilities in young children concluded that the boys are superior in tests that evaluating

coordination, strength, velocity, while the girls are significantly better in flexibility and balance (Toriola and Igbokwe, 1986; Al-Haroun, 1987; Gallahue and Ozmun, 1998; Bala, 2003; Cvetković et al., 2007; Milanese et al, 2010).

Meanwhile, few researches investigated the interaction of gender, movement performance and physical activity. Moreover, physical activity is necessary in preventing overweight and obesity in young children, which reached epidemic levels in everyday life (Bonvin et al., 2012). Differences in motor performance and in measured physical activity are well documented in school children and also are reported and proposed to start with prevention strategies in preschool age in order to avoid large discrepancies (Singh et al., 2010; Monasta et al., 2011).

Respectively, the aim of this study was to establish the relationship between motor abilities, physical activity and

**Table 1.** The relationship between motor abilities and gender in preschool children

Significant of regression	F – value(6,136)=5,0093 p<,00011		
Motor performance Multiple R = 0,43	Boys (n=71)	Girls (n=72)	Standardise Beta regression
SUP30	14,45 ± 4,61	14,40 ± 4,00	0,098
PBW	11,81 ± 4,35	13,73 ± 4,67	0,264*
SAR	1,92 ± 6,79	5,52 ± 6,60	0,291*
APT	13,43 ± 2,24	13,21 ± 2,11	0,045
SLJ	114,57 ± 17,40	108,56 ± 18,67	-0,139
SOL	10,21 ± 7,16	12,88 ± 8,70	0,178*

\* = marked p-value statistically significant at  $p \leq 0,05$

**Table 2.** The relationship between motor abilities and physical activity in girls and boys

Significant of regression models	F – value (6,64)=1,8270 p<,10778 F – value (6,136)=4,4911 p<,00035	
Motor performance Multiple R = 0,40	Standardise Beta regression coefficient in boys	Standardise Beta regression coefficient in girls
SUP30	0,049	0,118
PBW	0,186	-0,201
SAR	0,034	0,146
APT	0,218	0,007
SLJ	0,323*	0,356**
SOL	-0,246	-0,287*

\* = marked p-value statistically significant at  $p \leq 0,05$

\*\*=backwardstepwiseregression model

gender in preschool children at the age of 6.

## METHODS

For the purpose of this study the subject was composed from a population of children from three Kindergartens in city of Zagreb (Iskrica, Potočnica and Vrbik). The research was conducted on sample of 143 preschool children (71 boys and 72 girls) at the age of six. The group who participated in physical activity program over three years (two lessons a week for 35 minutes of exercising) was consisted of 68 children (34 boys and 34 girls), while the group that was no enrolled in any physical activity in kindergarten was made of 75 pre-schoolers (37 boys and 38 girls).

The research variables were obtained on the basis of a set of six motor tests for accessing motor abilities: polygon backward (PBW) for establish coordination, sit and reach (SAR) for flexibility, standing long jump (SLJ) for explosive strength, arm plate tapping (APT) for frequency of movement, standing with one leg on the cube (SOL) for balancing and sit-ups in 30 seconds (SUP) for assess repetitive strength. The variables were also gender and amount of physical activity. All tests

were performed in standard conditions, using standard apparatuses and under the supervision of the authors of this paper.

All obtained results were calculated by statistic package Statistics for Windows 7.0. The basic statistic parameters were calculated for all variables. For determine the relationship between motor abilities, physical activity and gender in preschool children the regression analyses was used. All found relationships between variables and groups of subjects are significant at  $p < 0.05$ .

## RESULTS

The conducted results of regression analyses, which was used to establish whether boys and girls are statistically significantly related in motor abilities according to gender, show that there is statistically significant relationships between gender and motor abilities, respectively concerning coordination (PBW), flexibility (SAR) and balancing (SOL) (Table 1.).

The results of regression analyses for all variables that specify motor performance in preschool boys and girls that are physically active or inactive are shown in table 2.

From the obtained results it can be seen that there is statistically significant relationships between *standing long jump* and physical activity in boys, and statistically significant relationships between *standing long jump* and *standing with one leg on the cube* according physical activity in girls.

## DISCUSSION

The goal of this study was to evaluate the relationship in motor abilities according to gender and according to physical activity in preschool children at the age of 6. The gender related association were found in several motor abilities. The boys are positive correlated with *polygon backward* which means that they are superior then girls in coordination, while the girls are positive correlated in *sit and reach* and *standing with one leg on the cube* which can be discussed that they are greater than boys in flexibility and balancing.

The similar founding were established in study of Toriola and Igbokwe (1986) who examined the difference in motor performance according to age and gender of 341 Nigerian preschool children. Analysis of variance was used to determine significant differences of the groups. At each age level the boys consistently performed better than girls in four of six motor tests: catching, standing long jump, tennis ball throw and speed run, while the girls were better in balancing. Also Bala (2003) measured the sample of 223 boys and 144 girls, 4 – 7 years of age, with three anthropometric measures and seven motor tests. The obtained results show that the boys have significantly better results in motor tests for estimation of explosive strength and functional coordination of primary motor abilities, whereas the girls performed better in flexibility tests. Correspondingly the Venetsanou and Kambas (2011) investigate the effect of age and gender on balance skills in preschool children. From the data analysis the significant gender differences were found in the subtest score and on six of the items in favour of a girl.

Regarding the relationship between motor abilities and physical activity in girls and boys in this study is established that boys involved in physical activity two times per week for 35 minutes are better in explosive strength than boys that are inactive. Also the girls that are physically active are positive correlated with explosive strength and negative in balancing. This founding indicates that physical activity positively affects on the development of explosive strength in boys, also in girls on explosive strength and flexibility but have not enough influence on balancing. That can be explained by fact that early childhood is characterized by a very intensive development of some abilities such as speed and coordination, whereas the development of others, such as balance, flexibility and endurance is a bit slower (Malina, 2004).

Few intervention studies examined relationships between motor abilities and physical activity among preschool boys and girls. They reported an association between motor abilities and time spent in physical activity. The authors concluded that children with poorer motor skills were less active than children with better developed motor skills, respectively motor abilities are positively associated with physical activity and inversely associated with sedentary activity in preschoolers (Wrotniak et al., 2006; Williams et al., 2008; Ikeda and Aoyagi, 2009; Ward et al., 2010; Bonvin et al, 2012; Bellows et al., 2013).

## CONCLUSION

In conclusion, our study provides information about association concerning motor abilities according to gender and physical activity in 6 year old preschool children. At this early age the positive correlation, concerning gender, were found in several motor abilities, in particular coordination, flexibility and balancing. Concerning physical activity the positive correlations are found in explosive strength. These results are important to consider when establishing physical activity recommendations or targeting health promotion interventions in preschool boys and girls.

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