

# DIFFERENCES IN MOTOR ABILITIES OF BOYS PARTICIPANTS OF THE ATHLETIC SESSIONS

Miloš Petrović

Faculty of Sport and Physical Education, Novi Sad, Serbia

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## Abstract

*In a sample of 164 participants of athletic sessions, aged 12-14 years who were divided into three subsamples per year, were implemented 8 tests. The problem of research was to analyze the manifestation of motor abilities of boys involved in the athletic section and to imply the existence of quantitative and qualitative differences in the manifestation of motor skills. The goal was to determine differences in motor abilities of boys involved in the athletic sections. Multivariate analysis of variance has shown the existence of statistically significant differences between age groups of boys. Discriminative analysis has shown two statistically significant discriminate factors that indicate the existence of considerable qualitative differences in motor abilities between boys of 12-14 years of age. After examining the maximum value of anthropometric and motor variables accelerants in the growth and development could be identified. These results could also be used in physical education for the evaluation of the effects of training program in athletic sections and making assessment of the results of development and physical quality.*

**Key words:** puberty, motor skills, differences.

## INTRODUCTION

Modern way of life has affected the man's natural need for movement and imposed a sedentary lifestyle as a reality. Inclusion of children in the program of athletic schools is one of the best methods for right mental and physical development, prevention of deformity, creation of working habits and social contacts, leisure time engagement and release of excessive energy (Kraemer & Fleck, 2005).

According to Baechle, Earle & Watchen (2000), the basis of workout is presented with acronym, SAID (Specific Adaptation Imposed Demands), in other words specific adaptation to imposed demands. The ultimate goal of workout is development of physical potential of young athletes. As the worldwide rate of obesity increases, the most important task becomes developing habit of exercise (Kraemer & Zatsiorsky, 2009). At this age it is necessary to teach children how to perform basic exercises, than follow up with gradual load in each exercise, as well as emphasizing the technique and gradually introduce more advanced exercises with little or no load.

Results in athletics can serve as the most realistic means for assessing the development of individual's abilities. Athletic programs are based curriculum in schools, both in the country and in the world (Mihajlović, 2005). It is certain that athletics with its natural resources is one of the most objective and best quality indicators of complex motion activities of the individual. Therefore, it should be used as a modern approach in regular teaching methods. There are possible oscillations it is considered that puberty in boys begins about 11 and finishes about 15 years of age (Barber-Westin, Noyes, Galloway, 2006; Philippaerts, Vaeyans, Janssens, Van Rentreghem, Matthys, Craen et al. 2006). Apart from physiological changes, puberty is characterized

by emotional changes, different attitudes related to lifestyle and identity crisis.

The area of motor abilities of young boys were previously processed in the studies by Rowlands, Ingledew, Eston (2000); Stojiljković, Branković, Milenković, Stojiljković, Joksimović (2007); Milenković (2009); Faigenbaum, James, Buchanan, Ratamess, Kang, Hoffman (2010), where were suggested that boys in this period vary in all aspects of power and speed, while in terms of flexibility the authors were divided. The main issue of this research is to analyze the manifestation of motor abilities of boys participants of several athletic schools, and to determine the existence of qualitative and quantitative differences in the manifestation of motor skills.

## METHOD

Testing was conducted in October 2010, one month after the athletic session's starts with program in the new school year. Only subjects who have experience of at least 2 school years in the athletics section were taken in further analysis. Research was performed on the sample of 164 boys divided in subsamples of 58 boys of 12 years, 54 boys of 13 years, and 52 boys of 14 years. All boys were participants of school athletic clubs in Senta, Novi Sad, Sremska Mitrovica and Šabac. Subjects were male who attended athletic sessions three times per a week; school program implemented standard athletic activities for ages between 12 to 14 years. Parents and their children gave consent for voluntary participation in testing. The battery of measuring instruments were consisted of 8 standard motor tests: 1) Seated medicine ball throw, 2) Standing broad jump, 3) Sargent jump test, 4) Deep forward bend on the bench, 5) Dislocation with a stick, 6) Depth forward bend position with spread legs, 7) 20-m dash, 8) 60-m dash.

Mean and standard deviation were calculated for all the variables. To determine the significance of differences in the applied variables, there were used the multivariate analysis of variance (MANOVA), univariate analysis of variance (ANOVA) and discriminant analysis (DISCRA).

## RESULTS

Multivariate analysis of variance indicates a statistically significant difference between groups in the entire system of variables (Table 1,  $F = 7.40$ ,  $P =$

0.00), and it can be concluded that all three groups of participants of athletic sessions differ significantly in the entire space of variables. Table 1 shows the means (M) and standard deviations (SD) of different age groups of boys and the results of univariate analysis of variance (ANOVA), with the aim of determining differences between each individual variable. These results clearly indicate that subjects significantly differ in all variables except the variable of depth forward bend position with spread legs.

Table 1.  
DESCRIPTIVE STATISTICS AND DIFFERENCES

VARIABLES	Age	M	SD	f	p
Seated medicine ball throw (cm)	12	545.10	66.4	24.97	0.00
	13	607.40	120.8		
	14	678.80	104.0		
Standing broad jump (cm)	12	156.80	23.0	22.73	0.00
	13	169.70	27.3		
	14	189.30	25.3		
Sargent jump test (cm)	12	26.90	6.0	27.76	0.00
	13	32.20	6.8		
	14	36.10	6.7		
20-m dash (0,1 s)	12	36.30	0.24	13.92	0.00
	13	35.60	0.19		
	14	34.00	0.28		
60-m dash (0,1 s)	12	110.00	0.71	14.33	0.00
	13	106.80	0.57		
	14	103.30	0.83		
Deep forward bend on the bench (cm)	12	22.70	7.3	4.10	0.02
	13	24.20	6.4		
	14	26.00	7.8		
Dislocation with a stick (cm)	12	97.20	11.4	3.97	0.02
	13	103.80	14.0		
	14	98.00	14.5		
Depth forward bend position with spread legs	12	34.70	9.0	0.31	0.73
	13	34.90	9.3		
	14	36.10	11.0		

$F=7.40$        $P=0.00$

Table 2 shows percentage values of variance discriminant function in the complete motor space, where the first variable explained 84% of the variance of the overall system of eight motor variables and the second variable much less (16%). It can be concluded that both discriminative factors are statistically significant. Table 2 presents the correlation coefficients between each variable and discriminant function, where could be noticed that the greatest contribution to the discrimination between groups, on the first discriminative function was Sargent jump test, seated medicine ball throw, standing broad jump, 60-m dash and 20-m dash. Therefore, this factor can be defined as an explosive power. The greatest contribution to group

discrimination in the second discriminative function were given by the variables, dislocation with a stick, depth forward bend position with spread legs and deep forward bend on the bench, which can be defined as flexibility. It is noticeable that the group of boys aged 14 significantly differs from the group of boys aged 12 at the first discriminative function (Table 2). The second discriminative function significantly distinguished group of boys aged 13 which has the best results, compared to the boys aged 12 and 14 years. Groups of boys aged 12 and 14 in the second discriminative function is relatively similar (-0.21 and -0.30 values).

Table 2.  
SUMMARY OF DISCRIMINANT ANALYSIS

VARIABLES	DF2	
DF1		
Sargent jump test		
Seated medicine ball throw	0,70*	0,02
Standing broad jump	0,66*	-0,17
20-m dash	0,63*	-0,28
60-m dash	-0,51*	0,020
Dislocation with a stick	-0,50*	-0,02
Deep forward bend on the bench	0,06	0,57*
Depth forward bend position with spread legs	0,24	0,29*
	0,06	-0,08*
Variance(%)	84,0	16,0
CR	0,64	0,34
$\lambda$	0,52	0,88
$\chi^2$	102,51	19,56
p	0,00	0,01
Group	C1	C2
12 age	-1,01	-0,21
13 age	0,12	0,51
14 age	0,10	-0,30

Legend: DF – discriminative factor, CR – coefficient of canonical correlation,  $\lambda$  – Wilks' Lambda,  $\chi^2$  – chi-square test, p – the level of statistical significant of chi-square test, C – centroids of subject groups.

## DISCUSSION

It is observed after the analysis of means and variability of the variables shown in Table 1 that subjects differ in all variables except the variable Depth forward bend position with spread legs. Also, subjects manifested better results, pointing to the fact that motor skills are developing intensively during this period. Previous knowledge of the characteristics of the ontogenesis in some periods is the basic precondition for the rational management of the individual development of motor skills and access programming process of training (Peterson, Alvar, Rhea, 2006). In the researches of Mejovšek, Antekolović and Dobrila (2003); Stojiljković, Branković, Milenković, Stojiljković and Joksimović

(2007); Rowlands, Ingledew, Eston (2000); Faigenbaum, James Buchanan, Ratamess, Kang, Hoffman (2010), Milenković (2009), Đinić, Mihajlović, Petrović (2010), Krsmanović and Berković (1999), Gamble (2010) were stated that development of these motor skills follows a certain trend, have their own dynamics. The total growth of muscle strength in the period from 9 to 16 years is 260% and this was most distanced in the first 2 to 3 years after puberty "leap" of growth (Krsmanović & Berković, 1999). These results can also be compared with the previously achieved results and based on that, the dynamics of development of certain motor skills could be observed. After the insight in the maximum value of anthropometric and motor variables, the growth and development could be identified. The obtained results indicate that the participants have achieved better results in comparison to their peers, as confirmed by Mihajlović (1996), Šolaja (1995), Petrović (2010).

## CONCLUSION

These results can be used in physical education for the evaluation of the effects of training program in athletic sessions by periodical testing of motor abilities and making assessment of the results of development and physical quality. Besides all this, these results provide insight into the current status of tested participants of the athletic sessions, and they could be compared with results obtained with subjects in other athletic sessions and different sports. Monitoring of sports practice both in the country and abroad shows that achieving high sport scores in mature age depends to a high degree on the proper oriented and well organized teaching process with children (Mihajlović, 2005). There are different criteria for assessment of the activity and efficiency in the entire system of physical education. It is certain that special place should be given to a planned and systematic monitoring of the development of motor skills. That is the reason why the problem of physical activity is related to well-timed selection in the different sports, and solution to this problem should have an important place in an observation of the overall problem.

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## RAZLIKE U MOTORIČKIM SPOSOBNOSTI DEČAKA UKLJUČENIH U RAD ATLETSKIH SEKCIJA

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### **Sažetak**

Na uzorku od 164 polaznika atletske škole, uzrasta od 12-14 godina, podjeljenih u tri subuzorka po godinama, primenjena je baterija od 8 motoričkih testova. Problem istraživanja je da se analiziraju ispoljavanja motoričkih sposobnosti dečaka, uključenih u rad atletske sekcije i da se nagovesti postojanje kvantitativnih i kvalitativnih razlika u manifestovanju motoričkih sposobnosti, a cilj je bio da se utvrde razlike u motoričkih sposobnosti dečaka uključenih u rad atletske sekcije. Multivarijantnom analizom varijanse utvrđeno je postojanje statistički značajnih razlika između uzrasnih grupa. Diskriminativnom analizom utvrđeno je postojanje dva statistički značajna diskriminativna faktora koji ukazuju na postojanje značajnih, kvalitativnih razlika u motoričkim sposobnostima između dečaka uzrasta 12, 13 i 14 godina. Uvidom u maksimalne vrednosti antropometrijskih i motoričkih varijabli mogu se detektovati akceleratori u rastu i razvoju. Ovi rezultati se takođe mogu koristiti u nastavi fizičkog vaspitanja za valorizaciju efekata vežbanja po programu u atletske sekcijama i pravljenje procene postignutog razvoja i fizičkog kvaliteta.

**Ključne reči:** pubertet, motoričke sposobnosti, razlike.

Author for correspondence:

Miloš Petrović, MSc  
University of Novi Sad  
Faculty of Sport and Physical Education,  
Novi Sad, Serbia  
e-mail: milos5rovic@yahoo.com