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Development of Motor and Specific Motor Abilities for Athletics in Elementary School Male and Female First-Graders

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A B S T R A C T

The aim of the study was to determine canonic relations between the set of basic motor variables and the set of athletic variables assessing the abilities of sprint, throw and long-distance run adjusted for children aged seven years. Study sample consisted of 635 first-graders from Split elementary schools, divided into groups of 325 male and 310 female subjects. The set of nine variables of the basic motor space and three variables of situation motoricity in athletics were applied at the beginning and at the end of the academic year. Association between the sets of variables was determined by canonic correlation analysis. In male subjects, association between the sets of variables revealed a predominant effect of explosive strength on the sprint and throw ability on initial measurement. On final measurement, association in the first pair of canonic dimensions was underlain by the favorable impact of all strength factors with a predominance of explosive strength, which was accompanied by the development of flexibility and coordination, influencing performance in sprint and throwing; the second canonic variable was bipolar, differentiating aerobic endurance ability determined by above-average flexibility, frequency of lower extremity movements and static strength, and throwing ability determined by above-average equilibrium, explosive strength, coordination and repetitive strength. In female subjects, on initial measurement association in the first pair of canonic dimensions was mostly determined by the effect of explosive strength, repetitive strength of the trunk and movement frequency on general ability in athletics defined by the abilities of sprint, throw and long-distance run. Association in the second pair of canonic dimensions was determined by the impact of explosive strength and flexibility on sprint performance on the one hand, and by the effect of movement frequency and repetitive strength of the trunk on long-distance run performance on the other hand. In female subjects, final measurement yielded only one significant canonic correlation underlain by the impact of all strength factors, frequency of lower extremity movements and flexibility on performance in the athletic events of sprint and throw. Relations between the sets of variables are also discussed according to sex.

Key words: *motor development, athletic abilities, canonic relations*

Introduction

The growth and maturation are influenced by the interaction of genes, hormones, nutrition and environment (Malina 1984)[1]. Increased physical activity is one of the environmental factors with a favorable impact on the growth and maturation. During the process of growth, significant changes in anaerobic strength and aerobic capacity occur under the influence of physical exercise (Bouchard et al. 1981)[2]. Physical activity influences the development of oxygen consumption (Bunc and Heller 1993)[3], aerobic strength and muscle strength (Shepard and Zavallee 1994)[4].

Specially programmed physical and health education curriculum predominated by athletics elements was found to significantly influence the development of aerobic endurance, flexibility, explosive, static and repetitive strength, and equilibrium in elementary school female first-graders (Katić 1995)[5].

In younger schoolchildren, motor abilities undergo homogeneous and continuous improvement as a function of age and sex. Even at preschool age, they are characterized by gradual neuromuscular maturation and development of basic movement models (walking, running and

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jumping). Once the basic movement structures have been properly adopted (around the age of six years), along with the child's developmental characteristics, bodily activity becomes a significant factor influencing development of the child's motor abilities (Malina and Bouchard, 1991)[6].

Studies reported in the literature (Babin et al. 2001[7]; Katić 2003[8]; Katić et al. 2005[9]) have demonstrated the development of motor abilities at the age of eight years to show a comparable pattern in male and female children, yet with some sex related specificities. Sex differences in motor abilities that develop at preschool age (and even earlier) determine motor functioning in first-graders. On solving and performing motor tasks, male children predominantly use strength, whereas female children mostly use speed (along with flexibility), i.e. each group use the abilities that are potentially more available.

In the study by Babin et al.[7], the structure of discriminative function of the variables of differences between initial and final measurements indicated complex changes in motor abilities of male and female children to have occurred at the age of eight years, while the flexibility, psychomotor speed, and to a certain extent coordination developed at a faster rate in girls. These changes are likely to be generated by both physical activities performed at school (Bouchard et al. 1981[2]; Malina and Bouchard 1991[6]; Katić 1995[5]; Babin et al. 2001[7]; Srhoj Lj et al.[10]; Delaš et al.[11]; Mihaljević et al.[12]; Erceg et al.[13]) and by biological continuity of developmental functions (Bale et al.1992[10]; Katić et al. 1994[11]; Katić and Viskić 1996[16]; Katić 2003[8]; Katić et al.[17]; Katić et al.[18]; Vlahović et al.[19]).

Bavčević et al.[20] demonstrated the development of the basic motor abilities and of specific motor abilities in the form of situation-motor abilities for athletics to proceed in parallel, along with the interaction, i.e. symmetric association of these two spaces, in elementary school male children, while Zagorac et al.[21] showed it in elementary school female children. In male children, the motor abilities of explosive strength, trunk strength and static strength of upper extremities were the best predictors of sprint performance, whereas explosive strength, trunk strength, static strength of upper extremities and coordination were the best predictors of throwing performance. In female children, trunk strength, coordination, flexibility, static strength of upper extremities and explosive strength were the superior predictors of sprint performance, whereas explosive strength and trunk strength were the best predictors of throwing performance.

The main objective of the present study derived from the findings and reports mentioned above, i.e. to determine canonic relations between the set of basic motor variables and the set of athletic variables assessing the abilities of sprint, throw and long-distance run adjusted for 7-year-old children. The canonic dimensions thus obtained will serve for a more efficient orientation and selection of children for athletic events as a basic sport activity.

Subjects and Methods

The sample of 635 subjects, first-graders recruited from Split elementary schools, mean age 7 years ± 2 months at the beginning of experimental procedure, were divided according to sex into the groups of 325 male and 310 female children. All study children underwent programmed 9-month kinesiologic transformation procedures and were evaluated at two time points, i.e. initially and at 9 months (±10 days). The purpose of transformation processes was to provide support to the biological growth and development, with special reference to their effect on broad-spectrum motor abilities.

Two sets of motor tests were applied initially and at 9 months, i.e. 9 tests assessing basic motor abilities and 3 tests assessing specific motor abilities for athletics (described in Katić 1995)[5].

The following variables were used to assess the basic motor abilities: sidesteps (s), polygon backward (s), bench standing (s), forward bow (cm), hand tapping (taps/min), foot tapping (taps/min), standing jump (cm), sit-ups (*per* min), and bent arm hang (s).

Specific motor variables used as criteria in this study were so chosen as to serve as indicators of the basic physical abilities of the speed, strength and endurance, and as representative values on assessing the situation-motor abilities for athletic events, i.e. sprint, throw and long-distance run. The following athletic variables were employed:

- 20-m high start run (s) (the task is to run the 20-m distance as fast as possible at the signal, the result being read in tenths of second), corresponding to sprint events in athletics;
- ball throw (dm) (the task is to perform standing 200-g ball throw from above the head as far as possible, the result being read in decimeters), as a preparatory exercise corresponding most to the athletic event of javelin throw; and
- 3-min run (m) (the task is to run as far as possible in 3 minutes, the result being read in meters), corresponding most to the athletic events of middle-distance run.

All measurements were performed by qualified and competent timekeepers with rich experience in collecting this type of data.

Relations between the set of basic motor variables and the set of particular situation-motor variables for athletic events were assessed by use of canonic correlation analysis according to Hotelling (1936). Based on Bartlett's technology (1941), the canonic correlations with the probability of error on refusing null hypothesis below 0.01 were considered significant. In case that correlation between these two sets of manifest variables be demonstrated, it would be possible to determine with maximal exploitation of all the common components responsible for the association between the two.

Results

All motor variables applied revealed favorable changes between the initial and final state in both male (Table 1) and female (Table 2) children. In male children, greatest changes were recorded in the tests of coordination, i.e. the tests assessing agility and whole body coordination, and in the tests assessing the rate of movement frequency, of lower extremities in particular. The test assessing aerobic endurance, the tasks of lower extremity explosive strength (of jump and run types), and the tests assessing repetitive strength of the trunk and static strength of upper extremities also revealed major alterations. Changes were less pronounced in the test assessing explosive strength of throwing type and the tests assessing flexibility and equilibrium.

In female children, most pronounced alterations were observed in the tests of coordination, i.e. the test assessing whole body coordination and the test assessing agility. Considerable changes were also recorded in the test assessing aerobic endurance, the tasks of lower extremity explosive strength, and the tests assessing repetitive strength of the trunk and the rate of movement frequency, lower extremities in particular. Alterations observed in the tests assessing static strength of upper extremities and explosive strength of throwing type, and in the tests assessing equilibrium and flexibility were less pronounced.

Canonic correlation analysis yielded an association between the set of 9 variables of the basic motor space and 3 variables of situation motoricity in athletics on

TABLE 1
DESCRIPTIVE STATISTICS AND ANALYSIS OF VARIANCE (F-test) BETWEEN INITIAL AND FINAL STATE IN MALE CHILDREN (n=325)

Measurement Variable	Initial Mean ± SD	Final Mean ± SD	Final-Initial Mean ± SD	F-test	p
Sidesteps#(s)	16.28 ± 2.10	14.21 ± 1.65	–2.08 ± 1.84	196.36	a
Polygon backward#(s)	22.97 ± 6.24	16.90 ± 4.02	–6.07 ± 5.04	217.45	a
Bench standing (s)	1.76 ± 0.75	2.13 ± 0.76	0.37 ± 0.87	39.55	a
Forward bow (cm)	36.86 ± 8.50	40.21 ± 8.23	3.36 ± 4.72	26.16	a
Hand tapping (taps/min)	19.18 ± 2.78	21.31 ± 2.56	2.13 ± 2.48	102.73	a
Foot tapping (taps/min)	15.67 ± 1.94	17.37 ± 1.88	1.70 ± 1.74	128.55	a
Standing long jump (cm)	113.09 ± 17.4	129.38 ± 17.1	16.29 ± 14.3	144.90	a
Sit-ups (*per* minute)	21.66 ± 6.36	26.88 ± 6.15	5.22 ± 5.62	112.99	a
Bent arm hang (s)	10.91 ± 9.53	18.81 ± 12.5	7.90 ± 11.2	82.00	a
Ball throwing (m)	10.57 ± 3.08	12.36 ± 3.35	1.79 ± 2.06	50.28	a
20-m run#(s)	4.94 ± 0.44	4.58 ± 0.38	–0.36 ± 0.31	126.84	a
3-min run (m)	441.05 ± 60.0	506.85 ± 67.8	65.80 ± 53.1	171.71	a

#variable with the opposite metric orientation

TABLE 2
DESCRIPTIVE STATISTICS AND ANALYSIS OF VARIANCE (F-test) BETWEEN INITIAL AND FINAL STATE IN FEMALE CHILDREN (n=310)

Measurement Variable	Initial Mean ± SD	Final Mean ± SD	Final-Initial Mean ± SD	F-test	p
Sidesteps#(s)	16.71 ± 1.99	14.64 ± 1.55	–2.07 ± 1.89	206.97	a
Polygon backward#(s)	26.63 ± 7.63	19.62 ± 4.71	–7.01 ± 5.99	189.39	a
Bench standing (s)	1.67 ± 0.79	2.02 ± 0.76	0.35 ± 0.92	32.26	a
Forward bow (cm)	41.27 ± 7.90	45.49 ± 8.65	4.22 ± 5.26	40.20	a
Hand tapping (taps/min)	18.73 ± 2.45	21.38 ± 2.75	2.65 ± 2.56	159.99	a
Foot tapping (taps/min)	15.92 ± 1.75	17.95 ± 1.88	2.03 ± 1.77	194.04	a
Standing long jump (cm)	103.83 ± 17.3	118.88 ± 16.6	15.04 ± 12.2	121.81	a
Sit-ups (per minute)	20.38 ± 6.49	25.44 ± 6.18	5.05 ± 5.36	98.45	a
Bent arm hang (s)	9.83 ± 8.01	16.73 ± 10.87	6.90 ± 8.63	80.94	a
Ball throwing (m)	7.10 ± 1.88	8.35 ± 2.34	1.25 ± 1.71	54.09	a
20-m run#(s)	5.11 ± 0.46	4.73 ± 0.41	–0.38 ± 0.34	119.21	a
3-min run (m)	418.78 ± 63.5	477.77 ± 64.8	58.99 ± 52.1	131.24	a

#variable with the opposite metric orientation

TABLE 3
CANONIC CORRELATION ANALYSIS BETWEEN THE SET OF BASIC MOTOR VARIABLES AND THE SET OF SPECIFIC ATHLETIC VARIABLES IN MALE CHILDREN (n=325)

Measurement / Variable	Initial		Final			Final/Initial		
	CAN1	p	CAN1	p	CAN2 p	CAN1	p	CAN2 p
Sidesteps#(s)	0.15		0.12		–0.07	0.08		0.03
Polygon backward#(s)	0.12		0.16		0.23	0.06		–0.49
Bench standing (s)	–0.16		–0.03		–0.47	0.09		–0.20
Forward bow (cm)	–0.04		–0.17		0.67	–0.31		–0.11
Hand tapping (taps/min)	–0.20		–0.11		0.07	–0.39		–0.05
Foot tapping (taps/min)	–0.06		–0.03		0.46	–0.10		0.44
Standing long jump (cm)	–0.58		–0.41		–0.41	0.05		0.62
Sit-ups (*per* minute)	–0.24		–0.27		–0.21	–0.20		0.23
Bent arm hang (s)	–0.06		–0.26		0.42	–0.59		–0.30
Ball throwing (m)	–0.47		–0.44		–0.82	–0.11		–0.51
20-m run#(s)	0.69		0.65		–0.17	0.06		–0.95
3-min run (m)	–0.21		–0.21		0.88	–0.95		–0.20
Can R	0.62	a	0.68	a	0.28 b	0.56	a	0.30 b

#variable with the opposite metric orientation, CAN – structure of canonic variables, Can R – canonic correlation coefficient, p – level of significance

both initial and final measurement in both male and female children (Tables 3 and 4, respectively). As shown by the results of canonic correlation analysis presented in Table 3, in male children one significant canonic correlation explained the association between the set of variables of the basic motor space and the variables of situation motoricity on initial measurement, whereas two significant canonic correlations between the two sets of variables were obtained on final measurement.

On initial measurement, a canonic correlation coefficient of 0.62, at a level of significance $p<0.001$, was obtained between the first pair of dimensions. In this pair of canonic dimensions, correlation was underlain by the positive and predominant effect of explosive strength, defined by the variable of standing long jump on the sprint (20-m run) and ball throw ability. The variable of standing long jump, saturated by the variable of trunk strength, variable of movement frequency of upper extremities, variable of equilibrium and coordination variables determined sprint performance to a considerably greater extent than throwing performance.

On final measurement taken 9 months after the initial one, the first canonic correlation coefficient between the set of predictor (basic motor) variables and the set of criterion (specific motor) variables was 0.68, at a level of significance $p<0.001$, while the second one was considerably lower, i.e. 0.28, at a level of significance $p<0.01$. Canonic correlation between the first pair of dimensions was responsible for the most of common variability in the motor and situation-motor variables. In this pair of canonic dimensions, correlation was underlain by the positive effect of all strength factors, with a predominance of explosive strength accompanying the development of flexibility (muscle tone regulation) and whole body coordination, on the sprint and throwing performance. The second canonic variable is bipolar, juxtaposing the ability of aerobic endurance determined by above-average flexibility, lower extremity movement frequency and upper extremity static strength along with below-average equilibrium, explosive strength, whole body coordination and repetitive strength of the trunk, against the ability of ball throwing determined by above-average equilibrium, explosive strength, whole body coordination and repetitive strength of the trunk along with below-average flexibility, lower extremity movement frequency and upper extremity static strength. Accordingly, the second canonic variable discriminated two types of male children, i.e. those with above-average flexibility, lower extremity movement frequency and upper extremity static strength but below-average equilibrium, explosive strength, whole body coordination and repetitive strength of the trunk, achieving above-average results in aerobic endurance but below-average results in throwing ability; and those of opposite motor characteristics achieving above-average results in ball throwing but below-average results in aerobic endurance.

Canonic correlation analysis between the predictor and criterion sets of variables in difference variables (final measurement *vs*. initial measurement), illustrated in Table 3, showed relations between these alterations, i.e. identified the mechanisms responsible for changes in both sets of variables. Two canonic correlations explained the association overlying the alteration variables between the variables of basic and specific motoricity. In the first pair of alteration factors, the association was underlain by the development of aerobic endurance being determined by the development of static strength of upper extremities, i.e. muscle endurance, and development

TABLE 4
CANONIC CORRELATION ANALYSIS BETWEEN THE SET OF BASIC MOTOR VARIABLES AND THE SET OF SPECIFIC ATHLETIC VARIABLES IN FEMALE CHILDREN (n=310)

Measurement / Variable	Initial				Final		Final-Initial	
	CAN1	p	CAN2	p	CAN1	p	CAN1	p
Sidesteps[#](s)	0.17		0.27		0.10		0.01	
Polygon backward[#](s)	0.12		–0.19		0.10		0.08	
Bench standing (s)	–0.04		0.07		–0.06		–0.07	
Forward bow (cm)	0.11		0.33		–0.26		–0.28	
Hand tapping (taps/min)	–0.20		–0.37		0.03		–0.22	
Foot tapping (taps/min)	–0.26		–0.40		–0.26		0.09	
Standing long jump (cm)	–0.45		0.70		–0.27		–0.16	
Sit-ups (*per* minute)	–0.29		–0.30		–0.31		–0.24	
Bent arm hang (s)	–0.16		0.09		–0.28		–0.66	
Ball throwing (m)	–0.54		–0.33		–0.42		–0.38	
20-m run[#](s)	0.56		–0.80		0.64		0.34	
3-min run (m)	–0.43		–0.63		–0.25		–0.60	
Can R	0.63	a	0.31	b	0.70	a	0.53	a

[#]variable with the opposite metric orientation, CAN – structure of canonic variables, Can R – canonic correlation coefficient, p – level of significance

of the speed of movement frequency of upper extremities, flexibility and repetitive strength of the trunk. In the second pair of alteration factors, the association was underlain by the development of sprint ability being positively determined by the development of explosive strength, whole body coordination, movement frequency of lower extremities, and development of repetitive strength of the trunk, while revealing negative association of these alterations with the variable of ball throwing in basic motoricity, which was positively influenced only by changes in the static strength of upper extremities.

In the group of female children, the results of canonic correlation analysis, presented in Table 4, yielded two significant canonic correlations that explained the association between the set of basic motor space variables and the set of situation motor variables on initial measurement, whereas only one significant canonic correlation between these two sets of variables was obtained on final measurement.

On initial measurement, the canonic correlation coefficient between the first pair of dimensions was 0.63, at a level of significance $p<0.001$, and was considerably lower between the second pair of dimensions, i.e. 0.32, at a level of significance $p<0.01$. In the first pair of canonic dimensions, the association was mostly underlain by the effect of explosive strength, repetitive strength of the trunk and speed of movement frequency on the general ability in athletics defined by the abilities of sprint, throwing and long-distance run. In the second pair of canonic dimensions, there was a predominant impact of explosive strength and flexibility along with below-average speed of movement frequency and repetitive strength of the trunk on sprint performance on the one hand, and the effect of the speed of movement frequency and repetitive strength of the trunk along with below-average explosive strength and flexibility on long-distance run on the other hand.

Final measurement yielded only one significant canonic correlation of 0.70, at a level of significance $p<0.001$, between the set of basic motor variables and the set of specific motor variables. In this pair of canonic dimensions, the association was underlain by the effect of all strength factors, movement frequency of lower extremities and flexibility on the performance of athletic events of sprint and throwing.

Canonic correlation analysis between the predictor and criterion sets of variables in the variables of differences (final measurement *vs*. initial measurement) in female children (Table 4) revealed the development of aerobic endurance and results achieved in the events of throwing and sprint to occur in parallel with the development of muscle endurance, flexibility, repetitive strength of the trunk, movement frequency of upper extremities and explosive strength.

Discussion

The changes and/or development of motor and specific motor abilities for athletic events are closely related and simultaneously depend on the biological continuity of developmental functions and intensity of kinesiologic activity. The studies reported to date have found the adaptation of schoolchildren of both sexes to programmed stimuli of physical and health education to produce specific changes that could mostly be related to the energy components of motion, which is a valuable indicator of the direction to be followed on planning programmed

treatments for the respective age group[5,7,10–13]. An increase in aerobic endurance provides a basis for the development of a number of other motor abilities that also rely on the development of the oxygen transport system, thus being the main goal of any training process. A higher capacity of the oxygen transport system has a substantial impact on the flow of information and optimal motion performance, and thus on higher ability achievements.

In the present study, linear combinations were established between the predictors (the variables of basic motoricity) and the criteria (the variables assessing performance in athletics) on initial measurement (at the beginning of the elementary school first grade) and final measurement (at the end of the elementary school first grade), followed by establishment of linear combinations between the predictor and criterion variables in the variables of differences (final *vs*. initial measurement). In this way, inter-determination of the sets of variables for a particular state (point of measurement) was established, i.e. the mechanisms responsible for the association of the sets of variables for a particular state were identified, while the relations of the variables between differences in the sets of variables identified mechanisms responsible for alterations in the structure of linear combinations of the sets of variables between these variables at particular points of measurement. These analyses were done for either sex in separate, thus enabling comparison, i.e. establishment of sex specificities in the development of functions that determine the association of basic motor abilities with situation motor abilities in athletics.

Male children:

- on initial measurement, the mechanism of the intensity of energy mobilization, i.e. the mechanism of force regulation, which in part includes the mechanism of simultaneous information processing in terms of synergistic movement regulation and coordination and the mechanism of successive information processing in terms of movement frequency of the trunk and upper extremities, was primarily responsible for the general association of the sets of variables. The mechanism thus described is predominantly present in sprint, to a lesser extent in throwing, and to the least extent in middle-distance run;
- on final measurement, the mechanism regulating all strength factors was responsible for the general association of the sets of variables, i.e. the first pair of canonic dimensions, with a predominance of explosive strength (the intensity of energy mobilization), to some extent accompanied by muscle tone regulation and coordination. The mechanism thus described mostly influenced performance in sprint, to a lesser extent in throwing, while exerting least influence on middle-distance run. The second linear combination juxtaposes two mechanisms, i.e. the mechanism integrating muscle tone regulation, lower extremity movement frequency and muscle endurance to achieve above-average results in middle-distance run, and the mechanism integrating synergistic regulation, explosive strength, coordination and explosive strength of the trunk to achieve above-average results in throwing; and
- the relations of the variables of differences in the sets of variables between the two points of measurement produced the factors of changes and/or processes that had led to alterations in the structure of linear combinations on final measurement as compared with initial measurement. The first factor of changes referred to the development of endurance, aerobic and muscle, i.e. the mechanism responsible for the duration of energy mobilization, whereas the second factor of changes was responsible for the regulation of force, i.e. intensity of energy mobilization.

Female children:

- on initial measurement, the mechanism of energy regulation of movement, primarily in terms of the intensity of energy mobilization, and the mechanism of speed regulation in terms of movement frequency were responsible for the general association of the sets of variables. The motor system thus described determines general performance in athletics (sprint, throwing and middle-distance run). The second pair of canonic dimensions juxtaposes the mechanism of force regulation that predominates in sprint and the mechanism of speed regulation (successive information processing) that is important in middle-distance run;
- on final measurement, general association of the sets of variables was found to be determined by the effects of the mechanism of energy regulation of movement in terms of duration and intensity of energy mobilization, and the mechanism of speed regulation in terms of lower extremity movement frequency in sprint, then in throwing, and to the least extent in middle-distance run;
- in female children, the processes that had led to changes in the structure of linear combinations on final measurement as compared with initial measurement were defined by the development of the mechanisms of energy regulation of movement, predominantly in terms of muscle endurance, which was accompanied by the development of muscle tone regulation as a basis of better performance in middle-distance run (aerobic endurance), then in throwing and sprint.

Comparison of the results obtained in male and female children revealed sex differences in the motor and specific motor functions, which were found to develop at a faster rate in female children, thus resulting in earlier formation of optimal linear combinations of the basic motor abilities and specific motor abilities for athletic events in female than in male subjects[7–9,20,21]. Upon completion of the motor ability differentiation at the beginning of the elementary school first grade (through two canonic variables), along with the process of homogenization at the end of the elementary school first grade, one canonic factor was formed in female children, as opposed to two canonic factors formed in male children only through the process of motor ability differentiation at the end of the elementary school first grade. Con-

sidering developmental characteristics in the study first--graders, the development of muscle and aerobic endurance was the basic process in female children, whereas in male children this process proceeded concurrently with the process of force development predominated by explosive strength development.

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RAZVOJ MOTORIČKIH I SPECIFIČNO MOTORIČKIH SPOSOBNOSTI ZA ATLETIKU KOD UČENIKA I UČENICA PRVOG RAZREDA OSNOVNE ŠKOLE

SAŽETAK

Istraživanje je provedeno s ciljem da se utvrde kanoničke relacije između skupa bazičnih motoričkih varijabli i skupa atletskih varijabli za procjenu sposobnosti brzog trčanja, bacanja i dugog trčanja, a koje su primjerene djeci starosne dobi od sedam godina. U tu svrhu na ukupnom uzorku od 635 ispitanika, polaznika prvih razreda osnovnih škola u Splitu koji je podijeljen na uzorak od 325 dječaka i uzorak od 310 djevojčica, primijenjen je skup od devet varijabli bazičnog motoričkog prostora i tri varijable situacijske motorike u atletici i to na početku i kraju školske godine. Kanoničkom korelacijskom analizom utvrdila se povezanost između skupova varijabli. Kod dječaka, u inicijalnom mjerenju u osnovi povezanosti skupova varijabli je dominantan utjecaj eksplozivne snage na sposobnost u sprintu i bacanju, a u finalnom mjerenju u osnovi povezanosti prvog para kanoničkih dimenzija je pozitivan utjecaj svih faktora snage uz dominaciju eksplozivne snage, što prati razvoj fleksibilnosti i koordinacije, na rezultat u sprintu i bacanju, dok je druga kanonička varijabla bipolarna, te suprotstavlja sposobnost u aerobnoj izdržljivosti koju determinira iznadprosječna fleksibilnost, frekvencija pokreta nogu i statička snaga, od sposobnosti u bacanju koju determinira iznadprosječna ravnoteža, eksplozivna snaga, koordinacija i repetitivna snaga. Kod djevojčica u inicijalnom mjerenju povezanost prvog para kanoničkih dimenzija determinira utjecaj uglavnom eksplozivne snage, repetitivne snage trupa i frekvencije pokreta na generalnu sposobnost u atletici definirane sposobnostima sprinta, bacanja i istrajnog trčanja dok je povezanost drugog para kanoničkih dimenzija na jednoj strani determiniran utjecajem eksplozivne snage, te fleksibilnosti na rezultat u sprintu i na drugoj strani utjecajem frekvencije pokreta i repetitivne snage trupa na rezultat u istrajnom trčanju. Kod djevojčica je u finalnom mjerenju dobivena samo jedna značajna kanonička korelacija u osnovi koje je utjecaj svih faktora snage, frekvencije pokreta nogu i fleksibilnosti na rezultat u atletskim disciplinama sprinta i bacanja. U radu su raspravljene relacije između skupova varijabli i u odnosu na spol.