

Original research article

**THE PREDICTIVE VALUE OF BASIC-MOTOR ABILITIES
ON SPRINTING RESULTS IN THE CASE OF SCHOOL STUDENTS**

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Abstract. *The aim of this research was to determine the degree and characteristics of the link between sprinting sports results in the case of the 60 meter sprint and the basic-motor abilities of the elementary school students of the Dušan Radović elementary school in Niš, aged 13. By means of a regression analysis a statistically significant connection at the multivariate level between the set of basic-motor abilities and the 60 meter sprint was determined. At the univariate level, a statistically significant explanation of the 60 meter sprint results was determined in the case of the hand tapping variable ($MTAP=0.04$), the foot tapping variable ($MTAN=0.02$) and the squat variable ($MČUČ=0.04$). The obtained results point out that the participants with better results on the hand tapping tests, the foot tapping and squat tests will achieve better results in the 60 meter sprint.*

Key words: *running speed, tapping, squat.*

INTRODUCTION

In the last couple of years, papers have been calling for an improvement in the quality of teaching in elementary and high schools.

The process of instruction requires the application of scientific methodology for the purpose of determining the structure of anthropological dimensions, their relations and developmental characteristics, for the efficiency of the steps taken for the implementation of the method, organizational forms, the extent of the load and the choice of motor exercises (Čoh, 2003; Pavlović, 2006; Željaskov & Daševa, 2002).

With this kind of approach it is possible to carry out an optimally programmed process of instruction adapted to the individual abilities of the students (Babić, Draganov, & Saratlija, 2003).

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If it were possible to determine which dimension of basic-motor abilities take part in the success in a sports discipline, and if the extent of the contribution of each dimension and the testing of these abilities in the evaluation of success were known, it would then be possible to implement such a programmed process of training which would affect precisely those factors which contribute the most to the explanation of the criteria (Platonov, 1997; Željaskov, 2004; Zatsiorsky & Kraemer, 2009; Milanović, 2007).

Within the scope of this research, a collection of basic-motor ability variables was analyzed along with one variable of sprint speed (a 60 meter run from an upright position) which was determined to have a great influence in those sports activities where speed is dominant.

All the research conducted on sprint speed so far has not been extensive and especially the one regarding the elementary schoolchildren population, which in itself is an additional motive for the realization of this paper. What this paper relied on was the work of Bala (1980), Lušić et al. (1990) and Kurc (2001).

In accordance with the results of some of the research carried out so far (Kruečić et al., 1975; Lušić, Marić, & Cvetković 1990), the aim of this research was to determine the degree and characteristics of the predictive values of the results of the 60 meter sprint (as the criterion variable) on the basis of basic-motor abilities (as the predictor system).

THE METHOD

Participants

The research was carried out on a sample consisting of 40 participants, chronological age of 13 (± 6 months) with an average height of 169,6 cm, and average weight of 60,2 kg. Apart from the work in their physical education classes, the participants did not take part in any other sports activities. All the participants had mastered the sprint running technique prior to the research.

Instruments

For the purpose of evaluating the basic-motor abilities (as the predictor system) a battery of tests used to study the structure and development of motor dimension in youth (Kurelić et al., 1975) was used. It included the following tests: 1) Agility on the ground (MOTL); 2) Hand tapping (MTAP); 3) Foot tapping (MTAN); 4) The splits (MŠPA); 5) Squats (MČUČ); 6) Push-ups (MSKL) and 7) hyperextensions (MDPK). The criterion variable was the sprinting speed of the 60 meter sprint from an upright position.

Procedure

Determining the predictive value of basic-motor tests was carried out by means of a regression analysis (the SPSS statistical package, version 8.0) at the multivariate and univariate level.

THE RESULTS

On the basis of the regression analysis in Table 1, it can be concluded that the obtained high multiple correlation ($RO=.623$) is significant at the .05 level. The determination coefficient (DELTA) had a value of .388, so 39% of the criterion variable variance can be explained by means of the predictive battery of basic-motor variables. The remaining 61% in the process of explaining the overall variability of the running speed at 60 meters can be ascribed to other factors and characteristics of the participants, which had not been taken into consideration in the research. The obtained results point to a statistically significant explanation of the criterion variable by means of a system of predictor variables ($Q=.042$), at the multivariate level.

Table 1 The results of multivariate analysis variance of the 60 meter run with an elevated start and basic motor ability

RO	DELTA	F	Q
.623	.388	7.39	.042*

Table 2 The univariate regression analysis variance of the 60 meter run with an elevated start in the manifestation area of the motor variables

VARIABLES	Q(BETA)
MOTL	.331
MTAP	.041*
MTAN	.023*
MŠPA	.263
MČUČ	.045*
MSKL	.096
MDPK	.219

A detailed analysis of the numerical values of the partial regression coefficients of individual basic-motor tests indicates, that for the prediction of the running speed at 60 meters from an upright position, hand tapping (MTAP) is significant at the $Q(BETA)=.041$ level, foot tapping (MTAN) at the $Q(BETA)=.023$ level and squats (MČUČ) with the results of the other variables of basic-motor abilities do not have a statistically significant influence on the speed results of the 60 meter run.

The obtained results indicate that the participants that have a higher level of segmentary speed (hand tapping (MTAP), foot tapping (MTAN) and leg strength (squats (MČUČ)) will achieve better results in the 60 meter run from an upright position.

DISCUSSION

The obtained predictive value of the basic-motor variables on the results efficiency in the 60 meter run was expected. The structure of the motions in the squat test, from hand tapping test and the foot tapping test, from a biomechanical point of views, does not have any kinematic or kinetic parameters similar to the 60 meter run from an upright position, but is directed towards the achievement of the greatest number of motions in a unit of

time, which is certainly statistically significant for the explanation of the criterion results. Apart from that, a significant connection to the criterion was certainly made possible by any means of the energy and action characteristics of segmentary speed and leg strength, which are important for the achievement of good speed results in the 60 meter run from an upright position. That indicates that the basis of these variables certainly contains the ability to manifest speed which enables activities with high motion intensity. It can be concluded that hand tapping, foot tapping and squats are significant predictors in the identification of sprint running speed (Vuleta, Šimec, & Sertić, 1997; Stojiljković, Pržulj, Branković, & Pavlović, 2006).

CONCLUSIONS

This paper has examined the hypothesis of the predictive value of basic motor abilities on the results in the 60 meter sprint on a sample of 40 participants, seventh and eighth grade elementary school students.

It has been determined that the system of predictor basic-motor variables is significant for the results efficiency in the 60 meter run ($Q=.042$). The results of the regression analysis indicate that the results sprint running speed at a distance of 60 meters and the system of predictor variables is characterized by a 38% shared variance.

According to the indicators and the regression coefficients at the univariate level, the results of the 60 meter run depend on the results which the participants had in hand tapping, foot tapping and squats, due to which it would be useful to use these tests for guidance and selection in sprinting disciplines.

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REZULTATI PREDIKTORSKIH VARIJABLI BAZIČNO MOTORIČKIH SPOSOBNOSTI NA REZULTATE TRČANJA KOD UČENIKA

Cilj istraživanja je bio da se utvrde karakteristike povezanosti rezultata sprintana 60 metra sa bazično-motoričkim sposobnostima učenika školskog uzrasta, uzrasta od 13 godina, +-6meseci. Utvrđena je statistički značajna povezanost na multivarijantnom nivou između neke bazično-motoričke sposobnosti i sprintana 60 metara. Na univarijantnom nivou, statistički značajno objašnjavaju rezultati koji su uskopovezanisa trčanjem na 60 metara a to su: Taping rukom (MTAP=0.04), Taping nogom (MTAN=0.02), Čučnjevi (MČUČ=0.04). Dobijeni rezultati ukazuju da ispitanici koji imaju dobre rezultate u testovima: Taping rukom, taping nogom, čučnjevi bi postigli bolje rezultate na trčanju na 60 metara.

Ključne reči: brzina trčanja, tapinig, čučanj.