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THE RELATIONSHIP BETWEEN MOTOR PERFORMANCE AND BODY BUILD AMONG THE STUDENTS APPLYING FOR ADMISSION TO THE HUNGARIAN UNIVERSITY OF PHYSICAL EDUCATION

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Abstract: Students applying for admission to the University of Physical Education, Budapest, have to participate in an entrance examination the first phase of which is a complex motor fitness test. Of all the points used in ranking the applicants in the course of the admission procedure, the points scored in the motor fitness test represent 25%.

There are ten items which yield objective scores; these are the medicine ball throw backwards, jump and reach, long and high jump, five-hop jump, shot put, fistball throw, two sprint items (60-m and 100-m) and a medium distance run (600-m for the females and 1000-m for the males).

The present analysis covers the relationships of the motor performance scores with the individual's body dimensions, namely, stature, body mass, per cent body fat content, the somatotype components of the Heath–Carter anthropometric somatotype, and the growth type indices of Conrad.

As shown by the obtained correlation coefficients, the motor performance scores are loosely or moderately related to the somatic parameters. Endurance type performance was found to be independent of the body build.Conrad's plastic index was related primarily to the scores achieved in the power test items.

Key words: Motor performance score, Body build.

Introduction

In predicting athletic performance, it is rather important to find out which of the physical characteristics allow an inference on the scores achievable in certain motor tests. Correlations between body dimensions and physical performance was loose in the anthropometric studies of Kohlrausch (1924).

Tittel and Adam (1963) have stated that motor performance indeed cannot be predicted by one or other physical characteristic, nevertheless, a combination of the different indices may be expected to relate the domains of physique and motor achievements.

Some indices of physique may be specific to certain events of sports, with individual variations of the general traits (Maas 1974). On the other hand, the absence of some equally specified characteristic of body build may preclude elite performance (Tanner 1964), or nearly so.

Farmosi et al. (1985) studied the relationship between the somatotype and motor performance in female students of a teacher's college. They found a moderate relationship between grip strength and stature, grip strength and body mass, and grip strength and arm circumference. Fésűs (1981) reported that the motor performance of a large sample of university and academy students was extremly poor, even when related to that of high school students. University students of 18 to 22 were found to achieve average or moderate scores in motor tests by Reigl (1983), but their performance in 800-m run and abdominal strength tests was poor. However, the athletic individuals of the material had significantly better scores.

Bale (1979, 1980, 1986) also observed connexions between physical build and motor performance in female students of physical education. Mesomorphy (IInd component) was closely related to 60-m run times and to strength measures. Polish investigators found moderately strong correlations of shot put with stature and body mass (Haleczko et al. 1978).

The nature of the relationship between the physical build and motor performance of students applying for admission to the Hungarian University of Physical Education also has deserved our attention, because all candidates are ranked by their motor performance in the course of the admission procedure, as well.

In addition to observations on the existence of such relationships, it was attempted to find out if better performance could be predicted by using body dimensions.

Material and Methods

The subjects were 108 female and 98 male candidates aged between 18 and 20.

The motor test items were jump and reach, five hop jump, long jump, high jump, medicine ball throw backwards, fistball throw, shot put, 60-m and 100-m dash, 600-m run (females) or 1000-m run (males). Performance was recorded as appropriate in athletic events or conventionally.

Body build was described by stature, body mass, per cent of body fat, the metric and plastic indices of the Conrad (1963) growth type, the three components of the Heath and Carter somatotype (Carter–Heath 1971), and the relative plastic index. In taking the body measurements the recommandations of the IBP (Weiner and Lourie 1969) were observed.

In addition to the basic statistics, the relationships of the body dimensions and the motor scores were studied by using linear correlations at the. 1% level of significance.

Results and Discussion

Table 1 contains the means and standard deviations of the motor tests' scores for the males and females. In general, motor performance scores were in the mediocre range, i.e. when one considers that these students were candidates for physical education, and the existing system of evaluating motor scores in this admission procedure, these scores can be given marks 3 or 4 in a five mark system where the best score is mark five.

Table 1. The motor performance scores of the two sexes

Tests	Females (n=108)		Males (n=98)	
	$\bar{x}$	s	$\bar{x}$	s
Jump and reach	54.2	4.81	67.8	4.83
Medicine ball throw backwards	10.6	1.45	11.7	1.31
60 m dash	8.6	0.38	7.7	0.31
100 m dash	14.0	0.84	12.2	0.53
Long jump	471.2	39.62	585.6	41.78
High jump	139.0	12.74	168.6	9.22
Shot put	8.1	1.09	10.1	1.10
Fist-ball throw	39.1	8.04	56.4	8.58
Five hop jump	14.7	0.88	17.4	0.87
600 m run	120.7	9.16	–	–
1000 m run	–	–	192.2	12.53

Table 2 shows a summary of the correlation coefficients between female body dimensions and indices and motor test scores. Significant coefficients only are shown. There were few of these, and they referred mostly to the connections of throwing and pushing performance with body dimensions. Thus, medicine ball throw was related to body mass and plastic index. Though their effects are partial the greater the body mass and the greater the plastic index the better the throwing performance. Shot put was negatively related to ectomorphy (IIIrd component). Positive correlation of performance

in the throwing events with body mass may be due to the advantage of a larger lean body mass and/or greater maximum strength.

The connexion of 60-m run with stature was moderate and negative. Taller stature helps, therefore, running at this distance, one explanation of which might be the longer stride of taller athletes and this, in turn, has an important effect on the results, provided that the pace is maintained.

Table 2. Correlations between constitution and motor performance – Females

Performace	Dimension			
	Body mass	Plastic index	Stature	IIIrd component
Medicine ball throw backwards	0.36	0.35		
Shot put	0.46	0.44		−0.32
60-m dash			−0.48	
	$r \geqslant 0.31$		$p < 0.001$	

Table 3 contains the significant correlations found in the male students, of which there were remarkably more than in the females.

In the throws (medicine ball throw backwards, shot put, fistball throw) positive correlations were again found with body mass and the plastic index, while in the shot put also tall stature was of advantage. Similar findings were reported by Haleczko et al. (1978).

Five-hop jump was negatively correlated with nonessential fat content, phyknomorphic values of the metric index and mesomorphy (IInd component), but positively with the IIIrd component.

Thus, in spite of the different number of significant correlations there were similarities in the two sexes.

Table 3. Correlations between constitution and motor performance – Males

Performance	Dimension						
	Body mass	Plastic index	Stature	%body fat	MIX	IInd component	IIIrd component
Medicine ball throw backwards	0.40	0.31					
Shot put	0.52	0.42	0.33				
Fistball throw	0.42	0.41					
Five hop jump				−0.34	−0.33	−0.35	0.36
High jump							0.31
		$r \geqslant 0.31$		$p < 0.001$			

In answer to the problem studied it may be stated that better performance was linked to greater body mass and plastic index in our sample, mainly in such movements that require the acceleration of an implement, but when it was the body mass proper that had to be moved, higher scores of the third component were of greater advantage. All these relationships were associated with low or mediocre correlations.

A further study of the motor tests used in the admission procedure (e.g. the interrelationships of the test items) may help in a more objective assessment of the candidates. These low coefficients of determination evidence that a great number of other factors may be at work in overall motor performance. The weight of several indices of physique appears to increase with the technical complexity of the item.

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