

THE OPINION OF PRACTITIONERS ON THE BIOMOTOR CHARACTERISTICS NECESSARY FOR PRACTICING HIGH-PERFORMANCE SPORTS

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Abstract: *A group of 79 coaches answered a questionnaire aiming at determining the most relevant characteristics necessary for the practice of high-performance sports: aggressivity, height, BMI, upper limb width, leg length, hand surface, isometric force, explosive strength, speed of movement on 5, 10, 15, and 20 m, reaction speed, coordination, agility, anaerobic resistance, aerobic resistance, mobility and more. After processing the results, the top three characteristics were found to be coordination, reaction speed, and explosive strength. Our study outlines the profile of a high-performance athlete with very good coordination, reactivity, and explosion.*

Key words: *biomotor, sports, performance, coaches, profile.*

1. Introduction

High-performance sports involve physical, cognitive and emotional requirements [1]. The measure of each pressure area is determined by the nature of sports competition, which requires a detailed approach within training. The physical component is highly relevant because it relies upon the genetic and momentary endowments of an athlete.

Physical qualities have a tremendous influence on sports performance and they determine the ultimate international and world rankings [8].

We can quantify the physical demands of a sports branch in a non-invasive manner, by analysing the movements of athletes during an official competition. Hence, we can appraise the distances covered and the intensities attained during effort, determining the energetic input on their basis. Nonetheless, such analyses fail to provide a reliable image because movement involves other activities, too (leaps, contact with the opponent, direction changes, etc). We can compensate for this shortcoming using complementary devices for the athletes' positional analysis [2].

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Thus far, it has been indicated that the practice of a sports branch requires a series of characteristics (i.e., age, gender) and anthropometrical characteristics (height, body mass, body mass index). An athlete can carry out physical activities by walking, running at aerobic intensities, running at anaerobic intensities, jumping, direction changes, and contact with the opponent, and others. By monitoring them, we can obtain useful information in the periodisation of sports training [3].

Physical requirements are different from one sports branch to another; technical and tactical requirements are also present. Hence, we have to increase exercise capacity as much as possible, pursuant to the individual particularities of athletes. Depending on the role within sports teams, an athlete's features may be particularly differentiated [16].

Covering great distances during a sporting competition is in close correlation with muscle strength and power, and aerobic and anaerobic exercise capacity. The better the exercise capacity is, the lower impairment of the muscle tissue following a competition dispute.

An essential role in sports expression is played by the capacity of processing information and making the best decision for a specific competitive moment. We have ascribed to this feature the term analytical thinking, without which the acquisitions for the other sports training components are in deficit. Decision-making capacity is determined, among others, by the limited space of an athlete pressured by the opponent, the time, and the need to provide a tactical advantage [8].

Because they require long periods for

improvement, physical qualities can represent a foundation for predicting the sports performances of a junior athlete. However, they can be developed in the long run, to create the proper foundation for high-performance sports activity [12].

The level of physical exercise capacity may represent an early selection criterion depending on the requirements of the sports branch concerning this process. It may be determined using measuring and assessing means, the structure of which comes very close to the competitive conditions [7].

Sports training involve alternating the intense loading with recovery periods. We have to consider this aspect when wishing to improve the motor qualities. In this respect, we can use the profile of high-performance athletes to define the relation between stimulating and resting periods [13], [14].

Coaches are decisive actors in many situations, which may help attain sports performances. They represent their mirror in what concerns the capacity of managing the training of the students. A successful trainer will be represented by high-performance athletes [18].

2. Objectives

The research aimed at determining the ranking of the main physical characteristics for high-performance athletes, using the coaches' experience and view.

3. Material and Methods

In the study, we used the investigation method (the working tool was a

questionnaire). We applied it to 79 specialists in the field (43.05 ± 9.54 years old) involved in the training of performance athletes. The questioned group comprised 26 women (32.9%) and 53 men (67.1%), each activating in sports training. 59.5% had over 9 years of experience in performance activity. The studies of the coaches questioned are 94.9% higher education studies; most of them had master degrees (54.4%).

The sporting branches where our study group activate are diverse: athletics, basketball, soccer, gymnastics, handball, swimming, rugby, tennis, volleyball, and others. Hence, the character of the profile defined within this study is generalised; its application may help to the early identification of the biomotor potential (to obtain great results).

We gave coaches a list of characteristics necessary for highly performing biomotor profile: analytical thinking, aggressivity, above average height, body mass index, arm span, foot length, hand length, isometric power, explosive strength, 5 m

sprint performance, 10 m sprint performance, 20 m sprint performance, over 20 m sprint performance, reaction speed, coordination, agility, anaerobic resistance, aerobic resistance choose only three, which they ranked by importance, from 1 to 3 (1 for the most important). Coaches considered the top three for practicing of high-performance sports.

We distributed the questionnaire online as a Google Form (<http://docs.google.com/forms>), collecting the coaches' answers automatically.

4. Results and Discussions

After collecting the answers from coaches, we created the database of the study; we processed the results using Microsoft Office Excel. We considered the frequency of choosing the characteristics proposed (relying on it, we calculated a general score). We determined it by adding the products between the frequencies recorded and the values 3, 2 and 1 for the first, the second, and the third place, respectively. It reflects the importance degree for the corresponding characteristics.

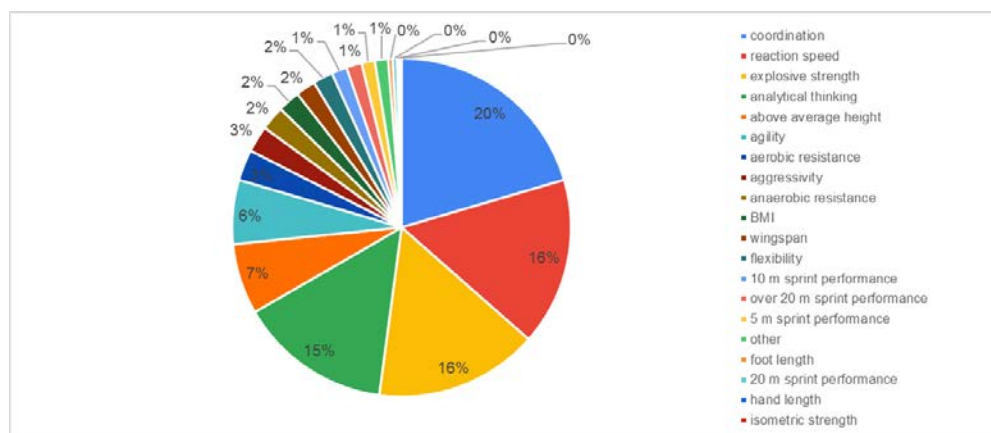


Fig. 1. *Weighting of physical characteristics in the profile of high-performance athletes*

Frequency of choosing characteristics for each level

Table 1

Characteristic	First place	Second place	Third place	Scores
Coordination	21	12	10	97
reaction speed	11	18	7	76
explosive strength	12	14	10	74
analytical thinking	14	5	17	69
above average height	6	6	2	32
Agility	5	4	6	29
aerobic resistance	2	3	2	14
Aggressivity	0	3	6	12
anaerobic resistance	1	3	2	11
BMI	1	3	1	10
arm pan	2	1	1	9
Flexibility	1	1	4	9
10 m sprint performance	0	3	1	7
over 20 m sprint performance	2	0	1	7
5 m sprint performance	0	1	4	6
Other	1	0	3	6
foot length	0	1	0	2
20 m sprint performance	0	1	0	2
hand length	0	0	1	1
isometric strength	0	0	1	1

Table 1 features in the descending order of importance ascribed by the respondents of our study, the characteristics necessary to a high-performance athlete. Hence, we can create an overview of the biomotor requirements to practice a sports branch successfully. The first three columns featuring values state the frequencies recorded by the characteristics within our list for each position (the first place represents the highest level).

The score calculated in the fourth column shows coordination as the first one (97 p), followed by: reaction speed (76 p), explosive strength (74 p), analytical thinking (69 p), above average height (32 p), agility (29 p), aerobic resistance (14 p), aggressivity (12 p), anaerobic resistance (11 p), body mass index (10 p), arm span (9 p), mobility (9 p), 10 m sprint

performance (7 p), over 20 m sprint performance (7 p), 5 m sprint performance (6 p), others (6 p), foot length (2 p), 20 m sprint performance (2 p), hand length (1 p), and isometric strength (1 p).

Hence, each characteristic among those we proposed was chosen at least once the first three options of the respondent coaches.

The processing of answers (fig. 1) shows a high-performance athlete with good coordination (20%), reaction speed (16%), explosive strength (16%), good analytical thinking (15%), above average height (7%), agility (6%), aerobic resistance (3%), and high aggressivity (3%). The other characteristics lower by the percentage ascribed below 2%; hence, we cannot give them much importance. Among them, we find anthropometrical parameters,

movement speed, and anaerobic resistance.

Coordination is a relevant characteristic for the practicing of high-performance sports because it is based on the rapid visual information processing, followed by the execution of an immediate motor response [6]. At the same time, coordination is useful in the acquisition and technical progress of an athlete [5].

The unpredictability of most situations in performance sports leads to the need of great reaction speed, as it is closely correlated with decision making and the expression of the other motor qualities [11]. Sporting performance prediction relies on several factors; speed is one of the most relevant for a successful sports career [4], [17], [19].

Strength is the physical characteristic helping an athlete to develop power effort, which is common within competitive effort. By focusing on this characteristic and combining it with speed, mechanical work power derives. To express it, we can use means to measure the distance covered following an execution. There is a difference between the high-performance and lower-performance athletes concerning the explosive strength of the lower body [20], [22].

We determine absolute strength for the sports branches where the contact with the opponent and the overcoming of their resistance are conditions for winning a duel. In this respect, we use the assessments related to the effort with maximum repetition for both the upper and lower train. The development of lower limb strength develops a better capacity for speed movements and in a muscular endurance regime [9].

With a significant role in reaching the

highest performances, analytical thinking is an indispensable process in all human activity. The mobility of intellectual processes makes technical and tactical expression possible in maximum efficiency conditions; the athlete's response to momentary perceptual situation or the coach's indications lead to an individual or collective advantage [15].

Height may represent a parameter on which we rely for sporting selection, but its correlation with sports success is low. It may be used within the athletes' orientation towards the best suited role. Besides height, body compositions that may determine the BMI may have a significant impact on sports performance. High-performance athletes record higher BMI values than lower-performance athletes; the difference is made by keeping the adipose tissue as low as possible and developing the active mass, to allow peak productivity.

Muscular symmetry is an aspect to reach through specific evaluation and training; it may have a positive influence on technical executions [10].

Agility, as a component of sports motor "luggage", is complex through its progress under the influence of its capacity to anticipate and recognise the competitive and decision-making situations [21], [23].

Hence, the complexity of agility is provided by the involvement of the nervous system which, through its fundamental processes, influences momentary successes.

Literature characterises aerobic resistance as a highly relevant parameter for selection, mostly among senior athletes. The practice level of performance sport increases the aerobic resistance capacity. It determines to a great extent

the physical competitive performance and the career success. The low aerobic level may determine an increased injury risk, mostly among senior athletes.

5. Conclusions

Considering the aspects featured above, the motor qualities are major determinants of practicing high-performance sports. At the same time, they manifest in high-pressure situations, determined by the increasing stake of current sports competitions.

The most important physical characteristics necessary to attain high sports performance are as follows (in the order of their ranking): coordination, reaction speed, explosive strength, analytical thinking, above average height, agility, aerobic resistance, and high aggressivity.

Through the means accessible to them, coaches can find and implement the most adequate solutions to assess, orient, and improve the physical qualities of athletes, in order to obtain the best possible results.

Future research directions can focus on analysing the importance of the components proposed by us in sports branches, by appraising their specific character.

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