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## **The determinants of footballers' effectiveness in a German club**

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### **Abstract**

The assessment of footballers effectiveness is the key element of control at every step of their training, regardless of on what level they are. What seems essential is the prediction of footballers' actions, the height of which is achieved in the time directly preceding taking part in competition. Therefore, twenty footballers took part in the study which involved efficiency tests concerning maximum speed in 5 meters and 20 meters races as well as endurance measured by Beep Test. The tests were conducted at the end of lead time. Additionally, the effectiveness of action was measured in the initial period. No significant correlations were found between the tested variables – speed tests and effectiveness of game. A significant relationship was found only between the endurance measured by Beep Test.

Summing up, the only factor significantly correlated to the effectiveness of footballers' action was endurance and it can be therefore seen as crucial in terms of motor preparation, at the tested sport level.

**Keywords:** football, effectiveness, speed, endurance

### **Introduction**

Talking about football and training process, and first of all about young players training, what must be stressed is the main goal of taken actions, the evaluation of which should be performed at all the levels. Experts often point out that it is worth to carry out training which will lead to raise country representatives. Therefore it is often asked: What factors influence the success in football? What is the right moment to trigger in training? What aspects of training should be more attention paid to?

This topic was taken up because there is a need to constantly monitor the effects of training, in order to make it easier to make predictions in terms of the right

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development of footballers. For this reason trainers make use of different kinds of diagnostic tests, the assessment of footballers play in both training and a match, for example through various systems of marks. All activities might be useful in the individualization of training because they facilitate a training process and are often necessary to succeed in football. It can be assumed that they determine the appropriate ways to use sufficient forms, methods and training measures (Sozański 1999). Depending on the level of competition, taking into account biological development, genetic conditions and current players' abilities, training goals will be varied, but at all levels of competition it is possible to achieve a relatively high sports level. Thus, the work focused on easy and available research methods in relation to basic indicators of fitness – endurance and speed as factors that may be related to the performance of players, determined on the basis of efficiency evaluation in league competitions. The collection of data was possible thanks to the kindness of the training staff and the administration of the BSC Eintracht Südring Berlin club, with the help of which diagnostic tests, as well as observation and evaluation of players' games in league games were carried out to verify the fitness determinants of efficiency in football mentioned above.

According to Sozański (1999), fitness preparation enables effective solutions of versatile motor tasks depicting the state of training of the body, which depends on the level of motor features or otherwise called motor skills. Among them are strength of muscles, speed, jumping, flexibility, coordination and endurance. The article focuses on speed and endurance demonstrated by players as variables affecting the effectiveness of the game. The adopted assumption results from the characteristics of work performed while playing football, which is included in the group of speed and endurance efforts (Śledzewski et al. 2005).

Therefore, competitors must shape and improve ' their ability to do activities of varying intensity (running speed) over long periods of time (endurance)' (Bangsbo 1999, pp. 87-88). As a consequence, it can be assumed that players' efficient oxygen mechanisms as well as speed capabilities play a vital role in the training process as they determine success of the whole game.

A certain pattern comes to mind – a player should be trained by a personal coach. The annual organization plan of the training should take into account the load during the appropriate period of the season and create similar conditions that exist during the starting efforts in order to increase the intensity and improve fitness indicators and skills during games.

Verification of the relationship of selected motor effects was chosen as the main purpose of the work with the efficiency of the German club's soccer players. According to the stated goal, the following research questions were formulated:

1. Was the relationship between motion speed and endurance of the tested competitors found?
2. Does the speed shown in the locomotion tasks show a connection with game efficiency?
3. Does the strength measured by the Beep Test show a link to game performance?

## Materials and research methods

20 players from the German club BSC Eintracht Südring Berlin, aged between 19 and 36, were examined. The team performs in the German playing class of the Berlin District (Kreisliga A).

The measurement of motor skills was carried out in January 2018 in Berlin at the end of the winter preparatory period. To assess strength, the Beep Test (Léger and Lambert 1982) was used over a distance of 20 m, according to the procedure described in the Eurofit manual (1993). The speed of motion was assessed in two running tests. The first of them verified the start speed over a distance of 5 meters, in the second test - over 20 meters. In both cases, the time taken to complete the sections was measured, using *the Microgate Witty System – Italy photocell set with an accuracy of 0.001 [s]*.

In both cases, the players started measuring from the high start, 0.5 m on the run. Each of the tests (5m and 20m) was carried out twice. A better result was used for analysis.

The assessment of footballers' effectiveness was carried out from February to June 2018 during the spring round of the 2017/2018 season using the modified method of 'competent judges', which consisted in quantitative assessment of technical and tactical measures.

Each evaluated player had to participate actively in the game for a minimum of 70 minutes. The evaluation was carried out by 5 experts. After rejecting the extreme notes, the arithmetic mean was calculated from the others. The players' scores were presented on a scale of 1 - 6 with an accuracy of 0.5 point - "1" being the highest and "6" being the lowest, according to the German scoring system. Players were evaluated for their movements on the field according to their position, effectiveness of shots, passing results, creation of shooting situations, 1x1 duels in attack and defense.

The collected results were compiled using the Statistica 13.1 sheet. Descriptive statistics of the studied variables were presented and the relationship between variables was determined using the Spearman correlation coefficient.

## Results

### The level of general physical state and assessment of the effectiveness of German club players

First of all, the level of the start speed was verified according to the assumed methodology. Table 1 presents the results of measuring time in a 5-meter run.

**Tab. 1.** Descriptive characteristics of the results obtained during the measurement of time in the start speed test (5m run)

Variable	BSC Eintracht Südring				
	<i>N valid</i>	<i>M [s]</i>	<i>min [s]</i>	<i>max [s]</i>	<i>SD</i>
Start speed (5 m)	20	0,99	0,915	1,231	0,078

The average value of results obtained in a group of 20 players was 0.99 seconds. The shortest time obtained is 0.915 seconds, while the longest time was 1.231 seconds. Next, the characteristics of the German team regarding the 20-meter running speed were presented.

**Tab. 2.** Descriptive characteristics of the results obtained during the measurement of time in the running speed test (20m run)

Variable	BSC Eintracht Südring				
	<i>N valid</i>	<i>M [s]</i>	<i>min [s]</i>	<i>max [s]</i>	<i>SD</i>
Running speed (20 m)	20	3,05	2,872	3,309	0,128

In the studied group, the average running time over a distance of 20 meters was recorded at 3.05 seconds. The best result was achieved by a player who covered a distance of 20 meters in 2.872 seconds, while the weakest result was 3.309 seconds (Table 2). Next, the results regarding the strength level are presented.

**Tab. 3.** Descriptive characteristics of the results obtained during the measurement of time in the strength test (Beep Test)

Variable	BSC Eintracht Südring				
	<i>N valid</i>	<i>M [lvl]</i>	<i>min [lvl]</i>	<i>max [lvl]</i>	<i>SD</i>
Strength (Beep Test)	20	8,83	5,80	11,10	1,719

In the Berlin team, the average value obtained in the Beep Test was 8.83 [lvl]. The lowest result among the respondents was 5.80 [lvl], while the highest result obtained was 11.10 [lvl].

Then, descriptive characteristics of the effectiveness of the German club's players are presented (Table 3).

**Tab. 4.** Descriptive characteristics of the effectiveness of German club players

Variable	BSC Eintracht Südring				
	<i>N valid</i>	<i>M [p]</i>	<i>min [points]</i>	<i>max [points]</i>	<i>SD</i>
Effectiveness	20	2,319	1,50	4,03	0,574

In the BSC Eintracht Südring Berlin team in the spring round of the 2017/2018 season there was an average score of 2.319 [points] according to the German scale. The lowest average value testifying to the best effectiveness of the game was recorded at 1.50, while the weakest result was obtained by the player who was awarded 4.03 [points] (Table 4).

### The relationship between speed, endurance and game efficiency

Next, an analysis of Spearman's correlation between the results obtained is presented in speed, endurance tests and game efficiency.

**Tab. 5.** Relationship between selected anaerobic, aerobic abilities and efficiency of German club players' game

Variable	Correlations of game speed, endurance and efficiency p < 0,05, N=20			
	Start speed	Running speed	Strength	efficiency
Start speed	1,0000	<b>,6833</b>	-,0698	,0150
<i>Running 5m</i>		<b>p&lt;,001</b>	p=,770	p=,950
Running speed	<b>,6833</b>	1,0000	-,2002	,0105
<i>Running 20m</i>	<b>p&lt;,001</b>		p=,397	p=,965
Strength	-,0698	-,2002	1,0000	<b>-,6185</b>
<i>Beep Test</i>	p=,770	p=,397		<b>p&lt;,01</b>

In the examined group of players a positive, statistically significant correlation between the starting speed and running speed was observed ( $\beta = 0.6833$ ;  $p < 0.01$ ), no statistically significant relationship between the results obtained in the running tests (5m and 20m) and strength (Beep Test) was observed. There was also no statistically significant relationship between start speed (5m), running speed (20m) and game efficiency (Table 5).

A statistically significant negative correlation was found only between endurance and the effectiveness of the game expressed by expert judgment ( $\beta = -0.6185$ ;  $p < 0.01$ ), which indicates that the high results obtained in the test of endurance tested using the Beep Test coincided with these high scores awarded in the performance assessment conducted on the basis of the German player scoring system (Table 5).

### Discussion

Keeping in mind diversity and complexity of the problem, the selection of variables is focused on the elementary properties of sports preparation, such as fitness preparation, which can be presented in terms of quantitative data. As a measure of

effectiveness, the notes made by coaches (which are a generally accepted player rating system) during the 2017/2018 revenge round were adopted.

German football, despite the recent failures of the national team at the World Championships, is still considered one of the four highest rated, while comparing with the sports level of leagues in Europe. After having found the causes of failure, deficiencies in the aspect of efficiency were noticed. It was a smaller number of sprints or lower intensity of efforts that were proposed as the reasons for not reaching the 1/8 finals of the World Cup in Russia. All in all, it can be assumed that there are many factors influencing the effectiveness.

Nevertheless, referring to the latest trends in Polish literature connected with stage sport training, Sozański (1999) said that it is worth to focus, first of all, on overall physical state. Therefore, it was assumed that the application value of the conducted tests can be applied not only to the training process in German football. Assuming that the basic element of football preparation, which is related to the effectiveness of the game, is motor features, while the nature of work performed on the field belongs to the group of speed and endurance efforts (Śledzewski et al. 2005). The essence of the cited assumptions, which is worth emphasizing, also applies to each stage of sports training and plays an equally important role at the recruitment level of young students.

Hence, in this study an attempt was made to determine the degree of dependence between the level of start speed, running speed and endurance, and the assessment of the game performance of the players of the Berlin club.

To summarize, taking into account the average value of the start speed over a distance of 5 meters below a second, the results obtained in the test can be considered satisfactory at the senior level (Strzelczyk et al. 2003; Reilly 2007; Konarski. Strzelczyk 2012). Individual assessment of the result obtained by the weakest player in this test is not disturbing, because 20 players from the team including goalkeepers took part in the study.

The results obtained in the 20-meter running speed test, despite a significant relationship with the start speed, can be considered average. The average value over 3 seconds over a 20-meter distance (with individual results below 2.9 seconds, but also above 3.3 seconds) may in a sense indicate a lower sports level of non-basic players included in the wide team (Strzelczyk et al. 2003; Reilly 2007; Konarski, Strzelczyk 2012).

Correlations obtained in the study between the start speed and running speed confirmed earlier scientific reports and indicated a statistically significant relationship. They confirmed the assumption that if a footballer is fast on a 5-meter stretch his speed on a 20-meter stretch will also be at a satisfactory level.

Interesting results were noted while examining the relationship between start, running speed and game efficiency. There was no statistically significant correlation in the examined players. The research did not confirm previous reports (Kalinowski et al. 2017) which resulted from the observation of the junior team of the German club Berliner TSC. It can be assumed that at this level of a competition, the effectiveness assessment does not show a significant relationship with speed. The

game at the lower level is characterized by a different specificity of actions on the field. Competitors have more time and space, which results primarily from a slower game pace. The size of the research group should be also taken into account, which may not allow to make definite conclusions, but the obtained results predestine for further expanded research.

In the discussed situation, it should be assumed that the team under investigation did not show the maximum speed, and perhaps tactical skills or endurance determined the sporting result.

The choice of the test determining the level of cardiovascular and respiratory endurance was caused by the simultaneous accessibility, practicality and similar nature of work, i.e. the change in the direction of the players' running during the test, which is similar to the nature of the work the player does on the pitch.

It should be emphasized that the results obtained in the strength test carried out by means of the Beep Test at an average level of about 8.3 points are interpreted as low. Even the highest value obtained at the level of 11.1 points is unsatisfactory. It may be affected by a lower level of sport and training of players as well as the time of conducting the test. The endurance tests were carried out during the first preparatory period after the new training staff took over the team. Therefore, we have no previous information about how the summer preparation period looked like. It is worth noting, however, that there was a statistically significant relationship between game efficiency and durability, checked in almost 62% of cases explained.

This fact confirmed earlier reports from research conducted on young players SV Berliner Brauereien (Kalinowski and Bugaj 2017). It can be assumed that the indicators obtained in the endurance test take values adequate to the sports level.

The test results confirmed the reports of Cihan, Can and Seyis (2012), in which the players were tested with the Yo - Yo Intermittent Recover Level - 1 (Yo - Yo IR1) test and showed a different level of endurance due to their position on the field. The highest values in own research, similarly to those of Cihan, Can I Sevis (2012) were noted in helpers. It is worth noting that in the team under investigation, it was not the goalkeeper who achieved the lowest result in the endurance test. Trends observed today indicate an increase in the level of endurance and the distance covered by goalkeepers, which is consistent with changes in the nature of work performed in a given position. The leading player in line with these trends is the German Bayern Munich goalkeeper – Manuel Neuer, who in the 2016/2017 season in one of the Bundesliga matches (against S.C. Freiburg) covered a distance of over 6.5 kilometers (Kalinowski 2017). It is also worth noting here that even in the 50s of the last century, the athlete "from the field" covered a distance of about 5 kilometers. This confirms the growing demand for ever-changing football.

## Conclusions

Taking into consideration the answers to the research questions posed as well as the analysis of the collected material, the following conclusions were made:

1. There was no relationship between the locomotion speed (5m and 20m run) and the endurance of the tested competitors.
2. Speed manifested in locomotion tasks, i.e. 5m and 20m run is not related to the effectiveness of the game.
3. Strength measured by Beep Test is associated with the assessment of game effectiveness.
4. In conclusion, the factor that could determine the effectiveness of the game in the studied group of the German team was not speed but endurance, which explained about 61% of the cases studied. That is why it can be assumed that endurance, at a particular level of playing under consideration, is significant in the training process, but it is not the only factor that determines success in football.
5. In order to justify the results of the study, a more extensive research, in which a larger number of competitors will be involved, should be undertaken.

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