

**COMPARATIVE STUDY OF PARAMETERS OBTAINED DURING
OFFICIAL GAMES BY U17 AND U19 PLAYERS THROUGH THE
PLAYERTEK SYSTEM**

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Abstract

During the ascertaining study of the parameters obtained during official games by U17 and U19 players, we chose to use the Playertek football player monitoring system. This system provides information related to players' physical parameters during matches and training. Analysis of these parameters provides important information about the type of effort players put in during matches. The objectives of the research consisted of: verification of evaluation tools; identification of physical parameters during official games with the help of Playertek GPS. At the beginning of the game, each player receives a Playertek GPS device, which turns on before the start whistle of the match and stops shortly after the match ends. The stored information is downloaded and analyzed on a computer with the help of a specific software, Playertek. We chose to analyze the parameters recorded during two official games played by the U17 and U19 teams of FC Botoșani in the National Junior Championship. Both teams played away at LPS Roman.

Introduction

The modern football game is characterized by alternating intense and complex demands made with maximum speed, power, agility, flexibility and slower demands made at low and moderate speed. The demands of the player's organism are supported by metabolic processes that ensure the production of mechanical energy through direct oxygen supply, through the activity of the functional systems involved (cardiovascular, respiratory, endocrine, muscular, bone, ligamentous, etc.). The effort capacity represents the totality of morphological, functional and motor characteristics that ensure the performance of physical exercises, with various efforts in structure and dosage. According to Dragnea and Bota in 1999, the effort capacity is "a characteristic of the individual who carries out motor activity and can be assessed by: the duration of the effort, the mechanical work and their opportunity" [1] and consists in "the possibility of the body to carry out a motor activity – mechanical work – with different intensities and durations. While the maximum effort capacity implies the possibility of performing as intense motor activity as possible in as long a time as possible." The capacity for physical effort depends on "the possibilities of the active muscular system to release, through

anaerobic glycolysis or oxidative phosphorylation, the energy necessary to produce as much mechanical work as possible and maintain it for as long as possible." In sports training we meet the concepts of: aerobic effort capacity, anaerobic effort capacity, training effort capacity and competition effort capacity, physical effort capacity, etc. "The capacity for physical effort consists in the possibilities of the active muscular system to release, through anaerobic glycolysis or oxidative phosphorylation, the energy necessary to produce as much mechanical work as possible and maintain it for as long as possible" [7]. "The demands to which the athlete's body is subjected are generally closely related to the metabolic processes of energy release, which occur under the influence of oxygen intake, as well as the reflex of self-regulation of the other functional systems (respiratory, cardiovascular, etc.). Thus, we are talking about: aerobic demands – in which oxygen needs are covered during exercise; anaerobic demands – in which the effort is carried out under the conditions of an oxygen debt (debt "covered" only after the end of the effort); mixed loads – where moments of aerobic stress are interspersed with moments, longer or shorter, of intense anaerobic stress"[7]. According to the author [6], directing effort in the football training lesson is done in two ways: programming the volume, intensity and complexity of the effort; size and nature of breaks between repetitions. Both modalities involve compliance with all concrete variables (age, sex and availability of subjects; material and climatic conditions). In the game of football, we are talking about a mixed, aerobic-anaerobic effort, in which the three processes of energy release are involved, namely: aerobic – 70%; anaerobic alactacid – 15%; anaerobic lactacid – 15% [4] Energy demands are high in both halves (Fig. 1), interspersed with rapid accelerations and decelerations and changes of direction in speed. The travel speed can reach values of 8-9 m / s. Rest periods are approximately 5-15 seconds and occur during the interruption of play when the ball is out of the field or certain fixed phases are executed, or when the ball is on the opposite side of the field. "The limiting factors of performance are acceleration-deceleration power, agility, gear changes, reaction and travel time" [5]. Personally, I believe that the speed of thinking capacity is not on the last place, and even on the first place.

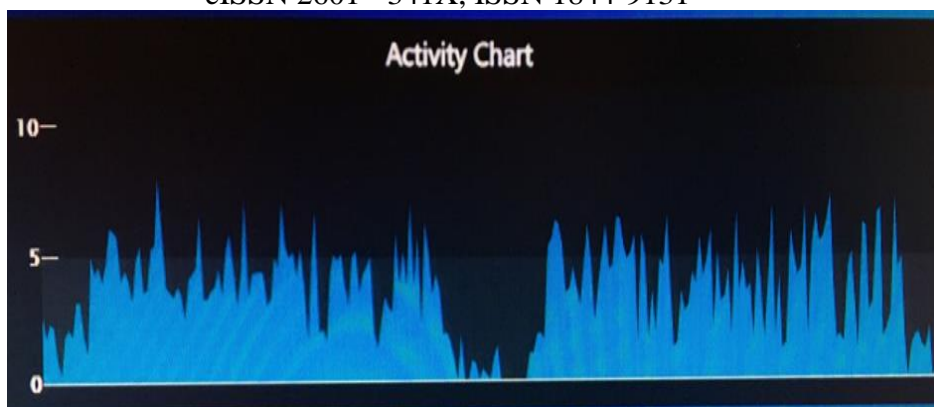


Fig. 1. Effort dynamics in the game of football according to travel speed (m/s) recorded with Playertek GPS

The authors believe that even with the use of computing, sports performance evaluation has become increasingly widespread and important in recent years. This technique involves collecting and analysing athletes' performance data using computers and specialised algorithms [3] and the purpose of data processing is to assess the level of athletes' physical condition and their chances of gaining future performance[13]. Computing has also been integrated into the selection process and training of athletes. With it, several programs are used for planning physical exertion and refreshment. The information system can forecast the following results to be obtained by athletes[11]. Another important element is that effective communication between teacher and student is crucial in the teaching-learning process of sports games, as this process is complex and can encounter difficulties in the absence of proper communication[2].

Material-method

The hypothesis of the paper assumes that the qualitative component of effort, expressed by the distance traveled in the sprint, is more important in increasing the pace of play in the U17 and U19 junior teams, compared to its quantitative component, expressed by the total distance traveled. The purpose of the research is to identify the level of physical training of U17 and U19 players, in terms of aerobic capacity. Analysis of effort during official games with the help of Playertek GPS. The subjects subject to research will be U17 and U19 juniors registered at AFC Botoșani, who participate in the U17, U19 and Liga 3 national championships, competitions organized by the Romanian Football Federation. In total, there are 44 subjects in the two teams. The AFC Botoșani U17 team consists of 22 players aged 15-16. The AFC Botoșani U19 team consists of 22 players aged 17-18. U19 National Junior Championship – Round 17, Date: 1.05.2019; 12:00, Stadium: "Constantinescu Nehoiu" Roman – synthetic; LPS Roman – FC Botoșani: final score 2 – 3 (break 0 – 2). U17 National Junior Championship – Round 17, Date: 1.05.2019; 14:00

Stadium: "Constantinescu Nehoiu" Roman – synthetic, LPS Roman – FC Botoșani: final score 1 – 3 (halftime 0 – 2) For a more objective analysis of player performance, Playertek software allows us to make comparisons between players. We chose to compare the parameters of players playing in the same position from the two teams involved in the research: U17 and U19.

Results

The values of the indicators of appreciation of the game parameters in the two groups FC Botoșani U19 and FC Botoșani U17, the differences highlight a number of aspects. The differences between FC Botoșani U19 and FC Botoșani U17 of 0.29 km at the total distance traveled, of 87.79 m at the distance run in the sprint, of 8 at the number of intense actions, of 0.43 m/s at the maximum speed (m/s), of -4.31% at the work/break ratio emphasize that the FC Botoșani U19 group is better than FC Botoșani U17, in some athletes. The differences in average values between FC Botoșani U19 and FC Botoșani U17 of 0.229 km at the total distance traveled, of 5.42 m at the distance run in the sprint, of 3.4 m at the number of intense actions, of 0.191 m/s at the maximum speed (m/s), of -0.691% at the work/break ratio highlight that the FC Botoșani U19 group is better overall than FC Botoșani U17. The differences between the minimum values between FC Botoșani U19 and FC Botoșani U17 of 0.64 km at the total distance traveled, of -47.96 m at the distance run in the sprint, of 0 at the number of intense actions, of -0.17 m/s at the maximum speed (m/s), of 7.28% at the work/break ratio emphasize that the FC Botoșani U19 group is better than FC Botoșani U17, in some athletes. Differences in standard deviation values between FC Botoșani U19 and FC Botoșani U17 of -0.081 km at total distance travelled, 14.27 m at distance run in sprint, 0.292 at number of intense actions, 0.153 m/s at maximum speed (m/s), -1.827% at work/break ratio underlines that FC Botoșani U19 group is not very different from FC Botoșani U17.

Table 1. Results of the appreciation indicators obtained by FC Botoșani U17 and U19 in official matches

Ind. ap.	Gr.	Dt (km)	DS (m)	No.Aim	Vm	Rl/p
V. max.	FC Botoșani U19	11,53	1273,38	90	9,31	44,37
	FC Botoșani U17	11,24	1185,59	82	8,88	48,68
	Difference	0,29	87,79	8	0,43	-4,31
V. med.	FC Botoșani U19	10,262	963,786	70,9	8,402	39,431
	FC Botoșani U17	10,033	958,366	67,5	8,211	40,122
	Difference	0,229	5,42	3,4	0,191	-0,691
V. min.	FC Botoșani U19	9,28	662,56	56	7,36	35,12
	FC Botoșani U17	8,64	710,52	56	7,53	27,84
	Difference	0,64	-47,96	0	-0,17	7,28
Ab. st.	FC Botoșani U19	0,741	173,933	9,734	0,606	3,884
	FC Botoșani U17	0,822	159,663	9,442	0,453	5,711
	Difference	-0,081	14,27	0,292	0,153	-1,827

Legend: P = post ; Dt = Total distance (km); Ds= Sprint distance(m); Nr.Ai = number of high-intensity actions; Vm = Maximum speed(m/s); Rl/p = Break Work Report(%);V.. max = Maximum value; V. med. = Mean value ;V. min = Minimum value; Ab. st. = standard deviation

Below I will present the results and comparative analysis of the actions of the players as U17 and U19 right-backs. Table 2 includes the difference between the average values of the indicators of appreciation of effort parameters for right-backs from FC Botoșani U19 and U17.

Table 2. Average values and differences in right-back effort parameters of the two teams

Current number	Par.	U17	U19	Difference U19 – U17
1.	Dt – (km)	9,99	10,62	0,63
2.	Ds sprint>5m/s(18km/h) (m)	907,07	1273,38	366,31
3.	Nr.Ai	63	90	27
4.	Vm (m/s)	7,9	8,35	0,45
5.	RI/p (%)	39,42	35,12	-4,3

Legend: Par. = parameters ; Dt = Total distance (km); Ds = Sprint distance; Nr.Ai = number of high-intensity actions; Vm = Maximum speed; RI/p = Pause Work Report

The parameter differences are 0.63 km at total distance travelled, 366.31m at sprint distance, 27 intense actions and 0.45 m/s at top speed. They show that the U19 right-back had better indicators than the U17 right-back. The U17 player was only 4.3% better in terms of work/break ratio, which was also due to the U19 player's numerous intense actions.



Fig. 2. Graphical representation of effort parameters in right-back players in the two teams Results and comparative analysis of players' actions as U17 and U19 right centre-back. From Table 3, which includes the difference between the average values of the indicators of appreciation of effort parameters for the central defenders from FC Botoșani U19 and FC Botoșani U17.

Table 3. Average values and differences in effort parameters right centre-backs of the two echipe

Current number	Par.	U17	U19	Difference U19 – U17
1.	Dt – (km)	9,39	9,67	0,28
2.	Ds sprint>5m/s(18km/h) (m)	710,52	662,56	-47,96
3.	Nr.Ai	56	56	0
4.	Vm (m/s)	8,4	7,36	-1,04
5.	RI/p (%)	35,82	36,64	0,82

Legend: Par. = parameters; Dt = Total distance (km); Ds = Sprint distance; Nr.Ai = number of high-intensity actions; Vm = Maximum speed; RI/p = Pause Work Report

At the effort parameters of the right centre-backs U17 and U19 we can observe a number of aspects. The differences between parameters are 0.28km at total distance, -47.96m at sprint distance, 0 at intensity actions, -1.04m/s at top speed and 0.82% at work/break ratio. They show that the performance of the two right-back centre-backs was similar.



Fig. 3. Graphical representation of effort parameters in right-back centre-back players in the two teams

Results and comparative analysis of the actions of players as left central defender U17 and U19. At the effort parameters of the left central defenders U17 and U19 we can observe a number of aspects. The parameter differences are 1.33km at the total distance, 75.43m at the sprint distance, 10 intense actions, 0.62m/s at top speed and 5.58% at the work/break ratio. They show that the U19 left-back performance was better.

Table 4. Average values and differences in effort parameters left centre-backs of the two teams

Current number	Par.	U17	U19	Difference U19 – U17
1.	Dt – (km)	9,77	11,1	1,33
2.	Ds sprint>5m/s(18km/h) (m)	863,77	939,2	75,43
3.	Nr.Ai	61	71	10
4.	Vm (m/s)	8,61	9,23	0,62
5.	RI/p (%)	38,55	44,13	5,58

Legend: Par. = parameters ; Dt = Total distance (km); Ds = Sprint distance; Nr.Ai = number of high-intensity actions; Vm = Maximum speed; RI/p = Pause Work Report



Fig.4. Graphical representation of effort parameters in left-back centre-back players in the two teams

The individualization of training in sports is carried out through modeling, which serves both as a principle and as a method. Its purpose is to maintain sports shape by correctly dosing the volume and intensity of work, usually adapted to maximum efforts. The individualization of training helps us through the ability to dose individual effort, allowing us to apply a greater number of technical-tactical exercises, which contributes to progress in this field [8].

Discussions

The purpose of this study was to analyze the behavior of soccer players in a standard small-sided game (SSG) according to the role played (offensive, defensive and wildcard) and its relationship to physical demands, technical performance and internal load. 24 well-trained young male football players were involved (12 under 16 and 12 under 19). During SSG, players alternated between the three roles, and

the results showed higher demands in defensive parameters. “A complementary, positive moderate correlation was found between PHYD and RPE in the U16 dataset ($r = 0.45$, $p < 0.006$). Very large positive correlations were also found between PHYD and RPE in the U19 and merged dataset ($r = 0.78$, $p < 0.001$ and $r = 0.46$, $p < 0.63$, respectively)” [12]. Another article confirms that recent studies suggest that variation in training and match load is influenced by various factors such as weekly schedule, initial player status, playing positions, age group, training mode and contextual factors. As a result, there is significant variation in the weekly load distribution and limited load variation over the course of a competitive season [9]. The authors [10] believe that with the recent increase in the frequency of use of devices, they seem to be promising in data collection. However, the basic assumption is that when devices are worn in training or gaming sessions and can detect and quantify movement reliably, validity is assured because tracking data comes directly from the activity itself.

Conclusions

The FC Botoșani U19 group registers higher values than the FC Botoșani U17 group at most of the evaluated parameters, indicating a better overall performance of the U19 athletes. The differences in maximum values between the two groups indicate that some athletes in the U19 group perform better than those in the U17 group in terms of total distance traveled, distance run in the sprint, number of intense actions, maximum speed and work/break ratio. The differences in the average values show that, in general, the FC Botoșani U19 group performs better than the U17 group in all evaluated parameters. Differences in minimum values indicate that the U19 group performs better than the U17 group in some athletes in terms of total distance traveled, distance run in the sprint, number of intense actions, maximum speed and work/break ratio. The differences in the standard deviation values show that the FC Botoșani U19 group is not very different from the U17 group in terms of performance variability. Comparative analysis of players' actions at right-back, centre-back right and centre-back reveals varying differences in their performance between the two groups, with athletes in the U19 group generally showing superior performance. The results indicate a difference in the performance of athletes in the U19 and U17 groups, with the U19 group generally showing better performance. These findings can serve as a basis for adjusting athletes' training and development strategies to maximize their potential and performance.

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