RELATIONS BETWEEN THE PARAMETERS OF EXTERNAL LOAD IN BASKETBALL GAME SIMULATING EXERCISES OF VARIOUS TECHNICAL-TACTICAL TASKS

Michał Nowak[1], Tomasz Gabryś[2] , Adam Stępniak[3] , Urszula Szmatlan-Gabrys[4]

[1]Secondary High School Romuald Traugutt in Częstochowa, Physical education, Poland
[2]Department of Physical Education Sciences, Faculty of Health Sciences, Jan Dlugosz University in Czestochowa, Poland
[3]University Club of the Academic Sports Association of the Czestochowa University of Technology, Poland.
[4]Department Anatomy, Faculty of Rehabilitation, University of Physical Education in Krakow, Poland.

DOI. 10.51371/issn.1840-2976.2021.15.S1.13 Original scientific paper

Abstract

The aim of the research was determining the differences, similarities and relations between time, distance and maximum speed occurring in the structure of exercises – small games. While selecting exercises, the assumption was to maintain similar internal load with various technical-tactical assumptions assessed with the help of parameters generated with the use of GPS and IMU technologies. Twelve basketball players took part in the research (age 24 ± 4.7 years; height 187.9 ± 5.2 cm; weight 83.9 ± 8.7 kg). 3 exercises simulating match conditions, and intervals between them lasted 5 minutes. The players played as long as one of the teams scored 25 points. The ranges of IMU like acceleration or deceleration were divided into I-VIII zones from the value of -8 to 8 m/s/s. To examine differences in total distance and total effort among three exercises, we performed repeated ANOVA measures. This test was statistically significant at alpha ($\rho \leq 0.05$). The maximum speed and the longest distance were registered in Exercise. 1 and equalled 23.22 ± 1.73 km/h and 1097.75 ± 48.11 respectively. The longest distance covered in 1 minute was registered in Exercise 2 – 66.10 ± 5.72 m/m. For bands II to VII, there were significant differences between Exercise 3 and Exercise 1 and 2. The correlations between Exercise 2 and 3 in bands III,VII was statistically relevant. Training time aiming at reaching the same external load should be modified and not dependent on score results. Changeable time conditions result in the lack of load stability in a given exercise, hence its unpredictability as to the planned training load. The results of this research shall help coaches apply, in the right moment of a training cycle, tasks simulating match conditions of particular running load, controlling in this way a type of tiredness and its level.

***Key words**: small games; accelerations; decelerations; basketball; distance*

Introduction

The research pertaining to the structure and intensity of effort in sports team games during training and sports competition is of a multidimensional character (Hoffman et al. 1996; McInnes et al. 1995; Montgomery et al. 2010; Roman et al. 2019). The knowledge of basketball motor behaviour, requirements in the area of motor preparation and effort adaptation taking into account one's position in the court constitutes the foundation of basketball training planning at different sports levels. The analysis of video recording served to determine specific motor activities in basketball, e.g. Pick, Shot, Shuffle, Pass, Jump, Sprint, Jog/Run, Walk and Stand (Jakobsmeyer et al. 2013; Torres-Ronda et al. 2016). The research conducted by McInnes et al (1995). showed that the frequency of such motor patterns as Pick, Shot, Shuffle, Pass, Jump, Sprint, Jog/Run, Walk and Stand (or the ones mentioned above) equalled on average 997 ± 183 activities per match, and the change of the pattern took place every 2.0 s, including on average 105 ± 52 activities in the area of high intensity (average duration time was 1.7s). In real time, motor patterns executed with high intensity took place every 21 seconds and lasted maximum 3 seconds. In their research, Stojanović et al (2018). drew the readers' attention to differences in distances covered by running at maximum speed. This observation confirms the view that high intensity work and not the whole distance covered by a given basketball player during the game reflects the character of this basketball player's preparation (Atl H et al. 2013; Sampaio et al. 2009). Basketball is an interval game based on undertaking anaerobic exercise repeatedly (Bredt et al. 2020; Delextrat et al. 2014,2018; Gantois et al 2017). Taking into account the differences between positions and individual predispositions of particular players constitutes the basis of match tactics determining interaction between players (Daniel et al. 2017). The systems that facilitate the evaluation of training or match work are Global Positioning System (GPS) (Cummins et al. 2013), Global Navigation Satellite System (GNSS) (Cummins et al. 2013) or (LPS – Local Positioning System) (Svilar et al. 2019). The systems are completed by the evaluation of external load with heart rate (HR) measurement, video recording (Sampaio et al. 2015) and Inertial Measurement Units – IMU (Nguyen et al 2015). The most frequently analysed parameters in basketball are: Distance - D, Time - T, Velocity - V, Accelerations - ACC, Decelerations – DEC and their combinations (Jakobsmeyer et al 2013). The differences in distance covered by particular basketball players during a given match (5-7km) derives from their position on the court and their sports level (Hoppe et al. 2018). The common parameters suggested by most devices equipped with IMU sensors are: change of direction (COD), ACC and DEC w in particular categories of intensity categorised on the basis of obtained acceleration results in three-dimensional space (high, low and medium intensity)(Roman 2019; Stojanović 2018; Abdelkrim et al 2010). This data helps to modify training tasks taking into account their content, in order to force a given number of repetitions in a given time and adjust the time break between the series with very high accuracy. While programming a training, it is important to determine the parameters of maximum effort, including very fast changes of leg settings in relation to the ground during body fake, jumps, sprints or collisions during screening (Abdelkrim et al. 2007; Scanlan et al. 2011).

The aim of the research was determining the differences, similarities and relations between time, distance and maximum speed occurring in the structure of exercises simulating proper game. While selecting exercises, the assumption was to maintain similar internal load with various technical-tactical assumptions assessed with the help of parameters generated with the use of GPS and IMU technologies

Methods

Twelve basketball players took part in the research (age 24 ± 4.7 years; height 187.9 ± 5.2 cm; weight 83.9 ± 8.7 kg). The participating in the study were players of the II national league team with 14.75 ± 5.55 years training experience. All study participants were of legal age (adult person) and agreed to participate in the study. The bioethics committee at the Regional Medical Council granted its permission for conducting the research. The players took part in three exercises simulating match conditions, whose content was developed on the basis of the frequency with which elements such as fast break, pattern offence, man to man defence, zone defence, mixed defence and individual actions undertaken in offence and defence by particular players in their positions occur in proper game (Klusemann et al. 2012; Lamas et al. 2014; Mitova et al. 2015; Pinar et al. 2014; Puente et al. 2017; Svilar et al 2018).

Exercise 1. Practising fast break in a 3 by 3 arrangement (blue team consisting of 2 teams, 3 players each and black team consisting of 2 teams, 3 players each. After its offence a given team returns to defence and defends itself against the next team of three. This exercise is of an interchangeable character and finishes the moment one team, blue or black, scores 25 points (teams of three consist of a point guard, a forward and a centre). Players in offence had the following tasks: option 1 - creating 3:1, 3:2 advantage finished with a close-range shot, or an open shot. Option 2 consisted in a quick pattern offence using a pick and roll and a screen for a player without a ball. Players in defence had the following tasks: a man to man defence, an aggressive full court press and a switch. (Figure1).

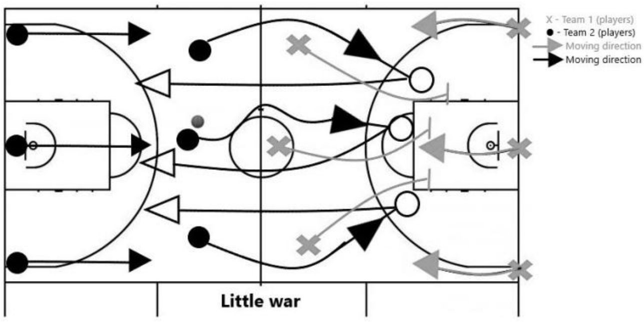

Figure 1. Exercise 1. Transition in a 3-by-3 arrangement with 2 teams blue and black played up to 25 points. Exercise 2. Practising team defence in 4 by 4 arrangements with switching the ball to the other side of the court. The team efficient in its attack gets a bonus and keeps playing against the opposite team. The game finishes the moment 25 points are scored. The players in offence had the following tasks: quick pattern offence with the use of the driver to the basket after a one-on-one game, a passing game, a screen for a player without a ball and long- distance shots. The players in defence had the following tasks: man to man defence, an aggressive half court press, help by jumping to the ball, rotation in defence and using a tactic called between (Figure 2).

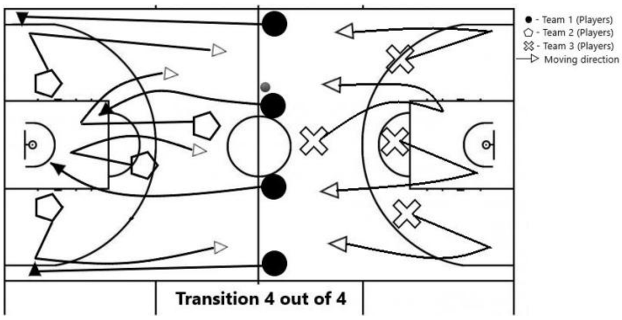

Figure 2. Exercise 2. Transition in a 4 by 4 game with a bonus for an effective attack, the teams played up to 25 points.

Exercise 3. The game consisted in practising offence against zone defence in a 2:1:2 arrangement and transition offence in a 5:5 arrangement. The players in offence had the following tasks: quick pattern offence – a set offensive pattern with the use of the driver to the basket after a one-on-one game, a passing game, a screen for a player without a ball and a close – range shot at a low post position, long- distance shots with open shots. The players in defence had the following tasks: zone defence, doubling the player at a low post position, rotation in defence and cutting off players without a ball.

The game finishes the moment 25 points are scored by one of the teams (Figure 3).

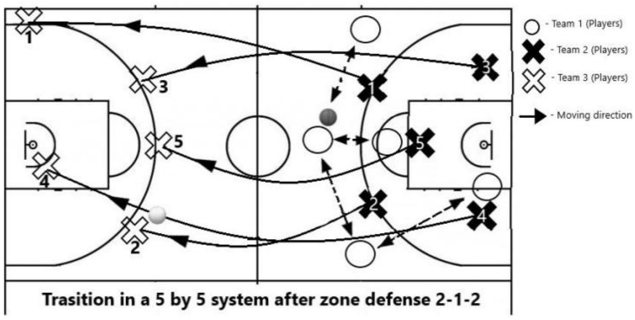

Figure 3. Exercise 3. Transition in a 5 by 5 after the 2-1-2 zone defence, teams played up to 25 points

All the exercises lasted as long as one of the teams scored 25 points . According to the coach's assumptions, in each quarter of the match his team is supposed to score about 25 points, and in all 4 quarters – 100 points. At 50% efficiency, this result guarantees victory with the opposing team and lets the team maintain high intensity in each 4 quarters of the match. Exercises 1, 2 and 3 were done once and intervals between them lasted 5 minutes. During the break, the players were practising shots and were getting acquainted with tactics requirements applied in exercises 1, 2 and 3. The motion of the basketball players was registered as far as distances and inertia motion were concerned with the help of Apex (STATSports Group Limited, Drumalane Mill, The Quays, Newry, Co. Down, N. Ireland) system. The monitoring system consisted on an APEX Module equipped with an integrated 18Hz GPS module, a 400Hz gyro sensor, a 600Hz multiaxial accelerometer, a 10Hz magnetometer and aerials to receive the signal from the court. The sensors were placed on the players' backs between their shoulder blades, in special vests. The ranges of observed intertia motion like acceleration or deceleration were divided into 8 zones from the value of -8 to -3; -3 to -2; -2 to -1; -1 to 0; 0 to 1; 1 to 2; 2 to 3; 3 to 8 m/s/s (Figure 4). Zones I to IV signify decelerations, and those from V to VIII accelerations. The limit values had been defined in earlier laboratory tests, in a RAST test. To examine differences in total distance and total efford among three exercises, we performed repeated ANOVA measures. This test was statistically significant at alpha ($\rho \leq 0.05$). Therefore, we performed a NIR post-hoc tests. Relationships between variables (total distance, total efford) were determined using Pearson's correlations using Statistica software (TIBCO Software Inc. (2017). Statistica (data analysis software system), version 13.3, Krakov, Poland).

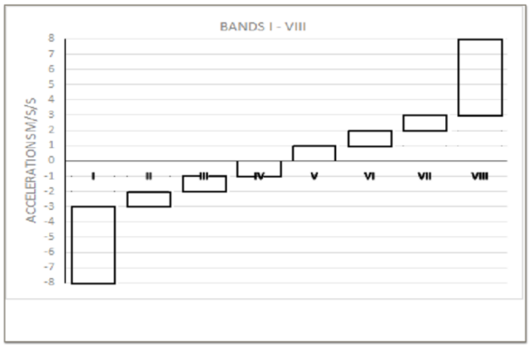

Figure 4. Bands of Accelerations I- VIII.

Results and discussion

Table 1. Average values of time, distance, and velocity in exercises simulating the game.

Exercise number	Total Duration *(hh:mm:ss)*	Total Distance (TD) X ± SD *(m)*	Distance Meterage Per Minute (Dm/m) X ± SD *(m/m)*	Maximum Velocity (Vmax) x ± SD *(km/h)*
1	00:19:13	1097.75 ± 48.11	57.12 ± 2.51	23.22 ± 1.73
2	00:16:18	1078.25 ± 93.56	66.10 ± 5.72	18.71 ± 1.42
3	00:17:09	821.85 ± 63.79	47.92 ± 3.71	20.42 ± 2.19

Table 1 presents time, distance and maximum speed registered in particular exercises simulating the game. The exercises differed in time and distance: the total one and that covered in one minute. The differences in corresponding parameters in the three exercises were statistically irrelevant. The first exercise lasted the longest (1153s), the second one was the shortest (978s). The maximum speed and the longest distance were registered in exercise 1 and equalled 23.22 ± 1.73 km/h and 1097.75 ± 48.11 respectively. The longest distance covered in 1 minute (Dm/min) was registered in exercise 2 – 66.10 ± 5.72 m/m. In exercise 3, the lowest values of TD and Dm/m were registered. To examine differences in total distance among three exercises, we performed repeated ANOVA measures. This test was statistically significant in seven out of eight bands – in bands I - VII. Therefore, we performed a NIR *post-hoc* tests.

Table 2. Total distance of different bands in three exercises. Different letter index shows the statistical significance between exercises (p < 0,05). NIR post-hoc test. M – mean, SD – standard deviation, F – repeated measures ANOVA result, η2 – size effect a and b and c signify post-hoc differences. If two groups have the same letters, they do not differ from each other. If the letters are different, there is a difference at the level of p < 0.05. Bands of Accelerations I- VIII.

	Exercise 1		Exercise 2		Exercise 3		*F*	*p*	η^2
Bands	*M*	*SD*	*M*	*SD*	*M*	*SD*			
I	5.20a	1.72	3.37b	1.28	2.62b	1.92	9.83	0.001	0.52
II	17.29a	4.22	16.62a	3.28	11.77b	4.32	13.22	<0.001	0.60
III	76.31a	12.89	72.46a	14.54	50.62b	6.29	18.55	<0.001	0.67
IV	348.49a	28.03	330.26a	32.24	247.86b	16.15	46.39	<0.001	0.84
V	417.88a	33.66	423.19a	32.01	329.76b	20.14	17.25	<0.001	0.75
VI	157.35a	21.16	157.35a	31.13	121.35b	18.04	12.90	<0.001	0.59
VII	62.44a	12.65	58.05a	12.26	46.07b	14.52	6.66	0.022	0.43
VIII	12.45	4.67	16.79	8.73	11.53	8.20	2.18	0.142	0.20

As it can be seen in Table 2 for band one there were significant differences between exercise 1 and exercises 2 and 3. The longest total distance was found in exercise 1, while the difference between exercises 2 and 3 was not statistically significant. For bands II to VII, there were significant differences between exercise 3 and exercises 1 and 2. In all those bands the shortest total distance was found in exercise 3. Additionally, in band IV we found a nearly statistically significant difference between bands I and II. The total distance was longer in exercise 1. In bands II, III, V, VI and VII, the difference between bands I and II was not statistically significant. Repeated ANOVA measures were not statistically significant for band VIII, although the size effect was relatively high and it is possible that with more than twelve participants also this analysis could reach statistical significance. In order to determine the nature of similarities pertaining to players' load, a correlation analysis between similar indicators was conducted in each exercise. It showed a statistically relevant correlation (p≤0.01) among maximum velocity values registered in each exercise (Table 3).

Table 3. The values of maximum velocity correlation in exercises 1, 2, 3.

	Exercise 1 and 2		Exercise 1 and 3		Exercise 2 and 3	
	r	*p*	*r*	*P*	*r*	*p*
Vmax	0.633	p≤0.05	0.795	p≤0.01	0.766	p≤0.01

In exercise 3, there is a very strong correlation between Total Distance and Vmax r=0.774 p=0.008; Dm/m a Vmax r=0.773 p=0.009.

Table 4 presents the nature of correlations between the total distance that the players covered in each of the three exercises. The relation between exercises 2 and 3 in bands III (r=0.745 p=0.013) and VII (r=0.877 p=0.001) was statistically relevant.

Table 4. Correlations between different exercises in total distance. Bands of Accelerations I- VIII.

	Exercise 1 and 2		Exercise 1 and 3		Exercise 2 and 3	
Bands	*r*	*p*	*r*	*p*	*r*	*P*
I	0.568	0.086	0.233	0.518	0.360	0.307
II	0.662	0.037	0.440	0.203	0.668	0.035
III	0.126	0.729	0.186	0.607	0.745	0.013
IV	0.572	0.084	-0.374	0.287	-0.233	0.518
V	-0.130	0.721	-0.104	0.774	-0.401	0.251
VI	0.449	0.193	0.587	0.074	0.388	0.268
VII	0.191	0.597	0.064	0.860	0.877	0.001
VIII	0.640	0.046	0.021	0.954	0.417	0.231

Table 5.Total effort of different bands in the three exercises. A different letter index shows the statistical significance between exercises (p < 0.05). NIR post-hoc test. M – mean, SD – standard deviation, F – repeated measures ANOVA result, η2 – size effect a and b and c signify post-hoc differences. If two groups have the same letters, they do not differ from each other. If the letters are different, there is a difference at the level of p < 0.05. Bands of Accelerations I- VIII.

	Exercise 1		Exercise 2		Exercise 3		*F*	*p*	η^2
Bands	*M*	*SD*	*M*	*SD*	*M*	*SD*			
I	5.2a	1.78	3.1b	2.02	2.9b	2.51	5.82	0.011	0.39
II	9.4	2.46	10.8	2.64	8.6	2.46	1.56	0.238	0.15
III	33.3a	5.39	51.1b	8.9	46b	5.35	23	<0.001	0.72
IV	480.4a	12.49	336.2b	20.26	397.3bc	21.04	144.32	<0.001	0.94
V	472.6a	12.27	326.1b	29.13	388.6bc	22.34	141.68	<0.001	0.94
VI	36.7a	6.44	50b	11.32	40.9	5.92	7.32	0.005	0.45
VII	13.7	3	14.3	3.41	11.8	3.43	1.29	0.299	0.13
VIII	3.3	1.79	3.2	2.48	2.3	1.9	0.9	0.424	0.91

Table 5 displays the number of activities that the players performed in each band. In corresponding bands of the three exercises, statistically relevant differences in the number of activities in exercises 1 and 2 were recorded in bands I, III, IV, V and VI. Statistically relevant differences in the number of activities in exercises 1 and 3 were recorded in bands I, IV, and V. No statistically significant differences in the number of activities were recorded between exercises 2 and 3. The number of running activities is closely related to the distance, acceleration and deceleration or change of direction of a given player.

Table 6. Average distance (MD) and average time (MT) obtained during a single effort in particular bands in exercises 1, 2, and 3. Bands of Accelerations I- VIII.

	Exercise 1		Exercise 2		Exercise 3	
Bands	*MD during 1 effort*	*MT during 1 effort*	*MD during 1 effort*	*MT during 1 effort*	*MD during 1 effort*	*MT during 1 effort*
I	1	0.827	109	1.161	0.9	1
II	1.84	1.372	1.54	1.62	1.37	1.581
III	2.29	1.375	1,.2	1.374	1.1	1.326
IV	0.73	1.294	0.98	1.352	0.62	1.413
V	0.88	1.061	1.3	1.197	0.85	1.107
VI	4.29	1.294	3.15	1.352	2.97	1.413
VII	4.56	1.139	4.06	1.308	3.9	1.28
VIII	3.77	0.788	5.25	1.375	5.01	1.13

Table 6 presents the characteristics of a number of activities for a given distance, expressed in metres of the distance covered. This data was completed with the time of doing a single activity. The number of activities for each band varies as far as exercises and motion character – acceleration and deceleration – are concerned. The longest distance is related to a single activity performed in bands VI to VIII and, depending on the exercise, it varies from 4 to 5m. The time of a single activity does not vary a lot between particular bands in particular exercises (1-1.4s) or between corresponding bands in particular exercises. Activities performed in each exercise in band I take the shortest time, whereas those in bands VI to VII take the longest time.

Table 7. Correlations between different exercises in total effort. Bands of Accelerations I- VIII

	Exercise 1 and 2		Exercise 1 and 3		Exercise 2 and 3	
Bands	*r*	*p*	*r*	*p*	*r*	*P*
I	0.718	0.019	0.341	0.335	0.377	0.283
II	-0.312	0.381	0.06	0.87	-0.12	0.741
III	0.279	0.435	0.306	0.391	0.338	0.339
IV	-0.137	0.707	-0.206	0.568	0.277	0.138
V	0.313	0.379	0.46	0.9	0.528	0.116
VI	0.469	0.171	-0.135	0.711	0.078	0.831
VII	-0.519	0.124	-0.326	0.357	0.467	0.173
VIII	0.526	0.118	0.15	0.68	0.221	0.54

Table 7 presents the relation between exercises as far as total effort in particular bands is concerned. Only in case of activities in band I, there was a statistically relevant relation between their number in exercise 1 and 2 ($r=0.718$ $p<0.05$). Activities performed in exercises 1, 2 and 3 in the other bands do not display statistically relevant relations. The difference in exercise time derived from the given training task, i.e. score results. Both Borin et al. (2005) and Svilar et al. (2019) drew the readers' attention to the possibility of varying training load in each exercise. It is a question of simulating conditions of the game whose time can be predicted only to a certain extent due to a discontinuous character of basketball and numerous breaks linked to breaking the rules of the game. It is clearly emphasised by Conte et al. (2016) and Daniel et al. (2017). Obtaining time differences between exercises allows for paying more attention to the choice of a given tactics depending on physical condition of a given team. Game tactics based on pattern offence and team zone defence is a beneficial solution for teams with high endurance. On the other hand, game tactics based on fast offence and aggressive individual defence would be perfect for teams whose efficiency depends on their velocity (Abdelkrim et al. 2010; Daniel et al. 2016). In exercise 1, there is a danger of lower efficiency of shots from the distance if a given player running with high speed stops. Taking into account the duration of a given exercise reflecting shot efficiency, one can remark that the shorter the total distance and the distance covered in 1 minute of a given exercise is, the higher shot efficiency is. It is probably the result of smaller tiredness after the run, which is emphasised by other authors (Gomez et al. 2015). The highest intensity could have led to exhaustion resulting in a worse selection of techniques and tactics, and what follows, more mistakes (Lorist et al. 2002). In this way it was proven that motor exhaustion has a negative impact on a given player's accuracy and motor skills, influencing negatively in exercise 1 their shot efficiency and lengthening exercise time. This relation is confirmed in the research by Coco et al. (2009) and Lorist et al. (2002) Thus, zone defence and pattern offence against zone defence occurring in exercise 3 impose the smallest physical load on a given basketball player as far as their running effort is concerned (Denesa et al. 2015, Sansone et al. 2019). The structure of differences in the distance covered in particular acceleration bands does not differentiate the exercises as far as acceleration and deceleration is concerned. Each exercise is dominated by running with acceleration in the range of -1 do 1 m/s^2 constituting 70% of the distance covered. It corresponds to the analyses of motion of players in a basketball match conducted by Torres et al.(2016), Svilar (2019). Similarly, the structure of the distance in other acceleration and deceleration bands in each of the three exercises is very similar and does not show statistically relevant differences. It is a structure typical for a basketball match Torres et al.(2016) and Svilar (2019). Relevant statistical differences occur not in the structure but in the length of the distance covered in particular bands. They occur between exercises 1 and 2 in all three bands and between exercises 2 and 3 in all the bands except band I. Thus, the tactics of exercise 3 points to the smallest running load imposed on a given player our of the three exercises. Analysing the research conducted by Deheres et al. (2015), Gomez et al. (2015) and Sansone et al. (2019), this characteristics of exercise 3 can be attributed to motion activities which generate much more positions for static open shots, developed by a passing game and doubling the player at a low post position. Thus, it is not the structure of the running effort different from the match effort but the specific tactics of this exercise that has an influence on the biggest shot efficiency (scoring 25 points faster). Gomez et al. (2010,2016) focus on bigger efficiency and smaller effort load in tactical solutions, dominated by pattern offence consisting of a 1 by 1 arrangement and zone defence. The lack of relevant correlations between the total distance covered in particular exercises leads to the conclusion about an individual nature of running load in particular positions. This observation is compatible with the research by Puente et al. (2014), who point out that tactical differences in exercises result in changeable player load, depending on their position (Svilar 2018; Vazquez-Guerrero et al. 2018). As there is a statistically relevant correlation between maximum speed obtained by particular players regardless of a solved tactical task (in every of the three exercises), one should pose a question about the relation of this correlation to the exercise content or motor preparation of particular players. The results of the research conducted by McInnes et al. (1995), Abdelkrim et al. (2007), Klusemann et al. (2012) point to the nature of a given exercise. Each of the exercises used in the research requires in respective positions players with a high capacity for running fast. The research by Trunić et al. (2014), Reina et al. (2020) points to the fact that regardless of a tactical solution, players with a high speed capacity always use their speed to get an advantage over their opponents in the exercises. The relation between tactical issues and court positions to running work load was the focus of the research by Abdelkrim et al. (2007), Sampaio et al. (2006) These authors showed that on average point guards performed more sprint runs in comparison with forwards and centres. It might be the result of a tactical task as it is usually the point guard who is responsible for quick passing of their team from defence to offence and vice versa. Generally, it was pointed out that players' statistics differed depending on their position, probably due to well-known differences in anthropometric features that conditioned the distance of the game from the basket and a number of specific motor activities generating given statistics. These observations go hand in hand with the research results. Only exercise 2 characterised by fast pattern offence and a passing game, and exercise 3 characterised by strictly defined tactical activities show the same requirements for running work in the same positions in bands III and VII, i.e. in bands with high acceleration and deceleration values. A very high diversity of exercises 1 and 2, and also 1 and 3 in that respect shows a very high diversity of match simulation exercises as far as their structure of running activities is concerned. Thus, these exercises differ in running load for particular basketball players. It cannot be stated while comparing exercises 2 and 3. In this case, there are no differences. The differences between exercises 1 and 2 derive from a different concept of sports competition. In exercise 1 the team tries to get an advantage thanks to fast break, whereas in exercise 2 they count on pattern offence. A close similarity in the structure of running activities of exercises 2 and 3 derives from the use of a big number of pattern offence elements in them. Accepting the view of Klusemann et al. (2012), Schelling et al. (2016), it seems that it is an effect of implementing in both exercises strictly defined tactical-technical rules for players in particular positions, both in offence and defence, eliminating intuitive decisions. A much bigger volume of running work against the distance covered in exercise 1 has an impact on undertaken activities as far as their acceleration, deceleration, change of the player's movement direction are concerned. In his research Svliar (2019) draws our attention to this correlation in small-games exercises. The lack of correspondence between the number of activities performed in each of the three exercises done in particular bands demonstrates a different nature of running work pertaining to particular players in corresponding positions. Therefore, the exercises used to simulate match effort did not double players' running work load. They allowed for activating various sides of physical preparation during the game aiming at scoring 25 points. Such a selection of exercises is necessary in preparing team games players (Schelling et al 2016). When it comes to players physical preparation, contemporary tendencies in the development of team games training methodology point to an increasingly significant role of exercises simulating match effort based on basketball small-sided games (Sampaio 2009; Klusemann 2012). It forces coaches to develop training programmes varying in motor activities, based on the analysis of basic motor activities being the highest external training load for a given player. However, these programmes should keep the proportion of activities characteristic for a match. GPS and IMU technologies create an opportunity to precisely assess for each exercise the load of particular players playing on different positions. As Schelling et al.(2016) and Svilar et al.(2018) remark, it is a fundamental condition of efficient management of individual training loads in sports team games.

Conclusion

Training time aiming at reaching the same external load should be modified and not dependent on score results. Changeable time conditions result in the lack of load stability in a given exercise, hence its unpredictability as to the planned training load. Contemporary approach to basketball training requires accurate data, especially if our assumption is to simulate match conditions. The results of this research shall help coaches implement, in the right moment of a training cycle, tasks simulating match conditions of particular running load, controlling in this way a type of tiredness and its level. The proven correlations between analysed small-games shall help in better understanding of the exercises' running intensity and ensure more efficient training sessions, keeping the balance between the time for small-games and rest. For example, the authors suggest that exercises 1 and 2 might be used 3-4 days before a given match, and exercise 3 1-2 days before the match.

Acknowldgments

Special thanks go to the RKS RAKÓW CZĘSTOCHOWA sports club for free rental of GPS systems for the needs of our research.

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Corresponding information:

Received:20.08.2020.
Accepted:25.01.2021.
Correspondence to: Michał Nowak
University: Secondary High School Romuald Traugutt in Czestochowa
Faculty: Physical Education
Phone: +48696473145
E-mail: muffi233391@gmail.com