NATIONAL SPORTS ACADEMY "VASIL LEVSKI"

TRACK & FIELD DEPARTMENT

VASIL BORISOV TSVETKOV

ANALYSIS OF MODELS FOR DEVELOPMENT OF THE SPEED ENDURANCE AMONG 15-16 YEARS OLD SOCCER PLAYERS

ABSTRACT OF A DISSERTATION

Sofia, 2020

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for affiliation of a doctoral degree in professional direction 7.6. – "Sports", in doctoral curriculum "Theory and methodology of sport science"

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Sofia, 2020

The dissertation has been discussed and proceeded for official defense at the internal meeting of the Track and Field department from the 26th February 2020.

The dissertation consists of a total of 130 pages, in which are included 39 figures, 45 table of contents, 4 appendixes and 18 pages of literature sources – a total of 168 headlines.

The defense will be held on the 19th May 2020 at 14:00 in A3 hall at National Sports Academy, at open meeting of the representatives of the committee:

1. Prof. Apostol Nikolov Slavtchev, PhD
2. Assoc. prof. Arahangel Grigorov Gigov, PhD
3. Prof. Kiril Atanasov Aladjov, DSc
4. Assoc. prof. Ventsislav Ivanov Gavrilov, PhD
5. Assoc. prof. Georgi Vladimirov Ignatov, PhD

Materials for the defense can be found in office 336 at National Sports Academy Vasil Levski

Author: Vasil Borisov Tsvetkov

Title: Analysis of models for development of the speed endurance among 15-16 years old soccer players

GENERAL CHARACTERISTICS OF THE DISSERTATION

The present dissertation consists of Introduction, four chapters, list of the literature sources and appendix. The main content is placed over 110 pages and the exposure is completed with various figures and tables. The list of the literature used for the study includes 168 headlines of various sources.

Actuality of the subject

Information from the literature analysis clearly suggests the need of optimization of methods for developing speed endurance. As an addition to already formed practice and knowledge in this field is possible to add new ones, by studying modern methods and technical kits designed to control and analyze the sports activity.

Target and subject of the study

The target of the present experiment are several fartlek models designed for developing speed endurance.

The subject is the motor ability called speed endurance and its forms within 15-16 years old soccer players.

Methodology of the study

For a successful realization of the experiment and all the tasks within, we used the following methods:

- General methods
  - analysis of the specific literature sources
  - sport experiment
  - questionnaire

- Specific sport-related methods
  - anthropometric
  - chronometric
  - ergo metrics
  - heart rate monitoring
  - GPS analysis
  - sports testing

- Statistics
  - variation analysis
  - comparative analysis
  - correlation analysis

Scientific novelty of the dissertation

In terms of Bulgarian practice in soccer, it is not present a unified specialized methodology for development of the speed endurance among this particular age group. There are however studies about this indicator but as we are concerned they are based on different approach and don't give the needed methodological knowledge.

Practical significance of the results

Implementation of our methodology in the training plan of U16 and U17 age groups in the PFC Levski Sofia Youth Academy. It is possible for others to use and adopt the methods of using GPS based systems when working with youth soccer players.

Structure of the dissertation

Introduction

Chapter I. Literature analysis – 34p.

Chapter II. Aim, tasks, organization and methodology of the study – 9p.

Chapter III. Analysis of the results – 59p.

Chapter IV. Conclusions and recommendations – 6p.

Literature – 18p.

Appendixes – 5p.

CONTENTS OF THE DISSERTATION

Introduction

In the introduction is substantiated the importance of the problem. Also there is information about the specifics of the game of soccer and the term conditioning in sports.

Chapter I. Literature analysis

In chapter I. we see analysis of different sources giving information about other achievements in the field of this problem and even ones close to it. A total of 168 headlines are conducted.

The role of the conditioning in sports and soccer in particular is explained as well as its aspects when working with younger players. Together with the subject of the dissertation in separate subchapters are presented:

- the characteristics and specifics of the motor and play activities concerning soccer

- characteristics of the motor qualities and abilities needed by the players, and a characteristic of the play within childhood period

A place is distinguished for:

- possibilities and place of the GPS systems in the preparation of the soccer players

- speed zones, needed to monitor the gameplay and training activity in soccer

- approaches for measuring the heart rate variability

Chapter II. Aim, tasks, organization and methodology of the study

Aim – optimizing the present methods for developing the speed endurance among 15-16 years old soccer players by analyzing various fartlek drills (models), based on the quantities of the motor mobility during official games.

Tasks

1. Analyzing of literature sources for the problems of the strength and conditioning among youths and specifically the field of development of the speed endurance in youth soccer.
2. Study and measure the border values of the speed zones for different types of mobility during a game.
3. Define using a GPS system the quantities of different types of mobility during a game.
4. Conducting and analyzing of several field and lab tests for assessing the levels of the anaerobic fitness indicators, related to the speed endurance motor ability.
5. Analyzing models of fartlek running drills, forming a methodology for developing of the speed endurance motor ability.

The specialized field and laboratory fitness tests are presented in details in Table 1.

Table 1.

Tests used in the study

	Test	Unit	Accuracy
1	Anthropometrics	cm, kg;	0.01, 0.1;
2	20m walk	sec	0.01
3	20m dash	sec	0.01
4	20m dash from a “fly” start position	sec	0.01
5	3x50m shuttle run	sec	0.01
6	600m run	sec	0.01
7	Heart rate	bpm	1
8	Wingate тест		laboratory
8.1	Maximal power	Wat	0.01
8.2	Average power	Wat	0.01
8.3	Minimal power	Wat	0.01
9	GPS data		
9.1	Total distance covered	m	0.1
9.2	Total distance for a time period	m	0.1
9.3	Total distance covered in Z1	m	0.1
9.4	Total distance covered in Z2	m	0.1
9.5	Total distance covered in Z3	m	0.1
9.6	Total distance covered in Z4	m	0.1
9.7	Total distance covered in Z5	m	0.1
9.8	Maximal velocity	Km/h; m/s	0.1
9.9	Average velocity	Km/h; m/s	0.1
9.10	Heart rate	bpm	1

Chapter III. Analysis of the results

1. Study of the methodological knowledge of the soccer coaches regarding body load and the speed endurance motor ability among 15-16 years old soccer players

We developed a questionnaire (app. 1) which gave us a closer look for the knowledge of the Bulgarian coaches about developing the speed endurance of their players. We included 10 questions, describing as detailed as possible the methodological knowledge of the coaches for – meaning of the motor qualities and abilities, the

regimes of energy distribution, methods and means for developing the speed endurance, tests for assessing the level of the anaerobic fitness.

- In their main part the football coaches we asked don’t have a significant experience in their field. The most experienced ones have up to 10 years of practice which suggests a modern vision for the play and its functional characteristics.
- Soccer coaches are well informed about the meaning of the motor qualities, needed by the players during the game. Furthermore, they successfully disperse the importance of these qualities in the preparation of the players. This vision totally corresponds with our opinion on the problem.
- Experts show some hesitation about their understanding of the importance of the motor skills required to play football. The opinion of the importance of the ability to exhibit speed endurance is largely confirmed, but they also give great advantage to speed and power qualities. From this we can conclude that it is possible to make significant methodological errors in the preparation and implementation of preparation methodology.
- We see extremely divided opinions about the dosage of training loads on the weekly micro cycle. Here we can conclude that there are serious methodological fluctuations in the perceptions of specialists. However, we adhere to the thesis shared by the higher percentage of respondents, namely, holding one training session per week.
- Mostly football professionals are aware of the means of developing endurance.
- There is great uncertainty about the means of controlling the ability to develop endurance. The majority of respondents answered "I do not know any", which implies serious problems in carrying out both the pre-season preparation and the whole annual macrocycle. In addition, some of the respondents indicated that tests

were entirely aimed at aerobic metabolism, which means a large discrepancy in determining the intensity of training loads.

2. Determination of speed and heart rate limits for age groups 15 and 16 years.

We used the method of sports-pedagogical testing. Given the experience of previous studies mentioned in the literature, we approached the development of our own methodology and model for determining speed ranges for players aged 15-16. It is based on specially selected tests in accordance with the main mobility areas during an official meeting:

We distinguished five zones:

- I zone – walking
- II zone – running with low intensity
- III zone – running with medium intensity
- IV zone – running with high intensity
- V zone – sprint

The boundaries of the zones were determined by a group of expertly selected tests whose variation values are illustrated in Table 2.

Table 2.

Variation analysis of the data from tests for determination of the speed zones

Indicator	n	X min	Xmax	R	Ẋ	S	V	As	Ex
20m dash	40	9.19	12.55	3.36	11.02	0.78	7.12	-0.088	-0.431
600m run	40	94.54	115.82	21.28	104.03	5.80	5.57	0.247	-1.152
3x50m shuttle	40	21.15	24.86	3.71	23.56	0.93	3.96	-0.74	0.389
20m fly start	40	2.38	2.75	0.37	2.56	0.11	4.17	0.091	-1.235

Summarizing the test data, we expressed the boundaries of the speed zones as follows:

Table 3.

Boundaries of the speed zones

Type of movement	Speed zones			
	m/s		Km/h	
Sprint	above/= 7.2		above/= 25.9	
Running with high intensity	6.06	7.1	21.8	25.8
Running with medium intensity	5.18	6.05	18.6	21.7
Running with low intensity	2.19	5.17	7.9	18.5
Walking		Up to/= 2.18		Up to/= 7.8

3. Measurement of individual forms of mobility, based on the created speed zones, in 15-16 years old football players.

We investigated a total of 57 cases of football players aged 15 ± 0.7 and 16 ± 0.5 in official matches lasting 80 minutes (2x40). In each match, 10 field players were analyzed. Only the cases where the player played the full 80 minutes were included in the sample data. The results in the different zones give a clear idea of the quantitative characteristics of the load during an official match. The total volume in zone 1 - walking for 15-16 year olds is 3630.8 ± 277.8 meters, in zone 2 - Low intensity running - 4396.1 ± 528.4 meters, in zone 3 - Medium intensity running -

375.8 ± 106.4 meters, in zone 4 - High intensity running - 230.1 ± 67.5 meters, in zone 5 - sprinting for 15-16 year olds is 53.7 ± 33.3 meters. Table 4 presents information on the variability of mobility data.

Table 4.

Variation analysis of mobility data for 15-16 years old soccer players

Ind.	n	X min	Xmax	R	Ẋ	S	V	As	Ex
Zone 1	57	3114.7	4347.6	1232.9	3630.8	277.8	7.7	0.451	-0.24
Zone 2	57	3232.4	5510.8	2278.4	4396.1	528.4	12.0	0.022	-0.612
Zone 3	57	192.2	675.7	483.5	375.8	106.4	28.3	0.337	-0.183
Zone 4	57	113.3	360.7	247.4	230.1	67.5	29.3	0.052	-1.152
Zone 5	57	8.9	130.1	121.2	53.7	33.3	61.9	0.55	-0.763
Total	57	7430.4	9794.5	2364.1	8686.6	581.0	6.7	0.076	-0.762

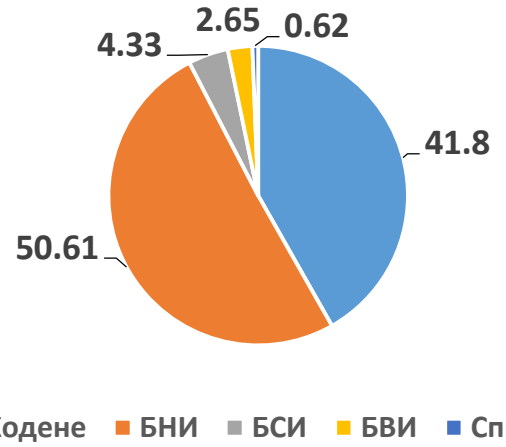

Fig. 1. Percentage of the distance in the mobility zones to the total distance traveled

4. Relationship between the Wingate Laboratory Test and the 3x50m Shuttle Run Field Test

In support of our hypothesis for the reliability of the field test, we tested the relationship of the field test with the well-known laboratory test "Wingate". The relationship between the two tests is known from previous studies in adolescent football, but across different age groups (Peev 2017) (Peev, Gadev 2017). In order

to prove the correlation between the tests and the informative nature of the 3x50m shuttle running field test, we compared the data from the variational and correlation analysis of the indicators of the two tests in the age range we studied. As we know, the Wingate laboratory test has proven reliability in determining the level of anaerobic power (O. Inbar et al 1996, Mackenzie 1996).

The results of the correlation analysis are presented in Table 5.

Table 5.

Correlation matrix of indicators from 3x50m field test and Wingate laboratory test

Indicator	PP	AP	MP	3x50
Peak power	1			
Average power	0.830	1		
Minimal power	0.808	0.846	1	
3x50m	-0.724	-0.666	-0.696	1

After analyzing the data, we concluded that the 3x50m shuttle running field test has a statistically significant and strong dependence on the peak power (-.724) and the average power (-.666) and minimum power (-.696) indicators. In fact, a stronger relationship with Peak and Average power is a prerequisite for a higher level of anaerobic power in the studied group of players.

In conclusion, higher values from the Wingate lab test are a prerequisite for higher levels of anaerobic power in football players in this age group. It can be claimed that there is a high statistical correlation between the two tests, which gives us reason to use the 3x50m shuttle running field test to determine the level of anaerobic capacity of football players aged 15-16.

5. Developing an expert methodology for the development of speed endurance based on mobility values.

For the purpose of this study, we have developed an expert training methodology, which we have applied in the training plan of the Experimental Group. The control group followed the same standard 6-week training plan, without the additional fartlek running sessions.

Table 6.

Distribution of training load for the first half-season experimental group

Cycle		First														
Period		Preparatory							Competitive							
Stage		General preparatory			Specific preparatory				Championship							
Mezocycle		1		2			3		4			5			6	
Microcyle		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Months		VIII		IX				X				XI				XII	
Weekdays	Monday									FT							
	Tuesday	WT	M1	M2	M3	M4	M4	M5	WT			M3		M3			
	Wednesday									G			G		G	G	G
	Thursday	FT															
	Friday																
	Saturday	-	FG	FG	FG	FG	FG	FG	G	G	G	-	G	G	G	G	G
	Sunday	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Session days		5	5	5	5	5	5	5	5	4	5	5	4	5	4	3	3
Sessions		5	5	5	5	5	5	5	5	4	5	5	4	5	4	3	3
Comp. days		0	1	1	1	1	1	1	1	2	1	0	2	1	2	2	2
Rest days		2	1	1	1	1	1	1	1	1	1	2	1	1	1	2	2
Fitness tests		Yes	-	-	Yes	-	-	-	Yes	-	-	-	-	Yes	-	-	-

The following cumulative total indicators for the study group were realized during the preparatory period:

- 40 training days
- 40 training sessions
- 7 competition days
- 9 rest days
- 6 sessions aimed for developing of speed endurance

5.1. Description of the experimental methodology

Our proposed method of work involves conducting five different models of Fartlek running, distributed over the six-week preparatory period of football players. Each weekly micro cycle includes one activity specifically designed to develop the ability to exhibit endurance. During the study period we studied for the experimental group, we selected the second training day of each weekly microcycle to conduct the respective exercise.

Table 7.

Load distribution in the training micro cycle for the experimental group.

Day	MON	TUE	WED	THU	FRI	SAT	SUN
Block	Rec	Load		Taper		Comp	Rec
Activity	Session	Session	Session	Session	Session	GAME	Rest

5.2. Fartlek run models

The expertly selected models of the Fartlek run, their way of execution and the results of the motor-time analysis performed with the help of 15Hz GPS system are graphically presented.

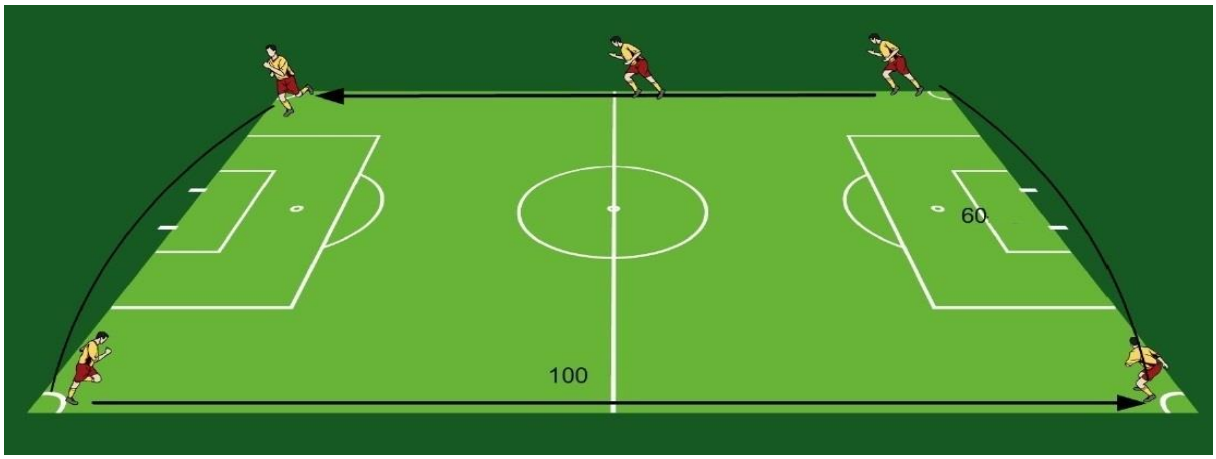

Fig. 2. Model 1.

Methodology of implementation: The team is divided into five groups. The entire tour of the playground is used. Each group performs accelerated running until it reaches the standing group and then goes into light running (low intensity running). Three series are performed - I. 14 min; II. 8 min; III. 6 min;

Table 8.

Model 1

Indicator	n	X min	X max	Ẋ	S	V
V max	18	22.7	25.5	23.84	1.02	4.27
V average	18	10.26	10.73	10.44	0.19	1.80
Zone 2	18	3309	3923	3636.78	216.42	5.95
Zone 3	18	627	793	717.11	55.70	7.77
Zone 4	18	14	114	71.44	30.23	42.32
HR average	18	183	202	192.28	6.21	3.23
Distance	18	5032	5532	5305.44	162.22	3.06

Table 8 presents the mobility indicators for model 1: the total distance traveled is 5305.4 ± 162.2m. Strong homogeneity of the sample is found at mean velocity (Vav) during variable running. Vav = 10.4 ± 0.19 at a coefficient of variation V = 1.80.

Maximum travel speed Vmax = 25.5km / h. The average value for the maximum speed of all 18 tested was 23.84 ± 1.02km / h. The distance traveled in the speed zones is as follows - Zone 2: 3636.7 ± 216.4; Zone 3: 717.1 ± 55.7; Zone 4: 71.4 ± 42.3.

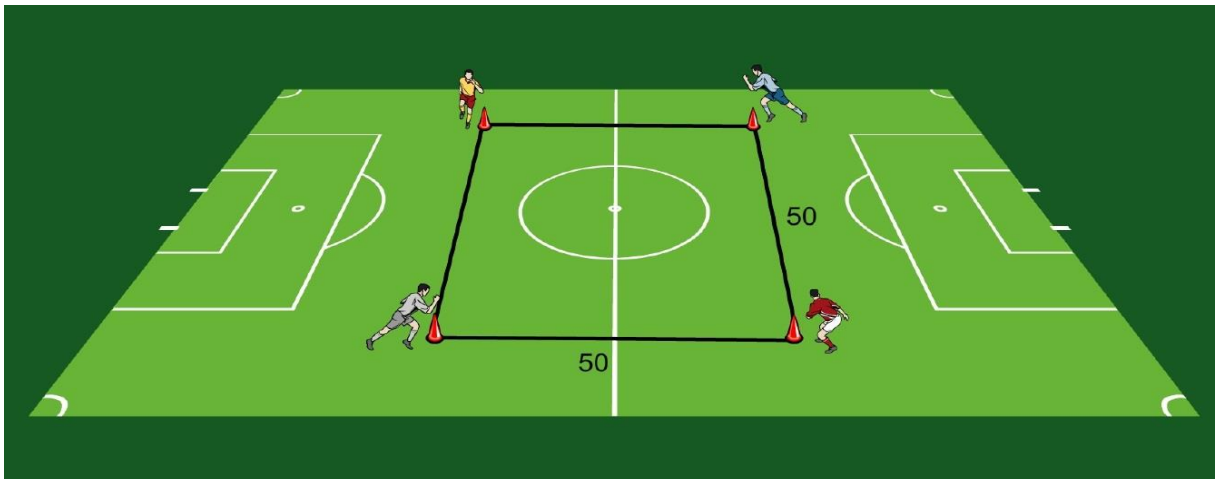

Fig. 3. Model 2.

Methodology: The team is divided into four groups, with each player in the group receiving a number - 1, 2, 3 and so on. In a 50x50m square, the same numbers in each group perform accelerated running until it reaches the front standing group and then goes into light running (low intensity running). This is followed by an accelerating run from the following identical numbers. Five series of 5 min runs over 2.5 min break.

Table 9.

Model 2

Indicator	n	X min	Xmax	Ẋ	S	V
V max	16	22.6	28.4	25.35	2.10	8.28
V average	16	9.8	10.5	10.19	0.20	1.97
Zone 2	16	2573	3130	2888.63	169.52	5.87
Zone 3	16	437	786	655.75	118.58	18.08
Zone 4	16	230	360	271.38	47.58	17.53
HR average	16	183	202	192.63	5.37	2.79
Distance	16	4308.46	4665.2	4515.73	101.93	2.26

Table 9 presents the mobility indicators for model 1: the total distance traveled is 4515.73 ± 101.93m. Vav = 10.18 ± 0.2 at a coefficient of variation V = 1.97. Maximum travel speed Vmax = 28.4km / h. The average value for the maximum speed of all 16 tested was 25.35 ± 2.1km / h. The distance traveled in the speed zones is as follows - Zone 2: 2888 ± 625; Zone 3: 655.75 ± 118.5; Zone 4: 271.38 ± 47.6.

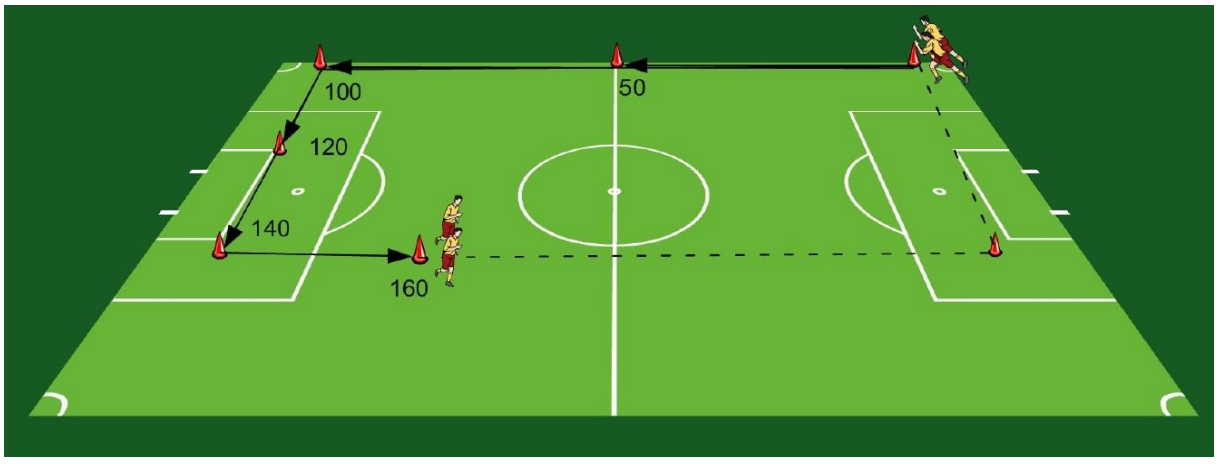

Fig. 4. Model 3.

Method of implementation: the team is divided into one group, in pairs. In a 100x40m rectangle, each pair performs high intensity running, alternated with light running. High intensity sections are as follows: 50m, 100m, 120m, 140m, 160m. Two series are running:

I.50-100-120-140-160-140-120-100-50m; II.50-100-120-140-160m;

Table 10.

Model 3

Indicator	N	Ẋ	S	V
V max	**18**	**28.02**	**1.02**	**3.63**
V average	**18**	**10.2**	**0.24**	**2.31**
Zone 2	**18**	**1233.44**	**114.56**	**9.29**
Zone 3	**18**	**653.56**	**86.42**	**13.22**
Zone 4	**18**	**446**	**68.42**	**15.34**
HR average	**18**	**190.44**	**6.02**	**3.16**

Table 10 presents the mobility indicators for model 3: Vav = 10.2 ± 0.24 km / h at a coefficient of variation V = 2.31. Maximum travel speed Vmax = 29.8km / h. The average value for the maximum speed of all 18 tested was 28.02 ± 1.02 km / h. The distance traveled in the speed zones is as follows - Zone 2: 1233.4 ± 114.56; Zone 3: 653.55 ± 86.4; Zone 4: 446 ± 68.4. We see an increase in the volume of work in zone 4 - high intensity running, at the expense of zone 2 - low intensity running. There is a decrease in the total distance traveled, at the expense of higher work intensity.

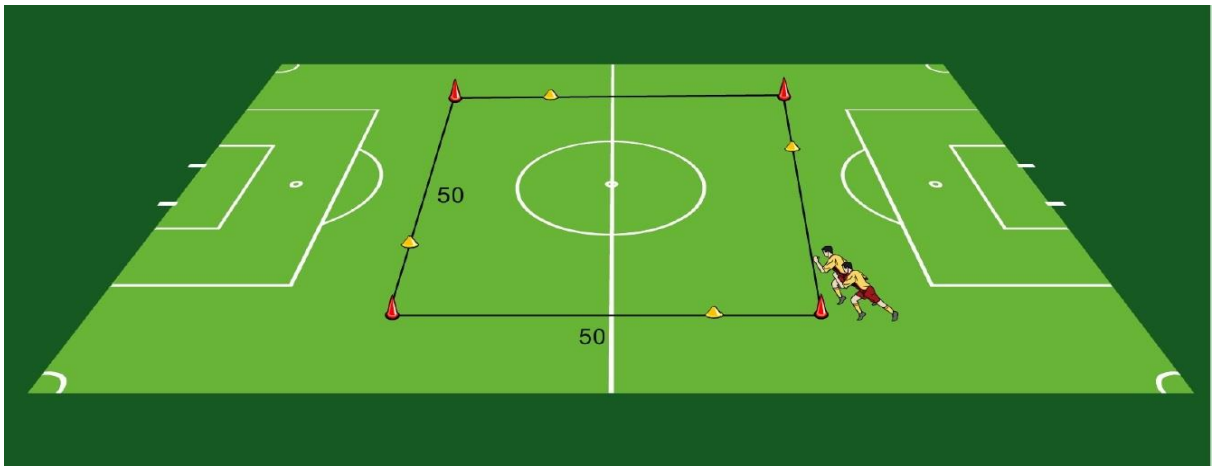

Fig. 5. Model 4.

Method of implementation: the team is divided into one group, in pairs. In a 50x50m square, each pair performs high intensity running, alternating with light running. The sections are as follows: 300m HIR over 200m LIR; 100m HIR over 100m LIR; 50m HIR over 50m LIR; Two series are running: I. 1x300m; 5x100m; 6x50m; II. 1x300m; 4x100m; 8x50m;

Table 11.

Model 4.

Indicator	N	Ẋ	S	V
V max	16	25.31	0.53	2.09
V average	16	9.84	0.07	0.74
Zone 2	16	750.13	33.39	4.45
Zone 3	16	918.56	90.06	9.80
Zone 4	16	505.75	77.47	15.32
HR average	16	196.94	4.97	2.53

Table 11 presents the mobility indicators for model 4: Vav = 9.84 ± 0.07 km / h at a coefficient of variation V = 0.74. Maximum travel speed Vmax = 25.9km / h. The average value for the maximum speed of all 16 tested was 25.31 ± 0.53km / h. The

distance traveled in the speed zones is as follows - Zone 2: 750.13 ± 33.39; Zone 3: 918.56 ± 90.06; Zone 4: 505.75 ± 77.47. We see an increase in the volume of work in high mobility areas at the expense of lower intensity areas. Again, we see a decrease in the total distance traveled, at the expense of a higher intensity of work.

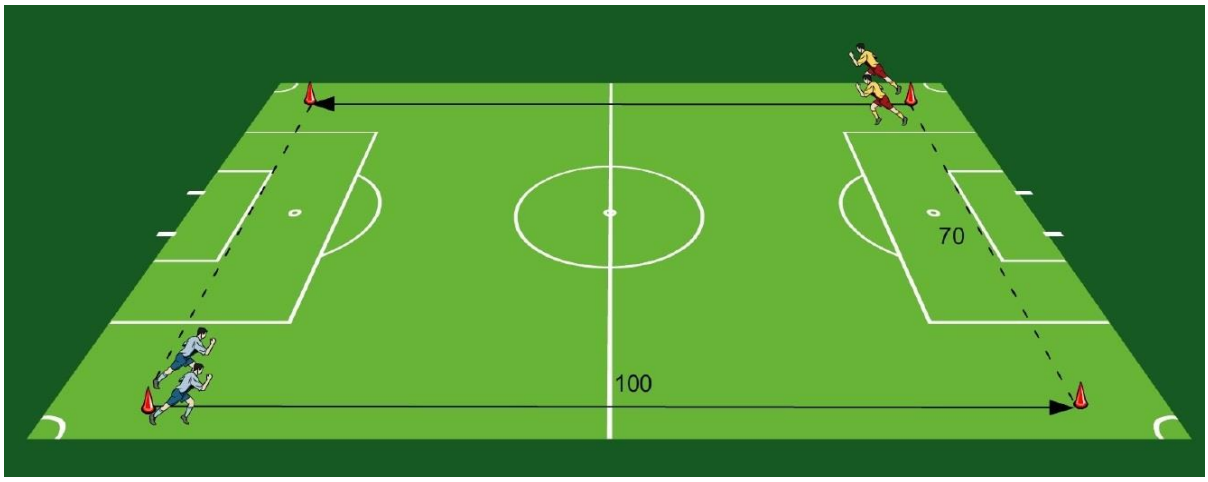

Fig. 6. Model 5.

Method of implementation: the team is divided into two groups, in pairs. In a 100x65m (60-70) rectangle, each pair in both groups performs 18 100m stretches over 65m of low intensity running. Control times: 100m - 16-17 sec;

Table 12.

Model 5

Indicator	n	$\dot{X}$	S	V
V max	**16**	**26.59**	**1.29**	**4.85**
V average	**16**	**10.5**	**0.07**	**0.70**
Zone 2	**16**	**476.25**	**48.93**	**10.27**
Zone 3	**16**	**547.81**	**76.00**	**13.87**
Zone 4	**16**	**767.75**	**73.55**	**9.58**
HR average	**16**	**195**	**3.46**	**1.78**

Table 12 presents the mobility indicators for model 5: Vav = 10.5 ± 0.07 km / h at a coefficient of variation V = 0.70. Maximum travel speed Vmax = 27.9km / h. The average value for the maximum speed of all 16 tested was 26.58 ± 1.29km / h. The distance traveled in the speed zones is as follows - Zone 2: 476.25 ± 48.93; Zone 3: 547.81 ± 76; Zone 4: 767.75 ± 73.55. We observe the highest values of workload in high mobility areas. Again, we see a decrease in the total distance traveled, at the expense of a higher intensity of work, with the intensity increasing dramatically here at the expense of the volume of work.

6. Analysis of the effect of the procedure performed on the experimental group

We measured the effect of our methodology through a 3x50m shuttle running field test and a Wingate laboratory test. They were held at the beginning and end of the winter preparation period of the 2017/2018 season. Each pair of tests was performed within 2 consecutive weeks.

Table 13.

Comparative analysis of the average values of time to run the 3x50m test

Indicator	n	Beginning		End		Statistical significance			
		X_1	S_1	X_2	S_2	d	d%	t	P (t)
3x50м	15	23.72	0.65	22.56	0.44	-1.17	-4.93	5.86	100.00
PP	15	699.51	74.62	807.19	100.73	107.68	15.39	3.58	99.70
AP	15	524.94	53.70	600.21	73.90	75.27	14.34	3.39	99.56
MP	15	327.83	40.03	380.29	44.84	52.46	16.00	3.45	99.61

7. Comparative analysis of the gains between Experimental and Control group

In order to claim that one group has a more significant increase, we performed a comparative analysis between the increments of the experimental and control groups for the indicators from the laboratory test "Wingate" and the field test "3x50m shuttle running". Tables 14, 15 and 16 summarize the data for Peak Power, Average Power and Minimum Power respectively.

Table 14.

Dynamics of peak power development in the initial and final study for the experimental and control group and statistical significance for the same

PP	n	I measure		II measure		Increase	Level of significance		
		Ẋ1	S1	Ẋ2	S2	d	d%	t emp	P (t)
Experimental group	15	699.51	74.62	807.19	100.73	107.68	15.39	3.58	99.70
Control group	13	666.82	68.11	719.28	88.27	52.46	7.87	1.98	92.89
Difference		32.69		87.91		55.22			
Level of significance	t	1.20		2.44		3.36			
	P(t)	76.03		97.81		98.36			

Table 15.

Dynamics in the development of the mean power in the initial and final study for the experimental and control group and statistical significance for the same

AP	n	I measure		II measure		Increase	Level of significance		
		Ẋ1	S1	Ẋ2	S2	d	d%	t emp	P (t)
Experimental group	15	524.94	53.70	600.21	73.90	75.27	14.34	3.39	99.56
Control group	13	513.68	55.64	553.14	68.44	39.46	7.68	2.16	94.86
Difference		11.26		47.07		35.81			
Statistical significance	t	0.54		1.74		2.22			
	P(t)	40.90		90.61		96.72			

Table 16.

Dynamics in the development of minimum power at the initial and final study for the experimental and control group and statistical significance for the same

AP	n	I measure		II measure		Increase	Level of significance		
		Ẋ1	S1	Ẋ2	S2	d	d%	t emp	P (t)
Experimental group	15	327.83	40.03	380.29	44.84	52.46	16.00	3.45	99.61
Control group	13	326.56	36.77	353.96	52.26	27.40	8.39	1.97	92.73
Difference		1.27		26.33		25.06			
Statistical significance	t	0.09		1.44		2.20			
	P(t)	6.85		83.69		95.91			

In summary, we present the increments of all study components in one place:

PP-EG – 15.39% и Pt – 99.70%; **PP-CG** – 7.87% и Pt – 92.89%

AP-EG – 14.34% и Pt – 99.56%; **AP-CG** – 7.68% и Pt – 94.86%

MP-EG – 16% и Pt – 99.61%; **MP-CG** – 8.39% и Pt – 92.73%

3x50-EG – -4.93% и Pt – 100%; **3x50-CG**– -1.32% и Pt – 84.31%

Chapter IV. Conclusions and recommendations

The main scientific conclusions drawn from the dissertation are distributed in three directions, arising from the tasks of the research:

1. The questionnaire concerning the methodological ideas of football coaches in the Republic of Bulgaria regarding the ability to exhibit speed endurance in child-youth football made the following judgments:

- There is insufficient knowledge of the functional relationship between speed capabilities;
- The low percentage (10.53%) of specialists who prefer specialized conditioning training for the development of speed endurance in a separate occupation, is a reason to claim that there are some gaps in their knowledge about the role and importance of modeled fartlek drills and in the construction of representative speed zones;
- We find a significant gap in their knowledge of the means to control the level of development of speed endurance in infant and adolescent football;

2. The data from the equipment and sports-pedagogical studies related to the nature of the ability to exhibit speed endurance are grounds for making the following summaries:

- The approach we use to determine the speed zones when using GPS systems allows accurate and precise determination of the speed zones regarding the study age range;
- The high correlations found between individual field and laboratory test benchmarks determine the proposed 3x50 m Shuttle test as a reliable means of controlling the ability to exhibit speed endurance for this age period;
- When comparing the generalized mean characteristics characterizing the different types of motor mobility in a real game situation, we find that the

differences between the two ages are statistically insignificant, which implies the possibility of using the same for both ages in the control and analysis of motor mobility;

- The relationship between maximum speed and speed endurance is straightforward and significant in dependence;
- The significant stronger and inversely proportional relationship between the ability to exhibit endurance and the features of the Wingate test - PP (peak power), AP (average power) and MP (minimum power), is also expected to state that a higher level of aerobic power is a prerequisite for a higher level of endurance performance;

3. Based on the data from the experiment concerning the methodology of developing the ability to exhibit endurance, we can state:

- The nature of the proposed fartlek running models and their influence on the development of the ability to exhibit speed endurance are revealed in detail;
- We also register higher values (both in sports-pedagogical and physiological features) of a positive effect on the level of development of the ability to exhibit speed endurance in the experimental group compared to the control group;
- The data lead us to conclude that this positive effect is a consequence of our proposed methodology for developing the ability to exhibit endurance.

The main scientific and applied contributions of this dissertation are:

1. **T**he speed zones of motor mobility in the use of GPS systems for this age period have been researched and scientifically substantiated.
2. The validity of the 3x50m shuttle running test for speed endurance control in U16 and U17 age groups (15-16 years old) for youth players has been confirmed and proven.

3. For the first time in the native practice, the motor activity profile for 15-16 years old football players was developed and determined. Moreover, by combining the information from this experiment, we are complementing a large unit of the long-term development of child-youth football, and in particular the conditioning of youth football players.
4. An entirely new approach to the development of speed endurance in 15-16 years old football players has been experimentally proven, which in turn would lead to more precise and complete development in the course of their many years of sports and technical training.

PUBLICATIONS

1. Tsvetkov V., M. Gadev, P. Peev – Determination of speed limits characterizing individual mobility variants in 16-17-year-old soccer players. International Scientific Congress “Applied Sports Sciences”. Sofia, 1-2 Dec, 2017.

2. Tsvetkov V., P. Peev, B. Petrova – Research of the mobility profile of 15-year-old soccer players during a game (a time motion analysis). VIII International Conference of Students and Young Scientists “University Sport: Health and Prosperity of Nation”. Ulaanbaatar, 20-21. Apr, 2018.

3. Peev P., V. Tsvetkov, N. Youroukov – Time-motion analysis of the football world cup in Russia 2018. Journal of Applied Sports Sciences 2019, Vol. 1, pp. 108 -121

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Graduates his secondary education in Ivan Vazov language school with French. Enters the Sports faculty of the NSA Vasil Levski in 2012 with the highest degree of all male applicants. Graduates his Bachelor's degree for a fencing coach with honors in 2015. During his studies he participates with articles at two scientific conferences. A year later in 2016 graduates with a Master degree specializing "Strength & conditioning in sports".

At child age he practices fencing, winning several titles of national championships, and honors from various international events. His active sports career dedicates to Track & field and the disciplines 100m dash and 200m, winning number of medals from National championships with records of 10.94 and 22.02s.

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His career as a strength and conditioning coach begins at the youth academy of PFC Septemvri Sofia with Elite Youth groups. Last two and a half years he works at the youth academy of PFC Levski Sofia consecutively with all age groups.

Volunteer as a strength and conditioning coach at Olympic Fencing Club.

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