Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XXI, ISSUE 2 Supplement, 2021, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST,
DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengage Learning, Cabell's Directories

Science, Movement and Health, Vol. XXI, ISSUE 2 Supplement, 2021
September 2021, 21 (2): 461 - 469
Original article

EXPERIMENT ON IMPROVING THE TRAINING OF FOOTBALL REPUBLICAN JUNIOR PLAYERS UNDER 17 THROUGH MATCHES WITH A REDUCED NUMBER OF PLAYERS

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Abstract

The aim of this research is to improve the physical and technical training of the junior players under 17 from the CSM football team Galati by using, during training, games with a reduced number of players. The two groups involved in the experiment are CSM Galati and LPS Galati, teams listed in the National Junior Republican Championship, both teams consisting of 18 players.

The experimental research took place on the Danube 2 stadium and the Siderurgistul Stadium in Galati, on standard pitches with synthetic surfaces.. For the evaluation of the subjects, we applied the following tests: for physical preparation (30meter speed run; Yo-Yo intermittent; Strength-standing long jump); for technical preparation (driving, dribbling; shot on goal: precision; long pass). For the statistical analysis we used IBM SPSS Statistics, version 23. The efficiency of the training program, based on games with a reduces number of players was outlined by the results obtained in final testing, both in physical and technical tests, which recorded statistically significant differences ($p < 0.05$) in favor of the experimental group, therefore validating the research hypothesis.

Key Words: physical training; games with a reduced number of players; football; junior players.

Introduction

The Strategy of the Romanian Football Federation to impose during the matches in the 3rd division the use of three junior players in the field has turned the preparation of young players under 17 into a goal of utmost importance for football clubs. After a difficult time, with pauses and breaks in the training, the use of effective training methods that could shortly bring the performance of junior players at the highest standard is the task of each coach working at this level.

To achieve a high level in the football game and not only, experts say 10000 hours of work is needed (Davies,2013). In other words, improving preparation is not an accident, but the result of a hard work, combined with love for football (Manolache, 2013). How football specific progress is achieved when training recreates competition requirements from a technical, tactical physical and mental perspective, a modern way of preparation that uses competition requirements in a training environment is the use of games with a small number of players (Mallo și Navarro, 2008; Owen et al., 2011).

Great world-class players have developed their basic skills by playing football on the street when they were children. With this method street football playing can be stimulated. Games with a small number of players are perfect to positively influence the performance of junior players because they have the potential to improve the technical and physical training up to proficiency level (Aguiar, 2012). The ability to develop physical characteristics along with the technical and tactical elements of the football game make the games with a small number of players an attractive workout (Savu, 2017).

Technically speaking, a study made by Manchester United (Di Salvo, 2013) has shown that the less number of players we have in the game, the more times the ball is touched, the higher the number of dribbles, 1x1 meetings and finish executions, because the time alloted to both collective and individual actions increases (Caracaleanu, 2018). Physically speaking, coaches expect players to run as much in matches as in training sessions and vice versa, and eventually they carry out their training sessions in short an intense stages to stimulate the rhythm of a game as effectively as possible.

Games with a small number of players allow juniors to strengthen and improve technical and tactical elements of the game on a particular physical background (Savu, 2011). There is a reduction in space and time that forces players to learn how to succeed in such extreme scenarios that do not occur on a standard size field as often (Terzis, 2013). The trainer's task is to "prepare and guide players so that they get great results (Trandafir, 2019). He must be

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Received 04.03.2021 / Accepted 8.05. 2021

permanently concerned about finding the most suitable solutions (Melenco, 2013), he must show a special interest in their preparation for high performance (Grosu, 2020) in such a way that players get successful experiences.

Methods

Purpose, Objectives and Hypothesis of the Research

The purpose of this research is to improve the physical and technical training of the junior players under 17 from the CSM football team in Galati by using games with a small number of players.

The research had the following objectives: develop a training program to improve the preparation of junior players in football; do an experiment-like study aimed at improving the physical and technical training of junior players under 17 and proving its effectiveness.

Research hypothesis: In this research we proposed to verify the hypothesis that "the use of a training program based on games with a small number of players will improve the physical and technical preparation of junior players under 17 in football."

Subjects, place and stages of the research

The two groups involved in the experiment are the Juniors under 17 from CSM Galaţi and LPS Galati teams, which are listed in the Republican Juniors' National Championship, both teams consisting of 18 players. The experimental research took place on the Dunarea 2 and Siderurgistul stadiums in Galati, on standard fields and synthetic surfaces. The research included the following stages: Stage 1- Initial assessment; Stage 2- Application of the training program based on games with a small number of players; Stage 3- Final assessment; Stage 4- Interpretation of results and conclusions.

The research methods used are the following: the analysis of the specialty literature, the observation, the experiment, the measurement and testing method, the statistical-mathematical method, the graphical and tabular representation methods (Mocanu, 2020). For the statistical analysis we used IBM SPSS Statistics, version 23. The t test for two pair samples is used to test whether the difference between the average values of the two groups is statistically significant. Pearson's correlation coefficient (r) shows whether or not there is any dependence between two phenomena as well as their degree of correlation. The significance threshold considered for the statistical tests is $\alpha = 0.05$.

In order to *apply the experimental program*, we have developed and used a training program based on the small number of players method. The experimental training program has been structured over 4 months, January-April 2021, with three weekly workouts of 90 minutes each, including the last week of the preparatory period, all the pre-training period and the first two weeks of the competition period. The control group has followed its own training program consisting in improving physical training through running and improving technical training through collective games. Depending on the goals of the training, we illustrate games with a small number of players used in the fundamental part of the training:

1.To improve the speed indices, we used 1x1, 2x1 games, in order to surpass the opponent and open the passage to the opponent's gate; they played according to the number of actions.

2.To improve the effort capacity we used 2x2; 3x3; 4x4; possession games using various tasks.

3.To improve technical training we used 1x1; 2x2; 3x3; 4x4; 5x5 games, 3x2; 4; 3; games in numerical superiority, 2x2+2; 3x3+2; 4x4+4 games with players on the sides; 3x3 + 2; 4x4 + 4 games with jolly players, 3x3 + 1; 4x4 + 1; 4x4 + 2 games that help the team while in possession.

Assessing subjects

The efficacy of the training process is given by the use of control tools that allow the assessment of the level of preparation, providing guidance notes to both athletes and their coaches, needed to make possible corrections to the training plan and improve the training process (Trandafir, 2018). At the beginning of the preparation period, awareness about the possibilities of each player is undoubtedly essential (Rață, 2020). For the evaluation of the subjects, we applied the following tests approved by the Technical Commission within the Romanian Football Federation:

For the physical preparation:

30meter speed run - the test takes place outdoors on synthetic ground. There must be sufficient space for stopping. Flat ground; 2 lines are marked at 30m from each other; 2 cones are placed on each side of the finish line.

Yo-yo intermittent test - to evaluate the individual skill of executing high intensity intervals and short recovery time for a prolonged period. For the "YO-YO intermittent" test we have the following elements: 20m + 5m recovery (10"Active Pause); run during the sound tempo given by the "Team Beep-Test" software on a distance of "20 m round trip"; a 10" active pause period follows (interleaved between each shuttle run respectively" 20m + 20m "), during which the subject has to go" 5m + 5m "(round trip); Speed on return trip "20m + 20m" increases progressively; A warning is given when the subject does not end a shuttle run during the allocated time, at the second mistake of this kind, the subject is

eliminated (https://pregatirefizica.wordpress.com/2017/06/14/yo-yo-test/).

Standing long jump - A tape measure is set on the ground. The start line must be marked with a line. This line must be perpendicular to the tape measure and should not be reached by players, neither before nor during jumping. The "zero" point of the tape measure is fixed on the edge of the line which is closest to the player. The leap is measured in meters, from the outer edge of the start line to the top point of the landing point.

For the technical preparation:

Driving, dribbling - an 8meter side square is drawn. The player starts from the first cone, leads the ball among various obstacles, has a one-two pass with the overturned gym bench, has a self-pass between 2 cones, goes round them takes over the ball and passes over the finish line.

Shot on goal: precision – the player executes 6 strokes and must send the ball to the numbered corners of the gate. The ball must be in the air when it enters the gate. Result: the sum of points.

Long Pass - The player must perform 6 strokes of the ball from a 25-meter distance in a 5-meter side square. The ball is static, 10 points are granted for each success. Result: the sum of points (http://www.frf.ro/sites/default/files/fisiere/TESTE%20%20TEHNICE%20%20JUNIORI.pdf).

Results

For the statistical analysis we used IBM SPSS Statistics, version 23. The Levene test checks the equality of variances of two independent groups and it is used to interpret the t test for independent samples.The t test for independent samples is used to test whether the difference between the average values of two groups made of different subjects is statistically significant.The t test for two pair samples is used to compare the average values of a variable for a single group, analyzed at different times. Pearson's correlation coefficient (r) shows whether or not there is any dependence between two phenomena as well as their degree of correlation. The significance threshold considered for the statistical tests is $\alpha = 0.05$.

30M SPEED RUN

The results obtained in the initial test for the 30m speed run show an average of 4.37s with a standard deviation of 0.03804S for the control group and an average of 4.355s with a standard deviation of 0.04105s for the experimental group. At the final test for the 30m speed run, subjects in the control group achieved an average time of 4.2533 with a standard deviation of 0.04589s, which is a progress compared to the initial testing of 2.67%. In the case of the experimental group, at the final test we obtained an average time of 4.1678s with a standard deviation of 0.03335s, a value that represents a progress of 4.31%.

After performing the T test for testing the difference between the averages of the two groups, we obtained, when comparing the values of the control group in the initial testing, and the final testing, the T = 10.726 value, when compared to the value corresponding to the number of cases in the Fisher table for the threshold P <0.001 shows that there are significant statistical differences between the time obtained in the initial testing and the final testing for the control group. T test shows significant statistical differences between the values of the initial test compared to the final test for the experimental group ($t = 24.856$, $p < 0.001$). Although the test does not indicate significant differences for the initial tests of the two groups ($t = 1.352$, $p = 0.194 > 0.05$) we notice that there are differences between the values of the final test of the two groups ($t = 6.990$, $p < 0.001$). The time obtained by the experimental group at the final testing is shorter than the one obtained by the control group, which shows that the training programs have been effective.

The Pearson correlation test shows that there is a strong positive correlation between the values obtained by the experimental group in the initial speed run test and the values obtained by this group in the final test ($r = 0.649$, $p = 0.004 < 0.05$).

The t test for independent samples was used to analyze the results obtained by the control group compared to the experimental group in the three physical tests of the initial testing and the final testing.In the case of initial testing for 30m speed run, the Levene test confirms the equality of variances of the two groups: $F = 0.879$ and $p = 0.355 > \alpha = 0.05$. Consequently, the test t test is to be read on the first row of the table (equal variances assumed). As $t = 1,137$ and Sig. (2-tailed) or $p = 0.263 > \alpha = 0.05$ or taking into account the fact that the confidence interval limits for the difference between the two groups (95% CI for the mean difference: (-0.01181, 0.04181)) includes the zero value it results that there are no significant differences between the average time obtained by the two groups. In the case of the final testing for the 30m speed run, the Levene test also shows the equality of variances of the two groups: $F = 1.470$ and $p = 0.234 > \alpha = 0.05$. As $t = 6.398$, $p < 0.001$, and the confidence interval limits for the difference between the two groups (0.05838, 0.11273) does not contain the zero value, it results that there are significant differences between the time obtained at the final test for the 30m speed run between the control and the experimental group. The smaller average value obtained by the experimental

group on final testing shows that the training program was effective.

Table 1. Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Diff.	95% Confidence Interval of the Diff. Lower	Upper
30m speed run, initial testing	Equal variances assumed	0.879	0.355	1.137	34	0.263	0.01500	0.01319	-0.0118	0.0418
30m speed run, final testing	Equal variances assumed	1.470	0.234	6.398	34	0.000	0.08556	0.01337	0.05838	0.1127

YO-YO INTERMITTENT TEST

After the initial testing in the yo-yo intermittent test we obtained an average of 1255.56m with a standard value of 1255.56m of the control group, with a standard deviation of 347.397m and an average value for the experimental group of 1246.67m with the standard deviation of 349.857m.

At the final testing the control group had an average value of 1302.22m with a standard deviation of 349.850m, which is a 3.71% progress compared to the initial testing. The experimental group obtained an average of 1371.11m with a standard deviation of 352.418m, a progress of 9.98% compared to the initial testing. The t test for testing the difference between pair samples indicate in the yo-yo test significant statistical differences between the initial testing and the final testing for the control group ($t = -12.907$, $p < 0.001$), between the final test for the experimental group ($t = -14.662$, $p < 0.001$), the final testing of the control group compared to the experimental group ($t = -3.902$, $p = 0.001 < 0.05$). There are no differences in the two groups at the initial testing ($t = 0.514$, $p = 0.614 > 0.05$). We have obtained very strong significant correlations ($p < 0.001$) between the initial test values and the final test values for the control group ($r = 0.999$), the initial and the final testing for the experimental group ($r = 0.995$), the experimental group and the control group at the initial testing ($r = 0.978$), the experimental group and the control group at the final testing ($r = 0.977$).

As to the yo-yo intermittent test, it has resulted that the variances of the two groups are equal ($p > \alpha = 0.05$ after doing the Levene test). There are no statistically significant differences between the averages obtained by the control group, respectively the experimental group, neither in the initial test ($t = 0.076$, $p = 0.939 > \alpha = 0.05$), nor in the final test ($t = -0.589$, $p = 0.560 > \alpha = 0.05$).

Table 2. Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Diff.	95% Confidence Interval of the Diff. Lower	Upper
Yo-Yo intermittent test, initial testing	Equal variances assumed	0.000	1.000	0.076	34	0.939	8.88889	116.209	-227.277	245.0556
Yo-Yo intermittent test final testing	Equal variances assumed	0.015	0.904	-0.589	34	0.560	-68.8888	117.045	-306.753	168.9768

STANDING LONG JUMP

In the case of the standing long jump we obtained at the initial test of the control group an average of 2.011m with the standard deviation of 0.0071m, and for the experimental group an average of 2.009 m with the standard deviation of 0.05058m.

After the final test, the average value recorded by the control group was 2.141m with a standard deviation of 0.03027m, which represents a 6.46% progress compared to the initial testing. The experimental group obtained at the final testing an average value of 2.2239m with a standard deviation of 0.06427m resulting in a progress of 10.67%.

After performing the t test in the case of the standing long jump, significant statistical differences resulted between the initial test and the final test for the control group (t = -16.950, p <0.001), between the final test for the experimental group (t = -27.621 , p <0.001), the final test of the control group compared to the experimental group (t = -7.120, p <0.001). There are no differences in the two groups at the initial testing (t = 0.148, p = 0.884> 0.05).

In the case of the standing long jump, we obtained significantly strong correlations (p <0.05) between the initial and the final testing in the control group (R = 0.615, p = 0.007), the initial and final testing for the experimental group (r = 0.862, p < 0.001), the experimental group and the control group in the initial testing (R = 0.472, p = 0.048), the experimental group and the control group in the final testing (r = 0.672, p = 0.002).

Analyzing the results of standing long jump test, the equality of the variances of the two groups for the initial testing (F = 0.994, p = 0.326> α = 0.05) was proven. The t test for independent samples shows that there are no significant differences between the two groups (T = -0.589, p = 0.560> α = 0.05). In the final testing for standing long jump, it resulted that the variances of the groups were not equal (F = 12.313, p = 0.001 <0.05). The t test confirmed the difference in the two groups in this test (t = -4.943, p <0.001, CI for the mean difference: (-0.11732, -0.04823)). Greater values for the experimental group showed the efficiency of the programs applied to this group.

Table 3. Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Diff.	95% Confidence Interval of the Diff. Lower	Upper
Standing long jump, initial testing	Equal variances assumed	0.994	0.326	0.109	34	0.914	0.00167	0.01530	-0.02944	0.0327
Standing long jump, final testing	Equal variances assumed	12.313	0.001	-4.943	34	0.000	-0.08278	0.01675	-0.11681	-0.0487

DRIVING; DRIBBLING

In the case of driving-dribbling test the average value for the control group in the initial test was 21.39s (standard deviation - 0.52566s). The average value obtained by the experiment algroup in the initial test was 21.3883S (standard deviation - 0.51516s). In the final testing, the control group obtained an average time of 19.4639s (standard deviation - 0.52141s), which is an improvement by 9.004% compared to the initial testing. In final testing the experimental group obtained an average time of 16.9611s (standard deviation - 0.9293S) resulting in an improvement of 20.699%. The t test in the driving-dribbling test shows that there are significant statistical differences between the initial testing and the final testing for the control group (t = 11.364, p <0.001), between the final testing for the experimental group (t = 16.135, p <0.001), final testing for the control group, compared to the experimental group (t = 14.090, p <0.001). There are no differences in the case of the two groups in the initial testing (t = 0.015, p = 0.988> 0.05).

In the driving-dribbling test we have achieved significantly strong correlations between the experimental and the control group in the initial testing (r = 0.586, p = 0.011), the experimental group and the control group in the final testing (r = 0.586, p = 0.011).

Analyzing the results for the initial testing for driving; dribbling test, the Levene test confirms the equality of variances of the two groups: F = 0.049 and p = 0.826> α = 0.05. So the t test result is to be

read on the first row of the table (equal variances assumed). Because t = 0.010 and Sig. (2-tailed) or p = 0.992> α = 0.05 or taking into account the fact that the confidence interval limits for the difference of average values between the two groups (95% CI for the mean difference: (-0.35088, 0.35422)) includes the zero value, it results that there are no significant differences between the average values recorded for the two groups.In the case of the final testing for the driving; dribbling test, the Levene test also confirms the equality of variances of the two groups: F = 4.142 and p = 0.0501> α = 0.05. Because t = 9.952, p <0.001, and the confidence interval limits for the difference between the average values of the two groups (1.99172, 3.01384) does not contain the zero value, it results that there are significant differences between the time obtained at the final testing driving; dribbling test between the control and the experimental group. The smaller average value obtained by the experimental group in the final testing shows that the training program was correct.

Table 4. Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Diff.	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Diff.	Lower	Upper
Driving; dribbling, initial testing	Equal variances assumed	0.049	0.826	0.010	34	0.992	0.0016	0.17348	-0.35088	0.35422
Driving; dribbling, final testing	Equal variances assumed	4.142	0.0501	9.952	34	0.000	2.5027	.25148	1.99172	3.01384

SHOT ON GOAL-PRECISION

In the shot on goal – precision test, the average score of the control group in the initial test was 33.56 (standard deviation - 3.838), and in the final test it was 46.72 (standard deviation - 2.562), which shows an improvement of 39.21%. The average score of the experimental group was 29.00 (standard deviation - 3.531), and in the final testing it was 52.61 (standard deviation - 1,650), which shows an improvement of 81.413%. The significant increase in the scoring for the experimental group in the final testing compared to the initial testing shows that the training program was effective.

After performing the t test in the shot on goal-precision task, there were statistically significant differences between the initial testing and the final testing for the control group (t = -13.953, p <0.001), between the final test for the experimental group (t = -28.348, p <0.001), the initial test of the control group compared to the experimental group (t = 4.411, p <0.001), the final test of the control group compared to the experimental group (t= -14.316, p <0.001).For the shot on goal-precision test, a very strong significant correlation resulted between the experimental group and the control group in the final test (r = 0738, p <0.001).

In the case of the shot on goal test, the results show that the variances of the two groups are equal in the case of the initial testing (F = 1.175, p = 0.286> α = 0.05) and are not equal for the final testing (F = 4.309, p = 0.046 <α = 0.05). There are statistically significant differences between the averages obtained in the shot on goal test by the control group, respectively the experimental group in the initial testing (t = 3.706, p = 0.001 <α = 0.05, CI for the mean difference: (-2.057, 7.054) but also for the final testing (t = -8.198, p <0.001, CI for the mean difference: (-7.358, -4.420).

Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
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Table 5. Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
								Std.	95% Confidence Interval of the Diff.	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Error Diff.	Lower	Upper
Shot on goal-precision, initial testing	Equal variances assumed	1.175	0.286	3.706	34	0.001	04.556	1.229	2.057	7.054
Shot on goal-precision, final testing	Equal variances not assumed	4.309	0.046	-8.198	29.02	0.000	-5.889	0.718	-7.358	-4.420

LONG PASS

In the long pass test, the average value of the control had in the initial testing an average score of 16.67 (standard deviation - 10.29) and in the final testing an average score of 32.22 (standard deviation - 12.15), which shows a 93.28% increase in the score of final testing compared to that of the initial testing. The experimental group obtained in the initial testing an average score of 15.56 (standard deviation - 10,966) and in the final testing an average score of 47.78 (standard deviation - 10.033), which shows an increase of 207.069% of the final testing score compared to the initial testing.

The t test in the case of the long pass task shows that there are significant statistical differences between the initial testing and the final testing for the control group ($t = -7.714$, $p < 0.001$), between the final test for the experimental group ($t = -13.626$, $p < 0.001$) , the final testing group, compared to the experimental group ($t = -4.507$, $p < 0.001$). There are no differences between the two groups in the initial testing ($t = 0.294$, $p = 0.772 > 0.05$).

In the case of the long pass test we obtained significantly strong correlations ($p < 0.05$) between the initial and the final testing in the control group ($r = 0.721$, $p = 0.001$), the initial and the final testing for the experimental group ($r = 0.57$, $p < 0.019$).

The results for the long pass test show equality of the variances of the two groups for the initial testing ($F = 0.308$, $p = 0.582 > \alpha = 0.05$). The t test for independent samples shows that there are no significant differences between the average values of the two groups ($t = 0.313$, $p = 0.756 > \alpha = 0.05$). In the final testing for the long pass, the results obtained show that the variances of the groups are equal ($F = 1.198$, $p = 0.281 > \alpha = 0.05$). The T test confirms the difference of average values in the two groups for this test ($t = -4.188$, $p < 0.001$, CI for the mean difference: (-23.104, -8.007)). Greater values for the experimental group show the efficiency of the chosen programs.

Table 6. Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
								Std.	95% Confidence Interval of the Diff.	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Error Diff.	Lower	Upper
Long pass, initial testing	Equal variances assumed	0.308	0.582	0.313	34	0.756	1.111	3.545	-6.092	8.314
Long pass, final testing	Equal variances assumed	1.198	0.281	-4.188	34	0.000	-15.55	3.715	-23.10	-8.007

Discussions

The use of games with a small number of players as a multifunctional training allows the development of all the components of the football game within a limited period. Trying to maximize the player's technical, physical and tactical skills is of particular importance and makes this method extremely attractive. In games with a small number of players,

the manipulation of variables has a direct consequence on the technical, physical, tactical and mental training (i.e. land size; number of players; duration of rounds and breaks). If there is a larger field, the physical activity increases, but the technical difficulty decreases. On the other hand, the lower the size of the field, the greater the capacity to perform technical acts and actions, more specific to the requirements of the game.

Conclusions

The differences found between the initial and final tests for both groups support the idea of improvement in the physical and technical training. From the point of view of the recorded results, it can be seen that by using games with a small number of players, the statistical analysis showed superior performance of junior players under 17 in the experiment group compared to the players of the control group ($p < 0.05$). Thus, we can say that repeated exercise for four months (12 weeks) has improved the level of physical and technical training, which has allowed movements at an increased speed, power and ability, aspect also highlighted by the occurring positive correlations. The drawback of the research is related to the fact that the LPS Galati team, although continued preparing a week before the beginning of the championship, it has not enrolled in the competition due to the protocol imposed by the Ministry of Youth and Sport, and will do it starting with the 2021-2022 championship.

The ability to develop, within a relatively short period of time, physical preparation in correlation with technical-tactical and even ethical-moral training (Popescu, 2012), makes the games with a small number of players an attractive proposal for junior players Under 17 and coaches.

In conclusion, research proved the fact that the hypothesis according to which "the use of a training program based on a games with a small number of players will improve the physical and technical training of Under 17 junior players in football" has been confirmed.

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