

Intermittent training: The benefits in football

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ABSTRACT

The aim of this study is to verify the effectiveness of an intermittent training methodology in groups of boys belonging to the "Giovanissimi" category of 9-a-side football. The sample is made up of 10 athletes aged 14-15. The sporting season was divided following phases, that is, starting from a preparatory phase and then arriving at the competitive phase, the agonistic one. For the evaluation of the qualitative and quantitative data, each athlete was subjected to anthropometric tests (height, weight, BMI) and spinal flexibility tests both at entry and exit; for the evaluation of endurance, strength, speed, speed and agility the following tests were used: yo-yo Test, Sargent test, T-Test Agility, M test (20m adapted), Speed test 5m, 10m and 20m. Through the statistical model of the t-test for dependent samples, the effectiveness of the method used is evident. The data reveals significant increases for yo-yo Test, Sargent test, M (20m) test, T-Test agility. For the other tests carried out at the exit, there are no significant increases, because they are short-distance tests that show little increase, as the rapidity and speed, in this period of the developmental age, do not produce improvements for the morpho-functional adaptations specific. It has been shown how young boys, sedentary or moderately trained, can obtain benefits thanks to the proposed training, following an adequate programming and planning of training sessions according to their needs.

Keywords: Testing; Sport performance; Young player.

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INTRODUCTION

In Italy, there is a very high percentage of participation in the sport of football among sports practitioners. This situational sport is constantly growing both for the training methods and for the participation of the female gender (Raiola & Di Domenico, 2021). Being a team sport, football involves cohesion with teammates, respecting the rules and opponents (Domenico et al, 2020, Giovanni et al, 2020, Raiola et al, 2020). Depending on the category, it is possible to highlight how individual technical fundamentals and tactical situations need to be trained in a different way. During sports, values are taught that go beyond the athlete's performance, such as respect for oneself and for others including among disabled people (D'Elia et al., 2020abc). The U14 category, the age group in which we focused on this research design, includes various aspects both on physical, technical, tactical and cognitive work (Calandro et al., 2020). The regulation, as for the previous categories, has undergone changes, for example on the playing time to be played during matches, on the size of the pitch and on the offside rule (Battisti, 2018; Ceruso et al., 2019). It is possible to notice how evident changes take place on the morpho-functional aspect of each individual athlete, starting from weight and height up to physical values (Raiola & Altavilla, 2020). During this work we focused on various aspects: technical-coordinative, tactical-cognitive and physical-motor (Altavilla,2020, Altavilla et al., 2017). During the planning of the season, in addition to having established the football methodology, an intermittent training methodology was chosen. Within this methodology the execution of physical exercises is foreseen for a determined period of time and at a greater intensity (Millefanti et al., 2016). Recovery can be passive, i.e., completely cancelling physical activity, or active, reducing the intensity of effort drastically. Using active recovery, it is possible to keep both heart rate and physical activity at the right intensity. The time of the effort entities is never less than the recovery time, whether it is active or passive. This study was carried out on a group of boys belonging to the U14 category of 9-a-side football. For this group, belonging to the age group between 14 and 15 years, it is not definitively proven that intermittent training produces incremental effects on the main data concerning the qualities of jumping, speed and power of young players.

Aim of the study

After two months of work, using a modern football and intermittent training methodology, it is advisable to verify the incremental variations before and after the training protocol. In the event that this methodological approach does not produce significant benefits, the hypothesis will be considered null, otherwise the hypothesis will be considered alternative, therefore valid.

MATERIAL AND METHODS

Study participants

The champion is made up of 10 athletes aged 14-15. They represent the U14 category of the "A.S.D. Rinascita Cava 2000" in the province of Salerno.

Design

Two training sessions lasting 90 minutes each were held every week, on Tuesdays and Thursdays from 16:30 to 18:00. The programming provided for the optimization of all the interventions proposed by the coach, the time and equipment available, in order to improve the skills of their players. In order to face this process, it was appropriate to take a short period to get to know the athletes better. During this time frame, i.e., the first week of training, the athletes were asked cognitive questions about past sports experiences, such as:

- "Have you ever played football?";
- "Do you know the rules of the football game?";
- "Is this your first experience?";

- "Have you ever played in other teams?";
- "How long have you been playing football?";
- "In which categories did you play?";
- "What role would you like to play during games?".

This information has been very useful for understanding the physical and technical needs of each individual athlete; in fact, starting from an "advanced" level of training could cause discomfort in the young person, if he did not have the necessary knowledge and skills. Once the athletes were known, a fundamental phase for adequate planning and planning of training sessions according to their needs, the annual plan was established using an intermittent training methodology (Gaetano et al., 2021). In the proposed workouts, an active type of recovery is carried out, gradually reducing the proposed effort, but still remaining in motion (Ruggiero, 2018). All workouts and exercises have been organized and developed according to this methodology, taking into account both physical and technical effort (F.I.G.C., 2008; 2011). In this category, being able to observe multiple biological, morphological-functional and also technical-tactical differences, it is advisable to carry out a gradual work following the objectives set in the pre-season (Esposito et al., 2020). Following this initial approach, having also been able to analyse the technical skills, it was possible to organize the definition of objectives, the choice of contents, or means of training, and the choice of methods (Izzo et al., 2020ab; Tossani, 2009). The structure, 5-a-side football field "Circolo Amici di Passiano", and the material used to achieve the objective of the research study were defined in cohesion with the club and the coach: balls (size 5), jerseys, cones markers, rods, steps, training cones, small goals, low over, high over, speed ladder, hoops, jump ropes, exercise mats.

Training Methodology

Once the equipment available, the contents to be transmitted to the students and the method used were defined, it was possible to define the annual plan. Due to the Covid-19 emergency, the training sessions were organized following the guidelines imposed by the Department of Sport. Having to respect the appropriate safety distances, spaced and individual training were carried out (Raiola et al., 2020). The sporting season was divided following phases, that is, starting from a preparatory phase and then arriving at the competitive phase, the agonistic one (Spattini, 2016).

The annual plan was divided into one-month macrocycles, then mesocycles, where each of them had set goals (Ceruso et al., 2020). The sessions are organized following an intermittent training and according to a modern football methodology, very close to the Spanish one, with the use of the ball in most of the exercises and leaving greater freedom of expression to individual athletes (De Rossi, 2018).

The training session is structured according to different phases:

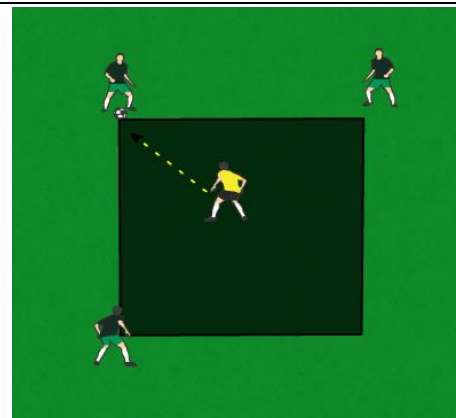
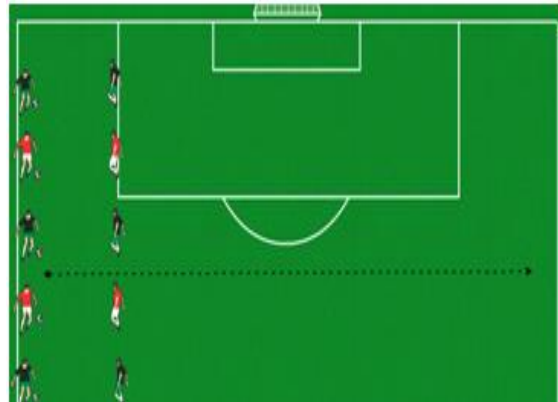
1. Joint mobility, dynamic stretching exercises and short sprints;
2. Technical activation, preparation of the athlete for technical exercises;
3. Athletic work, depending on the proposed exercise, the use or non-use of the ball is envisaged;
4. Individual technical-tactical exercise;
5. Collective technical-tactical exercise;
6. Themed match;
7. Free game;
8. Postures for accident prevention.


For the evaluation of the qualitative and quantitative data, each individual athlete was subjected to anthropometric tests (height, weight, BMI) and flexibility of the spine both at entry and exit (Esposito et al.,

2019). The following tests were used to evaluate endurance, strength, speed, speed and agility: Yoyo Test, Sargent test, T-Test Agility, M test (20m adapted), Speed test 5m, 10m and 20m (Ferretti et al., 2011). Below is an example of a training session developed and subsequently reproduced.

Table 1. Exercises included in the training program.

Tuesday - 1st weekly training U14	
<p>Step 1: Joint mobility Material: 14x marker cones Length: 12'</p>	<p>Slow running for increased heart rate and body temperature (2') dynamic stretching exercises (8'); running gaits with sprints of 5m (2').</p>
<p>Step 2: Technical Activation Technical objective: transmission, reception, header material: 5x balls 4x bib Duration: 9' Recovery: active between one exercise and another</p>	<p>Arranged in pairs on the lateral line of the field, they carry out technical activation exercises. Once on each side, the one who makes the transmission and who performs the technical gesture alternates. 1.transmission with feet and sole reception (3'); 2. foot transmission and internal foot reception (3'); 3.transmission with hands and header (3').</p>
<p>Step 3: Integrated athletic work Physical goal: strength training Technical objective: transmission and header Materials: 10x exercise mats 5x balls Duration: 15'</p>	<p>Two 7' series are carried out: Plank 30"/R30" Squat 30"/R30" Monopodalic squat with alternating foot internal transmission 30"/R30" Bends 30"/R30" Superman 30"/R30" Crunch with 30"/R30" header Reverse Crunch 30"/R30" At the end of the first and second series a slow run of 1' circular to the playing field is carried out as an active recovery.</p>
<p>Phase 4: individual technical-tactical exercise Technical objective: transmission, reception, demarcation, interception. Material:2x bib, 8x cones markers, 2x balls Length:10'</p>	<p>Three players transmit the ball outside the perimeter of a square 6m x 6m clockwise or counter clockwise. The request is to offer the element in possession always 2 side solutions (creation of a triangle). The orientation of the body and control must be taken care of. In the centre of the square there will be a player who will have to put pressure on the ball holder. Every 2'30" the presser will be changed with one of the players placed outside the square.</p>



<p>Phase 5: collective technical-tactical exercise Technical objective: transmission, demarcation, reception, conduction, shooting Material: 1x ball, 5x bib, Cones to delimit the playing field, 2x small doors Length: 10'</p>	<p>In a field of size 20m x 28m two teams face each other (4+1 goalkeeper > 5). The objective of the exercise is to train technical skills in situational exercises. The team with the goalkeeper will have to score inside the two small doors. It is only possible to make a goal when all the members of the team have touched the ball at least once.</p>	
<p>Step 6: Theme match Length: 12'</p>	<p>A game is played where the team in the ball possession phase has the obligation to play the ball on the ground and not be able to raise it. The goals on the developments from the corner and the side-line are worth double.</p>	
<p>Step 7: Free match Length: 12'</p>	<p>Young footballers are left free to express themselves in a 5>5 game, bringing back to the game what was produced during the training session.</p>	
<p>Step 8: Postures for injury prevention Length: 6'</p>	<p>The players carry out postures on the wall on the instructions of the coach. Each posture has a duration of 40". These postures are carried out as cool-down, allowing to lower the heart rate, cool the body temperature and for the prevention of injuries.</p>	

Statistical analysis

After reporting the results of the tests carried out at the exit, the t-test statistical model for dependent samples was used, in order to observe and evaluate the subjects on two different occasions. Two hypotheses have been developed, namely null hypothesis and alternative hypothesis. With the null hypothesis, it is assumed that the averages remain unchanged, therefore, in this experimental study there is no improvement after two months of training. According to the alternative hypothesis, the two averages are different, so after the training sessions it is assumed that there are substantial improvements.

RESULTS

Table 2. Incoming results of anthropometric and spine flexion tests.

Athlete	Weight	Height	BMI	Vertebral column flexion test
Athlete 1	69.5 Kg	161 cm	26.81	Positive
Athlete 2	67 Kg	169 cm	23.46	Positive
Athlete 3	77 Kg	167 cm	27.61	Positive
Athlete 4	66 Kg	164 cm	24.54	Negative
Athlete 5	38.5 Kg	154 cm	16.24	Negative
Athlete 6	55 Kg	147 cm	25.45	Negative
Athlete 7	41.5 Kg	152 cm	17.96	Negative
Athlete 8	53 Kg	150 cm	23.56	Negative
Athlete 9	58.5 Kg	165 cm	21.49	Positive
Athlete 10	50 Kg	162cm	19.05	Positive

Table 3. Final results of anthropometric and spine flexion tests.

Athlete	Weight	Height	BMI	Vertebral column flexion test
Athlete 1	70 Kg	162 cm	26.67	Positive
Athlete 2	67 Kg	169 cm	23.46	Positive
Athlete 3	80 Kg	168.5 cm	28.18	Positive
Athlete 4	66.5 Kg	166 cm	24.13	Negative
Athlete 5	39 Kg	154 cm	16.44	Positive
Athlete 6	53 Kg	148 cm	24.2	Negative
Athlete 7	42 Kg	154 cm	17.71	Positive
Athlete 8	52 Kg	151 cm	22.81	Negative
Athlete 9	57.5 Kg	165 cm	21.12	Positive
Athlete 10	51.5 Kg	165cm	18.92	Positive

Table 4. Incoming test results: Yoyo Test, Sargent Test, T-Test Agility, M Test (20m), Test 5m, 10m, 20m

Athlete	Yoyo Test	Sargent Test	T-test agility	M test (20 m)	Test 5 m	Test 10 m	Test 20 m
Athlete 1	LEV. 12 /200 m	28 cm	11.81"	5.81"	1.84"	2.78"	4.12"
Athlete 2	LEV. 13 / 400 m	29 cm	11.73"	6.72"	1.66"	2.59"	3.84"
Athlete 3	LEV. 13 / 360 m	31 cm	14.30"	6.87"	1.80"	2.75"	4.41"
Athlete 4	LEV. 13/ 360 m	36 cm	12.17"	6.66"	1.44"	2.50"	3.84"
Athlete 5	LEV. 15/ 960 m	23 cm	11.78"	6.90"	1.53"	2.43"	3.97"
Athlete 6	LEV. 15/ 800 m	30 cm	12.05"	6.63"	1.68"	2.31"	3.88"
Athlete 7	LEV. 14/ 600 m	34 cm	11.69"	5.65"	1.68"	2.66"	4.28"
Athlete 8	LEV. 13/ 360 m	26 cm	11.98"	6.97"	1.53"	2.59"	4.35"
Athlete 9	LEV. 15/ 1080 m	32 cm	11.09"	6.17"	1.56"	2.41"	3.81"
Athlete 10	LEV. 15/ 920 m	43 cm	10.82"	6.50"	1.46"	2.38"	3.94"

Table 5. Incoming test results: Yoyo Test, Sargent Test, T-Test Agility, M Test (20m), Test 5m, 10m, 20m

Athlete	Yoyo Test	Sargent Test	T-test agility	M test (20 m)	Test 5 m	Test 10 m	Test 20 m
Athlete 1	LEV. 14 /520 m	32 cm	10.59"	5.50"	1.97"	2.93"	4.76"
Athlete 2	LEV. 13 / 440 m	32 cm	10.67"	5.16"	1.79"	2.75"	4.20"
Athlete 3	LEV. 13 / 400 m	30 cm	13.86"	6.43"	1.79"	2.85"	4.68"
Athlete 4	LEV. 14/ 560 m	39 cm	11.87"	5.81"	1.49"	2.62"	4.06"
Athlete 5	LEV. 15/ 880 m	25 cm	10.52"	5.09"	1.53"	2.72"	4.37"
Athlete 6	LEV. 14/ 720 m	29 cm	12.28"	6.82"	1.57"	2.45"	4.08"
Athlete 7	LEV. 14/ 720 m	37 cm	11.19"	5.33"	1.60"	2.52"	4.11"
Athlete 8	LEV. 14/ 560 m	29 cm	12.41"	6.85"	1.62"	2.62"	4.18"
Athlete 9	LEV. 17/ 1480 m	37 cm	10.73"	5.65"	1.63"	2.43"	3.72"
Athlete 10	LEV. 16/ 1120 m	48 cm	10.42"	5.09"	1.66"	2.56"	4.06"

Table 6. Results of paired sample test.

		Paired differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Yo-yo test1 - 2	-136	159.10863	50.31457	-249.8195	-22.18054	-2.703	9	0.024
Pair 2	Sargent test 1 - 2	-2.6	2.1187	0.66999	-4.11563	-1.08437	-3.881	9	0.004
Pair 3	T-test Agility 1 - 2	0.488	0.5656	0.17886	0.08339	0.89261	2.728	9	0.023
Pair 4	M (20m) test 1 - 2	0.715	0.66842	0.21137	0.23684	1.19316	3.383	9	0.008
Pair 5	Test 5m 1 - 2	-0.047	0.09764	0.03088	-0.11685	0.02285	-1.522	9	0.162
Pair 6	Test 10m 1 - 2	-0.105	0.11511	0.0364	-0.18734	-0.02266	-2.885	9	0.018
Pair 7	Test 20m 1 - 2	-0.178	0.2633	0.08326	-0.36636	0.01036	-2.138	9	0.061

DISCUSSION

From the tables previously reported, it is possible to note that improvements are evident thanks to the training methodology applied during the experimental study. Through careful observation, the effectiveness of the method used is evident. The data brings to light significant increases for Yoyo Test, Sargent test, M (20m) test, T-Test agility, as demonstrated by the elaborations of the t-test for dependent samples. For the other outgoing tests there are no significant increases, as confirmed in the literature, because they are short-distance tests that show little increase, since the rapidity and speed, in this period of the developmental age, do not produce improvements for the specific morpho functional adaptations. By comparing the data from the incoming and outgoing tests, a statistically significant improvement can be observed in almost all tests ($p < .05$) except for the 5m test where $p > .05$ ($p = .162$). The null hypothesis that does not provide for significant increases in performance is rejected and the alternative that sees significant increases is accepted. The sample, not very representative due to the Covid-19 pandemic, represents a limitation of experimental research, as the methodology and tests were administered to only 10 athletes. The study carried out launches interesting future perspectives from the point of view of programming and planning of intermittent training in the world of football for this age group (Ferrante, 2015; Nelson, 2011). Through this training methodology and a modern approach of integrated football technique, it is possible to obtain significant results in a short period of time on the jumping qualities, speed and power of young players.

CONCLUSION

Through the analysis of the results that emerged in the study, obtained from the various field tests and t-tests for dependent samples, it is possible to ascertain the effectiveness of the method applied during the two training mesocycles. A modern football training methodology and the application of intermittent training allow to observe numerous benefits on young players, for endurance, strength, agility, speed, and rapidity. It is

appropriate to highlight how young children, sedentary or moderately trained, can obtain benefits thanks to the proposed training, following an adequate planning and planning of training sessions according to their needs. It is possible to conclude and confirm that the objective was achieved as assumed, except for the 5m speed test as previously mentioned.

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