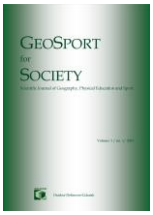
© **GeoSport for Society**, volume 21, no. 2/2024, pp. 126-135, DOI 10.30892/gss.2105-113



GEOSPORT FOR SOCIETY
Scientific Journal founded in 2014 under aegis of University of Oradea (Romania), University of Debrecen (Hungary), University of Gdánsk (Poland)
ISSN 2393-1353
Edited by Oradea University Press
1, University Street, 410087, Oradea, Romania
Journal homepage: http://geosport.uoradea.ro

The development of determining motor qualities in children aged 10-12

Dragoș Vasile SĂVESCU*
Department of Physical Education, Sport and Physical Therapy, Faculty of Geography, Tourism and Sport, University of Oradea, 1st University Street, 410087, Oradea, Romania, e-mail: savescudragos@yahoo.com

Pavel Ionuț PETRICA
*Bihoru*l High School with Sports Program, 4 Calea Matei Basarab, 410095, Oradea, Romania, e-mail: petricaionut84@yahoo.com

Bianca Cristina SĂVESCU
Wenford Academy Theoretical High School, 13 Primariei Street, 410209, Oradea, Romania, e-mail: jurcabianca06@yahoo.com

Citation: Săvescu, D.V., Petrica, P.I., & Săvescu, B.C. (2024). The development of determining motor qualities in children aged 10-12. *Geosport for Society*, 21(1), 126-135. https://doi.org/10.30892/gss.2105-113

Article history: Received: 18.09.2024; Revised: 25.10.2024; Accepted: 04.11.2024, Available online: 12.11.2024

Abstract: Physical preparation is one of the most important components of sports training, supporting specific technical expressions to achieve sports performance. The lack of physical preparation in the training process for 10–12-year-old children, in the football game, can lead to the impossibility of developing the technical and tactical attributes they need during the match. The 10-12 years age group represents the most accessible period in the process of training young footballers. Thus, it is possible to act efficiently on the development of motor qualities, speed, and coordination, and motor qualities determined in the game of football at this age category. Thus, this study aims to evaluate and develop the main motor qualities we act on at this age in the football game. For the evaluation and development of the two qualities, a battery of tests was prepared that evaluates the speed and coordination of the players, and training plans were created to develop these determining motor qualities in the game. At the end of the research, it was observed that the progress between the initial and final testing is obvious, with the majority of players making progress between the two tests.

Keywords: physical training, motor skills, assessment, speed, coordination

Introduction

Modern football is a game with discontinuities of movement but of great intensity. During the match, players perform high-intensity sprints, alternating with light running, jumping, rolling, turning, kicking, heading, etc. The higher the player's

training level, the higher the energy requirement and global stress during the game (Bompa, 2001; Ilieş & Caciora, 2020; Ilieş et al., 2021; Kozma et al., 2023).

Sports training represents a long-term adaptation process, which takes place over a period of several years, for which effective management can only be achieved on the basis of the scientific provision of sets of objectives, decisions and means. In this sense, the planning process must comply with certain requirements related to the particularities of age and training of the subjects (Dragnea & Teodorescu, 2002; Savescu & Sandra, 2021; Giurgiu et al., 2024; Herman et al., 2024).

Physical preparation is one of the most important factors in sports training (Papp et al., 2019; Erdely et al., 2020; Sandra et al., 2023a and b). The physiological attributes necessary for sports success are developed through adequate physical training. These physiological adaptations are the basis on which technical and tactical advances are built. In the absence of physical skill development, the athlete's ability to tolerate training will be substantially diminished, leading to the impossibility of developing the technical and tactical attributes he needs to succeed in reaching his maximum level. The main obstacle to adequate technical and tactical development is, most frequently, accumulated fatigue, which can be avoided by developing the physiological base, through a structured physical training (Bompa, 2014).

Speed is the main characteristic of the modern football game; thus, according to the FIFA manual (2016) (Figure 1), this motor quality will be acted upon between 9 and 13 years of age when the children's nervous system is much more adaptable.

Coordination is an essential motor quality representing the interaction between the nervous and muscular systems during movement. As in the case of speed, the optimal age to be able to act effectively on motor quality, coordination is between 8-13 years (Figure 1).

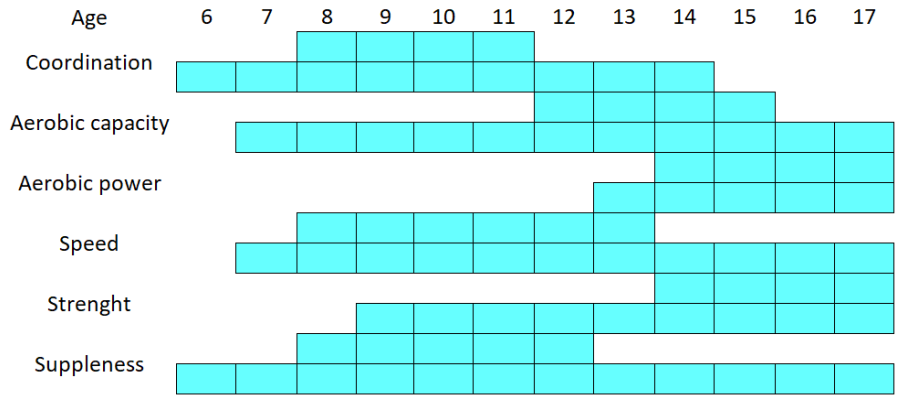


Figure 1. Model of sensitive phases for the development of motor skills in children and juniors

Speed is a basic motor quality, which depends on the type of nervous system of the subjects, this determines a more difficult development, compared to the other motor qualities. In the game of football, movement speed does not refer to running from one fixed point to another, as for example in a sprint, but to a speed specific to the game (Avram, 1980). Analyzing the specific speed of the football game, we can

refer to several components: running at speed with movements adapted to the game, the need to execute technical elements quickly and safely, speed of thought and specific tactical combinations, quickly executed, with spontaneous reactions to unforeseen interventions of the opponent etc (Sandra et al., 2022).

In programming and planning speed training, two fundamental principles must be respected, namely: The first and most important is related to intensity, which must always be maximal. The second is never to reach the fatigue threshold (Dumitrescu, 2014). Thus, for children aged 10-12, the speed can increase up to the equivalent of 83% of the maximum yield, the duration of the exercises will be between 4-6 seconds and specific drive systems will be used, such as executions, game sequences, fast attacks, which through positive transfer increase the speed potential (Dumitrescu, 2014).

Ciolcă (2006) defines coordination as the complex motor ability (psycho-neuro-motor) based on the ability of the central nervous system and neuro-muscular to determine finely differentiated, coordinated, and precise movements in time and space, in the most varied conditions, and with maximum spontaneity.

In the game of football, especially in children and youths, the components of the coordinative abilities (aspects of kinesthetic differentiation, spatial orientation ability, balance ability, reaction ability, segmental coordination, motor adaptation and readaptation ability) are required in abundance. The degree of coordination that a football player can reach is conditioned by the type of higher nervous activity, age of initiation, multilateralism and polysportity, sports mastery and sports life. The performance capacity in the football game is influenced to a very large extent by this motor quality, it is in a close connection with the other motor qualities, the motor area, and the analysis capacity available to the respective player (Ciolcă, 2006).

Scheduling and planning training aimed at motor skills and coordination is essential in the preparation of future athletes. Thus, it is necessary to act on coordination without which the technique of the football game is inconceivable. In this age stage of 10-12 years, there is a decrease in the amount of general skill exercises in relation to the exercises specific to the football game (Dumitrescu, 2014). The motor qualities of speed and coordination are a factor of progress in terms of the dynamism and fluency of the soccer game. In this context, this study aims to determine the level of preparation from the perspective of motor qualities (speed and coordination), in the LPS Bihorul Oradea U12 football team, the development of these two determining motor qualities in the game of football in children aged 10-12 years and not finally, determining the quality of the means used in training during the research.

Materials and methods

The research was conducted over a period of 6 weeks, during which the initial testing and the final testing were carried out. The football team, on which this study was carried out, is made up of children between the ages of 10 and 12 and carries out its activity, having a number of 3 training sessions per week plus a friendly/official match. This team was in the pre-competitive period when the training program aimed at developing speed and coordination was implemented.

Tests used

The 10×5 m shuttle has as its objective the assessment of speed in coordination mode. To apply this test, two parallel lines located at a distance of 5 m from each other will be drawn with tape for marking/two stakes will be placed at a distance of 5 m from each other. The subject will position himself next to one of the lines/one of the stakes, with one of his feet further back. At the starting signal, he will have to run as fast as possible to the other line, crossing it with his feet and then running to the starting line. One run is one cycle, 5 cycles are required for this test.

Speed running for 30 m aims to assess the speed of acceleration, so the departure is made from behind the starting line, the run is made at the highest speed, exceeding the finish line by another 2-3 m to avoid slowing down before the 30m. Timing starts when the back leg lifts and stops when the performer's chest crosses the finish line.

The Denisiuk test aims to assess general coordination. The test consists of running 5m, going around a flag 360 degrees, running, rolling forward, running, going around the second flag 180 degrees, running in bent support, rolling forward, going around the flag 360 degrees and arriving at the place where He left. The mattress is arranged in the middle of the distance between the two flags. The return route measures 30m and is timed

The Matorin test aims to assess general coordination. The test consists of performing a standing jump, followed by as many rotations as possible around the longitudinal axis of the body. The test is applied by drawing a line of approximately 30-35 cm on the ground. The subject sits with his feet close to either side of the line. For measurement, a compass and a 40-45cm ruler are used, placed between the soles of the subject after landing. Jumps are performed with rotations to the left, then to the right, recording the values achieved in both directions.

The physical training of athletes in this age category, 10-12 years, is fundamental, especially from the perspective of motor qualities, speed and coordination. Thus, after obtaining the results of the initial testing, a detailed analysis was made regarding the preparation of the children from the perspective of these two qualities. The following training program was created and proposed for a period of 6 weeks in which action was taken on the development of speed once a week on Wednesday and on the development of coordination twice a week on Mondays and Fridays.

Table 2. Presentation of the means and their dosage regarding the development of speed

Speed development	***Cycle I***	***Cycle II***	***Cycle III***	***Cycle IV***	***Cycle V***	***Cycle VI***
Intensity	90-95%	90-95%	90-100%	90-100%	95-100%	95-100%
Duration	5-8 min	5-8 min	5-8 min	5-8 min	5-8 min	5-8 min
Charging time	4-5 sec	4-5 sec	3-6 sec	3-6 sec	3-7 sec	3-7 sec
Duration of rest	45-90 sec	45-90 sec	45-90 sec	45-90 sec	45-90 sec	45-90 sec
Means used	4×7 m 3×15 m 2×20 m	4×7 m 3×15 m 2×20 m	4×12 m 2×15 m 2×25 m	4×12 m 2×15 m 2×25 m	3×10 m 4×15 m 2×30 m	3×10 m 4×15 m 2×30 m
Frequency	Once a week	Once a week	Once a week	Once a week	Once a week	Once a week

For the Wednesday of each week, action on speed development was scheduled and planned. The means used to improve speed were the classic ones that consist of running at different distances and repeated a certain number depending on the distance run (Table 2). Each training session dedicated to speed development was preceded by a very carefully directed warm-up, especially to prepare the body for effort but also to avoid certain injuries.

Table 3. Presentation of the means and their dosage regarding the development of coordination

Development of coordination	***Cycle I***	***Cycle II***	***Cycle III***	***Cycle IV***	***Cycle V***	***Cycle VI***
Intensity	95-100%	95-100%	95-100%	95-100%	95-100%	95-100%
Duration	15-20 min	15-20 min	15-20 min	15-20 min	15-20 min	15-20 min
Charging time	20-25 sec	20-25 sec	20-25 sec	20-25 sec	20-25 sec	20-25 sec
Duration of rest	45-60 sec	45-60 sec	45-60 sec	45-60 sec	45-60 sec	45-60 sec
Means used	Warm up with the small string ball Ladder exercises Relays /Games	Warm-up with the small string ball in pairs Ladder exercises with the small string ball	Warm up with the small string ball Ladder exercises Relays /Games	Warm-up with the small string ball in pairs Ladder exercises with the small string ball	Warm up with the small string ball Ladder exercises Relays /Games	Warm-up with the small string ball in pairs Ladder exercises with the small string ball
Frequency	Twice a week	Twice a week	Twice a week	Twice a week	Twice a week	Twice a week

On Mondays and Fridays, training specific to the development of coordination was scheduled and planned. To improve this quality, means such as scaled exercises were used, different types of movements, first without the ball, then with the ball, games in pairs that required the coordination of both players. The main means used to develop coordination was to perform exercises with a small ball tied with a string. These exercises involve the body's ability to control body movements, especially the coordination between the lower and upper limbs.

Results and discussions

During the 6 weeks in which the two training programs specific to the development of speed and the development of coordination (table 2, table 3) were implemented in the children's training, two tests were also carried out (final test, initial test), and after them we obtained the following results.

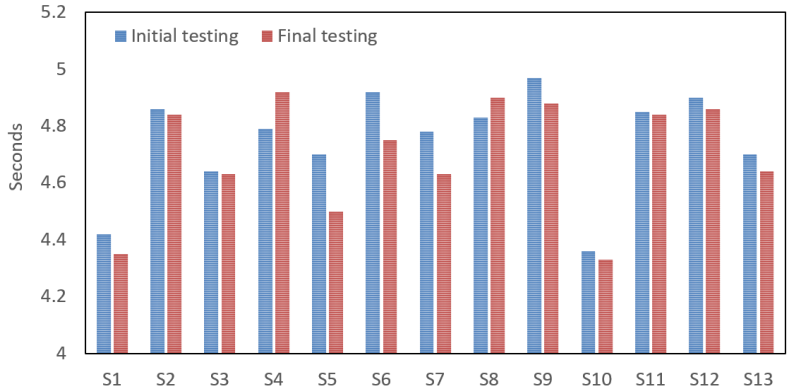


Figure 2. The results obtained by the subjects at the initial test and the final test at the speed running test over a distance of 30 m

By applying this test, we tried to evaluate acceleration speed which in the game of football has a very important role. The results obtained were satisfactory, and a slight improvement in the time obtained in the final testing compared to the initial testing can be seen (Figure 2). Most of the players in this test achieved better results in the final test compared to the initial one. Comparing the results with the 5th grade physical education rating scale of motor skills, all players achieved results below 5.5 seconds, thus all team players scored 10 in this test, both in the initial and final testing. The best result was 4.33 seconds, and the worst was 4.9 seconds, these results being obtained in the final testing.

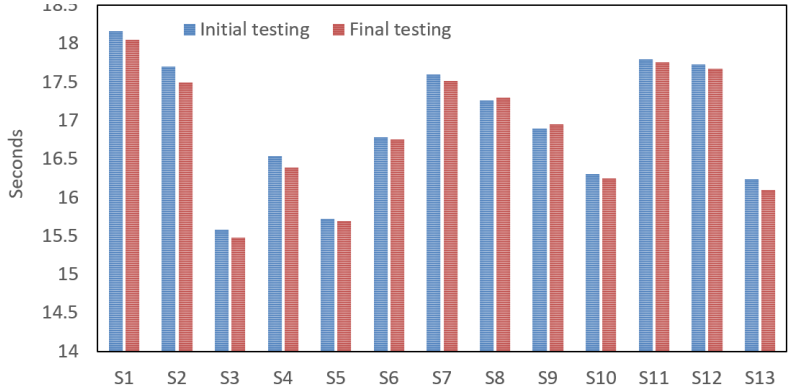


Figure 3. The results obtained by the subjects at the initial test and the final test at the Shuttle 10×5 m test

The 10×5 m shuttle test has as its main objective the assessment of speed in coordination mode, and most players achieved positive results in both the initial and final testing. Coordination speed in football is characterized by many changes of direction that occur in a match. Even though the application of this test also evaluates the movement speed, the players who obtained the best results in the speed run over a distance of 30 m did not obtain equally good results in this test, this can be seen in figure 3. By performing the test, we found that many players have problems with

direction changes, and in the future this detail should also be focused on. The best result was 15.5 seconds, and the worst was 18.1 seconds, obtained in the final testing.

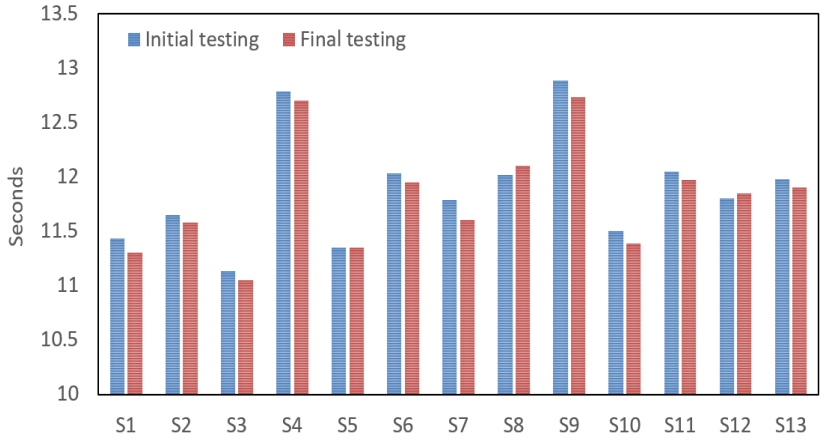


Figure 4. The results obtained by the subjects at the initial testing and the final testing at the Denisiuk test

After applying the Denisiuk test, as well as in the two tests presented previously, two team players obtained worse results in the final test than in the initial one. Only one player achieved the same time in both the initial and final testing. The obtained results are satisfactory because during a match, the players often encounter such movements that are also found in this test. In figure 4 we notice that most players did not pass the 12-second threshold, both in the initial testing and in the final testing. Also, in this graph, you can see two players who achieved results close to 13 seconds, but you can also see a small progress of them compared to the initial testing. The best result was 11.1 seconds, and the worst was 12.7 seconds, these results being obtained in the final testing.

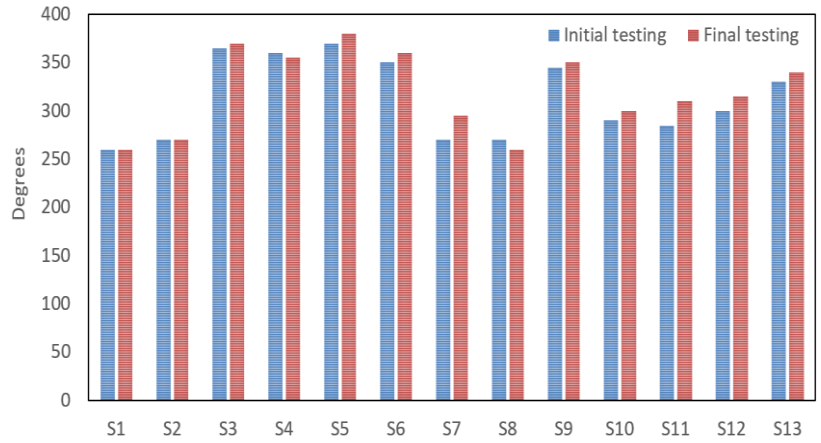


Figure 5. The results obtained by the subjects at the initial testing and the final testing at the Matorin test – left foot

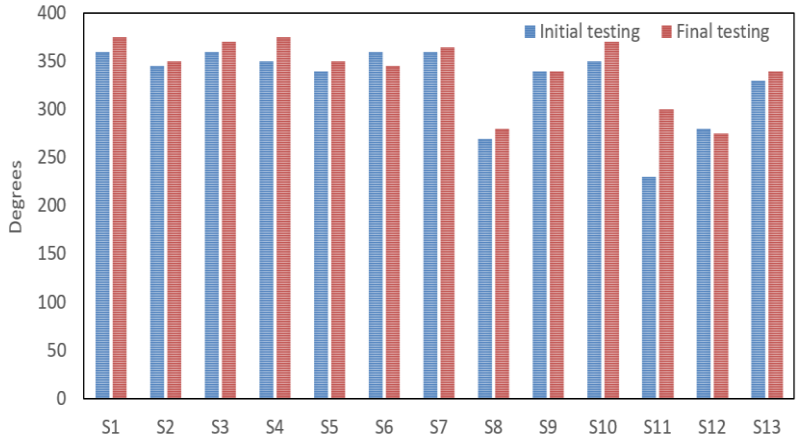


Figure 6. The results obtained by the subjects at the initial testing and the final testing at the Matorin test – right foot

After running this test, only one player scored below 270 degrees in the initial test (right), all other players scored above 270 degrees in the initial test (right). In figure 5 it can be seen that the player who obtained the worst result in the initial testing (right), had a progress of 70 degrees in the final testing (right). The results obtained after performing the test on the left side are not as good as those obtained on the right side, one of the causes may be that most of the players in the team are right-footed players. However an S3 right-footed player achieved a result of 370 degrees in the final test. Matorin equated the performance over 360 degrees with the qualification "very good". Thus, when performing the test towards the right side, five players obtained the qualification "very good", and when performing the test towards the left side, three players obtained the qualification "very good". The best result obtained towards the right side was 375 degrees, and the weakest 275 degrees. On the left side, the best result obtained is 380 degrees, and the worst is 260 degrees (Figure 5 and 6).

Conclusions

Following the research carried out, we were able to evaluate the determining motor qualities in the football game at this age level. Speed and coordination are probably the main motor qualities that children encounter during practice or a match at this age. Most of the training of this team is based on the development of individual techniques, which in turn require very good coordination. Certainly, the other motor skills will also be addressed in the future, which also have an important role in developing these children as future footballers.

The training level of the children at the initial testing was normal, consistent with the current demands in the game of football at this age. Through this study, we wanted to highlight the degree and level of progress in a 6-week training period for 10–12-year-old children in the soccer game. The study occurred during the preparation period, after the children returned from winter vacation. The means of intervention used in the development of these motor skills were classical and standardized means.

After implementing the proposed program for the development of motor skills, speed, and coordination and following the results obtained, we can say that the approach to training athletes in this age category is correct.

Author contributions: Conceptualization, D.V.S. and B.C.S.; methodology, D.V.S; validation, P.I.P.; formal analysis, D.C.S., P.I.P. and B.C.S.; investigation, D.V.S. and B.C.S.; data curation, P.I.P.; writing - original draft preparation, D.V.S. and P.I.P.; writing - review and editing, B.C.S.; visualization, P.I.P..; supervision, D.V.S. All authors have read and agreed to the published version of the manuscript.

Funding: Not applicable.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this paper may be obtained on request from the corresponding author.

Conflicts of Interest: The authors declare no conflict of interest.

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