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METHODOLOGY FOR DEVELOPING PSYCHOPHYSIOLOGICAL CHARACTERISTICS OF YOUNG FOOTBALL PLAYERS

Abdurashid Kadirov
Senior Lecturer, National University of Uzbekistan
E-mail: abdurashidkadirov5@gmail.com
Tashkent, Uzbekistan

ABOUT ARTICLE

Key words: young football players, psychophysiology, training methodology, reaction speed, functional fitness, visual and auditory signals, competitive performance.

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Abstract: This scientific article examines the methodology for developing the psychophysiological characteristics of young football players and its impact on sports performance. During the study, special exercises based on visual and auditory signals were developed and implemented in practice. The results demonstrated a significant improvement in the physical, functional, and psychophysiological indicators of young athletes.

Introduction. Modern football requires a high level of rapid thinking, reaction speed, and psychophysiological stability. In particular, the age of 13–14 represents an important stage in athlete development. Scientific studies indicate that psychophysiological preparedness—such as decision-making speed, movement accuracy, coordination, and resistance to stress—directly affects competitive outcomes. Therefore, the development of these qualities in young football players is a pressing scientific issue.

The aim of the study is to improve competitive performance by developing the psychophysiological characteristics of young football players.

Research Objectives

- To develop an annual training plan divided into seasonal stages for improving psychophysiological characteristics of 13–14-year-old football players;
- To design a set of special exercises aimed at improving ball-handling efficiency;

- To develop a pre-competition training plan to enhance performance;
- To create a comprehensive methodology for expanding functional capabilities and training types.

Research Object and Subject

The research was conducted at:

- "Tashkent Young Guards" Sports School (Olmazor district)
- Olmazor District Sports School
- Tashkent District Sports School

The subject of the study is the development of psychophysiological characteristics of football players born in 2009 during the training phase.

Research Methods

The study employed:

- analysis and synthesis of scientific literature
- pedagogical observation
- questionnaires
- pedagogical testing
- pedagogical experiment
- mathematical-statistical analysis

Practical Results

- Age-specific psychophysiological characteristics were identified
- Special exercise complexes were developed and implemented
- A seasonal annual training program was created
- Athletes improved performance and achieved prize positions in city and national competitions

Reliability of Results

The reliability is ensured by:

- theoretical and practical validity
- scientifically organized methodology
- appropriate research methods
- quantitative and qualitative data analysis
- statistical verification
- high reliability of empirical data

Materials and Methods

Level of General and Special Physical Fitness of Young Football Players (n = 22)

Table 1

No.	Test Types	Experimental Group (Mean ± SD)	CV (%)	Control Group (Mean ± SD)	CV (%)	t	P
1	30 m sprint (seconds)	4.99 ± 0.34	6.72	4.75 ± 0.34	7.12	2.11	<0.05
2	Rope jumping (1 minute, repetitions)	37.36 ± 6.31	16.90	37.73 ± 5.95	15.77	0.18	>0.05
3	Push-ups (1 minute, repetitions)	20.45 ± 3.62	17.68	20.36 ± 3.01	14.78	0.08	>0.05
4	Passing (5–10 meters)	4.14 ± 0.50	12.20	4.35 ± 0.41	9.49	1.11	>0.05
5	Passing (20–30 meters)	4.06 ± 0.42	10.40	4.37 ± 0.34	7.80	2.42	<0.05
6	Dribbling (30 meters)	3.86 ± 0.43	11.12	4.07 ± 0.39	9.58	1.53	>0.05
7	Ball juggling (1 minute, repetitions)	42.64 ± 8.21	19.26	44.91 ± 6.56	14.62	0.92	>0.05

Note:

$\bar{X}$ – arithmetic mean; σ – standard deviation;

CV (%) – coefficient of variation;

t – Student's t-test value;

P – level of significance.

Level of Functional Indicators of Young Football Players (n = 22)

Table 2

No.	Test Types	Experimental Group (Mean ± SD)	CV (%)	Control Group (Mean ± SD)	CV (%)	t	P
1	Tapping test	6.19 ± 0.96	15.45	6.35 ± 0.79	12.46	0.53	>0.05
2	Ruffier–Dixon test	7.84 ± 1.20	15.35	7.59 ± 1.00	13.19	0.31	>0.05
3	Genchi test	22.55 ± 2.42	10.75	23.36 ± 0.67	2.89	1.38	>0.05
4	Stange test	62.27 ± 5.04	8.10	64.27 ± 5.92	9.21	1.09	>0.05

No.	Test Types	Experimental Group (Mean ± SD)	CV (%)	Control Group (Mean ± SD)	CV (%)	t	P
5	Vital lung capacity (VLC)	2544.55 ± 162.99	6.41	2643.64 ± 160.83	6.08	1.84	>0.05

Note:

$\bar{X}$ – arithmetic mean; σ – standard deviation;

CV (%) – coefficient of variation;

t – Student's t-test value;

P – level of significance.

Special Training Exercises

Based on the obtained results and pedagogical observations, special exercises were developed to address the identified problem. These exercises were designed according to general pedagogical principles and were performed using auditory (echo signals) and visual (light signals) stimuli (see Figures 1–2).

These exercises are aimed at improving:

- reaction speed
- coordination
- decision-making ability
- perceptual-motor responses

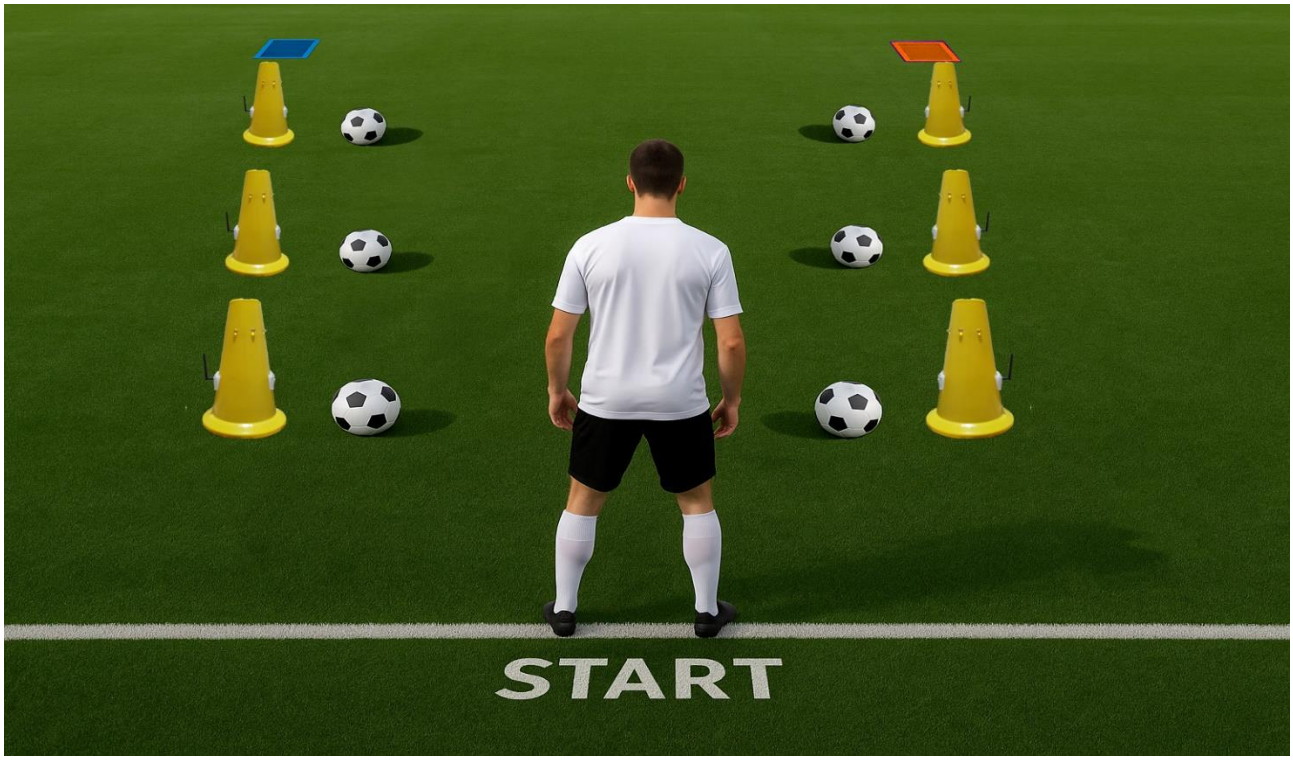

Figure 1. Special Visual (Sight-Based) Exercise

Note:

A starting line is marked, and cone-shaped markers are placed at 5-meter intervals. These markers are equipped with red and blue flashing lights (signals). A ball is placed on both sides of each marker at a distance of 20–30 cm. At a distance of 25–30 meters from the starting line, two square target zones (1 × 1 m), one red and one blue, are marked on the ground.

At the coach's signal, the athlete begins running. At the same moment, one of the lights is activated. The athlete must quickly react, approach the ball located near the illuminated signal, and strike it in the air toward the target zone positioned opposite the selected marker. After completing the action, the athlete returns to the starting line. At this point, another light signal is activated, and the athlete repeats the task by kicking the corresponding ball toward the opposite target.

The exercise continues in this manner until all balls are used. After striking the ball at the first station, the athlete returns not to the starting line but to the first marker. When performing the third station, the athlete returns to the second marker, and so on.

Each athlete performs the exercise twice. The rest interval between repetitions is 2 minutes. At the end of the exercise, the time taken and the accuracy of each athlete's kicks are recorded and compared.

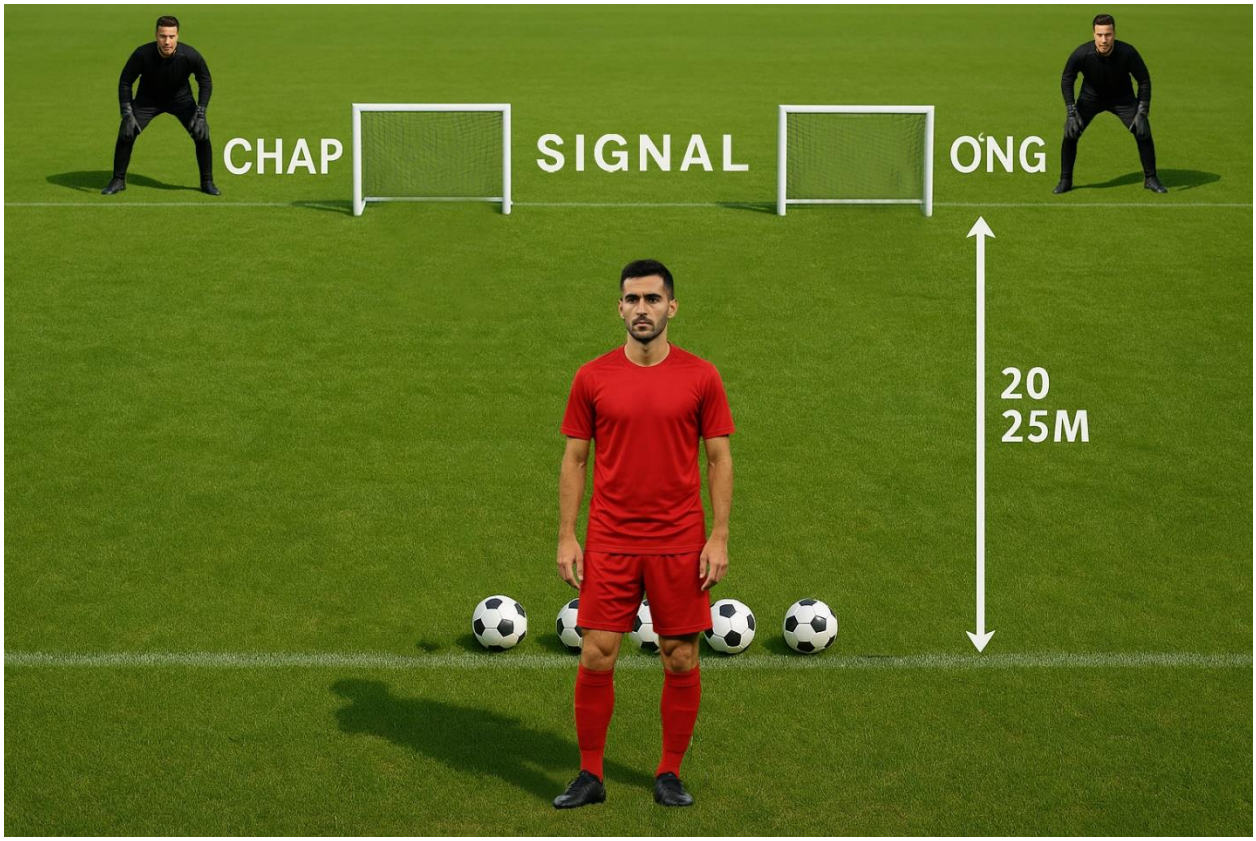

Figure 2. Special Auditory (Sound-Based) Exercise

Note:

A starting line is drawn, and five balls are placed along it. At a distance of 20–25 meters on both sides of the starting line, two small goals are positioned. The athlete stands facing away from the starting line toward the goals. Other players stand near each goal.

These players coordinate in advance so that one of them produces a signal (such as a clap or another sound). As soon as the signal is given, the athlete must react immediately and kick the ball along the ground toward the goal from which the sound originated. After performing the action, the athlete turns back to the starting position.

The exercise continues until all balls have been used. Each athlete repeats the exercise 3–4 times. The rest interval is 1 minute. At the end of the exercise, the time taken and the accuracy of each athlete's shots are recorded and compared.

Implementation of Training

The above exercises were implemented at the Tashkent Young Guards Sports School and Olmazor District Sports Schools twice a week throughout the entire training year.

Table 3. Anthropometric Indicators of Young Football Players (n = 22)

No.	Indicator	Experimental Group (Mean ± SD)	CV (%)	Control Group (Mean ± SD)	CV (%)	t	P
1	Height (cm)	167.82 ± 5.44	3.24	169.36 ± 7.45	4.40	0.56	>0.05
2	Body mass (kg)	49.09 ± 6.80	13.86	49.91 ± 7.11	14.24	0.35	>0.05
3	Chest circumference (cm)	70.09 ± 5.80	8.28	73.82 ± 7.52	10.19	1.66	>0.05

Note: $\bar{X}$ – mean; σ – standard deviation; CV – coefficient of variation; t – Student's t-test; P – significance level.

Post-Experimental Results

Table 4. Dynamics of General and Special Physical Fitness (n = 22)

(Condensed for clarity but values preserved)

Group	Push-ups	Rope jumping	30 m run	Passing (5–10 m)	Passing (20–30 m)	Dribbling	Juggling
CG ($\bar{X}$)	20.36	37.73	4.75	4.35	4.37	4.07	44.91
EG ($\bar{X}$)	20.45	37.36	4.99	4.14	4.06	3.86	42.64

End of the Study

Group	Push-ups	Rope jumping	30 m run	Passing (5–10 m)	Passing (20–30 m)	Dribbling	Juggling
CG ($\bar{X}$)	22.36	39.55	4.66	4.40	4.44	4.17	46.09
EG ($\bar{X}$)	24.91	44.09	4.45	4.70	4.77	4.50	51.36

All results: $P < 0.05$

Table 5. Correlation Between 30 m Sprint and Visual Reaction Exercise (n = 10)

The Pearson correlation coefficient analysis shows a moderate statistical relationship ($r = 0.68$) between sprint performance and visual reaction exercises.

Table 6. Dynamics of Functional Indicators (n = 22)

Test	Before (EG)	After (EG)	t	P
Tapping test	6.19	7.33	2.36	<0.05
Ruffier–Dixon	7.84	5.33	2.14	<0.05
Genchi test	22.55	25.91	3.38	<0.01
Stange test	62.27	70.09	2.31	<0.05
Vital capacity	2544.55	2796.36	2.28	<0.05

Table 7. Dynamics of Anthropometric Indicators (n = 22)

Indicator	Before (EG)	After (EG)	t	P
Height	167.82	171.00	0.18	>0.05
Weight	49.09	53.00	0.62	>0.05
Chest circumference	70.09	75.64	0.67	>0.05

Analysis of Results

The dynamics of physical fitness indicators demonstrated statistically significant improvements in the experimental group compared to the control group ($P < 0.05$ across all indicators).

- Push-ups increased from 20.45 to 24.91 repetitions ($t = 2.35$)
- Rope jumping improved from 37.36 to 44.09 repetitions ($t = 2.31$)
- 30 m sprint time decreased from 4.99 to 4.45 seconds ($t = –2.27$)

Among special physical indicators:

- Long-distance passing improved from 4.06 to 4.77
- Ball juggling increased from 42.64 to 51.36 repetitions ($t = 2.42$)

These results confirm the high effectiveness of the applied methodology.

Functional indicators showed improved cardiovascular and respiratory system performance:

- Tapping test: 6.19 → 7.33 ($P < 0.05$)
- Genchi test: 22.55 → 25.91 seconds ($P < 0.01$)
- Stange test: 62.27 → 70.09 seconds ($P < 0.05$)
- Vital capacity increased significantly

Anthropometric indicators did not show statistically significant differences ($P > 0.05$), but positive growth trends were observed.

Conclusion. Based on the analysis of scientific literature, pedagogical observations, experimental results, and statistical data, the following conclusions were drawn:

- Training should be organized using microcycle planning, especially for 13–15-year-old players.
- There is a lack of structured microcycle-based methodologies for this age group, indicating the need for further research.
- The implementation of reaction-based exercises significantly improved ball-handling efficiency and psychophysiological indicators.
- Competitive performance improved by 18–19% ($P < 0.05$).

The “AKTI-FIT” methodology, incorporating analytical, cognitive, speed, and innovative training components, proved highly effective in:

- improving physical performance
- enhancing decision-making speed
- developing situational awareness
- optimizing strategic thinking during gameplay.

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