

**National Sports Academy "Vasil Levski"**

Faculty of Sport

Department of Football and Tennis



**"Specialized Methodology for Sports  
Training of 14-15-Year-Old Female Football  
Players"**

**Bozhiya Mitkova Noeva**

**Abstract - English Translation**

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# **"Specialized Methodology for Sports Training of 14-15-Year-Old Female Football Players"**

## **Abstract**

for obtaining the educational and scientific degree **"Doctor"**  
in professional field **7.6 Sport**

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The dissertation consists of **253 pages**, including **26 tables** in the main section and **47 figures**, as well as **79 tables** in the appendix. The bibliography includes **74 sources in Cyrillic** and **32 in Latin script**, totaling **106 sources**.

The dissertation was reviewed, approved, and submitted for defense by the **Department of Football and Tennis** at the **National Sports Academy "Vasil Levski"** on **January 30, 2025**.

The defense of the dissertation will take place on **May 14, 2025, at 13:00**, in the **"Beckenbauer" Hall** at the **National Sports Academy "Vasil Levski", Student Town**, during a meeting of the **Scientific Jury on Theory and Methodology of Physical Education and Sports Training**.

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## **Abbreviations Used**

**FRG** – Federal Republic of Germany

**PRC** – People's Republic of China

**AFL** – Amateur Football League

**BFS** – Bulgarian Football Union

**FIFA** – Fédération Internationale de Football Association (International Federation of Association Football)

**UEFA** – Union of European Football Associations

**ACL** – Anterior Cruciate Ligament

**PE** – Physical Education and Sport

**SFT** – Specialized Physical Training

**GFT** – General Physical Training

**PT** – Physical Training

**EG** – Experimental Group

**CG** – Control Group

**TTA** – Technical-Tactical Actions

**USA** – United States of America

**NABWF** – National Association of Bulgarian Women's Football

# Introduction

Football has established itself as one of the most widespread and significant sports worldwide, attracting players and fans from diverse age and cultural groups. In recent decades, women's football has made remarkable progress, becoming an integral part of the global sports scene. However, this development has also highlighted substantial gaps in scientific research and methodological approaches tailored to the specific needs of female football players. These needs continue to differ from those of their male counterparts, requiring adapted approaches in the training process.

The growing demand for scientifically based and targeted training methodologies for young female football players underscores the importance of comprehensive research. Sporting success in young female athletes depends not only on individual skills and talent but also on the application of training approaches that consider their physiological and psychological characteristics. Adolescence, particularly the 14-15 age range, represents a critical stage for developing the physical, technical, and psychological attributes of young athletes.

This period is characterized by intense physiological transformations, including rapid growth, significant changes in musculoskeletal structure, and hormonal regulation. While these processes are crucial for athletic development, they also increase the risk of injuries if the training process is not adapted to age- and gender-specific factors. Therefore, a deep scientific understanding of these adaptations is essential for designing effective training programs that support both physical and psychological development while minimizing injury risks.

The objective of this study is to develop and scientifically validate a **specialized training methodology** for female football players aged **14-15**. This methodology will be based on an integrated understanding of their physiological, psychological, and technical needs. The proposed training approach aims to

**Structured Training Practices.** The methodology will incorporate **structured training practices** that not only enhance fundamental sports skills but also reduce the risk of injuries characteristic of this age group.

Additionally, the methodology will integrate **modern research and approaches** from the fields of **biomechanics, physiology, sports psychology, sports medicine, and sports sciences**. Through this comprehensive approach, the developed program is expected to **improve athletic performance** and contribute

to the establishment of **scientifically validated training practices**, supporting the development of young female football players at both the **national and international levels**.

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## Working Hypothesis

Our primary assumption is that a **specialized training methodology**, adapted to the **physiological and psychological characteristics** of **14-15-year-old female football players**, will lead to **significant improvements** in their **physical and technical preparation** compared to traditional training methods.

By developing and implementing a **specialized training methodology** that applies the **variability method**, focusing on the **targeted use of specific football exercises and conditioning techniques**, a decisive improvement in their **general and specialized physical training**, as well as their **technical and tactical abilities**, will be achieved. This will better prepare them for **higher age groups** and **increase their potential** for integration into **women's teams and the representative squad of FC NSA-Women**.

## Conclusion

The **working hypothesis** is based on the necessity of creating a **scientifically grounded methodology** for optimizing the **sports training** of **14-15-year-old female football players**, taking into account both their **physiological characteristics** and the **demands of the game**.

## Objective and Research Tasks

The **main objective** of this study is to develop and evaluate the effectiveness of a **specialized training methodology** for **14-15-year-old female football players**. The methodology is designed in accordance with the **physiological and psychological characteristics** of this age group and aims to optimize their **physical, technical, and tactical development**. The developed methodology will be based on **modern principles of sports science** and will provide an **integrated approach** to the training of young female football players, focusing on their **long-term development, motor skills, abilities, and athletic performance**.

## Key Research Tasks:

1. **Review and summarize existing research** on the training and improvement of **14-15-year-old female football players** based on literary sources. A **comprehensive literature analysis** has been conducted on issues related to **specialized physical training, technical preparation, and tactical training** of young female footballers. For the purposes of this study, a total of **106 scientific works** were reviewed, including **74 in Cyrillic and 32 in Latin script**.
2. **Develop and validate a specialized methodology**, incorporating **physical, conditioning, technical, and tactical exercises**, specifically designed and selected for **14-15-year-old girls** actively engaged in football.
3. **Conduct and analyze anthropometric assessments** of **14-15-year-old female football players** to evaluate their **growth and development**.
4. **Identify a set of sports-pedagogical tests**. Conduct research and analyze the results, assessing the correlation between **technical preparation** and **specialized physical training** indicators.
5. **Establish a normative framework** of tests for **selection, control, and assessment** of **specialized physical training (SPT)** and **technical-tactical preparation** in **14-15-year-old female football players**, utilizing **sports-pedagogical and medico-biological research**.

## **Subject and Participants of the Study**

The **subject of the study** is the development and evaluation of the impact of a **specialized comprehensive training methodology** for **14-15-year-old female football players**, incorporating the **physical, technical, and tactical aspects** of the training process (**Appendix 2**). The research focuses on assessing the **effectiveness of the developed methodology** in enhancing and maintaining the **fundamental physical qualities and technical-tactical skills** of adolescent female football players aged **14-15 years**.

## **Selection of Study Participants**

For the purposes of the study, a selection of **14-15-year-old female football players** from **two leading football clubs in Bulgaria** was conducted. The participants were divided into **two groups – experimental and control**, ensuring a **comparative analysis** and **objective evaluation** of the effectiveness of the applied training methods.



- **Experimental Group:** Composed of female football players training at **NSA Sports Football Club** – a team with **long-standing traditions** in developing young talent and integrating them into **youth and women's football**.
- **Control Group:** Formed from players of **LP-Supersport Football Club, Sofia** – a club with a **proven track record** in the **sports development of young female athletes**, with numerous achievements at **regional and national levels**.

The selection of participants was based on their **age, training experience, and current sports level**. This approach ensures **equal conditions** between the groups and creates a **foundation for an objective evaluation** of the study results.

### **Organization and Stages of the Study**

The **total number of participants** in the study is **30 (n=30)**, distributed into two groups:

1. **Experimental Group:** Consists of **20 (n=20)** players from **NSA Sports Football Club**.
2. **Control Group:** Includes **10 (n=10)** players from **LP-Supersport Football Club**.

The experiment is conducted over a period of **two sports-competitive years**, from **01.09.2022 to 30.11.2024**.

The experiment itself is based at the training facilities of the clubs, including sports fields and facilities adapted to the needs of the study.

### **Stages of the Study**

During the experimental research from **September 2022 to November 2024**, the following stages can be distinguished:

#### **First Stage – September 2022 – September 2023**

- **Study, summarize, and analyze** literary sources addressing the problem.
- **Conduct discussions with specialists** working in the field of **women's football** – including conversations and exchanges of experience with both **foreign and Bulgarian specialists and coaches** working in women's and youth football during **seminars, conferences, and tournaments organized by UEFA**.

- **Formulate the purpose and working hypothesis** of the study.

### **Second Stage – September 2022 – September 2023**

- **Develop a system of 16 tests** for the **control and assessment** of the **sports training** of female football players.
- **Organize and conduct the final experiment** – determine the **control and experimental groups**, update the test battery.

### **Third Stage – September 2023 – November 2024**

- **Conduct sports-pedagogical research** with both the **experimental and control groups**.
- **Mathematical-statistical processing and analysis** of the obtained results.
- **Perform variation, comparative, and correlation analysis** and summarize the results.
- **Conduct final consultations** on structuring, formatting, and completing the dissertation.

### **Specialized Methodology of the Pedagogical Experiment**

When working with 14-15-year-old female football players, it is important to monitor the gradual increase in workloads while ensuring adequate recovery time. At this age, the body adapts quickly, but it is crucial to avoid overloading in order to reduce the risk of injuries. The primary goal in training should be to develop speed-strength qualities (speed and explosiveness) and special endurance, which are key factors for football performance.

### **Conditioning Training**

Conditioning exercises are the foundation of physical preparation. They include:

- Strengthening large muscle groups, such as the quadriceps, glutes, and abdominal muscles.
- Speed exercises, such as sprints over short distances.
- Interval training, which combines periods of intense effort with rest to improve endurance.

Progression in conditioning should be carefully planned, with workloads gradually increasing. It is important to combine intensive and recovery periods to avoid overtraining.

## **Development of Technical and Tactical Skills**

At this age, the player begins to develop game intelligence and skills for solving situations on the field. The use of a variable method in training is highly effective. This includes:

- Changing game conditions – for example, using smaller fields, games with different numbers of players, or limited time for action.
- Tasks that promote thinking – such as passing under pressure, quick reactions to changes in direction, or ball retrieval.

These exercises create situations close to real-game scenarios and help the player develop the ability to adapt and make quick decisions.

## **Organization of Training Sessions**

The training process should be well-structured. Here is how it can be organized:

### **1. Preparatory Stage:**

- Strengthening the physical foundation through exercises for strength, endurance, and coordination.
- Improving basic technical skills, such as passing and shooting.

### **2. Competitive Stage:**

- Practicing game strategies and tactics through simulation of match situations.
- Increasing the intensity of exercises.

### **3. Evaluation and Correction:**

- Conducting tests to measure progress, such as sprints, jumps, or shuttle runs.
- Analyzing the results and making adjustments to the training process.

## What to Avoid:

- **Stereotyped Exercises:** These do not help in developing game intelligence.
- **Excessive Load Without Proper Recovery.**
- **Isolated Exercises That Do Not Connect Physical Skills With Game Situations.**

As a coach, you should aim for a balanced approach – developing the player's physical qualities while also fostering game intelligence and technical skills. Work with a clear vision of her long-term development, laying the foundations for future success in youth and women's football. Your goal is to create a player who is physically resilient, tactically intelligent, and psychologically confident.

## Methods of Research

Within the framework of the pedagogical experiment, anthropometric measurements and functional tests will be conducted to provide a detailed assessment of the physical condition and functional capacity of the participants.

## Anthropometric Measurements

- **Height** – A term used to describe the height of a person, measured from the floor to the highest point of the body (usually the top of the head). It is measured in the vertical direction and serves as one of the primary indicators of a person's physical characteristics.
- **Weight** – A measure of the mass of a person or object, determined by the force of gravity acting upon it. Typically, a person's weight is measured in kilograms (kg) or pounds (lbs).
- **Biological Age** – Measured in years, this refers to the unit of time that indicates a person's age or the duration of a specific event within a year (365 days, or 366 days during a leap year). In the context of human age, years indicate how much time has passed since the person's birth.
- **BMI (kg/m<sup>2</sup>)** – BMI, or Body Mass Index, is a measure used to assess whether a person has a healthy weight relative to their height. It is calculated using the following formula:
- **LBM (Lean Body Mass)** – This term is used to describe the body mass that does not contain fat. It includes muscle mass, bones, water, and other non-fat

tissues. LBM (Lean Body Mass) can be measured in kilograms (kg) and is an important indicator of a person's physical condition.

- Depending on the level of physical activity and training, a person may have different values of LBM. This is a useful indicator when trying to lose weight or build muscle mass, as it shows how much of your body weight is composed of lean tissue (without fat).
- **Chest Circumference (cm)** – This is the measurement around the chest, usually at the widest part. It is measured around the chest, over the armpits, and at the level of the shoulders. Chest circumference is an important indicator for evaluating body composition and the health of the respiratory system.
- **Waist Circumference (cm)** – Waist is measured around the narrowest part of the body, usually just above the navel. This measure is often used to assess the distribution of body fat. A larger waist can indicate a higher risk for various health problems, such as cardiovascular diseases.
- **Forearm Circumference (cm)** – This is the measurement around the forearm, typically at the widest part between the elbow and wrist. It is an important indicator for assessing muscle mass in the upper body and can be used to monitor progress in training, particularly in muscle-building goals.
- **KG Triceps (mm)** – The Skinfold Calculator (KG) when referring to measuring the triceps is used to assess the amount of body fat by measuring the thickness of the skinfold in various areas of the body, including the triceps.
- **KG Scapula (mm)** – Used to measure the thickness of the skinfold in the scapula (shoulder blade) area on the back. This measurement is part of the method to assess the percentage of body fat by measuring skinfolds.
- **Fat (kg)** – Refers to the total amount of body fat in the body. This amount is determined based on measurements such as body fat percentage, which can be calculated using various methods such as skinfold measurements, bioelectrical impedance analysis (BIA), or DEXA scanning.
- **Fat%\_Slaughter** – Refers to the body fat percentage in adolescents.
- **Fat%\_Parzhiskova** – Not a widely used standard term in scientific or health literature, but it refers to adolescents.
- **PP [W]** – Commonly used as an abbreviation for "Peak Power" (measured in watts, W). This represents the maximum power that can be generated or used at a given moment. A watt (W) is the unit of power measurement in the International System of Units (SI).
- **PP [W/kg]** – Used to measure peak power per kilogram (Peak Power per kilogram). This is an indicator of how much power (in watts) an individual or system can generate per kilogram of body weight or mass.

- **W/kg LBM** – (Watt per kilogram of Lean Body Mass) is a measure that shows the amount of power (in watts) generated per kilogram of a person's lean body mass (LBM). This is an important indicator for athletic performance, especially in sports requiring high intensity and short bursts of effort, such as cycling, sprinting, and strength training.
- **AP [W]** – Refers to Average Power (measured in watts, W). This indicator measures the average amount of energy generated or used over a given period of time. Average power is often used in sports and physical applications to assess effort and performance of athletes or machines.
- **AP [W/kg]** – Refers to Average Power per kilogram and shows how much power (in watts) is generated by a person or system per kilogram of their body weight or lean body mass (LBM).
- **PD [%]** – Typically used as an abbreviation for Power Density or Power-to-Mass Ratio. The percentage of PD is often associated with power in sports and physical disciplines or in technological contexts.
- **HGRight (kg)** – "Hand Grip" (grip strength), when measuring the physical grip strength of the right hand.
- **HGLeft (kg)** – "Hand Grip" (grip strength), when measuring the physical grip strength of the left hand.

## Functional Tests

### TEST № 1: Triple Jump from Standstill (Explosive Power)

**Required Equipment:** Field, tape measure, one expert

**Execution:** The football player starts the jump from standstill, first jumping with both feet. She lands and then jumps off one foot, lands again, and jumps off the other foot before landing on both feet. Two attempts are made.

**Evaluation:** The best attempt is recorded in meters and centimeters, with a tolerance of  $\pm 1$  cm.

### TEST № 2: 30 Meter High Start (Speed)

**Execution:** The test is performed with running shoes on a tartan track or an outdoor track. No prior acceleration towards the distance is allowed, and the result is measured using a photometric system or an electronic timer in seconds.

**Evaluation:** Three attempts are made, and the best result is recorded.

### **TEST № 3: Change of Direction without the Ball (Agility, Quickness)**

**Execution:** The agility tests for running and dribbling can be conducted on the same field. The test consists of completing the course as quickly as possible without errors. The test will be without a ball. The track is marked with six poles and is in the form of a slalom. The times are measured using two light barriers placed at the start and finish of the course. The start is self-timed without a signal. The starting foot is at the beginning, and the starting line is 1 meter wide to avoid a flying start. Two attempts are made, and both are recorded. There should be a 1-minute rest between attempts. The poles must not be knocked over.

**Evaluation:** Measures agility, reaction speed, and the ability to quickly change direction.

### **TEST № 4: Change of Direction with the Ball (Agility, Quickness)**

**Execution:** The tests for agility during running and dribbling can be conducted on the same field. The test consists of completing the course as quickly as possible without errors. The track is marked with six poles and is in the form of a slalom. The times are measured using two light barriers placed at the start and finish of the course. The start is self-timed without a signal. The starting foot is at the beginning, and the starting line is 1 meter wide to avoid a flying start. Two attempts are made, and both are recorded. There should be a 1-minute rest between attempts. The poles must not be knocked over.

**Evaluation:** The test measures the agility and quickness of the participant, focusing on the following physical qualities:

### **TEST № 5: 180 Meter Shuttle Run (Speed Endurance)**

**Execution:** The test is performed on a grassy field with football boots. The distance is marked in a straight line with cones. The football player, starting from self-command, reaches the first cone, returns to the start, reaches the second cone, returns to the start, reaches the third cone, and finishes at the start.

**Evaluation:** One attempt is made, and the achievement is recorded in seconds.

### **TEST № 6: Throw-in (Explosive Power)**

**Execution:** The test is performed from the sideline of a grassy football field (without acceleration) with football shoes. Three consecutive attempts are made – a side throw according to the rules, within a marked corridor (2.5 meters wide).

**Evaluation:** The achievement is measured in meters and centimeters, with an error of  $\pm 10$  cm. An attempt is considered unsuccessful if the ball does not land within the outlined corridor.

### **TEST № 7: Vertical Jump from Standstill (Explosive Power)**

**Execution:** A special tensometric platform is used for this test.

**Evaluation:** The result is measured in centimeters and millimeters, performed from standstill.

### **TEST № 8: Juggling with the Ball (Technique)**

**Required Equipment:** Field, cones, ball, one expert

**Execution:** The football player, in standard kit, will juggle a ball while passing through cones arranged in the shape of a figure-eight, 1.5 meters apart. The task lasts for 45 seconds, and the number of times the player passes the ball through the cones with both the right and left foot is counted.

**Evaluation:** The achievement is measured in points – each successful pass through a cone with the right or left foot without dropping the ball is counted as one point.

### **TEST № 9: Target Shots (Right Foot from 10 Meters)**

**Required Equipment:** 10 balls, net with holes, two experts

**Execution:** The player takes shots at the goal from 10 meters using their right foot.

**Evaluation:** The number of accurate shots into the center of the goal is recorded.

### **TEST № 10: Target Shots (Left Foot from 10 Meters)**

**Required Equipment:** 10 balls, net with holes, two experts

**Execution:** The player takes shots at the goal from 10 meters using their left foot.

**Evaluation:** The number of accurate shots into the center of the goal is recorded.

### **TEST № 11: Combined Test (Ball Control, Dribbling Between Cones, Shot at a Standard Football Goal from the Left Wing with the Preferred Foot)**

**Required Equipment:** Field, 14 cones, 8-10 balls, two stopwatches, two experts

**Execution:** The left wing track is arranged as follows: on the line connecting the left vertical post of the goal and the penalty spot, five cones are placed 2 meters apart, starting 2 meters from the edge of the penalty area. From the fifth cone, the sixth cone is placed 10 meters away, and the seventh cone is placed 5 meters further. A similar setup is arranged on the right side.

The player receives a rolling ball from the expert (the expert starts the stopwatch upon striking the ball). The player controls the ball before the sixth cone, turns, and dribbles through the cones, then shoots at the goal after the last cone. The stopwatch is stopped when the ball crosses the goal or out line.

**Evaluation:** Two attempts are made from both the right and left. Achievements are recorded in seconds, as well as the accuracy of the shot.



## **TEST № 12: Combined Test for Ball Control, Dribbling Through Cones, and Shooting at a Regular Football Goal from the Left Flank with the Weak Foot**

**Required Equipment:** Field, 14 cones, 8-10 balls, two stopwatches, two experts.

### **Execution:**

The course on the right flank is set up as follows: along the straight line connecting the right goalpost and the penalty spot, at two meters from the penalty area boundary, five cones are placed at two-meter intervals. From the fifth cone, a sixth cone is placed 10 meters away in a straight line, and five meters from it, a seventh cone is positioned. The same setup is mirrored on the left flank.

The test subject receives a rolling ball from the expert (the expert starts the stopwatch upon striking the ball), controls it in front of the sixth cone, turns, and dribbles through the cones. After passing the last cone, they attempt a shot at the goal. The stopwatch stops when the ball crosses either the goal line or the out line.

### **Scoring:**

Two attempts are made from both the right and left sides. The results are recorded in seconds, along with the accuracy of the shot.

## **TEST № 13: Combined Test - Ball Control, Dribbling Between Cones, Shot at a Normal Football Goal from the Right Wing with the Preferred Foot**

**Required Equipment:** Field, 14 cones, 8-10 balls, two stopwatches, two experts.

**Execution:** The track from the right wing is arranged as follows: along the line connecting the right vertical post of the goal and the penalty spot, five cones are placed 2 meters apart, starting 2 meters from the edge of the penalty area. From the fifth cone, the sixth cone is placed 10 meters away, and the seventh cone is placed 5 meters further. A similar setup is arranged on the left side.

The participant receives a rolling ball from the expert (the expert starts the stopwatch upon striking the ball). The player controls the ball before the sixth cone, turns, dribbles through the cones, and shoots at the goal after the last cone. The stopwatch is stopped when the ball crosses the goal or out line.

**Evaluation:** Two attempts are made from both the right and left sides. Achievements are recorded in seconds, as well as the accuracy of the shot.

### **TEST № 14: Combined Test - Ball Control, Dribbling Between Cones, Shot at a Normal Football Goal from the Left Wing with the Non-Dominant Foot**

**Required Equipment:** Field, 14 cones, 8-10 balls, two stopwatches, two experts.

**Execution:** The track from the right wing is set up as follows: along the line connecting the right vertical post of the goal and the penalty spot, five cones are placed 2 meters apart, starting 2 meters from the edge of the penalty area. From the fifth cone, the sixth cone is placed 10 meters away, and the seventh cone is placed 5 meters further. A similar setup is arranged on the left side.

The participant receives a rolling ball from the expert (the expert starts the stopwatch upon striking the ball). The player controls the ball before the sixth cone, turns, dribbles through the cones, and shoots at the goal after the last cone. The stopwatch is stopped when the ball crosses the goal or out line.

**Evaluation:** Two attempts are made from both the right and left sides.

Achievements are recorded in seconds, as well as the accuracy of the shot.

### **TEST № 15: Beep Test**

**Execution:** The test consists of consecutive runs between two lines placed 20 meters apart. The participant must reach the line before the sound signal ("beep"). Over time, the interval between signals decreases, forcing the participant to increase their speed.

**Purpose of the Test:** To evaluate the maximum aerobic oxygen consumption ( $\text{VO}_2 \text{ max}$ ). To assess endurance in exercises with progressively increasing intensity. To determine the level of cardiovascular fitness.

**Preparation:** Two lines are marked 20 meters apart. Participants should wear comfortable sports clothing and shoes. The test requires an audio recording with pre-programmed sound signals (beeps).

**Instructions:** The participant begins running from one line to the other at the speed indicated by the sound signals. Each subsequent beep requires the participant to reach the opposite line.

The speed increases every minute or "level," as the intervals between signals shorten.

**Termination:** The test ends when the participant fails to reach the line before the sound signal two times in a row or withdraws due to exhaustion.

**Results:** The results are expressed in the number of levels reached and the distances covered. Conversion tables are often used to translate the results into  $\text{VO}_2 \text{ max}$  values.

The beep test is an effective, cost-efficient, and practical method for assessing aerobic endurance. While dependent on the participant's effort and motivation, it provides valuable information about physical fitness and cardiovascular endurance levels.

### **Statistical Analysis of Results**

Mathematical and statistical data processing represents a critical stage in scientific research, ensuring objectivity and evidential value of the results obtained. In this study, variation, comparative, and correlation methods will be applied, which are established tools for analysis in sports science.

Variation analysis will allow for the evaluation of the dispersion of the measured indicators, identifying the degree of deviation in the group of athletes studied. This method will analyze the distribution of the studied variables, forming the basis for a statistical justification of the observed changes.

Comparative analysis will be used to investigate the differences between baseline and final values of key indicators.

Correlation analysis will examine the degree of interrelationship between various functional, anthropometric, and training indicators. By calculating the correlation coefficients, the strength and direction of dependencies between the observed variables will be determined. This approach will

**Provide information about the structural and functional relationships that determine the athletic performance and results of the athletes.**

To determine the statistical significance of the observed changes, a standard significance level will be used. This criterion will ensure that the obtained results are not a product of random variations but reflect real effects of the applied training methodologies.

The application of mathematical and statistical methods will not only validate the research results but also provide a solid foundation for an objective analysis and interpretation of the data. This approach will contribute to the scientific credibility of the conclusions and the development of effective strategies for optimizing the training process of the athletes.

## **Results and Analysis**

### **Best Tests from the Study**

Within the scope of this study, five tests have been identified that show the most significant improvements and directly correlate with the optimization of athletic performance in 14-15-year-old female football players. The selection of these tests was based on their scientific and practical contribution to assessing the physical, functional, and technical-tactical characteristics. These tests are as follows:

Table 1. List of Sports Pedagogical Tests Used in Control Assessments

## Control Assessment:

Nº	Test Name	Measurement Units	Orientation / Logical Information	Reliability	Age Group
1	Triple jump from a standstill	cm	Explosive strength	0.75–0.95	12-18 years
2	30-meter sprint (high start)	sec.	Speed	0.90–0.95	8-18 years
3	Direction change without a ball	sec.	Agility / maneuverability	0.85–0.95	8-18 years
4	Direction change with a ball	sec.	Agility / maneuverability	0.85–0.95	8-18 years
5	Shuttle run – 180 meters	sec.	Speed endurance	0.85–0.95	8-18 years
6	Throw-in distance	meters	Explosive strength	0.86	8-18 years
7	Vertical jump from a standstill	cm	Explosive strength	0.91	8-18 years
8	Juggling with a ball	count (3-5 attempts)	Accuracy	0.60–0.75	8-18 years
9	Shot on target – 10 meters (right foot)	count	Accuracy	0.60–0.75	8-18 years
10	Shot on target – 10 meters (left foot)	count	Accuracy	0.60–0.75	8-18 years
11	Combined test (left – dominant foot)	sec.	Specific work capacity	0.69	8-18 years
12	Combined test (left – weak foot)	sec.	Specific work capacity	0.69	8-18 years
13	Combined test (right – dominant foot)	sec.	Specific work capacity	0.69	8-18 years
14	Combined test (right – weak foot)	sec.	Specific work capacity	0.69	8-18 years
15	Beep test	sec.	Endurance	0.85–0.95	13-18

Source: "System for Selection, Training, and Development of Young Football Players" by Prof. Lachezar Dimitrov (2019).

## Test 2. 30-Meter High Start.

The 30-meter high start test is a widely used method for assessing speed and explosive power in athletes. Conducting the test at different time intervals allows for tracking changes in speed performance and provides an opportunity to evaluate the effectiveness of training methods. The table presents the results of two different groups – NSA and LP, including data for the initial and final stages of the study period. By calculating the average values and percentage difference, the progress of each group is analyzed to identify trends and opportunities for optimizing the training process.

Test 2 - 30 meters high dive / seconds - NSA"				
No	Name	Result 1	Result 2	% Difference
1	EN.	4.93	4.67	5.3
2	VL.	5.75	5.43	5.6
3	NA.	4.9	4.73	3.5
4	IA.	4.93	4.63	6.1
5	JS.	5.14	5.04	1.9
6	AH.	5.24	4.94	5.7
7	HV.	4.78	4.63	3.1
8	SH.	5.02	4.89	2.6
9	MT.	5.11	5.01	2.0
10	HC.	5.05	4.99	1.2
11	MP.	5.08	4.78	5.9
12	TG.	4.89	4.59	6.1
13	KI.	4.96	4.75	4.2
14	JG.	5.24	4.93	5.9
15	GP.	5.12	4.9	4.3
16	DK.	5.32	5.06	4.9
17	KR.	5.18	5.02	3.1
18	AG.	5.86	5.36	8.5
19	DV.	5.76	5.03	12.7
20	JP.	5.46	5.03	7.9
Average values		5.186	4.9205	5.0
Test 2 - 30 meters high start / seconds - LP				
No	Name	Result 1	Result 2	%Difference
1	VK.	5.05	5.05	0.0
2	LZ.	5.27	5.41	2.7
3	HM.	5.27	5.49	4.2
4	IT.	5.31	5.44	2.4
5	KC.	5.36	4.91	8.4
6	KS.	5.35	5.39	0.7
7	AP.	5.74	5.85	1.9
8	PD.	5.34	5.14	3.7
9	DA.	5.42	5.44	0.4
10	RF.	4.69	4.79	2.1
Average values		5.28	5.291	2.7

"Table 5. Test 2 '30 meters high dive: Eg and Kg."

Table 5 shows the results of the 30-meter high dive test, measured in seconds, for two groups – NSA and LP – over two different time periods. The NSA group demonstrated significant progress, with the average result decreasing from 5.186 seconds to 4.9205 seconds, representing an improvement of 5.0%. In contrast, the

LP group showed minimal change, with average values increasing from 5.28 seconds to 5.291 seconds, resulting in a percentage difference of only 2.7%. This indicates significantly better progress in the speed performance of the NSA group compared to the LP group.

Figure 6 illustrates the average results of the 30-meter high dive test for the two groups – NSA and LP – at the initial and final stages of the study.

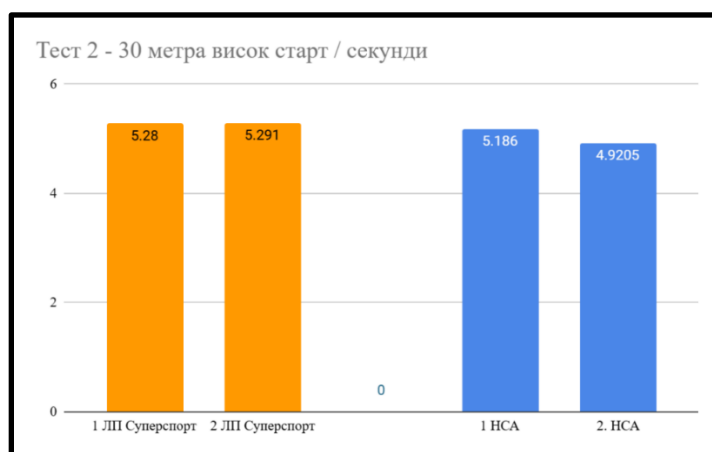


Figure 6. Test 2 "30 meters high dive, seconds Eg and Kg."

The NSA group shows statistically significant improvement in speed performance, with the average time decreasing from 5.186 seconds to 4.9205 seconds, indicating an increase in explosive strength and the effectiveness of the training process. On the other hand, the LP group shows no substantial progress, with the average time increasing minimally from 5.28 seconds to 5.291 seconds. This reflects a limited impact of the applied training methods on the speed qualities of this group compared to the NSA group.

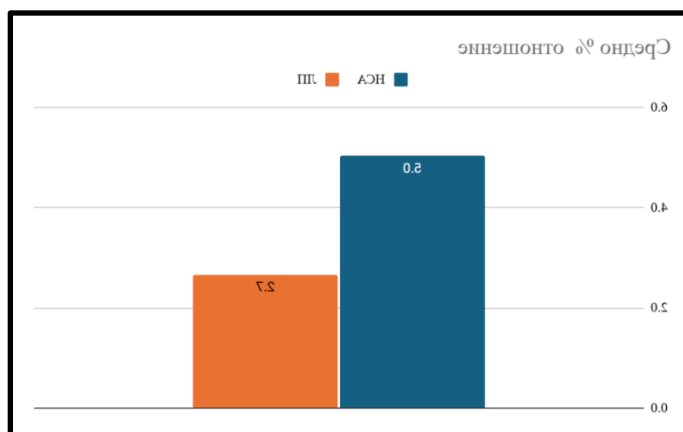


Figure 7. Test 2 "30 meters high dive, average ratio in % Eg and Kg."

The NSA group demonstrates a significantly higher average improvement percentage of 5.0%, which clearly highlights the effectiveness of the applied training methods in developing the athletes' speed performance. This achievement is an indicator of a well-structured and targeted training process, leading to a noticeable increase in explosive strength and speed skills. The progress of the NSA group is not only quantitatively higher but also shows greater consistency in improvement across all participants, further suggesting that the methods were successfully applied on a broad scale.

On the other hand, the LP group shows significantly more limited progress, with an average improvement of 2.7%. This lower percentage of improvement may be due to insufficient adaptation of the training programs to the specific needs of the participants or the lack of the necessary...

Intensity and focus in the training process. Although some participants in the LP group demonstrate individual improvements, the overall development trend remains weaker compared to the NSA group.

The comparison between the two groups clearly shows that the athletes from NSA improved their results nearly twice as much as those from LP. This difference is key to evaluating the effectiveness of the training approach. While NSA has made significant progress, in line with the requirements of modern sports preparation, LP demonstrates a slower development pace. The higher percentage of improvement in NSA not only highlights the effectiveness of the approach but also serves as a basis for future recommendations for optimizing training.

### **1. Vertical Jump from a Standstill – Assessment of Explosive Strength in the Lower Limbs, Critical for Football Performance.**

#### **Test 7. Vertical Jump, cm.**

The table presents the results of the vertical jump test (in centimeters) for the NSA and LP athletes over two measurement periods. The data includes initial results (Results 1), final results after the training period (Results 2), and the percentage improvement (% Difference).



1	Test 7 - Vertical Jump / cm - NSA				
2	40	Name	Result 1	Result 2	% Difference
3		1 EN.	39.62	40.89	3.2
4		2 VL.	37.45	43.94	17.3
5		3 HA.	40.64	42.92	5.6
6		4 LA.	38.35	42.67	11.3
7		5 JC.	40.64	43.68	7.5
8		6 AH.	38.86	45.72	17.7
9		7 HV.	38.1	45.92	20.5
10		8 SH.	41.14	41.65	1.2
11		9 MT.	38.86	42.43	9.2
12		10 HC.	45.97	48.19	4.8
13		11 MP.	47.75	50.75	6.3
14		12 TG.	52.4	57.4	9.5
15		13 KI.	42.92	45.92	7.0
16		14 JG.	40.38	41.65	3.1
17		15 GP.	40.64	44.19	8.7
18		16 DK.	37.59	40.06	6.6
19		17 KR.	42.14	48.68	15.5
20		18 AG.	40.13	43.37	8.1
21		19 DV.	43.94	46.99	6.9
22		20 JP.	30.7	34.79	13.3
23		Average Values	41.9	45.4	8.5
24	Test 7 Vertical Jump / sm / LP				
25	No	Name	Result 1	Result 2	% Difference
26		1 VK.	42.96	41	4.6
27		2 LZ.	49.27	41.65	15.5
28		3 HM.	45.46	42.67	6.1
29		4 IT.	39.37	39.87	1.3
30		5 KS.	40.13	44.45	10.8
31		6 HS.	43.68	39.87	8.7
32		7 AP.	47.24	48	1.6
33		8 PD.	46.22	44.95	2.7
34		9 DA.	37.33	36.06	3.4
35		10 RF.	44.95	43.94	2.2
36		Средни стойности	43.7	42.2	5.7
37					

Table 10. Test 7 "Vertical Jump, cm Eg and Kg."

Table 10 presents the average values of the vertical jump (in centimeters) for the two teams – NSA and LP Supersport, measured in two stages. The results illustrate the differences between the initial values (Stage 1) and the results after the training period (Stage 2).

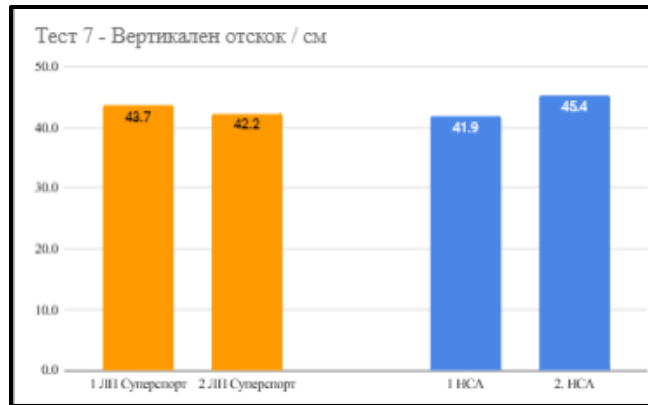


Figure 21. Test 7 "Vertical Jump, cm Eg and Kg."

The main observations from the vertical jump test highlight the differences in performance between the two groups – NSA and LP Supersport – before and after the training period. The NSA group starts with an average value of 41.9 cm in the first measurement, which increases to 45.4 cm after the training period. This represents an improvement of 3.5 cm, clearly showing the effectiveness of the training process and the positive trend in the athletes' performance.

In contrast, the LP Supersport group demonstrates a higher initial value of 43.7 cm, but after the training period, the results drop to 42.2 cm, representing a decrease of 1.5 cm. This decline suggests a lack of effectiveness in the training methods applied to this group.

The graph clearly shows that the NSA athletes achieved significant progress in vertical jump performance after the training period, while the LP Supersport athletes experienced regression in their results. These differences emphasize the importance of well-adapted and targeted training programs to achieve optimal results.

Figure 22 illustrates the average percentage improvement in the results of the vertical jump test for the athletes from NSA and LP Supersport.

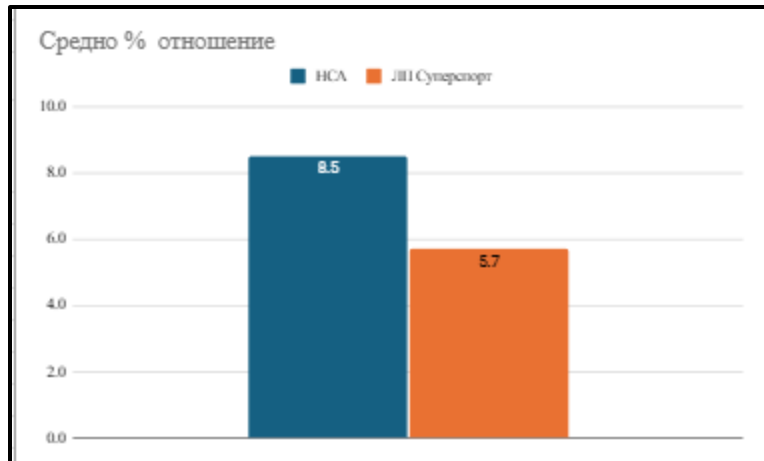


Figure 22. Test 7 "Vertical Jump, cm Eg and Kg."

The graph presents the comparison of the average percentage improvement between the NSA and LP Supersport groups after the training period. The results show that the NSA group demonstrates a significantly higher average percentage improvement – 8.5%, compared to the LP Supersport group, which records only 5.7%.

This clearly highlights the effectiveness of the training process in the NSA group, where the athletes managed to achieve greater progress in their performance. On the other hand, the LP Supersport group shows more limited progress, which could be due to differences in methodology, intensity, or the training approach.

The 2.8% difference between the two groups is indicative of the superiority of the training methods applied in the NSA group, which led to better results and a more favorable development trend. This emphasizes the importance of adapted and targeted training approaches for achieving optimal results.

### **Test 1. Triple Jump from a Standstill.**

The triple jump from a standstill is an established method for objectively assessing explosive strength, coordination abilities, and overall physical fitness of athletes. Conducting this test at different time intervals allows tracking the dynamics of physical performance development.

Test 1 - Triple Jump from Standstill / meters - kg.				
No	Name	Result 1	Result 2	% Difference
1	EN.	5.3	5.6	5.7
2	VL.	4.9	5.4	10.2
3	HA.	5.65	5.9	4.4
4	IA.	5.5	5.9	7.3
5	JS.	5.1	5.5	7.8
6	AH.	5.1	5.4	5.9
7	HV.	5.05	5.6	10.9
8	SH.	5	5.4	8.0
9	MT.	5.4	5.9	9.3
10	HC.	5.3	5.6	5.7
11	MP.	6	6.4	6.7
12	TG.	5	5.5	10.0
13	KI.	5.1	5.6	9.8
14	JG.	5	5.4	8.0
15	GP.	4.8	5.3	10.4
16	DK.	5.3	5.7	7.5
17	KR.	5	5.5	10.0
18	AG.	5	5.4	8.0
19	DV.	5	5.5	10.0
20	JP.	4.8	5.3	10.4
Average Values		5.165	5.59	8.3
Test 1 - Triple Jump from Standstill / meters - kg.				
No	Name	Result 1	Result 2	% Difference
1	VK.	4.7	4.7	0.0
2	LZ.	5	4.8	-4.0
3	HM.	5.75	5.62	-2.3
4	IT.	5.22	5.17	-1.0
5	KS.	5.8	5.75	-0.9
6	HC.	5.01	4.95	-1.2
7	AP.	5.45	5.2	-4.6
8	PD.	4.96	5.7	14.9
9	DA.	4.7	4.9	4.3
10	RF.	5.15	5.05	-1.9
Средна стойност		5.174	5.184	0.3

Table 4. Test 1 "Triple Jump from a Standstill, Eg and Kg."

The table shows a significant improvement in the average results of the first group (NSA), with the average value increasing from 5.165 m to 5.59 m, representing an overall progress of 8.3%. At the same time, the results of the second group (LP) demonstrate minimal changes, with an average increase from 5.174 m to 5.184 m and a percentage difference of only 0.3%, indicating more stable but limited changes in their performance.

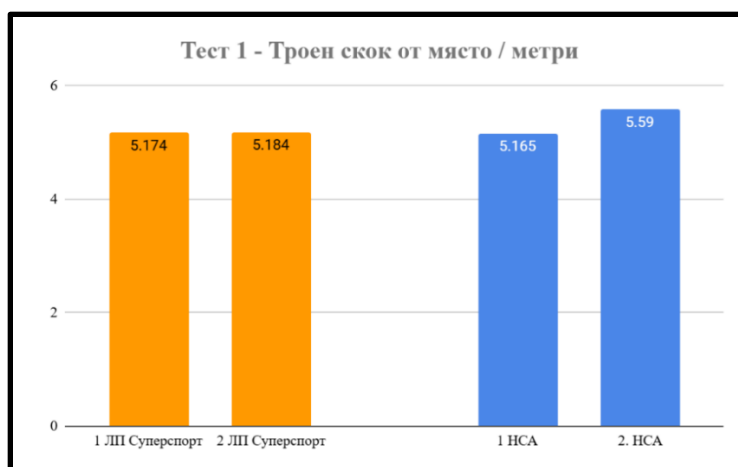


Figure 3. Test 1 "Triple Jump from a Standstill, meters Eg and Kg."

The graph clearly shows that the NSA group achieved a significantly greater improvement in the triple jump results (increase from 5.165 m to 5.59 m), while the LP Supersport group recorded a minimal increase (from 5.174 m to 5.184 m), highlighting the greater effectiveness of the training process in the NSA group.

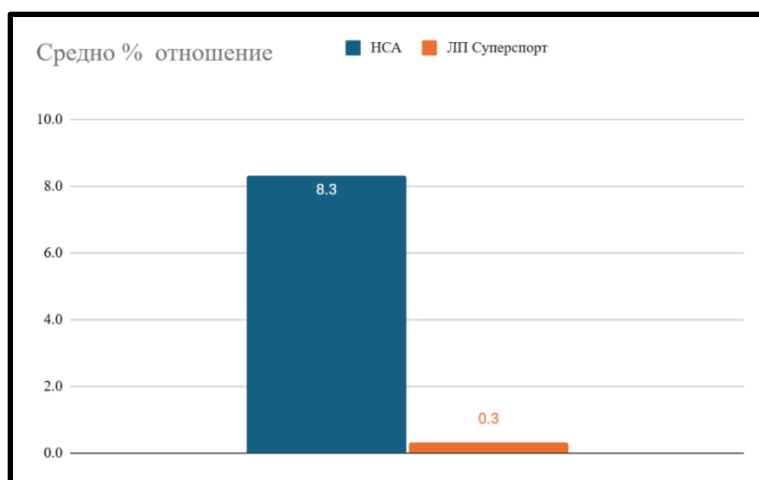


Figure 4. Test 1 "Triple Jump from a Standstill, average values Eg and Kg."

Both the previous graph and the graph for average change demonstrate that the NSA group shows an 8.3% increase, while the LP Supersport group reports only 0.3%, highlighting the significantly more effective progress of the NSA participants.

#### **Test 5. Shuttle Run 180 meters, seconds.**

Table 8 presents the results in seconds, conducted on two different groups – NSA and LP. The results reflect the times taken to complete the task in seconds,

measured in two different trials, conducted on different dates. For each group, the individual results of the participants are presented, along with the calculated percentage difference between the first and second trials.

Test 5 - Shuttle Run 180 meters / seconds - NSA				
	Namq	Result 1	Result 2	% Difference
1	EN.	38.62	37.62	2.6
2	VL.	39.02	38.76	0.7
3	HA.	36.93	35.93	2.7
4	IA.	35.65	35.34	0.9
5	JS.	38.44	38.4	0.1
6	AN.	40.77	39.35	3.5
7	HV.	36.53	35.53	2.7
8	SH.	38.31	37.85	1.2
9	MT.	38.17	37.18	2.6
10	HC.	37.06	36.36	1.9
11	MP.	37.37	36.37	2.7
12	TG.	37.45	34.45	8.0
13	KI.	35.03	34.01	2.9
14	JG.	37.23	35.23	5.4
15	GP.	37.49	35.49	5.3
16	DK.	37.93	34.39	9.3
17	KR.	38.26	37.26	2.6
18	AG.	43.24	41.05	5.1
19	DV.	39.07	36.07	7.7
20	JP.	39.16	36.16	7.7
Average Values		38.2	36.0	5.7
Тест 5 - Бягане совалка 180 метра / секунди - ЛП				
No	Name	Result 1	Result 2	% Difference
1	VK.	37	37.45	1.2
2	LZ.	39.2	40.5	3.3
3	HM.	42.45	43.5	2.5
4	IT.	38.45	39.95	3.9
5	KS.	38.67	39.83	3.0
6	HS.	43.07	40.75	5.4
7	AR.	37.51	37.45	0.2
8	PD.	39.9	36.9	7.5
9	DA.	40.84	42.42	3.9
10	RF.	36.42	37.5	3.0
Average Values		39.4	39.6	3.4

Table 8. Test 5 "Shuttle Run 180 meters, seconds Eg and Kg."

Table 8 displays the results of Test 5 Shuttle Run 180 meters/seconds, comparing the average times to complete the task between two groups: LP Supersport (orange bars) and NSA (blue bars), for two different trials.



Figure 15. Test 5 "Shuttle Run 180 meters, seconds Eg and Kg."

The main observations from the data show differences in the performance of the two groups – LP Supersport and NSA – during the test. The LP Supersport group starts with an average time of 39.4 seconds in the first trial, and this time slightly increases to 39.6 seconds in the second trial. This minimal increase in the completion time suggests that the group did not show improvement between the trials, indicating a lack of significant progress.

Meanwhile, the NSA group demonstrates significantly better dynamics. In the first trial, the average time is 38.2 seconds, while in the second trial, it decreases to 36.0 seconds. This represents an improvement of 2.2 seconds, clearly showing better progression and effectiveness of the training process in this group.

The comparison between the two groups highlights the advantage of the NSA group in both trials. The difference in average values between the groups is 1.2 seconds in the first trial and increases to 3.6 seconds in the second trial. While the NSA group demonstrates significant progress between the two trials, the LP Supersport group shows slight regression. The graph highlights the clear advantage of the NSA group in terms of speed and dynamics in completing the test.

Figure 16 presents a comparative analysis of the average percentage improvement between the two groups: NSA (blue bar) and LP Supersport (orange bar).

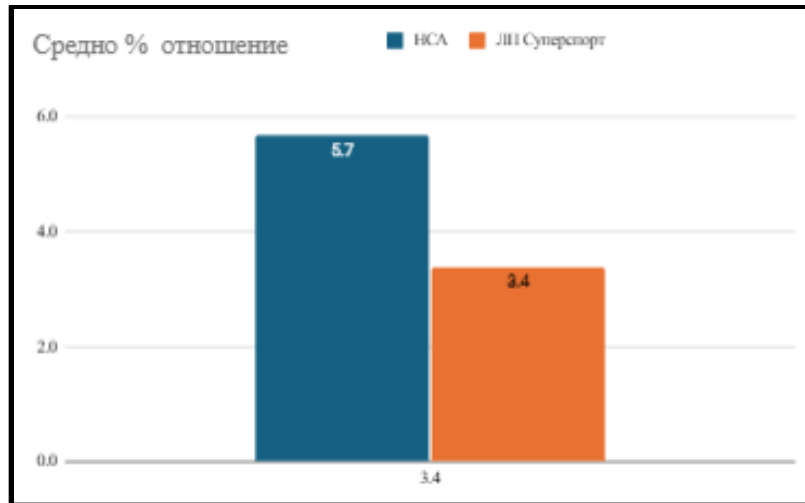


Figure 16. Test 5 "Shuttle Run 180 meters, seconds Eg and Kg."

The graph shows the average percentage improvement of the two studied groups – NSA and LP Supersport – in the "Change of Direction with Ball" test after the training period. The NSA group demonstrates an average percentage improvement of 5.7%, reflecting significant progress in agility and coordination. This highlights the effectiveness of the applied training programs and the targeted approach to the preparation of this group. On the other hand, the LP group shows an average percentage improvement of 3.4%, which is also a positive result but significantly lower compared to that of NSA.

The results clearly indicate that the NSA group has a greater development dynamic, as seen from the 2.3% difference in percentage improvement compared to LP. This emphasizes the effectiveness of the training methods used in NSA. While both groups show progress, the NSA results demonstrate higher effectiveness and greater consistency in the development of the participants' physical skills.

#### **Test 9. Accuracy of Shots at Target from 10 meters, right foot /0-/1+.**

The table presents the results from Test 9, which measures the accuracy of shots at a target from a distance of 10 meters with the right foot.



Test 9 - Hits on Target – 10 meters / Right Foot / 0-/1+ NSA												
No	Name	Attempt 1	Attempt 2	Attempt 3	Attempt 4	Attempt 5	Attempt 6	Attempt 7	Attempt 8	Attempt 9	Attempt 10	
1	ЕН.	0	0	1	0	0	1	0	0	0	1	3.0
2	VL.	0	0	0	0	0	0	1	0	0	0	1.0
3	NA.	0	0	1	0	0	1	0	0	0	0	2.0
4	IA.	0	0	0	0	0	0	1	0	0	0	1.0
5	ЖС	0	0	0	0	0	1	0	0	0	0	1.0
6	АН	0	0	1	0	0	0	1	0	0	0	2.0
7	ХВ	0	0	0	0		1	0	1	0	0	2.0
8	СХ	0	0		0	0	0	0	0	0	0	0.0
9	МТ	0	0	0	0	0	0	0	0	1	0	1.0
10	ХЦ	0	0	0	0	0	0	1	0	0	0	1.0
11	МП	0	0	0	0	0	1	0	1	0	0	2.0
12	ТГ	0	0		0	0	0	0	0	0	0	0.0
13	КИ	0	0	0	0	0	1	1	0	0	0	2.0
14	ЙГ	0		1	0	0	1	0	1	0	1	4.0
15	ГП	0	0	0	0	0	0	0	1	0	0	1.0
16	ДК	0	0	0	1	1	0	0	1	1	0	4.0
17	КР	0	0	0	1	1	1	1	1	0	0	5.0
18	АГ	0	0	0	0	0	0	0	0	1	0	1.0
19	ДВ	0	1	0	0	1	0	0	0	0	1	3.0
20	ЙП	0	1	0	0	1	0	1	0	0	1	4.0
Total Points		0.0	2.0	4.0	2.0	4.0	8.0	7.0	6.0	3.0	4.0	1.9
Test 9 - Hits on Target / 10 meters – Right Foot / 0-/1+ LP Supersport												
No	Name	Attempt 1	Attempt 2	Attempt 3	Attempt 4	Attempt 5	Attempt 6	Attempt 7	Attempt 8	Attempt 9	Attempt 10	
1	ВК	1	0	0	0	0	0	0	0	0	0	1.0
2	ЛЗ	0	0	0	0	0	0	0	0	0	0	0.0
3	ХМ	0	0	0	1	0	0	0	0	0	0	1.0
4	ИТ	0	0	0	0	0	0	0	0	0	0	0.0
5	КС	1	0	0	0	0	0	0	0	0	0	1.0
6	НС	0	0	0	0	0	0	0	0	0	0	0.0
7	АР	0	0	0	0	0	0	0	0	0	0	0.0
8	ПД	0	0	0	0	0	0	0	0	0	0	0.0
9	ДА	0	0	0	0	0	0	0	0	0	0	0.0
10	РФ	0	0	0	0	0	0	0	0	0	0	0.0
Total Points		2.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5

Table 12. Test 9 "Shots at Target 10 meters, right foot Eg and Kg."

The table presents the results of the "Shots at Target 10 meters, right foot" test, conducted at different time intervals for the two studied groups – NSA and LP Supersport. The test is designed to assess the accuracy of participants' shots at a target with the right foot, with the results expressed in points for each attempt.

The NSA group demonstrates consistent improvement in their results throughout the training period. The group's overall score increases from 0 points at the start to 8 points in the sixth attempt, with results stabilizing around 4 points by the end of

the test. The average score for the NSA group at the end of the study is 1.9 points, clearly reflecting progress in shot accuracy following the training process. The best individual results within the group show that some athletes significantly improved their skills, highlighting the effectiveness of the applied training methods.

In contrast, the LP Supersport group shows minimal improvement during the study period. The group's results range between 0 and 1 point, with no significant progress in shot accuracy. The overall result for the group remains consistently low, suggesting that the training approaches used in this group did not have a sufficient impact on the development of accuracy skills.

The comparative analysis between the two groups clearly highlights the advantage of NSA. While the NSA group demonstrates progress in both overall results and individual performance, the LP Supersport group shows limited changes. The difference in the dynamics of the test results emphasizes the higher effectiveness of the training process in NSA compared to LP Supersport. This suggests that the methods applied in the NSA group are more targeted and appropriate for developing accuracy in shots at the target.

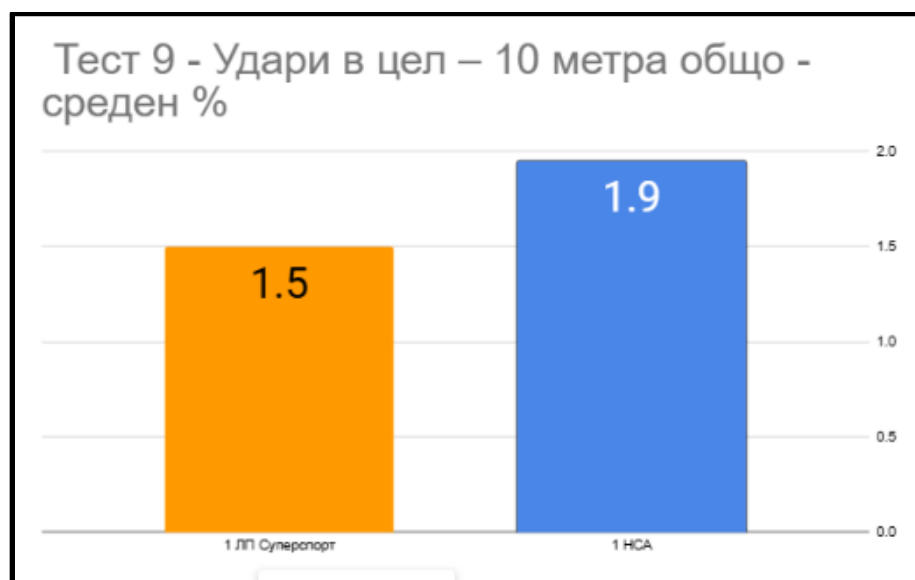


Figure 27. Test 9 "Shots at Target 10 Meters, Right Foot, EG and KG."

The graph presents a comparison of the average success rate in the "Shots at Target 10 Meters" test for the two studied groups – NSA and LP Supersport. The purpose of the test is to assess the accuracy of participants in hitting a target with the right foot.

The NSA group demonstrates a higher average score of 1.9 points, highlighting significant progress in execution accuracy. This shows that the training methods applied to this group are more effective in developing the skill of accuracy in target shooting.

The LP Supersport group records a lower average score of 1.5 points, indicating limited improvement compared to the NSA group. The difference between the two groups (0.4 points) emphasizes the advantage of the NSA group, as well as their better performance in this aspect of the training process.

The graph clearly illustrates the differences in training effectiveness between the two groups. While both groups show some progress, the NSA results exhibit better developmental dynamics, which reflects well-structured and targeted methods for improving accuracy in shots (Figure 27).

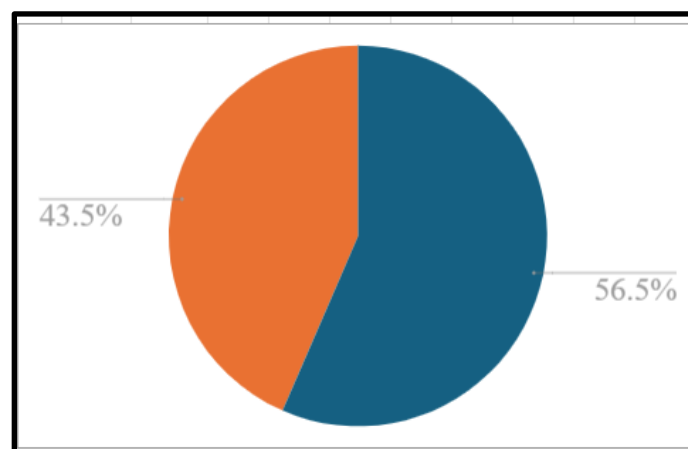


Figure 28. Test 9 "Shots at Target 10 Meters, Right Foot, Eg and Kg."

The pie chart shown illustrates the distribution of successes in the "Shots at Target 10 Meters" test between the two studied groups – NCSA and LP SuperSport – expressed in percentages. The NCSA group (56.5%) occupies a larger share of the overall successes in the test, highlighting their better performance and more effective mastery of accuracy in target shooting. This aligns with the observed trend of higher average success rates and better development dynamics compared to LP SuperSport. The LP SuperSport group (43.5%) occupies a smaller share, indicating more limited progress in their results. This corresponds to the established lower average values and weaker effectiveness of the training process.

The chart clearly highlights the difference between the two groups, with NCSA demonstrating better results and higher success rates, reflecting the effectiveness of the training methodologies used in this group. The difference in percentage distribution is indicative of the significant advantage of the NCSA group in this aspect of the study.

## Conclusions

Based on the research and investigative activities conducted during the preparation of the dissertation, the results obtained and the summaries allow the following conclusions to be drawn:

1. A review of the literature sources showed that very few authors have conducted experimental studies and drawn corresponding conclusions and guidelines specifically on the sports training process for 14-15-year-old female footballers. This age range is noted for intense physiological changes, dynamic alterations in the musculoskeletal structure, growth, and hormonal regulation. Considering these age and gender characteristics is an important factor when preparing and implementing effective training programs of a complex nature.
2. The survey conducted revealed the main obstacles to the popularization of football among girls and women, such as: lack of media coverage, insufficient publicity of the sport and quality of play, lack of teams in local areas, lack of dynamics, and weak atmosphere at matches. To overcome these issues on a national level, strategic guidelines for development were outlined as follows: Improving visibility and support, UEFA initiatives, expanding the competitive structure, training coaching staff, and expanding infrastructure.
3. The results and analysis of the anthropometric indicators established specific standards for evaluating the physical development and growth of 14-15-year-old female footballers. The results from the measurements show a clear trend of positive changes in body composition and functional abilities, including a reduction in body fat, an increase in muscle mass, and improved grip strength. These conclusions are supported by the training and competition process and the dietary regimen.
4. The conducted sports-pedagogical testing provides an assessment of the physical fitness (PF) and technical-tactical development (TTD) of the experimental and control groups (EG and CG). Table 1 shows the main statistical indicators from the first and second tests across 10 control tests,

including average values, standard deviations, variance, coefficient of variation, minimum and maximum values, median, skewness, and kurtosis of the distribution. The second measurements demonstrate overall progress in the achievements of the footballers, with positive changes serving as evidence of the effectiveness of the applied complex methodology for the development and improvement of PF and TTD. The correlation analysis carried out allowed for identifying the relationships between the results from the various control tests. Figure 2 displays a network diagram (comparative analysis of dependencies between the first and second tests). In the first study, fewer and less pronounced dependencies are observed, with the major dependencies being limited. In the second study, significant and large dependencies are much more pronounced and frequent. We would likely note that the positive changes in physical and technical-tactical abilities are due to the practical work carried out. The figures clearly show that in the second measurement, there is a stronger correlation between the tests, which is an indicator of better functional integration of skills and actions.

5. The developed normative system for control and evaluation allows for the operational and ongoing determination of the degree of improvement in technical-tactical skills and abilities, as well as the development of physical fitness (PF). The results of the control checks provide objective information to coaches for making rational decisions about adjustments in the sports training process. This study presents an objective and methodologically substantiated approach for evaluating results, using the medians of the measured values as a reference point. Table 23 shows that using the median as a reference value reduces the risk of distortion in the evaluation due to extreme results. This ensures the reliability and validity of the evaluation system used in scientific research and experiments in the field of football and sports.

## Recommendations

1. The main problems negatively impacting the increase in the number of girls actively involved in football are well-known, such as insufficient infrastructure, limited media coverage, lack of systematic training activity, dynamics and quality of play, and others. Despite the positive role, initiatives, and decisions by UEFA and the Bulgarian Football Union (BFS) to overcome the visible lag, a major issue for women's and girls' football in the country lies

with the professional clubs from the A and B Professional Football Groups (PFG). For example, in the women's championship, out of 12 teams, only Ludogorets Razgrad (ARFG) and Pirin Blagoevgrad, Etar Veliko Tarnovo (BRFG) have teams. In the new National Championship for girls up to 16 years old, out of 13 teams in two groups, the A PFG has Lokomotiv Sofia and Botev Plovdiv, and the B PFG has Minyor Pernik, Etar Veliko Tarnovo, Dunav Ruse, and Yantra Gabrovo. Unfortunately, leading professional clubs such as Levski, CSKA Sofia, CSKA 1948, Slavia Sofia, Lokomotiv Plovdiv, Cherno More, Spartak Varna, Beroy Stara Zagora, Botev Vratsa, Septemvri Sofia, and Arda Kardzhali meet the minimal requirements with only one age group (10-13-year-old girls) and participation on a tournament basis. We recommend that the leadership of professional clubs activate and organize their own teams to participate in the national championship for girls up to 16 years old. This would provide a significant boost to the development of girls' football and expand the base for selecting players for the national teams for U15, U17, and U19 categories. For professional clubs in both professional groups, this is a real opportunity to form representative women's teams in the near future.

2. The results, analysis, and summaries from the anthropometric studies provide specific guidelines for the sports training process for 14-15-year-old female football players. The wide range of studied indicators forms a differentiated standard for monitoring and evaluating the growth and development of this age group, which would serve as a good reference for coaches in this area.
3. The developed and experimental comprehensive program across four mesocycles for the period from April 1, 2024, to November 30, 2024, with a total of 117 training sessions, 20 friendly matches, and 10 official matches, is justified with methodological approaches that utilize modern conditioning and competitive tools and methods. In accordance with the training load and the organization of practical sessions, we would recommend that the presented and illustrated program, divided into mesocycles, be developed into a methodological guide for use by coaches working with this age group.
4. The test battery used for monitoring and evaluation provides a real opportunity to track, both quickly and consistently, the level of mastery of technical-tactical skills and the development of physical fitness (SFP). It is presented based on mathematical-statistical processing with a six-point grading system using the applied sport-pedagogical tests. For the preparation

of the normative framework, we used the median as a reference value, which reduced the risk of distortion in the assessments, thereby ensuring the reliability and validity of the evaluation system. The use of this normative framework for both normative and ongoing control and assessment of the qualities and abilities of 14-15-year-old female football players would assist coaches in making informed decisions regarding changes in the training process.

## **Here is the translation of the publication**

- **Identifying the Main Barriers to the Popularization of Women's Football and Opportunities for Development** / e-Journal VFU / Issue 22 – 2024
- **Specialized Methodology for Sports Training of 14-15 Year-Old Female Football Players** / Sports and Science, Vol. 3, 4 / 2024