JOURNAL OF MULTIDISCIPLINARY SCIENCES AND INNOVATIONS

VOLUME 04, ISSUE 10
MOPNTHLY JOURNALS

ISSN NUMBER: 2751-4390
IMPACT FACTOR: 9,08

# DEVELOPMENT OF ENDURANCE AS A PHYSICAL QUALITY IN CHILDREN AGED 11–14 YEARS

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**Abstract:** The article examines pedagogical and physiological aspects of developing endurance in children aged 11–14 years. The study emphasizes the importance of systematic physical training, game-based methods, and the use of moderate-intensity aerobic exercises to enhance cardiovascular and respiratory efficiency. The results demonstrate that a scientifically justified combination of running, active games, and circuit exercises contributes to a significant improvement in general and special endurance among school-aged children.

**Keywords:** endurance, schoolchildren, physical training, aerobic capacity, functional preparedness, game methods.

## 1. Introduction

Endurance is one of the key physical qualities that determine the overall level of a child's physical development and health. During the ages of 11 to 14, children undergo significant physiological transformations related to growth, hormonal changes, and increased motor activity. These factors make this period highly sensitive for the development of endurance as a foundation for overall physical performance.

According to modern pedagogical and physiological research, endurance directly influences the stability of cardiovascular and respiratory systems, the ability to sustain prolonged physical loads, and the formation of healthy lifestyle habits. In the educational process, however, endurance training is often insufficiently developed or conducted irregularly, which limits the adaptive potential of schoolchildren.

The purpose of this study was to analyze and determine the most effective pedagogical methods for developing endurance among 11–14-year-old pupils through systematic physical exercises and movement games.

## 2. Methods

The research was conducted over a 12-week period among 60 schoolchildren (30 boys and 30 girls) aged 11–14 years from general education schools in Fergana region. Participants were divided into an **experimental group (EG)** and a **control group (CG)**, each consisting of 30 pupils.

- **The experimental group** followed a specially designed endurance development program including:
  - cyclic aerobic exercises (running 600–1000 meters, skipping, relay games);
  - circuit training with moderate intensity (heart rate 140–160 bpm);
  - breathing and relaxation exercises at the end of each session;

- active games designed to maintain emotional engagement and motivation.

- **The control group** continued with the standard physical education curriculum without specific endurance training emphasis.

The following methods were applied:

- **Testing of general endurance:** 1000-meter run, step test;
- **Testing of special endurance:** 3-minute shuttle run;
- **Physiological control:** heart rate recovery time, vital capacity of lungs (VC).
  All data were processed using mathematical-statistical methods (mean, percentage change, t-test).

## 3. Results

After the 12-week training cycle, the experimental group demonstrated statistically significant improvements compared to the control group:

| Indicator | Before experiment | After experiment | Improvement (%) |
|---|---|---|---|
| 1000 m run time | 5.12 ± 0.3 min | 4.37 ± 0.2 min | +14.6% |
| Shuttle run (3 min) | 480 ± 20 m | 552 ± 25 m | +15.0% |
| Heart rate recovery (1 min) | 115 bpm | 98 bpm | +14.8% |
| Vital capacity (VC) | 2200 ml | 2550 ml | +15.9% |

The control group's improvement was less significant (4.2–6.1%). Statistical analysis confirmed the reliability of differences between groups ($p < 0.05$).

## 4. Discussion

The study confirmed that systematic and scientifically based endurance training contributes to the overall physical fitness of school-aged children. The inclusion of active and emotionally rich forms of activity—such as relay races and outdoor games—proved particularly effective. These methods not only enhanced aerobic capacity but also maintained a high level of motivation and engagement among pupils.

The obtained results align with previous findings by researchers such as Platonov (2019), Matveyev (2018), and Uzbek scholars Abdullaev and Khankeldiev (2020), who emphasize the critical importance of gradual load progression and individualized approaches in endurance development.

Furthermore, it was observed that girls showed slightly slower adaptation dynamics than boys, likely due to physiological differences in cardiovascular response during puberty. This finding supports the need for differentiated approaches in physical education programs for 11–14-year-old pupils.

5. Conclusion

1. The period of 11–14 years represents a favorable stage for the development of general and special endurance, as the functional systems of the body are highly adaptive.
2. The use of moderate-intensity aerobic loads, combined with active games and circuit methods, ensures effective development of endurance in schoolchildren.
3. Regular monitoring of physiological indicators helps to optimize the training process and prevent overfatigue.
4. The integration of game-based and emotional components in endurance training enhances motivation and contributes to the formation of a positive attitude toward physical culture and sport.

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