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PROPERLY DEVELOPING THE SPEED AND ENDURANCE QUALITIES OF MINI FOOTBALL-PLAYERS

Meliqulov Davronjon To'ychiyevich

Teacher of the department of physical education and sports, Tashkent state agrarian university

Annotation. This article examines the methodological foundations for properly developing speed and endurance qualities in mini football players aged 6–14 years. It analyzes the specific physiological and motor demands of small-sided football and emphasizes the importance of age-appropriate, long-term athletic development. The paper outlines key principles for training acceleration, agility, speed endurance, aerobic capacity, and anaerobic endurance through game-based and structured methods. Special attention is given to growth-related considerations, load management, and the integration of technical–tactical elements into physical preparation. The proposed framework aligns with contemporary youth development models promoted by organizations such as FIFA and UEFA, prioritizing long-term athlete development over early specialization and performance maximization.

Keywords: Mini football; youth football training; speed development; acceleration; agility; speed endurance; aerobic endurance; anaerobic endurance; small-sided games; long-term athletic development (LTAD); training load management; youth athlete conditioning; motor skill development.

Аннотация. В данной статье рассматриваются методологические основы правильного развития скоростных и выносливостных качеств у юных футболистов в возрасте 6–14 лет. Анализируются специфические физиологические и двигательные требования мини-футбола и подчеркивается важность соответствующего возрасту долгосрочного спортивного развития. В статье изложены ключевые принципы тренировки ускорения, ловкости, скоростной выносливости, аэробной и анаэробной выносливости с помощью игровых и структурированных методов. Особое внимание уделяется факторам роста, управлению нагрузкой и интеграции технико-тактических элементов в физическую подготовку. Предложенная структура соответствует современным моделям развития молодежи, продвигаемым такими организациями, как ФИФА и УЕФА, отдавая приоритет долгосрочному развитию спортсмена, а не ранней специализации и максимизации результатов.

Ключевые слова: Мини-футбол; тренировки по футболу для молодежи; развитие скорости; ускорение; ловкость; скоростная выносливость; аэробная выносливость; анаэробная выносливость; игры в мини-футбол; долгосрочное

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спортивное развитие (ДСТ); управление тренировочной нагрузкой; физическая подготовка юных спортсменов; развитие двигательных навыков.
Annotation. This article examines the methodological foundations for properly developing speed and endurance qualities in mini football players aged 6–14 years. It analyzes the specific physiological and motor demands of small-sided football and emphasizes the importance of age-appropriate, long-term athletic development. The paper outlines key principles for training acceleration, agility, speed endurance, aerobic capacity, and anaerobic endurance through game-based and structured methods. Special attention is given to growth-related considerations, load management, and the integration of technical-tactical elements into physical preparation. The proposed framework aligns with contemporary youth development models promoted by organizations such as FIFA and UEFA, prioritizing long-term athlete development over early specialization and performance maximization.
Keywords: Mini football; youth football training; speed development; acceleration; agility; speed endurance; aerobic endurance; anaerobic endurance; small-sided games; long-term athletic development (LTAD); training load management; youth athlete conditioning; motor skill development.

INTRODUCTION.

Developing speed and endurance in mini football (small-sided football) requires a scientific, age-appropriate, and long-term approach. Because mini football is played on reduced-size pitches with fewer players, the game is faster, more intense, and demands frequent accelerations, decelerations, and rapid changes of direction. Proper conditioning must reflect these realities while protecting young athletes from overload and burnout. Properly developing speed and endurance in mini football players requires a balanced, age-appropriate, and game-based approach. Speed should be trained with full recovery and high quality, while endurance must be integrated into football-specific activities rather than isolated running sessions.

The ultimate goal is not early performance maximization but long-term athletic development. When speed, endurance, technique, and enjoyment are combined intelligently, young players build a foundation for future success in football and lifelong physical activity. The development of speed and endurance in mini football players has been widely examined within the broader framework of youth football science and long-term athletic development. Contemporary literature emphasizes that physical preparation in children aged 6–14 must be biologically appropriate, systematically structured, and integrated with technical–tactical training.

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LITERATURE REVIEW. Research in pediatric exercise physiology consistently shows that children are not "miniature adults." Their neuromuscular coordination, anaerobic enzyme activity, and cardiovascular responses differ significantly from those of mature athletes.

Studies indicate that:

- Children demonstrate lower anaerobic power but faster recovery between high-intensity efforts.
- Aerobic metabolism predominates during exercise.
- Neuromuscular plasticity is highly responsive to coordination and speed stimuli before puberty.

These findings support the concept that early training should emphasize coordination, movement efficiency, and acceleration mechanics rather than high-volume anaerobic conditioning.

Speed is recognized as a sensitive quality during prepubertal and early pubertal stages. Literature on long-term athletic development models highlights two key "windows of opportunity" for speed training:

- Early childhood (ages 6–9): reaction speed and movement frequency
- Early adolescence (around peak height velocity): acceleration and maximal sprint speed

Research supports short sprint training (5–20 m) with full recovery as the most effective and safe method for youth players. Studies comparing isolated sprint drills and game-based approaches demonstrate that small-sided games (3v3, 4v4) provide significant improvements in acceleration and agility while simultaneously enhancing decision-making and technical skills.

Scholars influenced by positional play models popularized by coaches such as Pep Guardiola emphasize that speed in football is contextual—cognitive processing speed and tactical anticipation are equally important as pure sprint capacity.

Literature consistently discourages long-distance continuous running for children involved in football. Instead, aerobic capacity is effectively developed through:

- Continuous small-sided games
- Interval-based technical drills
- Possession games with controlled intensity

Research shows that small-sided games elicit heart rate responses between 80–90% of HRmax, which is sufficient for aerobic development in youth populations.

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The introduction of structured anaerobic training is recommended only after the onset of puberty. Before this stage, repeated sprint ability should be developed through playful competition and short-burst activities rather than metabolic overload training. Studies highlight that excessive high-intensity interval training in prepubertal players does not significantly enhance anaerobic enzyme activity but may increase fatigue and injury risk.

Meta-analyses show that manipulating pitch size, player number, and work-to-rest ratios significantly alters physiological demands. Reduced pitch size increases acceleration frequency and high-intensity efforts, making it particularly suitable for mini football contexts. Thus, small-sided games are widely regarded as a cornerstone of modern youth football methodology.

Growth spurts and peak height velocity present critical periods of vulnerability. Literature emphasizes:

- Monitoring maturation status rather than chronological age
- Adjusting training intensity during rapid growth phases
- Preventing overuse injuries

Long-term athlete development frameworks promoted within international football structures stress gradual progression, diversified movement exposure, and psychological well-being as essential components of sustainable performance development. Despite extensive research on youth football conditioning, several limitations remain:

- Limited longitudinal studies tracking mini football players across developmental stages
- Insufficient differentiation between biological and chronological age in some studies
- Variability in protocols used to measure speed endurance.

Future research should prioritize long-term monitoring and individualized training prescriptions based on maturation indicators.

The literature strongly supports a game-based, age-appropriate, and progressive approach to developing speed and endurance qualities in mini football players. Speed training should focus on short accelerations with full recovery, while endurance should be primarily developed through structured small-sided games rather than isolated running sessions. Evidence aligns with contemporary youth development philosophies endorsed by leading football institutions and modern coaching practice. Ultimately, long-term athletic development—not early performance maximization—remains the central principle guiding effective preparation of mini football players.

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RESEARCH METHODOLOGY. This study employed a quasi-experimental longitudinal design to evaluate the effectiveness of a structured training program aimed at developing speed and endurance qualities in mini football players. The intervention lasted 12 weeks and compared an experimental group (EG), which followed a specially designed program integrating small-sided games and structured conditioning drills, with a control group (CG), which followed a standard training curriculum.

The study involved 40 male mini football players, aged 10–12 years, recruited from a local football academy.

Inclusion criteria:

- Minimum 2 years of football training experience
- Regular participation in training (3 sessions per week)
- Medical clearance for sports participation

Exclusion criteria:

- Current musculoskeletal injury
- Chronic cardiovascular or metabolic disorders

Participants were divided into:

- Experimental Group (n = 20)
- Control Group (n = 20)

Parental consent and institutional ethical approval were obtained prior to data collection.

The experimental program was conducted 3 times per week, 60–75 minutes per session, for 12 weeks.

Each session included:

1. Warm-up (10–15 min)
   - Coordination drills
   - Dynamic mobility exercises
   - Reaction games
2. Speed Development Block (15–20 min)
   - 5–20 m acceleration sprints
   - Agility drills with direction changes
   - Reaction-based competitive sprints
   - Work-to-rest ratio: 1:6–1:8
3. Endurance Development Block (20–25 min)
   - Small-sided games (3v3, 4v4)
   - Interval-based possession games (3–4 min bouts)
   - Repeated sprint sequences (6–8 × 20 m)
4. Technical-Tactical Integration (15–20 min)

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- Game-based drills under fatigue
- Conditioned matches.

Table-1.

Dynamics of speed performance indicators in mini football players (Pre- and Post-Intervention).

Indicator	Group	Pre-test (M ± SD)	Post-test (M ± SD)	% Improvement
10 m Sprint (s)	EG	2.10 ± 0.08	1.98 ± 0.07	5.7%
	CG	2.11 ± 0.09	2.07 ± 0.08	1.9%
20 m Sprint (s)	EG	3.65 ± 0.12	3.48 ± 0.11	4.7%
	CG	3.66 ± 0.13	3.60 ± 0.12	1.6%
Illinois Agility Test (s)	EG	18.20 ± 0.50	17.40 ± 0.45	4.4%
	CG	18.25 ± 0.52	18.00 ± 0.50	1.3%

Table-2.

Dynamics of endurance performance indicators in mini football players (Pre- and Post-Intervention).

Indicator	Group	Pre-test (M ± SD)	Post-test (M ± SD)	% Improvement
Intermittent Recovery Test Level 1 (m)	EG	840 ± 95	1040 ± 110	23.8%
	CG	845 ± 90	900 ± 100	6.5%
Repeated Sprint Ability (Total time, s)	EG	29.50 ± 0.90	28.10 ± 0.85	4.7%
	CG	29.60 ± 0.95	29.20 ± 0.90	1.3%
Heart Rate During SSG (avg bpm)	EG	182 ± 6	176 ± 5	—
	CG	181 ± 7	179 ± 6	—

Table-3.

Between-group comparison of performance improvements after 12 weeks.

Indicator	EG Improvement (%)	CG Improvement (%)	Effect Size (Cohen's d)	Statistical Significance
10 m Sprint	5.7%	1.9%	0.85 (large)	$p < 0.05$

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20 m Sprint	4.7%	1.6%	0.78 (moderate–large)	$p < 0.05$
Agility	4.4%	1.3%	0.81 (large)	$p < 0.05$
Repeated Sprint Ability	4.7%	1.3%	0.75 (moderate)	$p < 0.05$

The control group continued their regular football training without structured speed–endurance progression. The chosen methodology allowed for controlled evaluation of the effectiveness of an integrated speed and endurance training model tailored to mini football players. By combining objective performance testing with structured intervention design, the study ensured both scientific validity and practical relevance for youth football coaching practice.

RESEARCH DISCUSSION. The purpose of this study was to evaluate the effectiveness of an integrated, age-appropriate training program for improving speed and endurance qualities in mini football players aged 10–12 years. The findings demonstrate statistically significant improvements in acceleration, agility, speed endurance, and aerobic capacity in the experimental group compared to the control group. The experimental group showed significant improvements in 10 m and 20 m sprint performance, as well as in agility test results. These findings confirm that short-distance acceleration training (5–20 m) combined with game-based drills is highly effective in mini football contexts.

The improvement in acceleration can be attributed to:

- High frequency of short sprints
- Full recovery intervals ensuring neuromuscular quality
- Repetition of football-specific movement patterns

This aligns with contemporary youth development principles promoted by FIFA, which emphasize speed development through football-specific stimuli rather than isolated track-style sprinting. Agility improvements were likely influenced by small-sided games and 1v1 situations, which require constant changes of direction, decision-making under pressure, and spatial awareness. The data support the idea that agility in football is not purely mechanical but also perceptual-cognitive in nature.

The most substantial improvement was observed in aerobic endurance, as indicated by the Yo-Yo Intermittent Recovery Test results. The experimental group demonstrated markedly higher progress compared to the control group. This finding suggests that structured small-sided games and interval-based football drills produce sufficient cardiovascular stimulus to enhance aerobic capacity in

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preadolescent players. Importantly, this was achieved without traditional long-distance running, supporting current methodological recommendations in youth football.

The improvement in repeated sprint ability indicates enhanced speed endurance and better recovery between high-intensity efforts. Given that mini football is characterized by frequent accelerations and short recovery periods, these adaptations are highly relevant to match performance.

The age group studied (10–12 years) corresponds to a sensitive period for coordination and acceleration development. The positive adaptations observed suggest that the program respected biological maturation principles and avoided excessive metabolic overload. The moderate but significant improvements in speed endurance demonstrate that prepubertal players can enhance repeated sprint performance when exposed to controlled, progressive stimuli. However, care must be taken not to apply adult-style high-intensity interval training during this developmental stage.

The findings are consistent with previous research indicating that:

- Short sprint training improves acceleration in youth football players.
- Small-sided games elicit heart rate responses sufficient for aerobic development.
- Game-based training produces greater transfer to match performance than isolated conditioning drills.

The present study reinforces the concept that physical development in mini football should be integrated rather than separated from technical–tactical training.

The results confirm that a structured, age-appropriate, and game-based training program significantly improves speed and endurance qualities in mini football players. The integration of acceleration drills and small-sided games proved particularly effective. Overall, the findings support contemporary youth football training models that emphasize progressive development, specificity, and long-term athlete preparation rather than early performance specialization.

CONCLUSION. The present study aimed to determine the effectiveness of a structured and age-appropriate training program for developing speed and endurance qualities in mini football players aged 10–12 years. Based on the results obtained, it can be concluded that the implementation of an integrated training model significantly improves acceleration, agility, aerobic endurance, and repeated sprint ability compared to traditional training approaches. The experimental program, which combined short-distance sprint exercises, structured small-sided games, and football-specific interval drills, proved to be an effective and safe method for enhancing physical performance in young players. The greatest improvements were observed in aerobic endurance and acceleration ability,

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highlighting the importance of football-based conditioning rather than isolated running exercises.

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