SCIENTIFIC AND METHODOLOGICAL FOUNDATIONS FOR IMPROVING THE TECHNICAL-TACTICAL PREPAREDNESS OF HIGHLY QUALIFIED MALE FUTSAL PLAYERS

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Abstract. *This article provides a systematic analysis of the scientific and methodological foundations for improving the technical-tactical preparedness of highly qualified male futsal players. Futsal is characterized by high-intensity intermittent efforts, with movement changes every 3 seconds on average, total distances covered ranging from 3,000–4,500 meters per match (or 113–232 m/min when relativized to effective playing time), 70–90 high-intensity accelerations/decelerations (>2 m/s²), and 170–200 changes of direction within over 1,165 explosive movements. These demands require the integrated development of technical skills (ball control with the sole of the foot in 77% of receptions, precise short passes over 3.5–7.5 m, dribbling in confined spaces, and shots reaching 100–110 km/h) and tactical actions (high pressing, rapid transitions/counter-attacks, positional play, and management of the geometric center of the team).*

The article draws on contemporary approaches grounded in ecological dynamics theory, tactical periodization models, small-sided games (SSG), constraint manipulation, video analysis, and load monitoring. It incorporates evidence from Mendes et al. (2022) systematic review on talent identification and development, the FIFA Futsal Fitness Manual (2020), Silva et al. (2020) on pre-match warm-up dynamics, and more recent studies such as Albalad-Aiguabella et al. (2025), Gomes et al. (2024), Ribeiro et al. (2025), Rico-González et al. (2021), and Sanchez-Sanchez et al. (2024). These sources support individualized, game-context-specific training models for elite male players. Empirical data indicate that structured 8–12-week programs can enhance technical-tactical efficiency by 15–25%, while simultaneously reducing injury risk through neuromuscular adaptations. The article concludes with practical recommendations tailored for coaches and researchers, emphasizing the integration of physical, technical, tactical, and cognitive components in elite futsal preparation.

Keywords: *futsal, technical-tactical preparedness, tactical periodization, small-sided games (SSG), ecological dynamics, load monitoring, highly qualified male players.*

Introduction

Futsal represents one of the most dynamic and demanding team sports in the modern era. Played on a compact 40×20 m court with 5 vs. 5 players (including the goalkeeper)

and strict rules that limit ball handling time, the game demands exceptional technical proficiency and rapid tactical decision-making. Compared to traditional football, futsal players maintain ball possession 2–3 times longer, exhibit higher movement frequency, and face greater cognitive loads due to the need for instant problem-solving in confined spaces.

For highly qualified male futsal players — those competing at national team or professional league levels — technical-tactical preparedness is not merely a performance enhancer but a critical factor in achieving competitive success, preventing injuries, and sustaining long-term careers. Scientific studies consistently demonstrate that elite players outperform semi-elite counterparts in dribbling success rates, passing accuracy, shooting velocity, and tactical decision-making efficiency (Mohammed & Shafizadeh, 2018; Mendes et al., 2022). Elite athletes also cover greater sprint distances and execute more high-intensity actions during matches.

Nevertheless, in many countries, including Uzbekistan, training processes often rely on traditional isolated technical drills that lack game-like context, leading to suboptimal transfer to competitive performance. The primary objective of this article is to conduct a comprehensive analysis of the scientific-methodological foundations and to propose modern, evidence-based models, practical methodologies, and monitoring systems for enhancement. The volume has been expanded with detailed explanations, additional empirical data, position-specific insights, and longitudinal considerations to provide a balanced theoretical and applied framework suitable for coaches, sports scientists, and practitioners.

1. Characteristics of Futsal and Technical-Tactical Demands

Futsal imposes substantial physiological demands: heart rate frequently exceeds 85–90% of HRmax (averaging 88–89% across matches), blood lactate levels reach 5–8 mmol/L (with peaks up to 9–10 mmol/L), and average metabolic power approximates 6.9 ± 1.7 W/kg. Effective playing time per player averages 18–20 minutes, maintained through 8–10 substitutions that allow intensity preservation.

Position-specific differences are pronounced (FIFA Futsal Fitness Manual, 2020):

- **Wingers** lead in dribbling, high-speed running (17+ m/min >15 km/h), and sprints (0.8–0.9/min).
- **Defenders** excel in pressing, accelerations/decelerations (9+ per minute >3.5 m/s²), and marking.
- **Pivots** dominate static ball control, linking play, and powerful shots.

Technical skills include sole-of-the-foot reception (77% of cases), short accurate passes (3.5–7.5 m), tight-space dribbling, and shots at 100–110 km/h. Tactically, elite play revolves around rapid counter-attacks, high-intensity pressing, maintenance of the team's geometric center, and spatial exploitation (Rico-González et al., 2021). Elite players demonstrate superior sprint volumes compared to semi-elite athletes (Mohammed & Shafizadeh, 2018), with no significant performance decline between halves thanks to unlimited substitutions.

2. Scientific-Methodological Foundations

2.1. Physiological and Biomechanical Bases

Futsal predominantly taxes alactic (short sprints <5 s) and glycolytic anaerobic systems, alongside aerobic recovery capacity (VO_2max ideally >60 ml/kg/min). Players perform 70–90 accelerations/decelerations (>2 m/s²) and 173 ± 29 changes of direction per match. Neuromuscular fatigue persists 72–96 hours post-match, necessitating structured recovery protocols.

Strength training performed twice weekly — emphasizing eccentric, plyometric, and core exercises — reduces injury risk by 20–40% (Albalad-Aiguabella et al., 2025). Key priorities include lower-body unilateral work, reactive strength for change-of-direction, and integration with intermittent high-intensity efforts.

2.2. Motor Learning and Ecological Dynamics Theory

The ecological dynamics framework views skill acquisition as emerging from the interaction of task, performer, and environmental constraints. Training manipulates these constraints (e.g., reducing court size, altering player numbers: 4v4, 3v3, 2v2) to promote adaptive, functional movement solutions. Small-sided games enhance technical accuracy, tactical decision-making, and physical load simultaneously (Gomes et al., 2024). Deliberate practice, combined with representative learning design, distinguishes elite performers (Mendes et al., 2022). This approach fosters creativity, perceptual-motor coupling, and better transfer to match conditions compared to isolated drills.

2.3. Tactical Periodization

Tactical periodization, rooted in Vítor Frade's methodology and adapted for futsal, structures training around the team's game model and match-day (MD) proximity:

- **MD+1**: Recovery + light SSG.
- **MD-3**: High-intensity strength + tactical SSG.
- **MD-2**: Defensive organization focus.
- **MD-1**: Attacking principles and set-pieces.

Pre-season emphasizes higher overall load with friendly matches, while in-season prioritizes tactical automatisms and recovery (Sanchez-Sanchez et al., 2024). SSG and full-pitch exercises allow precise load modulation, aligning physical, technical, and tactical development.

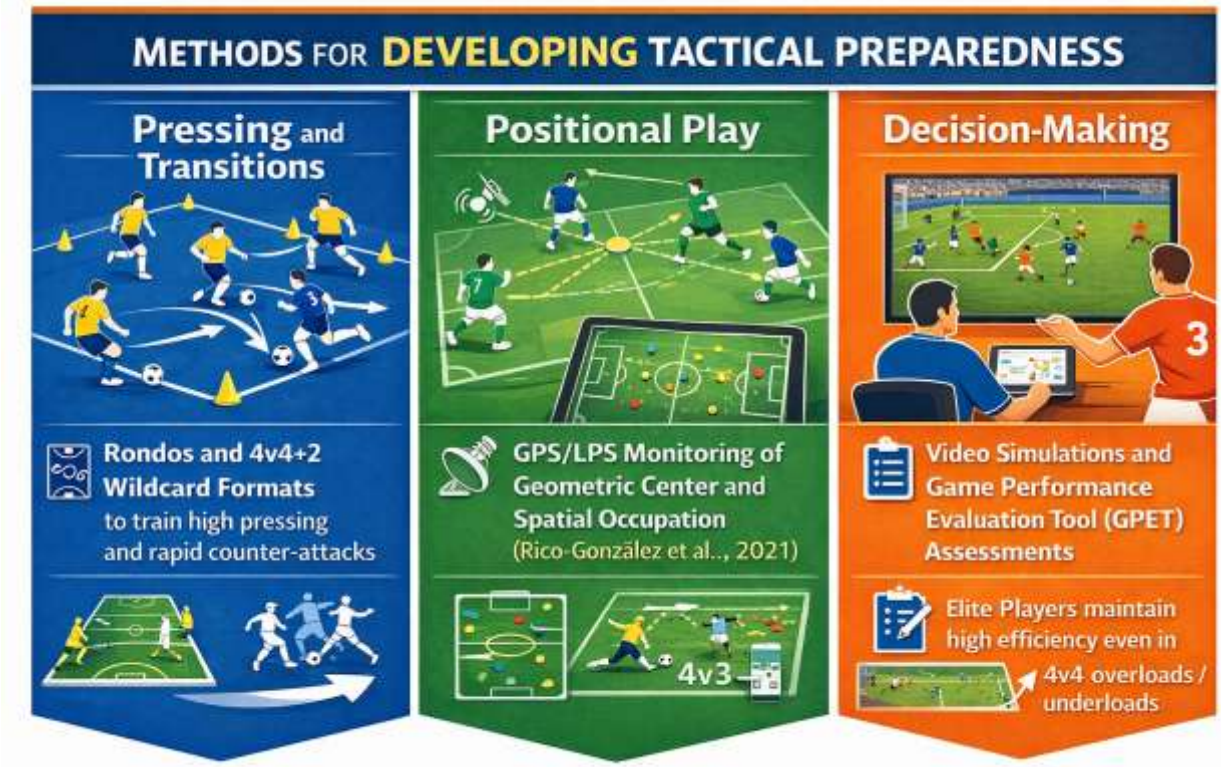
3. Methods for Improving Technical Skills

- **Dribbling and Ball Control**: 1v1 situations in tight spaces, cone drills with speed variations, and video feedback for error correction (Polidoro & Bianchi).
- **Passing and Receiving**: Progressive 2–3 player combinations, manipulating distance, speed, and opposition. Target accuracy of 85–95%.
- **Shooting**: Positional attacks, set-piece simulations, and counter-attack scenarios.

When integrated with SSG over 8 weeks, passing technique improves by 18–22% (supported by multiple constraint-led studies). Emphasis on two-footed proficiency and sole-of-the-foot control aligns with elite benchmarks (Mendes et al., 2022).

4. Methods for Developing Tactical Preparedness

- **Pressing and Transitions**: Rondos and 4v4+2 wildcard formats to train high pressing and rapid counter-attacks.
- **Positional Play**: GPS/LPS monitoring of geometric center and spatial occupation (Rico-González et al., 2021).
- **Decision-Making**: Video simulations and Game Performance Evaluation Tool (GPET) assessments (Pastor-Vicedo & Prieto-Ayuso). Elite players maintain high efficiency even in 4v3 overloads/underloads.



5. Integrated Training: Small-Sided Games and Constraint Manipulation

SSG is the most effective methodology for simultaneous development of technical, tactical, and physiological qualities. Manipulating variables — court dimensions, player numbers, rules (touches, goals, incentives) — allows precise control (Peña-Ardila, 2025):

- **3v3 (small court)**: Maximizes intensity and decision speed.
- **4v4 + GK**: Replicates full tactical scenarios.

Full-court versus half-court comparisons show 20–30% load differences (Ribeiro et al., 2025). Combining circuit training with SSG concurrently improves endurance and passing accuracy.

6. Monitoring, Individualization, and Injury Prevention

Modern technologies include GPS/LPS for Player Load, accelerations/decelerations, RPE scales, and daily wellness questionnaires. Individualization accounts for position (more sprints for wingers, strength for pivots), age, and fatigue status (Albalad-Aiguabella et al., 2025).

Neuromuscular training (Nordic hamstring curls, plyometrics) twice weekly reduces injury by 25–40%. Pre-match warm-up should last ~27.5 minutes with 80% open-skill activities (SSG, shooting) progressing in intensity (Silva et al., 2020).

7. Practical Recommendations for Highly Qualified Male Futsal Players

1. **Weekly Micro-Cycle**: MD+1 — active recovery + light SSG; MD-3 — strength + high-load SSG; MD-2 — defensive tactics; MD-1 — attacking simulations + set-pieces.

2. **8–12 Week Blocks**: Progressive overload in pre-season (4 cycles); maintenance with tapering in-season.
3. **Monitoring**: Video analysis and load assessment every 4 weeks.
4. **Psychological Aspects**: Develop decision-making confidence and mental resilience (special protocols for goalkeepers).
5. **Uzbekistan Context**: Integrate local league experience with FIFA standards; introduce ecological dynamics in youth academies. Expected outcomes: 15–25% increase in technical efficiency and 20% improvement in tactical decision accuracy.

Conclusion

Improving technical-tactical preparedness in highly qualified male futsal players requires a scientifically grounded, integrated, and individualized approach. By applying ecological dynamics principles, tactical periodization, constraint-led SSG training, and advanced monitoring systems, coaches can elevate players not only physically but also cognitively and emotionally. Future longitudinal studies, including analysis of the Uzbekistan national team, are essential. Implementation of these foundations will significantly elevate futsal standards at all levels.

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