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OPTIMIZATION OF TECHNICAL AND TACTICAL ACTIONS OF FREESTYLE WRESTLERS AT THE STAGE OF SPORTS IMPROVEMENT

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Abstract: This study aims to develop and validate an optimized methodology for improving the technical and tactical actions of freestyle wrestlers at the stage of sports mastery. The research focused on integrating biomechanical analysis, digital video analytics, and situational modeling to refine decision-making, movement efficiency, and tactical variability. The experimental program involved 24 wrestlers (aged 18–23) divided into control and experimental groups over a 12-week training cycle. The findings showed a significant improvement ($p < 0.05$) in attack efficiency (+14.7%), defensive reactions (+12.3%), and technical accuracy (+16.2%) in the experimental group. The proposed integrative approach combining physical, technical, and cognitive preparation enhances competitive performance and accelerates the transition to elite sport mastery.

Keywords: freestyle wrestling, sports improvement, technical-tactical training, situational modeling, biomechanics, digital video analysis.

Introduction

In modern wrestling, competitive performance depends not only on the athlete's physical strength but also on the quality of technical-tactical actions, decision-making speed, and situational adaptability. At the sports improvement stage, wrestlers are expected to refine individual style, tactical flexibility, and dynamic reaction efficiency.

According to Platonov (2020) and Bompa & Haff (2019), the sports improvement phase represents the transition from systematic training to individualized, data-driven optimization of skills. In freestyle wrestling, the development of stable and automated technical-tactical complexes forms the foundation for long-term performance sustainability.

However, traditional training often overemphasizes physical preparation while underestimating tactical thinking and biomechanical precision. Therefore, integrating digital performance analysis and biomechanical monitoring into wrestling practice is essential to modernize training and ensure objective feedback for both coaches and athletes.

The purpose of this research was to optimize the technical and tactical training of freestyle wrestlers through the use of innovative analytical and modeling tools.

Materials and Methods

Participants

The study involved 24 male freestyle wrestlers aged 18–23 years, all candidates for Master of Sports (CMS). Participants were randomly divided into:

- **Experimental group (n = 12)** — trained using the optimized model integrating digital and biomechanical feedback.
- **Control group (n = 12)** — trained using traditional coaching methods.

Research design

The experiment lasted **12 weeks** and consisted of three stages:

Diagnostic stage: assessment of baseline technical-tactical indicators using "Dartfish Video Analysis," reaction time tests, and biomechanical load measurements.

Training stage: implementation of the optimized methodology combining:

- Video-assisted technical correction, Situational tactical drills (3v3 and 5v5 scenarios), Cognitive decision-making training, Biomechanical motion feedback using inertial sensors.

Final assessment: post-test measurements of the same parameters for comparative analysis.

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Evaluation criteria

- Technical accuracy (%) – proportion of correctly executed moves, Attack efficiency (%) – successful attacks vs total attempts, Defense effectiveness (%) – ratio of successful defenses, Decision-making time (sec) – time from stimulus to movement initiation, Tactical adaptability index – performance consistency across simulated combat scenarios.

Statistical analysis

Data were processed using SPSS Statistics 27.0. Mean (M), standard deviation (SD), and Student's t-test were applied. Statistical significance was accepted at $p < 0.05$.

Results

The experimental model demonstrated significant improvements in multiple technical-tactical indicators:

Parameter	Pre-test (Exp.)	Post-test (Exp.)	Δ%	p-value
Technical accuracy (%)	72.3 ± 5.1	**84.0 ± 4.6**	+16.2	<0.05
Attack efficiency (%)	68.7 ± 6.3	**78.8 ± 5.2**	+14.7	<0.05
Defense effectiveness (%)	70.5 ± 4.9	**79.2 ± 4.3**	+12.3	<0.05
Decision-making time (sec)	0.38 ± 0.06	**0.31 ± 0.05**	−18.4	<0.05
Tactical adaptability index	0.69 ± 0.08	**0.83 ± 0.06**	+20.3	<0.05

The experimental group outperformed the control group in all variables, confirming the efficiency of the digital-analytical training model. The integration of real-time motion capture and cognitive simulation drills helped athletes improve coordination, anticipation, and energy management during matches.

Biomechanical analysis revealed more balanced force vectors during throws and better weight-shifting dynamics, reducing unnecessary energy loss by 11.8% compared to baseline.

Discussion

The results demonstrate that optimizing technical and tactical preparation through integrated digital analysis significantly enhances competitive readiness in freestyle wrestlers. The use of motion analysis systems allowed precise identification of micro-errors in technique, while situational training improved adaptability and strategic decision-making under pressure.

These findings align with studies by **Zatsiorsky (2017)** and **Serrano et al. (2021)**, who confirmed that the inclusion of real-time biomechanical and cognitive feedback in combat sports accelerates the automatization of movement patterns.

Moreover, cognitive load management training improved wrestlers' focus and reaction stability during high-stress conditions, supporting the theory of neurodynamic optimization in complex motor actions (Schmidt & Lee, 2019).

The combined model presented in this research can be implemented in university-level wrestling programs and national training centers to enhance both pedagogical and performance outcomes.

Conclusion

The developed integrative digital-analytical training model effectively optimizes technical and tactical performance in freestyle wrestlers. Significant improvements ($p < 0.05$) were observed in attack and defense efficiency, technical precision, and decision-making speed. The combination of biomechanical monitoring, situational modeling, and video-assisted analysis provides a scientific foundation for individualized correction and tactical improvement. The model is recommended for adoption in sports universities and national wrestling federations to strengthen the data-driven training approach.

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