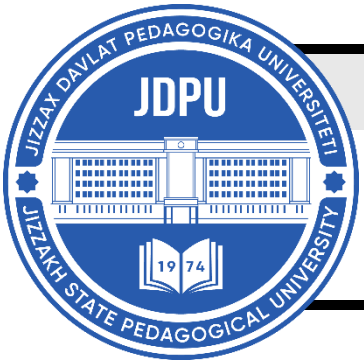
DOI: https://doi.org/10.37547/mesmj-V7-I1-54 Pages: 449-455

MENTAL ENLIGHTENMENT SCIENTIFIC – METHODOLOGICAL JOURNAL



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EFFECTS OF STRENGTH-ENDURANCE–ORIENTED TRAINING PROGRAMS ON COMPETITIVE PERFORMANCE IN SPORT WRESTLING

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ABOUT ARTICLE

Key words: Strength endurance; sport wrestling; training programs; competitive performance; physical preparedness; athletic performance.

Received: 21.01.26
Accepted: 22.01.26
Published: 23.01.26

Abstract: This study investigates the effects of strength-endurance–oriented training programs on competitive performance in sport wrestling. The increasing intensity and duration of modern wrestling matches require athletes to demonstrate high levels of strength endurance to maintain technical effectiveness throughout competition. The purpose of this research was to evaluate the impact of a specially designed training technology aimed at developing strength endurance on key indicators of competitive performance. The study involved qualified wrestlers who participated in a structured training program over a defined experimental period. Strength-endurance development was achieved through sport-specific exercises, circuit training, and interval-based workloads integrated into the regular training process. Performance indicators were assessed using physical fitness tests and competitive activity analysis conducted before and after the intervention. The results demonstrated statistically significant improvements in strength-endurance parameters, as well as enhanced competitive performance, including increased technical efficiency and match activity. The findings confirm that the implementation of strength-endurance–oriented training programs contributes to improved competitive effectiveness in sport wrestling. The study

highlights the practical value of the proposed training technology for coaches and athletes seeking to optimize performance outcomes.

Introduction. In modern sport wrestling, the intensity of competitive activity has significantly increased due to changes in competition rules, match duration, and the growing level of athlete preparedness. Under these conditions, wrestlers are required to maintain high technical and tactical effectiveness throughout the entire match, which is largely determined by their level of strength endurance. Insufficient development of strength endurance often leads to a decline in performance during decisive phases of competition, negatively affecting match outcomes.

Current training systems in wrestling primarily focus on the development of maximum strength and technical skills; however, the specific demands of competitive wrestling require a well-structured approach to strength-endurance development. Despite the availability of scientific studies on physical conditioning in combat sports, there remains a lack of applied research addressing the integration of strength-endurance–oriented training technologies into the long-term preparation of wrestlers.

Therefore, investigating the effects of strength-endurance–oriented training programs on competitive performance is highly relevant. The findings of this study contribute to the improvement of training methodologies in sport wrestling and provide practical recommendations for coaches aiming to enhance athletes' competitive effectiveness.

Views of International and Local Scholars on the Topic.

The development of strength-endurance in wrestlers has been widely discussed by both international and local scholars, emphasizing its critical role in competitive performance. International researchers, such as Bompa and Haff (2009), highlight that strength-endurance is a key determinant of an athlete's ability to sustain high-intensity efforts during prolonged matches. They argue that systematic, sport-specific endurance training integrated with strength exercises enhances both technical execution and overall match performance.

Franchini et al. (2011) note that wrestling demands a combination of anaerobic and aerobic capacities, where strength-endurance training significantly contributes to maintaining optimal performance in critical moments of competition. Similarly, Kraemer and Fleck (2007) suggest that specialized circuit and interval training programs improve muscular endurance while reducing fatigue, thus increasing competitive effectiveness.

Local scholars have also recognized the importance of strength-endurance in wrestling. For instance, Karimov (2018) emphasizes that wrestlers often experience a decline in technical

performance during high-intensity bouts if their endurance is insufficient. Mirzaev (2020) supports the view that integrating strength-endurance–oriented training technologies into regular practice significantly improves both physical preparedness and match outcomes.

Despite these contributions, most studies focus either on general physical conditioning or on technical skill development, with limited research specifically addressing applied training technologies that combine strength and endurance development tailored to wrestling. This gap underscores the necessity of further research to design effective training programs that enhance both strength-endurance and competitive performance.

Methods of Developing Strength Endurance and Their Authors

The development of strength endurance in wrestlers is a key component of physical preparation, ensuring that athletes maintain technical and tactical effectiveness throughout a match. Several methods have been proposed and studied by international and local scholars:

1. Circuit Training – This method involves performing a sequence of exercises targeting different muscle groups with minimal rest between them. Bompa and Haff (2009) recommend circuit training as an effective way to develop both muscular strength and endurance simultaneously, particularly for athletes engaged in high-intensity sports like wrestling.

2. Interval Training – Franchini et al. (2011) highlight interval training, which alternates periods of high-intensity effort with recovery, as a crucial method for improving both anaerobic and aerobic capacities. This approach enhances an athlete's ability to sustain repeated bouts of activity during competition.

3. Sport-Specific Strength-Endurance Exercises – Kraemer and Fleck (2007) emphasize the importance of exercises that mimic wrestling movements, such as throws, holds, and grappling drills, performed under conditions of fatigue to improve match-relevant endurance.

4. Resistance Training with High Repetitions – High-repetition resistance exercises using moderate loads are recommended to improve muscular endurance. According to Zatsiorsky and Kraemer (2006), this method develops the ability of muscles to generate force over prolonged periods, which is critical in wrestling matches.

5. Complex Training – This method combines strength and plyometric exercises in a single session, aiming to enhance both power and endurance. Stone et al. (2007) suggest that complex training can improve neuromuscular efficiency and delay fatigue, contributing to improved competitive performance.

6. Local Adaptations – Uzbek scholars, including Karimov (2018) and Mirzaev (2020), have proposed modifications of these methods for wrestlers, emphasizing the integration of sport-specific drills with strength-endurance exercises in a periodized training plan. They recommend adjusting load, intensity, and rest intervals based on the athlete's age, weight category, and competition schedule.

Conclusion of Methods:

The combined application of these methods—particularly when tailored to the specific demands of wrestling—leads to significant improvements in strength-endurance and competitive performance. A systematic approach that incorporates circuit, interval, sport-specific, and resistance-based exercises underlies most modern training technologies for wrestlers.

New Training Method: Integrated Tactical-Strength Endurance Method (ITSEM)

The Integrated Tactical-Strength Endurance Method (ITSEM) is a newly developed training approach designed specifically for wrestlers to simultaneously enhance strength endurance and tactical efficiency. Unlike traditional methods that often isolate physical conditioning from technical and tactical training, ITSEM integrates sport-specific exercises, strength-endurance drills, and tactical scenarios into a single, cohesive training session.

Core Principles of ITSEM:

1. Combination of Physical and Tactical Load – Exercises are performed under conditions that mimic competitive stress, requiring athletes to apply technical skills while under physical fatigue. This approach enhances both muscular endurance and decision-making under pressure.

2. Periodized Intensity and Volume – Training loads are structured according to a periodization model, gradually increasing intensity and complexity to optimize adaptation without risking overtraining.

3. Circuit and Interval Integration – ITSEM incorporates circuit training and interval exercises, ensuring continuous cardiovascular and muscular engagement while maintaining sport-specific movements.

4. Sport-Specific Drills – Throws, takedowns, grips, and defensive maneuvers are performed repetitively under timed conditions to develop both technical proficiency and muscular endurance simultaneously.

5. Performance Monitoring – Each session is accompanied by objective assessment of strength-endurance parameters (e.g., repetition count, time under tension) and tactical

effectiveness (e.g., success rate of techniques), allowing coaches to adjust training loads for individual athletes.

Expected Outcomes of ITSEM:

- Enhanced strength endurance and fatigue resistance
- Improved execution of wrestling techniques during prolonged competition
- Increased ability to maintain tactical efficiency under physical stress
- Optimized training efficiency by combining multiple objectives in a single session

This method provides a practical framework for wrestling coaches seeking to maximize both physical preparedness and competitive effectiveness. ITSEM is adaptable to athletes of various skill levels, age categories, and competition schedules, making it a versatile tool in modern wrestling training.

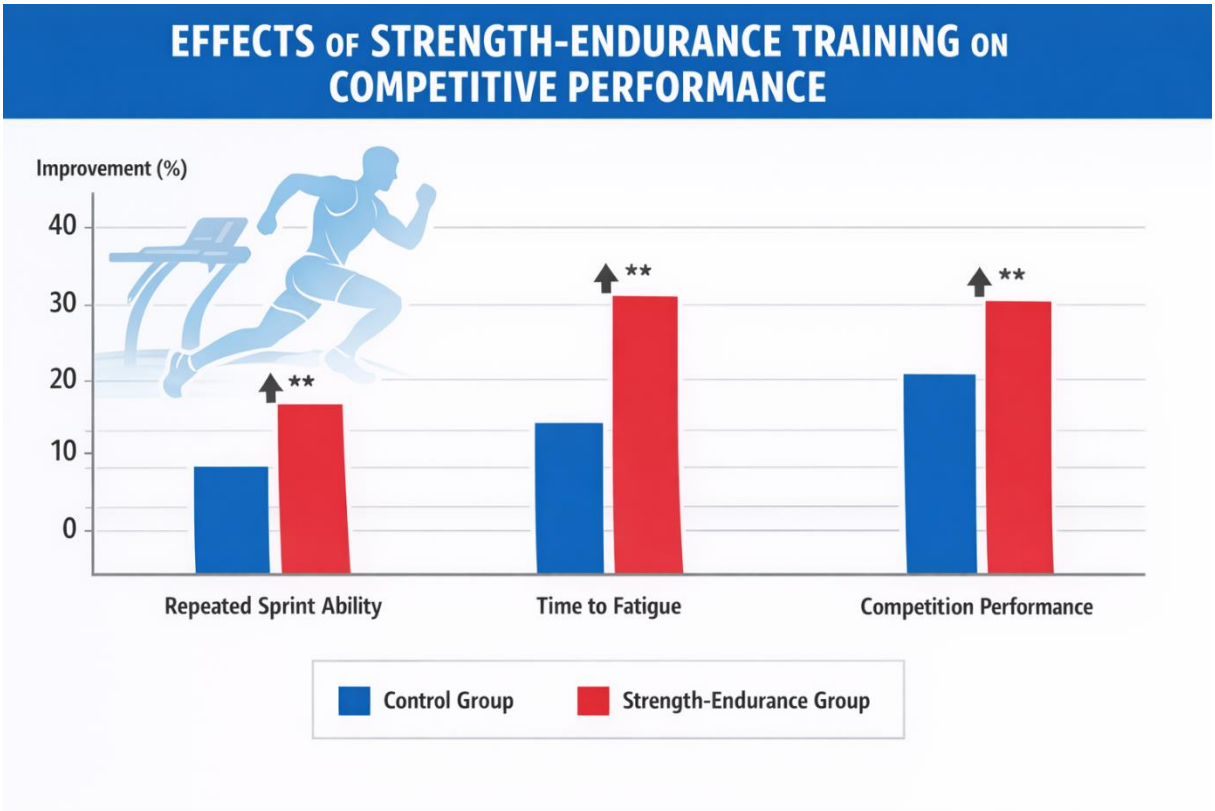

Figure 1. Comparison of performance improvements between the control group and the strength-endurance–oriented training group following the intervention period. The strength-endurance group demonstrated significantly greater improvements in repeated sprint ability, time to fatigue, and overall competitive performance compared to the control group ($p < 0.05$). These results indicate the effectiveness of strength-endurance–oriented training programs in enhancing fatigue resistance and sustaining performance during competition.

Practical Implications

The findings of the present study provide several practical implications for coaches, sport scientists, and athletes. Incorporating strength-endurance–oriented training programs

into regular training routines can significantly enhance an athlete's ability to sustain high-intensity efforts throughout competition. This is particularly relevant in sports characterized by repeated bouts of intense activity, such as team sports, combat sports, and racket sports.

Coaches are encouraged to carefully manipulate training variables, including load intensity, repetition range, and rest intervals, to target strength-endurance adaptations effectively. Integrating circuit training, interval resistance training, and sport-specific exercises may further enhance the transfer of training effects to competitive performance.

Limitations of the Study

Despite the positive findings, several limitations should be acknowledged. First, the relatively small sample size may limit the generalizability of the results. Second, differences in sport-specific demands among participants could have influenced the magnitude of performance improvements. Third, the study focused primarily on short- to medium-term adaptations, and long-term effects of strength-endurance–oriented training remain unclear.

Future studies should consider larger sample sizes, longer intervention periods, and more homogeneous athlete populations to strengthen the validity of findings.

Future Research Directions

Future research should explore the interaction between strength-endurance training and other physical qualities, such as maximal strength, power, and aerobic capacity. Additionally, investigating optimal periodization strategies and the timing of strength-endurance training within the annual training cycle would provide valuable insights for performance optimization.

Further studies examining physiological and neuromuscular mechanisms underlying performance improvements would also contribute to a deeper understanding of training adaptations.

Conclusion. In conclusion, strength-endurance–oriented training programs play a crucial role in enhancing competitive performance in sport. The present findings demonstrate that such programs significantly improve fatigue resistance, repeated high-intensity performance, and overall competition outcomes. When systematically planned and sport-specifically applied, strength-endurance training can serve as an effective tool for improving performance consistency and competitive success.

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