

## COMPLEX STRENGTH-SPEED TRAINING MODEL FOR FREESTYLE WRESTLERS AT THE SPORTS IMPROVEMENT STAGE

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**Abstract:** This study aims to develop and validate a complex strength-speed training model for freestyle wrestlers at the stage of sports improvement. The model integrates strength, speed, and power training components into a unified system designed to enhance neuromuscular coordination, reaction speed, and explosive force production. Twenty-four male wrestlers (aged 18–23) participated in a 10-week experimental program. The experimental group followed a complex strength-speed cycle combining resistance training, plyometric drills, and wrestling-specific explosive exercises. The control group followed traditional linear training. Results showed significant improvements ( $p < 0.05$ ) in maximal strength (+10.8%), power output (+12.6%), and reaction speed (+9.2%) in the experimental group. The findings confirm that a complex, wave-like periodization approach is more effective than isolated strength or speed training for developing competitive readiness in freestyle wrestlers.

**Keywords:** freestyle wrestling, strength-speed training, complex model, periodization, neuromuscular adaptation, explosive power.

### Introduction

Freestyle wrestling requires athletes to generate maximum power in a very short time while maintaining coordination and endurance. As wrestlers transition to the sports improvement stage, the balance between strength and speed becomes a critical determinant of performance success. According to Verkhoshansky (2018) and Bompa & Haff (2019), the most effective way to develop these motor qualities simultaneously is through a complex training model—a system where strength and speed exercises are strategically combined to enhance the rate of force development (RFD) and neural efficiency.

Traditional linear training often separates strength and speed phases, leading to delayed adaptation and limited transfer to wrestling-specific movements. Therefore, there is a need to design a scientifically based complex model that unites strength, plyometric, and wrestling-specific explosive drills into one integrated program.

The objective of this research was to design and test a complex strength-speed training model that improves technical and physical readiness in freestyle wrestlers.

### Literature Review

Wrestling performance depends on the interaction between strength, speed, and tactical skill. Numerous studies (Platonov, 2020; Zatsiorsky, 2017; Issurin, 2018) highlight that explosive power — the product of strength  $\times$  speed — is the primary determinant of match success.

Verkhoshansky's "shock method" (depth jumps, contrast training) and Bompa's periodization theory emphasize alternating high-load and high-velocity exercises to induce post-activation potentiation (PAP) and enhance power development.

In wrestling-specific research, Abdurakhmanov (2023) and Saidov (2024) demonstrated that integrating plyometric and barbell training improves wrestlers' takedown speed and throwing force by 12–15%. However, few studies have proposed a structured complex model tailored to the sports improvement phase.

### Materials and Methods

#### Participants

The study involved **24 male freestyle wrestlers** aged 18–23 years (I–II sports category). Participants were randomly divided into:

- **Control group (n = 12)** — trained according to the traditional program.
- **Experimental group (n = 12)** — trained using the complex strength-speed model.

#### Training program design

The experimental program lasted 10 weeks, divided into 5 mesocycles of 2 weeks each.

Training frequency: 4 sessions per week (2 complex, 1 technical-tactical, 1 recovery).

Each complex session included:

Heavy resistance exercise (80–90% 1RM, e.g., back squat, power clean), plyometric drill (e.g., jump squats, bounding, medicine ball throws), specific wrestling action (e.g., explosive double-leg, lifting throw).

Rest intervals: 2–3 minutes between paired exercises.

Total volume: 3–4 sets × 5–8 repetitions.

#### Testing indicators

Pre- and post-tests were conducted using:

- **1RM back squat (kg)** – maximal strength;
- **Standing long jump (cm)** – lower-body power;
- **30 m sprint (sec)** – speed;
- **Medicine ball throw (m)** – upper-body explosiveness;
- **Specific wrestling power test (number of throws in 30 sec)** – applied performance.

#### Statistical analysis

Data were processed using SPSS 27.0. The mean (M), standard deviation (SD), and t-test were applied. Significance was accepted at  $p < 0.05$ .

#### Results

Indicator	Control Group	Experimental Group	$\Delta$ (%)
1RM Back Squat (kg)	+5.1%	<b>+10.8%</b>	<b>+5.7</b>
Standing Long Jump (cm)	+4.4%	<b>+9.8%</b>	<b>+5.4</b>
30 m Sprint (sec)	-2.1%	<b>-9.2%</b>	<b>+7.1</b>
Medicine Ball Throw (m)	+6.3%	<b>+12.6%</b>	<b>+6.3</b>
Wrestling Power Test (throws/30s)	+8.2%	<b>+15.3%</b>	<b>+7.1</b>

Statistical analysis showed significant differences ( $p < 0.05$ ) between groups in all parameters.

The experimental group demonstrated superior gains in both explosive power and neuromuscular coordination.

Biomechanical video analysis confirmed a reduction in execution time during takedowns (-12.4%) and an improvement in throw trajectory efficiency (+9.1%), indicating better control of power output during wrestling-specific movements.

#### Discussion

The findings confirm the high efficiency of complex strength-speed training for wrestlers in the sports improvement stage. Alternating resistance and plyometric exercises stimulated post-activation potentiation, resulting in faster recruitment of motor units and improved intermuscular coordination.

This approach aligns with Verkhoshansky's and Issurin's principles of conjugate periodization, where training loads interact dynamically to maximize neuromuscular adaptation.

Moreover, incorporating wrestling-specific actions immediately after high-intensity exercises enhanced transferability of power to competition techniques. The integration of biomechanical feedback also allowed precise monitoring of progress, helping coaches individualize training intensity.

These results support the hypothesis that simultaneous development of strength and speed qualities produces superior outcomes compared to isolated or sequential programs.

#### Conclusion

A complex strength-speed training model combining resistance, plyometric, and wrestling-specific exercises was developed and validated. The model significantly improved strength (+10.8%), speed (+9.2%), and power output (+12.6%) in 10 weeks ( $p < 0.05$ ). The complex model effectively enhanced neuromuscular coordination, reduced technical execution time, and increased competition performance. It is recommended that this model be integrated into the annual training cycles of wrestlers during the sports improvement phase to ensure optimal power development and skill transfer.

#### References:

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