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DYNAMICS OF SPECIAL WORK CAPACITY IN QUALIFIED JUDOKAS DURING THE INTEGRATION OF CROSSFIT INTO THE SPORTS TRAINING PROCESS

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ABOUT ARTICLE

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Abstract: This study presents a statistically substantiated investigation of the effects of a 12-week integration of CrossFit training complexes (twice per week within the weekly training cycle) on indicators of special work capacity in qualified judokas. Forty athletes (First Sports Rank, Candidate for Master of Sport) participated in the study and were divided into a control group (CG, n=20) and an experimental group (EG, n=20). The absence of statistically significant baseline differences between the groups confirmed their initial comparability. The main effectiveness criteria were the Special Judo Fitness Test (SJFT) index and the time of the 3×10 m shuttle run. In the experimental group, statistically significant improvements were observed in both the SJFT index and the shuttle run performance ($p<0.001$), whereas no statistically significant improvements were recorded in the control group.

Introduction. Special work capacity is a key determinant of competitive performance in judo and reflects an athlete's ability to maintain high efficiency of technical and tactical actions under conditions of increasing fatigue and limited recovery time. This capacity is

formed through long-term adaptation to sport-specific loads and is commonly assessed using tests that model competitive activity [5].

The Special Judo Fitness Test (SJFT) is widely recognized as a valid and informative indicator of functional readiness in judokas, allowing an integrated evaluation of their special physical preparedness. Lower SJFT values indicate higher levels of special work capacity and better adaptation to judo-specific demands.

In addition to special work capacity, speed and coordination abilities play an essential role in judo performance, ensuring effective movement, timely execution of techniques, and rapid changes in motor patterns during combat [4]. The 3×10 m shuttle run is considered an informative test reflecting speed, coordination, and the ability to rapidly change direction.

In modern judo, characterized by increasing training intensity and volume, there is a growing need for training tools that enhance special work capacity without disrupting the structure of traditional training programs. CrossFit, a high-intensity functional training system combining strength, speed-strength, and cyclic exercises, has gained attention due to its variability and adaptability [1,2,3].

Although previous studies report positive effects of CrossFit-based training on physical fitness, its application in judo requires rigorous statistical validation, including baseline group comparability, appropriate statistical procedures, and evaluation of both statistical and practical significance. Therefore, the present study aims to analyze the effects of integrating CrossFit training on indicators of special work capacity in qualified adolescent judokas.

Materials and Methods

Participants

Forty qualified judokas aged 15-17 years (First Sports Rank, Candidate for Master of Sport) participated in the study. Athletes were randomly assigned to a control group (CG, n=20) and an experimental group (EG, n=20). No statistically significant differences between groups were observed at baseline.

Study Design

The pedagogical experiment lasted 12 weeks. The experimental group performed specialized CrossFit training complexes twice per week during the main part of training sessions, while the control group followed a traditional training program.

CrossFit Training Program

Three specialized CrossFit complexes were implemented, targeting explosive strength, endurance, and functional fitness.

Assessment Measures

The effectiveness of the intervention was assessed using: Special Judo Fitness Test (SJFT) index and 3×10 m shuttle run time (s).

Statistical Analysis

Data are presented as mean ± standard deviation (M±SD).

Within-group changes were analyzed using the paired Student's t-test.

Between-group differences after the intervention were assessed using Welch's t-test.

Statistical significance was set at $p < 0.05$

Results. Table 1 presents the descriptive statistics of the studied performance indicators in the control and experimental groups before and after the pedagogical experiment. At baseline, the SJFT index and 3×10 m shuttle run time were comparable between groups, indicating the absence of meaningful initial differences.

Table 1. Changes in performance indicators before and after the pedagogical experiment (M±SD)

Indicator	CG – Pre	CG – Post	EG – Pre	EG – Post
SJFT index	13.05 ± 1.45	12.89 ± 1.27	13.17 ± 1.40	11.95 ± 1.03
3×10 m shuttle run (s)	12.43 ± 0.28	12.30 ± 0.29	12.35 ± 0.31	12.09 ± 0.31

Following the 12-week intervention, both indicators demonstrated a more pronounced improvement in the experimental group. Specifically, the experimental group exhibited a marked reduction in the SJFT index and shuttle run time, reflecting improvements in special work capacity and speed-coordination performance. In contrast, changes observed in the control group were smaller in magnitude.

To assess the statistical significance of changes within each group, a paired Student's t-test was applied (Table 2).

Table 2. Within-group changes (paired Student's t-test)

Indicator	CG: Pre	CG: Post	p	EG: Pre	EG: Post	p
SJFT index	13.05 ± 1.45	12.89 ± 1.27	0.583	13.17 ± 1.40	11.95 ± 1.03	<0.001
3×10 m (s)	12.43 ± 0.28	12.30 ± 0.29	0.032	12.35 ± 0.31	12.09 ± 0.31	<0.001

In the experimental group, statistically significant improvements were observed in both the SJFT index and the 3×10 m shuttle run time ($p<0.001$), indicating a clear positive training effect of the integrated CrossFit program.

In the control group, a statistically significant improvement was detected only for the 3×10 m shuttle run ($p=0.032$), whereas no significant change was observed for the SJFT index ($p=0.583$). This pattern suggests that traditional training was sufficient to elicit limited adaptations in speed-related performance but did not produce meaningful improvements in special work capacity.

To determine whether the observed improvements differed between groups, between-group comparisons were conducted after completion of the experiment using Welch's t-test (Table 3).

Table 3. Between-group differences after the experiment (CG–EG)

Indicator	Mean difference	p	95% CI
SJFT index	0.94	0.014	[0.20; 1.68]
3×10 m (s)	0.21	0.033	[0.02; 0.40]

Statistically significant between-group differences were identified for both indicators. Positive mean differences (CG-EG) indicate higher SJFT index values and longer shuttle run times in the control group. Since lower values represent better performance for both measures, these findings confirm a statistically significant advantage of the experimental group in terms of special work capacity and speed-coordination ability.

The confidence intervals for both indicators did not include zero, further confirming the robustness and reliability of the observed between-group differences.

Discussion. The present study demonstrates that a 12-week integration of CrossFit training into the training process of qualified judokas leads to significant improvements in indicators of special work capacity. The experimental group showed a pronounced reduction in SJFT index values, reflecting improved functional readiness and adaptation to judo-specific loads.

Improvements in the 3×10 m shuttle run indicate enhanced speed and coordination abilities, which are crucial for effective movement and rapid tactical responses in judo. The absence of comparable changes in the control group suggests that traditional training alone may be insufficient to elicit similar adaptations within the same time frame.

Importantly, the use of appropriate statistical methods and confirmation of baseline comparability strengthen the validity of the findings. The direction of effects was interpreted considering the specificity of the indicators, where lower values correspond to better performance. The confidence intervals did not include zero, indicating robustness of the observed effects.

Overall, the results support the practical applicability of CrossFit-based training as an effective supplementary tool for enhancing special work capacity in adolescent judokas.

Conclusion

1. A 12-week CrossFit intervention performed twice per week significantly improves SJFT index values and 3×10 m shuttle run performance in qualified judokas aged 15–17 years.

2. After the intervention, the experimental group significantly outperformed the control group in both indicators of special work capacity ($p<0.05$).

3. Integration of CrossFit into the training process can be considered an effective method for improving functional readiness and speed-coordination abilities in qualified adolescent judokas.

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