Methodology for improving the physical fitness of uzbek martial arts practitioners

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[1]Usmonov Pulat Akramovich
[1]Uzbekistan state university of physical education and sport, Chirchik, Uzbekistan

Abstract
The article substantiates the scientific and methodological foundations for enhancing the physical activity of Uzbek martial arts practitioners. In this study, physical activity is defined as a controlled training-related motor activity aimed at improving general and special physical fitness, work capacity, and the quality of technical and tactical performance. The proposed methodology integrates the striking, defensive, throwing, and combination actions of Uzbek martial arts with the targeted development of speed-strength abilities, coordination, special endurance, and psychomotor stability. The research logic included a literature review, pedagogical observation, a pedagogical experiment, anthropometry, heart rate monitoring, testing, and mathematical-statistical analysis. The article argues that a methodology based on the integration of general, special, and technical-tactical training—supplemented by video analysis, signal-based drills, psychoregulation, and recovery tools—is more productive than a traditional unidirectional training approach. Illustrative calculations derived from the accessible summary matrices of the dissertation indicate the superiority of the experimental programme across several parameters of strength, speed, agility, and special motor activity. It is concluded that the proposed methodology can be recommended for the training system of adolescents practicing Uzbek martial arts.
Keywords: Uzbek martial arts, physical activity, physical fitness, special training, speed-strength abilities, coordination, endurance.

Introduction

In the modern era, the development of national sports and martial arts is considered not only a means of preserving cultural heritage but also a vital resource for improving the health, functional fitness, and social stability of young people. International documents emphasize the fundamental nature of the right to physical activity and sports, as well as the need for teaching, coaching, and managing sports programs to be conducted by qualified specialists based on evidence and effectiveness assessments [1–3]. For Uzbekistan, this direction holds particular national importance, as the enhancement of physical culture, sports, and mass physical activity is regarded as a priority area for development [1].

From a sports and pedagogical perspective, Uzbek martial art is of particular interest as it combines striking, defensive, coordination-maneuvering, and throwing actions. This structure makes it a potentially effective means for the simultaneous development of speed-strength abilities, general and special endurance, coordination, reaction time, spatial orientation, and psychomotor stability. At the same time, an analysis of specialized literature shows that despite the existence of historical-cultural and technical-tactical studies, the methodology for improving the physical activity of those engaged in Uzbek martial art has not yet been sufficiently systematized in a scientifically verified form.

The problem is compounded by the fact that in actual practice, the training process is often fragmented: general physical conditioning, special conditioning, and the technical-tactical block are developed separately, while age-specific characteristics, the signal-response component, and methods of psychoregulation and recovery are inconsistently taken into account. As a result, some training effects are only localized and fail to provide the required transfer to competitive performance [5–10]. Therefore, the development and scientific substantiation of a comprehensive methodology based on the structure of Uzbek martial art and the principles of sports adaptation is a relevant theoretical and practical task.

Research Objective. To scientifically substantiate and describe a methodology for improving the physical performance of Uzbek martial arts practitioners by integrating general, special, and technical-tactical training.

Methods

The study was designed as a sports-pedagogical experiment and included an analysis of scientific and methodological literature, pedagogical observation, pedagogical testing, anthropometry, heart rate monitoring, and methods of mathematical statistics. The selec-

tion of methods was determined by the need to assess not only the general level of physical fitness but also specific parameters of motor activity directly related to the structure of Uzbek martial arts: the frequency of strikes, the speed of throwing techniques, the quality of movement, the level of special strength endurance, and the ability to maintain proper technique while fatigued.

The research project on which this article is based involved 40 athletes aged 15–16. The subjects were divided into control and experimental groups, maintaining a gender balance of 10 girls and 10 boys in each. The groups were formed taking into account comparable athletic experience, similar weight categories, and a similar initial level of fitness. This organization allowed for a comparison of the dynamics of changes and for the interpretation of any differences as a consequence of the training methodology itself, rather than random differences between the groups.

The core of the methodology was the phased integration of general physical training, special physical training, and technical-tactical training. According to the logic of the dissertation program, the greatest emphasis was placed on technical-tactical training, followed by special and general physical training; smaller but mandatory components included psycho-regulation, theoretical support, and recovery measures. In practice, this involved the use of medicine balls, interval running, functional circuits, and plyometric exercises; interval series of bag strikes, dummy throws, rope pulls, and combined "strike-grapple-throw" drills; as well as sparring, high-speed technical-tactical tasks, video analysis of mistakes, signal drills for initiating attacks, concentration exercises, breath control, autogenic training, and stretching and recovery blocks.

To monitor effectiveness, we used general physical fitness tests and special tests modeling the specific motor skills of Uzbek martial arts. The general battery of tests included indicators of upper shoulder girdle strength endurance, short-distance speed, shuttle run agility, coordination endurance in rope jumping, and general endurance. The special battery of tests included the frequency of hand and foot strikes on a punching bag within a set time, throwing frequency, and tests for speed-strength rope climbing. Statistical processing was based on mean values, standard deviation, the coefficient of variation, and Student's t-test; interpretation was based on a significance level of $p<0.05$.

Results and discussion

Analysis of the available final data matrices shows that the greatest effect of the experimental methodology is observed where motor qualities are developed in close connection with the structure of competitive action. In other words, the isolated development of strength or speed is less effective than the integrated development of strength, speed, coordination, and decision-making within strike-and-throw combinations. This is especially noticeable in the indicators for upper-shoulder strength endurance, the frequency of special actions, and throwing activity.

A preliminary summary based on the final dissertation tables illustrates the general trend of changes without replacing the full statistical analysis. In the experimental group, the increase in arm strength endurance was approximately 33.5% to 41.6%, whereas in the control group it was 11.6% to 13.9%. In the 60-second jump rope test, the gain in the experimental group was about 30.2%–34.0%, and in the control group, 19.8%–22.4%. The frequency of bag strikes improved in the experimental group by approximately 10.6%–17.4%, and the frequency of throws by 20.5%–35.4%, which exceeded the growth rates of the control group. For the speed tests, the improvement was reflected in a reduction of completion time; here too, the experimental program yielded a more pronounced effect.

From a substantive standpoint, this is explained by several mechanisms. First, Uzbek martial art, as a mixed motor system, requires constant alternation of focused efforts, stance adjustments, and changes in distance and attack direction, which objectively increases the functional intensity of the training process. Second, the inclusion of signal-response drills and variable combinations accelerates the transition from a simple motor reaction to a complex, situationally-dependent one. Third, the cyclical integration of video analysis, psycho-regulation, and recovery procedures prevents the accumulation of non-productive fatigue and helps maintain a higher level of technical quality.

Alongside the pronounced positive shifts, it should be noted that the differences do not reach the same statistical significance in all tests. In a number of coordination and temporal indicators, the dynamics are positive but moderate. This is to be expected: adapting to com-

plex coordinated movements requires not only intensity but also a sufficiently long-term consolidation of the motor stereotype. Consequently, the author's methodology should not be viewed as a short-term "results accelerator"; its value lies primarily in the systematic conversion of physical activity into a more specific, controlled, and competition-relevant form.

The gender aspect deserves special attention. According to the data from the dissertation project, the effectiveness of the targeted development of shoulder girdle strength endurance, coordination, and specific action frequency was particularly evident in girls. In boys, a more noticeable effect was observed in indicators of special strength, throwing activity, and striking power. This means that a single methodological model can be used for both groups, but the emphasis of the load must be varied within it.

Discussion. The results obtained are consistent with modern sports theory concepts regarding the necessity of a specific transfer of training effects. The closer the structure of a training task is to a competitive action, the higher the probability that an increase in physical qualities will translate into real competitive effectiveness [4–10]. In this sense, Uzbek martial art has significant methodological potential: it allows for the simultaneous development of strength, speed, coordination, and psychomotor parameters without removing the athlete from the context of their core athletic activity.

A comparison with research data on judo, sambo, and mixed martial arts shows that the most effective programs are those in which speed-strength development is not isolated from the technical structure of an action [8–13]. Punching a bag, throwing a dummy, controlling distance, instantly transitioning from defense to attack, and working under time constraints shape not only a muscular response but also a more precise sensorimotor organization. This is especially important for adolescents, in whom the consolidation of motor patterns is still plastic and sensitive to the quality of the methodological approach.

The psychological component is no less important. The inclusion of visualization, concentration exercises, breathing regulation, and basic forms of autogenic control increases stress resistance, improves decision-making quality under time constraints, and promotes a more rational distribution of effort. For martial arts, where an erroneous decision often has immediate consequences, this component cannot be considered secondary.

The principle of age-appropriate progression is also methodologically significant. Materials on Uzbek martial arts demonstrate that technical content should be introduced from simple to complex: from basic stances, direct strikes, and elementary movements to combinations, throws, counterattacks, and complex integrated structures. For the 15–16 age group, this means a transition from a predominantly instructional model to a model of athletic development, where the technical-tactical repertoire is no longer merely mastered but begins to be individualized. It is at this stage that the rational linkage of "general foundation — specialized load — technical-tactical execution" becomes particularly important.

A limitation of this draft is that the article was prepared without the complete set of primary individual data intended for the final journal version. Therefore, the table block below is a consolidated summary derived from available final matrices, rather than a full statistical table. However, even in this format, it substantiates the main conclusion: a comprehensive methodology based on the structure of Uzbek martial arts has greater potential for improving physical fitness than a traditional, compartmentalized approach to the training process.

To improve the physical fitness of Uzbek martial arts practitioners, it is advisable to build upon an integrated methodology that combines general physical, special physical, technical-tactical, psycho-regulatory, and recovery training. The effectiveness of this model is demonstrated by a more pronounced increase in strength endurance, speed-strength qualities, specific action frequency, coordination, and overall work capacity. The methodology is particularly effective when training tasks are structured according to the logic of specialized striking-and-throwing and situational-reactive actions. For the final submission of the article, it is recommended that the consolidated illustrative summary be replaced with the author's final statistical tables for the full sample or broken down by gender.

Practical Recommendations. During the training microcycle, it is recommended to prioritize the technical-tactical block while maintaining general and special physical conditioning as the supporting foundation. It is rational to follow a load distribution similar to the dis-

Table 1. Summary of improvement rates for indicators in the control and experimental groups

Indicator	Experimental group, %	Control group, %	Comment
Arm strength endurance	33.5–41.6	11.6–13.9	The most pronounced advantage of the experimental methodology
60 m sprint	4.2–4.5	2.3–2.6	Improvement calculated as a reduction in time
Shuttle run 3×10 m	4.2–4.3	2.1–2.4	Positive trend in agility and change of direction
Rope jumping in 60 s	30.2–34.0	19.8–22.4	Reflects coordinative and speed endurance
Punching bag strike frequency	10.6–17.4	0.7–4.2	Advantage in specialized striking activity
Throwing frequency	20.5–35.4	8.4–18.2	One of the most sensitive specialized tests
Rope climbing	11.5–17.0	2.7–10.5	Improvement is calculated as a reduction in time

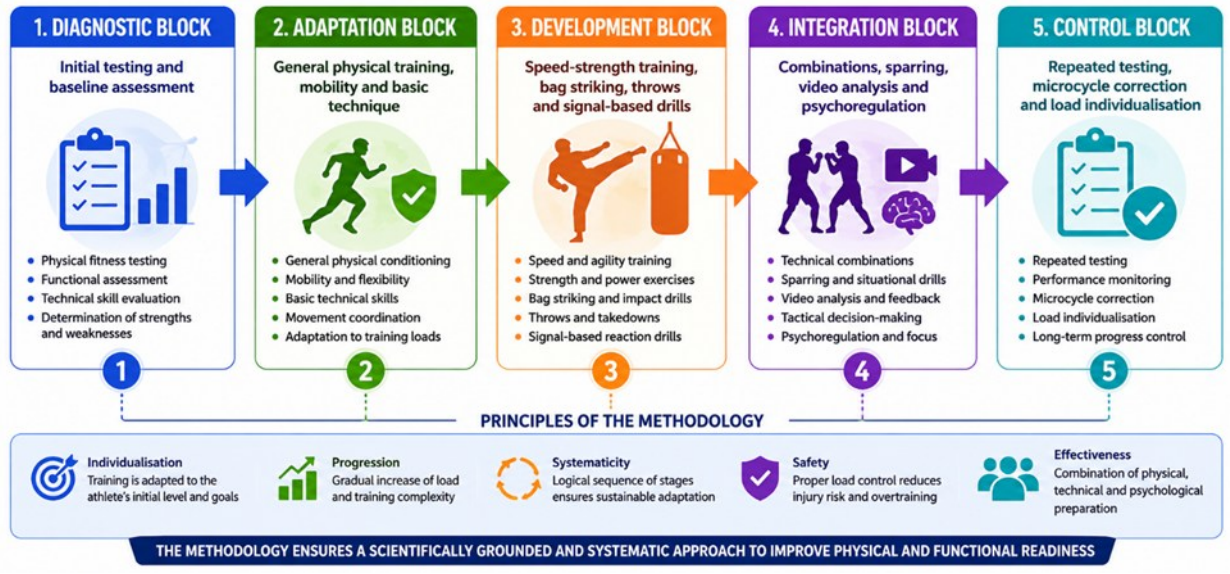
sertation model: about a quarter of the volume dedicated to general physical conditioning, another quarter to special conditioning, approximately two-fifths to technical-tactical work, and the remainder to psychological, theoretical, and recovery support. Control testing should be conducted every 6–8 weeks, using not only general physical fitness tests but also specialized ones, such as hand and foot strike frequency, throwing frequency, rope climbing, reaction drills, and timed sparring assignments. In female groups, it is advisable to provide additional emphasis on coordination and shoulder girdle strength endurance; in male groups, on special strength, throwing activity, and striking power. In both cases, the inclusion of video analysis, breathing regulation, and recovery methods is mandatory.

Figure 1 presents the conceptual framework of the author's methodology for improving the physical and functional preparedness of individuals engaged in Uzbek martial arts. The methodology is based on a sequential and systematic training process consisting of five interconnected blocks, each aimed at solving specific pedagogical and physiological tasks.

Conclusion

The first stage, the Diagnostic Block, fo-

Fig 1. The author's methodology for improving the physical and functional readiness of cadets through the integrated use of combat sports training methods



cuses on the comprehensive assessment of athletes' initial physical and functional condition. At this stage, baseline testing is conducted to determine the level of strength, speed, endurance, agility, coordination abilities, and functional readiness. The obtained data serve as the foundation for planning individualized training loads and monitoring subsequent progress.

The second stage, the Adaptation Block, is designed to prepare athletes for more intensive training loads. Particular attention is paid to the development of general physical fitness, mobility, flexibility, and the acquisition of fundamental technical skills of Uzbek martial arts. This stage facilitates the gradual adaptation of the musculoskeletal, cardiovascular, and neuromuscular systems to regular training activities, thereby reducing the risk of injury and overtraining.

The third stage, the Development Block, represents the core component of the methodology. During this phase, athletes perform specialized speed-strength exercises, striking drills, throwing techniques, and reaction-based tasks. The primary objective is to enhance sport-specific physical qualities that directly influence competitive performance. The use of signal-based exercises contributes to the improvement of reaction time, movement accuracy, and decision-making speed under dynamic conditions.

The fourth stage, the Integration Block, combines technical, tactical, psychological, and physical components into a unified training process. Athletes practice complex combinations, sparring activities, situational exercises, and video-assisted performance analysis. In addition, psychoregulatory techniques are employed to improve emotional stability, concentration, and self-control during training and competition. This stage ensures the transfer of previously developed physical qualities into practical combat situations.

The final stage, the Control Block, is devoted to the evaluation of training effectiveness through repeated testing and performance monitoring. Based on the results obtained, coaches adjust training loads, modify microcycles, and individualize future training programs according to the athlete’s progress and adaptation level. Continuous feedback allows for the optimization of the training process and ensures sustainable long-term development.

Overall, the proposed methodology provides a scientifically grounded and systematic approach to improving the physical and functional readiness of Uzbek martial arts practitioners. The gradual progression from assessment and adaptation to development, integration, and control creates favorable conditions for enhancing athletic performance, reducing injury risk, and achieving long-term training effectiveness.

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AUTHOR BIOGRAPHY:



Pulat Akromovich USMONOV

Employment
Researcher at Uzbekistan state university of physical education and sports

Degree
MD

Research interests
Uzbek martial arts, physical education and sport, Theory of physical education, Analyzing of sport competitions