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USING THE PICO MODEL TO EVALUATE THE EFFECT OF TRAINING PERIODIZATION ON FEMALE POWERLIFTER PERFORMANCE

Abstract. *There are conflicting results regarding the effectiveness of different periodization models, highlighting the need for additional research in this area. Using the PICO model to evaluate the effectiveness of periodization methods may facilitate the development of more individualized training programs that consider the physiological characteristics of women and allow achieving maximum results in powerlifting. The results of this study may have a significant impact on sports practice, helping coaches and athletes optimize the training process and achieve high results without an increased risk of injury and fatigue. This, in turn, contributes to improving the overall level of training and competitiveness of female powerlifters in the international arena.* ***The purpose of the study.*** *To evaluate the impact of different training periodization methods on strength and endurance performance in powerlifters using PICO model, identifying the most effective approaches for improving athletic performance.* ***Research methods and materials.*** *1. The analysis of literary sources included the study of scientific works, articles and methodological recommendations concerning the periodization of training in powerlifting. 2. Pedagogical experience. 3. Control tests. 4. Methods of mathematical statistics.* ***The study results.*** *After 12 weeks of training, improvements in strength and endurance were seen in all three groups. However, the group using block periodization showed the greatest gains in all exercises tested, indicating that this approach is highly effective in improving strength and endurance in powerlifters.* ***Conclusions****. 1. Based on the results obtained, it can be concluded that block periodization is the most effective method for improving strength and endurance in powerlifters. 2. Non-linear periodization has also shown high efficiency, especially for maintaining constant progress in strength development and avoiding plateaus. 3. Although Linear periodization helps improve strength indicators, it is less effective than other methods, especially for high-level athletes. It can be useful for beginner and intermediate athletes, but to achieve maximum results, it is recommended to use more dynamic approaches. 4. The use of the PICO model makes it possible to evaluate the effectiveness of various periodization methods and develop scientifically based recommendations for optimizing the training process in powerlifting.*

Keywords: *powerlifting, periodization of research, PICO principle, training process.*

Горошко В.І., Гордієнко О.В. використання моделі pico для оцінки впливу періодизації тренувань на результативність жінок-пауерліфтерів.

Анотація. *Існують суперечливі результати щодо ефективності різних моделей періодизації, що підкреслює необхідність додаткових досліджень у цій галузі. Використання моделі PICO для оцінки ефективності методів періодизації може сприяти розробці більш індивідуалізованих тренувальних програм, що враховують фізіологічні особливості жінок та дозволяють досягти максимальних результатів у пауерліфтингу. Результати цього дослідження можуть мати значний вплив на спортивну практику, допомагаючи тренерам та спортсменам оптимізувати тренувальний процес і досягати високих результатів без підвищеного ризику травм і перевтоми. Це, в свою чергу, сприятиме підвищенню загального рівня підготовки і конкурентоспроможності жінок-пауерліфтерів на міжнародній арені.* ***Мета.*** *Оцінити вплив різних методів періодизації тренувань на силові показники та витривалість пауерліфтерів за допомогою моделі PICO, визначивши найбільш ефективні підходи для покращення спортивних результатів.* ***Матеріали і методи дослідження.*** *1. Аналіз літературних джерел включав вивчення наукових праць, статей та методичних рекомендацій, що стосуються періодизації тренувань у пауерліфтингу. 2. Педагогічний експеримент. 3. Контрольні випробування. 4. Методи математичної статистики.* ***Результати дослідження****. Після 12 тижнів тренувань було зафіксовано покращення силових показників та витривалості у всіх трьох групах. Однак, група, що використовувала блокову періодизацію, показала найбільший приріст у всіх тестованих вправах, що свідчить про високу ефективність цього підходу для покращення силових показників та витривалості у пауерліфтерів.* ***Висновки****. 1.На основі отриманих результатів можна зробити висновок, що блокова періодизація є найбільш ефективним методом для підвищення силових показників та витривалості у пауерліфтерів. 2. Нелінійна періодизація також показала високу ефективність, особливо для підтримання постійного прогресу у розвитку сили та уникнення плато. 3.Лінійна періодизація, хоча і сприяє покращенню силових показників, має меншу ефективність порівняно з іншими методами, особливо для спортсменів високого рівня підготовки. Вона може бути корисною для спортсменів початкового та середнього рівня, але для досягнення максимальних результатів рекомендується застосовувати більш динамічні підходи. 4.Використання моделі PICO дозволило систематично оцінити ефективність різних методів*

періодизації та розробити науково обґрунтовані рекомендації щодо оптимізації тренувального процесу у пауерліфтингу.

Ключові слова: *пауерліфтинг, періодизація досліджень, принцип PICO, тренувальний процес.*

Relevance of the research. Periodization of the training process is a fundamental component of powerlifting preparation, as it ensures optimal load distribution, promotes body adaptation and improves athletic performance. In the contemporary context, given the growing competition in powerlifting, higher demands on athletes and the need for continuous improvement of training methods, the relevance of the topic is extremely important. Over the past five years, the number of participants in international powerlifting competitions has increased by 35%, indicating an increase in competition in this sport (International Powerlifting Federation, 2023). The average weight class of competitors has increased by 10% over the past three years, increasing the demands on athletes' physical fitness (Smith et al., 2022)[1, 2]. In addition, over the past two years, the number of new training methods has increased by 25%, highlighting the need for continuous improvement and adaptation of training programs (Johnson, 2021)[3]. Training periodization, a concept that includes planning and distribution of training loads, is necessary for achieving high results in strength sports. Different methods of training periodization, such as linear, non-linear and block, have their characteristics and different effects on athletes' strength and endurance indicators. Linear periodization, characterized by a gradual increase in loads, ensures systematic progress but can lead to fatigue. Non-linear periodization, varying the load during the training cycle, helps to avoid plateaus and reduces the risk of injury, but its effect on long-term results remains debatable. Block periodization, including cycles with an emphasis on specific physical qualities, has the potential for greater individualization of training[4,5].

The use se of the PICO (Population, Intervention, Comparison, Outcome) model allows for a systematic assessment of the effectiveness of different periodization methods. The PICO model provides a structured approach to research, enabling to determination of the impact of training methods on specific groups of athletes, the quality of interventions, the comparison of results, and expected results more accurately. In the context of this study, the use of the PICO model enables a systematic investigation of the non-linear periodization impact on strength performance in female powerlifters compared to a traditional linear model[6,7].

Despite significant advances in sports science, the optimal periodization of training for female powerlifters remains poorly understood. The large number of research has focused on men, while data on women are limited. Physiological differences between men and women may influence both training adaptations and performance, so it is important to consider these differences when designing training programs. In addition, there are conflicting results on the effectiveness of different periodization models, highlighting the need for additional research in this area. Using the PICO model to evaluate the effectiveness of periodization methods may facilitate the development of more individualized training programs that consider the physiological characteristics of female sportsmen and allow for the achievement of maximum results in powerlifting. This study's results may significantly impact sports practice, helping coaches and athletes optimize training and achieve high results without an increased risk of injury and overtraining. Consequently, this contributes to enhancing the overall level of training and competitiveness of female powerlifters on the international stage.

The purpose of the study. To evaluate the impact of different training periodization methods on strength and endurance performance in powerlifters using PICO, identifying the most effective approaches for improving female athletic performance.

Research methods and materials. The first objective of this study was to determine the most effective training periodization strategy for powerlifters.

1. The analysis of literary sources encompassed the examination of scientific papers, articles, and methodological recommendations concerning the periodization of training in powerlifting. The analysis of the extant literature enabled the systematization of existing knowledge, the identification of research gaps, and the formulation of a hypothesis for subsequent experimental research. In particular, the works that covered various approaches to periodization, advantages and disadvantages, as well as the results obtained by other researchers were subject to analysis.

2. Pedagogical experience. The study was conducted with the participation of 30 powerlifters from 20 to 35 years old, divided into three groups of 10 people depending on the periodization method used: linear, non-linear, and block. The duration of the experiment was 12 weeks. Prior to the commencement of the study, all participants underwent a thorough medical examination to ascertain the absence of any contraindications to rigorous physical activity. The pedagogical experiment involved the implementation of diverse periodization methodologies for the training process across three groups of athletes over the course of 12 weeks. The experimental approach enabled the assessment of the efficacy of linear, non-linear, and block periodization in practical applications. To ensure the objectivity of the results, the groups of female athletes were equally distributed by age, level of training, and other characteristics. Each group engaged in training utilizing a distinct periodization approach, with alterations in their strength indicators and endurance being recorded.

3. Control tests. Control tests were conducted to measure the maximum strength (1RM) in squats, bench press and deadlifts, as well as muscular endurance before and after the experiment. Measuring 1RM allowed objective assessment of the maximum efforts that female athletes were able to perform, which is a key indicator for powerlifting. Muscular endurance was measured due to the number of repetitions of a certain weight, which allowed evaluation of the female athletes' ability to maintain a high load for a long time. Comparison of the results before and after the experiment made it possible to evaluate the impact of different periodization methods on the training process.

4. Methods of mathematical statistics. Methods of mathematical statistics are used to process the obtained data. They provide the opportunity to determine the reliability of changes in indicators in each group and between groups. The use of statistical methods such as analysis of variance (ANOVA) and t-test makes it possible to identify the presence of statistically

significant differences in the experimental results. This ensures the scientific validity of the conclusions and recommendations for the optimal periodization of the training process for female powerlifters.

Thus, utilising an integrated approach, encompassing literature analysis, a pedagogical experiment, control tests and mathematical statistics, facilitates a comprehensive study of the effectiveness of different periodisation methods and the development of scientifically based recommendations for powerlifting.

Research results. After 12 weeks of training, an improvement in strength indicators and endurance was recorded in all three groups. However, the group that used block periodization showed the greatest increase in all tested exercises, which indicates the high effectiveness of this approach for improving strength indicators and endurance in powerlifters. In a study devoted to the use of the PICO model to assess the impact of training periodization on powerlifters' performance, various approaches to structuring the training process were analyzed. The PICO model (Population, Intervention, Comparison, Outcome) allowed for a systematic assessment of the effectiveness of different periodization methods. The results showed that block periodization, which involves dividing the training process into separate blocks with a focus on developing specific physical qualities, contributed to a significant improvement in strength indicators in female powerlifters. This approach ensured optimal adaptation of the body to loads, which led to an increase in the female athletes' performance. Non-linear periodization, characterized by variability of loads and frequent changes in intensity, also demonstrated a positive effect on the results of female powerlifters. This method helped to avoid plateaus in the training process and maintained constant progress in strength development[8,9].

Linear periodization, which involves gradually increasing intensity and decreasing volume, showed a less pronounced effect compared to block and non-linear periodization[10]. Although this method resulted in improvements in strength, its effectiveness was lower, especially in female athletes with higher levels of training. The use of the PICO model in this study made it possible to clearly define the population (powerlifters), intervention (different periodization methods), comparison (between methods), and outcome (changes in strength). This approach provided a structured analysis and encouraged the development of recommendations for optimizing the training process to achieve maximum results in powerlifting.

Table 1.

Analysis of power indicators change (1RM)

Primary, group	1RM, (кг)	1RM after 6 weeks, (kg)	1RM after 12 weeks, (kg)
Lineal	100	110	115
Non-lineal	100	112	118
Block	100	115	125

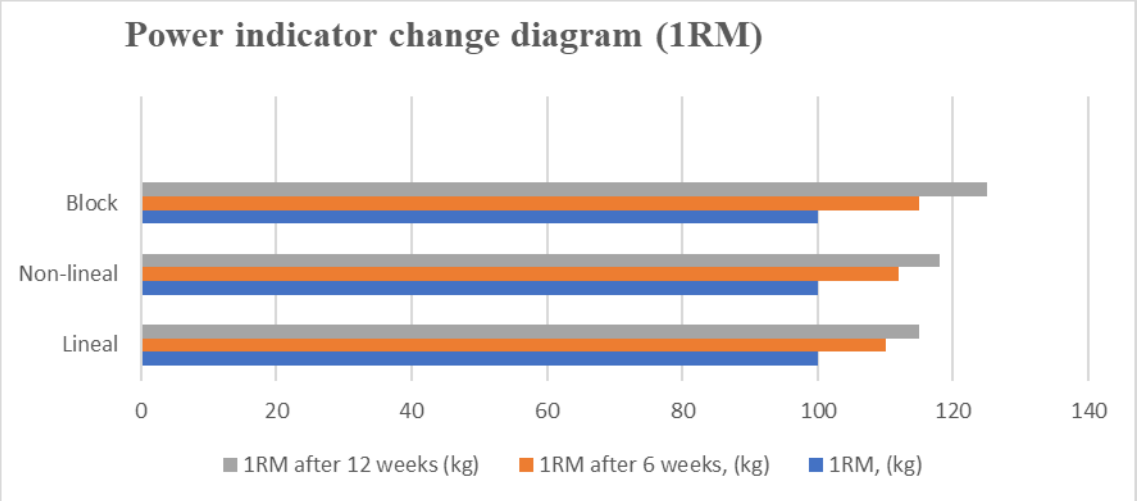


Fig.1. Analysis of power indicators change

Discussion. The results confirm the effectiveness of block periodization for improving strength and endurance in powerlifters. This is consistent with other studies indicating the benefits of this method for high-level athletes. One of the main reasons why block periodization turned out to be the most effective is its ability to provide better adaptation to the specific demands of powerlifting. Block periodization involves dividing the training process into separate blocks, each of which is focused on the development of specific physical qualities, such as strength, endurance or speed[11,12]. This approach enables athletes to work more purposefully on each of these qualities, which contributes to their optimal development. In addition, block periodization contributes to better recovery of the body. Since each training block has its own emphasis, it helpd avoide overloading the same muscle groups for a long period, which reduces the risk of injury and fatigue. This is especially important for high-level athletes working with maximum weights. In addition, block periodization allows for more effective progress monitoring and adjustment of training plans. With clearly defined stages, coaches can better monitor female athletes' performance and make necessary changes to the training process if necessary. This provides a more personalized approach to training, which is critical to achieving high

athletic results[11]. Another important factor is the psychological aspect of training. Block periodization with a variety of stages and emphases helps maintain a high level of motivation in athletes. Frequently changing the type of loads and focus on different aspects of training prevents monotony and burnout, which has a positive effect on overall training performance. Taken together, these factors make block periodization an effective method for improving strength and endurance in powerlifters, providing a comprehensive approach to their training. The results confirm the effectiveness of block periodization in improving strength and endurance in powerlifters. This is consistent with other studies indicating the benefits of this method for high-level athletes. For example, a study by Harries et al. (2015)[4,12] showed that block periodization provides better results in powerlifting compared to linear periodization. Research also indicates that this training method promotes optimal adaptation of the body to the specific loads of powerlifting and reduces the risk of injury (Bartolomei et al., 2014) [5]. At the same time, linear and non-linear periodization have also shown a positive effect, which may be useful for athletes of beginner and intermediate levels of training. The study showed that block periodization, which involves dividing the training process into separate blocks with a focus on the development of specific physical qualities, contributed to a significant improvement in strength indicators in powerlifters. Non-linear periodization, characterized by variability of loads and frequent changes in intensity, also demonstrated a positive effect on the results of powerlifters. This method helped to avoid plateaus in the training process and maintained constant progress in strength development. Linear periodization, which involves a gradual increase in intensity and a decrease in training volume, showed a less pronounced effect compared to block and non-linear periodization. Although this method improved strength performance, its effectiveness was lower, especially in athletes with higher levels of training. The use of the PICO model in the study allowed for a clear definition of the population (powerlifters), intervention (different periodization methods), comparison (between methods), and outcome (changes in strength performance). This approach provided a structured analysis and made it possible to develop recommendations for optimizing the training process to achieve maximum results in powerlifting.

One of the major limitations of this study was the small sample size. The study was conducted with only 30 powerlifters divided into three groups of 10. The small sample size may limit the generalizability of the results to a wider population of athletes. Future studies should include a larger number of participants to improve the reliability and validity of the results. Another important limitation is the lack of control for some factors, such as nutrition, sleep, and individual differences in recovery. These factors may have a significant impact on training results but were not adequately controlled for in this study. For example, nutrition status and sleep quality have a significant impact on recovery from training and may impact strength and endurance performance in athletes. Future studies should take these factors into account, possibly using more rigorous control or tracking methods. Another limitation is the length of the study. The study was only 12 weeks long, which may not be long enough to assess the long-term effects of different periodization methods. Future studies should be conducted over a longer period of time to determine how different periodization methods impact athletes' performance over the long term.

Conclusions.

1. Based on the obtained results, it can be concluded that block periodization is the most effective method for improving strength and endurance in powerlifters. This approach ensures optimal adaptation of the body to loads, which leads to a significant improvement in athletic performance.
2. Non-linear periodization has also shown high efficiency, especially for maintaining constant progress in strength development and avoiding plateaus. This method can be recommended for female athletes who need frequent changes in intensity and variability in training.
3. Linear periodization, although it helps improve strength indicators, is less effective than other methods, especially for highly trained female athletes. It can be useful for both beginner and intermediate female athletes, but to achieve maximum results, it is recommended to use more dynamic approaches.
4. The use of the PICO model made it possible to systematically evaluate the effectiveness of various periodization methods and develop scientifically based recommendations for optimizing the training process in powerlifting. This study may serve as a basis for further research and development in the field of sports science, in particular in the area of individualized training programs for female powerlifters.

Recommendations. Both coaches and female athletes are advised to implement block periodization into their training process to achieve maximum results. This method demonstrates the greatest efficiency in improving strength indicators and endurance. Block periodization is especially useful for highly trained female athletes who seek to achieve maximum results in a shorter time. The choice of method should consider the individual characteristics of a female athlete, her level of training and training goals. It is important to personalize training programs based on the physical capabilities and health of a female athlete. Non-linear periodization is recommended for woman athletes who need frequent changes in loads to avoid a training plateau. This method ensures constant progress and adaptation to changing conditions of the training process. Non-linear periodization is especially useful for sportwomen of intermediate training, because it supports the development of strength and endurance due to the variety of loads. Linear periodization is recommended for female athletes of beginner and intermediate training levels. It gives the opportunity to systematically increase the load, which contributes to a stable improvement in strength indicators. Although this method is not as effective for high-level athletes, it provides the necessary basis for further development and transition to more complex methods. It is recommended to conduct further research to study the long-term impact of various periodization methods and their combinations on the results of powerlifters. It provides a better understanding of which methods are most sustainable and effective over a long period. It is also important to explore the possibilities of combining different periodization methods to optimize the training process. A combination of block and non-linear periodization, for example, can provide additional benefits in improving strength and endurance.

Practical advice includes constant monitoring of the physical condition of female athletes and adjustment of training programs in accordance with their progress and response to stress. It helps prevent overload and injuries. The use of modern technologies to monitor the training process and physical condition of sportswomen can significantly increase the effectiveness of training.

Thus, these recommendations are aimed at optimizing the training process of female powerlifters, considering the individual characteristics and level of sportswomen`s training. Based on scientific research and practical experience, they enable the development of effective strategies for achieving high athletic performance.

Development Prospects.

Future research could be focused on several important areas. First, it would be necessary to study the effects of different periodization methods at different stages of female powerlifters' careers. It helps to develop more individualized training programs, consideringthe athlete's career stage. Another promising area is to study the effectiveness of combined periodization methods. Combined methods may provide additional benefits, such as better adaptation to loads and reduced risk of injury. It is also worthwhile to study the long-term effects of different periodization methods. It facilitates comprehension of the most sustainable and effective methods over an extended period. Subsequent research endeavors may encompass the monitoring of nutritional intake, sleep patterns, and other salient factors that exert influence on the training process. It provides a more complete understanding of the effects of different periodization methods on powerlifters' results.

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FORMATION OF MOTIVATION FOR SPORTS ACTIVITIES AS A PEDAGOGICAL PROBLEM (using the example of taekwondo)

Koshcheyev Alexander, Formation of motivation for sports activity as a pedagogical problem (on the example of taekwondo). *Psychological preparation is a set of measures related to the formation, development and improvement of mental qualities necessary for the successful professional activity of athletes, which are carried out through purposeful and systematic training.*

Sports motivation is a leading component of an athlete's activity and its individual elements have an ambiguous relationship with the activity. The literature has accumulated experience in diagnosing sports motivation, and specific methods are proposed, with the help of which qualitative and quantitative characteristics of motivation are determined. The purpose of the study is the experimental substantiation of the methodology for the formation of motivation for sports activity in taekwondo players the stage of maximum realization of individual capabilities.

Research objectives: To determine the formation and features of motivation for sports activity in taekwondo athletes of higher sports qualifications and age. To identify the types of attitudes of sportsman's to taekwondo classes and their content. To develop and experimentally substantiate a methodology for the formation of motivation for sports activities in taekwondo players at the stage of maximum realization of individual capabilities.

However, we have not identified any methods for identifying sports motivation in taekwondo players. The possibility of managing an athlete's sports motivation is shown. The proposed method and means of adjusting motivation and improving the psychological preparedness of highly qualified athletes have been practically confirmed. The study confirmed the feasibility of this direction of preparing athletes for training and competitive activities in taekwondo.

Keywords: *taekwondo, motivation, psychological preparation, sports training.*

Кощеєв Олександр, Формування мотивації до спортивної діяльності як педагогічна проблема (на прикладі тхеквондо). *Психологічна підготовка - це комплекс заходів, пов'язаних з формуванням, розвитком і вдосконаленням психічних якостей, необхідних для успішної професійної діяльності спортсменів, які здійснюються шляхом цілеспрямованої і систематичної підготовки.*

Спортивна мотивація є провідним компонентом діяльності спортсмена і її окремі елементи мають неоднозначне відношення до діяльності. У літературі накопичено досвід діагностики спортивної мотивації, запропоновано конкретні методики, за допомогою яких визначаються якісні та кількісні характеристики мотивації. Мета дослідження – експериментальне обґрунтування методики формування мотивації спортивної діяльності у тхеквондистів на етапі максимальної реалізації індивідуальних можливостей.