INPLASY

The effect of Block Periodization versus Traditional Periodization on Endurance Performance: A Systematic Review and Meta-Analysis

Corresponding author:
xiaoxin li

lixiaoxin@whut.edu.cn

Author Affiliation:
Wuhan University of Technology.

Li, XX ; Hu, HX ; Jin, CP.

ADMINISTRATIVE INFORMATION

INTRODUCTION

*R*eview question / Objective The aim was to conduct a systematic review and comparison of the effects of block periodization versus traditional periodization methods on endurance performance.

Rationale In the periodization models of endurance training, both traditional periodization and block periodization methods are research focuses. They are applied to training based on different adaptive characteristics, application scenarios, and arrangements of training loads and contents.

In recent years, an increasing number of studies have compared the effects of the two methods in endurance training, but the current research findings are inconclusive. Some studies have suggested that segmented periodization methods have a more pronounced effect on endurance performance. For instance, Pallarés et al.[1] found that a 12-week segmented periodization resulted in similar improvements in endurance performance compared to a 22-week traditional periodization；Breil et al. [2]also found that short-term, high-intensity aerobic interval training using segmented periodization significantly improved maximal oxygen uptake and athletic performance；Issurin et al. [3] emphasized from the perspective of biological mechanisms that periodization methods can significantly enhance the growth of mitochondria and protein synthesis in slow-twitch muscle fibers. Other studies have indicated that traditional periodized training may be more effective at enhancing endurance performance. For instance, a meta-analysis found that traditional endurance training can significantly increase maximal oxygen uptake (VO2 max) in healthy young and middle-aged adults [4]. Chinese elite swimmers Qi Hui and Luo Xuejuan employed traditional periodized endurance training and achieved excellent results in major competitions throughout the year. The renowned British middle-distance runner Sebastian Coe utilized an annual single-cycle model based on traditional

periodization theory, earning 4 Olympic medals, breaking 8 world records, and becoming the former world record holder in the 800 meters [5]. In addition, some studies suggest that there is no significant difference in the effects of endurance training between the two methods. For example, Almquist et al. [6] conducted a 12-week intervention study with cyclists and found no significant difference in performance between athletes using block periodization and traditional periodization after training. Solli et al. [7] also indicated that both block periodization and traditional periodization can contribute to successful endurance training for world-class cross-country skiers.

In summary, the effectiveness of periodized training methods under the guidance of block periodization and traditional periodization theories for endurance training remains a topic of intense debate in the field of sports training. The uncertainty of the conclusions greatly interferes with their application and promotion in training practice.Although some meta-analysis results support block periodization as a viable alternative to traditional periodization and superior in certain training outcomes, relevant studies have not comprehensively examined influencing factors and specific endurance metrics, resulting in limitations in the findings [8]. In fact, as sports training is an extremely complex system, it increasingly.

Condition being studied Healthy athletes.

METHODS

Search strategy Through databases such as CNKI, EBSCO, Web of Science, ScienceDirect, SpringerLink, and Superstar Library, using Chinese keywords ('板块分期' or '传统分期' or '分期' or '经典分期' or '线性分期') and ('耐力' or '耐力表现'); Take (periodization OR periodized OR periodisation OR periodised OR block OR blocking OR linear periodization OR nonlinear periodization OR classic periodization*)AND TS=(training OR exercise OR performance) AND TS=(endurance)AND TS=(athlete OR player*) English keywords were searched for literature published up to September 2023 on plate staging and traditional staging on endurance training for athletes. According to the PICOST principle, literature inclusion criteria were established, and quality assessment was conducted using the Cochrane Risk of Bias Assessment Tool. A total of 9855 references were retrieved, among which 8 were deemed eligible for inclusion. From each eligible literature, data such as author(s), publication year, intervention, training level, participant characteristics, training period, training modality,

experimental design, assessment methods, and outcome measures were extracted. The collected data will be inputted into RevMan 5.4 software for conducting a meta-analysis.

Participant or population Trained athletes or elite athletes.

Intervention It must be a double-arm randomized controlled trial, using block periodization and traditional periodization as interventions.

Comparator Block periodization and traditional periodization.

Study designs to be included RCT, block periodization and traditional periodization.

Eligibility criteria Inclusion criteria were established based on the PICOST principle [10]. Inclusion Criteria:①The study must involve interventions related to endurance training.②The study must employ a double-group or triple-group randomized controlled trial design.③The study must assess at least one key endurance indicator before and after the intervention. Exclusion Criteria:①Traditional periodization is not used as a control group.②Block periodization is not used as a control group.

Information sources Randomized controlled trials on the impact of block periodization and traditional periodization on endurance qualities were searched through databases such as CNKI, EBSCO, Web of Science, ScienceDirect, SpringerLink, and Superstar Digital Library. Relevant literature from the establishment of the databases to September 2023 was collected.

Main outcome(s) A total of 9,855 articles were initially retrieved, with 2,847 duplicates removed. After excluding reviews and unrelated articles (6,948 articles), and applying the PICOST criteria, 15 non-randomized controlled trial articles, 20 intervention studies on strength training, and 13 articles where traditional periodization was not used as a control group were excluded based on title and abstract review. This left 10 potentially relevant articles, of which 8 were finally included after quality assessment.

Data management Zotero.

Quality assessment / Risk of bias analysis This study follows the requirements of "The PRISMA 2020 statement: an updated guideline for reporting systematic reviews"to organize and statistically

analyze the included literature. Using the Cochrane Risk of Bias assessment tool to evaluate the quality of included studies, methodological assessment of included literature was conducted using Review Manager 5.4.1 software. Assessment criteria included randomization, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, completeness of outcome data, selective reporting, and other biases. Assessment options were categorized as low risk, unclear risk, or high risk. Studies scoring 4 or above were considered of higher quality. Quality assessment was independently conducted by two researchers, with consultation of experts in cases of uncertainty.

Strategy of data synthesis Using RevMan 5.4 software for data synthesis, forest plot generation, heterogeneity analysis, and subgroup analysis.

Subgroup analysis This study conducted subgroup analysis on factors such as age, athletic level, training period, and training methods, as these may influence the differences in the effects of block periodization and traditional periodization on athletes' maximum oxygen uptake and maximum aerobic power output indicators.

Sensitivity analysis There were fewer than 10 studies included, hence a sensitivity analysis was not conducted.

Country(ies) involved China.

Keywords Block periodization; Traditional periodization; Endurance performance; Athletic performance.

Contributions of each author
Author 1 - Xiaoxin Li proposed the research topic, performed the statistical data analysis, and wrote the manuscript. Xiaoxin Li drafted the manuscript with the assistance of Haixu Hu and Chengping Jin.
Email: lixiaoxin@whut.edu.cn
Author 2 - Haixu Hu handled the data processing, structured the logical flow of the manuscript, reviewed, guided the revisions of the paper.
Email: hhx100000@163.com
Author 3 - Chengping Jin extracted and processed the data, and revised the paper's translation into English.
Email: 12842@whut.edu.cn