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Individualization in Strength and Conditioning Training at Physical and Psychosocial Levels in Professional Sports: A Scoping Review

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ADMINISTRATIVE INFORMATION

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INTRODUCTION

Review question / Objective (1) to identify literature on the individualized training practices of strength and conditioning coaches in professional sports across various sports disciplines, (2) to present the available evidence, and (3) to highlight potential knowledge gaps in order to provide methodological guidelines for future research in this area. This study aims to identify the existing literature on the individualization of training by strength and conditioning coaches in professional sports across various sports.

Background The Strength and Conditioning Coach (SCC) is an integral part of a multidisciplinary team, aiming to enhance athletes' physical and athletic capabilities while minimizing injury risks. SCCs are expected to possess both general and specific knowledge of training methodologies relevant to various sports, both individual and team-based. Despite extensive research on SCC practices across different professional sports, literature on individualized strategies remains scarce. Recently, SCCs have gained prominence in optimizing athlete and team development, leading to improved performance levels and reduced injury rates.

The recent surge in the intensity of high-performance sports has correlated with an increase in the number of injuries. Factors like the pressure for better results and fast-paced competitions have prompted athletes to seek individual coaches for personalized training complementing team practices. This scenario underscores the necessity for tailored strategies in load management, recovery, and continuous monitoring of athletes' physical conditions to

mitigate injury risks. Understanding the specific needs related to each sport and athlete position is essential for structuring programs that effectively develop strength, power, agility, speed, and overall conditioning.

Scientific evidence suggests approaches that assist athletes in achieving and maintaining peak performance. Even a few weeks of detraining can lead to performance deterioration, particularly in elite athletes. Individual responses to training stimuli can vary widely based on several characteristics—including biological age, gender, size, injury history, and others—which highlights the importance of personalized training interventions.

Programming and periodization of training play a critical role in collective sports contexts, where a one-size-fits-all approach can overlook individual athlete needs. Strategies that can be replicated across multiple athletes may lack the necessary individualization, as they often assume uniform athlete requirements. Current training practices necessitate personalization to ensure that each athlete's training respects their unique capacities, potential, and training history. All aspects of strength training—including workload quantity, intensity, and type—must be adjusted according to individual experience and ability.

Supervised training programs tend to be more effective when tailored to an athlete's specific requirements. Professional oversight positively influences the training intensities that individuals select independently in unsupervised settings. However, addressing the varying needs of each athlete can be challenging, especially in multifaceted training contexts such as team sports. Training adaptations are specific to the nature of exercise stimuli, emphasizing the importance of an athlete's ability to endure and respond positively to the demands of their sport. Consequently, not all components of a strength and conditioning program should be emphasized simultaneously; prioritization is key to maximizing performance, reducing injury risks, minimizing overtraining, and enhancing recovery.

For elite athletes, the interplay between strength, power, speed, and endurance is influenced by both sport-related requirements and individual specifications. Moreover, two athletes demonstrating equivalent performance may not share identical work capacities, as their effectiveness can significantly differ due to various biological and psychological factors. The individual capacity for work is critical in determining the total workload volume, training intensity, and the type of strength training conducted by an athlete. Additionally, this capacity is influenced by the athlete's training experience, necessitating a nuanced approach to designing strength and conditioning regimens that accommodate these individual differences.

Rationale The rationale of this article is to examine the importance of individualizing strength and conditioning training for professional athletes. With the increasing intensity of competitions and a rise in athlete injuries, personalized training programs are necessary to address the unique needs of each athlete. Different factors, such as training experience, injury history, and specific roles, influence how athletes respond to training stimuli, making individualization crucial for maximizing performance and minimizing risks. The review aims to gather existing literature on personalized training practices across various sports to highlight the importance and identify gaps in knowledge for future research.

METHODS

Strategy of data synthesis Each article was independently read by two authors for the extraction of the following characteristics: (1) name of the first author and year of publication; (2) country or geographic area in which the article was developed; (3) sports modality under investigation; (4) title; (5) summary of the information related to the individualization of training. The results of the extraction process were critically evaluated by the research team and discussed until consensus was reached.

Eligibility criteria The criteria established for the inclusion and exclusion of scientific articles aimed to create a strategy for the collection and selection of information related to the context of individualized training with athletes from various sports in a professional setting. In this regard, the inclusion criteria were as follows: (1) articles with full text from scientific databases that contained information about individualized training with professional athletes; (2) articles published between 1985 and February 13, 2024, as evidence in the training field began to gain greater relevance from the 1980s (reference here); and (3) original documents written in English to ensure greater universality in the study. On the other hand, articles and documents were not included if: (1) they did not address the issue of the individualization of physical conditioning training with professional athletes; (2) they corresponded to books, chapters, and conference papers in the databases.

Regarding the population, concept, and context: (1) the involved population was related to Strength and Conditioning Coaches and Physical Trainers; (2) with individualization and personalization in physical conditioning training interventions; and (3) with adult professional athletes, excluding the context involving young athletes.

Source of evidence screening and selection After searching the selected databases, the results were imported into the reference management software (Endnote 20.4, 2020, Clarivate Analytics, Philadelphia, PA, USA). Duplicate articles were removed using an automatic tool for this purpose, followed by reading the titles, a triangulation process, and manual screening. Next, the articles were included for analysis by the first author based on the title and the abstract. Subsequently, the authors independently examined the full text of each article to verify whether it met the eligibility criteria and, where applicable, to assess its relevance. After this stage, the articles were selected for analysis in this review.

Data management The initial search yielded 6,246 results from the selected databases. Automatically, 400 duplicates were excluded; 1,023 were deemed ineligible for lacking an author or being books, book chapters, generic documents, or conference papers; and manually, 4,726 were excluded for not fitting the defined criteria regarding population, context, and concept. After analyzing the abstracts or full texts of the 98 articles, 86 were not integrated under the theme of "individualized training." This left 12 eligible and relevant articles for inclusion in the present study.

Language restriction Studies written in English Studies were included.

Country(ies) involved Portugal.

Keywords Individualized Training, Athletes, Physical Conditioning, Performance, Psychosocial.

Contributions of each author

Author 1 - Pedro Gonçalves - Author 1 drafted the manuscript and has participated in all phases of the project.
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Author 2 - Pedro Teques - Author 2 drafted the manuscript, participated in the search and selection and general revision.
Author 3 - Daniel Duarte - Author 3 drafted the manuscript and its general writting and revision.4d